



FINAL REPORT

Impact Assessment of MLA Expenditure 2010-11 to 2014-15

Economic quantification of benefits

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**THE CENTRE FOR INTERNATIONAL ECONOMICS, AGSTRAT ASSOCIATES PTY LTD
AND ISJ INVESTMENTS PTY LTD**

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1 Executive summary

Top line result —Meat & Livestock Australia (MLA) expenditure from 2010-11 to 2014-15 on research & development (R&D) and marketing programs provide industry returns of \$6 170 million from expenditure of \$997 million with a benefit cost ratio (BCR) of 6.2:1

Impact summary

MLA expenditure from 2010-11 to 2014-15 on R&D and marketing programs provide industry returns of \$6 170 million from expenditure of \$997 million with a BCR of 6.2:1.

By program area:

- 1. Market access provided NPV benefits of \$2 165 million and BCR of 14.8:1
- 2. Growing demand provided NPV benefits of \$2 155 million and BCR of 5.2:1
- 3. Productivity provided NPV benefits of \$1 385 million and BCR of 4.5:1
- 4. Integrity/sustainability provided NPV benefits of \$464 million and BCR of 3.8:1.

By time period:

- 2010-11 to 2014-15 provide NPV benefits of \$2 528 million
- the period after 1 July 2015 provide NPV benefits of \$3 641 million.

By industry sector:

- Grass fed cattle – NPV benefits of \$4 028 million and BCR of 8.8:1
- Grain fed cattle - NPV benefits of \$279 million and BCR of 4.1:1
- Sheep – NPV benefits of \$1 217 million and BCR of 4.3:1
- Goats – NPV benefits of \$41 million and BCR of 6.7:1
- Processing – NPV benefits of \$505 million and BCR of 3.0:1
- Live export – NPV benefits of \$100 million and BCR of 7.8:1.

By animal:¹

- Beef chain:
 - NPV benefits of \$39.50/head over 2010-11 to 2014-15
 - NPV benefits of an additional \$3.80 per head each year from 2015-16 to 2030 (\$56.50/head over the 15 years)
 - In farm gate prices equivalent to 8 cents in the \$ for cattle prices received over the 2010-11 to 2014-15 period plus an additional 11 cents in the \$ to be captured over the next 15 years

¹ Calculated by dividing the present value of net income by the total number of livestock exits from the Australian system (slaughter plus live exports) over the period 2010-11 to 2014-15.

- Sheep chain:
 - NPV benefits of \$3.80/head over 2010-11 to 2014-15
 - NPV benefits of an additional \$0.40 per head each year from 2015-16 to 2030 (\$5.70/head over the 15 years)
 - In farm gate prices equivalent to 6 cents in the \$ for sheep prices received over the 2010-11 to 2014-15 period plus an additional 6 cents in the \$ to be captured over the next 15 years
- Goat chain:
 - NPV benefits of \$0.60/head over 2010-11 to 2014-15
 - NPV benefits of an additional \$0.10 per head each year from 2015-16 to 2030 (\$2/head over the 15 years)
 - In farm gate prices equivalent to 4 cents in the \$ for goat prices received over the 2010-11 to 2014-15 period plus an additional 8 cents in the \$ to be captured over the next 15 years

By the community:

- In addition to industry benefits, domestic Australian consumer benefits (consumer surplus) were also generated by MLA R&D programs. Consumer benefits would also be generated in export markets but these have not been quantified.
 - Domestic consumer surplus NPV at retail prices was \$1 320 million
 - Domestic consumer surplus NPV at wholesale / export prices was \$616 million.

Standout programs

The significant industry benefits contributed by four programs in particular are highlighted. These programs combined generated 46 per cent of total industry returns from 20 per cent of MLA expenditure:

Market access - NPV benefits: \$999 million and BCR:24.0:1.

- There was an unparalleled level of activity and success in the Market Access Program in the period 2010-11 to 2014-15, with FTAs completed with three of Australia's four largest export meat markets. The returns attributed to MLA in this area reflect both the levels of trade liberalisation opportunities that became available during this period and MLA's success in ensuring these opportunities were realised to the maximum extent possible by the meat industry.

Live exports - NPV benefits: \$705 million and BCR:14.5:1.

- The Live Export Program (LEP) added considerable value to the industry in a number of key areas over a challenging period. In animal welfare, the Exporter Supply Chain Assurance System (ESCAS) requirements were met, speeding up reopening of trade and avoiding trade closure in other cases. R&D is likely to contribute to a reduction of on-board sheep mortalities by 40 per cent and has contributed to a reduction in ESCAS compliance costs. Market access activities also added considerable value to the live export sector.

Eating quality - NPV benefits: \$679 million and BCR: 12.5:1.

- The review period saw the MSA program grow to become a very significant component of Australian beef and sheepmeat supplies. In 2014-15, almost 42,000 sheep and cattle producers were MSA registered, as were 54 processors, supplying over 130 MSA licensed brands to the marketplace, all using MSA as an independent eating quality endorsement. MSA cattle grading numbers increased from 17 per cent of adult slaughter in 2009-10 to 35 per cent in 2014-15 (1.3 million to 3.22 million head). Cattle price premiums increased from \$0.15 per kilogram HSCW in 2009-10 to \$0.33 per kilogram HSCW for young grass fed (YG) classified cattle and \$0.10 per kilogram for grain fed cattle. The number of eligible lambs presented for grading grew strongly from 883,133 in 10-11 to 6,768,449 in 2014-15.

Product integrity – NPV benefits: \$462 million and BCR: 8.3:1.

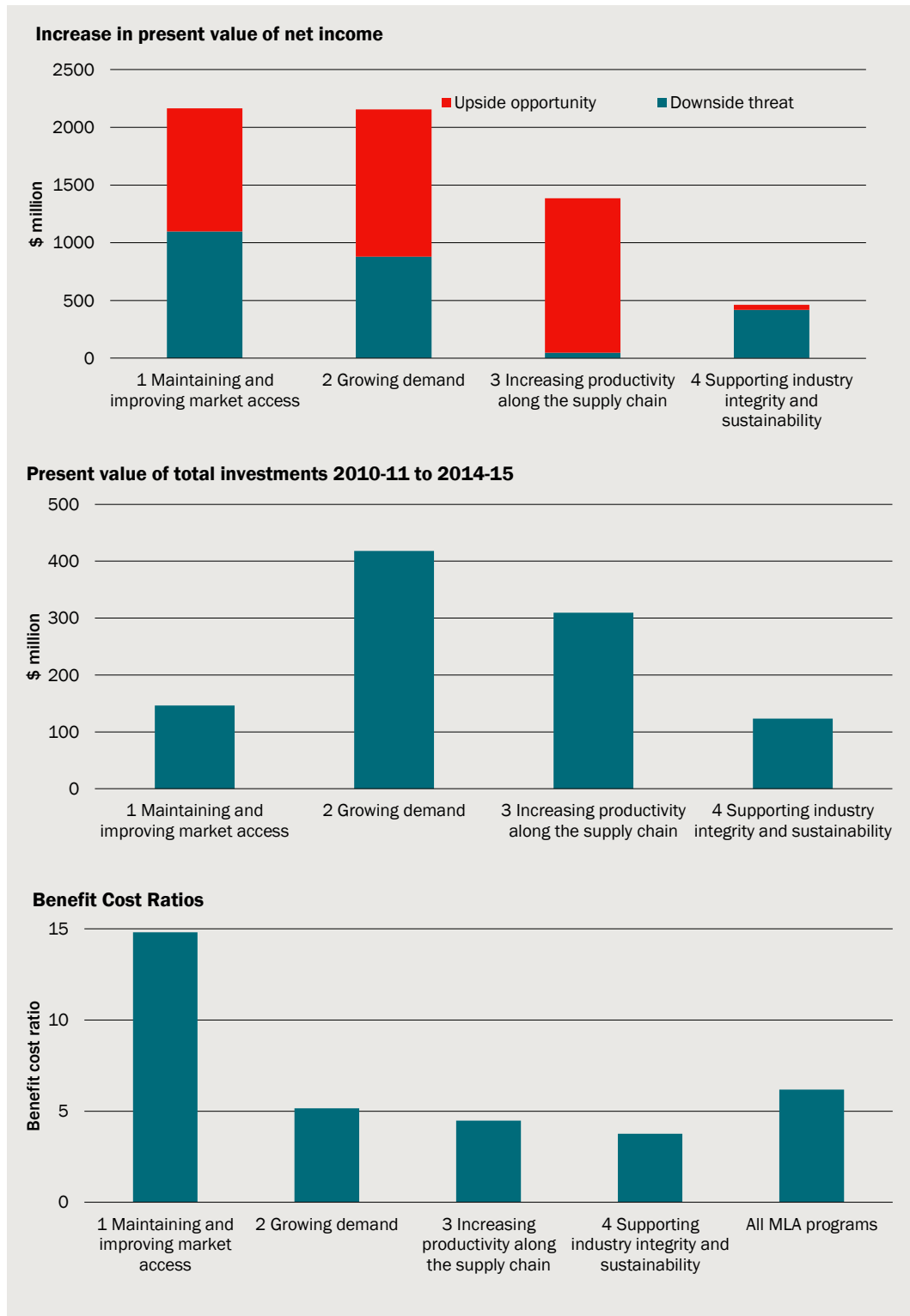
- This program provides some of the bed rock on which the Australian industry rests – assisting to safeguard the industry against the impact of the possible incursion of exotic diseases and contributing to the image of all Australian meat as ‘clean and green’. Both of these areas have been assessed as providing significant benefits to the Australian industry — the disease control aspects mitigating against downside risks and Australia’s leadership in product integrity systems allowing price premiums to be realised in global markets.

1.1 MLA Impact —benefits in terms of red meat net income: All MLA programs^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
1 Maintaining and improving market access	1 098	1 067	2 165	14.8
2 Growing demand	879	1 276	2 155	5.2
3 Increasing productivity along the supply chain	47	1 338	1 385	4.5
4 Supporting industry integrity & sustainability	419	44	464	3.8
Total - ALL MLA programs	2 444	3 725	6 170	6.2
– % of impact benefits	40	60	100.	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

1.2 Summary of MLA benefits, investments and returns— all program areas^a



^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

Impact by program

1.3 Summary – investment, benefits and return by program^a

Program	Expenditure NPV 2010-11 to 2014-15	Impact			Benefit cost ratio
		NPV Meat Industry Net Income 2010-11 to 2014-15	After July 2015	Total	
	\$m	\$m	\$m	\$m	
1.1 Product integrity	56	127	335	462	8.3
1.2 Market access	42	47	952	999	24.0
1.3 Livestock exports	49	381	324	705	14.5
Total – 1. Market access	146	555	1 611	2 165	14.8
2.1 Eating quality	54	327	351	679	12.5
2.2 Nutrition		(included in 2.4 & 2.5)			
2.3 New products	21	24	9	33	1.6
2.4 Domestic beef marketing	96	95	12	108	1.1
2.5 Domestic lamb marketing	65	222	43	265	4.1
2.6 Export beef marketing	137	602	319	921	6.7
2.7 Export sheepmeat marketing	44	125	25	150	3.4
Total – 2. Growing demand	418	1 395	760	2 155	5.2
3.1 On-farm productivity	130	19	330	349	2.7
3.2 Off-farm productivity	69	114	209	323	4.7
3.3 Market information	40	300	15	315	7.9
3.4 Animal health	43	11	184	195	4.6
3.5 Producer engagement		(included in 3.1, 3.4, 4.1 & 4.3)			
(3.6) Lot feeding (on-farm)	25	81	114	195	7.6
(3.7) Goat industry (on farm)	3	5	3	8	2.6
Total – 3. Increasing productivity	310	529	856	1 385	4.5
4.1 On-farm environment	67	-8	308	300	4.5
4.2 Off-farm environment	16	4	36	40	2.5
4.3 Animal welfare	16	53	71	124	7.7
4.4 Community engagement		(included in 4.1 & 4.3)			
4.5 Innovation capability	24	(impact not assessed)			
Total – 4. Integrity & sustainability	123	49	415	464	3.8
Grand total	997	2 528	3 641	6 170	6.2
MLA Donor Company (MDC) ^b	128	na	na	517	4.0

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b MDC benefits and expenditure included in relevant programs above and MLA total.

Key outcomes that delivered program impacts

#1 Market Access Programs

1.1 Product Integrity

- Integrity systems maintain the reputation of Australian red meat overseas, contributing to price premiums and reducing the cost of disease in the event of an exotic disease outbreak.
 - Currently, Australian exporters received average premiums of around 40% in key developing markets, compared to product from India and Brazil. In 2014-15, the contribution of MLA's integrity programs to this price premium from investments made in the period 2010-11 to 2014-15 was conservatively assumed to be just 0.11%. This loss of premium was assumed to apply to all markets outside of Japan, Korea and the United States.
 - Without MLA's investment in traceability systems, the expected annual cost of a major disease outbreak would be higher. This investment increases livestock traceability - from 65% (under a mob based system) to 97% (for NLIS cattle). The reduction in the expected annual costs of emergency disease outbreak, such as FMD and BSE, was estimated to be \$29.2 million in 2014-15 terms every year out to 2030.
- The impacts indicate that 77% of benefits accrue to livestock traceability systems/Australia's disease-free status, with the remainder (23%) to the impact of Australia's integrity systems for our clean-green image.
- The higher proportion of benefits attributed to livestock traceability systems/Australia's disease-free status is due to the significance of exports to the key developed markets (Japan, Korea and the United States) that comprise the majority of Australia's exports by value and volume. In these markets, there is limited head-on competition with low-cost suppliers, but if Australia was to experience an adverse disease event, the impacts would be significant.
- For developing markets, the contribution of Australia's integrity systems to supporting price premiums of 40 per cent is uncertain. These premiums have been discounted heavily for this analysis - the analysis, by being conservative, may underestimate the benefits.

1.2 Market Access

- The benefits arising from trade access changes over the Evaluation Period are unprecedented (certainly since the conclusion of WTO Uruguay Round negotiations). The majority of the benefits accrue to beef/cattle - most of the reductions in market access barriers negotiated in the recent FTAs relate to beef.
- FTAs
 - Japan beef – average tariff falls from 38.5% to 22.5% by 2030 while safeguard volumes increase from 300 to 370 kt product weight with a penalty tariff of 38% (including transition to TPP arrangements).
 - Korea beef – average tariff falls from 40% to 0% by 2028 while safeguard volumes increased from 155 to 204 kt product weight with a penalty tariff of 24%.
 - China beef – average tariffs falls from 13% to 0% by 2023 while safeguard levels increase from 170 to 249 kt at a penalty tariff of 12%.
 - China sheep and goat meat – average tariffs falls from 15% to 0% by 2022.
- Trans Pacific Partnership
 - Japan beef – all tariffs to 9% by 2030 and elimination of safeguards.
 - Canada beef – phase-out of over-quota tariffs by 2020.
 - Mexico beef – phase-out of current tariffs of 25% by 2020.
 - Peru beef and sheepmeat – average tariff falls from 13% to 6 % by 2027
- In terms of the relative contribution to the total results for beef (after attribution to MLA) results are as follows:
 - Japan FTA (26%), Korea FTA (30%), China FTA (14%), ASEAN (2%), TPP (29%).
- Comparatively, the improvements for sheepmeat are modest. Results for sheepmeat are also impacted indirectly by the higher levels of the beef trade and changes in relative prices (which encourages some production shift).
 - Over 75% of the first-round benefits for sheepmeat are the result of the China FTA.
- Around 90% of the benefits are captured by the on-farm sectors.

1.3 Live Export Portfolio

- Over 90% of the impact from the Live Exports Program (LEP - funded jointly by MLA and LiveCorp) was the result of

#1 Market Access Programs

assisting industry with ESCAS compliance. Without this contribution, in the assessment of workshop participants, trade to some key markets may have significantly fallen or ceased altogether.

- The largest impact related to assisting the Indonesian live cattle trade with ESCAS compliance - this accounts for 60% of the total estimated benefits for this program. Without the LEP, it was agreed that the Indonesian live cattle trade would have responded to the new ESCAS regulations much more slowly, returning to only 30 per cent of its previous level by the end of the first 6 months (about 60 000 cattle) and only 80 per cent of its previous level by the end of 18 months. The trade was assumed to have resumed normal levels by 2019.
- The assistance provided by the LEP to ESCAS compliance in other markets was also important, accounting for 29% of program benefits - comprising of cattle to Vietnam (7.6% of total benefits), sheep to the Middle East sheep (11.7%) and goats to Malaysia (9.8%).
- The contribution of R&D to reductions in on-board sheep mortalities is the smallest benefit (1.1% of total benefits) because of current low mortality levels.
- General improvements in market access and lower regulatory costs accounted for 8.5% of benefits.

#2 Growing Demand Programs

2.1 Eating Quality

- Without continued MLA investment in eating quality over the evaluation period, grading numbers and premiums paid would have been lower. By 2014-15:
 - Rather than increasing, in the assessment of workshop participants, the number of cattle graded would have fallen, to 546,000 head (compared to 3.2 million actually graded in 2014-15) with average premiums paid being 20.8 c/kg cwe lower than observed.
 - Lambs graded would have been zero (rather than 6.5 million). The 3.4 million component in 'trademarked' lambs would lose the \$1 per head premium.
- The upside contribution of MLA's eating quality investments to higher grading numbers and premiums contributed 84% of the total program benefits. The primary beneficiary of MLA investments in Eating Quality investments was the grass fed cattle sector:

2.3 New products

- In total, four 'product development' innovations were identified by workshop participants as providing benefits from MLA investments made between 2010-11 and 2014-15. These were 'very fast chilling / salting', 'Smartshape', 'thin slice technology' and 'pulled meats'. These innovations were found to provide NPV benefits of \$32 million, 'Very fast chilling / salting' was found to be the most significant (54% of benefits) followed by Smartshape (22% of benefits).

2.4 and 2.2 Beef domestic marketing and Nutrition, 2.5 and 2.2 Lamb domestic marketing and Nutrition

2.6 Beef export marketing 2.7 Sheepmeat export marketing

- The key impacts in terms of benefits delivered by each component of the Marketing program are directly related to the size of the model inputs (the shocks) and market sizes, and also the elasticity of demand in each market.
 - The majority of the benefits were in the 2010-11 to 2014-15 period.
- The largest benefits for key beef markets (in order) come from Japan, then Korea, the domestic market and China.
- Demand for Australian lamb/mutton across all markets is less responsive to price than beef because New Zealand is the only other substantive exporter. Therefore, the shift in demand required to achieve the same payoff is smaller than for beef.
 - The largest benefits for lamb and mutton come from the domestic market, the United States and then MENA countries.

#3 Increasing Productivity Programs

3.1 Increasing Productivity On-farm (including 3.5 producer engagement)

#3 Increasing Productivity Programs

- The major impacts, in terms of industry net income, from MLA's On-farm Productivity Program were related to work on livestock genetics (23%), on-farm R&D (36%) and producer engagement (41%).
- In the case of genetics, grass and grain fed cattle accounted for 80% of the benefits, with relatively smaller benefits for on-farm sheep. The Southern beef industry received over 90% of the benefits from the genetics program.
 - Gains from British breeds accounted for 90 per cent of total gains in cattle and gains in maternals accounted for 70 per cent of the total gains for sheep.
 - Contributing factors to the sheep result were the small attribution to MLA investments in genetics (despite strong TFP growth) and fact that the on-farm sheep sector pass 60% of benefits onto users and consumers.
- The on-farm R&D component was comprised of the following:
 - Enrich program – New forage increases turnoff of ewes in the wheat / sheep zone by 5% (\$6 per ewe) and reduces costs of supplementary feed by \$10 per ewe in 2015 terms. These benefits are partially offset by establishment costs of \$14 per hectare (annualised). It is assumed that only 10% of each property would be planted or 200 hectares.
 - Phosphorus use efficiency– Fertiliser savings of \$15 per hectare for those currently over-using P fertiliser.
 - Pastures to counter buffel grass run down – increase in live weight gain of 23 kg/head/year of improved over unimproved pasture in Northern beef. These benefits are partially offset by annualised establishment costs, plus ongoing costs of improved pasture of \$18.80 per hectare in 2015 terms.
 - Psyllid resistant Leucaena – increase in turnoff of 150 kg lw per ha per year from Leucaena relative to unimproved pasture. These benefits are partially offset by annualised establishment costs, plus ongoing costs of \$85 per hectare in 2015 terms.
 - Breeder Mortalities/Cash Cow – reduction in 2% points for cow mortalities in northern industry or around 8 000 cows valued at \$600 in 2015 terms. Costs are \$10 per head in 2015 terms.
 - Entire males – benefit is avoided \$8 per head cost of HGP.
- In terms of sectoral information:
 - For the sheep sector the majority of benefits are due to the impact of the Enrich program. The outcomes are extremely sensitive to the assumption of 100% attribution to MLA.
 - For the Northern Beef sector two-thirds of the benefits result from Psyllid resistant Leucaena, with the remainder on work undertaken in countering Buffel Grass rundown and Cash Cow / Breeder mortality activities.
- Producer engagement benefits arose from MLA investments in More Meat from Sheep, More Beef from Pastures and extension activities in Northern cattle.
 - More Beef from Pastures engaged 17 000 southern producers– 12 per cent said they had changed practices by 2014. Making More from Sheep engaged 10 000 southern producers– 32 per cent of the southern sheep industry – 15 per cent (1 553) said they had changed practices by 2014. The participatory research project EverGraze prompted an estimated 2300 to 4400 producers to make changes on between 642,000 and 1.2 million hectares. In northern Australia extension activities were implemented through the FutureBeef Program co-investment with Queensland DPI.
 - Increases in Total Factor Productivity of 2.3% (Sheep), 2.2% (Southern cattle), 1.0% (Northern beef) were observed for producers who changed practices accounting for 5.7%, 10.1% and 20% respectively of the flock/herd. An adjustment was made for other programs that were running concurrently.
- Across all three productivity components, the sheep industry capture 34% of the benefits, northern and southern beef capture 18% and 17% of the benefits respectively while the processing sector is the beneficiary of the remainder in the red meat chain.

3.2 Off-farm productivity

- The first-round benefits of MLA's investments in Off-farm Productivity related to MDC supported innovations to improve yields and reduce labour and average fixed costs.
 - 30% of the first-round benefits were due to the adoption of spray chilling in beef, 41% due to the LEAP technologies for lamb and the remainder benefiting all species.
- Over the medium to long term, the Australian processing sector passes the majority of benefits back to producers and also forward to consumers and users.
 - The on-farm sector captures 56% of the benefits in terms of net income as a result of greater demand for

#3 Increasing Productivity Programs

livestock (lamb receives 50% of the on-farm benefits) while processing captures 43% of the benefits, which includes a return on installed capital.

- Users and consumers are also winners through lower prices.

3.3 Market information

- The impact for this program was set by the 8:1 BCR determined by the workshop for general MLA market information. There was an additional small positive return from LDL, which has significant potential for impact beyond 2015 (with further investment).

3.4 On- farm animal health and biosecurity

- Benefits from MLA investments between 2010-11 and 2014-15 in the On- farm Animal Health and Biosecurity Programs were made up of the following components:
 - Improved FMD diagnostics and regional capability – reduces potential costs (reduction in export prices) of an FMD outbreak by 5 per cent
 - Barbers Pole Worm Vaccine— avoided economic losses of \$11 per ewe with 70% attribution to the vaccine
 - Integrated Pasture Management (IPM) to reduce reliance on anthelmintics to control sheep worms – net benefit of \$2 per sheep in 2014 terms in high rainfall areas
 - Theileria orientalis epidemiology – net benefits in 2015 terms of \$0.335 million for Northern beef and \$1.258 million for Southern beef
 - Johnes Disease vaccine optimisation - economic losses of \$75 per sheep in 2015 terms are avoided with producers continuing vaccinations.
- More than 80% the benefits from this program were from improved productivity and lower costs, of which the majority occur in the sheep industry due to endemic nature of disease in sheep (relative to cattle).
 - MLA investments to maintain vaccination rates for Johnes Disease, which would have fallen otherwise resulting in higher sheep mortalities and lower turnover, was found account for around 80% of the upside benefit from this program with the next most significant area being benefits from Barber's Pole Vaccine.
- The remaining 20% of program benefits are attributable to Improved FMD diagnostics. This is relatively small as the workshop assessed that investments over the period contributed 5% of annual benefits (avoided costs) from a FMD outbreak that has an annual probability of occurring of 0.6%.
- After passing benefits along the chain, 60% of the benefits remain with the on-farm industry while the processing sector captured 30% of the benefits for the red meat chain.

3.6 Feedlot programs: productivity, health, welfare and environment.

- The estimates for the feedlot sector provide a high degree of confidence with regard to impact and reflect the intensive nature of feedlot systems and capability within the sector. The following components were identified:
 - Contribution to industry TFP – the increase in TFP over the Evaluation Period provided by feedlot operators & experts was 1.55% each year, 100% adoption by industry and 20% attribution to MLA.
 - Reduction in regulatory cost – \$14.4 million per year, 100% adoption by industry and 100% to MLA
 - Net feed intake – 1% increase in feed efficiency, 2.5% adoption by industry and 100% to MLA
 - Improved summer rations/heat stress – 0.45% increase in TFP, 90% adoption by industry and 100% to MLA
 - Improved BRD management – 24% reduction in mortality, 15% adoption by industry and 100% to MLA
 - 2 in 1 BRD vaccine – 0.4% reduction in costs, 60% adoption by industry and 100% to MLA
 - Lignite pen surface ameliorant – 0.25% reduction in costs, 5% adoption by industry and 100% to MLA.
- The largest single benefit area for the feedlot program resulted from the workshops' attribution to MLA (assumed to be 20%) of observed cumulative increases in sector TFP of 8% over the period 2010-11 to 2014-15.
 - These accounted for 60% of total program benefits identified by the Impact Assessment.
- Improved summer rations/heat stress and the 2 in 1 BRD vaccine provided the majority of the benefits beyond 2014-15.
- Of total benefits retained within the industry, the feedlot sector retained 70% while 30% were passed back the grass fed sector via higher feeder prices.

#3 Increasing Productivity Programs

3.7 Goat Industry

- Representatives from the goat industry and relevant experts attributed some of the growth observed in this sector since 2010-11 to MLA investments. Amongst other things, MLA investments highlighted the potential of the goat industry to prospective entrants. At the same time, it was acknowledged that much of the growth in the goat industry came from the rangeland, rather than the farmed, sector.
- The key parameter for benefits was a 20% attribution to MLA of sector growth over the period.

#4 Industry Integrity & Sustainability Programs

4.1 On farm environmental sustainability

- Impact of the On-farm Environmental Sustainability Program took into account three major outcomes from MLA Investments during the Evaluation Period:
 - R&D results from the Wambiana Project and other work on Northern Grazing Land Management;
 - The likely impact of new strains of the RHD virus in controlling rabbits; and
 - Work on Greenhouse Gas (GHG) mitigation and substantiating new Emissions Reduction Fund (ERF) Methodologies.
- Results from evaluating MLA investments in these areas were:
 - Northern Grazing Land Management involved halving stocking rates across 2.5% of northern beef businesses. At an industry level, this resulted in a 2% reduction in value of output of the northern beef industry, offset by a 5.6% reduction in selected operating costs and a small net benefit that is equivalent to 0.05% of base industry GVP.
 - Rabbit Control with RHDV involved an initial 20% reduction in rabbit numbers, diminishing to a 16% reduction in 2030. The result in this decline in rabbit numbers was a net benefit of \$50 million or 1.1% GVP equivalent for southern beef and \$4.8 million or 0.11% GVP equivalent for sheep. 100% attribution to MLA.
 - GHG mitigation and ERF Methodology results in a maximum benefit for the northern beef industry of \$1.8 million by 2025.
- Lessons from the Wambiana trial are potentially far-reaching for the northern industry as reduced stocking rates (by up to half) is a dramatic change.
- In terms of net income, the majority of the impacts (76%) delivered by this program are from the RHD virus on southern beef systems, as reducing the rabbit population reduces outputs losses, and 25% from reduced stocking rates in the North. The implication for net income in northern beef is, however, marginal, and highlights the need for additional work around variable stocking rates.

4.2 Off-farm environmental sustainability

- Important work was undertaken through the Donor Company in lowering energy costs and improving environment performance in processing plants through resource use efficiency and the installation of Covered Anaerobic Lagoons (CALs).
 - Research from six energy saving projects had been adopted, generating aggregate annual savings of 5,382 MW/h worth just over \$2 million p.a. saving and an equivalent of 4,700 T GHGe p.a.
 - Through de-risking investment MLA's Donor Company brought forward the installation of CALs – conservatively assumed to be one year
- Notwithstanding the importance of environmental benefits from this program, the economic benefits are relatively modest even with the inclusion of revenue from saved CO₂ emissions valued at \$10 per tonne. In the first round, the present value of benefits in real terms was \$47 million compared to a present value of investment of \$16 million over the 5 years.
- As these benefits were applied as a cost-saving, they are shared primarily with upstream sectors (on-farm cattle and sheep).
- No attempt was made to quantify the benefit of keeping individual processors located in peri-urban areas in business.

4.3 On-farm animal welfare

#4 Industry Integrity & Sustainability Programs

- Benefits from MLA investments during the Evaluation Period have been assigned to mitigating potential industry threats and comprise 3 major components:
 - A demand impact stemming from MLA's community engagement activities – modelled using the outcome of Workshop deliberations which suggested avoiding a 0.25% increase in demand for all species from MLA's work in this area.
 - Extending transport times from 36 to 48 hours – avoiding unnecessary transport costs.
 - Improved poll gene test for Bos Indicus derived cattle – benefit is annual avoided deaths of up to 19 500 calves in the northern beef industry at \$300 per calf.
- The avoided reduction in demand from MLA's community engagement provides the 50% of the benefits attributed to Program 4.3. These benefits are distributed equally across the species.
- 40% of benefits accrue from the reduction in transport times. The most significant assumption for this component, and indeed program 4.3, was the 5% attribution assigned to MLA's activities over the Evaluation Period (because the benefits apply uniformly over the period 2014-2030).
- The industry impact of the improved poll gene test for northern cattle comprises the remaining 10% of benefits. The critical parameter here is the reduction in calf losses resulting from not having to dehorn.

4.5 Sustainable Innovation Capability

- No impacts modelled

Purpose

To undertake a comprehensive and thorough independent assessment of the impact of the entire MLA 2010-11 to 2014-15 portfolio of programs.

Methodology

Involved 5 key steps:

- capturing total MLA expenditure, both planned and actual, by program and by year
- preparation of workshop background papers on each program summarising economic, social and environmental achievements over the review period
- review of the background papers using workshops with independent technical and industry expertise, assessing the industry impact and identifying areas for improvement
- outputs from the workshops providing input into industry wide economic models to assess impact by species and sector;
- model results being summarised in a report to MLA, this report containing information on the current and likely future industry returns from MLA's investments made in the period 2010-11 to 2014-15 (the Evaluation Period)
 - this report also to contain recommendations on opportunities to improve performance and impact assessment procedures.

The methodology conforms to the CRRDC requirements for ex-post impact analysis.

Expenditure

Total MLA expenditure over the review period was \$864 million in nominal terms (\$997 million NPV), including staff and overhead costs as well as program expenditure.

Recommendations

The following strategic, operational and program specific recommendations are provided to assist MLA consider approaches that could further enhance industry impact from future R&D and marketing activities. Note: the background to each recommendation is provided in Chapter 28.

Strategic recommendations

Recommendation 1

Clear strategic focus — MLA impact can be improved by ensuring there is absolute clarity and company focus regarding a single strategic plan that provides the blueprint for MLA operations and aligns with achieving the industry impact identified in total industry plans (MISP2020 is the prescribed plan). This includes:

- alignment of MLA programs to achieve outcomes at the MISP2020 Imperative level
- implementing a ‘tops-down’ budget for the MLA 2020 strategic plan that follow the funding changes recommended in MISP2020 for each Imperative.
 - Note: the only variations to MISP thinking that came through the impact assessment are:
 - The domestic market for beef and lamb should be viewed as defensive strategies to minimise downside impact (rather than growth opportunities).
 - There is strong support for MLA export marketing activities in developed markets as well as for developing markets (the impact assessment team would still support the MISP recommendation to proportionally increase funding in developing markets).

Recommendation 2

Improved performance measurement — MLA impact (and objective evidence of impact) can be improved by developing and implementing a renewed monitoring, evaluation and reporting system. This includes:

- developing KPIs that meet two criteria (a) providing a quantified impact statement for achieving major outcomes prescribed under each program, and (b) explaining how the industry impact of each MLA program will be measured.
 - It is noted that this is an expectation at the Imperative level in MISP2020.
- implementing monitoring and evaluation processes to measure performance against KPIs, including allocation of adequate funding within each business plan to measurement

- reducing the number of KPIs to those necessary to cover each key program area (based on MISP2020 Imperatives) rather than the large number of business plan and AOP KPIs evidenced in the assessment period
- maintaining the Integrated Framework as well as the Global Meat Industry models up-to-date to be utilised in measuring impact with consideration given to merging the two models into one and broadening the linkage to the Australia wide economy.

Recommendation 3

Value chain approach — MLA impact (including, most importantly, impact to producers) can be improved by ensuring a whole of supply/value chain approach to delivering industry impact. This includes:

- ensuring improved collaboration between programs and managers where joint activities are required to achieve program KPIs
- improving and developing effective working relationships with other relevant industry organisations. This includes clarifying MLA responsibility for effectiveness of expenditure that is under the ‘joint’ responsibility of MLA and AMPC.

Recommendation 4

Viability of northern cattle industry — MLA impact can be improved by looking at the environmental sustainability issue of the northern cattle industry as an industry viability issue which is a significant economic risk to the industry as a whole. This includes:

- recasting the current work in the Wambiana trial, Buffel grass rundown and other associated areas to have a significant focus on economic as well as environmental concerns.

Operational recommendations

Recommendation 5

Align structures and responsibilities — MLA impact can be improved by resetting advisory structures and responsibilities to align with industry impact KPIs. This includes:

- Committee structures that support achievement of the KPIs (and associated MLA business plans).
- Committee responsibilities that are clarified to eliminate (as much as possible) the current duplication of roles and responsibilities. The need for and benefits from consultation should not be confused with the benefits from following the strategic focus in recommendation 1.

Recommendation 6

Program focus — MLA impact can be improved by firmly focussing on integrated programs of activity (based on business plans to achieve industry impact KPIs) as opposed to the funding of many disparate projects. This includes:

- development of business plans for each major area of industry impact
- allocation of budgets as discussed previously for the full term of the business plan and in alignment with MISP2020 recommendations.
- reporting that focusses on progress with achieving the industry impact KPIs rather than outcomes from individual projects.
- monitoring impact (see recommendation 2) at the program rather than project level and, where multiple programs contribute to practice change in the same producers, at the KPI level rather than the program level (that is, through integrated M&E processes).

Recommendation 7

Efficient contracting — MLA impact can be improved by substantially speeding up the contracting of programs/projects once consultation is concluded. This includes:

- establishing best practice benchmarks for efficient contract approval times
- monitoring and transparent reporting of performance against these benchmarks.

Recommendation 8

Maximise available funding — MLA impact can be improved by increasing funding for the implementation of business plans to achieve industry impact KPIs, in a period of levy reductions, through better utilisation of the MLA Donor Company (MDC). This includes:

- establishing targets for MDC funding, in total and for business plans, particularly in areas that require implementation through commercial supply chains.
- ensuring that protection of intellectual property and inefficient funding approval times (as discussed earlier) are not impediments to potential partners involvement.
- increasing focus on partnering with MLA producer and lot feeder members.

Program specific recommendations

Recommendation 9 — Maintaining and improving market access

- Achieve consolidation of the meat industry's integrity systems and move all systems from paper based to electronic transfer of data.
- Devote more effort to measuring industry returns from Market Access Programs operated by MLA.
 - In the market access area increase the accuracy with which MLA's contribution to outcomes is measured.
 - Undertake analysis of the contribution of MLA's product integrity programs to price premiums achieved in overseas markets.
- Inject further resources into technical market access issues — this is the growth area in trade impediments for the meat and livestock industry. Examine the benefits of

integrating the meat safety science research more fully into MLA's market access program.

- Going forward defence of market access conditions will increase in importance — this needs to be recognised in program strategies and outcome measurement.
- Significant dangers continue to exist to the Live Export trade. Community expectations of the trade will keep on increasing and further work will be required to meet these expectations on an ongoing basis - for example, the work on the Livestock Global Assurance Program (LGAP).

Recommendation 10 - Growing demand

- Develop a strategic approach for domestic beef marketing with consistent execution that recognises the defensive nature of marketing activities in this market.
- Improve communications with domestic and export commercial industry partners on marketing activities.
- Globalise MSA with better integration of MSA knowledge into marketing strategy.
- Discontinue the new products program except through individual MDC projects.
- Develop a global approach with individual market execution to measure the commercial impact from domestic and export marketing programs on an ongoing basis. This approach will facilitate measurement of progress made against industry impact KPIs.
- Supermarkets to supply scan data, rather than utilising the Nielsen consumer panel data, to evaluate and better understand the impact of domestic marketing.
- Improving understanding of, and linkages between, key MLA programs.

Recommendation 11 — Increasing productivity across the supply chain

- Improve the standard of ex-ante analyses by training all relevant on-farm Managers in the use of the AWIMLA economic model developed by RMCG, and ensure both peer review of assumptions including expertise, external where necessary, on likely marginal benefit and extent of adoption in the target markets and the counterfactual scenario, and the recording and retention of these analyses.
- Use independent external expertise to update ex-ante analyses with most recent industry and research project information prior to future MLA impact assessment workshops, and focus the workshop participants on discussing the updated key assumptions.
- Continue and build on the strong approach to monitoring and evaluation taken in assessing benefits in Majority Market programs but integrate where multiple adoption activities occur to allow evaluation at the impact KPI level rather than at the project or program level.
- Expand efforts to move from relying on self-assessed practice change to quantifying not only level but extent of adoption.
- Invest in commercial validation trials and/or commercial case studies with early adopters to develop compelling business propositions for producers who might

consider adopting each of the various innovations promoted by MLA, and include more prominently in adoption communications packages.

- Review the development and use of \$ index values for the future estimation of return on R&D investment in livestock genetics programs.

Their use for future R&D impact evaluation would be considerably enhanced and greatly simplified by using independent technical expertise to:

- establish rules for the creation and updating of the underlying assumptions of input assumptions on future input costs and product prices, discount rates, frequency of updates and the transparency of this information, particularly for beef indexes, with standardisation across breed societies
- certify all updates and make the underlying assumptions available to industry in easy-to-understand extension material
- develop recommendations on the most appropriate methodology to calculate both weighted average \$ index industry values to account for changes in breed composition and trait addition over time, and annual \$ increment values using these \$index values to best reflect future industry value added; and
- develop recommendations on the most appropriate methodology to account for incomplete records in the two years prior to any impact assessment, and to estimate counterfactual scenarios, taking account of changes to both seedstock enrolments and industry breeding females over time, so that future impact estimates more accurately reflect the incremental genetic value added in any time period and the distribution of that value in future years.

Recommendation 12 — Supporting industry integrity and sustainability

As for supply chain productivity:

- Improve the standard of ex-ante analyses by training all relevant on-farm Managers in the use of the AWIMLA economic model developed by RMCG, and ensure both peer review of assumptions including expertise, external where necessary, on likely marginal benefit and extent of adoption in the target markets and the counterfactual scenario, and the recording and retention of these analyses.
- Use independent external expertise to update ex-ante analyses with most recent industry and research project information prior to future MLA impact assessment workshops, and focus the workshop participants on discussing the updated key assumptions.
- Continue and build on the strong approach to monitoring and evaluation taken in assessing benefits in Majority Market programs but integrate where multiple adoption activities occur to allow evaluation at the impact KPI level rather than at the project or program level.
- Expand efforts to move from relying on self-assessed practice change to quantifying not only level but extent of adoption.
- Invest in commercial validation trials and/or commercial case studies with early adopters to develop compelling business propositions for producers who might

consider adopting each of the various innovations promoted by MLA, and include more prominently in adoption communications packages.

1 Purpose, methodology and approach

Purpose

This project undertakes a comprehensive and thorough independent assessment of the value of MLA's programs to test if these programs provided benefit to stakeholders in the red meat industry and the general community.

Evaluation is part of normal business (continuous improvement loop) for MLA and this project delivers information on the industry and community impact of MLA programs. It covers the period 2010-11 to 2014-15 utilising a revised process that will become part of the MLA 5 year planning cycle.

The results provide a basis for MLA Board and management to enhance performance and will be utilised by the concurrent MLA Performance Review that is required under the Statutory Funding Agreement with the government.

In addition, this impact assessment process will assist MLA meet the ongoing performance measurement requirements of the Meat Industry Strategic Plan (MISP2020) that will provide a solid basis for the development of the next MISP in 4 years' time.

Methodology

In summary, the methodology involves simultaneously reviewing MLA total activities on a program basis for the full five-year period — rather than reviewing a selection of individual projects or programs at different times as has been past practice. The key steps include:

- developing a structure for reviewing groupings of MLA programs based on the program structure in the 2014-15 Annual Operating Plan;
- background Papers being prepared by MLA Program managers on the outcomes delivered from the program and industry impact achieved;
- workshops of technical experts and industry commercial operators reviewing the background papers and providing their independent advice on the outcomes delivered and the industry impact achieved;
- outcomes from the workshops being fed into the industry models most suitable for this type of analysis (Integrated Framework and Global Meat Industry models managed by CIE) to generate industry benefits and Benefit Cost Ratios (BCRs);
 - In several cases where a recent evaluation of a program was available, the consultant team used this as the independent source to assess the industry impact of the program;

- advice being received from MLA program managers and workshop participants on what has worked well and what can be improved to enhance MLA's role in generating industry benefits;
- the above information being reported in terms of industry/sector and community economic impact as well as social and environmental benefits where available.

Workshop approach

Workshops were structured to review associated programs as effectively as possible. Mapping between workshops and MLA programs is detailed in table 1.1 below.

1.1 Impact assessment workshops and MLA programs coverage^a

Workshop name and date	Programs to be covered
1. Beef marketing 16 November 2015	The workshop covered the impact on beef demand stemming from MLA activities across the following programs: <ul style="list-style-type: none"> ▪ 2.1 Enhance the nutritional reputation of red meat ▪ 2.4 Aggressive promotion of beef in the domestic market ▪ 2.6 Aggressive promotion in export markets — beef ▪ 2.3 Develop new products
2 Sheepmeat marketing 18 November 2015	The workshop covered the impact on sheepmeat demand stemming from MLA activities across the following programs: <ul style="list-style-type: none"> ▪ 2.1 Enhance the nutritional reputation of red meat ▪ 2.5 Aggressive promotion of lamb in the domestic market ▪ 2.7 Aggressive promotion in export markets — sheepmeat
3. Processor portfolio 20 November 2015	Covered the processor related activities in the following program areas: <ul style="list-style-type: none"> ▪ 3.2 Identify and deliver opportunities to increase off-farm productivity and capability ▪ 4.2 Support off-farm environmental sustainability
4. On-farm productivity 25 November 2015	Covered all aspects of on-farm productivity and adoption, except for activities related to animal genetic improvement, activities related to market compliance or work done with feedlots <ul style="list-style-type: none"> ▪ 3.1 Identify and deliver opportunities to increase on-farm productivity ▪ 3.5 Increase producer engagement with MLA tools and information to support productivity
5. On-farm animal health and welfare 27 November 2015	<ul style="list-style-type: none"> ▪ 3.4 Support industry to improve animal health and biosecurity ▪ 4.3 Provide industry with solutions to meet high standards of animal welfare without reducing productivity levels ▪ 4.4 Support industry's effective engagement with the community (aspects of this program that might affect the community's perception of animal welfare practices of producers and issues response)
6. On-farm environment practices and performance 30 November 2015	<ul style="list-style-type: none"> ▪ 4.1 Support on-farm environmental sustainability ▪ 4.4 Support industry's effective engagement with the community (aspects of this program that might affect the community's perception of environment performance of producers and issues response)

Workshop name and date	Programs to be covered
7. Live export 2 December 2015	<ul style="list-style-type: none"> ▪ 1.3 Maximise market options for producers and exporters in the livestock export
8. Eating quality 4 December 2015	<ul style="list-style-type: none"> ▪ 2.1 Develop practices and drive programs that help industry deliver consistent and optimal eating quality
9. Market information and compliance 7 December 2015	<ul style="list-style-type: none"> ▪ 3.3 Deliver valued supply chain and market information ▪ 3.1 Market compliance aspects of program 3.1: On-farm productivity
10. Feedlot programs 9 December 2015	<p>Feedlot related aspects in the following program areas:</p> <ul style="list-style-type: none"> ▪ 3.1 Identify and deliver opportunities to increase on-farm productivity ▪ 3.4 Support industry to improve animal health and biosecurity ▪ 3.5 Increase producer engagement with MLA tools and information to support productivity ▪ 4.1 Support on-farm environmental sustainability ▪ 4.3 Provide industry with solutions to meet high standards of animal welfare without reducing productivity levels
11. Goat industry 14 December 2015	<ul style="list-style-type: none"> ▪ 2.5/2.7 Aggressive promotion of goat meat in the domestic and exportmarkets ▪ 3.1 Identify and deliver opportunities to increase on-farm productivity

^a Base on 2014-15 Annual Operating Plan.

Program areas where Workshops were not required included:

- 1.1 Product integrity — recent 3rd party review completed
- 1.2 Market access — recent 3rd party review completed
- 3.1 Livestock genetic component — recent 3rd party review completed
- 4.5 Sustainable innovation capability — background paper only required
- MLA Donor Company (MDC) — included in relevant workshops with follow-up and interviews of by the Consultant Team as required.

Background papers

Except where a recent evaluation was available (see above), MLA staff prepared a background paper on each program to provide basic data on which an independent assessment of industry impact could be based — the independent assessment being provided by either workshop participants or the consultant team. These papers were especially critical to workshop deliberations and contained the following information:

1. Scope

- Summary of MLA program area(s) addressed by the paper

2. Inputs, outputs and outcomes achieved over the 5 years

- Inputs — annual MLA expenditure (planned and actual).

- Outputs — including technical progress and other precursors to industry outcomes being achieved. Outputs were included for activities in which no outcome has yet been achieved.
- MLA Outcomes delivered

3. Industry Impact over the 5 year review period

- Program area performance in terms of industry impacts realised between 2010-11 to 2014-15 (inclusive) as a result of investments made by MLA during this period
- This included an assessment within the background paper of how adoption of these program outcomes impacted on the industry — did they reduce costs, increase demand, increase prices, etc?
- Distinctions were also made between the industry impact flowing from MLA investments during the 5 year period and industry impact arising from a host of other factors. Amongst other things, this required separation and non-inclusion of the benefits/impacts that occurred in the five years as a result of past expenditure and as a result of the activities of other parties (the counterfactual case).

4. Future Industry Impact

- The evaluation methodology recognised that future industry benefits are likely to arise from MLA investments made during the 5-year review period — and allowed for these benefits to be captured. These benefits were captured by addressing the questions:
- Assuming no further MLA investment in the program areas, how will outputs and outcomes delivered as a result of MLA investments between 2010-11 to 2014-15 impact on future industry costs, demand, prices, etc?
- How much of these future benefits are due to MLA investments made prior to 2010-11?

5. Summary of what was achieved

- This section is designed to ‘tell the story’ about the key achievements delivered in the 5 year period in terms that were meaningful to the intended beneficiaries of the program — This is what MLA set out to do — This is the progress MLA made — These are the outputs MLA delivered — These are the outcomes/impact MLA achieved. This information was provided both at an industry or sector level and then, in some cases, translated into individual animal or farm and included social and environmental benefits.
- Individual enterprise case studies were to be provided if available.

6. Opportunities to improve outputs/outcomes/impact achieved

- This section listed any key things that had assisted the MLA program team’s capacity to achieve industry benefits (approaches the program team would like to retain)

- Also opportunities to improve the MLA program team's capacity to achieve industry benefits were listed and explained (approaches the program team would like to change).

7. Objectives and performance against stated 5 year and annual KPIs

- Business plan KPIs in program areas covered by the background paper and performance against these KPIs.
- Annual AOP milestones in program areas covered by the background paper and performance against these milestones.

Workshops

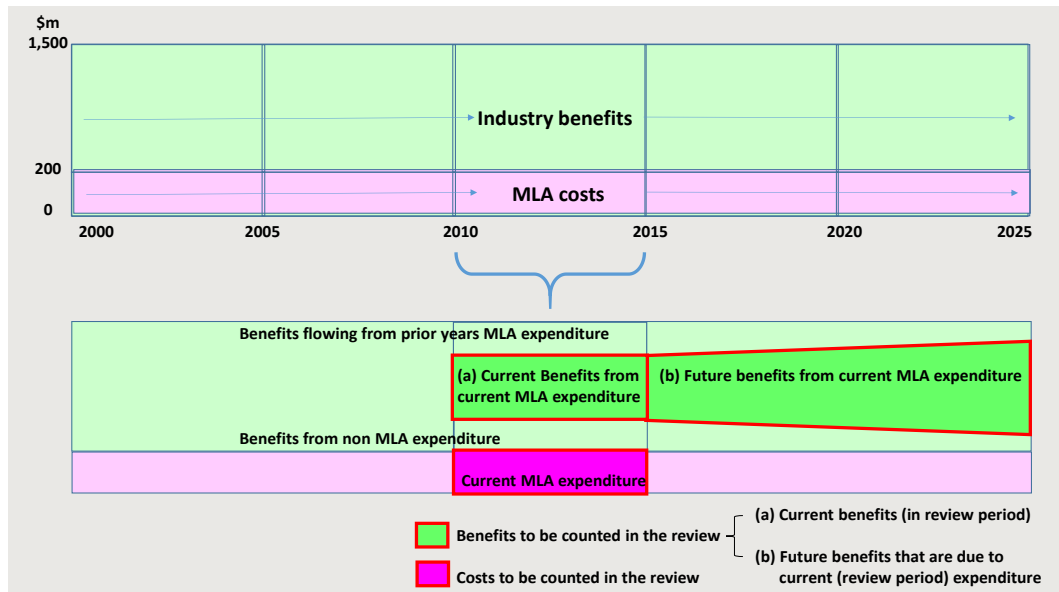
Workshop attendees were selected for technical expertise and industry commercial experience in the program areas being reviewed. In addition every effort was made to ensure Peak Industry Council participation and overlap with representatives from on-farm R&D advisory committees and MLA task forces. MLA staff attended the workshops to present a summary of the Background Paper and be available to respond to questions from the participants.

The role of each Workshop participant was to:

- critically review the MLA portfolio background paper that was provided one week prior to the workshop, and
- attend the workshop and participate fully in reviewing the performance of MLA's portfolio, especially in terms of impact on industry, and provide ideas for improving future performance.

This was acknowledged to be a challenging role. It was necessary to not only estimate the full industry impact achieved in each portfolio area during the review period and in the future but also to determine what proportion of this impact was due to MLA expenditure in the review period (not funding in prior periods) and what proportion was due to the activities of MLA (not activities or funding of other parties — the counterfactual case). This is illustrated below in chart 1.2.

1.2 Conceptual approach to quantifying impact of MLA investments



Data source: Consultant Team.

Workshops were held, in Sydney, over the period 16 November to 14 December (including one workshop by telephone conference). Participants included 118 industry or technical expertise specialists plus representatives from MLA and the Impact Assessment team. A listing of participants for each workshop is provided in Appendix A.

Workshops followed a common agenda as per the Beef Marketing Workshop as shown by table 1.3 below.

1.3 Example of workshop agenda – Workshop 1: Beef Marketing

Time	Agenda item
9.30am	Tea/coffee on arrival
10.00am	Welcome
10.05am	Setting the scene Introductions Purpose of project and endpoint Explanation of 'impact' being measured Methodology of project Role of the workshop participants Agenda for program discussion Workshop – rules of engagement Any questions on purpose / methodology / impact etc
10.25am	Programs and expenditure overview
10.30am	MLA presentation on Export Marketing background paper

Time	Agenda item
10.45am	Questions of clarification re background paper Discussion – performance/impact by key market Opportunities to improve performance Review – key workshop conclusions
12.30pm	Lunch
1.00pm	MLA presentation on Domestic Marketing background paper
1.15pm	Questions of clarification re background paper Discussion of key initiatives and performance/impact Opportunities to improve performance Review – key workshop conclusions
2.30pm	MLA presentation on New Products background paper
2.45pm	Questions of clarification re background paper Discussion of key products and impact Opportunities to improve performance Review – key workshop conclusions
3.45pm	Next steps – follow up – attendees review draft Participants views of the impact assessment process
3.55pm	Thanks for participation
4.00pm	Workshop concludes

Introduction to workshops

A member of the consulting team chaired the workshop and explained that the workshop was part of a process to evaluate the industry impact flowing from MLA expenditure of \$0.9 billion over the last 5 years.

The outputs from the Workshop, in terms of industry impact, would be used in economic models to demonstrate benefits (or lack thereof) from MLA expenditure over the last 5 years. Workshop deliberations would also form an important component into a wider review of MLA governance procedures and compliance required under the Deed of Agreement between MLA and the Australian Government.

A background paper was provided to Workshop participants with staff views on the possible impact of MLA's activities for the coverage from each workshop. The Chair defined the role of the workshop as providing independent third party assessment of the views expressed in the background paper as well as other relevant observations — is the assessed impact reasonable and what are the key parameters that underpin the impact?

The importance of isolating the benefits flowing from MLA activities from those that would have occurred anyway- through the operation of commerce or the actions of Government independent of MLA activities - was emphasized.

In terms of the process being undertaken, other things noted by the Chair were:

- workshop participants were attending as individuals, not as company/organisational representatives with invitations being issued on the basis of technical and industry expertise
- there may be a need to seek further information from workshop participants as the data to be entered into the model is further developed — the Chair sought the cooperation of workshop participants in providing information that may be needed at a later stage
- as part of MLA's commitment to continuous improvement views would be also gathered from workshop participants on how to improve MLA's performance in the future
- participants would receive a draft report on the deliberations of the workshop and would have the opportunity to correct mistakes — the report would contain a summary of workshop discussions, but would not attribute comments to individual participants.

The workshop report and background paper were not for further distribution — the workshop was only one step in the evaluation process and participants should wait until the conclusion of the process with a final report being available on results of the entire process.

Measuring impact utilising industry economic models

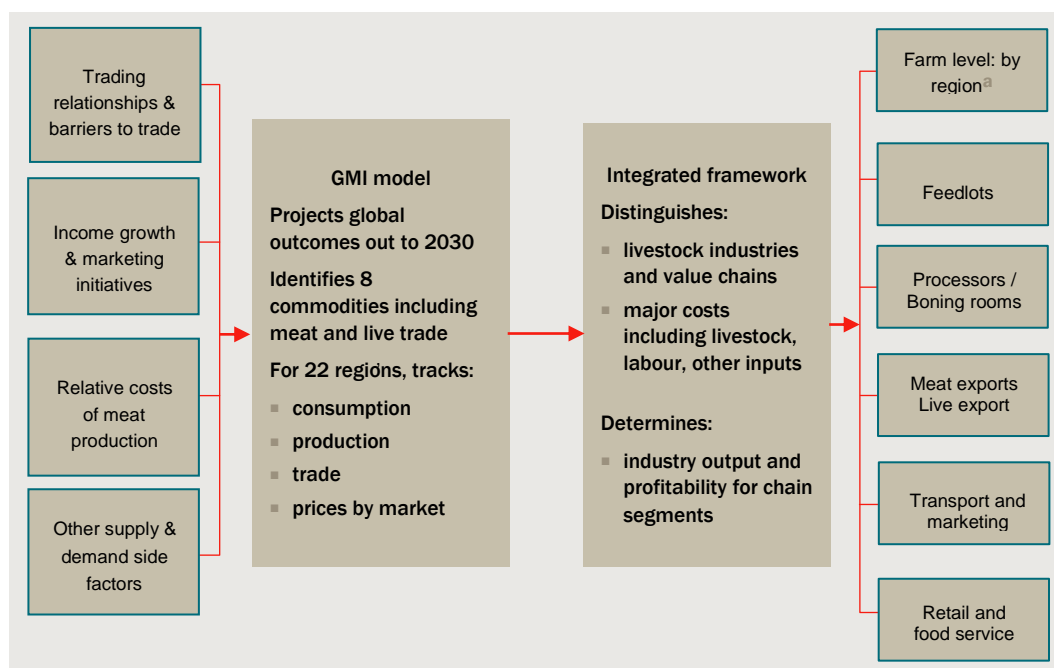
The project utilises the same economic modelling framework as was used for the quantification of the Meat Industry Strategic Plan (MISP2020) for the Red Meat Advisory Council. The framework, run by CIE on behalf of MLA and the wider red meat industry, is comprised of two parts:

- the global meat industries (GMI) model — contains a detailed representation of demand and supply for meat and livestock globally; and
- the integrated framework (IF) model — contains a detailed representation of the Australian red meat value chain.

Chart 1.4 illustrates how these models work together to provide a comprehensive representation of the red meat value chain.

The project also extended the Integrated Framework model used in the RMAC analysis to better capture consumer benefits. Specifically, this enhancement captured benefits (consumer surplus) passed on to domestic consumers. However, this does not capture flow-on benefits to other industries and to employment, which would be better captured in an economy wide model at an aggregate level.

1.4 Linked GMI and Integrated Framework



^a Includes identification of northern and southern industries for cattle.

Data source: CIE.

Consistency with CRRDC project impact assessment

This methodology is consistent with the CRRDC project impact assessment methodology utilised by all RDCs. The key steps in the CRRDC process are:

- define the project
- identify and value research inputs
- identify research outputs
- define counterfactual or baseline (without investment scenario)
- identify, quantify and value outcomes for adopters
- estimate adoption
- identify and value impacts
- estimate attribution
- synthesis and interpretation

The methodology used in this project has five major advantages over MLA's traditional individual program/project use of the CRRDC approach. These advantages are that:

- The current evaluation approach is comprehensive in that it estimates the impact of the entire MLA portfolio of activities. Traditionally impacts assessments are conducted on a subset of individual projects or programs and there is an inherent potential to focus on perceived successful projects/programs that could provide results with a positive bias. Additionally, the temptation to avoid reviewing perceived

‘problem’ projects/programs reduces the opportunity to address the weaknesses in these areas and improve future performance.

- The current evaluation method assesses the results for all programs simultaneously. This enables the capture of economic linkages between programs and a more accurate ‘net’ impact of all programs funded in the review period. This minimises the traditional risk of double counting benefits between portfolio areas.
- The current evaluation method is time specific — it measures the impact of all MLA investments made within a specified period of time. With traditional evaluation processes, assessments of individual programs are conducted independently and the time periods used can vary enormously — they are not common. Use of a common time period means that all expenditure by MLA can be accounted for — the sum of the annual and total 5 years’ expenditure in this project matches the sum of the 5 MLA annual report’s financial statements for the same period. Traditionally BCRs or impact assessments utilise the contracted expenditure figures which do not include all overhead costs.
- The current evaluation method is transparent. Inevitably, assessments of the industry ‘value add’ of MLA’s investments require the application of judgement, primarily in the construction of the counterfactual (that is, what would have happened without MLA investment). With traditional evaluation approaches this judgement has been applied by a single consultant or team of consultants. In the current study this judgement was made by industry representatives and technical experts in a workshop environment.
- Finally, the current evaluation method generated ownership of the evaluation process by MLA staff and management. This ownership has led to a greater awareness by MLA staff and management of the need to address shortcomings in current KPIs and impact measurements — weaknesses that became evident as staff prepared background papers and faced questions from independent workshop participants. Common issues were identified in most workshops/programs — this is a more powerful force for change than individual impact assessments being undertaken over an extended period of years.

The methodology also has some downside risks:

- The transparency of the process is both an advantage and disadvantage. By securing industry input into the judgements that are needed in any evaluation, the crucial role played by these judgements was revealed to all. The complexity and difficulty in making these judgements (especially the counterfactual case) came as a surprise to some.
- The methodology applied relied heavily on the input of workshop participants and was conducted over a compressed period of time. As noted above the comprehensive, simultaneous and transparent nature of the current evaluation approach represent significant advantages, and industry input through an open workshop process is a critical component of this. Ideally, however, the role of the workshop would be to react to assessments already completed (including well-developed MLA internal assessments of impact) — reacting, for instance, to assumptions made or the construction of the counterfactual. In some cases in the current evaluation the

workshop had this information available, however in other cases, workshop participants were faced with making impact assessments based on limited information. In the future this potential disadvantage of the current evaluation methodology can be addressed through an improved set of MLA KPIs and more thorough impact measurements being undertaken.

One final point needs to be highlighted, in terms of the evaluation approach used, relates to assigning benefits where MLA partners with other organisations (CRCs, State Departments of Agriculture, CSIRO, etc) to deliver program outcomes:

- In cases where MLA was a part funder of a project that resulted in industry impact, if the judgement was made that the project would not have proceeded without MLA investment, the entire benefit from the project was assigned to MLA. In such cases, the assignment of all benefits to MLA is appropriate from an MLA levy payer member perspective. However, it must also be recognised that there is the potential for double counting if external parties conduct their own impact assessments for these project (including other RDCs in the case of joint projects).
- In cases where MLA was a part funder of a project that would have proceeded anyway even if MLA did not contribute, the only benefits attributed to MLA were the degree to which MLA funding sped up the delivery of project outcomes.
- In all cases only MLA expenditure is included in the BCR assessment.

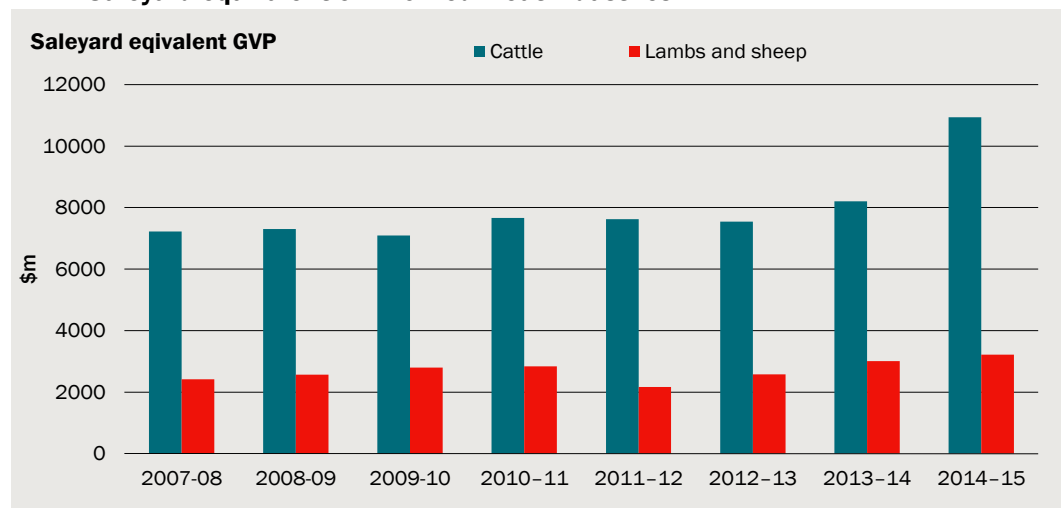
2 Setting the scene

Industry economic context 2010-11 to 2014-15

Production and value of sales

The past 5 years have been dominated by seasonal conditions that were a significant driver of saleyard gross value of production, especially for northern beef industry that resulted in liquidation of the herd (see chart 2.1).

2.1 Saleyard equivalent GVP for red meat industries



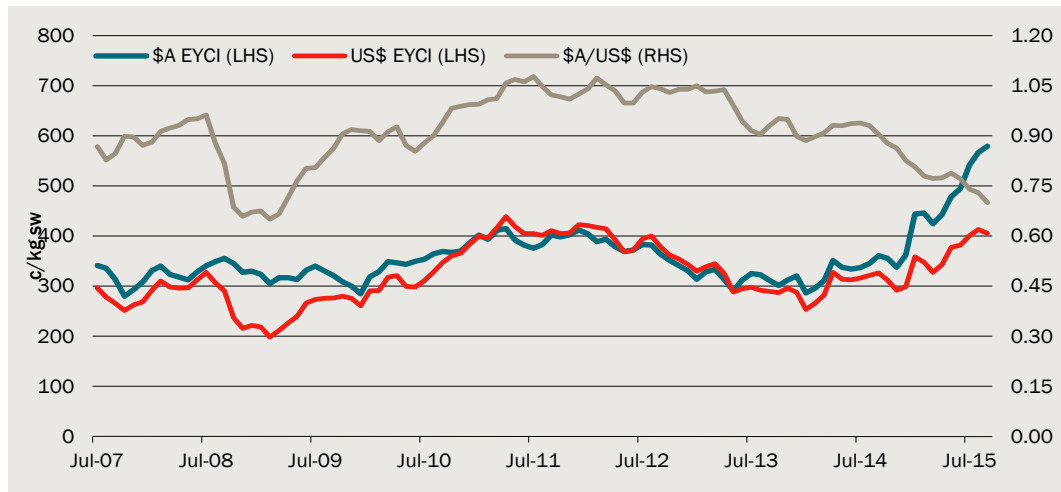
a Includes the export value of live exports which has been adjusted back from free-on-board (FOB) levels to saleyard equivalent.

Data source: ABARES Australian Commodities and CIE calculations.

The Australian dollar is critical to the competitiveness and saleyard prices of the industry. While the majority of the past 5 years was a period of a high Australian dollar, the recent devaluation in combination with a herd rebuilding phase have resulted in a spike in livestock prices across most categories (see chart 2.2).

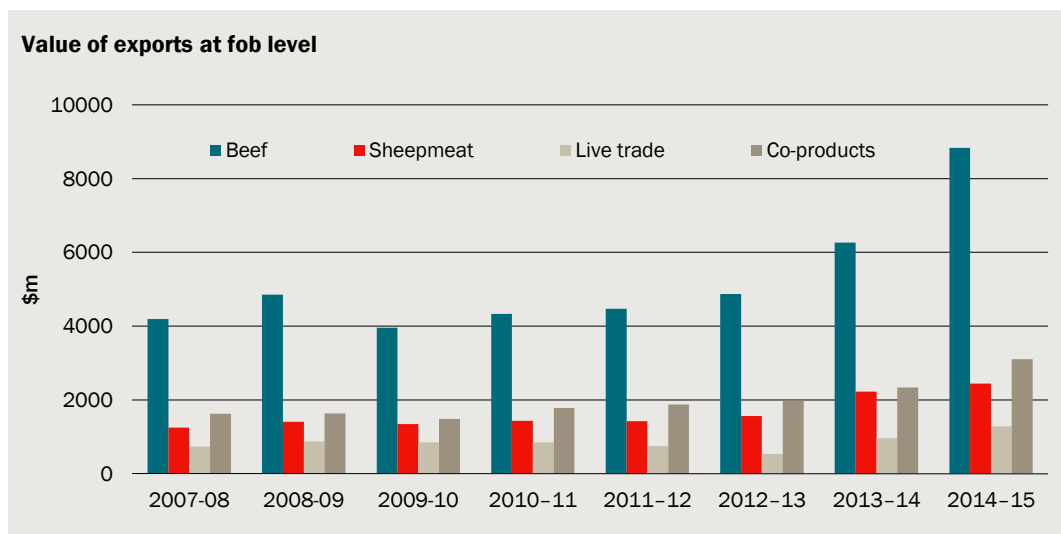
As a result of the herd liquidation, and strong demand from international markets, export value for meat has grown strongly, there has also been significant contributions from the live trade and sale of co-products (chart 2.3).

2.2 Exchange rate impact on saleyard prices of cattle^a



^a Eastern Young Cattle Indicator.
Data source: MLA and GMI database

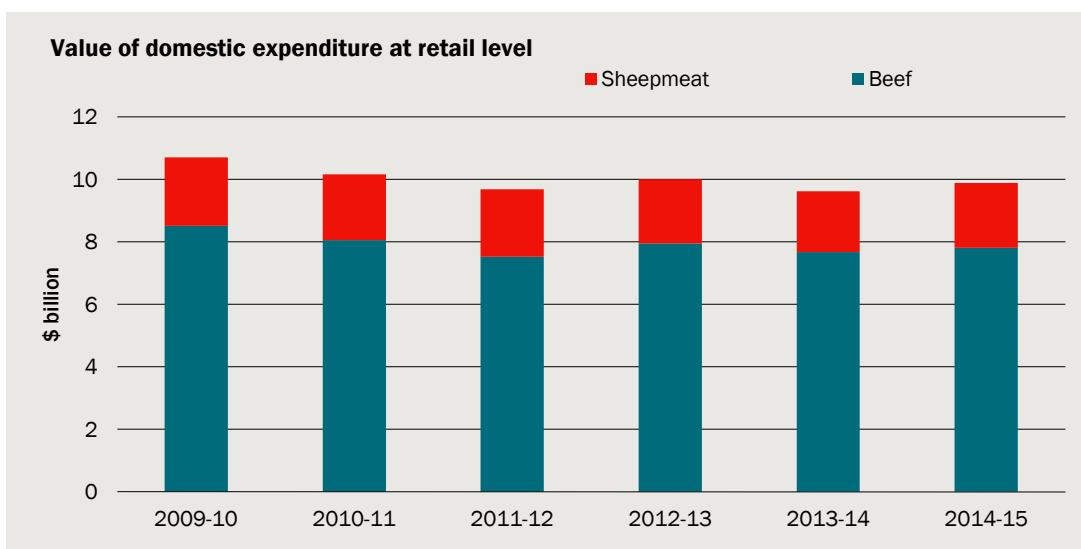
2.3 Value of sales to export markets



^a Exports are valued at free on board (FOB) levels.
Data source: DAFF, MLA and CIE calculations.

While exports grew, domestic per person consumption and total expenditure were largely unchanged or fell slightly reflecting a mature developed market for red meat (see chart 2.4).

2.4 Values of domestic sales



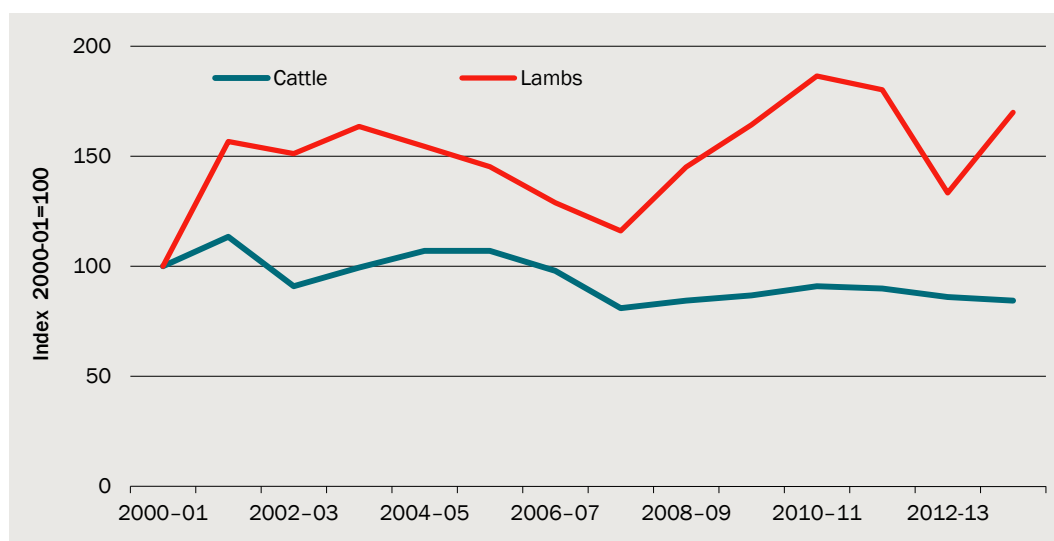
^a Domestic expenditure for red meat is measured at retail level.

Data source: DAFF, MLA and CIE calculations.

Productivity and profitability

Relative prices based on latest available data (of prices received and prices paid) shown in chart 2.5, reflect further declines in farmer's terms of trade for cattle producers over the past 5 years, whereas strong prices for lambs and sheep have improved their situation.

2.5 Terms of trade for beef and sheepmeat producers^a

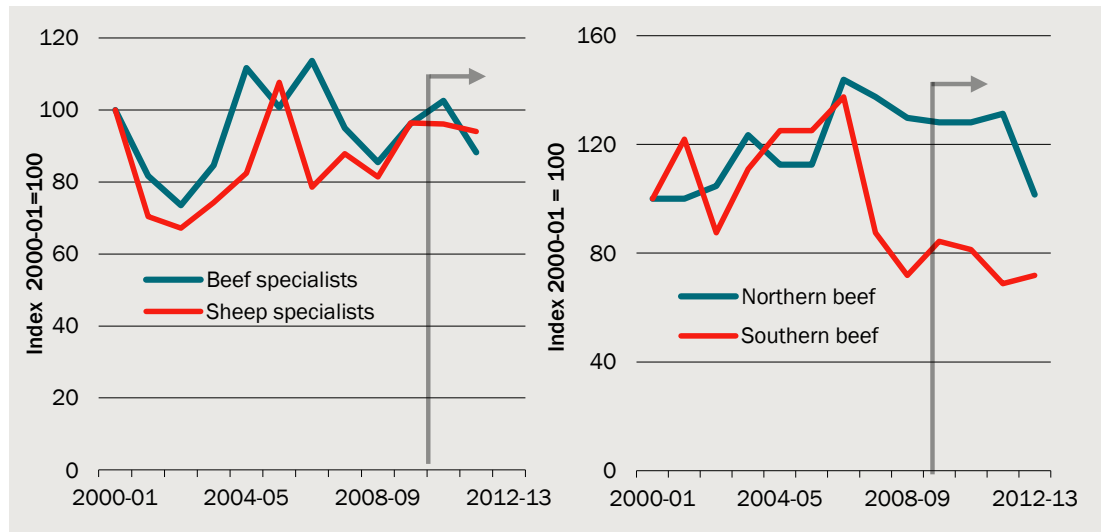


^a Terms of trade calculated as an index of prices received for livestock relative to prices paid which includes costs of materials and services.

Data source: ABARES and CIE calculations.

Productivity improvements can offset declines in the farmers' terms of trade. Chart 2.6 shows, however, that total factor productivity (TFP) for the red meat industry has been falling since the mid-2000s. Note that 2012-13 is the latest available data.

2.6 Total factor productivity across red meat industries^a

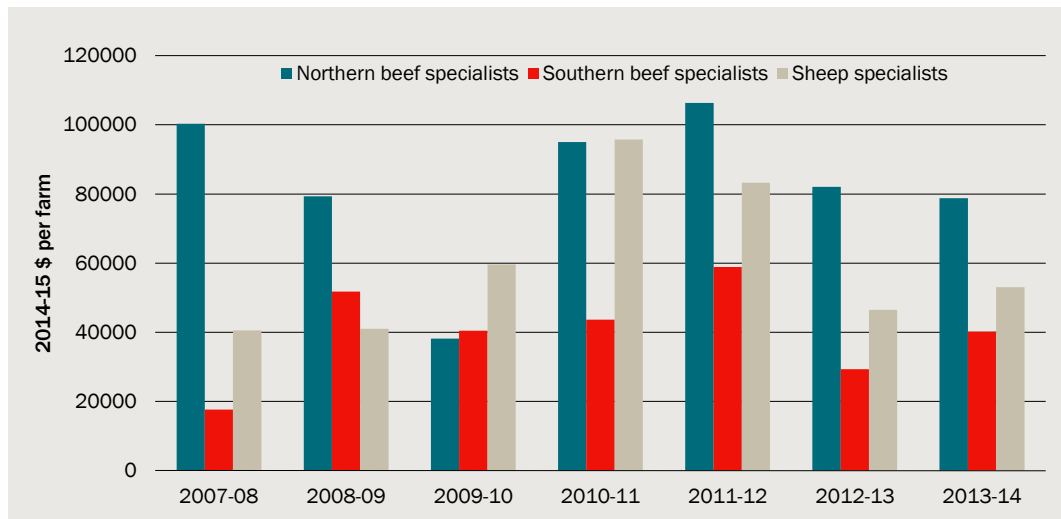


^a Total factor productivity is measured as an index of outputs (revenue) relative to an index of inputs (costs). Data source: ABARES 2015, Australian Farm Surveys 2012-13 to 2014-15 and ABARES 2015 Australian beef: financial performance of beef cattle producing farms, 2012-13 to 2014-15.

This is especially for the southern beef industry where productivity has sharply declined since the 2007-08 drought and failed to recover to previous levels.

Overall, average (net) farm incomes in real terms across the industry have been variable over the past 5 years, as seen in chart 2.7. These outcomes not only reflect differences between revenues and cash costs, but also the scale of the enterprise especially larger farm sizes on the northern beef industry.

2.7 Farm (net) incomes in 2014-15 terms for specialist producers^a



^a Farm income as defined by ABARE is equal to total farm receipts less total cash costs for labour, materials and services, but makes allowance for repayment of debt or income drawn by the owner-operators. Data source: ABARES.MLA Farm surveys database.

MLA investment decision making

MLA investment decision making is structurally complex and highly consultative at both strategic and operational levels.

At the strategic level, direction comes from the Meat Industry Strategic Plan (MISP) and then the subset industry plans for the beef, sheep and goat industries. These whole of supply chain plans are then supplemented by sector plans for processing, live exports and grain feeding. In addition there are Commonwealth R&D priorities that are taken into account. So long as all the plans and priorities (and Peak Industry Councils) are aligned then the multitude of plans can facilitate ownership by all sectors — however, if they are not aligned then MLA is faced with divergent strategic advice.

At the annual operational level, program and project advice comes from a plethora of committees and task forces — these have been expanded in the recent past.

For on-farm R&D there are:

- The Red Meat Panel which considers the balance of regional versus national investment priorities and is the single point of advice on RD&E investment for implementation by MLA
- The three councils — NABRC, SAMRC and WALRC — which represent the interests of northern, southern and western grassfed cattle, sheep and lamb levy payers and review regional priorities against national priorities
- The eighteen Regional Red Meat and Livestock Committees that help identify relevant priorities at the agro-climatic zone level and also provide a platform for testing new concepts
- For the programs that involve marketing/market access and multiple sectors in R&D and there are eleven task forces covering different regions and topics.

At the operational level the challenge is in ensuring that achieving industry ownership and commercial advice through a highly consultative process is not at the expense of efficient and effective decision making within MLA to address the key industry priorities from the MISP. Likewise it is a challenge to ensure the consultative process does not lead to a focus on local issues and a multitude of projects and result in a dilution of effort in addressing the key strategic issues

Issues relating to the MLA consultation process were raised and are further addressed in the section covering the lessons learnt and opportunities for improvement identified in the background papers and workshops.

MLA expenditure

MLA expenditure over the review period was \$864 million in nominal terms (NPV of \$997m). In an impact assessment, expenditure is important, not only in providing one half of the economic equation in generating Benefit Cost Ratios for achieving industry impact, but also in providing tangible evidence that the priorities and associated budgets have been translated into action in the expected time period.

2.8 Budgets by Program

Budgets by Program	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
1.1 Product integrity	9 595	8 027	9 600	9 569	9 554	9 539	10 118	9 678	11 648	11 956	50 515	48 769
1.2 Market access	7 997	6 913	8 538	6 416	8 484	7 230	8 504	7 799	8 511	7 905	42 034	36 263
1.3 Livestock exports	7 533	7 643	10 465	9 359	8 743	8 208	7 998	8 435	7 996	8 459	42 735	42 104
TOTAL – Maintaining & improving market access	25 125	22 583	28 604	25 344	26 781	24 977	26 620	25 912	28 154	28 321	135 284	127 136
2.1 Eating quality	8 633	8 606	9 274	9 627	8 719	9 021	9 005	10 303	10 318	9 583	45 948	47 139
2.3 New products	2 165	2 840	2 133	3 040	2 180	2 550	2 988	3 665	1 622	6 450	11 087	18 545
2.4 Domestic beef marketing	17 618	18 557	17 826	18 158	16 284	16 048	15 006	14 809	14 987	14 496	81 721	82 069
2.5 Domestic sheepmeat marketing	10 683	11 134	11 794	12 237	11 216	11 058	11 026	10 968	11 112	10 898	55 831	56 295
2.6 Export beef marketing	26 516	26 303	26 555	24 524	23 447	22 310	22 957	23 752	22 365	20 974	121 840	117 862
2.7 Export sheepmeat marketing	8 195	7 456	8 251	7 421	7 833	7 562	7 736	7 884	8 011	7 999	40 026	38 321
TOTAL – Growing demand	73 809	74 895	75 832	75 007	69 679	68 549	68 718	71 380	68 415	70 400	356 453	360 231
3.1 On-farm productivity	16 675	18 448	17 662	21 646	19 829	23 070	20 453	24 731	19 309	25 496	93 927	113 391
3.2 Off-farm productivity and capability	3 562	13 341	4 062	8 303	3 778	11 637	3 486	12 642	4 530	13 673	19 418	59 596
3.3 Supply chain and market information	6 673	6 462	6 784	6 676	7 247	6 595	7 169	7 920	7 665	7 048	35 538	34 701
3.4 Animal health and biosecurity	5 586	5 630	5 963	8 218	7 992	9 265	7 685	8 677	7 718	5 144	34 944	36 934
(3.6) Lot feeding program	3 924	3 357	4 020	2 905	4 865	4 127	5 786	5 518	5 338	6 840	23 934	22 746
(3.7) Goat industry program	362	360	453	588	624	604	623	507	618	528	2 680	2 586
TOTAL – Increasing productivity across the supply chain	36 783	47 598	38 943	47 976	44 335	55 299	45 201	59 995	45 177	58 729	210 441	269 954
4.1 On-farm environmental sustainability	14 456	14 687	16 339	14 377	11 692	8 437	9 787	9 926	6 730	9 546	59 003	56 973

Budgets by Program	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
4.2 Off-farm environmental sustainability	2 457	2 061	2 374	3 815	2 436	2 130	2 440	3 516	1 076	2 216	10 784	13 739
4.3 Animal welfare	2 595	1 226	2 240	1 208	2 568	3 734	3 547	5 049	3 390	3 225	14 341	14 442
4.5 Sustainable innovation capability	2 866	3 469	2 218	2 880	1 838	2 701	2 874	5 328	5 414	7 111	15 210	21 489
TOTAL – Supporting industry integrity and sustainability	22 374	21 443	23 172	22 280	18 535	17 003	18 647	23 819	16 611	22 099	99 338	106 644
TOTAL – MLA Donor Company	22 000	*	30 000	*	22 000	*	24 000	*	28 000	*	126 000	*
GRAND TOTAL	180 091	166 520	196 552	170 965	181 330	165 826	183 187	181 106	186 357	179 548	927 517	863 965

* MLA Donor Company actual expenditure is included in actual expenditure of relevant R&D program areas

3 *Aggregated impact assessment*

Top line result to date — MLA expenditure on all R&D and marketing programs provide industry returns of \$6 170 million from expenditure of \$997 million with a BCR of 6.2.

Chart 3.1 and tables 3.2, 3.3 and 3.4 provide a summary of the payoffs from investment in *all MLA R&D and marketing* programs. Supporting details behind the impact from each program area and individual program are provided in following sections.

3.1 Summary of MLA benefits, investments and returns^a— all program area



^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

3.2 Summary of MLA benefits, investments and returns^a— all program areas

		Maintaining and improving market access	Growing demand	Increasing productivity along the supply chain	Supporting industry integrity and sustainability	All MLA programs Total
		1	2	3	4	
Expected benefits						
Red meat industry net income - total ^b	\$m	2 165	2 155	1 385	464	6 170
— 2010-11 to 2014-15	\$m	555	1 395	529	49	2 528
— > July 2015	\$m	1 611	760	856	415	3 641
Red meat gross value of production- total ^c	\$m	3 963	3 838	1 686	-484 ^e	9 003
— 2010-11 to 2014-15	\$m	869	2 446	633	-26 ^e	3 922
— > July 2015	\$m	3 094	1 392	1 053	-458 ^e	5 081
Actual investment^d						
— 2010-11 to 2014-15 inclusive	\$m	146	418	310	123	997
Benefit cost ratio						
Red meat industry net income - total		14.8	5.2	4.5	3.8	6.2
Red meat gross value of production - total		27.1	9.2	5.4	-3.9 ^e	9.0

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. b Net income across all red meat industry sectors including processing. c Saleyard equivalent GVP excluding processing (basis for levies). d Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent. e The logic for this apparent 'anomaly' where net income is positive yet GVP is negative is detailed later in the report – the major factor is a reduction in carrying capacity in northern beef to achieve sustainability leading to a fall in cattle slaughtered (and GVP) but with reductions in costs leading to an increase in net income.

3.3 MLA Impact – benefits in terms of red meat net income^a: All MLA programs

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
1 Maintaining and improving market access	1 098	1 067	2 165	14.8
2 Growing demand	879	1 276	2 155	5.2
3 Increasing productivity along the supply chain	47	1 338	1 385	4.5
4 Supporting industry integrity and sustainability	419	44	464	3.8
Total - ALL MLA programs	2 444	3 725	6 170	6.2
<i>— per cent of impact benefits</i>	<i>40</i>	<i>60</i>	<i>100</i>	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

3.4 MLA Impact – benefits in terms of GVP^a: All MLA programs

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
1 Maintaining and improving market access	1 701	2 262	3 963	27.1
2 Growing demand	1 613	2 225	3 838	9.2
3 Increasing productivity along the supply chain	81	1 605	1 686	5.4
4 Supporting industry integrity and sustainability^b	-555	71	-484	-3.9
Total - ALL MLA programs	2 840	6 163	9 003	9.0
<i>— per cent of impact benefits</i>	<i>32</i>	<i>68</i>	<i>100</i>	

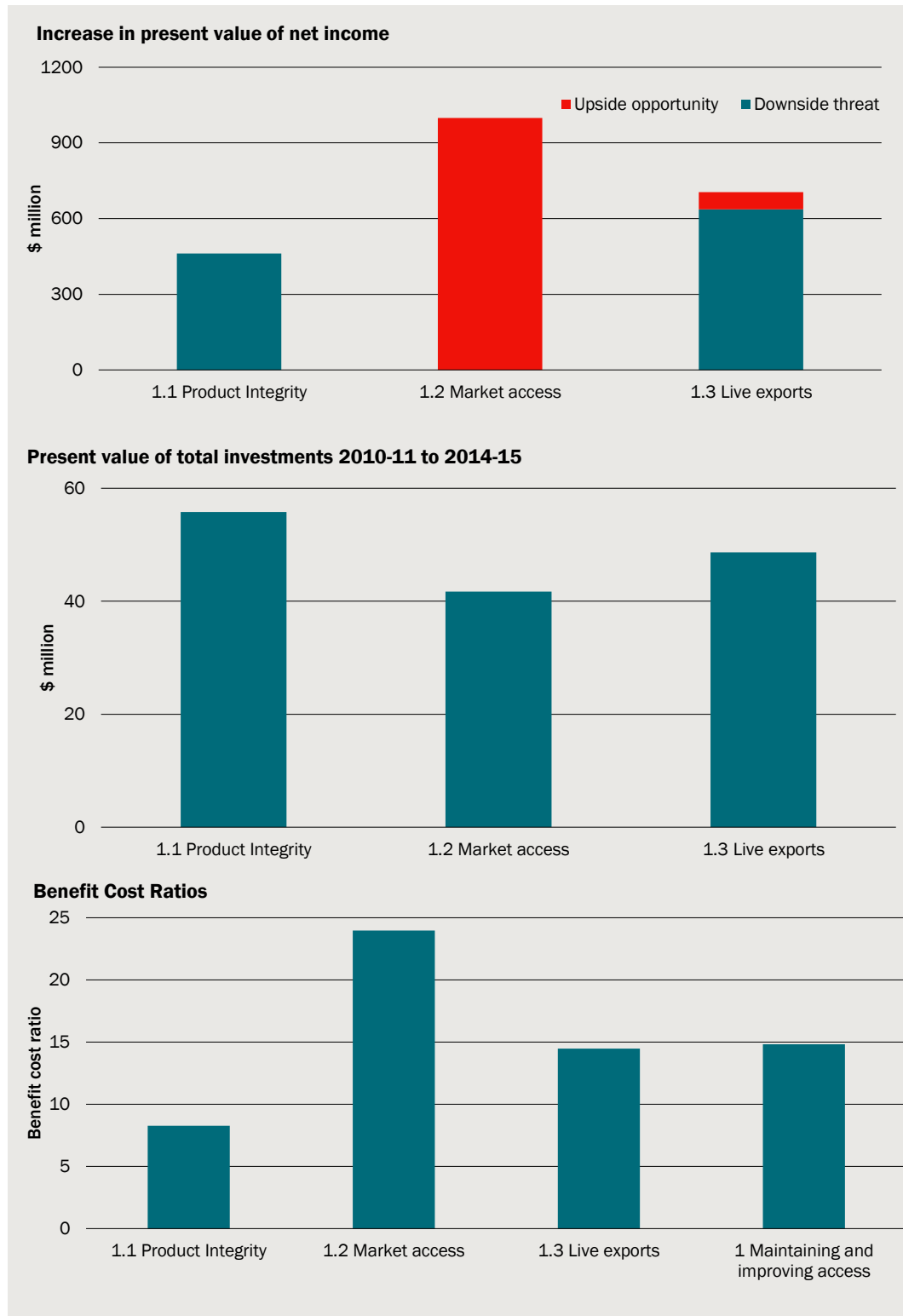
^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b see explanation in footnotes to table 3.2

4 #1 Market Access

Top line result to date — MLA expenditure on Market Access programs provide industry returns of \$2 165million from expenditure of \$146 million with a BCR of 14.8:1.

Chart4.1 and tables 4.2, 4.3 and 4.4 provide a summary of the payoffs from investment in *Market Access* programs. Supporting details behind the impact for each individual program are provided in following sections.

4.1 Summary of MLA benefits and investments^a – Market access portfolio



^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

4.2 MLA Impact – benefits and investments^a: 1 Maintaining and improving market access

		Develop and deliver industry systems that underpin product integrity	Support industry and government to maintain and liberalise world meat markets	Maximise market options for producers and exporters in the livestock export market	Maintaining and improving market access Total
		1.1	1.2	1.3	1
Expected benefits					
Red meat industry net income - total ^b	\$m	462	999	705	2 165
– 2010-11 to 2014-15	\$m	127	47	381	555
– > July 2015	\$m	335	952	324	1 611
Red meat gross value of production- total ^c	\$m	856	2 167	940	3 963
– 2010-11 to 2014-15	\$m	236	97	535	869
– > July 2015	\$m	620	2 069	404	3 094
Actual investment^d					
– 2010-11 to 2014-15 inclusive	\$m	56	42	49	146
Benefit cost ratio					
Red meat industry net income - total		8.3	24.0	14.5	14.8
Red meat gross value of production - total		15.4	52.0	19.3	27.1

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. b Net income across all red meat industry sectors including processing. c Saleyard equivalent GVP excluding processing (basis for levies). d Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

4.3 MLA Impact – benefits in terms of red meat net income^a: 1 Maintaining and improving market access

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
1.1 Develop and deliver industry systems that underpin product integrity	462	0	462	8.3
1.2 Support industry and government to maintain and liberalise world meat markets	0	999	999	24.0
1.3 Maximise market options for producers and exporters in the livestock export market	637	68	705	14.5
Total - 1 Maintaining and improving market access	1 098	1 067	2 165	14.8
– per cent of impact benefits	51	49	100	

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

4.4 MLA Impact – benefits in terms of GVP^a: 1 Maintaining and improving market access

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
1.1 Develop and deliver industry systems that underpin product integrity	856	0	856	15.4
1.2 Support industry and government to maintain and liberalise world meat markets	0	2 167	2 167	52.0
1.3 Maximise market options for producers and exporters in the livestock export market	845	95	940	19.3
Total - 1 Maintaining and improving market access	1 701	2 262	3 963	27.1
– per cent of impact benefits	43	57	100	

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

Key Points

Impact

MLA expenditure on *Market Access* programs provide industry returns of \$2 165 million from expenditure of \$146 million with a BCR of 14.8:1.

Of the component programs in the portfolio, market access delivered 46 per cent of the benefits.

In terms of return on investment, market access delivered the highest BCR of 24.0:1, followed by live exports (14.5:1) and product integrity (8.3:1).

Observations

Product integrity — MLA's Product Integrity Program is critical for industry in mitigating the impact of an emergency disease outbreak and in marketing Australian product at price premiums in global markets.

- The NLIS database for livestock traceability was effectively managed by MLA and a number of enhancements made.
- Important steps were taken by MLA towards achieving even greater levels of compliance in the LPA program
- The meat science research program made a significant contribution to knowledge in a number of important areas
- Work completed under SAFEMEAT Initiatives Review, which was supported by MLA, provides a pathway for further improvements into the future.

Market access — There was an unparalleled level of activity and success in the Market Access Program in the period 2010-11 to 2014-15, with FTAs completed with three of Australia's four largest export meat markets. The returns attributed to MLA in this area reflect both the levels of trade liberalisation opportunities that became available during this period and MLA's success in ensuring these opportunities were realised to the maximum extent possible by the meat industry.

Live exports — Major changes were made to regulations applying to the Live Export trade during the Evaluation Period and nimbleness was required in the operation of the industry's live export programs in order to respond to the new environment. In the view of industry and Government representatives consulted, the response of the Live Export Program to the new environment prevented the industry from suffering a significant downturn in returns.

Impact team recommendations

- Achieve consolidation of the meat industry's integrity systems and move all systems from paper based to electronic transfer of data.
- Devote more effort to measuring industry returns from Market Access Programs operated by MLA
 - In the market access area increase the accuracy with which MLA's contribution to outcomes is measured
 - Undertake analysis of the contribution of MLA's product integrity programs to price premiums achieved in overseas markets.
- Inject further resources into technical market access issues — this is the growth area in trade impediments for the meat and livestock industry. Examine the benefits of integrating the meat safety science research more fully into MLA's market access program.
- Going forward defence of market access conditions will increase in importance — this needs to be recognised in program strategies and outcome measurement.

- Significant dangers continue to exist to the Live Export trade. Community expectations of the trade will keep on increasing and further work will be required to meet these expectations on an ongoing basis - for example, the work on the Livestock Global Assurance Program (LGAP).

5 1.1 Product integrity

Top line result to date — MLA expenditure on the Product Integrity program provide industry returns of \$462m, from expenditure of \$56 million with a BCR of 8.3:1.

Tables 5.1, 5.6, 5.7 and 5.8 provide a summary of the payoffs from investment in the *Product Integrity program*.

5.1 Summary—MLA Impact benefits and investments^a: 1.1 Product integrity

		Product Integrity
		1.1
Expected benefits		
Red meat industry net income - total ^b	\$m	462
– 2010-11 to 2014-15	\$m	127
– > July 2015	\$m	335
Actual investment^c		
– 2010-11 to 2014-15 inclusive	\$m	56
Benefit cost ratio		
Red meat industry net income - total		8.3

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

b Net income across all red meat industry sectors including processing.

c Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

Summary

Work undertaken in MLA's Product Integrity Program provides some of the bed rock on which the Australian industry rests — assisting to safeguard the industry against the impact of the possible incursion of exotic diseases and contributing to the image of all Australian meat as 'clean and green'.

Both of these areas have been assessed as providing significant benefits to the Australian industry — the disease control aspects mitigating against downside risks and Australia's leadership in product integrity systems allowing price premiums to be realised in global markets.

A number of important advances were made under this Program during the Evaluation Period

- The usability of the NLIS database was further improved over the Evaluation Period, particularly in the critical area of running complex tracing reports. Additionally, work was commenced on a complete re-write of the NLIS software to ensure it remains current. Industry and Government standards in terms of the operation of the database continued to be met.
- With LPA, extensive communications activities were undertaken to remind producers of their obligations under LPA and the LPA recommitment program was introduced. These initiatives had obvious success — with the number of LPA accredited producers increasing by 14 per cent and almost 25 per cent of producer respondents to a survey stating that they had changed on-farm practices to meet LPA requirements.
- The meat safety science activities continued to supply world leading knowledge to the Australian industry - knowledge that allows the industry to better understand hazard and manage/mitigate risk and demonstrate control.
- Program impact was measured at \$462 million (net industry income) with a BCR of 8.3:1. Some 27 per cent of the benefit accrued during the assessment period with 73 per cent to be captured in coming years.

Evaluation process

Program 1.1, 'Develop and deliver industry systems that underpin product integrity', hereafter referred to as the 'Product Integrity Program', was evaluated using:

- Results from a previous evaluation by Marsden Jacobs Associates conducted in 2015²;
- Information collected as part of developing the MISP2020³ and
- Analysis undertaken in a previous study by the Centre for International Economics for Animal Health Australia⁴.

As noted by Marsden Jacob Associates, MLA's Product Integrity Program comprises activities that fall into three major component areas:

- Ongoing development and support of a central database and associated support systems for livestock traceability, which operates as the National Livestock Identification System (NLIS);
- Ongoing development and support for on-farm food safety systems, which operates as the Livestock Product Assurance (LPA); and

² Marsden Jacob Associates 2015, *'Ex-post benefit-cost assessment of MLA's Product Integrity Programs'*, Project code V.LIM.1505, Prepared for Meat & Livestock Australia, July.

³ Centre for International Economics 2015, *'Meat Industry Strategic Plan 2015-20: Quantifying the payoffs from collaborative investments by the red meat industry'*, Prepared for the Red Meat Industry Council, September.

⁴ Centre for International Economics 2010, *NLIS (sheep and goats) business plan: the costs of full compliance with NLTPS*, prepared for Animal Health Australia, Centre for International Economics, Canberra and Sydney, June.

- Scientific research, which involves a range of projects related to researching and communicating food safety risks and management approaches and other interventions to address these.

In the current evaluation two key types of benefit were considered to have arisen from the Product Integrity Program:

- Avoidance of potential costs associated with disease outbreaks - MLA's Product Integrity Program reduces the impact of disease outbreaks by improving animal traceability.
- Achievement of price premiums in overseas markets due to the Product Integrity Program contributing to Australia's world leadership in product meat safety and integrity systems.

Objectives from MLA 5 year business plan

The key objectives of the Product Integrity Program, as stated in the 2012-13 to 2015-16 Business Plan, were as follows:

Livestock Traceability: *Develop and implement appropriate meat and livestock traceability systems*

- Position the NLIS database to ensure sustainable longer term performance.
- Enhance the usability of the NLIS database through improved functionality and implementation of new technologies.
- Implement robust methodologies and processes to ensure device retention and readability meets industry and government expectations.
- Support industry and government in meeting the National Traceability Performance Standards through the effective administration of NLIS.
- Establish an operational framework to support the expansion of NLIS into other species and industries.

On-Farm Food Safety Systems: *Support the development and uptake of food safety and quality assurance systems by all sectors of the red meat supply chain*

- Develop systems that facilitate the electronic transfer of food safety information throughout the supply chain.
- Improve on-farm food safety program awareness and compliance through effective communication.
- Develop a future roadmap for industry's on-farm risk management systems.
- Support industry in the sustainable delivery of its on-farm food safety programs.

Food Safety Scientific Research: *Conduct scientific research to ensure food safety systems are at the leading edge of knowledge and practice*

- **Products:** Manage known problems and issues, identify emerging issues, and ensure product shelf life.

- **Process:** Provide tools to better control the production process and monitor processing performance.
- **Systems:** Develop systems to monitor product quality and improve inspection activities.

Program Outputs and Outcomes

As identified by MLA staff, key program outputs and outcomes during the Evaluation Period are listed below.

Livestock traceability

The NLIS database for livestock traceability was effectively managed by MLA throughout the Evaluation Period and a number of enhancements made.

Critical to the effective management of the database was regular performance and security testing. Also important in ensuring that the database continues to be effective was the role of the NLIS Help Desk. During the Evaluation Period, on an annual basis, the NLIS Help Desk service took around 45,000 calls and 10,000 emails. Amongst other things these calls involved requests for assistance in:

- the general use of the database;
- identifying and correcting errors and inconsistencies; and
- actioning errors and warnings flagged by the database.

Major enhancements to the operation of NLIS made during the Evaluation Period were:

- The 'NLIS Refresh' project - commenced in 2013 and due for completion in 2016. This project involves a complete upgrade of the NLIS Database — 'from the ground up'. The first publically visible output of the changes being implemented was the release of the new NLIS website in July 2015.
- NLIS Ltd also commenced the development of a data warehouse to improve the reporting experience — being especially designed to improve the tracing and compliance monitoring activities undertaken by the State and Territory Departments. The changes involve vast improvements in the time taken to run complex tracing reports — with times being reduced from hours to minutes. The data warehouse will continue to be extended for other reporting requirements as the NLIS Refresh progresses.
- Improved protocols for testing NLIS devices were developed and implemented during the Evaluation Period. To address retention issues with devices, NLIS Ltd commenced two projects — the development of a laboratory test protocol for ear tags, and a desktop retention analysis.
 - The project on laboratory testing allows new tags submitted for accreditation to be laboratory tested prior to the commencement of field trials, resulting in a significant reduction in the risk of tags passing three year field trials but not performing beyond this.

- The desktop retention analysis involves data mining to detect patterns that may provide clues on retention issues and, ultimately, result in better procedures and devices.

On-farm food safety systems

During the Evaluation Period MLA continued to support industry in the delivery of on-farm food safety risk management programs such as LPA and National Vendor Declarations (NVDs).

A critical contribution during the Evaluation Period was MLA designing and implementing a three year communications program to reacquaint accredited producers with LPA and to increase participation in the program.

- Over the evaluation period, program participation increased by 14 per cent from 187,000 to 213,000 accredited LPA participants.
- A survey conducted at the completion of the project found a 25 per cent increase in awareness of LPA over the course of the campaign. The survey also found that nearly 25 per cent of respondents had changed on-farm practices during the previous year to meet LPA requirements, with most of them (73 per cent) focussed on improved record keeping.

As a part of the LPA program strategy, MLA supported the launch of the LPA recommitment program. The recommitment is required to be completed by all LPA accredited participants on an annual basis or each time NVDs are ordered (to a maximum of once per year). Designed as a mechanism to remind LPA participants of their obligations as a part of the LPA program, the LPA recommitment was introduced in July 2012. At the end of the evaluation period, more than 157,000 LPA accredited participants had recommitted to the LPA program. Further steps to strengthen the LPA recommitment program were progressed in 2014-15 with the development of an eLearning tool for the LPA program.

Progress was also made during the Evaluation Period on transitioning from a paper based system for NVDs to an electronic system:

- In 2010-11, MLA developed a web based system for the eDEC tool to facilitate greater uptake and usage of electronic NVDs. The web based eDEC was launched in December 2011 to provide LPA accredited producers with the ability to enter NVDs through an on-line interface, removing the need to download and install software locally. The launch of the new online eDEC system stimulated significant uptake of the eDEC, with users increasing from 2,780 in July 2010 to 32,000 users by June 2015. During 2014-15 more than 86 000 NVDs were generated using the online eDEC system.
- While the uptake of the eDEC system moved industry closer to an electronic model for transferring food safety information through the supply chain, the eDEC continues to require the printing of a paper-based NVD to accompany livestock as they move. Research conducted during the Evaluation Period identified that the processing of paper-based NVDs costs industry more than \$13

million each year. Two alternative models were considered for the development of a fully integrated electronic livestock declaration system:

- One involved a central web interface
- The other involved development of customised software solutions by commercial providers with this software complying to certain standards for the type of information collected and data transfer protocols.
- The second of these models was chosen by industry. At the end of the Evaluation Period, MLA had finalised the framework for the eNVD including the business rules, data standards, methods for data transfer and validation, and the delivery of a central archive database for traceability and auditing.
- A final critical activity during the Evaluation Period was the SAFEMEAT Initiatives Review. This review was commissioned by SAFEMEAT in 2011-12 to assess the future requirements of Australia's through-chain assurance systems. The key industry programs covered in the review were NLIS, LPA and NVDs.
- The output from the Initiatives Review is a report 'Towards an Integrated Integrity System'. This report details a pathway to achieving the vision of a fully auditable and responsive whole-of-chain risk management system — one that maintains market access, food safety, product integrity (including traceability and animal welfare), and biosecurity — to ensure that Australia's world leadership in this area is maintained in the future. The key aspects of this report are likely to form the focus of MLA's investment and involvement over the next planning period and include recommendations that:
 - Animal welfare and biosecurity Standards are embodied as part of the LPA program.
 - The scope of industry's integrity programs is adjusted to deliver a strengthened through-chain risk management system.
 - LPA participants undergo an enhanced recommitment to the LPA program once every three years.
 - An eLearning process becomes a part of the LPA program, to reinforce the strengthened on-farm system and ensure familiarity with LPA requirements.
 - An integrated integrity system communications strategy is delivered in consultation with industry.
 - A phased rollout of the eNVD is commenced.
 - A single log-in for NLIS, LPA, eNVDs and other industry initiatives is implemented.
- Importantly, from a delivery perspective, the Steering Group's report recommends that the management and delivery of industry's integrity programs (NLIS, LPA, NVDs) becomes the responsibility of a single company operating initially as a subsidiary of MLA. The delivery of the integrity programs under a single management structure should create opportunities for better integration and increased efficiencies within the red meat industry's integrity system.

Meat safety scientific research activities

- The meat safety R&D component of the Product Integrity Program was described by MLA staff as a 'producer of knowledge assets'. Those assets are then used to secure other objectives such as regulatory reform, risk management procedures or responding to customer requirements. Knowledge assets are inherently difficult to value because their value lies in wide knowledge, understanding and acceptance of the information, which means that implementation can frequently occur without the generator of the knowledge being aware. There is also the problem of measuring public health benefit, when data are often insufficient to clearly attribute a burden of disease to red meat products (which is extremely low) and the effect of a control measure on the incidence of disease is also difficult to measure.
- In terms of high level program outputs MLA staff noted the following:
- The suite of activities has produced scientific research of relevance to the industry that is of high quality. As evidence of this quality, a number of pieces of research generated by the program have been published in well-regarded international scientific journals. Additionally, those involved in the Program are invited reviewers on international scientific publications and are members of international scientific advisory groups. This involvement strengthens Australia's meat safety leadership role and creates credibility that is useful in effectively dealing with issues when they do arise.
- Outputs from the program have been used within Australia and internationally to enter into dialogue on proposed regulation and regulatory approaches, to produce guidelines for regulatory compliance and to provide industry with concepts and practices to enhance meat safety and integrity.
- Specific outputs from the program have included:
- Demonstration of a low prevalence in Australian beef exports of the non-O157 E. coli strains referred to as the 'Big 6' (O26, O45, O103, O111, O121, and O145). This project was initiated in response to increasing regulations in this area. Two important benefits of this research are:
 - the data demonstrates the good food safety attributes of Australian meat; and
 - the data provides a justification for lower sampling rates being applied to Australian meat.
- The research also provides Australian processors with local data for presentation to their international customers.
- Investigations were conducted into patterns of shedding E. coli O157 on farm to generate Australian data that would allow greater understanding of the ecology/epidemiology of shedding and the potential for control on farm. The on-farm investigations suggest that rain events precede high prevalence and concentration of E. coli O157 shedding in cattle. Further work will be done to try to understand (and, potentially, manage) this shedding. Once further work is completed processors may be able to make use of the information in their control strategies.

- A risk assessment was undertaken of the significance of *E. coli* O157 in hamburgers made with Australian beef and consumed in the USA. Data on Australian beef has been used to demonstrate a very low risk of illness, even when subjected to American domestic (under)cooking. Three scientific publications and conference presentations have been made based on this work. This work underlines Australia's position and may be relevant in future discussions on the significance of Shiga toxin producing *E. coli* (STEC) in beef and also in addressing the developing regulations on Salmonella in beef.
- The ESAM database contains information from all export slaughter establishments on carcase, and more recently, carton meat samples, for total viable count, *E. coli*, STECs and Salmonella. The information in the database is derived from information collected by the Department of Agriculture and is managed by South Australian Research and Development Institute (SARDI). MLA contracts SARDI to analyse the data and provide reports to establishments. SARDI provides around 60 processing establishments with monthly reports using information in the database. The data has allowed MLA to maintain a watch on trends, to present interpretations to industry on these trends, and has been used as the basis for a number of investigations. As importantly, processors use the reports to determine operational changes that may be needed. In a survey of processors in 2014 89 per cent of respondents actively considered the report, with 26 per cent stating that it provided considerable value.
- MLA during the Evaluation Period conducted a number of training courses and produced guidelines in a number of areas. New editions of the 'Processor's Guide to Improving Microbiological Quality' and 'Guidelines for the Safe Manufacture of Smallgoods' were published and 'Guidelines for the safe retailing of meat and meat products' were produced.
- MLA undertook a range of research projects examining the shelf life of vacuum packed meat products, in particular beef and lamb. These projects illustrated that the shelf life of vacuum packed beef and lamb is longer than market restrictions in place in some parts of the world to which Australia exports vacuum packed meat. A book, 'Shelf life of Australian red meat' was published that provides information for processors, exporters, importers, traders, regulators and customers about the shelf life of red meat - with a focus on vacuum packed product. The research continues to be used by MLA and by the Department of Agriculture in arguing for changes in shelf life regulations in a number of importing countries — but only with limited success at this stage.
- A range of projects have been directed at understanding hazards - contextualising risk, investigating risk, managing/mitigating risk and demonstrating control. This has been, essentially, a defensive activity conducted to prepare for threats to the industry that may come through investigations linking red meat to various foodborne diseases. Research in this area has been completed on *Clostridium difficile*, *Toxoplasma gondii* and into Antimicrobial resistance (AMR). Additionally, significant work was commenced to document and understand the prevalence of Salmonella in Australian beef supply chains in response to regulatory processes beginning in the USA, related to ground beef.

Inputs into Impact Modelling

The impact of the Product Integrity program was modelled using information from:

- the Marsden Jacob Associates Evaluation, published in 2015;
- analysis completed as part of the MISP2020; and
- previous work undertaken by the Centre for International Economics for Animal Health Australia⁵.

In the current Evaluation two types of benefits are ascribed to MLA's Product Integrity Program⁶:

- The first relates to avoidance of costs associated with disease outbreaks. By improving traceability MLA's Product Integrity Program reduces the impact of disease outbreaks.
- The second relates to price premiums secured in overseas markets from Australia's world leadership in Product Integrity. These price premiums arise from a range of factors, including from the complete suite of activities undertaken in the Product Integrity Program — the maintenance and constant improvement in NLIS, maintenance and further development of on-farm food safety systems (Livestock Production Assurance) and the heavy investment into scientific research that is conducted into food safety risks and management approaches.

Avoidance of costs associated with disease outbreaks

In calculating the 'disease avoidance' benefits arising from the traceability systems supported by MLA under the Product Integrity Program we have generally accepted the approach adopted by Marsden Jacob Associates. As highlighted in the Marsden Jacob Associates report, the introduction and operation of NLIS has improved levels of traceability for cattle, sheep and goats which leads to benefits in limiting the costs of a disease outbreak in the event that a disease outbreak occurs. The benefits arising from NLIS, therefore, are benefits related to reductions in disease costs.

It is important to realise that NLIS does not reduce the probability of a disease outbreak. Rather, the benefit of NLIS is to reduce the cost of the occurrence of a disease outbreak if an outbreak were to occur. Effectively the improved traceability offered by NLIS allows an outbreak to be 'ring fenced' and brought under control more quickly than would

⁵ Centre for International Economics 2010, *NLIS (sheep and goats) business plan: the costs of full compliance with NLTPS*, prepared for Animal Health Australia, Centre for International Economics, Canberra and Sydney, June.

⁶ It should be noted that the analysis of benefits in the current evaluation differs somewhat from that undertaken by Marsden Jacob Associates. The approaches are reasonably similar for the calculation of benefits arising from avoidance of costs associated with disease outbreaks. However, approaches differ in the calculation of other benefits. In the current evaluation we have ascribed a price premium in export markets as arising holistically from the work undertaken in the Product Integrity Program – as was done in calculating MISP2020 benefits. Marsden Jacob Associates did take into account price premiums, but in a very limited way, associating these with particular projects of scientific research.

otherwise be the case. A risk continues to exist of a major disease outbreak in Australia. Tools such as NLIS are required to mitigate the impact on the Australian industry of a possible disease outbreak.

In analysing the benefits of NLIS Marsden Jacob Associates considered two types of disease outbreaks:

- A fast moving, highly contagious disease, exemplified in the Marsden Jacob Associates evaluation by Foot and Mouth Disease (FMD).
- A slow moving disease, exemplified in the Marsden Jacob Associates evaluation by Bovine spongiform encephalopathy (BSE).

The following probabilities have been assumed for an FMD and BSE outbreak:

- For FMD Marsden Jacob Associates assumed the probability of an outbreak in any year to be 1.5 per cent. In the current evaluation this probability has been adjusted downwards, to 0.6 per cent, to reflect the latest OIE thinking on risk⁷.
- For BSE the probability of an outbreak in Australia was assumed by Marsden Jacob Associates to be 1 per cent in 2004, reducing to 0.25 per cent in 2014 and to 0.002 per cent by 2044. A probability curve has been fitted to this data to provide estimates for 2010 to 2030, the evaluation period used in the current study.

The estimated losses to the industry of a disease outbreak vary considerably depending on the key assumptions around size of the outbreak, the time and effectiveness of mitigation strategies and the exclusion period of Australian producers from key export markets. The CIE in 2010 estimated that an FMD outbreak could cost Australian red meat industries between \$8.9 and \$16.6 billion over the 3 to 5 year period from the time of the outbreak to the full re-entry into sensitive markets⁸. ABARES in 2013, on the other hand, placed the industry costs as high as \$42.5 billion in present value terms⁹.

In terms of impact on the Australian industry of a disease outbreak:

- For the industry impact of an outbreak of FMD Marsden Jacob Associates used the ABARES estimate of impact and, for consistency, the same estimate is used here.
- For the industry impact of an outbreak of BSE Marsden Jacob Associates used the estimate of \$3.3 billion (in 2006 dollars) by Yainshet, Cao and Elliston¹⁰ and

⁷ Miller, G., Ming, J., Williams, I. and Gorvett, R 2012, *Probability of introducing foot and mouth disease into the United States via live animal importation*, Revue Scientifique et Technique, Office International Epizooties, Vol. 13, pp. 777-787.

⁸ Centre for International Economics 2010, *NLIS (sheep and goats) Business Plan: The costs of full compliance with NLTPS*, Prepared for Animal Health Australia, June.

⁹ Buetre, B, Wicks, S, Kruger, H, Millist, N, Yainshet, A, Garner, G, Duncan, A, Abdalla, A, Trestrail, C, Hatt, M, Thompson, LJ & Symes, M 2013, *Potential socio-economic impacts of an outbreak of foot-and mouth-disease in Australia*, ABARES research report, Canberra, September.

¹⁰ Yainshet, A., Cao, L. and Elliston, L. 2006, *A Hypothetical Case of BSE in Australia: Economic Impact of a Temporary Loss of Market Access*, ABARE Report Prepared for the Product Integrity, Animal and Plant Health, Australian Government Department of Agriculture, Fisheries and Forestry, Canberra, October, page 18.

adjusted this estimate by the GDP deflator to derive costs for later years — and we have followed the same approach.

Two further critical parameters are needed in order to assess the benefits flowing from NLIS in terms of reducing potential disease costs:

- First, estimates are required of the degree traceability has been improved by NLIS versus the most likely alternative that would be used if NLIS did not exist.
- Second, any improvement in traceability needs to be translated into a reduction in disease costs on the industry.

On the first of these, Marsden Jacob Associates assumed that in the absence of NLIS a traceability system would still operate in Australia, but the system would be considerably inferior to NLIS. In particular, Marsden Jacob Associates assumed that if NLIS did not exist (or if NLIS operations ceased) a mob based traceability system would operate based on visual tags (tail for cattle and ear for sheep and goats). Furthermore, Marsden Jacob Associates assumed that in the absence of NLIS database tools, the tracing of cattle, sheep and goats would be undertaken via a paper based system. Differences between the current system and the assumed ‘counterfactual’ by Marsden Jacob Associates are summarised in table 5.2.

5.2 Comparison of current system with counterfactual

Characteristic of system	Current system	Counterfactual
Type of system	Individual cattle identification for cattle Mob-based identification for sheep and goats	Mob-based identification for cattle Mob-based identification for sheep and goats
Devices	Electronic RFID ear tag or rumen bolus for cattle Ear tag for sheep and goats	Tail tag for cattle Ear tag for sheep and goats
Supporting tracking system	NLIS database for cattle, sheep and goats	No NLIS database: paper-based NVD

The differences in system characteristics between NLIS and the counterfactual translate into different performances in terms of traceability.

The performance of NLIS in terms of traceability has been well documented:

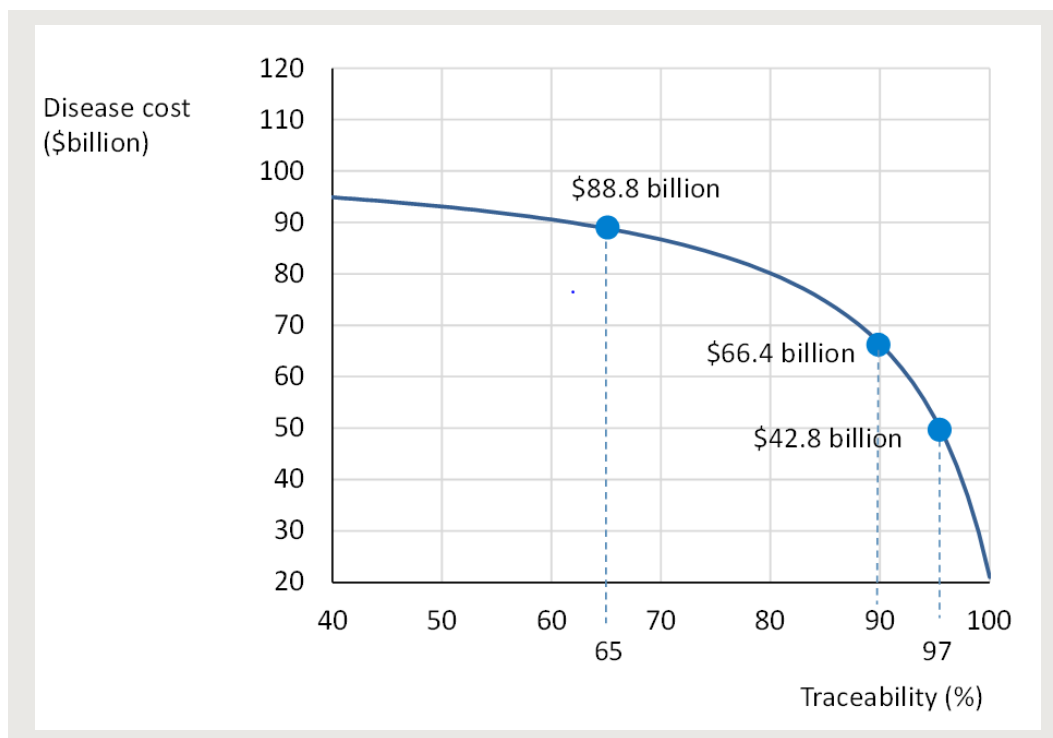
- For cattle the most recent traceability exercise was Cow Catcher II, held in 2007. This exercise demonstrated that NLIS achieved traceability of 97.8 per cent. Marsden Jacob Associates assumed a slightly more conservative traceability figure of 97 per cent.

- For sheep and goats Marsden Jacob Associates, following ABARES analysis conducted in 2014¹¹, assumed traceability of 90 per cent. The ABARES conclusion on traceability was based on consultation with State and Territory jurisdictions.

Under the counterfactual Marsden Jacob Associates assumed that a traceability level of 65 per cent would apply (compared to the 'with NLIS' case of 97 per cent for cattle and 90 per cent for sheep) and a similar figure has been assumed in the current study:

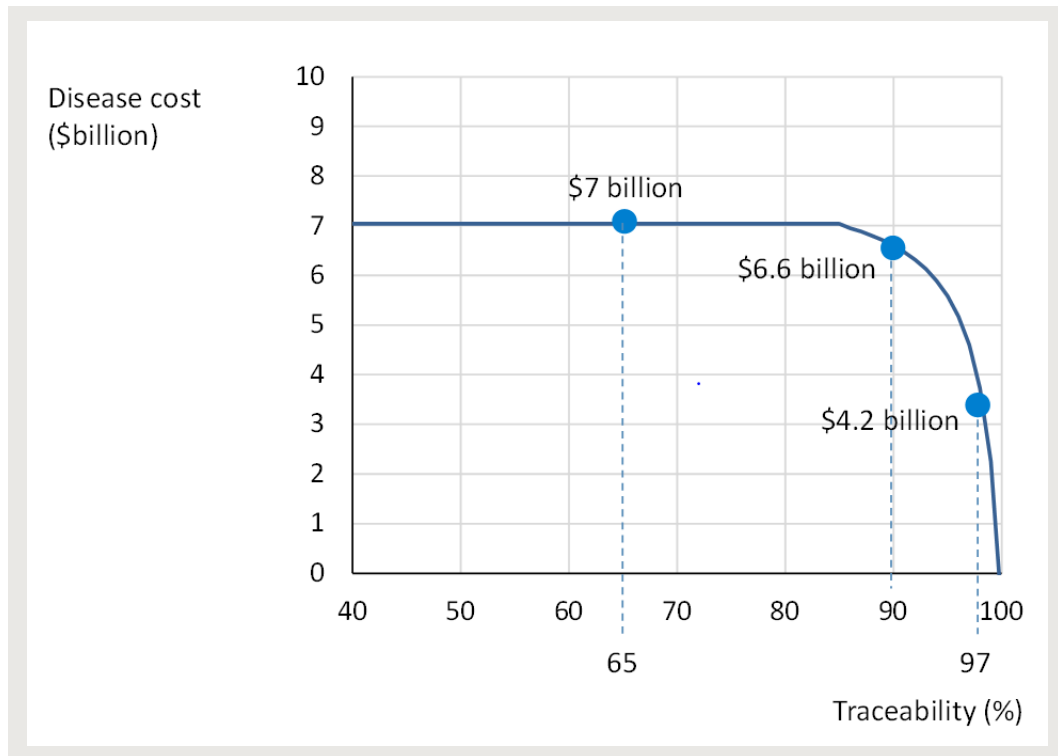
- The Marsden Jacob Associates assumption was based on stakeholder consultation which revealed that traceability under a mob based system was likely to be similar to those that were achieved under Exercise Sheepcatcher in 2007 which estimated the traceability of sheep at 57 per cent.
- Marsden Jacob Associates adjusted the Exercise Sheepcatcher level of traceability up to 65 per cent assuming that there would have been minor incremental improvements to traceability implemented between 2007 (when Exercise Sheepcatcher took place) and 2014.
- In terms of the impact of the improved traceability in reducing disease costs:
- For FMD Marsden Jacob Associates used analysis undertaken by the CIE in 2010 and the current evaluation also relies on this analysis. The relationship between traceability and FMD disease costs is shown in chart 5.3.

5.3 FMD disease outbreak costs at different traceability levels



¹¹ ABARES 2014, *Implementation of improvements to the National Livestock Identification System for sheep and goats: Decision Impact Regulatory Statement*, ABARES research report.

5.4 BSE disease outbreak costs at different traceability levels



- For BSE, based on MLA analysis, Marsden Jacob Associates assumed the relationship between disease costs and traceability levels shown in chart 5.4 and this assumption has been followed in the current evaluation.

There is one important difference between the Marsden Jacob Associates analysis and that followed in the current evaluation: Marsden Jacob Associates assigned no past benefits to NLIS because no disease outbreak had occurred. The current evaluation, however, does assign past benefits to NLIS.

The approach taken by Marsden Jacob Associates is quite clearly stated on p24 of their report:

‘The historical benefits of the NLIS are estimated to be zero in present value terms since there have been no FMD outbreaks since the introduction of the NLIS’.

It is the view of the current Evaluation Team that this is faulty logic. In the view of the current Evaluation Team if it made sense ex ante to mitigate a risk based on an assumed level of risk and likely impact, and neither of these parameters had changed, ex-post the same level of benefits should apply.

An analogy can be found in personal decisions to insure houses and cars. If no claims are made on an insurance policy, ex-post do individuals regard the policy as a waste of money? Surely not — the policy has served its purpose of mitigating risk.

If the Marsden Jacob Associates approach were to be adopted a dichotomous approach to NLIS benefits would result:

- No benefits would be generated until a disease outbreak occurred
- Once a disease outbreak occurred enormous benefits would be generated

Just as the costs of traceability systems are spread across the years, so should be the benefits and this is the approach taken in the current study. Over an infinite time period no difference in the Marsden Jacob Associates approach and that taken here would occur, but in five year time spans considerable differences arise.

Price premiums arising from Australia's integrity systems

Australia has a well deserved reputation world-wide for supplying 'clean and green' products. As an island continent, an accident of geography, Australia has been protected from a range of plant and animal diseases which are prevalent in most other parts of the world. Additionally, world leading integrity and meat safety systems and high standards of meat inspection in Australia ensure that Australian meat is of the highest quality in terms of being 'clean and green'.

This 'clean and green' image confers significant advantages on Australia. Not only has Australia's 'disease free' status and world leadership in food safety and integrity systems provided access to a very wide range of global markets, including fastidious markets in North America and North Asia, it has also allowed price premiums to be secured within markets.

The combination of our integrity systems and 'disease free' status allows exporters to charge a premium over suppliers from other countries without similar credentials. These price premiums are undoubtedly considerable, but difficult to directly measure. In most cases, Australian product does not compete directly with product from those countries with lower standards to permit a direct comparison on a like-for-like basis. In some countries, however, comparisons are possible.

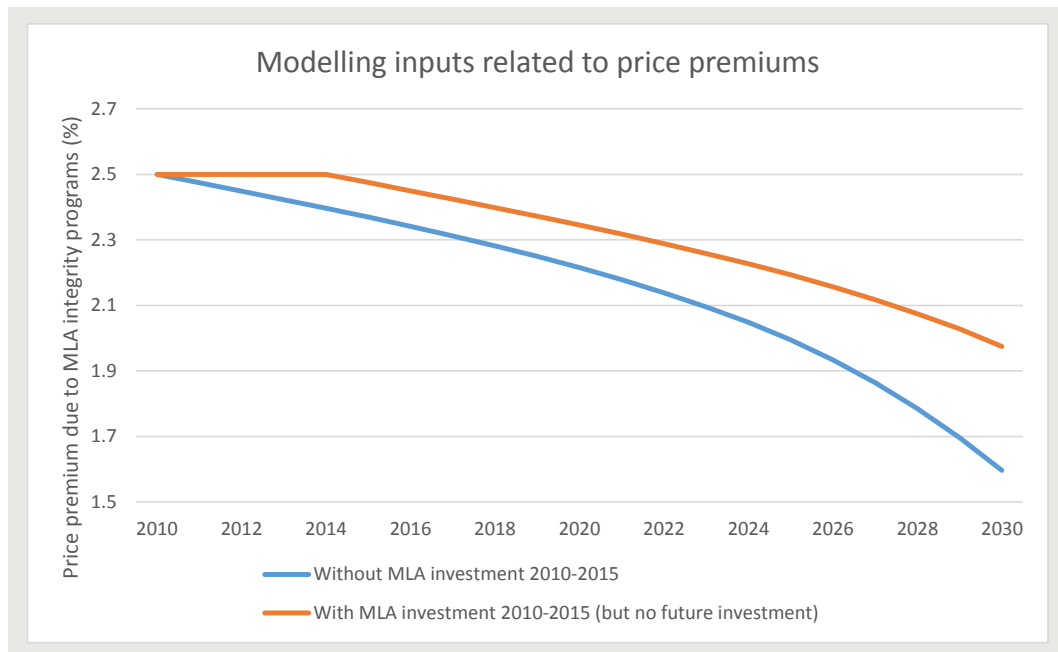
- An analysis of forequarter beef prices in the Malaysian market, conducted as part of MISP2020, showed this premium can be up to 40 per cent.¹² The Malaysian market provides an opportunity to compare similar product between the major exporters including Australia and New Zealand, India and Brazil.
- Across all markets, the MISP2020 analysis concluded that a premium of 30 per cent was likely to be a more conservative estimate for beef. As noted above, however, this premium is attributable to both Australia's integrity systems and 'disease free' status, which is largely unrelated to industry investment on integrity systems.
- MISP2020 concluded that without continued industry investment in integrity systems, price premiums for beef may fall by about 5 per cent - but the fall was likely to be gradual and over an extended period of time. Similarly, MISP2020 concluded that without on-going industry investment in integrity systems prices for Australian sheep and goat meat could fall by about 1 per cent by 2030. The authors of MISP2020 also noted that it was unlikely that premiums would be completely eroded without any industry investment, due to current systems that are already in place, further actions from individual firms that will step in without

¹² Centre for International Economics 2015, *Meat Industry Strategic Plan 2015-20: Quantifying the payoffs from collaborative investments by the red meat industry*, Prepared for the Red Meat Industry Council, September – especially see appendix D for details behind this calculation.

industry investment and the contribution of the 'disease free' status to demand for Australian product.

- In assigning benefits recognition is also needed that of the industry's total investment in integrity systems only about 60 per cent is through MLA (considerable investments are also made through Animal Health Australia and the National Residue Survey).
- Based on the MISP 2020 analysis, model inputs, in terms of price premiums, used to evaluate benefits from MLA investment in integrity systems in the period 2010-11 to 2014-15 are shown in chart 5.5. The difference between the two lines in the chart effectively provides a measure of the benefits of MLA's integrity investments 2010-11 to 2014-15.

5.5 Modelling inputs related to price premiums



Opportunities to improve impact achieved

- Over the course of the Evaluation Period, there were a number of significant achievements in the delivery of livestock traceability, on-farm food safety systems and scientific research. In the assessment of the Evaluation Team the Program has operated effectively over the past five years and generated significant benefits for industry.
- During the Evaluation Period there was a heavy focus from industry on developing future strategies for the red meat industry's integrity system, which will largely be implemented from 2016 onwards. Through the SAFEMEAT Initiatives Review, industry aims to deliver a strengthened through-chain risk management system that underpins domestic and overseas market access. The

outcome of the Review should be more robust industry assurance programs that incentivise participation and uptake, promote greater efficiency in their delivery, and encourage continual improvement.

- Within the boundaries of the meat industry the SAFEMEAT Initiatives Review has identified critical improvements to the way Product Integrity systems operate. Ultimately, however, it needs to be recognised that many farmers operate across commodities — from meat to wool to grains to vegetables, etc. Considerable efficiencies can be realised, and frustrations avoided, through integrating the operation of on-farm QA systems across agriculture generally. Ensuring QA systems operate optimally across commodities, as well as within a commodity, must be a focus going forward.

In terms of MLA's meat safety scientific research activities, it is recognised that these have multiple targets for communication, with concrete results only evident over the longer term. It is acknowledged by MLA staff that there is a need to communicate better with PICs about the work of the program and the strategies being pursued. There is also a need to be more effective in communication and encouraging change at the national and international levels.

Going forward a critical aspect of work in this area will be coordination between MLA and AMPC. AMPC has taken a more active interest in food safety in the past couple of years, initiating their own research program. Inevitably, there will be overlapping ideas and the need to coordinate.

Increased benefits would also flow from closer technical cooperation between the MLA scientific meat research program and the Department of Agriculture, particularly through the positioning of MLA resources in a semi-official capacity. It is the view of staff that, apparently, MLA, as an industry representative organisation, is perceived by the Government to have a conflict of interest which can limit official consultations. Greater cooperation with the Department and perceived independence may be helpful to maximise the outcomes. Given that MLA has a Deed of Agreement with the Australian Government about the way we behave, it might be possible to include appropriate safeguards/undertakings that would allow some kind of semi-official role for MLA in pursuing, together with the Department, the reduction of trade barriers.

More generally, and along the same lines, there may be advantages in MLA internally positioning much of the work conducted in the meat safety scientific research program as a market access activity — addressing technical barriers to trade. MIS 2020 has an emphasis on reducing technical barriers to trade. It is also the view of the Evaluation Team that this is an area requiring increased attention and resources.

Impact assessment

5.6 MLA Impact benefits and investments^a: 1.1 Product Integrity

Develop and deliver industry systems that underpin product integrity

		1.1
Expected benefits		
Red meat industry net income - total ^b	\$m	462
– 2010-11 to 2014-15	\$m	127
– > July 2015	\$m	335
Red meat gross value of production- total ^c	\$m	856
– 2010-11 to 2014-15	\$m	236
– > July 2015	\$m	620
Actual investment^d		
– 2010-11 to 2014-15 inclusive	\$m	56
Benefit cost ratio		
Red meat industry net income - total		8.3
Red meat gross value of production - total		15.4

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. b Net income across all red meat industry sectors including processing. c Saleyard equivalent GVP excluding processing (basis for levies). d Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

5.7 MLA Impact – benefits in terms of red meat net income^a: 1.1 Product Integrity

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	
1.1 Develop and deliver industry systems that underpin product integrity	462	0	462	8.3
– per cent of impact benefits	100	0	100	

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

5.8 MLA Impact – benefits in terms of GVP^a: 1.1 Product Integrity

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
1.1 Develop and deliver industry systems that underpin product integrity	856	0	856	15.4
– per cent of impact benefits	100	0	100	

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

5.9 Budgets for 1.1 Product Integrity

Budgets by Program	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
1.1 Develop and deliver industry systems that underpin product integrity	12 417	10 533	12 559	11 287	9 040	8 775	9 554	8 869	10 884	10 795	54 454	50 260
Less 1.1.4.3 Communicate the integrity of Australian red meat products internationally and provide a response capability IMES (10/11, 11/12) ^a	-3 431	-3 280	-3 523	-2 589	0	0	0	0	0	0	-6 954	-5 869
MLA Donor Company projects	0	296	0	223	0	242	0	250	0	294	0	1 306
Overheads (Corporate Services / Communications)	609	478	564	648	514	521	564	559	764	866	3 015	3 072
TOTAL	9 595	8 027	9 600	9 569	9 554	9 539	10 118	9 678	11 648	11 956	50 515	48 769

^a This activity included in program 1.2 from 2012-13 – expenditure for full review period included in program 1.2

6 1.2 Market Access

Top line result to date — MLA expenditure on the Market Access program provide industry returns of \$999 million, from expenditure of \$42 million with a BCR of 24.0:1.

Tables 6.10, 6.11 and 6.12 provide a summary of the payoffs from investment in the Market Access program.

6.1 Summary — MLA Impact benefits and investments^a: 1.2 Market Access

		Support industry and government to maintain and liberalise world meat markets
		1.2
Expected benefits		
Red meat industry net income — total ^b	\$m	999
— 2010-11 to 2014-15	\$m	47
— > July 2015	\$m	952
Actual investment ^c		
— 2010-11 to 2014-15 inclusive	\$m	42
Benefit cost ratio		
Red meat industry net income - total		24.0

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

Summary

For the purposes of the current evaluation MLA's market access program was segmented into two major components:

- Addressing economic and technical barriers to trade — either by defending existing 'favourable' conditions of access or by working with industry and Government in an attempt to secure improvements.
- Communicating the integrity of Australian red meat products internationally and providing a response capability in cases where issues with Australian product arise.
- Program impact was measured at \$999 million (net industry income) with a BCR of 24.0:1. Just 5 per cent of the benefit accrued during the assessment period with 95 per cent to be captured in coming years.

6.2 Major outcomes achieved are summarised below

Outcomes	Details
Market access improvement	
AUS-Malaysia FTA	<ul style="list-style-type: none"> Tariffs on livestock and red meat bound at zero per cent
ASEAN Australian FTA	<ul style="list-style-type: none"> Tariffs on red meat and livestock reduced across Indonesia, Malaysia, Philippines, Thailand, Vietnam and Singapore
JAEP A	<ul style="list-style-type: none"> Tariffs on beef reduced from 38.5 per cent to an average of 22.1 per cent across fresh and frozen product by 2032.
KAFTA	<ul style="list-style-type: none"> Eliminate 40 per cent tariff on beef and 18 per cent tariff on bovine offal over 15 years Eliminate 22.5 per cent tariff on sheep meat over 10 years Eliminate tariffs on live animals over 15 years
CHFTA	<ul style="list-style-type: none"> Eliminate beef tariffs over 9 years (from 20-25 per cent carcasses and 12 per cent other) Eliminate sheep and goat meat tariffs over 5 years
Russia Federation quota access	<ul style="list-style-type: none"> Guaranteed access to a pooled quota of 407 000 for frozen beef and 11 000 chilled beef.
Trans Pacific Partnership	<ul style="list-style-type: none"> In Japan <ul style="list-style-type: none"> Further falls in beef tariffs over JAEP A – to 9 per cent for grassfed and grainfed (compared to end points of 19.5 per cent and 23.5 per cent respectively, under JAEP A. Processed red meat import tariffs eliminated within 15 years (currently range from 6-50 per cent), the majority of offal tariffs eliminated within 10-15 years; and the tariffs applied to live cattle imports will also be eliminated. In Canada, the above quota beef tariff of 26.5 per cent will be phased out. Additionally, the 2.5 per cent tariff on Australian sheepmeat will be eliminated . In Mexico, the current 20-25 per cent beef tariff will be eliminated within 10 years; the 10 per cent sheepmeat and goat meat tariffs will be eliminated within 8 years; the majority of offal tariffs will be eliminated; and the 10-15 per cent tariffs on live animals will also be eliminated. In Peru, which represents a new market opportunity for Australian red meat, the 17 per cent beef tariff will be phased out and the 9 per cent sheepmeat and goat meat tariffs will be eliminated
Market access defence	
China – HGP s and chilled issues	<ul style="list-style-type: none"> Threat of trade suspension to China – in the case of chilled beef trade was suspended for 9 months
Indonesia quota	<ul style="list-style-type: none"> Quotas caused total boxed beef imports into Indonesia to fall from 111,000 tonnes in 2009 to 32,000 tonnes in 2013.
Product integrity / safety	
Benefits arising from integrity / meat safety communications	<ul style="list-style-type: none"> Same benefits attributed as for beef and sheepmeat marketing

Evaluation process

The market access program was evaluated by updating a previous evaluation of the MLA market access program completed by the Centre for Economic Analysis in 2014¹³, as well as using information from the beef and sheepmeat marketing workshops conducted as part of the current evaluation.

The previous evaluation of MLA's market access program only related to economic and technical barriers to trade and concluded that the expected benefit cost payoff (in terms of increased GVP) to red meat producers was 39.9 to 1:

- the benefit cost ratio for beef was 54.6 to 1
- the benefit cost ratio for sheepmeat was 9.4 to 1

As part of the current evaluation results from the previous evaluation have been modified and updated.

In terms of modification, the current evaluation is based on a different period (1 July 2010 to 30 June 2015) compared to the previous evaluation (2006 to 2013). As a result:

- Payoffs from MLA input into in some market access improvements considered by the previous evaluation, such as the Australia-Chile Free Trade Agreement (ACIFTA), are not taken into account here — as MLA input into the improvement occurred before the current Evaluation Period.
- Conversely, some benefits are taken into account in the current evaluation that were not considered in the previous evaluation — most notably MLA's contribution to achieving a favourable outcomes for the red meat industry in the Trans Pacific Partnership (TPP) — at the time of conducting the previous evaluation negotiations on the TPP were a long way from being concluded.
- Many achievements, however, are common between this evaluation and the previous evaluation, including industry market access gains under:
 - The Japan-Australia Economic Partnership Agreement (JAPEPA) which was formally signed on 7 April 2014 and entered into force on 15 January 2015
 - The Korea-Australia Free Trade Agreement (KAFTA) which was formally signed on 8 April 2014 entered into force on 12 December 2014.
 - The China-Australia Free Trade Agreement (ChAFTA) was signed on 17 June 2015 and entered into force on 20 December 2015

The second major difference between the current evaluation and that conducted by CIE in 2014 is that this evaluation takes into account the second component of the market access program — communicating the integrity of Australian red meat products internationally / issues management. Over the 2010 to 2015 period MLA activity under this component largely involved communicating positive messages to overseas customers about the integrity and safety of Australian red meat. Consequently, the same approach is used to assess payoffs from MLA

¹³ Centre for International Economics 2014, *An evaluation of MLA's market access program*, Prepared for Meat and Livestock Australia, September.

work in this area as is used for MLA work under beef and sheepmeat export marketing (programs 2.6 and 2.7).

Objectives from MLA 5 year business plan

- *Market access improvements / defending current conditions*
 - Support industry and government to maintain and liberalise world meat markets:
 - ... Ensure that access opportunities are not eroded through administrative, regulatory or policy impositions; and
 - ... Secure a more favourable export market environment through strategic trade reform.
- *Communicating product integrity / issues management*
 - Assist in positioning Australia as a supplier of choice for red meat and livestock products, ensuring that overseas customers and regulators have confidence that Australia's integrity and safety systems and performance record is equivalent to, or better, than alternate supplying countries.

Program Outputs and Outcomes

Market access improvements

Table 6.3 demonstrates the success of the approach outlined above in terms of the industry securing market access improvements. During the period 2010 to 2015 major achievements involved trade agreements with Korea, China and Japan, that will result in substantial reductions in barriers to trade for the Australian red meat and livestock.

- In the case of the first two of these agreements, tariffs on major Australian red meat products will be eliminated entirely over time.
- In the case of the agreement with Japan, frozen and chilled beef tariffs were reduced during the Evaluation Period by 10 per cent and 7 per cent, respectively, and will be reduced further over the next 13 years, conferring a major competitive advantage on the Australian industry.

6.3 Outputs and outcomes in terms of market access improvements achieved over the 5 years

Outputs	Outcomes
Free Trade Agreements	
<ul style="list-style-type: none"> ■ MAFTA (Malaysia-Australia FTA) ■ MLA lodged submissions DFAT / DAFF [Oct 2004 (scoping study), May 2005, December 2009] on industry priorities for the MAFTA negotiations ■ MLA partnered industry peak councils on a targeted trade advocacy effort 	<ul style="list-style-type: none"> ■ MAFTA entered into force on 1 January 2013 ■ MAFTA met following industry negotiation targets: <ul style="list-style-type: none"> ■ Reaffirmed zero tariffs applicable to livestock and red meat products ■ Incorporated procedures & consultative mechanisms to deal with standards, technical

Outputs	Outcomes
<ul style="list-style-type: none"> ▪ MLA, in consultation with Peak Councils, responded to negotiation offers 	<ul style="list-style-type: none"> regulations and conformity assessment ▪ Consultative arrangements reaffirmed via continuation of the DAFF led <i>Malaysia-Australia Agricultural Co-operation Working Group</i> for progressing agricultural trade and market access issues
KAFTA (Korea-Australia FTA)	
<ul style="list-style-type: none"> ▪ Numerous submissions & correspondence lodged ▪ Ongoing representations during course of negotiations ▪ Industry FTA sub-committee (MLA secretariat) had direct interface with negotiators and Trade Minister ▪ MLA prepared submissions to JSCOT & Senate inquiries 	<ul style="list-style-type: none"> ▪ KAFTA entered into force on 12 December 2014 ▪ Tariffs applicable to Australian beef, sheepmeat and goat meat eliminated over 10 to 15 years ▪ 100 per cent of industry negotiation targets achieved
JAEPA (Japan-Australia Economic Partnership Agreement)	
<ul style="list-style-type: none"> ▪ Numerous submissions & correspondence lodged ▪ Ongoing representations during course of negotiations ▪ Industry FTA sub-committee (MLA secretariat) had direct interface with negotiators and Trade Minister ▪ MLA prepared submissions to JSCOT & Senate inquiries 	<ul style="list-style-type: none"> ▪ JAEPA entered into force on 15 December 2015 ▪ Some industry negotiation targets achieved – beef tariff was reduced but not eliminated (a phased tariff reduction for beef from 38.5 per cent to 23.5 per cent for chilled product and 19.5 per cent for frozen product over the next 18 years) ▪ MFN clause incorporated
ChAFTA (China-Australia FTA)	
<ul style="list-style-type: none"> ▪ Numerous submissions & correspondence lodged ▪ Ongoing representations during course of negotiations ▪ Industry FTA sub-committee (MLA secretariat) had direct interface with negotiators and Trade Minister ▪ MLA prepared submissions to JSCOT & Senate inquiries 	<ul style="list-style-type: none"> ▪ ChAFTA entered into force 20 December 2015 ▪ Tariffs levied on Australian beef of 12-25 per cent will be eliminated within 9 years; sheepmeat and goat meat tariffs of between 12-23 per cent will be eliminated within 8 years; the tariffs on offals of 12-25 per cent will be eliminated over 4-10 years; the 5-14 per cent tariffs on hides and skins will be eliminated over 4-8 years; and the 10 per cent tariffs on live cattle and live sheep eliminated over 4 years ▪ 100 per cent of industry negotiation targets achieved
Trans-Pacific Partnership (TPP)	
<ul style="list-style-type: none"> ▪ MLA has prepared submissions to DFAT / DA; drafted and lodged industry's position with Australia's Trade Minister; prepared market access requests and responded to market access offers; attended negotiating rounds; briefed other TPP member officials / negotiators on Australian industry priorities. 	<ul style="list-style-type: none"> ▪ Negotiations on the TPP concluded on 5 October 2015, beyond the Evaluation Period, but major elements of the agricultural negotiations were concluded prior to 30 June 2015. The TPP has yet to enter into force. ▪ Under the TPP: <ul style="list-style-type: none"> ▪ Tariffs levied on Australian beef entering Japan will be further reduced from those negotiated under JAEPA. The tariff on both frozen and chilled beef will fall to 9 per cent over 15 years - as opposed to the end point of 19.5 per cent for frozen beef & 23.5 per cent for chilled beef secured under the JAEPA. A global beef safeguard provision will apply. ▪ In Canada, the current 35,000 tonne beef quota (0 per cent in-quota tariff) will remain, however, the

Outputs	Outcomes
	<p>above quota tariff of 26.5 per cent will be phased out. Additionally, the 2.5 per cent tariff on Australian sheepmeat will be eliminated on entry into force.</p> <ul style="list-style-type: none"> ▪ For Australia's trade to Mexico, the current 20-25 per cent beef tariff will be eliminated within 10 years; the 10 per cent sheepmeat and goat meat tariffs will be eliminated within 8 years; the majority of offal tariffs will be eliminated on EIF; and the 10-15 per cent tariffs on live animals will also be eliminated on EIF. ▪ In Peru, which represents a new market opportunity for Australian red meat, the 17 per cent beef tariff will be phased out and the 9 per cent sheepmeat and goat meat tariffs will be eliminated on EIF.
Other access improvements:	
India (2012-13)	
<ul style="list-style-type: none"> ▪ MLA and peak industry councils made submissions and undertook in-market advocacy for improved certification conditions for sheepmeat destined for India 	<ul style="list-style-type: none"> ▪ Australian Government negotiated certification arrangements and established new conditions for lamb, sheep, goat, uncooked meat products and edible offal exports into India ▪ New export conditions saw 65 tonnes of Australian sheepmeat exported to India in 2013 and a further 45 tonnes exported in 2014 ▪ 100 per cent of industry objectives achieved
European Union (2006-2013)	
<ul style="list-style-type: none"> ▪ Bulgaria and Romania acceded to the EU ▪ MLA and peak industry councils (in close collaboration with the Australian Government), sought compensation, via submissions and personal representation, for prior trade performance 	<ul style="list-style-type: none"> ▪ Australia's sheepmeat quota for exports into the EU increased by 400 tonnes to 19,186 tonnes ▪ 100 per cent of industry objectives achieved
Russia (2011)	
<ul style="list-style-type: none"> ▪ MLA, in partnership with peak industry councils and Government, sought access for chilled and frozen beef following Russia's accession to the World Trade Organization ▪ MLA prepared submissions and had direct interface with WTO accession negotiators in Geneva 	<ul style="list-style-type: none"> ▪ Australian beef secured access to a shared pool of up to 407,000 tonnes of frozen beef and 11,000 tonnes of chilled beef (a 10,000-tonne increase), with in-quota tariff rates of 15 per cent ▪ 90 per cent of industry objectives achieved ▪ Work on-going re high quality beef definition / specification

Market access defence

In addition to the areas where market access conditions improved, a number of instances arose during the Evaluation Period where Government and industry, with MLA support, had to act to defend conditions of market access — some times with partial success, at other times unsuccessfully.

- In February 2014, Russia banned beef offal imports from Australia and in late March and early April, banned chilled and frozen beef products — allegedly relating to the

detection of Trenbolone in meat and offal. Then, in August 2014, Russia banned fruit, vegetable, meat, fish and dairy imports from Australia in retaliation for sanctions imposed over the crisis in Ukraine. On 24 June 2015, Russian Prime Minister Medvedev signed an order extending the Russian food import ban on specified agricultural products for an additional year, to 5 August 2016.

- In 2013 and 2014 problems over protocols applying to the China market had the potential to cause severe disruptions for trade into this market for two reasons in particular :
 - One related to assurances sought by the Chinese Government that Australian beef imported into China was HGP free in accordance with long-standing Chinese requirements. The Chinese move to greater assurances was widely seen as stemming from Russia's actions over Australian beef (see previous dot point). Australia responded proactively to the Chinese Government request and the trade continued with no significant disruption due to the HGP issue.
 - In October 2013 Chinese authorities moved to prevent chilled beef imports into China. For the nine months of 2013 prior to October, Australia shipped about 12 200 tonnes of chilled beef, both boneless and bone-in, to China. The chilled trade was re-opened in July 2014 with 10 plants accredited to export chilled product to China.
- Over the Evaluation Period a series of restrictions were introduced by the Indonesian Government which severely impacted on Australian red meat exports to this market. Most important of the measures imposed by the Indonesian Government was binding quotas on live cattle and boxed beef imports. These quotas saw boxed beef imports into Indonesia fall from 111,000 tonnes in 2009 to 32 000 tonnes in 2013. The Australian Government and the Australian industry, with MLA support, advocated vigorously for the removal of these quotas, arguing that the quotas caused economic damage in Indonesia and hurt consumers. Amongst other things domestic Indonesian organisations were encouraged to also argue against the quotas. The quotas were eventually lifted in 2014.

Technical access barriers

Some of the major market access defence activities listed above were technical in nature (for example, the initial Russian actions over Trenbolone and the China chilled trade issue). These technical market access defence issues, however, only represent a small subset of the wide range of technical issues that have been evident over the last five years (some of these are new, but many existed prior to 2010). A major output of MLA for this program over the Evaluation Period was a research document, released in June 2013, that identified and quantified technical trade barriers (TBTs). By quantifying the cost of TBTs the report enables the industry to strategically prioritise industry's resources on TBT barriers with the greatest impact.

Tables 6.4 and 6.5 list the key areas of MLA and industry involvement in addressing emerging and entrenched TBTs.

6.4 Emerging TBTs by jurisdiction

Issue	Proposal	MLA outputs	Impact
International – WHO			
Antimicrobial resistance (AMR)	AMR recognised as a global priority and countries need to develop AMR management plans	<ul style="list-style-type: none"> Participated in development of plans in Australia. Seminar, scientific and industry publications. 	<ul style="list-style-type: none"> Beef industry recognised as responsible and negligible contribution to AMR in Australia
International - Codex Alimentarius			
Salmonella in beef	Code of Practice for control of Salmonella in beef supply chains	<ul style="list-style-type: none"> Published research, prepared a submission and contributed to expert consultations 	<ul style="list-style-type: none"> International code of practice will not present problems for the Australian industry
China			
Knife sterilisation in boning rooms	2011 audit raised cross contamination issues	<ul style="list-style-type: none"> Prepared document describing results of investigations 	<ul style="list-style-type: none"> Additional requirements not implemented
European Union			
Shiga toxin-producing E. coli (STEC) (2013)	No STEC allowed in any beef product	<ul style="list-style-type: none"> Submission, cooperation with Dutch importers. Influence on revision of the ISO standard 	<ul style="list-style-type: none"> Minimal disruption: continuing watch
United States			
Non-O157 E. coli in manufacturing beef (2012)	Non-O157 adulterants in beef destined for grinding	<ul style="list-style-type: none"> Publications and submissions influenced the implementation of regulations. helped Australian processors to manage the risk 	<ul style="list-style-type: none"> Minimised disruption to trade.
Antimicrobial resistant Salmonella	Petition with FSIS to declare AMR Salmonella adulterants in meat destined for grinding	<ul style="list-style-type: none"> Scientific publication demonstrates low risk from Australian beef 	<ul style="list-style-type: none"> Keeping watch.
Russia			
Frozen meat (2010)	Proposal to ban frozen meat	<ul style="list-style-type: none"> Prepared a submission on effect of freezing on meat quality 	

Source: MLA.

6.5 Entrenched TBTs by jurisdiction

Issue	Problem	MLA outputs	Impact
Gulf Cooperation Council			
Shelf life standard	70 day shelf life standard for chilled beef and lamb	<ul style="list-style-type: none"> Submissions to Gulf Standards Organisation (2014, 2015) 	

Issue	Problem	MLA outputs	Impact
Egypt			
Drip, shelf life	Egyptian standard allows for no drip, and 49 days shelf life	<ul style="list-style-type: none"> Submissions, presentations and meeting with Egyptian standards committee and government departments 	
UAE (Dubai)			
Microbiological criteria	Issue with microbiological criteria for beef and lamb	<ul style="list-style-type: none"> Discussions with laboratory and inspection personnel, workshop for Dubai Municipality, presentations at Dubai International Food Safety Conference 	
Jordan			
Microbiological criteria (2011)	Issue with microbiological criteria for chilled meat	<ul style="list-style-type: none"> Prepared submission 	
Lebanon			
Shelf life (2012)	Shelf life limit 70days (28 days for bone-in)	<ul style="list-style-type: none"> Prepared submission 	
Japan			
Commercial shelf life standard	Limits product to 77 days	<ul style="list-style-type: none"> Presentations to trade in Japan, visit to Australia by Japan Meat Traders Association 	<ul style="list-style-type: none"> Some traders have changed their shelf life for Australian beef
Vietnam			
Microbiological standards (2012)	Inappropriate microbiological criteria for chilled beef	<ul style="list-style-type: none"> Prepared submission 	

Communicating product integrity / issues management

MLA initiatives in the meat safety / issues management area under the Market Access Program centred mostly on communicating Australian integrity and food safety systems to overseas customers - informing, educating and building confidence with customers and regulators. Specific activities included the following:

- Incorporation of key integrity and safety messages into promotional material and in trade and consumer seminars and events.
- Generation of positive PR regarding integrity and food safety systems.
- Conducting missions to Australia highlighting the world leading integrity and food safety systems being used in Australia.
- Including information on Australia's integrity and food safety systems in websites with up-to-date messages.

- Helping to manage concerns / issues pertaining to Australian product in-market — appropriately informing key organisations of integrity / meat safety issues, ensuring a prompt and timely response.
- Maintaining strong links with counterparts in-market, along with key regulatory and monitoring organizations, to facilitate early identification of potential issues and ensure the industry is positioned to respond promptly.
- Maintaining regular communication with Government and industry organisations in Australia on global developments on integrity and food safety systems and regulations.

In terms of outcomes, in the key markets of Japan and Korea, perceptions of the integrity and safety of Australian product rose over the Evaluation Period. For example:

- In Japan trade ratings for ‘strictly inspected’ increased from 83.9 per cent in 2010 to 85.6 per cent in 2015 (the equivalent rating in 2005 was 78.0 per cent)
- In Korea trade ratings for ‘food safety and QA’ increased from 84.4 per cent in 2010 to 91.7 per cent in 2015 (the equivalent rating in 2005 was 79.2 per cent)

In all markets consumer perceptions of the safety of Australian beef exceeded those from all other imported sources, while the safety of Australian lamb was generally seen as on a par with that of New Zealand (see table 6.6).

6.6 Consumer ratings of the safety of Australian red meat versus other suppliers

Region	Safety ratings for Australian beef (%)			Safety ratings for Australian lamb (%)		
	Australia	Other imported	Domestic	Australia	NZ	Domestic
Japan	16	7 (US)	58	29	32	39
Korea	26	8 (US)	72	33	39	46
China	46	23 (Argentina)	29	59	62	41
Taiwan	34	13 (US)	37	49	45	42
Indonesia	47	37 (NZ)	64	35	24	36
Malaysia	47	45 (NZ)	53	21	15	55
UAE	31	16 (Brazil)	36	29	32	39

Evaluation of industry impact

Based on the previous evaluation of market access and information contained above, economic modelling of the impact of MLA’s market access program was undertaken based on the parameters in tables 6.7– 6.9.

6.7 Modelling parameters used for market access improvement

Outcomes	Details	Without scenario	MLA contribution ^a
AUS-Malaysia FTA	<ul style="list-style-type: none"> Tariffs on livestock and red meat bound at zero per cent 	<ul style="list-style-type: none"> No change in access 	40 per cent
ASEAN Australian FTA	<ul style="list-style-type: none"> Tariffs on red meat and livestock reduced across Indonesia, Malaysia, Philippines, Thailand, Vietnam and Singapore 	<ul style="list-style-type: none"> No change in access 	20 per cent
JAEPA	<ul style="list-style-type: none"> Tariffs on beef reduced from 38.5 per cent to an average of 22.1 per cent across fresh and frozen product by 2032. Sheepmeat already at zero duty. 	<ul style="list-style-type: none"> No change in access 	20 per cent
KAFTA	<ul style="list-style-type: none"> Eliminate 40 per cent tariff on beef and 18 per cent tariff on bovine offal over 15 years Eliminate 22.5 per cent tariff on sheep meat over 10 years Eliminate tariffs on live animals over 15 years 	<ul style="list-style-type: none"> No change in access 	30 per cent
CHFTA	<ul style="list-style-type: none"> Eliminate beef tariffs over 9 years following entry into force (from 20-25 per cent carcasses and 12 per cent other) Eliminate sheep and goat meat tariffs over 5 years following entry into force 	<ul style="list-style-type: none"> No change in access 	30 per cent
Russia Federation quota access	<ul style="list-style-type: none"> Guaranteed access to a pooled quota of 407 000 for frozen beef and 11 000 chilled beef. 	<ul style="list-style-type: none"> Uncertain access levels and poorly defined HQB 	40 per cent
Trans Pacific Partnership	<ul style="list-style-type: none"> In Japan <ul style="list-style-type: none"> Further falls in beef tariffs over JAEPA – to 9 per cent for grassfed and grainfed (compared to end points of 19.5 per cent and 23.5 per cent for grassfed and grainfed beef, respectively, under JAEPA. Processed red meat import tariffs applied by Japan eliminated within 15 years (currently range from 6-50 per cent), the majority of offal tariffs eliminated within 10-15 years; and the tariffs applied to live cattle imports will also be eliminated. In Canada, the above quota beef tariff of 26.5 per cent will be phased out. Additionally, the 2.5 per cent tariff on Australian sheepmeat will be eliminated on entry into force (EIF). In Mexico, the current 20-25 per cent beef tariff will be eliminated within 10 years; the 10 per cent sheepmeat and goat meat tariffs will be eliminated within 8 years; the majority of offal tariffs will be eliminated on EIF; and the 10-15 per cent tariffs on live animals will also be eliminated on EIF. In Peru, which represents a new market opportunity for Australian red meat, the 17 per cent beef tariff will be phased out and the 9 per cent sheepmeat and goat meat tariffs will be eliminated on EIF 	<ul style="list-style-type: none"> No change in access 	20 per cent ^b

^a The balance of benefits are attributable to the collective efforts of peak industry councils, government negotiators, and industry trading in the affected markets

^b Only 70 per cent of the benefits from the TPP have been taken into account in this evaluation on the basis that further work will be needed by MLA and the industry to ensure the TPP enters into force as currently drafted and no 'backsliding' occurs – that is, the MLA contribution shown in the table above, of 20 per cent has been discounted to 14 per cent.
Source: MLA and CIE.

6.8 Modelling parameters used for market defence

Outcomes	Details	Without scenario	MLA contribution ^a
China – HGPs and chilled issues	<ul style="list-style-type: none"> Threat of trade suspension to China – in the case of chilled beef trade was suspended for 9 months 	<ul style="list-style-type: none"> Complete suspension of trade to China for 12 months 	7.5 per cent
Indonesia quota	<ul style="list-style-type: none"> Quotas caused total boxed beef imports into Indonesia to fall from 111,000 tonnes in 2009 to 32,000 tonnes in 2013. 	<ul style="list-style-type: none"> Quotas would have continued to be imposed for another 6 months 	10 per cent

^a The balance of benefits are attributable to the collective efforts of peak industry councils, government negotiators, and industry trading in the affected markets
Source: MLA and CIE.

Note from comparing Table 6.8 with the section detailing outputs and outcomes for market access defence and Tables 6.5 and 6.6 that no benefit is ascribed to many market access defence activities because benefits were relatively small.

For integrity / meat safety communications and issues managements the same parameters were used as for beef and sheepmeat marketing by region (see programs 2.6 and 2.7).

6.9 Modelling parameters used for integrity / meat safety communications

Outcomes	Details	Other information
Benefits arising from integrity / meat safety communications	<ul style="list-style-type: none"> Same benefits attributed as for beef and sheepmeat marketing 	Benefits vary by market

Opportunities to improve impact achieved

Industry and government stakeholders have strongly endorsed MLA's contribution on market access. MLA's knowledge of the commercial environment; advocacy of trade negotiations; ability to build alliance networks with government and industry; provision of market intelligence and analysis (including research, reports and industry endorsed submissions); advice regarding local sensitivities and contacts; and on-the-ground competencies in target export markets, are seen as key strengths integral to the success of the Market Access Program.

Seeking resolution of non-tariff or technical access issues remains an ongoing frustration shared by Government, industry and MLA. An intensified joint effort is required in this area and plans are underway to dedicate appropriate attention and resources.

As further improvements are made to market access impediments, defence of market access conditions will increase in importance. Threats to market access are often best addressed while they are a minor irritant and before becoming a major trade issue.

Successfully defending conditions of market access will involve

- a thorough process of monitoring emerging issues
- proactively developing a united industry position in response to these issues
- working with the Australian Government and local industry participants to nip emerging issues 'in the bud'.

Impact Assessment

6.10 MLA Impact benefits and investments^a: 1.2 Market Access

		Support industry and government to maintain and liberalise world meat markets
		1.2
Expected benefits		
Red meat industry net income - total ^b	\$m	999
– 2010-11 to 2014-15	\$m	47
– > July 2015	\$m	952
Red meat gross value of production- total ^c	\$m	2 167
– 2010-11 to 2014-15	\$m	97
– > July 2015	\$m	2 069
Actual investment^d		
– 2010-11 to 2014-15 inclusive	\$m	42
Benefit cost ratio		
Red meat industry net income - total		24.0
Red meat gross value of production - total		52.0

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Saleyard equivalent GVP excluding processing (basis for levies). ^d Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

6.11 MLA Impact – benefits in terms of red meat net income^a: 1.2 Market Access

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	
1.2 Support industry and government to maintain and liberalise world meat markets	0	999	999	24.0
– per cent of impact benefits	0	100	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

6.12 MLA Impact – benefits in terms of GVP^a: 1.2 Market Access

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
1.2 Support industry and government to maintain and liberalise world meat markets	0	2 167	2 167	52.0
– <i>per cent of impact benefits</i>	0	100	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

6.13 Budgets for 1.2 Market Access

Budgets by Program	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
1.2 Support industry and government to maintain and liberalise world meat markets	4 061	3 178	4 520	3 427	8 041	6 862	8 041	7 355	8 041	7 400	32 704	28 222
Plus 1.1.4.3 Communicate the integrity of Australian red meat products internationally and provide a response capability IMES (10/11, 11/12)	3 431	3 280	3 523	2 589	0	0	0	0	0	0	6 954	5 869
MLA Donor Company	0	0	0	0	0	0	0	0	0	0	0	0
Overheads (Corporate Services / Communications)	505	455	495	399	443	368	463	444	470	506	2 376	2 172
TOTAL	7 997	6 913	8 538	6 416	8 484	7 230	8 504	7 799	8 511	7 905	42 034	36 263

7 1.3 Live Export Portfolio

Top line result to date — MLA expenditure on the Live Exports program provide industry returns of \$705 million, from expenditure of \$49 million with a BCR of 14.5:1.

Tables 7.1, 7.3, 7.4 provide a summary of the payoffs from investment in the *Live Exports* program.

7.1 Summary — MLA Impact benefits and investments^a: 1.3 Live Export portfolio

Maximise market options for producers and exporters in the livestock export market		
		1.3
Expected benefits		
Red meat industry net income - total ^b	\$m	705
— 2010-11 to 2014-15	\$m	381
— > July 2015	\$m	324
Actual investment^c		
— 2010-11 to 2014-15 inclusive	\$m	49
Benefit cost ratio		
Red meat industry net income - total		14.5

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

Summary

- The Live Export Program (LEP) was evaluated as an MLA/LiveCorp partnership, with the conclusion that the LEP had added considerable value to the industry in a number of key areas:
- Animal welfare — the LEP provided significant assistance in enabling the Exporter Supply Chain Assurance System (ESCAS) requirements to be met, speeding up reopening of trade and avoiding trade closure in other cases;
- R&D — LEP R&D activities had contributed to a reduction of on-board mortalities by 40 per cent and a reduction in ESCAS compliance costs;
- Market access — added considerable value to the live export sector and a BCR of 10:1 was agreed.
- Program impact was measured at \$705 million (net industry income) with a BCR of 14.5:1. Some 54 per cent of the benefit accrued during the assessment period with 46 per cent to be captured in coming years.

Objectives from MLA 5 year business plan

- To enhance the sustainability and competitiveness of Australian livestock exports by providing highly valued support services to assist producers and exporters involved in the trade:
- to meet (and be seen to meet) and exceed community standards on animal welfare in Australia and overseas markets;
- to improve the efficiency of management of livestock throughout the supply chain; and
- to maintain and increase access to overseas markets.

MLA Summary of Live Export Program

The breadth of coverage of the Program was emphasised by the fact that services are provided in 22 countries to 124 importers, 452 feedlots and 503 abattoirs. Within this coverage:

- 95 per cent of all exporter/importer requests for support were met by the program
- surveys indicated high levels of satisfaction with services provided:
 - 85 per cent of exporters surveyed stated that the LEP added value to their business and/or industry
 - 84 per cent of Peak Industry Council and Government representatives surveyed indicated that the LEP had added value through the provision of advice on live export market access issues, market intelligence and regulatory issues
- 95 per cent highly rated LEP delivery on R&D projects stating that the R&D had improved the performance of livestock through the supply chain

For the purposes of the impact assessment the program is divided into 3 subprograms:

- Assist industry and government formulate new regulations to meet community expectations in terms of animal welfare practices and then assist supply chains with implementation and compliance with these regulations through the provision of gap analyses, risk analyses, training and technical and systems advice
- Through R&D, recommend improvements to regulations and operations to improve efficiency and effectiveness
- Secure improvements in access to overseas markets by working with industry and government

Subprogram — Animal welfare

MLA Summary of Sub-Program Outputs and Outcomes

In terms of animal welfare activities a distinction was made between the different strategies applied pre and post ESCAS.

Pre ESCAS the LEP was involved with:

- the installation of Mark I slaughter boxes, an activity funded by the Australian Government
- the design of the Mark IV box
- attempting to achieve a wider adoption of stunning, and
- animal handling and slaughter training across abattoirs and feedlots.

Post ESCAS the strategies followed were:

- gap analysis to identify steps required by supply chains to attain ESCAS standards
- risk analysis of approved ESCAS supply chains to identify areas where a risk of ESCAS non-compliance may arise
- training to meet ESCAS regulations (including train the trainer activities) and
- the provision of technical advice

Indonesia

Indonesia is by far the largest of Australia's live cattle markets, taking almost 2.5 million cattle during the Evaluation Period, about 54 per cent of Australia's total live cattle exports.

In June 2011 Indonesia was the first of Australia's live export trading partners to be subjected to the new ESCAS regulations. Following the introduction of ESCAS, the LEP's work in Indonesia was directed at:

- First, achieving acceptance of the new ESCAS regulations
- Second, in assisting supply chains to upgrade facilities and procedures to meet the new regulations — through the provision of gap analyses, technical advice, standard operating procedure templates, etc.
- Finally, work aimed at securing ongoing compliance with the new regulations.

Targeted input by the LEP, in combination with the efforts of individual supply chains, produced a very high level of acceptance of the ESCAS regulations and implementation of significantly improved animal welfare practices at the point of slaughter. Intensive animal handling and slaughter training was provided to assist supply chain operators understand and adopt ESCAS. In Indonesia the LEP trained 3 232 workers and conducted 1 318 activities to assist supply chains — it is noteworthy that the use of stunning in Indonesia has increased from 2.8 per cent in 2010, to 93.6 per cent in 2015.

Without LEP assistance through the animal cruelty crisis, the prospect of a prolonged trade closure would have been increased. The LEP mobilised and facilitated resources and importer commitment to ensure rapid uptake of ESCAS requirements and associated compliance.

The services provided by the LEP in market have assisted the industry to create a new level of business operation and has opened opportunities for increased trade between Australia and Indonesia.

Other Asia

The 'Other Asia' region (that is, all of Asia, except Indonesia) has been growing in importance as a destination for Australian live cattle exports. During the Evaluation Period this region took more than 1.2 million cattle — over 25 per cent of all live cattle exports. Additionally, within this region a small, but significant, live goat trade exists to Malaysia (with Malaysia accounting for 97 per cent of total live goat exports). Goat consignments to Malaysia are predominantly transported by air (averaging 2 000 goats per consignment). In 2014-15 this trade was valued at \$8.4 million from 88,000 goats.

ESCAS regulations started applying to markets in this region from 1 September 2012. Following the introduction of ESCAS considerable work directed at all markets in the region, but particularly the Malaysia and Vietnam markets.

Traditionally the livestock trade in Malaysia has been based on trading and sale to many differing customers. The advent of ESCAS animal welfare, control and traceability regulations, required a reassessment and consolidation of supply chains. There was an initial slowdown in goat and cattle exports as ESCAS was imposed, but the trade recovered. Some of the direct improvements since ESCAS implementation have included:

- Cattle Feedlots — general improvements in ramps, yards, water points and raceways.
- Cattle Abattoirs — upgrading of abattoirs, including the installation of compliant restraining boxes.
- Animal handling - more confidence amongst stock handlers
- Abattoir practices — improved control of the slaughter process

The LEP has trained more than 1,000 industry participants in the Malaysian market since the introduction of ESCAS as well as providing gap and risk analyses and technical support.

For Vietnam ESCAS was implemented on 1 January 2013. Prior to that date export volumes were small as the trade was just developing, but over the Evaluation Period Vietnam has been the fastest growing market for cattle exports. As cattle imports have grown, there has been substantial local investment made in Vietnam's feedlot infrastructure — and in making this investment there has been genuine consideration of ESCAS requirements and harnessing of experience from Australia. Abattoirs have also been built to include ESCAS compliant lairage, restraining boxes and stunning equipment. Other pre-existing abattoirs have been upgraded to comply with ESCAS requirements. Over 50 abattoirs have now been ESCAS approved. Some of the direct improvements since ESCAS implementation have included:

- Animal handling — improved stock skills through handling training
- Feedlot performance - improving capacity to feed animals via technical support
- Abattoir practices — more efficient use of facilities with increased throughput and better welfare standards/practices

- Stunning has increased in Vietnam — all Australian cattle in Vietnam are stunned and an increasing number of local cattle are stunned (due to the improvements made in supply chains handling Australian cattle).
- Post slaughter practices have also improved with better food hygiene

Some of the support provided by the LEP in Vietnam has included:

- Advice on abattoir design and upgrades
- Advice on feedlot design and layouts to address such points as feed bunks, watering troughs and overhead cover.
- Extensive training addressing
 - Formal theory and practical workshops to feedlot/abattoir staff and management.
 - Theory workshops to provide staff with an understanding of ESCAS, and skill in handling and slaughtering Australian cattle.
 - Training at individual facilities has occurred regularly, particularly during 2013-14, with on-the-spot assistance given to feedlots and abattoirs.
 - SOP training videos have been developed in Vietnamese highlighting key animal welfare points from arrival to slaughter. The slaughter section covers the use of penetrative stunning and thoracic stick as applied in Vietnam.

The Korban programs conducted by the LEP in Singapore (2012-2014) and Malaysia (2012-2015) also provided assistance in identifying and understanding ESCAS compliance risks during this festive event. The program improved preparation for festive periods where there is a higher likelihood of animal welfare issues.

Across the 'Other Asia' region the LEP:

- Delivered 74 gap and risk reports at the request of exporters and/or importers
- Provided handling and slaughter training provided to more than 2,000 participants
- Devoted 379 consultant days in the provision of technical advice to supply chain participants.

MENA

The MENA region and Turkey is by far and away Australia's largest live sheep destination. Markets in this area accounted for 98 per cent of Australia's live sheep exports during the Evaluation Period, taking almost 11.5 million sheep. Largest markets in the region are Kuwait (4.2 million sheep during the Evaluation Period), Qatar (2.3 million sheep) and Bahrain and Jordan (1.4 million sheep each).

ESCAS was introduced for all major markets in this region on 1 March 2012. Well before ESCAS was introduced into the region the LEP devoted considerable effort into ensuring widespread acceptance of ESCAS across the region. At first there was strong resistance to ESCAS with some describing ESCAS as 'ridiculous', unsuited to Middle East market conditions and stating that they would turn to Sudan, Somalia and parts of Europe to supply their needs. Turning these attitudes around and achieving acceptance of ESCAS by the trade and overseas Governments in the MENA region was critical — and the LEP

was a major mechanism by which acceptance was achieved. The LEP over many years had developed strong relationships with the Middle Eastern trade and Middle Eastern Governments. The LEP, in particular, worked with the local trade to turn attitudes — from what was regarded initially as impossible to seeing that it could be implemented — and to identify and implement changes required.

The impact of ESCAS has varied across markets in the region and has the extent of animal welfare improvements brought about by the new regulations (in some markets animal welfare standards were high prior to the introduction of ESCAS). The following general comments can be made, however:

- Direct improvements have been driven by ESCAS during Eid Al Adha. Traditionally during this festival period livestock would be sold direct to consumers for at home slaughter. With the introduction of ESCAS, there is a need to maintain control of livestock at all times and ensure appropriate slaughter by trained personnel. The LEP, in combination with supply chain participants, has devoted considerable resources to ESCAS compliance during Eid Al Adha.
- Throughout the region the LEP has provided SOP training and infrastructure design advice. General infrastructure upgrades have been implemented and there has been a greater emphasis on correct slaughter techniques. Importantly these programs have generally been well supported by the importer and exporter, which greatly assists implementation. As well as the work by the LEP some exporters have placed permanent staff in the region to assist with welfare outcomes (the placement of some of these staff has been supported through the LEP's Industry Collaborative Welfare Program).
- Significant improvements in animal handling and slaughter evolved over the 5 years in review with better trained operational personnel, better informed senior management with genuine commitment to welfare improvement and subsequent investment in infrastructure that facilitated low stress transport, handling and slaughter practices. Major seminars, workshops and awards programs underpinned a progressive change in attitudes across MENA stakeholders, and a united and sometimes competitive approach was taken to the rate and magnitude of welfare improvement initiatives.

In the Middle East over the Evaluation Period 805 consultant days were involved in providing technical advice, training was delivered to more than 3 410 participants and 174 gap/risk reports were completed.

Workshop evaluation of performance

Workshop discussion on the impact of the LEP's animal welfare activities focused on the role of the LEP in (a) securing the acceptance of ESCAS by overseas Governments and the trade and (b) supporting individual supply chains meet ESCAS requirements through gap and risk analysis, the provision of technical advice and training activities.

A variety of views were canvassed on what might have occurred without the existence of a well-resourced industry service program (the LEP):

- At one end of the spectrum there was a small, but distinct, possibility existed that the trade would have permanently closed following the events of May 2011 — as had occurred in New Zealand. It was recognised that Government was never likely again to act as it did in 2011 to overtly shut the trade, but over time could use increasingly stringent regulations to choke the trade to a point of non-existence.
- At the other end of the spectrum there was confidence that over time the trade would have continued, with large companies working with Government and putting in place their own initiatives to meet new regulations. It was recognised, however, that delays would have occurred and that the trade may have never returned to previous levels, since smaller live export companies may not have had the capability/resources to address the new requirements.

The extensive training activities undertaken by the LEP over 2011-2013 were particularly highlighted — training aimed at ensuring that all in the supply chain were aware of their new obligations under the ESCAS regulations. View included:

- The resources needed to do all the training work were enormous — exporters wouldn't have had the capacity to even put in one-tenth of the resources required.
- Exporters had devoted considerable resources to ensuring supply chains were ESCAS compliant and, in the absence of the LEP, importers would have had to do more.
- There was consensus that, without LEP training, there would have been significant delays.

It was recognised that both the Government and community took confidence in the united position adopted by the industry following the events of 2011 in:

- recognising that reform was needed and constructively participating in, and assisting with, the design of ESCAS
- the work done in encouraging the overseas trade to raise standards and accept ESCAS.

The achievement of this united position and these outcomes were critically dependent on the existence of the LEP. A DAWR representative confirmed that the confidence of the regulator in the LEP was a critical factor in facilitating the operation of the trade under new regulation. The representative also confirmed the importance with which DAWR views LEP activities.

There was consensus that:

- the LEP played a pivotal role in securing acceptance of ESCAS and ensuring the live trade returned to pre-ESCAS levels extremely quickly.
- it is inherently difficult — almost impossible — to place a value on this work undertaken.

It was noted that the work completed by the LEP prior to ESCAS being introduced, including the work installing Mark I boxes, meant that strong relationships had formed with overseas trading partners and Governments and these relationships were vital in

obtaining acceptance of, and cooperation with, the revolutionary new ESCAS regulations.

Indonesia impact and development of counterfactual

- *Impact summary: Without the LEP, it was agreed that the Indonesian live cattle trade would have responded to the new regulations much more slowly, returning to only 30 per cent of its previous level by the end of the first 6 months (about 60 000 cattle) and only 80 per cent of its previous level by the end of 18 months, remaining at 80 per cent of previous levels beyond this.*

In terms of the Indonesia live cattle trade it was agreed that the economic impact on the industry of the LEP's animal welfare activities should be measured by how quickly the trade met, and continued to comply with, the ESCAS regulations introduced in 2011. It was observed that with the support of the LEP, the trade was able to quickly meet the ESCAS regulations — only dipping sharply in June and, especially, July 2011.

It was noted that, with LEP support and the work of individual supply chains, the Indonesia live export cattle trade returned to its previous level quite rapidly following the introduction of ESCAS. In fact, it was noted that, with LEP support, the disruption to the total live cattle trade to Indonesia was extremely brief — a significant disruption to live cattle trade to Indonesia occurred in July 2011, but in the five months prior to July 2011 190,000 cattle were exported to Indonesia and in five months subsequent to July 2011 192,000 cattle were exported.

The following was agreed as the counterfactual — that is, a measure of what might have occurred in Indonesia, following the events of 2011, if the LEP wasn't involved:

- the trade would have returned to 30 per cent of its previous level by the end of the first 6 months — about 60 000 cattle
- by the end of 18 months the trade would have increased to 80 per cent of its previous level and remained at 80 per cent of volumes subsequently traded.

In coming to a conclusion that the trade may have never returned to its previous level, it was noted that in February 2012 there were issues, and another bout of adverse publicity involving the Mark IV box, which required significant LEP support and extensive communication work by ALEC.

Middle East impact and development of counterfactual

- *Impact summary: In terms of the Middle East live sheep trade it was agreed that the impact of the LEP's animal welfare activities should be measured by the acceptance of the new ESCAS animal welfare regulations by the Middle East Governments and the trade. It was observed that, with the involvement of the LEP, Governments and the trade in all Middle East countries, with the exception of Saudi Arabia, accepted the new ESCAS regulations and worked to comply. Without the involvement of the LEP the view of the Workshop was that there was a 10-20 per cent probability (with a leaning towards the lower end of this range) that Governments and trade in the region would have opposed the ESCAS*

regulations and the Middle East sheep trade would have permanently closed from 2012 (when ESCAS was first introduced into the region).

In terms of the impact of LEP activities in the Middle East the following was noted:

- other convenient sources of sheep supplies exist for Middle East markets — from Europe, Sudan and Somalia — and, compared to the cattle trade to Indonesia, a greater danger of cultural offence existed from the impositions of ESCAS.
- elements of the trade (which is often closely connected with Middle Eastern Governments) began with the stance of firmly resisting the introduction of ESCAS with one major Middle East country still refusing to accept ESCAS to this day.
- compared to Indonesia, partly due to location, significantly weaker relationships exist between the Australian Government and MENA Governments and the extent of Australian Government presence is much less.
- achieving acceptance of ESCAS by the trade and overseas Governments was critical — and the LEP was a major mechanism by which acceptance was achieved.
- On an annual basis the resources applied by the LEP during the Eid festival were also vital. Eid is a high-risk period for ESCAS compliance. Traditionally, during this festival period, individuals have been able to purchase Australian sheep and slaughter them at home. The practices, however, were incompatible with ESCAS, as was the general trading environment during Eid — with multiple distribution points and slaughter by untrained people. In light of this, since ESCAS was introduced, during Eid the LEP (along with individual exporters) have posted significant numbers of staff/consultants to the region to increase levels of ESCAS compliance. In a couple of important Middle East markets this has resulted in single points of distribution for carcasses, rather than live animals. In other markets live animals continue to be purchased, but are then slaughtered by trained staff in the presence of the buyer.
- While not discounting the work of the LEP, it was also observed that a couple of significant Middle East importers also owned ships that are used in the trade. Due to the immense capital investment involved these importers would be motivated to ensure the trade continued.

With the above points noted, the conclusion of the Workshop was that the LEP had played a critical role in achieving acceptance of ESCAS in the Middle East. It was agreed that without the involvement of the LEP there was a 10 to 20 per cent probability that the Middle East sheep trade would have permanently closed from March 2012 (when ESCAS was first introduced into the region).

‘Other Asia’ ‘impact and development of counterfactual

- *Impact summary: The live cattle trade to Vietnam, a trade now valued at \$330 million per year, developed during the Evaluation Period and was required to comply with ESCAS conditions from 1 January 2013 — conditions which are foreign to historical animal*

trading and treatment conditions in Vietnam. Without the support of the LEP, it was agreed that there was a 20 per cent probability that the trade would not have developed.

There are a number of significant live animal trades in the 'other Asia' region (that is, the region encompassing Asian countries other than Indonesia):

- slaughter/feeder cattle trade to Vietnam, valued at \$330 million in 2014-15
- breeder trade (dairy & beef) to China, valued at \$169 million in 2014-15
- slaughter/feeder cattle trades to the Philippines and Malaysia valued at \$71 million in 2014-15
- feeder trade to Japan, valued at \$15 million in 2014-15
- goat trade to Malaysia, valued at \$8 million in 2014-15.

Although the LEP worked in all these trades, discussion focused on the cattle trade to Vietnam and the goat trade to Malaysia.

The Vietnam trade, which was developed over the evaluation period, grew from \$2 million in 2011-12 to \$330 million in 2014-15. Workshop views ranged from 'we wouldn't have had a Vietnam without the LEP' to observations that since 2011, exporters are very conscious that they are responsible for the manner in which the trade is conducted and the animal welfare outcomes achieved. It was recognised that:

- there had been some issues in Vietnam and that the LEP was useful in addressing problems that arose (while noting that there was further work to be done).
- the role of ALEC also was crucial in the formation of the 'six point plan'.

In light of the above it was agreed that the counterfactual for Vietnam be that there was a 20 per cent chance of the trade not being developed without the LEP.

In terms of the goat trade to Malaysia, without the activities of the LEP it was agreed that there was a high (50 percent) chance of no trade after the introduction of ESCAS in September 2012. This higher chance of the trade failing was attributed to the fact that exports are undertaken by smaller companies and the distribution systems in Malaysia are quite broad.

Going forward

It was agreed that there was likely to be considerable residual impact from LEP investments and activities made in the period 2010-11 to 2014-15 that would extend beyond 1 July 2015. The most substantive benefit was that enhanced capacity now existed for supply chains to meet animal welfare requirements.

- It was noted that exporters were now in a much improved position, compared to 2011, to meet the ESCAS requirements in the absence of involvement from the LEP — for instance, most large exporters now had animal welfare officers permanently on staff in overseas markets, some had previously worked for the LEP.

- Small exporters, however, would still rely on the LEP and it was noted that a series of animal welfare incidents involving small exporters still had the potential to affect the entire trade.

In terms of the residual value beyond 2015 of investments made during the Evaluation Period:

- It was believed that there would be accelerated consolidation of the export industry and greater efforts to highlight differences between the ‘performers’ and the ‘non-performers’ of the industry.
- It was recognised that community expectations of the trade would keep on increasing and that further work would be required to meet these expectations on an ongoing basis — for example, the work on the Livestock Global Assurance Program (LGAP).

Other points made

Other major points were:

- the fact that the LEP existed prior to May 2011, but its activities did not prevent May 2011 from occurring. Given this, an obvious question was: as well as accepting the benefits from its post 2011 work, should benefits to the LEP be ‘discounted’ because the pre-2011 work in some sense failed?
- It was agreed that no ‘discount’ should apply to account for the apparent failure of the pre-2011 work. It was noted that the LEP in 2010 had a specific objective to raise stunning levels for Australian cattle in Indonesia, in the knowledge that this would be desired by the Australian community, but this objective was resisted strongly by importers. It was concluded that within the regulatory environment that existed prior to mid-2011, the LEP had done all it could. It was also noted that the activities of the LEP prior to 2011 in installing 110 Mark I boxes in overseas markets, regardless of views over the animal welfare outcomes associated with these boxes, allowed the LEP to react quickly to raise standards once ESCAS was introduced.
- It was also observed that LEP support in the area of animal welfare (including assisting in stunning being widely adopted in Indonesia) led to ‘triple bottom line’ benefits in terms of improved welfare for the animals themselves. In particular, it was observed that the LEP was a major change agent in facilitating improved animal welfare on ships and in-market (and this outcome extended, to an extent, beyond Australian animals to animals generally). These improved animal welfare outcomes were a very important outcome in their own right.
- It was also noted that the LEP participants provide domestic Australian social benefits through supporting Foodbank Australia in the establishment of a collaborative supply program for beef — under this program cattle that fall outside export specifications are donated to Foodbank which leads to sausages being made available to welfare agencies across Australia to support people who would otherwise go hungry.

Opportunities to improve impact achieved

The following were noted as areas for program improvement:

- Communications was described as a ‘missing component’. It was recognised that LEP activities were directed at the avoidance of hazard — in addition to this it was noted that investments needed to be made in communications to inform the public about the trade so the public has quick access to relevant facts. Given greater knowledge about the trade, the majority of the community may not support calls for the trade to be closed if an unacceptable event occurs despite the industry’s best endeavours. The program going forward needs to better understand its role in this regard. The LEP needs to compile and communicate to the public and to journalists some basic facts about the trade — the welfare work and training undertaken, the volume of trade, the advances in markets (for example, Eid), the success of introducing stunning in markets (particularly Indonesia and Vietnam), etc. The LEP has focussed on making change, but has not focussed on how to communicate this to the community.
 - The question was asked: ‘what is MLA’s risk appetite for the live trade?’
- The work that the LEP has done in country was described as ‘invaluable’ and needed to be continued. The LEP, particularly in its overseas work, acted as the ‘honest broker’. LEP training activities needed to be continued — practices slip if training is not continued — but this needed to increasingly focus on ‘train the trainer’. Generally the LEP was described as ‘delivering value in spades’.
- Looking to the future, some rebalancing of LEP program activities could be useful.
 - It was observed that individual supply chains are now taking increasing responsibility for animal welfare outcomes — this was an area where the LEP made the vast majority of investments during the impact evaluation period. The possible need for the LEP to invest less in this area in the future potentially provides increased space for work on other areas such as communications or other R&D activities.
 - Consistency and improved techniques in gathering statistics/information would help. For instance, in gathering FOB values it was likely that some exporters included the value of the fodder on board, whereas others only included the value of the livestock
- Over the next five years there was a need to:
 - focus on new markets — China will need significant training and resources
 - focus on underpinning systems that increase accountability in market
 - use NLIS information to better effect.
 - ... All cattle have an electronic tag when they leave Australia. The NLIS database is a great resource that is underutilised, getting data together is an opportunity for the live export industry — this should be a focus for R&D going forward.

Additional suggestions are provided by MLA in the background paper.

Subprogram — R&D

MLA Summary of Sub-Program Outputs and Outcomes

Indonesia

To establish best practice beef breeding management in Indonesian feedlots, Indonesia feedlot operators who have breeding females in the feedlot have access to a training manual and DVD translated into Bahasa that has documented key issues common to Indonesian systems for breeding cattle and describes potential solutions and best practices. Reports show that mortality has declined, from 20 per cent to <5 per cent, which was attributed to improved colostrum management. In two other breeding feedlots, despite improvements to colostrum management, calf mortalities only declined from 15 per cent to approximately 10 per cent and from about 18 per cent to 12 per cent.

Regarding stunning boxes, the LEP assisted to develop, install and validate to OIE standards (ESCAS compliance), and provide assistance with modifications to an existing Mark I restraining box to allow it to be used for stunning of bovine animals in the upright position. The plans are available across the market for abattoirs to include a stunning box that has been tried and tested as OIE compliant. There was an upgrade of the Mark IV restraining box to maintain ESCAS compliance and improvements in compliance with ESCAS in non-stun markets for cattle slaughter. There are 5 original Mark IV boxes in Indonesia and 11 copies of Mark IV boxes (hydraulic restraining box).

The LEP provided abattoir design concepts that can be adapted for the specific needs of each proposed abattoir site and provide guidelines and advice to the Indonesian cattle processing industry. This in turn improves handling, slaughter and hygiene in facilities. Without the LEP driving design and concept ideas across the market, use of such a resource is likely to decline.

Across all markets

Throughout the five year period in review, the LEP has developed extension materials to support the rollout and compliance with ESCAS in various languages. Such materials include supply chain procedures checklist for slaughter of Australian cattle, sheep and goats in overseas markets, work instructions to support the documented SOPs management of Australian livestock in overseas markets, knife sharpening DVD to provide guidance to slaughtermen for knife sharpening and maintenance and production of instructional DVD training material which is used as an aid in training stockman on managing, handling and slaughter of Australian livestock in overseas markets. Also, the LEP has developed a detailed modular training program for each of the supply chain elements for cattle, sheep and goats and to manage the implementation of the training projects in market.

The LEP has arranged auditor training courses in Indonesia, South East Asia and across MENA for ESCAS auditors to improve ESCAS auditor assessment skills and understanding of ESCAS, World Organisation for Animal Health (OIE) welfare guidelines and compliance requirements. The LEP R&D Program has directed significant resources and funding towards the successful implementation and

development of ESCAS. Projects have been undertaken that build operator compliance capacity, facilitate knowledge and understanding by importers and increase the technical capacity of those involved in managing and administering the system.

Close to \$2.5 million from the LEP R&D portfolio has been invested to improve engagement, communication, message consistency with workers/employer and employees that manage and handle Australian livestock in overseas markets. There has been improved worker safety from competent handling of Australian animals, potential for improvements in health, welfare and management from ESCAS training, and auditor training which has helped improve auditor confidence and competency has also been critical. Without the MLA/LEP, these training and extension materials would not exist.

Efforts have been made to manage ESCAS audit duplication with an investigation of development of a risk management and quality assurance (QA) program for the Live Export Industry. The occurrence of audit duplication and the potential for and appropriateness of synchronising auditing for shared facilities in order to reduce duplication and administrative burden has also been researched. Audit duplication was costing the industry in excess of \$2 million. As a result of the LEP input to the ESCAS reform, audit duplication has significantly been reduced.

An R&D report (ESCAS Risk Management/Audit duplication) was completed in 2013 scoping and determining a framework for the development of a livestock global quality assurance program (LGAP). This report was the first step in demonstrating industry's progress towards implementing the Farmer Report's recommendation that 'industry develop and implement a supply chain QA system.'

The objective of the LGAP project is to deliver, develop and pilot a global assurance program for the Australian livestock export industry that includes all supporting materials including templates, standards and rules, implementation and communication plans and detailed costings. This project represents an ongoing effort by industry and has been subject to much consultation and consideration by many parties within and outside the industry.

Research is still underway, however, this program offers long term sustainability for the industry and is the next generation of exporter ESCAS compliance. This program, should it be implemented by the live export industry, will remove the major focus on exporter responsibility for the welfare of the livestock. It will be the responsibility of the facility or those that are doing the wrong thing, and there will be consequences if noncompliant. The program will also recognise areas of strength and excellence and encourages continuous improvement.

Other projects of significance

The inattention R&D project has measured feeding and drinking patterns of approximately 14,254 sheep, from September 2011 to February 2015. Sheep that spend less than 30 minutes total time per day at the feed trough are considered to be at high risk of developing disease, or dying. Based on this, it takes 5 days for more than 90 per cent of sheep to be spending an acceptable time at the trough eating pellets, and there remains around 2 per cent of sheep in the groups that do not spend adequate time feeding per day.

The results of this project provide guidance on any potential improvements to export preparation practices and the Australian Standards for the Export of Livestock (ASEL). Research is still being undertaken on how to get the 2 per cent onto feed quicker.

With the Salmonella vaccine development, the project has constructed derivatives of Salmonella DAM vaccines that reduce the risk of the vaccine resulting in clinical disease in vaccinated animals by improving safety, without compromising effectiveness. The vaccine will be delivered in drinking water to allow mass medication of animals at receipt into export facilities and will provide rapid protection. Rigorous studies have been undertaken that demonstrate a high level of vaccine safety and efficacy with minimal toxicity. Regulatory approval to return the biological material has been undertaken and granted. Once the material is back in Australia from the United States, an industry partner will undertake large animal studies with the aim of producing a commercial vaccine that can be delivered orally for sheep.

The project which focuses on reducing mortality on long haul cattle voyages originated in part from concerns over respiratory disease as a cause of mortality in cattle exported from Australia to the Middle East. Some of the outcomes achieved determined that the major cause of mortalities from the 20 voyages were respiratory disease (50 per cent of all deaths that were studied) followed by musculoskeletal and injury conditions (15 per cent of deaths), and for the first time, advanced molecular diagnostic techniques have been applied to samples collected at pre-export feedlots and during the voyage to identify respiratory disease pathogens. Also for the first time, detailed descriptions of mortality rates (deaths per 1,000 cattle days) were recorded for export voyages and patterns of daily mortality rates were described. Recommendations for follow up work include the development and implementation of risk mitigation strategies aimed at reducing BRD risk during export.

From the mortality project, there is production of valid and credible descriptions of the causes of death in cattle exported from Australia to the Middle East. Industry is now equipped with a better understanding of the causes of morbidity and mortality on long haul voyages. BRD was identified as the major cause of mortality on long haul cattle voyages and there is now an understanding of the similarities between land-based BRD studies and what happens during long haul voyages. This presents an opportunity for the Live Export and the Feedlot industry to work together to increase awareness and benefits of backgrounding and preparation of animals entering live export or domestic feedlot supply chain. Furthermore, numerous training resources have been developed and some into apps, for example the Vet Handbook which to date has been downloaded 1,758 times.

Workshop evaluation of performance

- *Impact summary: During the evaluation period a salmonella vaccine was developed by the LEP to the point that discussions are underway with an animal health company about commercialisation of the vaccine. It was agreed that the impact from the development of a salmonella vaccine be calculated on the basis of a reduction in on-vessel mortalities from*

0.74 to 0.46 per cent for sheep (a 40 per cent reduction) — with an 80 per cent probability being assigned to the vaccine becoming commercially available in 2018.

- *In terms of the impact of LEP R&D assisting in reducing costs of ESCAS compliance it was agreed that the following be used as the basis of the benefit calculation:*
- *Part of the regulatory reform to ESCAS involved a move to risk based auditing. The Department has previously estimated that in the first year of risk based auditing there would be a 30 per cent reduction in the number of facilities audited (representing by its estimate \$2 million in savings), with further reductions to apply as compliance history is demonstrated.*
- *The regulatory reforms also made it more easy for exporters to share audits of overseas facilities (abattoirs, feedlots, etc), thus reducing costs associated with audit duplication. The annual cost to the industry of duplicated audits was calculated to be about \$1.25 million in 2013. It is estimated that a 20-30 per cent saving in this cost was achieved from audit duplication reduction.*
- *In terms of use of templates and regulatory reform, the DAWR representative stated that regulatory reform had resulted in a time saving for Departmental staff totalling 30 per cent. It was noted that these time savings had, in general, not resulted in cost savings for exporters in DAWR charges (the main exception being for air freight shipments where some savings were realised). DAWR noted that the savings enabled work in additional markets and in the absence of these saving exporters would have incurred additional charges. LiveCorp also noted that exporters had saved time from the templates / regulatory reform.*

Much of the LEP's R&D work between 2010-11 and 2014-15 was animal welfare related — developing Standard Operating Procedures (SOP) templates and training materials to ESCAS standards and translating these into a number different languages. The impact of this work was effectively already incorporated into the animal welfare impacts considered earlier in the workshop.

Apart from the animal welfare work, there were at least two other LEP R&D outputs in the period 2010-11 to 2014-15 that may have significant industry impact:

- the work undertaken on salmonella/inanition in sheep
- work undertaken on ESCAS in an attempt to reduce regulatory burden while retaining the ESCAS animal welfare outcomes.

Salmonella vaccine development

The most common cause of sheep mortalities on a live export vessel is salmonellosis / inanition. Prolonged anorexia leads to inanition. Anorexia is a feature of salmonellosis so when a sheep dies with signs of salmonellosis and reduced gut fill it is not possible to tell if the salmonellosis preceded or followed the anorexia. The average annual mortality rate on live export sheep vessels is about 0.74 per cent, with inanition and salmonellosis accounting for the majority of these (60-75 per cent). The salmonella vaccine could potentially reduce mortalities by a further 40 per cent making annual average mortalities around 0.46 per cent. The long term aim would be to reduce the reportable mortality level on board boats from 2 per cent to 1 per cent.

A salmonella vaccine for sheep, delivered orally in water, was developed by the LEP during the Evaluation Period. This vaccine is now in the hands of a commercial entity.

A BCA conducted by the LEP prior to the full development of the vaccine showed that an efficacious salmonella vaccine could result in a BCR of 1.13:1. Major intangibles benefits associated with the impact of salmonella vaccination were identified as: 1) those relating to public perceptions about the livestock export trade and additional animal welfare benefits through reduced morbidity; and 2) improved performance associated with a reduction in salmonella exposure and infection.

The impact of the development of a salmonella vaccine will be calculated on the basis of the above information — with a probability of 80 per cent being assigned to the vaccine becoming commercially available in 2018.

Reducing the cost of ESCAS compliance

The LEP has undertaken a number of R&D projects aimed at reducing the costs of ESCAS compliance while retaining the ESCAS animal welfare outcomes.

Outputs/outcomes from these projects include:

- the use of templates in paperwork with the Department on ESCAS regulations, resulting in uniformity in approach and time savings
- a number of regulatory reforms which reduce paperwork and involve simplified procedures
- reducing the extent of duplication in audits (that is, different supply chains auditing the same overseas facilities).

The following impacts were identified from this work:

- in terms of audits, the implementation of the risk based audit policy reforms by DAWR delivered two key outcomes:
 - It reduced the number of audits required by the department under ESCAS. Under the new policy, facilities are assessed and given risk scores based on how long a facility has been approved, the type of facility and slaughter method, and any non-compliances. Supply chains are also given risk scores based on non-compliances and how long that market has been approved under ESCAS. The risk scores for facilities and supply chains are combined to determine ESCAS audit frequency for each facility.
 - It allowed exporters to more easily share facility audits, thereby reducing unnecessary costs incurred with audit duplication (these arose when two or more supply chains used the same facility — under the old policy the facility had to be audited under each supply chain).
- The Department has estimated that in the first year of risk-based auditing there would be a 30 per cent reduction in the number of facilities audited (representing by its estimate \$2 million in savings), with further reductions to apply as compliance history is demonstrated.

- Additionally, the annual cost to the industry of duplicated audits was calculated to be about \$1.25 million in 2013. It is estimated that a 20-30 per cent saving in this cost was achieved from audit duplication reduction.
- In terms of use of templates and regulatory reform, the DAWR representative stated that regulatory reform had resulted in a time saving for Departmental staff totalling 30 per cent. It was noted that these time savings had, in general, not resulted in cost savings for exporters in DAWR charges (the main exception being for air freight shipments where some savings were realised). DAWR argued that the savings enabled work in additional markets and in the absence of these saving exporters would have incurred additional charges. LiveCorp also noted that exporters had saved time from the templates / regulatory reform.

Opportunities to improve impact achieved

The following were noted as areas for program improvement:

- Going forward greater attention was needed on measuring the industry impact of LEP activities with an R&D project needed within the LEP to achieve this.
- Hotstuff — it was noted that 2010-2015 represented the first 5 year period that Hotstuff (model to reduce heat stress) had been a compulsory part of the trade. A study could be conducted into measureable outcomes from Hotstuff, both in terms of commercial benefits and higher confidence by the community.
- Research is needed to rigorously monitor health and welfare outcomes on ship and identify how research interventions could assist with improvement.
- Improve the selection process for R&D projects. DAWR would like an input into the selection of projects. There could also be an expanded opportunity provided for those outside the industry to put ideas forward.

Additional suggestions were provided by MLA in the background paper.

Subprogram — Market Access

MLA Summary of Sub-Program Outputs and Outcomes

Indonesia

A protocol for productive heifers was agreed and utilised for shipments and was further refined in October 2015 with campylobacteriosis and trichomoniasis testing removed, quarantine time halved and other savings achieved. The amendments removed between \$130 and \$150 per head from the cost of the protocol (for example, \$1.5 million for 10,000 head), with exports of around 10,000 head likely in 2015.

In September 2015, the delegation from IAQA brought proposed protocols for pre-export inspection of cattle exports which were proposed to apply to feeder, slaughter and breeding cattle protocols. They included unworkable conditions such as testing for brucellosis, tuberculosis and vaccination against all serotypes of bluetongue. Through the

delegation and the involvement of the LEP and Department of Agriculture, the delegates increased their understanding of Australia's animal health systems and the export preparation process. IAQA subsequently re-submitted protocols which only applied to productive heifers and aligned with the existing DGAHLS health requirements without the additional testing and vaccination requirements.

The delegation resulted in IAQA amending and reducing its proposed pre-export requirements and limiting their application to productive heifers. This reduced or removed its potentially negative / trade restrictive impact on exports.

Furthermore, the LEP worked with the Department to develop the Registered Premises list (so as to prevent agreement to Indonesia's proposed requirement for farms of origin to be approved) as part of the October 2013 protocol negotiations. Over the following two years, the LEP and the Department have continued to push for further additions to the list and for a process to expeditiously add registered premises. To date, there have been no facilities added to the Indonesian approved list since October 2013, although there have been progressive steps forward, and a visit by the DG of DGAHLS in October 2015 provided the opportunity to reiterate the importance of a more responsive system.

Other Asia

Throughout the period in review, it has been of key importance to maintain close contact with importers and Australian and overseas governments to engage in formal and informal action to maintain or increase access for Australian livestock. Market access has been achieved for feeder/slaughter cattle in China and Thailand, while improved technical knowledge has developed in Vietnam.

For China, the LEP developed a strategy for progressing the opening of the China market with the aim of achieving the best possible access for all of Australia (including northern producers). Three Chinese delegations to Australia and a technical visit to China, coupled with significant technical papers and effort resulted in the agreement of feeder and slaughter cattle protocols with China in mid-2015. The agreed protocol included significant changes to how China manages bluetongue virus and in turn provides access for northern cattle.

China has been a priority for the livestock export industry for more than a decade. The opening of the market reflected significant strategic and operational effort from the LEP, which incorporated the commercial demand pressure developed by exporters and state / territory governments. The market provided a new opportunity for exports and helped build optimism in the producer and exporter sectors. The involvement of the LEP helped to speed up the process and achieved better access for northern Australia. For sheep, industry and Government have developed proposed breeder sheep and goat protocols and provided these to China on several occasions. While they have not progressed to date, with the feeder and slaughter cattle protocols agreed, it is likely they will proceed in the next year. And as part of the Australia-China FTA, tariffs on feeder/slaughter cattle will be reduced from 10 per cent to 0 per cent over the next 4 years.

In 2014, the LEP developed a standard operating procedure for Ovine Johne's Disease testing under the China breeder sheep protocol to support ongoing trade. It was agreed by

China and breeder sheep exports were able to continue. Breeder sheep exports to China in 2014 were 5,712 head and to August in 2015 around 13,000 head, with LEP involvement supporting some of these exports. The Department and industry are also prepared to progress negotiations for breeder sheep and goats with a number of refinements to improve exports.

For Thailand, protocols were agreed for feeder and slaughter cattle after many years of LEP activities, including the coordination of a delegation in July 2014. Thailand provides a new market opportunity for cattle exporters and northern cattle producers. A total 9,200 cattle have been exported to Thailand as of August 2015.

In Vietnam, the LEP liaised with exporters, the NT Government and the Department of Agriculture to pursue agreement for feeder and slaughter buffalo protocols, and was ultimately achieved in 2013-14. Exports of buffalo to Vietnam increased from 798 head in 2013, to 4,068 head in 2014 — a significant impact for a niche industry.

Cambodia saw protocols agreed for feeder and slaughter cattle as well. There are yet to be cattle exported, however the LEP is aware of interest and activity in the market and provides an additional market opportunity for exporters and northern cattle producers. Additionally, the completion of the feeder and slaughter cattle protocols has also allowed negotiations to commence for a breeder cattle protocol.

For Korea, as of 2015 the Australian and Korean Governments had agreed on the health conditions. However, they are currently awaiting approval from the Korean Government.

For the Solomon Islands, the feeder cattle protocol was agreed in 2012-13, however there have been no exports under the protocol, although the market is open if an opportunity for export develops.

A protocol with Myanmar for breeding cattle has largely been agreed with only final confirmation required. The protocol will provide a new market opportunity for exporters of breeding cattle, although exports are likely to commence after 2015.

In 2011, the Malaysian Government sought to amend its slaughter goat protocol with Australia to include Hendra treatment (oxytetracycline) following outbreaks in Queensland. The LEP coordinated with exporters to formulate advice and provide an agreed position for the department. The trade stopped for four weeks during the discussions and recommenced when the Malaysian Government agreed to proceed with the original requirements without Hendra treatment. The protocol was agreed with clinical freedom from Hendra included in place of treatment, allowing trade to continue without the unnecessary cost, mortalities and slaughter interval issues that oxytet treatment would have caused. This achievement has applied to the subsequent exports of goats of around 255,000 head.

MENA

Through regular formal and informal engagement with stakeholders, including Australian Government and importing country officials, market access can be maintained across the MENA markets for Australian livestock.

Except for Saudi Arabia, market access has been maintained for all pre-ESCAS markets. It should be noted that exports to Saudi had been decreasing for some years prior to ESCAS. In-market presence has enabled the development and maintenance of relationships with key stakeholders, both government and commercial. These relationships have been critical in enabling (often in close cooperation with the Australian Government) the resolution of most market access issues when they have arisen, or where this has not been possible, the minimisation in most circumstances of potential negative impacts. Additionally, market access has been regained for Bahrain and Egypt, and gained for Iran and Lebanon.

In 2010-11, the second closed loop supply chain in Egypt opened. The LEP Livestock Services Manager in MENA and the Department of Agriculture Consul in Dubai reported in support on opening a second supply chain. The announcement increased the opportunities for export to Egypt, doubling the number of available supply chains.

The Bahrain protocol renegotiation and market opening saw shipments of sheep commence in April 2014. The opening of the market required new protocols to be renegotiated and additional assurances obtained relating to the unloading of vessels. In 2011, sheep exports were 350,000 head; in 2012 they totalled 250,000 head; while in 2013 there were no exports following market access closure. In 2014, sheep numbers reached 280,000 head and to August 2015 totalled 260,000 head.

Egypt protocol renegotiations arose for feeder and slaughter cattle, with new protocols for feeder and slaughter sheep and breeder sheep and cattle. Market closures were reversed with new protocols developed, ESCAS implementation and additional industry-based HGP freedom assurance certification requirements agreed. In 2014, 27,900 head of cattle were exported and in 2015 to date there have been 18,500 head. The protocol agreement led to the first shipments of sheep since 2003, with 79,000 head exported in 2014.

For Lebanon, sheep, goat and cattle feeder and slaughter protocols have been agreed in 2014-15, thus opening the market. There has been no significant impact as yet, although it presents a new market opportunity for Middle East sheep exporters.

Turkey sheep and cattle protocols were agreed and finalised in 2010-11, allowing exports to commence. In 2010-11, Turkey opened in September with 224,285 sheep and 66,002 cattle exported that year. The following two years there were 352,352 and 245,147 sheep and 56,000 and 46,000 cattle exported, respectively. Iran protocols were agreed in 2014 for feeder and slaughter sheep, goats and cattle. To date however, there have been no exports, in part due to political and financial challenges.

In 2013, the legislation of the Customs Union required that existing protocols with CU states (for example, Russia) would continue to apply so long as negotiations had commenced for CU protocols. With the Department, industry developed proposed breeder, feeder and slaughter cattle protocols which were submitted to the CU in December 2013. These allowed the trade to continue under the existing Russian protocols. Furthermore, vaccination against BRSV is required under the Russian breeder cattle protocol and Kazakh protocol and when Triangle 4 became unavailable in Australia the LEP worked closely with the Department and exporters to seek

dispensations and develop arrangements to allow continued trade. Trade for cattle in 2013 was around 5,000 head to Kazakhstan and 35,000 head to Russia. In 2014, exports to Russia were 48,000 head and to August 2015 were around 24,000 head. The efforts of the LEP supported continuity of the trade.

Other

Aside from regional specific market access protocols, there has been development of standardised health condition wording and clauses for slaughter/feeder livestock. The Department and industry developed template wording for health conditions, including basic feeder/slaughter cattle and feeder/slaughter sheep and goat protocols to use as the starting point for negotiations and with markets that demonstrated an interest in importing. The certainty provided by the Department approving the wording for these templates has allowed the LEP to work with exporters and their importers to improve the certifiability of import permits and it has sped up the process of commencing negotiations by providing an easily accessible, industry/government agreed starting point. The standard health protocols have allowed for prompt responses to enquiries from Cambodia and Lebanon; each of which agreed to the basic protocols.

The development of additional industry-based Hormone Growth Promotant freedom assurance measures had the LEP develop a process, SOPs, work instructions and promotional materials agreed to by the Department for use for HGP sensitive markets. This allowed the re-opening of trade with Egypt and was adopted for Turkey to allow ongoing supply. It was utilised when Russia heightened its sensitivity to HGPs (in meat) and allowed exporters to provide additional assurance to satisfy the Department and allow continued trade. It will provide a basis for developing systems to meet China's HGP freedom requirements.

The Protocol Committee has provided an effective means for determining clear market access priorities for the Department and coordinating an agreed industry position on technical issues. It has improved the way in which the Department and industry operates, provides a mechanism for providing a coordinated industry position and results in industry and the department focusing on the highest priority markets/issues. As per the outcomes, the last five years have seen significant progress in market access for livestock exports and the development of strong, productive relationships between industry and government.

The LEP prepared a submission outlining the technical concerns with the Department's policy of requiring a Memoranda of Understanding (MOUs) for unloading of livestock with all new markets. The submission proposed a risk-based approach. The impact of removing the MOU requirement for all markets significantly sped up the process of achieving agreement for market access (for example, by simplifying it to just requiring the health protocols to be agreed). The role of the LEP was primarily to highlight the concerns of the restrictiveness and technical limitations of the MOU approach.

In 2015, the Australian Government and industry have worked together to progress a protocol for feeder cattle exports to the US. While agreement has not yet been reached, significant progress has been made. It is likely that the impact from the work to date will flow beyond 2015.

Workshop evaluation of performance

- *Impact summary: It was agreed that the LEP's market access activities added considerable value to the live export sector and that a BCR for LEP market access activities of 10:1 be used.*

In terms of the LEP's market access activities three tiers of achievement were noted:

- involvement in opening new markets
- defensive market access activities in market maintenance — preventing new protocols from being introduced that would be more costly to meet, and finally
- involvement in improving protocols to existing markets.

It was recognised that the LEP's market access activities spanned a wide expanse of territory. The work in Indonesia in 2013 was particularly noted — with the LEP working with others in industry and with DAWR to:

- undertake a 'Gap Analysis' of three new/changed protocols that were proposed for that market versus the existing protocols
- negotiate an improved the feeder cattle protocol — compared to provisions originally proposed, the final protocol agreed involved savings of about \$120 per head (indeed the original proposal may have involved a cessation of the trade).

In terms of other major issues:

- the critical role the LEP played in the re-opening of the Bahrain market was acknowledged — this market may have remained closed for very long time if not for the work of the LEP
- the development of the Vietnam market to a 300 000 head market could be partly attributed to the work of the LEP, as a protocol needed to be developed for this market and the LEP played a role in this undertaking.
- the LEP's involvement with Turkish market access issues, including the hosting of delegations, was also noted.

The DAWR representative noted that they very much appreciated the role of the LEP in coordinating industry input into market access issues and prioritising these issues. DAWR noted that, in the absence of work done by the LEP, additional Department staff would have to be assigned to this area, but that it was more efficient, and resulted in improved industry outcomes, for the LEP to undertake this work.

It was unanimously agreed that

- LEP's market access work is enormously useful to industry
- that access would be available to less markets, if the LEP did not exist, and access to some other markets would be more difficult
- the value of the LEP's market access activities is derived from not only assisting to open new markets, but also maintaining access to existing markets

- if not for the coordinated market access activities of the industry through the LEP over time market access conditions would gradually deteriorate and Australian live exports would suffer reduced volumes and market shares.
- that in the absence of the LEP many market access outcomes would still be achieved, but achievement occurred more rapidly because of LEP resources. In the absence of the LEP, it was very probable that industry would take on this activity again and provide input into Government.

It was also unanimously agreed that this was a difficult area to measure. The workshop agreed that, rather than trying to value benefits from specific market access outcomes, an overall value for the LEP's market access activities be applied of 10 times expenditure.

Opportunities to improve impact achieved

Nothing was noted as areas for program improvement.

Impact Assessment

7.2 MLA Impact benefits and investments^a: 1.3 Live Export portfolio

		Indonesia	Vietnam	Middle East	Malaysia	R&D	Market access plus	Live Export Portfolio Total
		cattle	cattle	Sheep	Goats	Sheep	lower compliance	
Expected benefits								
Red meat industry net income - total ^b	\$m	432	54	82	69	8	60	705
– 2010-11 to 2014-15	\$m	287	20	46	20	0	7	381
– > July 2015	\$m	287	34	36	49	8	52	324
Actual investment^d								
– 2010-11 to 2014-15 inclusive	\$m							49
Benefit cost ratio								
Red meat industry net income - total								145
Red meat gross value of production - total								19.3

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Saleyard equivalent GVP excluding processing (basis for levies) ^d Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

7.3 MLA Impact – benefits in terms of red meat net income^a: 1.3 Live Export portfolio

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
1.3 Maximise market options for producers and exporters in the LEP	637	68	705	14.5
– <i>per cent of impact benefits</i>	90	10	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

7.4 MLA Impact – benefits in terms of GVP^a: 1.3 Live Export portfolio

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
1.3 Maximise market options for producers and exporters in the LEP	845	95	940	19.3
– <i>per cent of impact benefits</i>	90	10	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

7.5 Budgets for 1.3 Live export portfolio

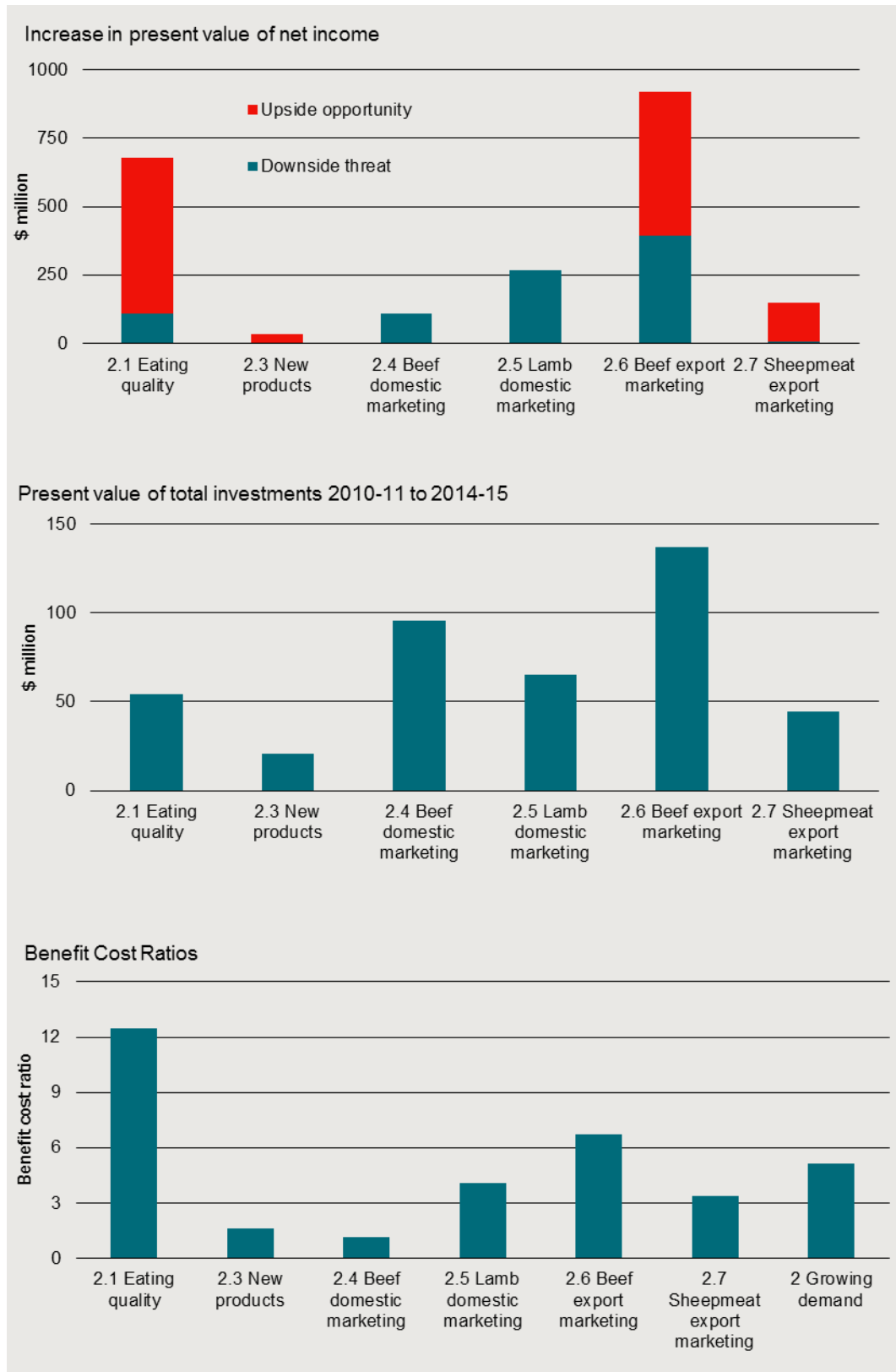
Budgets by Program	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
1.3 Maximise market options for producers and exporters in the livestock export market	6,976	7,020	9,390	8,339	8,025	7,546	7,317	7,766	7,367	7,637	39,075	38,308
MLA Donor Company	0	0	0	0	0	0	0	0	0	0	0	0
Overheads (Corporate Services / Communications)	557	623	1,075	1,020	718	662	681	669	629	822	3,660	3,796
TOTAL	7,533	7,643	10,465	9,359	8,743	8,208	7,998	8,435	7,996	8,459	42,735	42,104

8 #2 Growing demand

Top line result to date — MLA expenditure on Growing Demand programs provide industry returns of \$2 155million from expenditure of \$418 million with a BCR of 5.2:1.

Chart 8.1 and tables 8.2, 8.3 and 8.4 provide a summary of the payoffs from investment in *Growing Demand* programs. Supporting details behind the impact for each individual program are provided in following sections.

8.1 Summary of MLA benefits and investments^a – Growing Demand portfolio



^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

8.2 MLA Impact –benefits and investments^a: 2 Growing demand

		Eating Quality	New Products	Beef Domestic Marketing (incl 2.2 Nutrition)	Lamb Domestic Marketing (incl 2.2 Nutrition)	Beef Export Marketing	Sheepmeat Export Marketing	Growing Demand Total
		2.1	2.3	2.4	2.5	2.6	2.7	2
Expected benefits								
Red meat industry net income - total ^b	\$m	679	33	108	265	921	150	2 155
– 2010-11 to 2014-15	\$m	327	24	95	222	602	125	1 395
– > July 2015	\$m	351	9	12	43	319	25	760
Red meat gross value of production- total^c								
– 2010-11 to 2014-15	\$m	518	45	220	359	1 088	216	2 446
– > July 2015	\$m	652	18	29	74	574	46	1 392
Actual investment^d								
– 2010-11 to 2014-15 inclusive	\$m	54	21	96	65	137	44	418
Benefit cost ratio								
Red meat industry net income - total		12.5	1.6	1.1	4.1	6.7	3.4	5.2
Red meat gross value of production - total		21.5	3.0	2.6	6.6	12.1	5.9	9.2

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Saleyard equivalent GVP excluding processing (basis for levies). ^d Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

8.3 MLA Impact – benefits in terms of industry net income^a: 2 Growing Demand

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
2.1 Eating Quality	107	572	679	12.5
2.2 Nutrition	Analysis included under Programs 2.4 and 2.5			
2.3 New products	0	33	33	1.6
2.4 Beef Domestic Marketing (incl nutrition)	108	0	108	1.1
2.5 Lamb Domestic Marketing (incl nutrition)	265	0	265	4.1
2.6 Beef Export Marketing	394	527	921	6.7
2.7 Sheepmeat Export Marketing	6	144	150	3.4
Total - 2 Growing Demand	879	1 276	2 155	5.2
— per cent of impact benefits	41	59	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

8.4 MLA Impact – benefits in terms of GVP^a: 2 Growing Demand

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
2.1 Eating Quality	182	988	1 170	21.5
2.2 Nutrition	Analysis included under Programs 2.4 and 2.5			
2.3 New Products	0	62	62	3.0
2.4 Beef Domestic Marketing (incl nutrition)	248	0	248	2.6
2.5 Lamb Domestic Marketing (incl nutrition)	434	0	434	6.6
2.6 Beef Export Marketing	739	923	1 662	12.1
2.7 Sheepmeat Export Marketing	10	252	262	5.9
Total - Growing Demand	1 613	2 225	3 838	9.2
— per cent of impact benefits	43	57	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

Key Points

Impact

MLA expenditure on *Growing Demand* programs provide industry returns of \$2,155 million from expenditure of \$418 million with a BCR of 5.2:1. Some 65 per cent of the benefit accrued during the assessment period with 35 per cent to be captured in future years.

Of the component programs in the portfolio beef export marketing delivered 43 per cent of the benefits followed by eating quality at 32 per cent.

In terms of return on investment, eating quality delivered the highest BCR of 12.5:1, followed by beef export marketing (6.7:1) and lamb domestic marketing (4.1:1).

Observations from commercial / technical workshops

Eating quality — there is strong support for the benefits generated from MLA investment in the MSA grading system over the evaluation period. The MSA grading systems and the quality mark were critical to the maintenance of eating quality standards and helped underpin private industry brands in both domestic and export markets.

New products — there are demonstrated returns from a selection of MDC based projects, but not from levy based projects.

Beef domestic marketing - limited value is evident from campaigns as a result of changing campaign objectives and themes over time in difficult economic circumstances combined with a reduced budget (in real terms and compared to competitor proteins). Impact was assessed as below the prior 5 year period, with nutrition a positive element.

Lamb domestic marketing - good value is seen with consistent and effective campaigns.

Beef export marketing - significant value has been created, whilst also acknowledging the contribution of industry macro drivers to the commercial outcomes that were observed.

Sheepmeat export marketing - significant value has been created, whilst also acknowledging the contribution of industry macro drivers to the commercial outcomes that were observed.

Impact team recommendations

Develop a strategic approach for domestic beef marketing with consistent execution that recognises the defensive nature of marketing activities in this market.

Improve communications with domestic and export commercial industry partners on marketing activities.

Globalise MSA with better integration of MSA knowledge into marketing strategy.

Discontinue the new products program except through individual MDC projects.

Develop a global approach with individual market execution to measure the commercial impact from domestic and export marketing programs on an ongoing basis. This approach will facilitate measurement of progress made against MISP2020 KPIs.

Supermarkets to supply scan data, rather than utilising the Nielsen consumer panel data, to evaluate and better understand the impact of domestic marketing.

9 2.1 Eating quality

Top line result to date — MLA expenditure on the Eating Quality program provide industry returns of \$679 million, from expenditure of \$54 million with a BCR of 12.5:1

Tables 9.1, 9.14 and 9.15 provide additional detail of the payoffs from investment in the *Eating Quality* program.

9.1 MLA Impact benefits and investments^a: 2.1 Eating Quality

		Eating Quality
		2.1
Expected benefits		
Red meat industry net income - total ^b	\$m	679
– 2010-11 to 2014-15	\$m	327
– > July 2015	\$m	351
Actual investment^c		
– 2010-11 to 2014-15 inclusive	\$m	54
Benefit cost ratio		
Red meat industry net income - total		12.5

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. b Net income across all red meat industry sectors including processing. c Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

Summary

MSA now forms a very significant component of Australian beef and sheepmeat supplies. In 2014-15 almost 42,000 sheep and cattle producers were MSA registered, as were 54 processors, supplying over 130 MSA licensed brands to the marketplace, all using MSA as an independent eating quality endorsement (see detailed data following).

MSA cattle grading numbers increased from 17 per cent of adult slaughter in 2009-10 to 35 per cent in 2014-15 (1.3 million to 3.22 million head).

Cattle price premiums increased from \$0.15 per kilogram HSCW in 2009-10 to \$0.33 per kilogram HSCW for young grass fed (YG) classified cattle and \$0.10 per kilogram for grain fed cattle in 2013-14 and 2014-15. This equates to an increase of \$42.38 and \$91.32 per head respectively for grain and grass fed cattle.

The MSA lamb and sheepmeat program has seen very strong growth over the last 5 years. The number of eligible lambs presented for grading grew strongly from 883 133 in 2010-11 to 6 768,449 in 2014-15.

MSA impact was measured at \$679 million (net industry income) with a BCR of 12.5:1. Some 48 per cent of the benefit accrued during the assessment period with 52 per cent to be captured in coming years.

Objectives from MLA 5 year business plan

- An innovative and efficient consumer-focused program that enables enterprises to underpin brands by accurately predicting the eating quality of an individual cut according to a specified cooking method, thereby reducing variability and increasing eating quality and demand for Australian beef and lamb

9.2 Detailed eating quality program annual data

Performance indicator	09-10	10-11	11-12	12-13	13-14	14-15
Cattle MSA graded (million)	1.3m	1.4m	2.1m	2.4m	3.0m	3.2m
per cent national adult cattle slaughter	17 per cent	19 per cent	29 per cent	31%	35 per cent	34 per cent
MSA compliance	92 per cent	94 per cent	94 per cent	94 per cent	93 per cent	93 per cent
Registered producers	15,584	18,500	23,751	30 409	37,616	41,973
MSA yearling cattle premiums	\$0.15	\$0.15	\$0.19	\$0.28	\$0.29	\$0.33
Licensed beef processors	33	35	40	41	41	43
Lambs processed using MSA standards (informal) - millions		0.9m	3.3m	5.4m	6.6m	6.8m
MSA graded lambs (formal) - millions				1.2m	2.8m	3.5m
per cent of national lamb slaughter		5 per cent	17 per cent	26 per cent	30 per cent	30 per cent
Licensed sheep processors		7	12	15	18	20
Licensed end-users	1,426	1,548	1,559	1,700	1,553	1,623
MSA Beef Index (average)	na	56.7	56.9	57.0	56.8	57.6
Licensed MSA brands	40	55	71	77	108	131
Online feedback system usage (no. of visits)	2,916	3,371	3,895	3,064	2,860	5,457
USDA PVP ¹			In progress	Certified	Maintained	Maintained
per cent of outlets issued with CAR's ²			6 per cent	14 per cent	14 per cent	5 per cent
Consumer awareness of the MSA trademark	-	-	50 per cent	51%	55 per cent	46 per cent
Consumer satisfaction 'Eating quality of beef has improved in the last 3	-	30 per cent	35 per cent	35 per cent	38 per cent	39 per cent

Performance indicator	09-10	10-11	11-12	12-13	13-14	14-15
years'						

(1) US Department of Agriculture (USDA) Process Verified Program (PVP) (2) CAR = Corrective Action Request

Eating quality — Beef

MLA Summary of Program Outputs and Outcomes

The current MSA beef grading model has been developed by analysing data from over 100,000 consumers who have eaten over 700,000 individual beef samples using 8 different cooking methods and across 8 different countries. The industry now has a system that can predict the eating quality of beef cuts from any animal, of any age, anywhere in the country

Brands developed by commercial business now deliver the MSA message as part of the eating quality aspect of the brand story. MSA is also used independently of proprietary brands in the domestic market. Today there is a greater critical mass of MSA product available in the market. The increase in MSA product availability led to a refresh of the MSA marketing effort when every major processing company produced MSA licensed brands and Australia's largest retailer — Woolworths, launched their MSA beef range nationally.

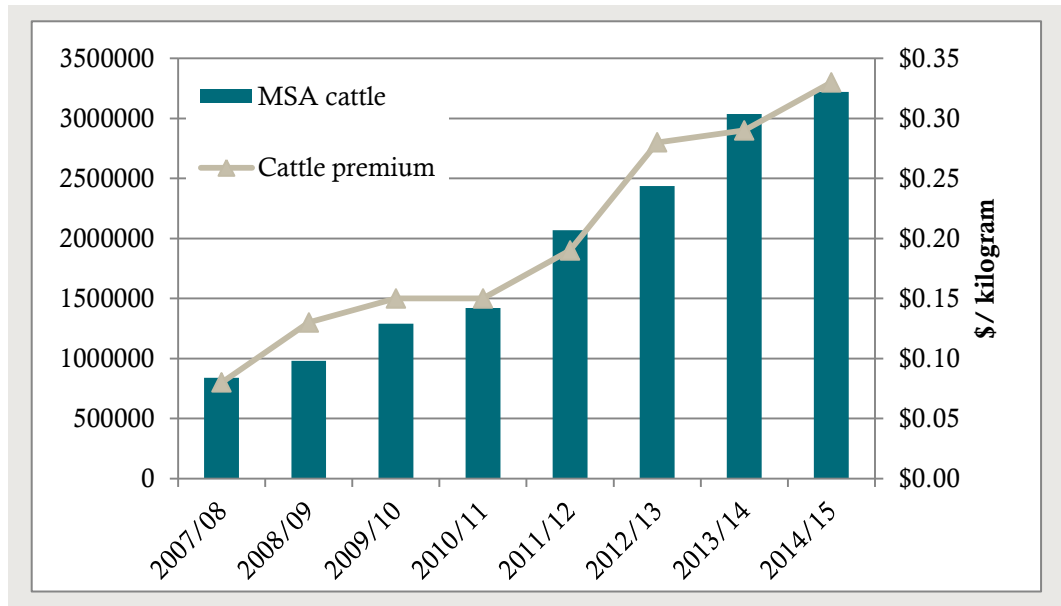
Over 3 million cattle are now graded on an annual basis. Whilst this figure is substantial, to drive improvements in domestic beef consumption and grow demand for Australia beef globally, the MSA program requires serious investment in order for the industry to capture the full potential that lies within the MSA program.

Within the MSA Program, large amounts of data are managed to directly assess compliance and the effectiveness of the program. The grading results for every graded carcass are uploaded into MSA's database allowing sophisticated analysis to be performed. Web based feedback, benchmarking and grading calculation tools have been made available to all registered producers and MSA licensees. The value of MSA, in its ability to deliver an increase in beef eating quality, can be quantified through the newly implemented MSA Index. With retrospective calculations, since 2010-11 there has been an increase in 0.83 MSA index points across the Australian cattle herd. This is a significant increase and demonstrates the adoption of eating quality principles in production systems.

Pricing surveys are constantly conducted to allow trends in the market to be captured at the farm gate, wholesale and retail level. Over the last 5 years, price premiums have evolved and in some cases continued to increase with commercial signals being delivered through the MSA supply chain offering incentives for the delivery of what consumers' desire, notably through farm gate premiums. Since 2010-11, the price premiums for MSA yearling cattle have increased from \$0.15 per kilogram to \$0.33 per kilogram in 2014-15. This has continued to occur as numbers of cattle graded have also significantly increased as shown in chart 9.3.

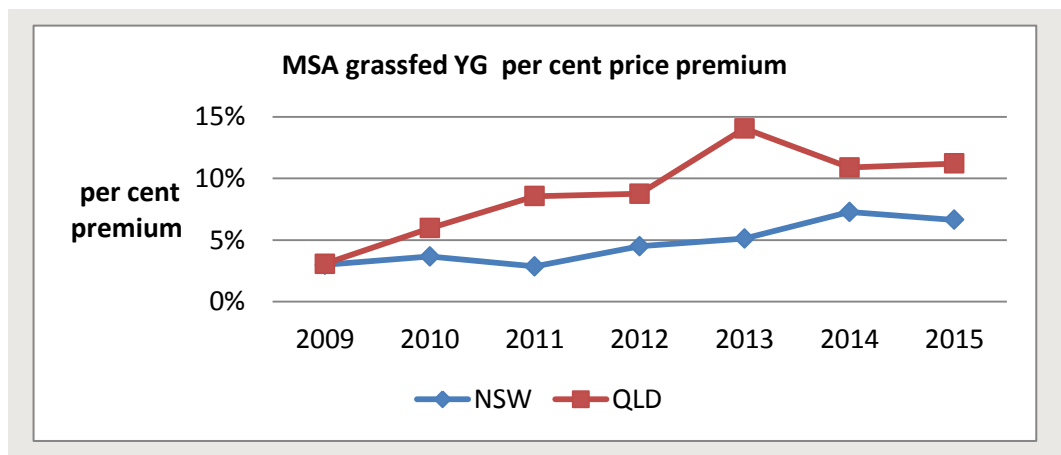
In 2014-15, these premiums equated to an approximate additional return of \$91 per head. With MSA prices for MSA grassfed cattle also now being reported in Queensland, it is estimated an additional \$174 million in MSA premiums were returned to producers in 2014-15.

9.3 Increase in MSA beef grading and subsequent cattle premiums



Even as cattle prices have fluctuated and more recently seen a significant increase, the value of the MSA premium as a percentage of the carcass return has continued to increase from 5 per cent in 2010-11 to 9 per cent in 2014-15 (see chart 9.4).

9.4 MSA price premiums as a percentage of carcass value

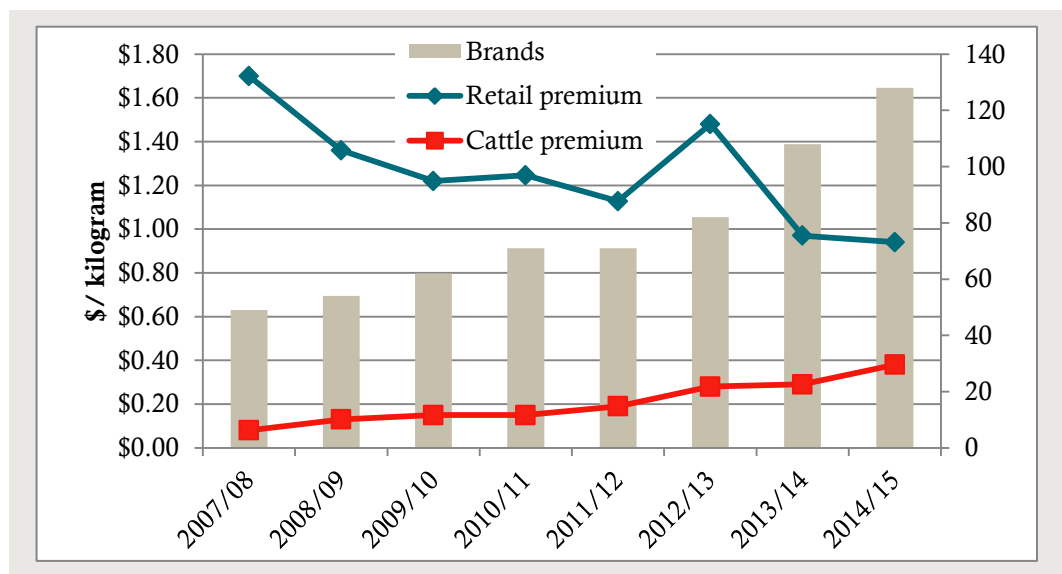


The integrity of the MSA program is managed by a stringent training and licensing process. MSA is part of the AUS-MEAT language and as such AUS-MEAT are the gatekeepers of the MSA standards. MSA manage the content of the standards and AUS-MEAT enforce compliance. The MSA Beef Taskforce and the Australian Meat Industry Language and Standards Committee (AMILSC) oversee changes to the standards and

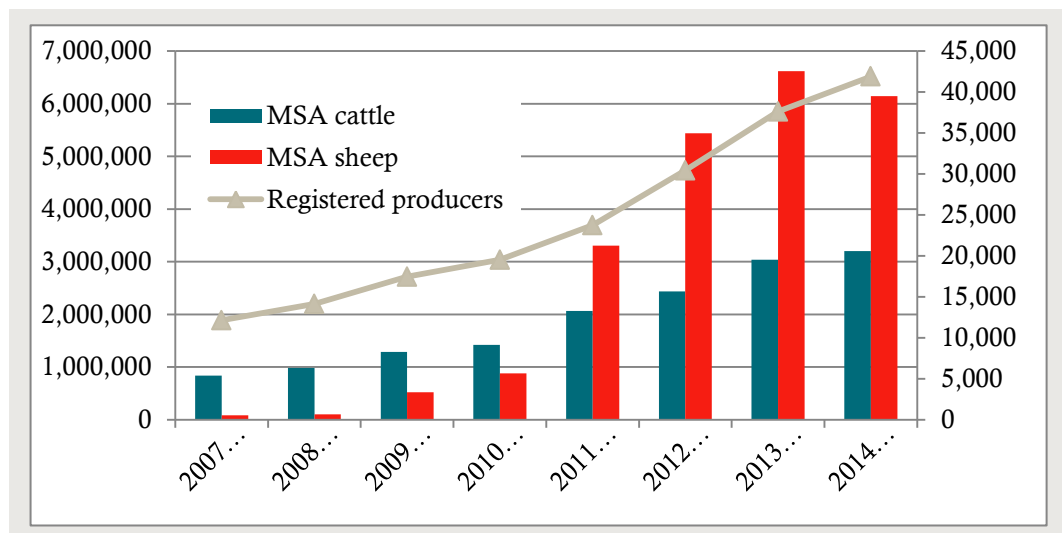
judge success of the integrity program holding MLA and AUS-MEAT accountable. To ensure the integrity of the program, AUS-MEAT performs independent audits against the MSA standards. In 2014-15, AUS-MEAT carried out 680 end-user audits in line with a risk-based auditing schedule.

In addition to the auditing of the program, training is delivered at each critical point along the supply chain by MSA and AUS-MEAT to participants including producers, feedlots, processors and end users in the key fundamentals to make sure a consistent eating quality product is delivered to consumers. Since 2010-11, over 14,000 supply chain stakeholders have participated in an MSA training program.

9.5 Adoption of MSA to underpin brands, cattle premiums and retail premiums



9.6 MSA registered producers and grading numbers over time



Workshop evaluation of performance / industry impact

During 2010-11 to 2014-15, the Eating Quality Program collected and published detailed statistics on eating quality performance for both the beef and sheepmeat programs. The workshop accepted all the data provided. This data effectively established, with a reasonable degree of precision, the outcomes achieved from the Eating Quality Program — that is, what was achieved in this area with MLA investment.

To calculate the impact of the MLA's Eating Quality Program, however, it is also necessary to determine what would have occurred without any MLA investment. This allows the 'with investment' and 'without investment' cases to be compared and, through this means, attribute a return on investments made. The main focus of the Workshop was on the 'without investment' case — that is, what would have occurred without any MLA Eating Quality Program investment between 2010-11 and 2014-15.

Beef grading numbers

In terms of grading numbers, MLA staff proposed the following for the 'with investment' and 'without investment' cases:

- 'with MLA investment' was based on what actually had occurred - actual cattle grading numbers increased from 17 per cent of adult slaughter in 2009-10 to 35 per cent in 2014-15 (1.3 million to 3.22 million head)
- 'without MLA investment' was based on MSA grading numbers remaining around 20 per cent of the adult slaughter through to 2014-15 and beyond
 - Therefore, an additional 1.32 million head of cattle were graded above the 'without investment' case in 2014-15 or 4 million head over 5 years

In considering the MLA staff proposal for the 'with investment' and 'without investment' cases, Workshop participants noted the following:

- The decision by Woolworths to join MSA in 2011 was an important driver of grading numbers — this decision, in part, was likely to have been based on industry's (MLA's) continued support for the program
- An additional 10 plants were MSA accredited after 2009-10 — this would not have occurred without continued MLA investment
- Between 2010-11 and 2014-15 there was an expansion in the number of MSA pathways — again this would not have occurred without MLA eating quality R&D investment
- There were increased shifts and volumes by processors who adopted MSA before 2010-11.
- Without MSA registration or accreditation, processors and their brands would have to develop their own accreditation systems.
- Without MSA, companies would have cherry picked the more favourable components of MSA. The proliferation of MSA-style models would compromise system integrity and consumer trust. In addition, R&D, feedback and support would not exist without continued MLA support.

- Who else would have been in the position to take up administration of the MSA system — other bodies do not have the resources.
- Over time, corporate knowledge around the value of MSA within processing plants would erode due to staff turnover.
- Some processors have a significant proportion of their production now graded and are likely to continue with this regardless of MLA investment.

On balance Workshop participants took the view that, in the absence of MLA investments in eating quality between 2010-11 and 2014-15, MSA grading numbers would not have remained at their 2009-11 levels of 20 per cent of overall slaughter (as proposed by MLA staff), but would have fallen:

- Without MLA eating quality investments between 2010-11 and 2014-15 grading numbers would have fallen to about 5-6 per cent of slaughter by 2014-15
- Moreover, without MLA eating quality investments between 2010-11 and 2014-15 and in the absence of any future investments, grading numbers remain at about this level. This reflects that some users have now become 'glued onto MSA' and would continue to use the technology even if it was not supported by Industry Service Organisations. This particularly applied to some major supermarkets and brand owners.

Effectively, therefore, workshop participants increased the level of industry impact from MLA 2010-11 to 2014-15 eating quality investments above that proposed by MLA staff by identifying another source of benefits:

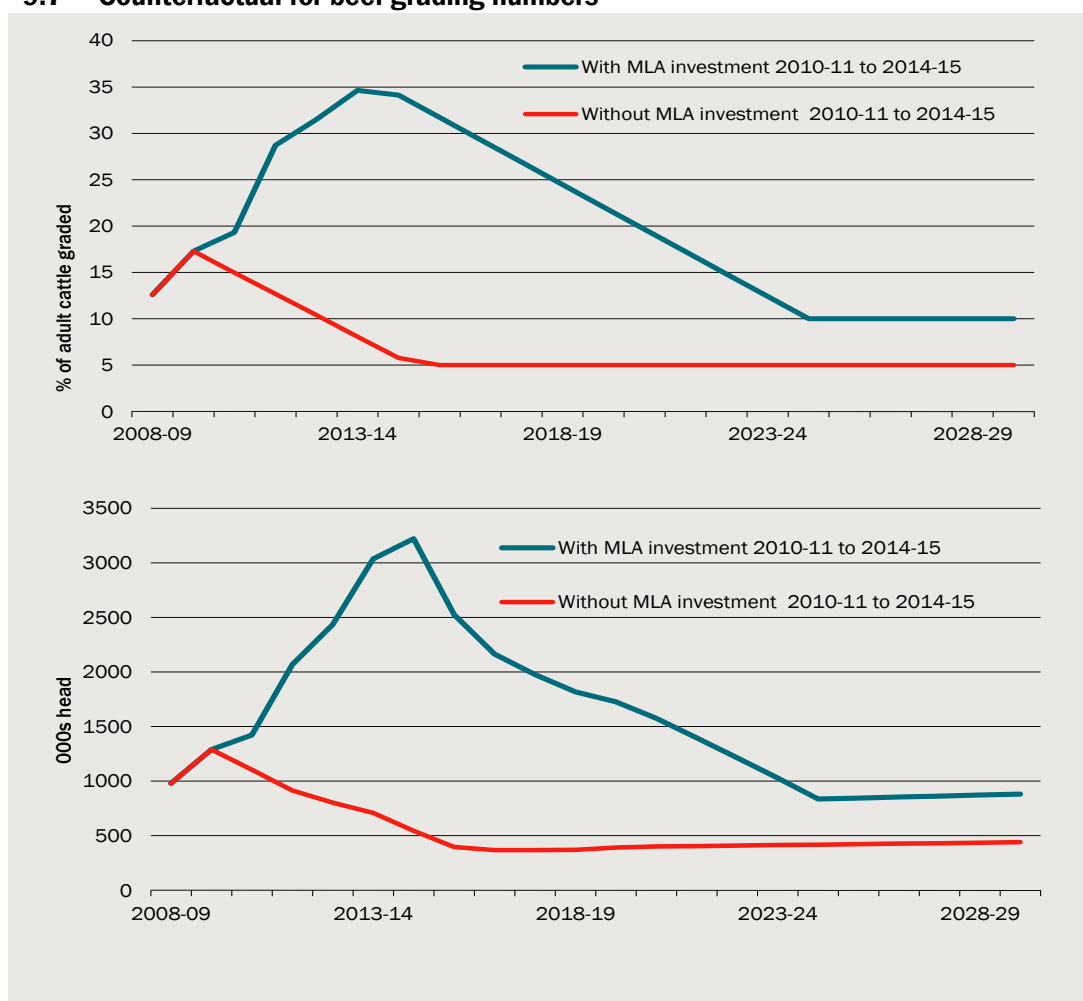
- Not only did the MLA 2010-11 to 2014-15 investments support an increase in MSA grading numbers from 20 per cent of slaughter to 35 per cent of slaughter.
- The MLA 2010-11 to 2014-15 investments also prevented grading numbers from declining to 5 per cent of total slaughter.

Finally, the Workshop agreed that if MLA investment in eating quality were to have ceased from 1 July 2015, grading numbers would decline over the next 10 years from their current level of 35 per cent of slaughter to 10 per cent of slaughter:

- The MLA investments in eating quality between 2010-11 and 2014-15 have resulted in a greater number of users now 'glued onto MSA'. Because of this, if investment were to cease now, grading numbers would only fall to 10 per cent of slaughter, not to 5 per cent of slaughter as was presumed to be the case if investments ceased on 1 July 2010.

The agreed outcomes in terms of grading numbers for the 'with MLA investment' and 'without MLA investment' cases are as shown in chart 9.7.

9.7 Counterfactual for beef grading numbers^a



^a The 'with MLA investment' scenario includes observed and expected outcomes from investments made over 2010-11 to 2014-15. Data source: MLA.

Cattle premiums / differentials

It was noted that price premiums for MSA cattle over non-MSA cattle increased between 2009-10 and 2014-15:

- For young grass fed (YG) cattle from \$0.15 per kilogram HSCW to \$0.33 per kilogram HSCW (see earlier chart) — and price premiums increased, not only in absolute terms, but also in proportionate terms (see earlier chart).
- For grainfed cattle prices had increased by about \$0.10 per kilogram HSWC.

This increase in price premiums that actually occurred is remarkable. A decline in price premium would have been entirely normal — with increasing supplies (grading numbers) prices would normally drop.

For the 'without MLA investment' case MLA staff proposed similar outcomes to that assumed in an ex-ante analysis of the value of investments in the Eating Quality Program undertaken in 2011 — specifically that:

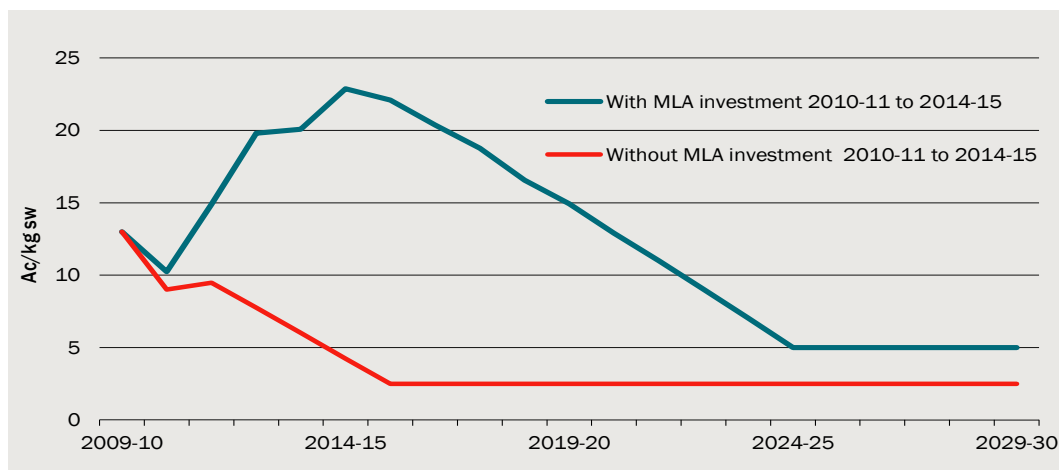
- Price premiums would peak by 2011-12 at \$0.19per kilogram and
- Then decrease, with the 2014-15 premium expected to be \$0.17per kilogram.

As with grading numbers the Workshop devoted considerable time to discussing price premiums under the ‘with MLA investment’ and ‘without MLA investment’ cases. The following was noted:

- Information on grain fed premiums had only been consistently collected for 2013-14 and 2014-15
 - 56 per cent of graded cattle are grass fed and 44 per cent grain fed in 2014-15
 - 75 per cent of graded cattle are in NSW and QLD.
- In practice price premiums/differentials vary widely - from 20 through to 70 cents, depending on location and time of the year.
- Often price premiums reflect a package of attributes that include MSA but also on-farm assurance programs. It was noted that the data collection is designed to compare MSA and non-MSA prices paid for the same cattle type.
- Many of the factors considered relevant for price premiums in the ‘with MLA investment’ and ‘without MLA investment’ cases were the same factors that had affected grading numbers — for example, the Woolworths decision to adopt MSA and the expansion of the program to an additional 10 processors

The consensus view of the Workshop in terms of price premiums is shown in Figure 6. It was agreed that MSA cattle premiums/differentials in the ‘without MLA investment’ scenario would largely track grading numbers over time.

9.8 MSA price differentials for cattle



^a Weighted average of grass and grain fed. ^b The ‘with MLA investment’ scenario includes observed and expected outcomes from investments made over 2010-11 to 2014-15.

Data source: MLA.

Compliance costs on-farm and in feedlots

The workshop considered the costs of compliance with MSA requirements on-farm and in feedlots.

For on-farm costs: it was viewed that MSA compliance involved adoption of best practice, therefore, additional costs should be minimal. For feedlots, the major area that could affect costs is where MSA impacts the use of HGPs.

- MSA downgrades carcasses based on HGP use and therefore feedlots may incur higher costs.
- However, since 2010, there has been a consistent fall in HGP cattle graded. The view was that this was driven by HGP policies outside of MSA, especially by customer requirements.

It was concluded that there were minimal compliance costs in farms and feedlots.

Processing price differentials and compliance costs

MLA staff identified two scenarios to estimate the benefit to processors:

- 4 cuts packed (cube roll, striploin, tenderloin, rump) from 50 per cent of MSA and company spec compliant carcasses = ~\$174 million premiums over 5 years
- 6 cuts packed (cube roll, striploin, tenderloin, rump, knuckle, blade) from 50 per cent of MSA and company specification compliant carcasses is equal to around \$307 million premiums over 5 years.

This amounted to a total premium of \$481 million over 5 years based on the following data and assumptions:

- 285 kilogram HSCW average, 87 per cent average compliance, HAM yields used, sold at \$1 per kilogram premium above non-MSA YG product
- from 20 per cent of the carcass a 20 per cent premium is achieved and the MSA premium is recovered from these cuts.

Overall, there were no clear answers on the proposed processing differential, however there was agreement that benefits for processors (the wholesale level differential) would at least cover the differential paid to producers and any compliance costs within the plant.

Retailers

MLA estimated the additional retail value of \$314 million over 5 years based on the following data and assumptions:

- average of \$1.21 per kilogram in premiums for MSA beef compared to non-MSA YG cattle
- 6 cuts retailed from 50 per cent of MSA and company specification compliant carcasses (cube roll, striploin, tenderloin, rump, knuckle, blade), weighted average premium, HAM yields used and 285 kilograms HSCW average.

The workshop's view was that, at retail level, MSA had largely become standard, which supported the data indicating that premiums have declined¹⁴.

¹⁴ The major supermarkets are supporting their own house brand offer with MSA.

- A key issue with the retail differential is that, with the changing structure of beef retailing to the large supermarkets who use MSA beef as their everyday offer, the comparison of MSA and non-MSA product is becoming limited to a smaller number of independent outlets.

Opportunities to improve impact achieved

The workshop identified that:

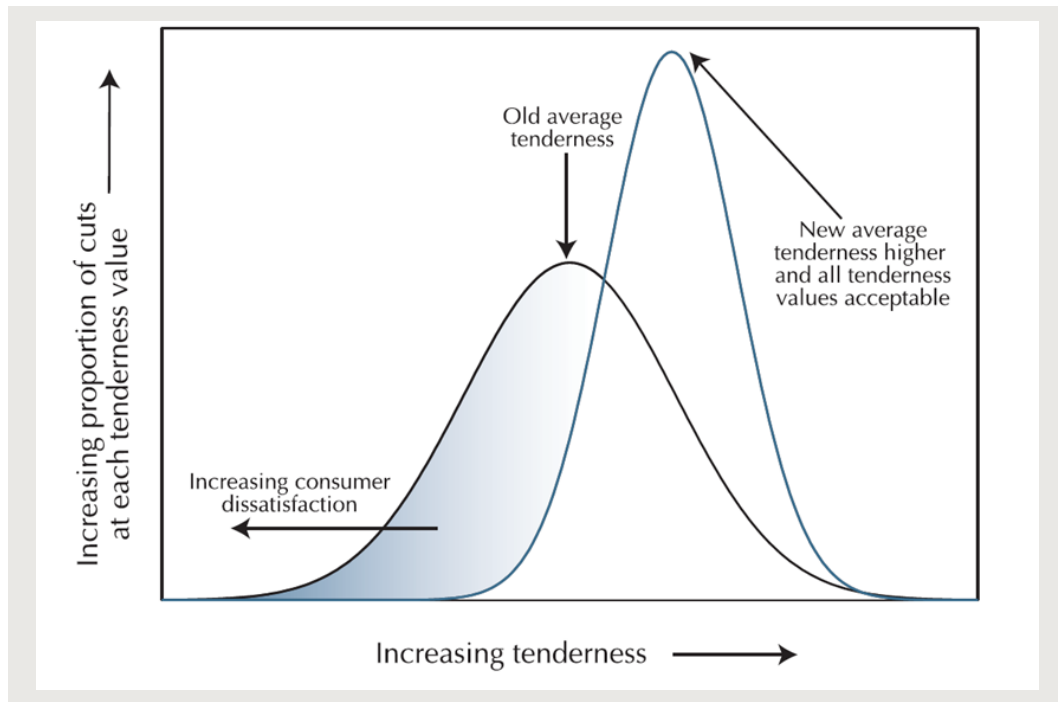
- For beef, there is an opportunity to better use more cuts and the whole carcass by the application of more research to pathways
- Increase R&D expenditure rather than the reduction that has occurred;
 - Investment priorities were also questioned in terms of funds available for eating quality R&D versus other MLA activities.
- Improve the speed in MLA decision making/contracting.
 - The example was provided, of work on stressed individual animals within MSA, where the project was signed-off by industry advisory committees almost 3 years ago but has not been progressed by MLA. This project was to address the situation where producers comply with MSA standards and still result in dark-cutters.
- MLA program silos may be holding back eating quality outcomes by ignoring the link from processing back to seedstock producers
 - While the Beef Information Nucleus (BIN) have been independently graded by MSA and eating quality measurements were taken, there was however no product collected for consumer sensory testing. This limits the effectiveness of eating quality traits in breeding indices.
- A priority was identified as the ‘internationalisation’ and implementation of MSA into key export markets — the next frontier for MSA.
- Better co-ordination between the key meat industry RDCs to improve R&D outcomes across the supply chain.
- Better coordination between beef and sheep programs who have been working independently but have the opportunity to benefit from synergies.

Eating quality — Sheepmeat

MLA Summary of Program Outputs and Outcomes

The MSA lamb and sheepmeat program has been developed from over 90,000 consumer taste tests of lamb and sheepmeat products. This has included 9 000 cuts of meat involving 15,000 consumers. The MSA program has delivered considerable eating quality benefits to the Australian lamb industry by reducing the variability in eating quality to consumers through a dedicated pathway approach to delivering improved eating quality (see chart 9.9).

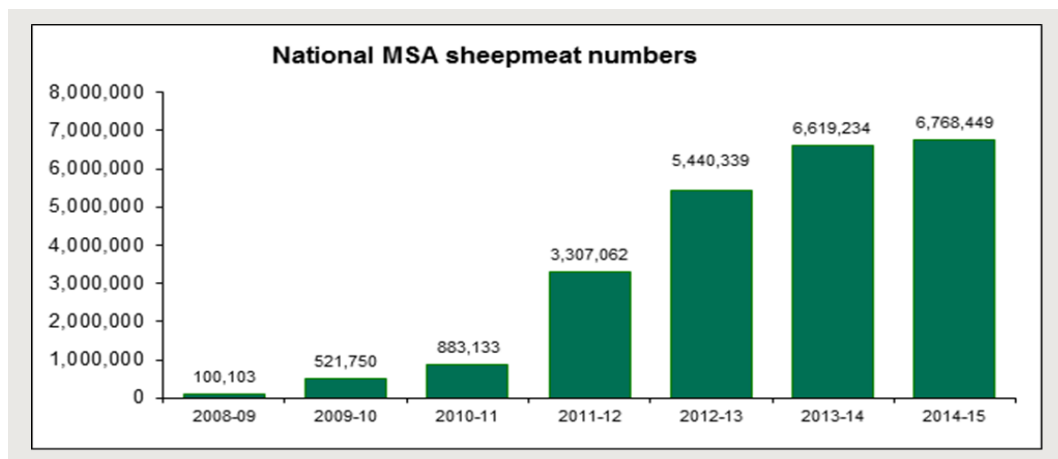
9.9 MSA lamb – eating quality



Data source: Research outcomes Sheepmeat Eating Quality (SMEQ 2003)

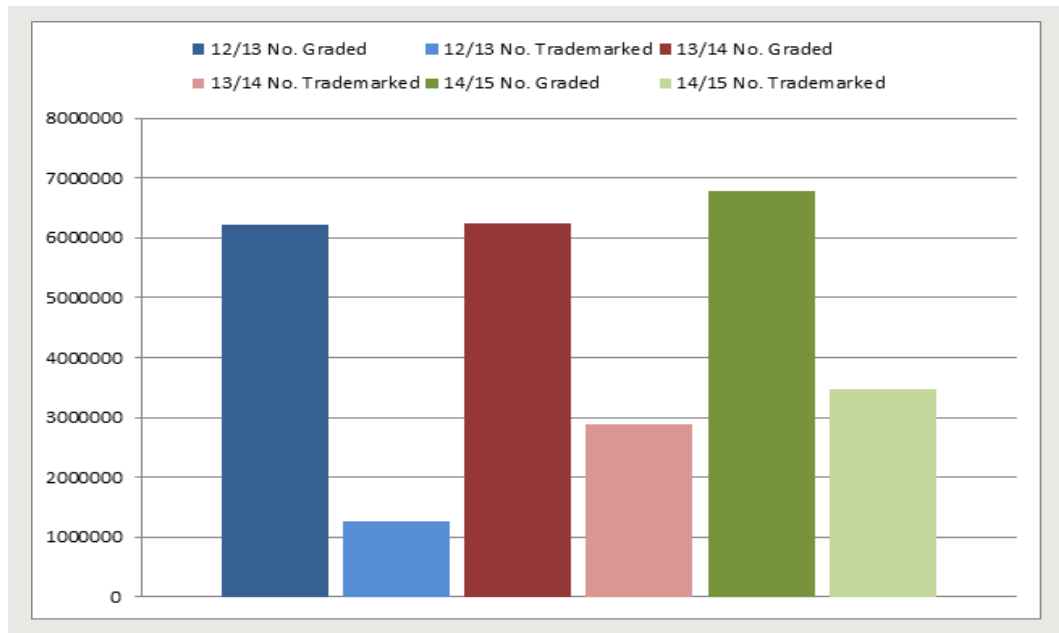
The MSA lamb and sheepmeat eating quality program has seen very strong growth over the last 5 years. The number of eligible lambs presented for grading grew strongly from 883 133 lambs in 2010-11 to 6 768,449 in 2014-15.

9.10 MSA lamb grading numbers over time



Not all lambs presented for grading have cuts or carcasses that are MSA trademarked. There was a 24.5 per cent increase in the number of MSA lambs processed using the MSA pathways and subsequently identified as MSA to the end user. 3.47 million lambs were MSA trademarked in 2014-15 compared to 2.78 million in 2013-14.

9.11 MSA graded v MSA trademarked lambs



As of June 30 2015 there are 21,680 producers registered to supply MSA lamb and sheepmeat, 20 licensed MSA licensed sheepmeat processors and 16 MSA licensed lamb brands.

Workshop evaluation of performance / industry impact

Over the Evaluation Period the Eating Quality Program collected and published detailed statistics for both the beef and sheepmeat programs. The workshop accepted all the data provided.

Furthermore, compared to beef, the ‘without MLA investment’ case was easier to define. MSA sheepmeat was a new program, largely developed within the Evaluation Period. Without MLA investment, therefore, there was general agreement that the program would not have existed or would have quickly withered. There was, however, considerable Workshop discussion on what would occur subsequent to 2014-15 under the assumption of no further funding to the program. There was also considerable discussion on price premiums.

By way of preliminary observations on the impact of the Sheepmeat Eating Quality Program Workshop participants noted the following:

- It was noted that there is both formal and informal use of MSA sheepmeat standards. In 2014-15, 6.768 million lambs were MSA graded with 3.5 million formally MSA graded and trademarked.
- An important outcome identified by the workshop was that the MSA program verified the correct functioning of electrical stimulation (ES) systems in 2009-10 and 2010-11.
- Work by the program also highlighted the risk of compromising eating quality through sustained selection for higher carcass weights and lean meat yield.

Grading numbers

The workshop considered the ‘with’ and ‘without MLA’ investment scenario and developed the following scenarios (see chart 9.12).

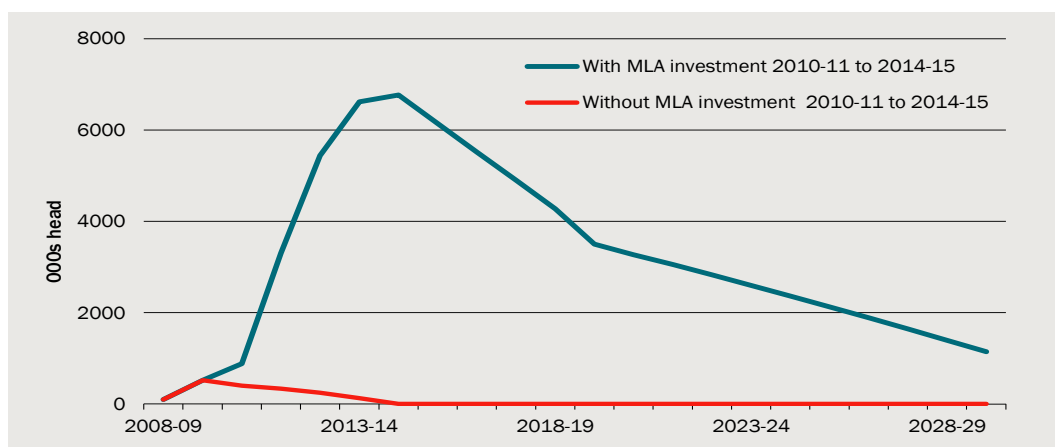
Without MLA investment over 2010-11 to 2014-15.

- There is a high likelihood that lamb grading would not have got off the ground with grading numbers falling to zero by 2014-15.

With MLA investment during 2010-11 to 2014-15, but with no funding to the Program beyond 2014-15.

- The total number of lambs graded would fall from 6.8 million in 2014-15 to 3.5 million by 2019-20 — these being slaughtered by the 3 biggest supply chains selling to supermarkets.
 - The 3.5 million remaining would all be lambs that were trademarked in 2014-15.
- The number of graded lambs would continue to fall through to 2029-30.
- The 3.3 million non-trademarked lambs would exit the system in 2014-15.

9.12 Counterfactual for lamb grading numbers^a



^a The ‘with MLA investment’ scenario includes observed and expected outcomes from investments made over 2010-11 to 2014-15.

Data source: MLA.

Premiums / differentials

In terms of the proposed price premiums/differentials MLA staff proposed a price premium/different of \$0.05 per kilogram applied to 50 per cent of trademarked lambs which is equivalent to \$1 per head with the potential premiums to producers over 5 years of around \$5 million.

Workshop participants noted that:

- Price premiums were almost always associated with a bundle of attributes. These attributes included MSA, no GMOs, no antibiotics, third party on-farm audits, etc. There were significant price premiums associated with being part of such supply chains, but it was difficult to isolate out the individual contribution of MSA.

- One processor commented that they pay a \$0.20 per kilogram premium for lamb that complies with MSA and other attributes as part of an on-farm quality assured supply chain.
- Following the workshop advice was received that the premium in Western Australia is \$0.20 per kilogram

On balance Workshop participants accepted the MLA proposal on price premiums. In particular it was agreed:

- For the 'without MLA investment' case, no premiums/differential would have been available from 2010-11 onwards.
- In the 'with MLA investment' case, the premium/differential for trademark lambs identified in the MLA proposal for 2014-15 be accepted.
- Without ongoing investment the price premium above, would fall to zero over the 5 year period to 2019-20.

Other benefits

In terms of other benefits of the program, it was recommended that avoiding the downside risks from the potential decline in eating quality from large lean lambs be included as a benefit¹⁵. There is a trade-off between selection for carcass weight and lean meat yield and a fall in eating quality. This would affect both domestic and export markets.

Opportunities to improve impact achieved

Opportunities to improve outputs / outcomes / impact for MSA sheepmeat were similar to those for beef eating quality

Additional suggestions were provided by MLA in the background paper.

Eating quality — Beef and Sheepmeat — Additional Activities

MLA Summary of MSA Marketing

Marketing of the MSA program has evolved considerably since its commercial rollout in 1999

After an initial launch that focused on communicating the MSA trademark to consumers the MSA program has evolved to focus on underpinning the eating quality of commercial brands without any specific requirement to communicate the MSA trademark to consumers at retail and foodservice. At the direction of industry MLA revisited the MSA

¹⁵ These benefits were quantified by CIE (2012) ex-ante analysis of options to improve MSA.

collateral and refreshed these assets repositioning the logo as a third party endorsement of quality for graded beef products.

The goal of the refresh was to communicate a credible eating quality message for the proprietary brand without dominating the brand, similar to the National Heart Foundation tick and Australian grown / Australian made trademarks. In 2013 demand for MSA to underpin lamb brands begun to emerge. During 2014-15 consumer awareness of the MSA symbol tracked at 46 per cent of the target audience reaching 55 per cent in December 2014. In 2015, consumer campaigns using simplified messaging to establish MSA as a quality mark were used.

In 2011 a survey of 508 consumers found that 32 per cent would be very confident and a further 59 per cent would be somewhat confident to select the right quality beef if they had the choice of three options, MSA 'Graded', MSA 4 star and MSA 5 star beef. MSA 4 & 5 star symbols have been developed and are available for use on a voluntary basis.

MLA Summary of Off-Farm Value Chain Objective Measurement Technology

The Sheep CRC lamb supply chain group (LSCG) has been an effective collaborative tool to link technology providers (STA, Carometec, etc), with the processing industry (a number of participating processors), and with independent science and metrology organisations (Murdoch University school of animal science). These collaborative relationships have proven very successful by facilitating mutually aligned strategies for technical and commercial innovation.

Significant recent progress has been made with the development of dual emission x-ray DEXA for both lamb and beef for the prediction of fat composition, lean meat yield and saleable meat yield. These technologies arose from increasingly precise and high resolution imaging required for automation cutting lines, which were recognised as also providing eating quality measurement potential.

A number of other measurement technologies are also being evaluated in relation to processing automation systems, such as: hyperspectral camera image analysis for cutting lines and fat composition attributes, and work with impedance spectroscopy for intramuscular fat prediction.

Impact assessment

9.13 MLA Impact benefits and investments^a: 2.1 Eating Quality

			Eating Quality
			2.1
Expected benefits			
Red meat industry net income - total ^b	\$m		679
– 2010-11 to 2014-15	\$m		327
– > July 2015	\$m		351
Red meat gross value of production - total ^c	\$m		1 170
– 2010-11 to 2014-15	\$m		518
– > July 2015	\$m		652
Actual investment^d			
– 2010-11 to 2014-15 inclusive	\$m		54
Benefit cost ratio			
Red meat industry net income - total			12.5
Red meat gross value of production - total			21.5

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Saleyard equivalent GVP excluding processing (basis for levies). ^d Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

9.14 MLA Impact – benefits in terms of industry net income^a: 2.1 Eating Quality

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	
2.1 Deliver consistent and optimal eating quality	107	572	679	12.5
– per cent of impact benefits	16	84	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

9.15 MLA Impact - benefits in terms of GVP^a: 2.1 Eating Quality

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
2.1 Deliver consistent and optimal eating quality	182	988	1 170	21.5
– per cent of impact benefits	16	84	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

9.16 Budgets for 2.1 Eating Quality

Budgets by Program	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
2.1 Eating quality												
2.1 Develop practices and drive programs that help industry deliver consistent and optimal eating quality	7 724	7 434	8 374	8 520	7 972	8 200	8 203	8 205	9 501	7 727	41 774	40 087
MLA Donor Company projects	0	254	0	79	0	84	0	1 370	0	1 138	0	2 925
Overheads (Corporate Services / Communications)	909	918	900	1 028	747	736	802	728	817	717	4 174	4 127
TOTAL	8 633	8 606	9 274	9 627	8 719	9 021	9 005	10 303	10 318	9 583	45 948	47 139

10 2.3 New products

Top line result to date — MLA expenditure on the New Products portfolio provide industry returns of \$33m, from expenditure of \$21 million with a BCR of 1.6:1.

Tables 10.3, 10.4 and 10.5 provide additional detail of the payoffs from investment in the New Products portfolio.

10.1 Summary — MLA Impact — benefits and investments^a: 2.3 New Products

		New Products
		2.3
Expected benefits		
Red meat industry net income - total ^b	\$m	33
– 2010-11 to 2014-15	\$m	24
– > July 2015	\$m	9
Actual investment^c		
– 2010-11 to 2014-15 inclusive	\$m	21
Benefit cost ratio		
Red meat industry net income - total		1.6

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

Summary

New products demonstrated returns from a small selection of MDC based projects but not from projects that are 100 per cent levy based – however, it was noted that levy funded research informed and led to some MDC activities. The most successful projects are detailed below are generated \$33 million benefit (net industry income) and a BCR of 1.6:1. Some 73 per cent of the benefits were captured in the assessment period with the remaining 27 per cent to be captured in coming years.

10.2 Most successful new product projects

	NPV benefit reported ^a			Commercially available / impact?	Comments
	MDC funding	2010-15	2015+		
	%	\$m	\$m		
Pulled meats	46	1.474	5.604	Yes	50 per cent attribution to MLA
Smartshape	46	3.099	3.563	Yes	3 systems in commercial production
Thin slice technology	100	0.469	0.539	Yes	One commercial system since 2012
Very fast chilling and salting	100	17.524	0.000	Yes	Operational for 3.5 years

^a An additional \$6m in 2015+ benefits from other projects were identified by MLA but not reviewed/verified by the workshop

Objectives from MLA 5 year business plan

- To alert the red meat industry to new product trends and ideas; to develop novel technologies and processes for producing value added products at increased margins; and to develop the industry's capability to adopt such technologies and to survive in consumer focused market sector

MLA Summary of Program Outputs and Outcomes

The key focus of the portfolio was to develop technologies and capabilities to increase the total net value of the carcass. There were two primary program areas totalling 75 per cent of investment (excluding support costs):

- *Bioactives & Co-products*, involving exploratory research to utilise blood products and offal;
- *Product innovation (meat)*, development of systems and products for strategic applied research proof of concept and development/launch.

Bioactives and co-products were identified as a significant opportunity to value add, as currently 80 per cent of the value of a carcass comes from 40 per cent of its weight. As a result, some of the research and development investment over the last 5 years has focussed on enabling technologies to increase returns from the 60 per cent of the carcass that contributes only 20 per cent of the value.

The remaining 25 per cent of investment was spread across three supporting program areas:

- *Market and consumer insights*, identifying key consumer trends;
- *New products (supply chain)*, marketing material development and publication;
- *New products (capability)*, development of strategic protocols, processors and guidelines for operation.

A total of 207 projects were undertaken with 7 products being commercialised. There are a number of key factors which MLA sees behind the low number of commercial outcomes:

- An inadequate business development strategy and portfolio approach to securing industry partnership for proof of concept development — particularly early on in the Evaluation Period.
- Limited industry partnership investment for commercialisation;
- Lack of transitioning knowledge to economic outcomes.

The project that provided 75 per cent of the current period benefits ran for four years but is no longer commercially operating.

Workshop evaluation of performance / industry impact

The individual innovations that comprised the majority of the benefit were:

- Very Fast Chilling (VFC);
- SmartShape; and
- Pulled beef.

VFC

This innovation involved working with one market participant.

This project involved a novel technique to produce high value meat using very fast chilling and salting of pre-rigor beef to prevent pH decline. The technology improves shelf life without the need for preservatives due to much lower microbial levels. It was applied in producing a range of sausages sold through a major domestic retailer. The sausages produced in this way provided:

- The retailer with a premium of \$2.23 per kilogram
- The supplier of 90CL with a 25 cents per kilogram premium.

Production of the high value sausages has now ceased as the retailer is reviewing the category.

- The period of exclusivity under the MDC Agreement has now elapsed, providing an opportunity for other businesses to pick up the innovation.

Smartshape

This technology was developed with two outcomes in mind:

- re-shape the primal to fit the plate or portion required (developed with a major food processing company)
- more consistent eating quality for beef especially for ready-to-eat meals that would be rapidly reheated.

Currently there are 3 units operating using 5 tonnes of beef each week.

Pulled beef

Working with a major QSR operator, the project developed a spiral cooker that reduced total cooking time to 1 hour where speed is a critical factor.

Opportunities to improve impact achieved

It was noted that the KPIs on which MLA investment decisions were made were overly optimistic — with results, although positive, in critical areas were not meeting KPI targets. MLA can learn from this, set realistic KPIs and then determine whether investment is warranted based on these KPIs.

The key lesson from the past 5 years was that there were too many small projects. In addition, a lesson of the last five years was that joining with a commercial partner, using the MDC mechanism, is critical for success. If a commercial partner does not participate from the outset, rates of adoption are likely to be poor or non-existent.

Impact assessment

10.3 MLA Impact – benefits and investments^a: 2.3 New Products

		New Products
		2.3
Expected benefits		
Red meat industry net income - total ^b	\$m	33
– 2010-11 to 2014-15	\$m	24
– > July 2015	\$m	9
Red meat gross value of production - total ^c	\$m	62
– 2010-11 to 2014-15	\$m	45
– > July 2015	\$m	18
Actual investment^d		
– 2010-11 to 2014-15 inclusive	\$m	21
Benefit cost ratio		
Red meat industry net income - total		1.6
Red meat gross value of production - total		3.0

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Saleyard equivalent GVP excluding processing (basis for levies). ^d Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

10.4 MLA Impact – benefits in terms of red meat net income^a: 2.3 New Products

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
2.3 New products	0	33	33	1.6
– <i>per cent of impact benefits</i>	0	100	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

10.5 MLA Impact – benefits in terms of GVP^a: 2.3 New Products

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
2.3 New products	0	62	62	3.0
– <i>per cent of impact benefits</i>	0	100	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

10.6 Budgets for 2.3 New Products

Budgets by Program	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
2.3 Develop new products, packaging and value chains	2 004	1 687	2 006	1 808	2 072	1 828	2 793	2 466	1 544	1 529	10 419	9 318
MLA Donor Company projects	0	1 023	0	1 094	0	605	0	1 024	0	4 824	0	8 570
Overheads (Corporate Services / Communications)	161	130	127	138	108	117	195	175	78	97	668	657
TOTAL	2 165	2 840	2 133	3 040	2 180	2 550	2 988	3 665	1 622	6 450	11 087	18 545

11 2.4 and 2.2 Beef domestic marketing and nutrition

Top line result to date — MLA expenditure on the Beef Domestic Marketing and Nutrition program provide industry returns of \$108m, from expenditure of \$96 million with a BCR of 1.1:1

Tables 11.7, 11.8 and 11.9 provide additional detail of the payoffs from investment in the Beef Domestic Marketing and Nutrition program.

11.1 Summary — MLA Impact — benefits and investments^a: 2.4 Beef Domestic Marketing (including Nutrition)

	Beef Domestic Marketing (incl 2.2 Nutrition)	
		2.4
Expected benefits		
Red meat industry net income - total ^b	\$m	108
– 2010-11 to 2014-15	\$m	95
– > July 2015	\$m	12
Actual investment^c		
– 2010-11 to 2014-15 inclusive	\$m	96
Benefit cost ratio		
Red meat industry net income - total		1.1

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

Summary

Overall, limited value is evident from campaigns as a result of changing campaign objectives and themes over time in difficult economic circumstances combined with a reduced budget (in real terms and compared to competitor proteins). Impact was assessed as below the prior 5 year period, with nutrition a positive element.

Impact was measured at \$108 million (net industry income) with a BCR of 1.1:1. Some 88 per cent of the benefit accrued during the assessment period with 12 per cent to be captured in the following year.

11.2 Market performance over the evaluation period

	Volume		Value		Return/price		Market share	
	2009-10	2014-15	2009-10	2014-15	2009-10	2014-15	2009-10	2014-15
	kt		\$A million		Ac per kilogram		%	
Domestic ^a	767.0	675.0	8 500	7 800	11.10	11.57	100.0	100.0

^a Volumes are on a carcass weight basis.

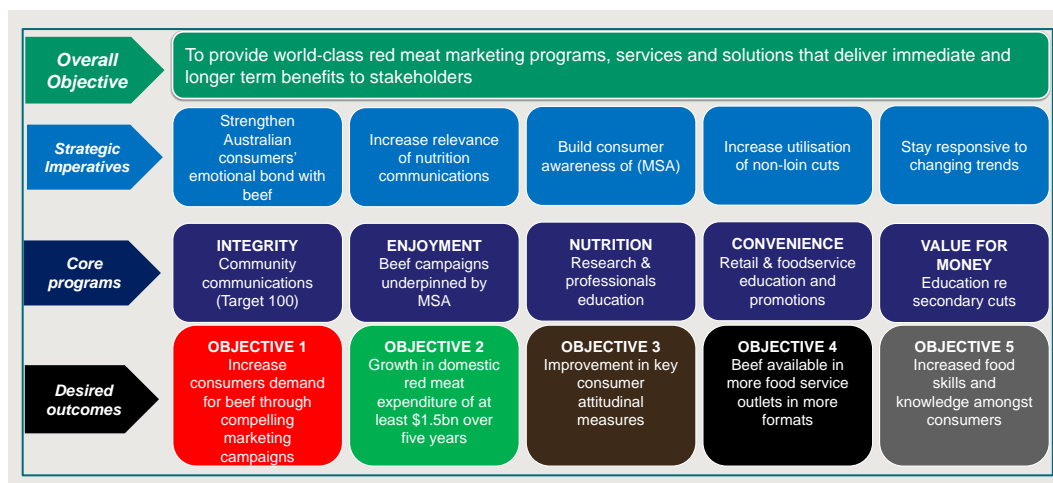
Objective from MLA 5 year business plan

To provide world-class red meat marketing programs, services and solutions that deliver immediate and longer term benefits to stakeholders from the domestic market

MLA Summary of Program Outputs and Outcomes

The domestic beef marketing strategy followed by MLA over the last five years, as revealed in the Australia Market Marketing Strategy 2011-12 — 2015-16 (hereafter referred to as the Business Plan), is summarised in chart 11.3. The strategy recognises five key drivers of domestic beef consumption, with objectives set against each driver.

11.3 Domestic beef marketing strategy



The Business Plan, developed almost five years ago, was based on the following assumptions:

- Beef consumption in Australia was forecast to grow by 55kt or 7.6 per cent over the five year period,
- Per capita consumption was projected to remain stable around 33 — 35 kilogram / capita.

At that time, it was also noted that given the predicted growth in export demand and global beef prices, it would be hard to predict the direction of demand for beef over the coming five year period.

Over the five year period 2010 - 2015, there were some significant variations from the assumptions made at the start of the period, and some core changes in the market environment, which impacted the performance of MLA beef marketing programs. Some of the market environment impacts were:

- There was a significant increase in export market demand for beef, and a shift towards exports over the domestic market, where the percent of production exported increased from 63 per cent in 2010 to 74 per cent in 2015.
- Supply and price competitiveness of competitor proteins within Australia increased:
 - pork retail price *declined* by \$2per kilogram
 - chicken retail price increased by only \$0.17per kilogram
 - beef retail prices increased by \$1.08per kilogram
- Increased supermarket competition occurred with the expansion of discount retailers such as Aldi and Costco. Furthermore, intensified price competition between Coles and Woolworths, exemplified in their 'price down' promotions, impacted retail sales values. As retailer margins on beef became less attractive in comparison to pork and chicken (especially recently), retailers focused more on pork and chicken in catalogues.
- Whilst beef is a staple product for Australians, as in all other developed western markets, there has been a long-term declining trend in per capita consumption of beef.

As a result, in comparison to the 2009-10 base year, by 2014-15, the beef market within Australia had contracted:

- Beef consumption declined by 92kt from 767kt to 674kt.
- Consequently, beef consumption per capita declined over the five year period from 35.1 kilogram / capita to 28.6 kilogram/capita.
- Retail value of the domestic beef market declined from \$8.5bn to \$7.8bn.

The workshop accepted that domestic beef marketing is a 'defensive' activity with export and domestic commercial conditions making it difficult for MLA to succeed in this area. That being said the workshop concluded that program performance did not achieve an acceptable outcome.

Objective 1: Increase Australian consumers' demand for beef through compelling marketing campaigns

In the competitive market environment described above, over the five year period 2010 - 2015, MLA ran 13 campaigns.

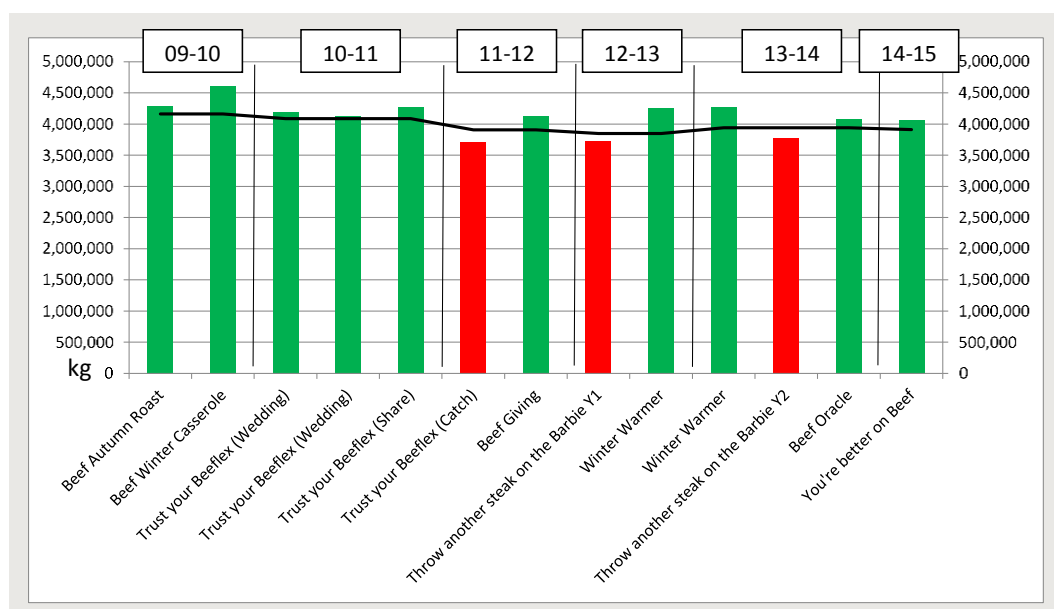
When comparing the *sales volume* during the campaign, with the financial yearly average, 10 of the 13 campaigns exceeded the benchmark (annual average sales) — although some campaigns only marginally exceeded the benchmark.

All three occasions that failed to exceed the benchmark were summer BBQ campaigns. The strategy implemented during this time was to communicate ‘superiority and seasonality’.

An analysis of the sales volume for the 5 year period is shown in Figure 2 (value data showed similar results):

- The black line indicates general trend of average sales over the five years
- Campaigns that had a positive impact on sales volume and / or value are shown in green
- Campaigns that did not result in a sales volume or value impact are shown in red

11.4 Beef volume in kilogram: weekly average per period



Source: Nielsen Home Scan

Objective 2 : Growth in domestic red meat expenditure of at least \$1.5bn over five years

Over the 5 year period, the retail value of beef sales in Australia contracted — by about 8 per cent. Total red meat sales also declined — rather than increase as per the objective. Over a six year period the market remained relatively stable, with a slight increase in the nominal value of red meat sales.

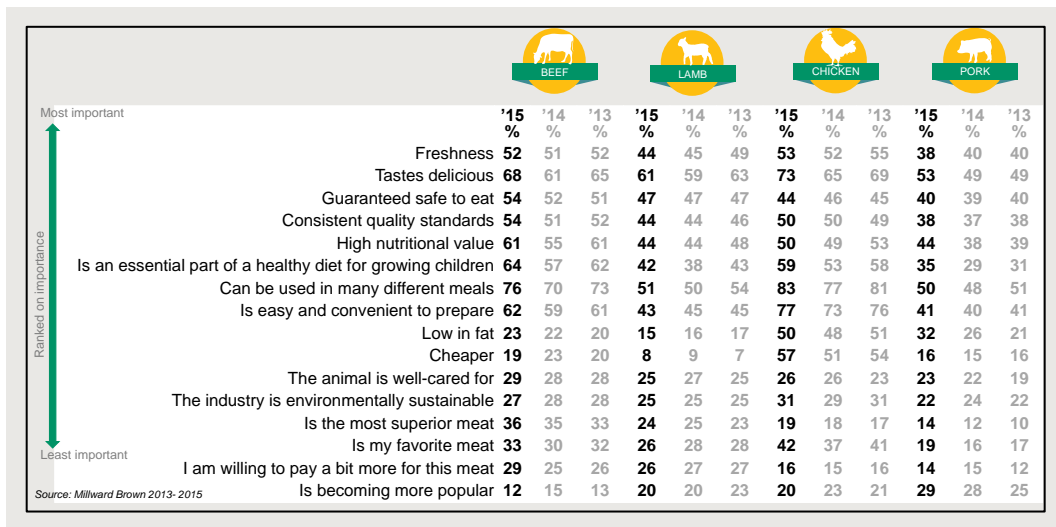
- Beef: increase on 2008/9, however decline on 2009-10:
 - 2008-09: \$7.533bn
 - 2009-10: \$8.512bn
 - 2014-15: \$7.812bn
- Total red meat: increase on 2008/9, however decline on 2009-10:
 - 2008-09: \$9.729bn
 - 2009-10: \$10.703bn

– 2014-15: \$9.926bn

Objective 3: Improvement in key consumer attitudinal measures

The figures below from the MLA Global Consumer Tracker* research provides an overview of consumer perception trends from 2013 — 2015.

11.5 Changes in key consumer attitudinal measures



Objective 4: Beef available in more food service outlets in more formats:

Since 2010 MLA have conducted annual presentations of new beef and lamb concepts to domestic Quick Service Restaurant (QSR) chains based on new product platforms (such as a pulled beef burger) or evolving trends in the QSR segment (such as snacking).

Over that time MLA have presented sliders, pulled beef burgers, steak sandwiches plus a number of beef snacking items designed to spread the use of red meat protein into breakfast and throughout the day.

As a result of these presentations MLA has contributed to the development of the first pulled beef sliders and steak sandwich wraps as versions of these products have been launched as limited time offers and in some instances as core range items on several quick serve restaurants.

A similar approach has been undertaken with foodservice supply companies such as Sodexo, Spotless and Opal Age Care. Annual presentations have set out to provide cost effective beef menu solutions with the aim of ensuring beef maintains its presence on menu.

As a result of these presentations MLA have influenced the penetration of beef across large scale foodservice venues nationally, including the integration of brand campaigns such as the ‘You’re better on Beef’ campaign most recently with Spotless.

- per cent of dishes on menu remained stable (although data is not available for base year)

- 2012-13 — 27 per cent;
- 2014-15 — 28 per cent

The Evaluation Team was not presented with evidence to support a conclusion that the objective ‘Beef available in more food service outlets in more formats’ had been met.

Objective 5: Increased food skills and knowledge amongst Australian consumers

Since 2010, MLA has sought to find new and innovative ways to help consumers prepare quick and healthy beef meals.

The *Entice publication* has been produced twice yearly and distributed in line with brand campaigns. Over 16 million copies of the publication have been printed over the reporting period. 68 per cent of butchers surveyed by Millward Brown rated Entice as having a positive impact on beef sales and 98 per cent of consumers surveyed found that Entice gave them new ideas for beef meals.

With the growth of smart phones, MLA has invested in emerging technology to adapt to the changing needs of consumers. Research indicated that consumers were nervous about cooking steaks for fear of getting it wrong. The *SteakMate app* was developed to help take ‘the guess work’ out of cooking a steak.

Backed by MSA grading data and cooking science, the app has been downloaded over 100,000 times and has been featured as ‘App of the Week’ through iTunes. Most recently it has been adapted for use with the new Apple Watch.

MeatCuts app was developed to help consumers better understand where various cuts come from on the carcass. Downloaded over 40,000 times this digital cuts chart showcases carcass utilisation, substitutable cuts, best cook method plus a simple recipe.

- Easy to cook and prepare:
 - 60 per cent agree that beef is easy to cook and prepare. Source; Millward Brown
 - 2009-10 — 68 per cent;
 - 2014-15 — 60 per cent
- Good for a variety of dishes
 - Two thirds agree that beef is good for a variety of dishes. Source; Millward Brown
 - 2009-10 — 76 per cent;
 - 2014-15 — 67 per cent

Nutrition

Nutrition remains an important driver of meal choice amongst Australian consumers. It is for this reason it has been important to ensure that consumers are constantly exposed to accurate information about the nutritional benefits of Australian beef and lamb.

MLA’s nutrition program addresses the downside risk on demand by consumers limiting their intake of red meat due to health concerns by ensuring red meat is accurately represented in nutrition policy and its nutritional benefits are recognised by healthcare professionals and the media.

In 2008, the NHMRC commenced a review of the Australian Dietary Guidelines, including the 3 to 4 times a week red meat recommendation, focusing on sustainability and health concerns around cancer. MLA's investment in activities ensured the recommendations released in 2013 reflected the most recent scientific evidence and consequently, maintenance of the 3 to 4 times a week red meat recommendation.

The nutrition research funded by MLA generates evidence required to inform policy-making which would otherwise not be available, including red meat nutrient compositional and consumption data along with the role of red meat in health, in particular iron and zinc and dietary patterns.

MLA research into the role of nutrition and sustainability, together with a series of forums organised in collaboration with other primary food industries, helped the NHMRC better understand this emerging area and established MLA as a trusted and valuable stakeholder.

Globally, MLA's membership as part of the International Meat Secretariat (IMS) enabled input into the WHO/FAO Rome Declaration on Nutrition which has signatories from over 170 countries, including Australia.

Communications targeting healthcare professionals and the media aim to raise and maintain awareness of the red meat recommendation with delivery through partnerships with professional associations, including dietitians, GPs and nurses for credibility.

Through its investment in nutrition research, including meal pattern behavioural research, MLA has established a reputation for supporting quality nutrition continuing education activities and healthy eating patient education resources. This has resulted in a partnership with Australian Doctor, the leading medical media and launch of a dedicated digital nutrition publication.

MLA PR activities linked to regular events such as Back to School, HSC, summer weight loss and starting solids achieved high reach ensuring a higher proportion of positive media stories and subsequently, balanced media coverage of red meat and health.

Without this investment, the ADG and the Rome Declaration on Nutrition may have recommended less red meat due to sustainability and health concerns which would have had subsequent adverse consequences on red meat recommendations by healthcare professional, media coverage and ultimately, consumer perceptions and consumption.

Workshop evaluation of performance / industry impact

Overall, participants saw limited value from domestic marketing campaigns except nutrition as a result of changing objectives and themes over time.

- Domestic marketing performance was lower than in the prior period and the strategy had not been effective with the exception of the nutrition program and even this area had become less visible in recent years.
- Domestic marketing performance was significantly below the 5:1 BCR level that had been revealed in some past studies.

Other views included:

- the program is clearly defensive, and the total investment wasn't in line with the benefits that could be captured from other (export) markets
- the domestic market was extremely competitive, especially on price, from the other proteins
 - also relevant was the impact of home brands and loss-leading for beef in major supermarkets
 - the independent butchers continue to be squeezed in the market and questioned whether MLA has made a difference to independent operators
- another view was the starting point year (2009-10) was an unusual base year for comparison. Unusual features included the high A\$ and the recovery from the global financial crisis which probably resulted in fairly optimistic projections for incomes and Australian domestic beef consumption levels going forward.

With reference to the effectiveness of the domestic campaigns, a number of comments were made:

- certain aspects of the campaigns had worked — nutrition had worked, including the 'You're Better on Beef' campaign introduced right at the end of the evaluation program — but beef marketing more generally has had limited success in the past 5 years — the marketing campaign hasn't been kept pace with market developments
 - It was believed that both the strategy/theme and the execution was poor: a hit and miss approach with confusing messaging
- With beef prices probably approaching threshold levels for many consumers in terms of maintaining beef consumption, retailers are looking for a point of difference to encourage purchase,
 - prices over \$23 per kilo are very difficult for consumers — the first factor that consumers consider is price and at current beef prices consumers need to be provided with a very compelling message if they are to continue purchasing at historical levels
 - retailers have explored every avenue to increase demand (such as selling mince, discounting, value adding, etc)
 - new signage and shop layouts are also now part of what is a complex offering
- for the independents, there has been limited interaction with MLA
 - independents need to position themselves to leverage off campaigns especially if campaigns are split between the supermarkets and the independents.
- the observation was made that MLA is very highly regarded by the trade and Governments in export markets, but doesn't seem to have attracted the same levels of respect by domestic supermarkets
- in the assessment of Workshop participants, execution of the beef marketing campaigns had been poor relative to lamb
- The MLA estimated impact of just over 0.7 per cent on domestic sales from the marketing and nutrition activities was noted and utilised in modelling the impact of this program

- MLA in its marketing campaigns needs to be strategic, not tactical.

11.6 Program benefits for marketing and promotion as rated by workshop

Region	Ranking of program outputs				
	Nutrition	Clean and green country brand	Consumer/market profiling	Benefits timeframe/nature of benefits	Ranked payoff per dollar
Domestic	***	na	*	Long/Defensive	*

*** indicates very important or very high down to * which is less important or moderate.

Opportunities to improve impact achieved

The general observation was made that domestic promotion should be approached as a portfolio and then implemented more consistently.

There was a call for more strategic and less tactical campaigns domestically, focusing on:

- nutrition as the message that ‘works’;
- MSA - simply sell beef domestically as good, better or best and by cooking method.

The lessons are ‘get the message and strategy right and then make the message effective by consistency in delivery and execution’.

Another key opportunity to evaluate and better understand the impact of domestic marketing would be to gain access to supermarket scan data rather than the Nielsen consumer panels data.

The point was made that there should be dual marketing programs for premium grass and grain fed, focusing on the benefits of both and not putting them up against each other.

It was noted that, generally, the poultry and pork value chains are significantly more responsive in terms of development of new products than for beef and lamb.

Nutrition

The workshop urged that nutrition messages be expanded to consumers with dissemination of the data that is available. This is based on the success of the ‘You’re Better on Beef’ campaign.

Impact assessment

11.7 MLA Impact - benefits and investments^a: 2.4 Beef Domestic Marketing (incl Nutrition)

		Beef Domestic Marketing (incl 2.2 Nutrition)	
		2.4	
Expected benefits			
Red meat industry net income - total ^b	\$m	108	
– 2010-11 to 2014-15	\$m	95	
– > July 2015	\$m	12	
Red meat gross value of production - total ^c	\$m	248	
– 2010-11 to 2014-15	\$m	220	
– > July 2015	\$m	29	
Actual investment^d			
– 2010-11 to 2014-15 inclusive	\$m	96	
Benefit cost ratio			
Red meat industry net income - total		1.1	
Red meat gross value of production - total		2.6	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Saleyard equivalent GVP excluding processing (basis for levies). ^d Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

11.8 MLA Impact – benefits in terms of red meat net income^a: 2.4 Beef Domestic Marketing

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
2.4 Beef Domestic Marketing (incl nutrition)	108	0	108	1.1
– per cent of impact benefits	100	0	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent

11.9 MLA Impact – benefits in terms of GVP^a: 2.4 Beef Domestic Marketing

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
2.4 Beef Domestic Marketing (incl nutrition)	248	0	248	2.6

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
— per cent of impact benefits	100	0	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent

11.10 Budgets for Beef domestic marketing

Budgets by Program	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
2.4 Aggressive promotion of beef in the domestic market	9,947	10,658	10,168	10,213	10,117	10,199	9,274	9,472	9,232	8,855	48,738	49,397
2.2 Enhance the nutritional reputation of beef	5,587	5,623	5,587	5,711	4,442	4,165	4,072	3,615	4,080	3,891	23,768	23,005
Ausmeat (allocation to domestic beef marketing)	184	182	185	187	189	184	182	169	185	181	924	904
MLA Donor Company projects	0	0	0	0	0	0	0	0	0	0	0	0
Overheads (Corporate Services / Communications)	1,900	2,093	1,886	2,047	1,537	1,500	1,478	1,553	1,489	1,569	8,290	8,763
TOTAL	17,618	18,557	17,826	18,158	16,284	16,048	15,006	14,809	14,987	14,496	81,721	82,069

12 2.5 & 2.2 Lamb domestic marketing and nutrition

Top line result to date — MLA expenditure on the Lamb Domestic Marketing and Nutrition program provide industry returns of \$265m, from expenditure of \$65 million with a BCR of 4.1:1

Tables 12.6, 12.7 and 12.8 provide additional detail of the payoffs from investment in the *Lamb Domestic Marketing and Nutrition* program.

12.1 Summary — MLA Impact — benefits and investments^a: 2.5 Lamb Domestic Marketing (incl Nutrition)

		Lamb Domestic Marketing (incl 2.2 Nutrition)
		2.5
Expected benefits		
Red meat industry net income - total ^b	\$m	265
– 2010-11 to 2014-15	\$m	222
– > July 2015	\$m	43
Actual investment^c		
– 2010-11 to 2014-15 inclusive	\$m	65
Benefit cost ratio		
Red meat industry net income - total		4.1

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

Summary

- Participants saw great value in the domestic marketing program with consistent and effective campaigns.
- Impact was measured at \$265 million (net industry income) with a BCR of 4.1:1. Some 84 per cent of the benefit accrued during the assessment period with 16 per cent to be captured in future years.

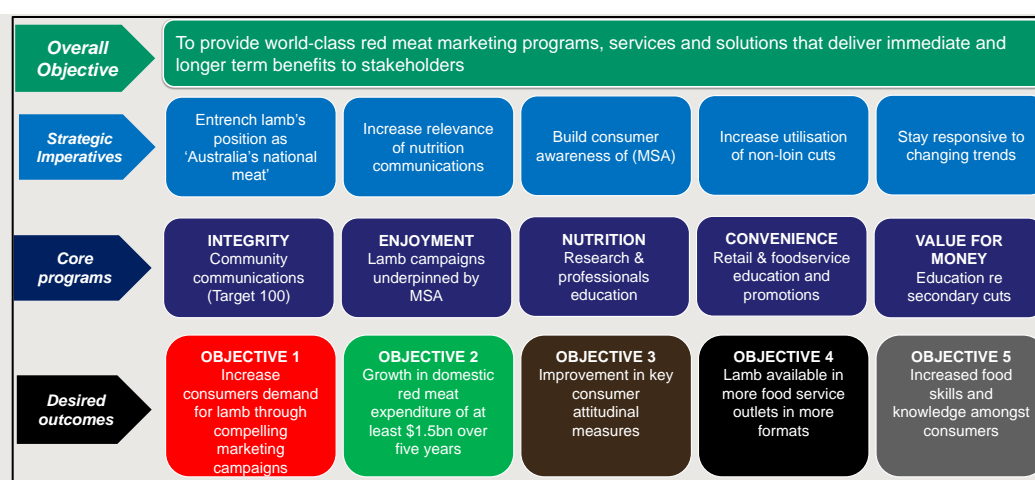
Objectives from MLA 5 year business plan

- To provide world-class red meat marketing programs, services and solutions that deliver immediate and longer term benefits to stakeholders from the domestic market

MLA Summary of Program Outputs and Outcomes

- The domestic lamb marketing strategy followed by MLA over the last five years, as detailed in the Australia Market Marketing Strategy 2011-12 — 2015-16 (hereafter referred to as the Business Plan), was similar in basic structure to beef — and is shown in the chart below. The strategy recognises five key drivers of domestic consumption, with objectives set against each driver.

12.2 Domestic lamb marketing strategy



- The Business Plan, developed almost five years ago, was based on the following assumptions:
- Lamb consumption in Australia was forecast to grow by 55kt or 23 per cent over the five year period,
- Per capita consumption was projected to rise by 0.9 kilogram / capita or 15.5 per cent, and
- There would be an easing in lamb prices from the 2010 peak over the next five years.

At that time, it was also noted that the growth in demand for lamb would not match the rapid growth experienced over the preceding decade.

As for beef, over the five year period 2010 - 2015, there were some significant variations from the assumptions made at the start of the period, and some core changes in the market environment, which impacted the performance of MLA lamb marketing programs. Some of the market environment impacts were:

- Significant increase in export demand for lamb and a shift towards export over the domestic market - the percent of production exported increased from 45 per cent in 2010 to 56 per cent in 2015.
- Lamb retail prices continued to increase from \$13.04per kilogram in 2010, peaking in 2012 at \$14.38per kilogram, before then declining to \$13.20per kilogram in 2015.
- Supply and price competitiveness of competitor proteins within Australia increased:
 - pork retail price declined by \$2per kilogram

- chicken retail price remained relatively stable, up \$0.17 per kilogram
- Increased supermarket competition occurred with the expansion of discount retailers such as Aldi and Costco. Furthermore, intensified price competition between Coles and Woolworths, exemplified in their ‘price down’ promotions, impacted retail sales values. As retailer margins on lamb became less attractive in comparison to pork and chicken (especially recently), retailers focused more on pork and chicken in catalogues.
- As in other developed markets, consumer concerns (in general) about sustainability and nutrition continued to influence consumers’ perceptions towards red meat.

As a result, in comparison to the 2009-10 base year, by 2014-15, the lamb market within Australia had contracted slightly, rather than grew as per the assumptions:

- Total lamb consumption in Australia declined slightly from 225.7kt in 2010 to 221.1kt in 2015.
- Consequently, lamb consumption per capita declined 0.9 kilogram/capita over the five year period from 10.3 kilogram / capita to 9.4 kilogram/capita. The decline in per capita consumption in Australia is similar to the downward trend (over the past couple of decades) in lamb consumption in other western markets.
- Retail value of the domestic lamb market declined marginally from \$2.06bn in 2009-10 to \$2.04bn in 2014-15, after peaking in 2011-12 at 2.14bn.

The workshop accepted that domestic lamb marketing is a ‘defensive’ activity with export and domestic commercial conditions making it difficult for MLA to succeed in this area.

Objective 1 : Increase Australian consumers demand for lamb through compelling marketing campaigns

In the market environment described above, over the five year period 2010 - 2015, MLA ran 17 campaigns.

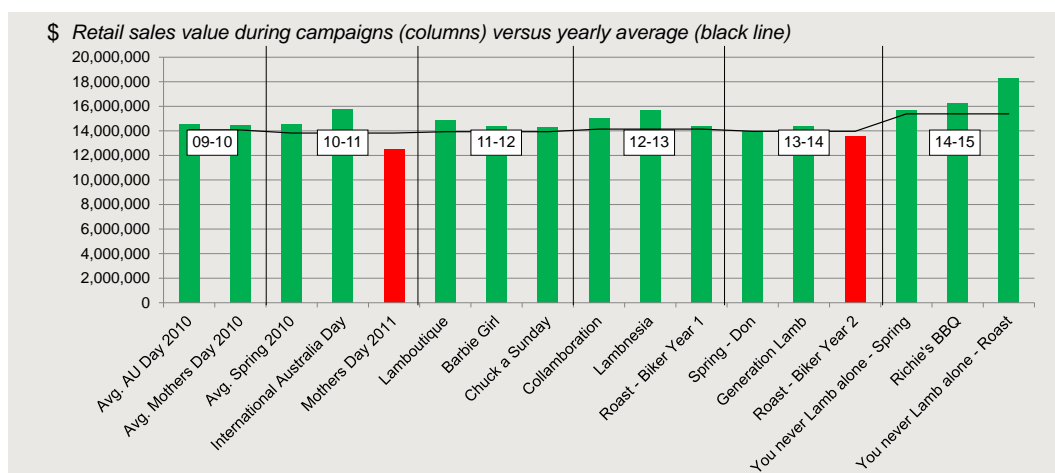
To measure the impact MLA’s campaigns had on consumer demand for lamb, MLA staff compared volume and value data for each campaign period against seasonally adjusted data.

When analysing the seasonally adjusted *sales value* data 15 out of 17 campaign periods exceeded the yearly average benchmark — although some only marginally so. The two campaigns that failed to exceed the benchmark were roast focused campaigns.

An analysis of the sales value for the 5 year period is shown in Figure 2 (volume data showed similar results):

- The black line indicates general trend of average sales over the five years.
- Campaigns that had a positive impact on sales volume and / or value are shown in green.
- Campaigns that did not result in a sales volume or value impact are shown in red

12.3 Lamb value in \$: weekly average per period



Data source: Nielsen Home Scan

Objective 2 : Growth in domestic red meat expenditure of at least \$1.5bn over five years

Over the 5 year period, the retail value of lamb sales in the domestic market declined — but only very slightly, by less than 1%. Total red meat sales decreased over this period by 6.5 per cent, rather than increase as per the objective.

- Lamb: increase on 2008/9, however decline on 2009-10:
 - 2008/9: \$2.016bn
 - 2009-10: \$2.060bn
 - 2014-15: \$2.043bn
- Total red meat: increase on 2008/9, however decline on 2009-10:
 - 2008/9: \$9.729bn
 - 2009-10: \$10.703bn
 - 2014-15: \$9.926bn

Objective 3 : Improvement in key consumer attitudinal measures

The chart below, from the MLA Global Consumer Tracker* research, provides an overview of consumer perception trends from 2013 — 2015. On some key attributes consumer attitudinal measures for lamb have deteriorated.

12.4 Changes in key consumer attitudinal measures

	LAMB			BEEF			CHICKEN			PORK		
	'15	'14	'13	'15	'14	'13	'15	'14	'13	'15	'14	'13
Ranked on importance	%	%	%	%	%	%	%	%	%	%	%	%
Most important												
Freshness	44	45	49	52	51	52	53	52	55	38	40	40
Tastes delicious	61	59	63	68	61	65	73	65	69	53	49	49
Guaranteed safe to eat	47	47	47	54	52	51	44	46	45	40	39	40
Consistent quality standards	44	44	46	54	51	52	50	50	49	38	37	38
High nutritional value	44	44	48	61	55	61	50	49	53	44	38	39
Is an essential part of a healthy diet for growing children	42	38	43	64	57	62	59	53	58	35	29	31
Can be used in many different meals	51	50	54	76	70	73	83	77	81	50	48	51
Is easy and convenient to prepare	43	45	45	62	59	61	77	73	76	41	40	41
Low in fat	15	16	17	23	22	20	50	48	51	32	26	21
Cheaper	8	9	7	19	23	20	57	51	54	16	15	16
The animal is well-cared for	25	27	25	29	28	28	26	26	23	23	22	19
The industry is environmentally sustainable	25	25	25	27	28	28	31	29	31	22	24	22
Is the most superior meat	24	25	23	36	35	33	19	18	17	14	12	10
Is my favorite meat	26	28	28	33	30	32	42	37	41	19	16	17
I am willing to pay a bit more for this meat	26	27	27	29	25	26	16	15	16	14	15	12
Least important												
Is becoming more popular	20	20	23	12	15	13	20	23	21	29	28	25

Source: Millward Brown 2013-2015

Objective 4: Lamb available in more food service outlets in more formats

Since 2010 MLA have conducted annual presentations of new lamb concepts to domestic Quick Service Restaurant (QSR) chains based on new product platforms (such as a lamb burger) or evolving trends in the QSR segment (such as snacking).

Over that time MLA have presented lamb burgers, sliders, and a lamb souvlaki plus a number of lamb snacking items designed to spread the use of lamb into breakfast and consumption in other parts of the day. The presentation of these new concepts assists Product Development Managers at QSR chains to identify early stage concepts for further review and consideration. The goal to build the presence of lamb on these menus is under increasing pressure from competitor proteins.

As a result of these presentations MLA influenced the launch of the first lamb burger in Australia, and contributed to the development of the first lamb souvlaki, as versions of these products have been launched as limited time offers, and in some instances, as core range items on several quick serve restaurants.

A similar approach has been undertaken with foodservice supply companies such as Sodexo, Spotless and Opal Age Care. Annual presentations have set out to provide cost effective lamb menu solutions with the aim of ensuring lamb maintains its presence on menu.

As a result of these presentations MLA has influenced the penetration of lamb across large scale foodservice venues nationally, including the integration of brand campaigns such as the 'Richie's BBQ' and 'You never Lamb alone' campaigns most recently with Spotless.

- per cent of dishes on menu remained stable, rather than increased (although data is not available for base year)
 - 2012-13 — 10 per cent;
 - 2014-15 — 10 per cent

Objective 5: Increased food skills and knowledge amongst Australian consumers

Since 2010, MLA has sought to find new and innovative ways to help consumers prepare quick and healthy lamb meals.

The *Entice* publication has been produced twice yearly and distributed in line with brand campaigns. Over 16 million copies of the publication have been printed over the reporting period. 68 per cent of butchers surveyed by Millward Brown rated *Entice* as having a positive impact on lamb sales and 98 per cent of consumers surveyed found that *Entice* gave them new ideas for lamb meals.

With the growth of smart phones, MLA has invested in emerging technology to adapt to the changing needs of consumers. Research indicated that consumers were apprehensive of cooking a lamb roast as it was time intensive and easy to get wrong.

The *LambRoast app* was developed to help take the guess work out of roasting lamb. Backed by MSA grading data and cooking science, the app has been downloaded over 10,000 times. Most recently it has been adapted for use with the new Apple Watch.

The *MeatCuts app* was developed to help consumers better understand where various cuts come from on the carcass. Downloaded over 40,000 times this digital cuts chart showcases carcass utilisation, substitutable cuts, best cook method plus a simple recipe.

Despite this work, there has been a deterioration in those agreeing that lamb is easy to cook and prepare.

- Easy to cook and prepare (*Source; Millward Brown*):
 - 2009-10 — 58 per cent;
 - 2014-15 — 46 per cent;

Nutrition

Nutrition remains an important driver of meal choice amongst Australian consumers. It is for this reason it has been important to ensure that consumers are constantly exposed to accurate information about the nutritional benefits of Australian beef and lamb.

MLA's nutrition program addresses the downside risk on demand by consumers limiting their intake of red meat due to health concerns by ensuring red meat is accurately represented in nutrition policy and subsequent red meat recommendations by healthcare professionals and the media.

In 2008, the NHMRC commenced a review of the Australian Dietary Guidelines, including the 3 to 4 times a week red meat recommendation, focusing on sustainability and health concerns around cancer. MLA's investment in activities ensured the recommendations released in 2013 reflected the most recent scientific evidence and consequently, maintenance of the 3 to 4 times a week red meat recommendation.

The nutrition research funded by MLA generates evidence required to inform policy-making which would otherwise not be available, including red meat nutrient compositional and consumption data along with the role of red meat in health, in particular iron and zinc and dietary patterns.

MLA research into the role of nutrition and sustainability, together with a series of forums organised in collaboration with other primary food industries, helped the NHMRC better understand this emerging area and established MLA as a trusted and valuable stakeholder.

Globally, MLA's membership as part of the International Meat Secretariat (IMS) enabled input into the WHO/FAO Rome Declaration on Nutrition which has signatories from over 170 countries, including Australia.

Communications targeting healthcare professionals and the media aim to raise and maintain awareness of the red meat recommendation with delivery through partnerships with professional associations, including dietitians, GPs and nurses for credibility.

Through its investment in nutrition research, including meal pattern behavioural research, MLA has established a reputation for supporting quality nutrition continuing education activities and healthy eating patient education resources. This has resulted in a partnership with Australian Doctor, the leading medical media, and launch of a dedicated digital nutrition publication.

MLA PR activities, linked to regular events such as Back to School, HSC, summer weight loss and starting solids, achieved high reach ensuring a higher proportion of positive media stories and subsequently, balanced media coverage of red meat and health.

Without this investment, the ADG and the Rome Declaration on Nutrition may have recommended less red meat due to sustainability and health concerns which would have had subsequent adverse consequences on red meat recommendations by healthcare professional, media coverage and ultimately, consumer perceptions and consumption.

Workshop evaluation of performance / industry impact

MLA's domestic lamb marketing program was regarded as defensive in nature — that is the aim was to limit the fall in lamb sales, rather than increasing sales. The difficulty of maintaining lamb sales was noted with high prices for lamb and low retail profit margins.

It was observed that the price of red meat will go up further and that will be a massive challenge in terms of maintaining volumes domestically — as relative prices change against pork and chicken. To address the challenge there is a need for compelling communication and promotional activities to convince consumers that lamb is a premium product and worth paying for.

Retailer representatives noted that MLA's lamb marketing campaign had involved the promotion of messages that had allowed retailers to piggyback on the messages. Retailers expect MLA to take the leadership for lamb on the domestic market.

- Over the last 5 years evolution of MLA's domestic lamb campaign was evident — with evidence in this evolution of a nimble approach being applied with messages changing slightly and also agencies changing.

It was noted that MLA does add value to lamb producers by not only promoting lamb sales but also adding value throughout the supply chain by its work on raising lamb quality and the production of product to consistent specifications.

Traditionally lamb has been seen as a product that hasn't lent itself to significant value adding (with traditional offerings such as chops, legs, etc), but this may now be changing and much of this work can be attributed to MLA. It was observed, however, that value adding and new product offerings were much greater in the chicken industry than for the lamb industry.

MLA's nutritional work was viewed as valuable — but often 'behind the scenes'.

- Workshop participants referred to the recent World Health Organisation report that attracted a lot of negative publicity for red meat and recognised that nutrition was a continued important area for MLA going forward.
- Exporters noted that MLA promotional activities seemed to promote health claims for lamb in export markets more aggressively than on the domestic market — for example, lamb as being high in Omega 3.
- A drop in health professionals recommending consumption of red meat was noted. It was observed that 5-10 years ago there were only a few products promoting nutritional claims, but this has now become common and perhaps this is a reason for the drop.

Impact comments.

- MLA's domestic lamb promotional activities were regarded as being 'very much more successful than beef'. MLA created activities that have resulted in lamb 'owning Australia Day' has been one of the most successful things that MLA has done.
- Workshop participants thought that perhaps there were slightly higher benefits from MLA lamb marketing activities in the first half of the period under evaluation (2010-11 to 2014-15) than the second half.
- The consensus view was that MLA lamb marketing activities in some export markets had achieved greater returns than for the domestic market, but that both were valuable.
- It was also reported that MLA Lamb campaigns had been effective for value adders targeting the food service market.
- MLA's domestic lamb campaigns were viewed as having a residual impact that 'will last for a long time' — especially the work involving Sam Kekovich.

12.5 Program benefits for marketing and promotion as rated by workshop

Country	Retail value 2014	MLA investments 2014-15a	Market access constrained?	Timeframe of benefits of investments	Nature of benefits	Ranked payoff per dollar
	\$m	\$m				
Domestic	2 100	10.688	No	Long term	Downside	***

*** indicates very important or very high down to * which is less important or moderate. Consumer expenditure at retail level.

Opportunities to improve impact achieved

Domestic marketing

- The promotion of MSA for lamb should be trade based — that is, MSA should be positioned as an integrity mark for company brands, rather than as a brand in itself directly communicated to consumers.

Nutrition

- Workshop participants felt that MLA could have been more successful in communicating nutrition messages to domestic consumers. It was noted that MLA health claims for lamb were greater overseas than domestically — for example, high in Omega 3

Impact Assessment

12.6 MLA Impact – benefits and investments^a: 2.5 Lamb Domestic Marketing (incl Nutrition)

		Lamb Domestic Marketing (incl 2.2 Nutrition)
		2.5
Expected benefits		
Red meat industry net income - total ^b	\$m	265
– 2010-11 to 2014-15	\$m	222
– > July 2015	\$m	43
Red meat gross value of production- total ^c	\$m	434
– 2010-11 to 2014-15	\$m	359
– > July 2015	\$m	74
Actual investment^d		
– 2010-11 to 2014-15 inclusive	\$m	65
Benefit cost ratio		
Red meat industry net income - total		4.1
Red meat gross value of production - total		6.6

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Saleyard equivalent GVP excluding processing (basis for levies). ^d Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

12.7 MLA Impact – benefits in terms of net income^a: 2.5 Lamb Domestic Marketing

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
2.5 Sheepmeat Domestic Marketing (incl nutrition)	265	0	265	4.1
– per cent of impact benefits	100	0	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

12.8 MLA Impact – benefits in terms of GVP^a: 2.5 Lamb Domestic Marketing

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
2.5 Sheepmeat Domestic Marketing (incl nutrition)	434	0	434	6.6
– per cent of impact benefits	100	0	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

12.9 Budgets for lamb domestic marketing

Budgets by Program	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
2.5 Aggressive promotion of lamb in the domestic market	7,227	7,550	8,256	8,554	8,285	8,204	8,120	8,174	8,057	7,573	39,945	40,056
2.2 Enhance the nutritional reputation of lamb	2,228	2,240	2,228	2,248	1,773	1,747	1,743	1,623	1,879	2,103	9,851	9,960
Ausmeat (allocation to domestic sheepmeat marketing)	65	66	68	69	68	65	68	64	67	64	335	327
MLA Donor Company projects	0	0	0	0	0	0	0	0	0	0	0	0
Overheads (Corporate Services / Communications)	1,163	1,278	1,243	1,366	1,090	1,042	1,095	1,106	1,110	1,159	5,700	5,951
TOTAL	10,683	11,134	11,794	12,237	11,216	11,058	11,026	10,968	11,112	10,898	55,831	56,295

13 2.6 Beef export marketing

Top line result to date — MLA expenditure on the Beef Export Marketing program provide industry returns of \$921m, from expenditure of \$137 million with a BCR of 6.7:1

Tables 13.11, 13.12 and 13.13 provide additional detail of the payoffs from investment in the *Beef Export Marketing* program.

13.1 Summary — MLA Impact — benefits and investments^a: 2.6 Beef export marketing

		Beef Export Marketing
		2.6
Expected benefits		
Red meat industry net income - total ^b	\$m	921
— 2010-11 to 2014-15	\$m	602
— > July 2015	\$m	319
Actual investment^c		
— 2010-11 to 2014-15 inclusive	\$m	137
Benefit cost ratio		
Red meat industry net income — total		6.7

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

Summary

Significant value had been created from the beef export marketing program over the past 5 years while the contribution of industry macro drivers to the commercial outcomes that were observed must also be acknowledged.

Impact was measured at \$921 million (net industry income) with a BCR of 6.7:1. Some 65 per cent of the benefit accrued during the assessment period with 35 per cent to be captured in future years.

13.2 Market performance over the evaluation period

	Volume		Value		Return/price		Market share	
	2009-10	2014-15	2009-10	2014-15	2009-10	2014-15	2009-10	2014-15
	kt shipped		\$A million		Ac per kilogram		%	
Japan	348.9	303.5	1 698	1 860	4.80	6.32	73.3	56.6
United States	210.5	471.2	813	2 234	3.88	6.88	26.9	40.4
Korea	123.8	156.9	599	1068	4.32	6.47	54.8	56.3
Europe	8.1	24.0	85	285	9.27	11.27	4.4	11.4
MENA	19.4	54.7	07	425	5.06	6.86	2.5	6.3
China	4.3	124.8	28	759	3.90	5.90	30.7	39.3
Indonesia	49.8	43.8	169	247	3.38	5.34	60.2	85.7

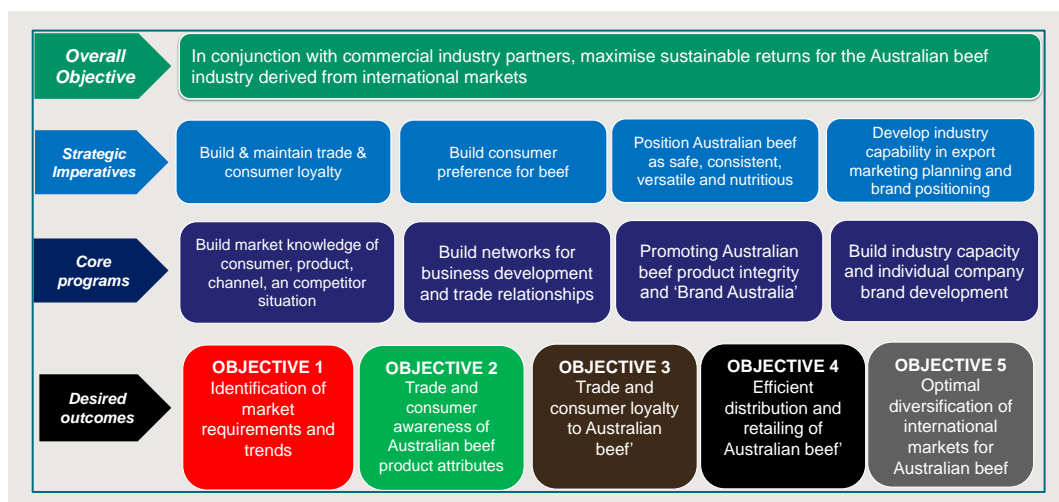
Overall objective from MLA 5 year business plan

- In conjunction with commercial industry partners, maximise sustainable returns for the Australian beef industry derived from international markets.

MLA Summary of Program Outputs and Outcomes

A summary of the strategy followed by MLA in the Export Beef Marketing Program during the Evaluation Period is shown in the chart below.

13.3 MLA's Beef Export Marketing Strategy



Objective 1: Identification of market requirements and trends

- *Global Consumer Tracker* consumer research commenced in 2013 in 7 countries to collect consistent data across key markets with the same methodology. This research was expanded to 12 countries by 2015. The Global Consumer Tracker research provided consumer insights for strategy development, as well as a consistent usage and attitude measurement across regions for brand health (comparisons with other beef supplying countries in each market), category health (comparisons with other proteins), attributes importance, purchase location retail v/s foodservice, and media consumption trends.
- *Market Insights reports* provided via Meat & Livestock Weekly (MLA online news) on key export market situation, *exports*, imports, prices, channel trends etc. Detailed analysis was provided on an annual basis for each key market through the Red Meat Market Reports, and more recently, through the Market Snapshots.
- *Competitor analysis* and reporting was also undertaken on a regular basis, with major events, such as *market* access changes, production and export trends reported via Meat & Livestock Weekly. Competitor briefs were also published via MLA website on Brazil and India to inform the industry on competitor supply situation, market access, and positioning within export markets.

Objective 2: Trade and consumer awareness of Australian beef product attributes

Consumer awareness and perceptions:

- In all key export markets, consumer awareness of Australian beef is high, and perceptions *towards* product attributes such as safety and quality, remain higher for Australian beef than other imported beef, but below domestic beef in all markets except China (see table 13.4).

13.4 Consumer awareness and perceptions of Australia in key markets

REGION	AWARENESS %			SAFE %			QUALITY %		
	Australia	Australia	OTHER*	Domestic	Australia	OTHER*	Domestic		
Japan	97	16	7 (US)	58	22	11 (US)	51		
Korea	98	26	8 (US)	72	22	10 (US)	60		
China	80	46	23 (ARG)	29	48	28 (ARG)	29		
Taiwan	99	34	13 (US)	37	41	24 (US)	37		
Indonesia	94	47	37 (NZ)	64	60	49 (NZ)	38		
Malaysia	89	47	45 (NZ)	53	53	50 (NZ)	37		
UAE	83	31	16 (BRZ)	36	36	14 (BRZ)	37		

* ARG = Argentina BRZ = Brazil Source: Millward Brown 2015

- When looking at those that are aware of the True Aussie Brand, whilst awareness is lower (than generic Australian beef), perceptions toward safety and quality are

significantly higher, indicating that consumers have a stronger preference and affinity with the brand, than with just generic Australian beef (see table .

13.5 Consumer awareness and perceptions of 'True Aussie' in key markets

REGION	AWARENESS %	SAFE %	QUALITY %
	True Aussie	True Aussie	True Aussie
	%	%	%
Japan	18	71	54
Korea	36	82	75
Taiwan	33	79	87
Indonesia	49	83	89
Malaysia	36	84	89
UAE	57	74	73

Source: Millward Brown 2015

- Until 2014, the Australian beef industry marketed Australian beef in export markets with different brand logos the two major logos being Aussie Beef in Japan, and HCW in Korea, with other market utilising a range of adapted versions of Aussie Beef or HCW. To focus on communicating a consistent message in all export markets, and to bring efficiencies to implementation across multiple export markets, the True Aussie 'brand Australia' for Australian beef was launched in 2014. With one core brand for Australian Beef, customised for local markets, MLA and the industry are now better positioned to further build trade and consumer awareness of Australian beef product attributes.

Trade perceptions (data available for Japan & Korea only):

Japan trade research results:

The trade in Japan have consistently rated Australian beef above US beef in terms of safety, consistency in quality, and having effective marketing promotions (see table 13.6). In fact, for safety and quality, the image has continued to improve for Australian beef (US has also improved with increased access).

13.6 Trade perceptions of Australia in Japan

	Strictly Inspected %		Consistent Quality %		Effective Promotions %	
	Australia	US	Australia	US	Australia	US
2006*	78.0	23.0	47.0	42.0	78.0	13.0
2010	83.9	38.1	56.1	48.4	65.8	33.5
2015	85.6	45.8	57.5	56.9	62.7	34.6

*2006 data used as 2005 data not available. Source: Nielsen (2006), Synovate (2010)

Korea trade research results:

The trade in Korea have consistently rated Australian beef above US beef in terms of safety and quality (table 13.7). The metrics for Australian have continued to increase over the two five year evaluation periods. Also, in term of marketing effectiveness, the Korean trade highly rate MLA marketing programs.

13.7 Trade perceptions of Australia in Korea

	Food Safety & QA %		Consistent Quality %		Effective Promotions %	
	Australia	US	Australia	US	Australia	US
2005*	79.2	60.0	54.2	90.0	80.4	n/a
2010	84.4	42.6	66.2	44.7	79.6	n/a
2015	91.7	67.7	79.8	72.6	86.9	n/a

Source: Macromill Embrain

Objective 3: Trade and consumer loyalty to Australian beef

- Consumer loyalty towards Australian beef is demonstrated by the fact that the percentage of consumers who state that Australian beef is their 'favourite' is higher in all key export markets than those that nominate other imported (US beef, Brazilian, Argentinian beef) as their favourite (table 13.8). In most markets, the local domestic beef was their favourite, followed by Australian.

13.8 Consumer loyalty to Australian beef in key markets

REGION	FAVOURITE (%)			
	Australia	US	OTHER	Domestic
Japan	19	12	6 (NZ)	62
Korea	23	7	7 (NZ)	84
China	42	-	21 (Argentina)	35
Taiwan	31	26	29 (JPN)	44
Indonesia	44	18	27 (NZ)	55
Malaysia	37	9	27 (NZ)	46
UAE	30	13	13 (Brazil)	39

Source: Millward Brown 2015

Objective 4: Efficient distribution and retailing of Australian beef

- Trade (importer, wholesaler, retail and foodservice) business development programs were implemented across all major markets. The programs included activities such as:
 - Trade show participation
 - Seminars for importers, wholesalers, butchers, supermarkets, chefs etc
 - Publication of cuts guides for use by the trade (retailers and foodservice)
- Retail marketing programs were implemented in most export markets. The retail programs included activities such:
 - Development of point of sale materials to promote product attributes of Australian beef
 - In-store sampling to increase purchase and understanding of Australian beef quality
 - Retail campaigns (Japan & Korea) to increase shelf space across all major retailers
- Industry Collaborate Agreements (ICA) and recently the CoMarketing Program supported individual companies undertake marketing activities in all major export markets. The number of participants remained stable at around 50 companies per year (this includes companies that conduct export programs as well as domestic marketing programs). With the launch of the CoMarketing program in 2014, the program emphasis changed to focus on strategic brand marketing activities, where the following outcomes were achieved with MLA support:
 - Number of total brands — 186 (number of brands that were MSA brands — 73)
 - Average volume of branded beef sales supported by CoMarketing on both export and domestic markets: 95,000 tonnes swt / month
 - 66 per cent of companies rated the outcomes of their strategic objectives as very successful
- The combination of trade, retail and collaborative marketing programs with commercial partners helped increase export volumes and value per unit of Australian beef, which ultimately helped increase Australia's market share in all key markets (with the exception of Japan where US beef regained some of their 'lost' market share). See below for a summary of key statistics for the performance of the Australian beef industry in export markets.

Objective 5: Optimal diversification of international markets for Australian beef

- To support the Australian beef industry to further diversify markets, marketing budget and human resources were boosted in developing markets such as China and Indonesia. The marketing budget was also increased in the EU to support the growth of grainfed beef with increased market access, and the Middle East to support the growth in exports to that developing market for Australian beef.
- Over the past five years, markets were further diversified - with the top 3 markets (US, Japan & Korea) representing 76 per cent of exports in 2010, which declined to 69 per

cent in 2015 as emerging marketing such as China, Indonesia (and South Asia in total) and the Middle East expanded their share of exports.

Summary of the performance of beef export markets

Comparing the base year 2009-10 with 2014-15. MLA export marketing programs, in conjunction with activities of commercial industry partners contributed towards the following impacts:

- *Export volume* to all destinations increased by 450kt swt, from 899kt to 1,349kt swt - an increase of 50 per cent on 2009-10.
- *Export value* increased by A\$4.91bn FOB, from \$4.13bn to \$9.04bn FOB - an increase of 119 per cent on 2009-10.
- *Average value per tonne* of beef exports increased from \$4.40per kilogram to \$6.56per kilogram
- *Markets were more diversified*, with the top 3 export markets (US, Japan, Korea) representing 76 per cent in 2009-10, and 69 per cent in 2014-15. This was due to expansion in emerging markets.
- *Market share ranking and market share percent* improved in most markets:
 - *US* — Australia was the 2nd largest supplier to the US with 26.9 per cent market share in 2009-10, and by 2014-15, Australia was the largest supplier to the US and market share had increased to 40.4 per cent.
 - *Korea* — Australia remained the largest supplier, with market share increasing from 54.8 per cent 2009-10, to 56.3 per cent in 2014-15.
 - *EU* — Australia was the 7th largest supplier with 4.4 per cent market share, and by 2014-15, Australia was the 4th largest supplier, representing 11 per cent market share. Access and expansion in market access for grainfed beef significantly contributed to the increase in exports to this high unit value market.
 - *China* — Australia was the 2nd largest supplier with 30.7 per cent market share, and by 2014-15, Australia had become the largest supplier, with 39.3 per cent market share.
 - *Indonesia* — Australia remained the largest supplier, with market share increasing from 60.2 per cent to 85 per cent in 2014-15.
 - *Japan* — With the staged re-entry of US beef, Australian market share has declined from 73.3 per cent to 56.6 per cent. This means Australia continues to supplant the US as market leader in the import beef category (in the last full year prior to BSE, Australian share was 46 per cent and US 48 per cent).

13.9 Market performance in summary over the evaluation period

	Volume		Value		Return/price		Market share	
	2009-10	2014-15	2009-10	2014-15	2009-10	2014-15	2009-10	2014-15
	kt shipped		\$A million		Ac per kilogram		%	
Japan	348.9	303.5	1 698	1 860	4.80	6.32	73.3	56.6
United States	210.5	471.2	813	2 234	3.88	6.88	26.9	40.4
Korea	123.8	156.9	599	1068	4.32	6.47	54.8	56.3
Europe	8.1	24.0	85	285	9.27	11.27	4.4	11.4
MENA	19.4	54.7	07	425	5.06	6.86	2.5	6.3
China	4.3	124.8	28	759	3.90	5.90	30.7	39.3
Indonesia	49.8	43.8	169	247	3.38	5.34	60.2	85.7

Workshop evaluation of performance / industry impact

The Workshop participants from industry assessed that significant value had been created from export marketing program over the past years while also acknowledging the contribution of industry macro drivers to the commercial outcomes that were observed. The broad view of the workshop is summarised below in table 13.10).

The workshop compared the MLA marketing performance in the review period to that of an earlier independent assessment and concluded that:

- MLA's export marketing activities and impact were regarded as better in the period 2010-15 than for the previous 5 years' performance and were assessed as being extremely valuable — above the 5:1 BCR recorded for the earlier period. Export marketing activities had been highly successful in Korea and the US, but valuable in all markets. If MLA were to cease activities in any market, but particularly in the North Asian markets, a considerable impact would be felt by the Australian industry.
- The workshop's evaluation by market was:

13.10 Program benefits for marketing and promotion by region as rated by workshop

Region (in workshop order)	Ranking of program outputs by market ^a				
	Nutrition	Clean and green country brand	Consumer/market profiling	Benefits timeframe/nature of benefits	Ranked payoff per dollar
Korea	**	***		Long/Defensive	***
United States	*	*	**	Short	***
Japan	***	***		Long/Defensive	**
China	*	**	**	Long	**

Region (in workshop order)	Ranking of program outputs by market ^a				Ranked payoff per dollar
	Nutrition	Clean and green country brand	Consumer/ market profiling	Benefits timeframe/ nature of benefits	
Other Asia	*	**		Short	**
Middle East	*			Short	*
EU	*	*		Short	*

*** indicates very important or very high down to * which is less important or moderate. ^a Industry Collaborative Agreements (ICAs) were also supported by workshop participants

Japan

The overall trend for Japanese beef consumption is one of static/declining per person demand. Australian export performance in this market was dominated by the re-entry of US beef after their exclusion as a result of the BSE outbreak and the change in their access requirement for sourcing product from cattle which increased from 22 to 30 months of age during the evaluation period. Higher Australian beef production levels and exchange rate shifts also had an impact on Australian market share.

Given these industry macro changes, the workshop reviewed MLA's performance relative to:

- marketing outcomes in the previous 5 year period
- marketing by the US Meat Export Federation (MEF).

The workshop indicated that:

- it was difficult to compare the periods pre and post-2010-11
- the reduction in marketing investment in Japan had probably been justified given declining consumption and its tough market conditions
- Australia was still the clean and green alternative to the United States (that is, country branding is important).

Japan remains a solid market for Australia despite long-term trends:

- it has relatively low political and regulatory risk and is among those that is easiest to pack for
- results in terms of Australia's market position today are the outcomes of long term investment by the industry in promoting Australian product's clean and green image (over a 30 year period)
- a significant disruption (food safety or disease) would be required to change the importance of this market for Australia.

The workshop identified the important MLA outputs in Japan that resulted in benefits included investments that:

- targeted nutrition (through the Iron Beauties campaign)
- maintained country branding (as a subordinate quality mark to company brands)
- provided independent market information to:

- Japanese importers/traders (independent of individual exporters/companies)
- Australian exporters around consumer attributes/profiling.

MLA plays the same role as the USDA as an independent, third party provider of standards and information.

Japan is a two-tiered market, comprised of high-quality fresh market and frozen cuts and grinding beef for food service:

- there are little/no new opportunities in Japan as all the market niches have been identified or developed
- the ultimate test of any promotion activities is how much consumers are willing to pay for Australian compared to US product.

Relative to Australian promotion, US MEF has had a huge budget but in recent years. However, US supply constraints have impacted on export volumes. Furthermore, high cattle prices in the US and, most recently, the US dollar appreciation have impacted on the competitiveness of US processors. Therefore, US promotion has probably been less effective. However, the US is now positioned to take advantage of opportunities in the Japan market when conditions change.

Overall, the workshop was highly satisfied with MLA performance which was better than the previous 5 year period. It was noted that MLA was seen in Japan as the pre-eminent source of information on the Australian beef industry and is highly regarded. The majority of MLA investment is defensive in nature.

- It was noted that MLA had contributed to retention of market share due to widespread appreciation amongst Japanese consumers and the trade of Australia's 'clean and green' image and the integrity/safety of Australian beef.
- It was noted that the Japanese market (together with the US market) had really 'carried the can' when Australia was faced with extraordinary levels of cattle turn-off and that this market was one of the easiest countries to pack for — a reflection of the long term nature of the trade and the trust that has developed.
- A decision by MLA over the Evaluation Period to cut expenditure in the Japan market, while logical in one dimension, was questioned by Workshop participants, particularly exporters. They view MLA's role in this market as 'vital'. It was noted that MLA expenditure on ICAs/collaborative marketing programs was appreciated, but general MLA presence was needed in overseas markets, particularly Japan and Korea.

When questioned on what would have happened with no MLA investment and how fast the benefits of investments would decay the workshop identified a number of options:

- outcomes would depend on market developments such as a (catastrophic) food safety incident
- Japanese would be offended by the departure and trust in Australian systems would 'evaporate'¹⁶
- USMEF would go in hard to win market share — probably successfully

¹⁶ This is the license to operate argument in Japan.

- While exports would continue, there would be a reduction in any price premium for Australian product.
- As a result of these sensitivities, the decay in benefits from previous programs would be speedy (in 12 months) and involve a loss in premium, although the size of the discount could not be estimated.

Korea

For this evaluation, Korea shares many of the attributes of the Japanese market including the impact of exclusion of the US following their BSE outbreak and the contribution of industry macro drivers, particularly changes in relative exchange rates. Despite the potential for increased consumption and the staggered re-entry of US product into this market, Australian export volumes have been steady over the evaluation period.

Overall, the workshop was very optimistic of prospects for the Korea market and were very supportive of MLA marketing activities ranking these activities as having the highest payoff per dollar invested across all export markets — Korea was the ‘pin up’ for Australian beef industry/MLA activities globally.

- The benefits are likely to come from building on the exclusion of the US product and recent devaluation of the Australian dollar, and from strong market awareness of the Australian beef brand and nutrition messaging, especially among Korean housewives.¹⁷
- The workshop was very satisfied with MLA performance and rated Seoul as the best MLA oversea office. MLA services in this market were described as ‘spot on’ with high levels of market knowledge and expertise exhibited by MLA staff. The majority of MLA’s investment in Korea should be regarded as defensive in nature, but less so than for Japan.

With regard to what would have happened without MLA investment and how fast the benefits of investments would decay — this question was framed relative to the answer for Japan summarised above:

- Korean reactions would similar to Japan’s, they would also be slighted about the withdrawal of MLA from the market, however they would most likely be more pragmatic.
- An MLA withdrawal from the market would give the United States a massive ‘leg in the door’.
- The Australian brand image would last longer in Korea because of its strength and because of distrust of US product, but eventually its benefits would decay.
- The workshop settled on the scenario that any premiums on trade to Korea would fall off slower than for Japan and that Australian branding would decay at a slower rate than for Japan. Therefore, the ROI for Korea would be significantly higher than for Japan.

¹⁷ MLA launched the Australian country-of-origin logo Hoju Chungjung Woo (HCW), meaning ‘Australian Beef, Clean and Safe’.

United States

As for Japan and Korea, changes in macro drivers of the United States have dominated market dynamics especially the appreciation of the US dollar, the comparatively low US herd and slaughter levels at the start of the period and more recently the build-up of finished cattle. Taking a wider view, the United States is a massive market for protein where the economy has picked-up recently.

- While the majority of Australian exports are commodity-based, there are numerous niche opportunities which are multiplied by the sheer scale of the market.
- Australia remains a small player in a massive market, where a niche could mean a market of 30 to 40 million people.
- There is a strong preference to high quality pasture fed product, including that certified by the Pasturefed Cattle Assurance System (PCAS).
- In terms of MLA activities, the workshop identified that over the past 5 years a shift in MLA focus has resulted in significantly better performance.
- There was recognition of the role played by MLA in obtaining USDA certification of MSA under the USDA's Process Verified Program (PVP).
- MLA also performs the role of supplying independent information to the trade.
- Workshop participants noted that the massive size of the US market meant that MLA activities had to be focussed in areas that provided maximum opportunity — and they had been.

The question was asked how MLA promotion compared to Uruguay - the answer was that Australia has long-established credentials for food safety which Uruguay would take a long time to match or exceed. Australia was 'very trusted' as a supplier, partly due to MLA's work over many years.

- Overall, the workshop rated MLA's performance very highly and in terms of value for money second to that for Korea and better than for Japan. The benefits would be higher levels of chilled exports to the US than would otherwise be the case.

In terms of what would have happened without MLA investment and how fast the benefits of investments would decay:

- Without MLA investment, it would be more difficult for exporters to identify and develop niche market channels. It would be unclear if these companies would fill the gap, indeed, if they could, it would be at a higher cost to industry.
- Therefore, benefits from MLA investments in the review period are likely to dissipate reasonably quickly without further funding. These investments address upside opportunities and are not defensive in nature as for Japan and Korea.

Europe

While the European markets are significant, market access remains the most significant constraint in realising opportunities. This was demonstrated by the increase in the grain fed quota, shared with other suppliers on a first come basis, and the Hilton quota that continues to restrict exports of grass fed chilled product.

- The European Union remains the highest value market on a per tonne basis which reflects both the impact of the quota but also the capacity to pay in some segments. At the same time, the majority of the European Union is a commodity market with users taking cheap and lower quality product from South American suppliers.
- The European Union could be considered a developing market for grain fed product. Because of the size and scope of the market, and the level of competition from other suppliers, Australian exporters need to look for niches within quota constraints.
- Overall, the workshop identified that access is the overall constraint, and until that is solved, there is a limited role for MLA marketing.

The primary areas of MLA involvement are in the development of trade contacts and developing of private brands through ICAs, which assist commercial players realise commercial opportunities.

- The workshop identified that there was no significant change in MLA performance between this and the previous period, and that while the investment was modest, the payoff was lower than for Japan.

Middle East including North Africa (MENA)

The MENA countries also require a targeted approach. While a number of countries, led by Saudi Arabia, buy mainly from the lowest cost suppliers, a targeted approach is required by MLA for niches in select countries.

- The 'gems' are the Gulf Co-operation Council (GCC) states.
- The workshop identified some significant benefits from MLA activities from small budgets.
 - The total MLA investment was \$700 000.
 - Events, like the Big BBQ Day, were noted as generating significant PR and goodwill for very little expenditure.
- In addition, it was noted that these markets were significantly different when compared to the previous 5 year period, and that any marketing activities are inextricably linked to market access and to a lesser extent sheepmeat exports.
- The majority of MLA activities revolved around developing trade contacts, trade shows and some market profiling.
- It was noted that MLA's activities in MENA markets for 2010-2015 had a greater impact than for the previous 5 years, but were below the impact of US activities.
- The workshop agreed that MLA activities were of benefit but are limited to developing a platform for future growth until a range of market access issues are addressed, many at a government level.

Indonesia

Similar to MENA countries, exporting to Indonesia was identified as being principally about market access with a limited role for marketing over the evaluation period.

China

The workshop identified that the Chinese market was a large number of diverse regions that were still immature in terms of consumer requirements and distribution channels.

- Early gains for Australian exporters were reduced with the ban on fresh imports.
- The bulk of beef imports are currently commodity/frozen in nature and the Chinese market quickly trade-off suppliers on price. That is, there is stiff competition from India and Brazil.

In terms of the difference MLA made in the Evaluation Period:

- There were few activities in the previous 5 year period for comparison.
- MLA activities focus on identifying niches, such as working with chefs in high-end food service. These activities, including brand building, are developing a platform for future growth and likely to have benefits over a 20 year time horizon.
- The workshop indicated that without MLA investment, exports would have still occurred but at a lower level (maybe 25 per cent lower). Without future funding, the benefit from this period would decay rapidly because brand building is in its infancy.
- It was recognised that MLA was laying a foundation stone for the Australian beef industry in China — and this, potentially, had significant benefits long term. A ‘20 year horizon’ was needed in China.

Other developing Asia

It was noted that MLA provided benefits that were short term in nature and would decay rapidly without ongoing investment.

The workshop compared the MLA marketing performance in the review period to that of an earlier independent assessment and concluded that:

- MLA’s export marketing activities and impact were regarded as better in the period 2010-15 than for the previous 5 years performance and were assessed as being extremely valuable — above the 5:1 BCR recorded for the earlier period.
 - Export marketing activities had been highly successful in Korea and the US, but valuable in all markets. If MLA were to ceased activities in any market, but particularly in the North Asian markets, a considerable impact would be felt by the Australian industry.

Opportunities to improve impact achieved

The workshop identified that:

- more information about consumers/retail markets/market segments by region was required. Consumers were ‘out of reach’ for individual businesses who lack the critical mass to conduct the required research - this research is considered to be pre-competitive

- MLA needs to be more demand driven, starting with the consumer and working back through pathways to establish niche segments etc. Without MLA being demand driven the MSA program in export markets was seen as ‘supply push’ by some exporters
- care is required when supporting overseas retailer private label brands — supply for these brands could be moved from Australia to competitor countries — this would be invisible to consumers and prior Australian marketing expenditure would end up supporting competitor country imports
- nutrition has become an important attribute that supports Australia’s clean and green image.

Other suggestions included:

- MLA conducts many valuable activities in overseas markets, but these are sometimes poorly communicated back to industry/exporters
- alternative channels for message delivery should continue to be explored particularly in the social media space, which is cheap and can be very effective
- MLA should continue to think innovatively about cross-promotion with other industries, such as tourism and wine at trade shows, etc, rather than being stand-alone
- MLA should consider insisting that recipients of cooperative marketing funds use the industry stand in trade shows

Additional suggestions were provided by MLA in the background paper.

Impact Assessment

13.11 MLA Impact – benefits and investments^a: 2.6 Beef Export Marketing

		Beef Export Marketing
		2.6
Expected benefits		
Red meat industry net income - total ^b	\$m	921
– 2010-11 to 2014-15	\$m	602
– > July 2015	\$m	319
Red meat gross value of production - total ^c	\$m	1 662
– 2010-11 to 2014-15	\$m	1 088
– > July 2015	\$m	574
Actual investment^d		
– 2010-11 to 2014-15 inclusive	\$m	137
Benefit cost ratio		
Red meat industry net income – total		6.7
Red meat gross value of production - total		12.1

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Saleyard equivalent GVP excluding processing (basis for levies). ^d Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

13.12 MLA Impact – benefits in terms of red meat net income^a: 2.6 Beef Export Marketing

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
2.6 Beef Export Marketing	394	527	921	6.7
– per cent of impact benefits	43	57	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

13.13 MLA Impact – benefits in terms of GVP^a: 2.6 Beef Export Marketing

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
2.6 Beef Export Marketing	739	923	1 662	12.1
– per cent of impact benefits	44	56	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

13.14 Estimation of first round benefits 2014-15 – beef export marketing

Region	Export value 2014-15	MLA expenditure	Suggested BCR	per cent sales impact	Benefit type		
					Downside	Upside	Decay period
	\$m	\$m		%	%	%	no years
Korea	1 068	4.082	10.0	3.82	25	75	2.0
United States	3 234	0.823	10.0	0.25	0	100	0.5
Japan	1 860	6.740	7.0	2.54	75	25	3.0
China	760	1.843	7.0	1.70	0	100	0.5
Other Asia	380	1.635	5.0	2.15	0	100	0.5
Middle East	425	0.902	5.0	1.06	0	100	0.5
EU	400	0.594	5.0	0.74	0	100	0.5
Others	923	4.355	5.0	2.36	0	100	0.5
Total export	9 049	20.974	7.0	1.62	31	69	1.7

13.15 Budgets for Beef export marketing

Budgets by Program	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
2.6 Aggressive promotion of beef in export markets	23,349	23,023	23,431	21,467	20,914	19,920	20,383	20,956	19,830	18,300	107,907	103,667
Ausmeat (allocation to export beef marketing)	276	258	275	253	271	256	278	271	275	259	1,376	1,296
MLA Donor Company projects	0	0	0	0	0	0	0	0	0	0	0	0
Overheads (Corporate Services / Communications)	2,890	3,022	2,849	2,804	2,261	2,134	2,296	2,525	2,260	2,415	12,557	12,900
TOTAL	26,516	26,303	26,555	24,524	23,447	22,310	22,957	23,752	22,365	20,974	121,840	117,862

Data source: XXXX

14 2.7 Sheepmeat export marketing

Top line result to date — MLA expenditure on the Sheepmeat Export Marketing program provide industry returns of \$150m, from expenditure of \$44 million with a BCR of 3.4:1

Tables 14.9, 14.10 & 14.11 provide additional detail of the payoffs from investment in the *Sheepmeat Export Marketing* program

14.1 Summary — MLA Impact — benefits and investments^a: 2.7 Sheepmeat export marketing

		Sheepmeat Export Marketing
		2.7
Expected benefits		
Red meat industry net income - total ^b	\$m	150
— 2010-11 to 2014-15	\$m	125
— > July 2015	\$m	25
Actual investment^c		
— 2010-11 to 2014-15 inclusive	\$m	44
Benefit cost ratio		
Red meat industry net income — total		3.4

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

Summary

Significant value had been created from sheepmeat export marketing programs whilst also acknowledging the contribution of industry macro drivers to the commercial outcomes that were observed.

Impact was measured at \$150 million (net industry income) with a BCR of 3.4:1. Some 83 per cent of the benefit accrued during the assessment period with 17 per cent to be captured in future years.

14.2 Market performance over the evaluation period

Region	Export Volume		Export Value \$Amil FOB		Ave \$/kg		Aust Share of Imports %	
	2009/10	2014/15	2009/10	2014/15	2009/10	2014/15	2009/10	2014/15
USA	36,912	48,153	\$ 296	\$ 532	\$ 8.21	\$ 10.46	65.8%	71.9%
MENA	33,410	69,374	\$ 184	\$ 442	\$ 5.25	\$ 6.64	55.2%	67.4%
China	11,678	35,737	\$ 37	\$ 191	\$ 2.92	\$ 4.27	41.6%	41.6%
Japan	7,199	9,474	\$ 56	\$ 86	\$ 7.22	\$ 9.24	59.5%	70.8%

^a Volumes and returns are on a shipped weight basis.

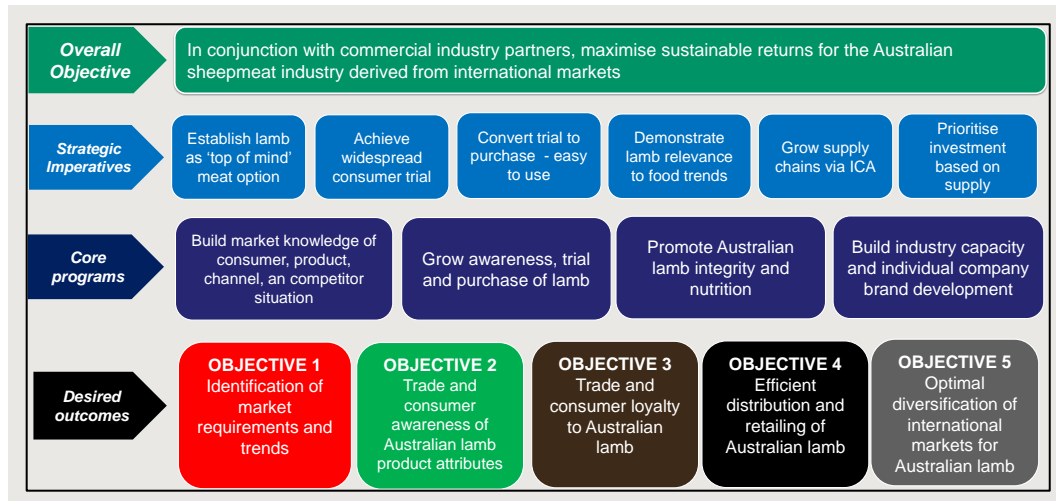
Objectives from MLA 5 year business plan

- In conjunction with commercial industry partners, maximise sustainable returns for the Australian sheepmeat industry derived from international markets.

MLA Summary of Program Outputs and Outcomes

A summary of the strategy followed by MLA in the Export Sheepmeat Marketing Program during the Evaluation Period is shown in chart 14.3 below.

14.3 MLA program summary – sheepmeat export marketing



Objective 1: Identification of market requirements and trends

- *Global Consumer Tracker* consumer research commenced in 2013 in 7 countries to collect consistent data across key markets with the same methodology. This research was expanded to 12 countries by 2015, with detailed lamb data available in 6 countries. The *Global Consumer Tracker* research provided consumer insights for strategy development, as well as a consistent usage and attitude measurement across regions for brand health (comparisons with other lamb supplying countries in each market), category health (comparisons with other proteins), attributes importance, purchase location retail v/s foodservice, and media consumption trends.

- *Market Insights reports* provided via Meat & Livestock Weekly (MLA online news) on key export market situation, exports, imports, prices, channel trends, competitors in the market, etc. Detailed analysis was provided on an annual basis for each key market through the Red Meat Market Reports, and more recently, through the Market Snapshots.
- *Competitor analysis* and reporting was also undertaken on a regular basis, with major events, such as market access changes, production and export trends reported via Meat & Livestock Weekly. Competitor briefs were also published via MLA website on NZ to inform the industry on competitor supply situation, market access, and positioning within export markets.

Objective 2: Trade and consumer awareness of Australian lamb product attributes

- In China and North America, when comparing country of origin, consumer perceptions towards product attributes such as safety and quality, are generally higher for NZ lamb than Australian, however in Middle East markets, perceptions are significantly higher for Australian than NZ lamb (table 14.4).

14.4 Consumer awareness of Australian lamb attributes in key markets

REGION	AWARENESS %	SAFETY %			QUALITY %		
	Australia	Australia	NZ	Domestic	Australia	NZ	Domestic
US	45	29	32	39	32	35	40
Canada	46	33	39	46	33	49	44
China	76	59	62	41	58	62	35
Malaysia	82	49	45	42	53	53	30
UAE	80	35	24	36	39	28	29
Saudi	53	21	15	55	24	15	53

- When looking at those markets that are aware of the **True Aussie** Brand, whilst awareness is lower (than generic Australian lamb), due to the fact that the brand has only been in market for less than a year, perceptions toward safety and quality are significantly higher, indicating that consumers have a stronger preference and affinity with the brand, than with just generic Australian lamb (table 14.5).

14.5 Consumer awareness of 'True Aussie' lamb attributes in key markets

REGION	AWARENESS %	SAFE %	QUALITY %
	True Aussie	True Aussie	True Aussie
Malaysia	41	84	89
UAE	53	74	73
Saudi	52	75	80

- Until 2014, the Australian lamb industry marketed Australian lamb in export markets with different brand logos in each region. To focus on communicating a consistent message in all export markets, and to bring efficiencies to implementation across multiple export markets, the True Aussie 'brand Australia' for Australian lamb was launched in 2014. With one core brand for Australian Lamb, customised for local markets, MLA and the industry are now better positioned to further build trade and consumer awareness of Australian lamb product attributes.

Objective 3: Trade and consumer loyalty to Australian lamb

- Australia faces stiff competition from NZ in all our major export markets, as shown in table 14.6) and this is reflected in the fact that in some markets, there is stronger favouritism towards NZ over Australia (that is, USA, Canada, and China). However in those markets where Australian lamb is more prevalent through to the consumer, there is favouritism towards Australia over NZ (ie: Malaysia, UAE and Saudi Arabia).

14.6 Consumer loyalty to Australian lamb in key markets

REGION	FAVOURITE %		
	Australia	NZ	Domestic
US	17	23	30
Canada	13	35	31
China	46	54	39
Malaysia	39	36	31
UAE	36	21	33
Saudi	21	13	52

Objective 4: Efficient distribution and retailing of Australian lamb

- Trade (importer, wholesaler, retail and foodservice) business development programs were implemented across all major markets. The programs included activities such as:
 - Trade show participation
 - Seminars for importers, wholesalers, butchers, supermarkets, chefs etc
 - Publication of cuts guides for use by the trade (retailers and foodservice)

- Retail marketing programs were implemented in most export markets. The retail programs included activities such:
 - Development of point of sale materials to promote product attributes of Australian lamb
 - In-store sampling to increase purchase and understanding of Australian lamb quality
 - Retail promotions to increase shelf space across all major retailers
- Industry Collaborate Agreements (ICA) for lamb commenced on a global basis in 2010-11, with 15 companies joining the program to develop individual supply chains in export markets. In 2013-14, ICAs ceased, and were replaced by the CoMarketing program in 2014-15, with a change in program emphasis to provide greater focus to strategic brand marketing activities. The following outcomes were achieved with MLA support during 2014-15:
 - Number of active participants: 19 companies
 - Number of total brands — 32 (number of brands that were MSA brands — 5)
 - Average volume of lamb sales supported by CoMarketing on both export and domestic markets: 23,000 tonnes swt / month
 - 64 per cent of companies rated the outcomes of their strategic objectives as very successful
- The combination of trade, retail and collaborative marketing programs with commercial partners helped increase export volumes and value per unit of Australian lamb. See below for a summary of key statistics for the performance of the Australian sheepmeat industry in export markets.

Objective 5: Optimal diversification of international markets for Australian lamb

- To support the Australian lamb industry to further diversify markets, marketing budgets and human resources were boosted in emerging markets such as China.
- Over the past five years, whilst there was 54 per cent expansion in export volumes, the growth was balanced across most markets. Balanced growth in all export markets enabled the industry to maintain a relatively low level of reliance on the major export markets. In 2014-15 42 per cent of exports were destined for the top 3 markets (US, China and UAE), compared with 44 per cent for these markets in 2009-10

Below is a summary of the performance of lamb export markets, comparing the base year 2009-10 with 2014-15. MLA's Sheepmeat Export Marketing Program, in conjunction with commercial industry partners, would have contributed towards these impacts:

- *Export volume* to all destinations increased by 84.6kt swt, from 157kt to 241kt swt. This represents an increase of 54 per cent on 2009-10.
- *Export value increased* by A\$849 million FOB, from \$933 million to \$1.8bn FOB. This represents an increase of 91 per cent on 2009-10.
- *Average value per tonne* of lamb exports increased from \$5.83per kilogram to \$7.01per kilogram.

- *Markets remained diversified*, with the top 3 export markets (US, China and UAE) representing 44 per cent in 2009-10 and 42 per cent in 2014-15. The growth in emerging markets was at the same pace as the larger more traditional markets for Australian lamb.
- *Market share ranking and market share percent* remained firm in most markets:
 - United States — Australia was the largest supplier of lamb to the US with 67.1 per cent market share in 2009-10, and by 2014-15, Australia's market share had increased to 71.9 per cent.
 - China — Australia was the 2nd largest supplier of sheepmeat with 41.8 per cent market share in 2009-10, which remained relatively stable throughout the period, with 41.6 per cent market share in 2014-15.
 - UAE — Australia was the largest supplier of sheepmeat to the UAE with 58.4 per cent market share in 2009-10, and by 2014-15, Australia's market share had decreased to 46.9 per cent%. The decline in market share was due to an increase in exports from India and the EU to the UAE since 2013.
 - MENA — Australia was the largest supplier of sheepmeat to the MENA region with 55.2 per cent market share in 2009-10, and by 2014-15, Australia's market share had increased to 67 per cent.
 - Japan — Australia was the largest supplier of sheepmeat to Japan with 59.5 per cent market share in 2009-10, and by 2014-15, Australia's market share had increased to 70.8 per cent.

14.7 Summary of export volumes, values, import market share for each region

Region	Export Volume		Export Value \$Amil FOB		Ave \$/kg		Aust Share of Imports %	
	2009/10	2014/15	2009/10	2014/15	2009/10	2014/15	2009/10	2014/15
USA	36,912	48,153	\$ 296	\$ 532	\$ 8.21	\$ 10.46	65.8%	71.9%
MENA	33,410	69,374	\$ 184	\$ 442	\$ 5.25	\$ 6.64	55.2%	67.4%
China	11,678	35,737	\$ 37	\$ 191	\$ 2.92	\$ 4.27	41.6%	41.6%
Japan	7,199	9,474	\$ 56	\$ 86	\$ 7.22	\$ 9.24	59.5%	70.8%

Workshop evaluation of performance / industry impact

The Workshop participants from industry assessed that significant value had been created from MLA's Export Sheepmeat Marketing Program during the Evaluation Period whilst also acknowledging the contribution of industry macro drivers to the commercial outcomes that were observed. The broad view of the workshop is summarised below.

Export sheepmeat marketing activities by MLA were favourably regarded, especially so in the Middle East, Japan and North America (although in this last market exporters believed that MLA activities added relatively more to Australian beef exports to North America).

The European Union was regarded as a market where access was the focus and MLA marketing activities were seen as providing 'negligible value' because Australia is restricted by quota allocation and high over quota tariffs.

In the China market MLA activities were seen as adding value in some areas (for example, high-end food service). It was also recognised that MLA's true contribution to this market would only be able to be assessed over an extended time period — MLA had to be in this market for the 'long haul'.

The workshop's evaluation by market was:

North America

MLA's North American lamb program was regarded by exporters as 'a very successful program'.

- MLA's North American team has done an 'exceptional job' of establishing and maintaining relationships with key trade players.
- MLA's input into marketing activities involving major US customers, such as Costco, and Australian lamb exporters was viewed as a critical contribution.
- It was noted that there had been a decline in domestic production of lamb in the United States over the past 20 years which had opened up opportunities, but the joint work of MLA and Australian exporters was needed to take advantage of these opportunities — and this had occurred.
- Exporters were of the view that MLA Washington was continuing to make good decisions to maximise impact under the constraint of limited levy funds — for example, the decision to pull out of NRA show. MLA's policy of not supporting coupon promotions was also endorsed — there was a need for MLA levy funds to capitalise on things outside simple price promotion.
- In terms of improvements going forward the following were noted:
 - Would it be possible for more work to be undertaken supporting Australian packer brands rather than supermarket private labels? It was noted that the Australian origin of the lamb was not typically highlighted in private labels — meaning that a different country of origin could be used by the private label in the future if competitive conditions changed.
 - Furthermore it was noted that currently under a strong private label the buyer tended to play Australian packers off against one another, and even NZ suppliers against Australian suppliers. Workshop participants were not advocating wholesale change in this area — just a change in emphasis, if possible, particularly with new or smaller accounts going forward.
 - Reporting back could be better on upcoming promotions and on the results of past promotions — at times MLA's activities in export markets were 'almost invisible'.
 - Smaller supermarkets that MLA was promoting beef to could also take some lamb — these cross promotional opportunities always needed to be at the forefront of MLA's strategies.
- Impact comments
 - In the view of Workshop participants, notwithstanding the success of MLA's lamb promotions, over the last 5 years MLA's North American activities had added more value to Australian beef sales than Australian lamb sales. Workshop participants noted that past studies for MLA's beef marketing activities had

indicated a Benefit/Cost Ratio (BCR) of about 5:1. Workshop participants expressed the view that for MLA's North American lamb activities this BCR was potentially 'quite generous'.

- MLA's activities in the market are viewed as having a strong residual value — meaning that even if MLA North American activities were to cease there would be a residual impact on sales. In addition if MLA's activities in North America were to cease, Australian processors would pick up more.

European Union

While the European markets are significant, market access remains the most significant constraint in realising opportunities — this is where MLA's activities in Europe needed to focus.

- The European Union remains a high value market on a per tonne basis which reflects both the impact of the quota but also the capacity to pay in some segments.
- Overall, the workshop identified that access is the overall constraint, and until that is solved, there is a limited role for MLA marketing.
- Impact comments
 - Given the access constraints, MLA's sheepmeat marketing activities were viewed by Workshop participants as having a relatively small but positive impact over the last 5 years, with limited residual effect.

Japan

The value of MLA's marketing efforts with lamb in Japan received positive comment from Workshop participants — participants were of the view that lamb marketing funds in Japan were very 'well spent'.

- It was noted that in Japan Australian lamb was able to piggyback on the widespread recognition of Australian beef — and that MLA had done this successfully.
- Due to this success, exporters tended to use the MLA positioning in their own marketing activities. Exporters observed that customers ask for 'True Aussie'.
- Impact comments
 - MLA lamb marketing activities had a greater return than average for Japan — say a BCR of 6:1. Similar comments (although at a much lower MLA expenditure level) could be made for Korea.

China

Workshop participants strongly endorsed MLA's lamb marketing activities in China, noting that MLA investment was warranted because of the potential of this market (even though currently the market is high in terms of volume of sales, it is low in terms of unit value).

It was observed, however, that it was too early to accurately gauge the degree of value adding by MLA marketing activities. Some analogies were drawn to MLA's MENA

marketing investments 10-15 years ago — these investments are now yielding dividends with segments of MENA markets now providing considerable value.

- Suppliers to high end food service and retail customers in China were already obtaining considerable value from MLA's China marketing activities, but current sales into this area are limited compared to hot pot manufacturing product.
- MLA's China activities should be focussed on the trade — with a focus on consistency of message with True Aussie providing an underpinning positioning for processor brands. It was noted that a high proportion of MLA's China expenditure is currently devoted to trades shows and this was considered to be a good use of money.
- Impact comments
 - Workshop participants were of the view that MLA China lamb marketing activities for the last 5 years would have returned about \$4 for every \$1 of MLA expenditure.
 - It was also noted that MLA activities had laid a strong foundation for the future — with positioning of True Aussie and Australian lamb generally. Similar funds needed to be allocated to this market in the future to continue this effort, not an increase in funds.

MENA

It was noted that of total sheepmeat sales to MENA of about \$700 million, over \$400 million was in lamb sales to the Gulf states and this was where the vast proportion of MLA's MENA marketing funds were spent.

- NZ marketing efforts in this region continued to be affected by seasonality of supply of NZ lamb — opening opportunities for Australian product.
- It was further noted that MENA is still a developing market which had benefitted from years of MLA investment — years of effort into promoting 'clean and green' image and the Halal conformity of Australia lamb.
 - MLA was highly regarded in the region. There were problems still to be resolved in the MENA region and the MENA trade and Governments were receptive to messages delivered by MLA.
- Exporters observed that much of the marketing activities in the Gulf were undertaken by their companies, outside MLA, but these activities still benefitted from the generic positioning of Australian lamb undertaken by MLA.
- The value added by MLA was echoed by exporters across the spectrum — by commodity traders as well as those selling into retail and higher end food service.
- The activities of MLA's resident high profile chef, amongst other MLA activities, was particularly commented on as having 'created a lot of value'.
- Longer term activities undertaken by MLA in the region were also positively regarded. For example, it was observed the MLA had recently attended a food fair in Tehran — Australia is currently selling no product to Iran, but this was a potentially important activity in terms of relationship building.
- Impact comments

- The return from MLA marketing activities was described as ‘sensational’ — this view was generally echoed in the workshop. This would indicate a payoff at least comparable to that from the US market from a modest investment.
- It was observed that consistency of MLA messages over the last 5 years and in previous periods had created a lot of goodwill that had translated into preference for Australian product.
- MLA should apply the same consistency of message over extended time periods in other markets — for example, developing markets in the South East Asia/China region.
- MLA’s MENA marketing activities from 2010 to 2015 were viewed as having a strong residual impact — lasting years.

South East Asia

It was observed that MLA services in South East Asia were spread thinly, but the strong push on trade shows in locations such as Singapore and Malaysia was supported.

- Concern was expressed that strategies in this region had undergone some major changes, for example, first largely withdrawing marketing efforts from developed countries in the region, only to return a few years later.
- It was noted that Vietnam and Myanmar were growing well and these may well require greater effort going forward.
- Given the niche nature of opportunities for Australian lamb sales in South East Asia, emphasis on the use of co-marketing funds in markets in South East Asia was regarded as potentially an important strategy going forward (for example, Indonesia).
- Impact comments.
 - A 3:1 BCR was suggested as being applicable to MLA expenditure in South East Asian markets.

14.8 Program benefits for marketing and promotion by region as rated by workshop

Country	Export fob value 2014	MLA investments 2014-15a	Market access constrained?	Timeframe of benefits of investments	Nature of benefits	Ranked payoff per dollar
	\$m	\$m				
North America	706	3.359	No	Short term	Upside	**
China	456	0.884	No	Long term	Upside	**
SE Asia	239	0.403	No	Short term		*
MENA	712	1.377	Yes	Long term	Upside and downside	***
Europe/Russia	201	0.309	Yes	Short term		*
Japan/Korea	152	0.229	No	Long term		***
PNG/Pacific	63		No			
Other countries	75					
Global/other/ICAs		0.509		Short term	Upside	***
Total export	2 604	6.560				**

*** indicates very important or very high down to * which is less important or moderate. Consumer expenditure at retail level.

The workshop compared the MLA marketing performance in the review period to that of an earlier independent assessment and concluded that:

- Impact was different by market and on average above the 5:1 BCR for the prior period, but below that achieved by beef.

Opportunities to improve impact achieved

The workshop identified that:

- MLA has the advantage of promoting beef, sheepmeat and goatmeat — MLA needs to carefully optimise activities to maximise the leverage and returns across all species.
- MLA's generic promotional activities for Australian lamb have been so successful that packers have taken up the same messages in their own brands — these synergies need to continue.
- MLA provides a point of entry and access for the trade. MLA plays a crucial role maintaining relationships with a wide range of players that facilitates the trade continuing to flow and expand.
- In term of MLA's role consistency of approach at a strategic, implementation and personnel level is important.
- Consistency of strategy and messages over an extended period of time was critical and added value. Strong consistency was evident in some markets (for example, the Middle East), but was at lower levels in other markets (for example, South East Asia).

- MLA needs also to amass knowledge of the trade and where product is flowing — both for its own planning purposes and for providing information to the Australian trade. In some markets knowledge is high, but in other markets could be increased.
- Reporting back could be better in all markets on upcoming promotions and on the results of past promotion.

Additional suggestions were provided by MLA in the background paper.

Impact Assessment

14.9 MLA Impact – benefits and investments^a: 2.7 Sheepmeat Export Marketing

	Sheepmeat Export Marketing	
		2.7
Expected benefits		
Red meat industry net income - total ^b	\$m	150
– 2010-11 to 2014-15	\$m	125
– > July 2015	\$m	25
Red meat gross value of production - total ^c	\$m	262
– 2010-11 to 2014-15	\$m	216
– > July 2015	\$m	46
Actual investment^d		
– 2010-11 to 2014-15 inclusive	\$m	44
Benefit cost ratio		
Red meat industry net income – total		3.4
Red meat gross value of production - total		5.9

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Saleyard equivalent GVP excluding processing (basis for levies). ^d Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

14.10 MLA Impact – benefits in terms of red meat net income^a: 2.7 Sheepmeat Export Marketing

	Mitigating Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
2.7 Sheepmeat Export Marketing	6	144	150	3.4
– per cent of impact benefits	4	96	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

14.11 MLA Impact – benefits in terms of GVP^a: 2.7 Sheepmeat Export Marketing

	Mitigating Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
2.7 Sheepmeat Export Marketing	10	252	262	5.9
– per cent of impact benefits	4	96	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

14.12 Estimation of first round benefits 2014-15 – sheepmeat export marketing

Region	Export value 2014-15	MLA expenditure	Suggested BCR for MLA activity	per cent impact on sales	Benefit type		
					Downside	Upside	Decay period
	\$m	\$m		%	%	%	years
North America	706	3.80	5.0	2.7	0	100	0.5
China	456	1.00	4.0	0.9	0	100	0.5
SE Asia	239	0.43	3.0	0.5	0	100	0.5
MENA	712	1.56	8.0	1.8	20	80	2.0
Europe/Russia	201	0.35	1.1	0.2	0	100	0.5
Japan / Korea	152	0.26	6.0	1.0	50	50	2.0
PNG/Pacific/other	138	0.03	2.0	0.0	0	100	0.0
Global/other/ICAs		0.58	5.0		0	100	0.0
Exports	2,604	7.999	5.2	1.6	8	92	1.0

14.13 Budgets for Sheepmeat export marketing

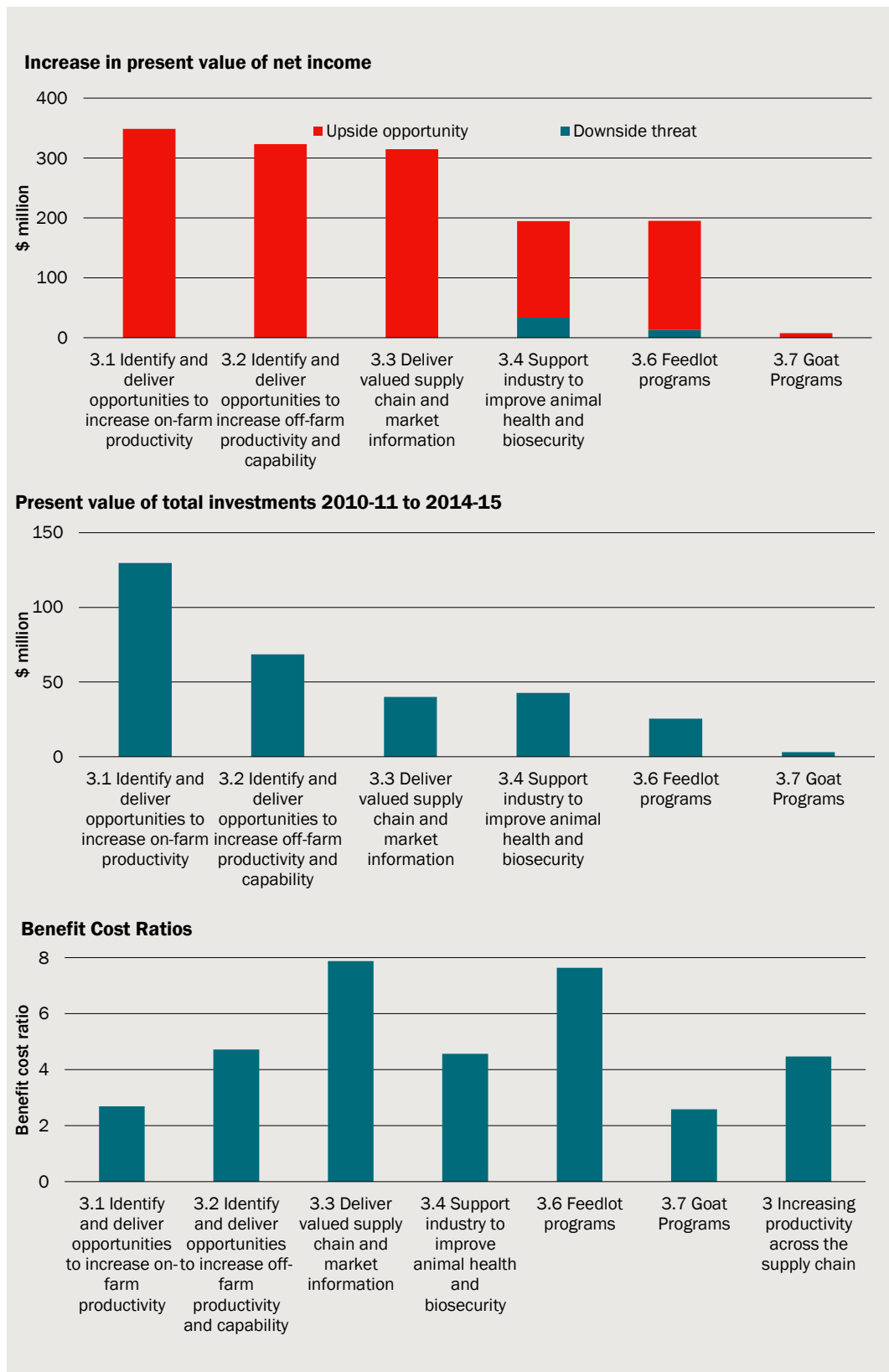
Budgets by Program	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
2.7 Aggressive promotion of sheepmeat in export markets	7,243	6,540	7,322	6,539	7,014	6,795	6,914	7,036	7,156	7,070	35,649	33,979
Ausmeat (allocation to export sheepmeat marketing)	50	44	47	41	47	45	47	46	48	46	240	223
MLA Donor Company projects	0	0	0	0	0	0	0	0	0	0	0	0
Overheads (Corporate Services / Communications)	902	872	882	840	771	722	775	802	807	883	4,137	4,119
TOTAL	8,195	7,456	8,251	7,421	7,833	7,562	7,736	7,884	8,011	7,999	40,026	38,321

15 #3 Increasing productivity

Top Line result – MLA expenditure on Increasing Productivity programs provide industry returns of \$1 385m from expenditure of \$310 million with a BCR of 4.5:1.

Chart 15.1 and Tables 15.2, 15.3 and 15.4 provide a summary of the payoffs from investment in Increasing Productivity programs. Supporting details behind the impact for each individual program are provided in following sections.

15.1 Summary of MLA benefits, investments and returns^a— 3 Increasing productivity



15.2 MLA Impact – benefits and investments^a: 3. Increasing productivity across the supply chain

		Identify and deliver opportunities to increase on-farm productivity	Identify and deliver opportunities to increase off-farm productivity and capability	Deliver valued supply chain and market information	Support industry to improve animal health and biosecurity	Feedlot programs	Goat Programs	Increasing productivity along the supply chain Total
		3.1	3.2	3.3	3.4	3.6	3.7	3
Expected benefits								
Red meat industry net income - total ^b	\$m	349	323	315	195	195	8	1 385
– 2010-11 to 2014-15	\$m	19	114	300	11	81	5	529
– > July 2015	\$m	330	209	15	184	114	3	856
Red meat gross value of production- total ^c	\$m	458	329	274	89	516	20	1 686
– 2010-11 to 2014-15	\$m	31	124	261	17	189	12	633
– > July 2015	\$m	427	205	13	72	327	8	1 053
Actual investment^d								
– 2010-11 to 2014-15 inclusive	\$m	130	69	40	43	26	3	310
Benefit cost ratio								
Red meat industry net income - total		2.7	4.7	7.9	4.6	7.6	2.6	4.5
Red meat gross value of production - total		3.5	4.8	6.9	2.1	20.2	6.7	5.4

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Saleyard equivalent GVP excluding processing (basis for levies). ^d Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent

15.3 MLA Impact v benefits in terms of red meat net income^a: 3. Increasing productivity across the supply chain

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
3.1 Identify and deliver opportunities to increase on-farm productivity	0	349	349	2.7
3.2 Identify and deliver opportunities to increase off-farm productivity	0	323	323	4.7
3.3 Deliver valued supply chain and market information	0	315	315	7.9
3.4 Support industry to improve animal health and biosecurity	34	161	195	4.6
3.5 Producer engagement	(included in programs 3.1 and 3.4)			
(3.6) Feedlot programs	13	182	195	7.6
(3.7) Goat Programs	0	8	8	2.6
Total - 3 Increasing productivity across the supply chain	47	1 338	1 385	4.5
– % of impact benefits	3	97	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent

15.4 MLA Impact – benefits in terms of GVP^a: 3. Increasing productivity across the supply chain

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
3.1 Identify and deliver opportunities to increase on-farm productivity	0	458	458	3.5
3.2 Identify and deliver opportunities to increase off-farm productivity	0	329	329	4.8
3.3 Deliver valued supply chain and market information	0	274	274	6.9
3.4 Support industry to improve animal health and biosecurity	62	27	89	2.1
3.5 Producer engagement	(included in programs 3.1 and 3.4)			
(3.6) Feedlot programs	19	497	516	20.2
(3.7) Goat Programs	0	20	20	6.7
Total - 3 Increasing productivity across the supply chain	81	1 605	1 686	5.4
– % of impact benefits	5	95	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

Key Points

Impact

MLA expenditure on Increasing Productivity programs provide industry returns of \$1 385m from expenditure of \$310m with a BCR of 4.5:1. Some 38 per cent of the benefit accrued during the assessment period with 62 per cent to be captured in future years.

Of the component programs in the portfolio on-farm productivity delivered 25 per cent of the benefits followed by off-farm productivity (23%) and market information (23%).

In terms of return on investment, market information delivered the highest BCR of 7.9:1, followed by the Feedlot program (7.6:1) and off-farm productivity (4.7:1).

Observations from commercial / technical workshops

- *On-farm productivity* — a large and diverse aggregation of R&D projects targeting on-farm innovation and adoption in both northern and southern Australia was evaluated. It was concluded that, due to the long-term nature of the investments, minimal benefits were claimed for on-farm R&D over the period 2010-11 to 2014-15.
 - Benefits from R&D outputs developed during the evaluation period were more likely to flow after 2015. Project outputs relevant to southern livestock systems were identified as having a higher probability of impact than those for northern beef systems.
 - In terms of producer engagement, there were demonstrated successes that provided significant economic benefits over the review period and these benefits are likely to persist beyond 2015. Virtually all of the impact identified was in southern livestock systems while adoption in northern beef remained problematic.
- *Off-farm productivity* — overall, there was support for investments made under the program over the evaluation period.
 - Successful investments have provided a significant payoff for the wider industry, particularly from innovations in processing plants leading to improvements in meat yield, with secondary benefits from savings in labour and WHS costs.
 - Significant triple bottom line benefits were also generated by the program through the investment in BLADESTOP.
 - The performance of the program had improved significantly compared to the previous planning period with the shift of investment out of the general levy program into joint investments with individual enterprises through the MDC.
- *Market information* — the availability and quality of MLA market information had improved in the evaluation period (compared to previous years) and greater use was now being made of this information, both within and outside the industry.
 - In addition, some southern production systems benefits from LDL had commenced prior to the public launch of LDL and the program is likely to give rise to large future benefits, but only if MLA continues to invest in this area.
 - MLA's research work on policy issues during the evaluation period had provided value to the industry — often in the form of averting or minimising downside risk -

and it was noted that the Beef Language Review is vital for the future of the Australian industry.

- *Animal health and biosecurity* — investments in R&D to address a wide range of disease issues and plant toxins that either currently impact, or could in future impact, negatively on the health and productivity of grazing ruminants in Australia were undertaken and strongly supported. Increasing producer understanding and confidence is important in much of this portfolio's R&D as individual herd/flock impacts can be financially devastating even when the specific disease does not have a large national impact.
 - MDC investments, often involving Animal Health Australia, have been important to encourage industry investment in topics which are largely defensive in terms of potential industry benefit (for example, minimising the risk or extent of FMD, bluetongue and Johne's Disease) and in encouraging commercial investment in innovative approaches to existing constraints which might otherwise be neglected due to relatively small market size (for example, BarberVax vaccine).
- *Feedlots* — it was determined that investments by MLA made a significant contribution to feedlot total factor productivity with impact within the review period and future benefits also likely to arise. Contributions made to productivity, heat stress management and Bovine Respiratory Disease were highlighted.
- *Goat industry* — MLA investments, across goat-related R&D, make a contribution to addressing supply-side constraints such as attracting producers into the sector and providing tools and information for producers to make more informed decisions.

Impact team recommendations

- Improve the standard of ex-ante analyses by educating all relevant 'on-farm' Managers in the use of the AWIMLA economic model developed by RMCg, and ensure internal peer review of assumptions including expertise, external where necessary, on likely marginal benefit and extent of adoption in the target markets and the counterfactual assumptions.
- Use independent external expertise to update ex-ante analyses with most recent industry and research project information prior to future MLA impact assessment workshops, and focus the workshop participants on discussing the updated key assumptions.
- Continue and build on the strong approach to monitoring and evaluation taken in assessing benefits in Majority Market programs.
- Expand efforts to move from relying on self-assessed practice change to quantifying not only level but extent of adoption.
- Invest in commercial validation trials and/or commercial case studies with early adopters to develop compelling business propositions for producers who might consider adopting each of the various innovations promoted by MLA, and include more prominently in adoption communications packages.
- Review the development and use of \$ index values for the future estimation of return on R&D investment in livestock genetics programs.

- Their use for R&D evaluation would be considerably enhanced and greatly simplified by using independent technical expertise to:
 - establish rules for the creation and updating of the underlying assumptions of input assumptions on future input costs and product prices, discount rates, frequency of updates and the transparency of this information, particularly for beef indexes, with standardisation across breed societies
 - certify all updates and make the underlying assumptions available to industry in easy-to-understand extension material
 - develop recommendations on the most appropriate methodology to calculate both weighted average \$ index industry values to account for changes in breed composition and trait addition over time, and annual \$ increment values using these \$index values to best reflect future industry value added; and
 - develop recommendations on the most appropriate methodology to account for incomplete records in the two years prior to any impact assessment, and to estimate counterfactual scenarios, taking account of changes to both seedstock enrolments and industry breeding females over time, so that future impact estimates more accurately reflect the incremental genetic value added in any time period and the distribution of that value in future years.

16 3.1 Increasing Productivity On-farm (including 3.5 producer engagement)

Top Line result – MLA expenditure on the On-farm Productivity program provide industry returns of \$349 million, from expenditure of \$130 million with a BCR of 2.7:1

Tables 16.12, 16.13 and 16.14 provide a summary of the payoffs from investment in the On-farm Productivity program.

16.1 MLA Impact v benefits and investments^a: 3.1 On-farm productivity (incl 3.5)

		Identify and deliver opportunities to increase on-farm productivity
		3.1
Expected benefits		
Red meat industry net income - total ^b	\$m	349
– 2010-11 to 2014-15	\$m	19
– > July 2015	\$m	330
Actual investment^c		
– 2010-11 to 2014-15 inclusive	\$m	130
Benefit cost ratio		
Red meat industry net income - total		2.7

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

Summary

This section reviews MLA's On-farm Productivity R&D (3.1) and Producer Engagement (3.5) portfolios.

This workshop evaluated a large and diverse aggregation of projects targeting on-farm innovation and adoption in both northern and southern Australia. The conclusion was that minimal benefits were claimed from on-farm R&D over the period 2010-11 to 2014-15 with benefits from R&D outputs developed during the evaluation period more likely to flow after 2015. Project outputs relevant to southern livestock systems were identified as having a higher probability of impact than those for northern beef systems.

In terms of producer engagement, the workshop concluded that there have been demonstrated successes that indicated impact and economic benefits over the period 2010-11 to 2014-15. In addition, these benefits are likely to persist beyond 2015 and then

decay without further MLA funding. Virtually all of the impact identified was in southern livestock systems while adoption in northern beef remained problematic, even with high levels of corporate involvement in the industry.

In the majority of cases examined by the workshop, adoption of R&D outputs remained a significant challenge. Looking forward, there should be greater focus on the impacts of R&D in terms of how to increase adoption of outputs and measure ongoing improvement through monitoring and evaluation.

The impact of investment in the livestock genetics improvement portfolio was evaluated separately using the weighted average \$index values for beef and sheep breed groups as calculated within the BREEDPLAN and Sheep Genetics national evaluation programs respectively to estimate future industry benefit for changes recorded during the evaluation period. This methodology has the advantage of using an existing value estimation system used routinely by the breeding sector to rank and value seedstock based on a whole of industry value approach, but could be substantively improved in terms of transparency and consistency of \$index estimation, particularly for beef, to simplify and increase the robustness in future impact evaluations.

Program impact was measured at \$349 million (net industry income) with a BCR of 2.7:1. Some 5 per cent of the benefit accrued during the assessment period with 95 per cent to be captured in coming years.

Objectives from MLA 5 year business plan

Increasing Productivity — On-farm

- 1. Enhance rates of genetic improvement in feedbase performance
 - i) Accelerate both discovery and delivery of new breeding methods to improve pasture and forage crop productivity, quality and persistence
- 2. Optimise productivity in grazing and feedlot systems
 - i) Develop new technologies and management programs to increase growth, feed efficiency, grazing performance, reproduction and reduce mortality rates in grazing and feedlot systems
 - ii) Develop new cultivars and/or agronomic practices to improve persistence and/or quality attributes of forage plants
- 3. Develop and implement information, resource and precision livestock management technologies
 - i) Evaluate, develop and implement technologies, tools and strategies to increase labour efficiency and reduce cost of production
 - ii) Increase producer capacity to make management decisions from more precise information leading to improved market compliance
- 4. Utilise producer participatory R&D to maximise rate and effectiveness of development and evaluation of new technologies.
 - i) Develop, demonstrate and evaluate technologies, tools and management strategies in conjunction with producers and key intermediaries

For this review, investments on feedlot performance and goat productivity are covered in specific chapters. The animal genetics portfolio review is included at the end of this chapter.

Producer Engagement

- 1. To inform producers of the opportunities derived from their R&D levy investment.
 - KPI: At least 50% of commercial producers engage with MLA through communication tools and programs and an increase in satisfaction with MLA communications activities from 3.4 to 3.5 out of 5.
- 2. To influence the development of producers' knowledge and skills that will improve business performance.
 - KPI: At least 50% of those commercial producers actively engaged in MLA extension programs, improve their knowledge, skills and/or have capacity to change practice as a result of their engagement.
- 3. To involve producers in partnerships that benefit their region
 - KPI: Facilitate the involvement of innovative producers and delivery partners to enhance producer engagement with MLA programs and activities.

MLA Summary of On-farm Productivity Program Outputs and Outcomes

A large number of projects were undertaken in the evaluation period, addressing a very wide range of issues and opportunities impacting on the productivity of grazing ruminants in Australia. The following research areas were highlighted as the topics of greatest importance during the evaluation period, with many requiring ongoing investment to deliver industry benefit.

1. Enhance rates of genetic improvement in feedbase performance

i) Accelerate both discovery and delivery of new breeding methods to improve pasture and forage crop productivity, quality and persistence.

The Feedbase Investment Plan (FIP) applied new genomics technologies to plant breeding with several projects aimed at identifying new DNA markers and tools to rapidly improve the productivity, adaptability and pest and disease resistance of some of Australia's most common pasture and legume species (phalaris, annual legumes and medics).

- An example outcome is that for pre-breeding of subterranean clover, the number of generations that can be produced in one year could be improved from one to between three and five such that the breeding times of some species may be accelerated by up to four years.
- The project has also defined the genome of subterranean clover.

- No economic impact is claimed for the 2010-2015 period. However, ex-ante analyses completed for these activities indicate a NPV of \$6.7 million, IRR of 4.4 per cent, BCR of 3.4.

Acid-tolerant lucerne varieties plus adapted rhizobia show promise to increase productivity by up to 18 per cent measured across core experimental sites. A current MDC project is working to develop the most promising lines and an acid-tolerant companion rhizobium inoculant for commercial release.

Buffel grass is the most widely sown grass of southern and central Queensland, but has inherently modest levels of digestibility. Selection of mutagenised plants has attempted to identify the Brown Mid Rib (BMR) phenotype, with higher digestibility. While no plants exhibited the desired phenotype, significant variation for leafiness, tiller number and vigour have been found making this population a valuable source for future breeding.

2. Optimise productivity in grazing systems

i) Develop new technologies and management programs to increase growth, feed efficiency, grazing performance, reproduction and reduce mortality rates in grazing systems

A suite of projects have been completed during the 2010-2015 period aimed at increasing the reproductive rate of sheep by 10 per cent, as part of the National Reproduction RD&E Strategy.

- Focus has been on conception & early embryo mortality, ewe and lamb survival, early reproductive success and weaner performance, including genetic and biological mechanisms underpinning reproduction.
- 15-20 per cent of specialist prime producers are now estimated to be mating some ewe lambs as a result of a better understanding of the drivers and economics of successful ewe lamb mating.
- In addition, MLA was a major investor in the Sheep CRC 's Program 1 'Sheep and their management' for which a 2014 national survey of 1 000 producers provided an estimate of 6 000 producers participating in the CRC's workshop and training programs to improve ewe management. The CRC Impact Tracker evaluation estimated the benefit of these initiatives to be around \$74 million each year by 2014.

Another suite of projects has examined economics, supplementary feeding, reproduction, and cow and calf mortality in northern beef herds including some R&D conducted in completion of the Beef CRC III program.

- The Beef CRC (2012) estimated the net present value through to 2020 of improved weaning rates in commercial northern herds from genetic and management tools to be \$20.3 million
- Additional research across northern Australia through the Breeder Mortality and Cash Cow projects has established regional benchmarks and approaches to reduce breeder mortality by 25 per cent (worth approximately \$50 million per annum based on ex-ante analysis) and improve reproductive performance that would deliver

improvements in weaning rates equivalent to an 11 per cent increase in liveweight / animal equivalent for each beast (or \$4.39/AE).

- The Breeder Mortality and Cash Cow projects have been completed but will have minimal impact in 2010-15. Findings from these projects have been extended widely to both corporate and family operated properties in the extensive areas of northern Australia.

Research on improving the use and benefits associated with phosphorus (P) supplementation in grazing systems has continued during 2010-15.

- Sales of P supplements and an abundance of anecdotal evidence suggest that only a low proportion of P-deficient cattle in northern Australia are being fed P supplements in an effective manner.
- Research on P supplementation is developing an improved diagnostic test of P status and ways to increase the attractiveness of P supplements. Management strategies which are dependent on deposition and mobilisation of P can now be recommended.
- A supplementary feeding calculator for northern herds was developed and released, but no economic impact is claimed for the evaluation period.

The effects of variable long distance transport duration on the welfare and subsequent meat eating quality indicators for beef cattle demonstrated that transport of up to 36 hours prior to slaughter can deliver animals compliant with MSA protocols.

- MSA protocols were revised in 2014 to support an additional 12 hours of transport duration, with an extra 100 000 head of cattle eligible to enter the MSA system. Minimal impact of this revision is expected for the 2010-2015 period.
- Future impacts are expected to be significant, with ex ante analysis assuming a 50 per cent uptake over 5 years, a compliance rate of 80 per cent and conservative MSA premium of 10c/kg carcass weight for a 300kg carcass would deliver an NPV of \$10.3m and BCR of 34:1.

A long-term investment in EverGraze concluded during the evaluation period, a nationally-coordinated, multi-organisational RD&E program that designed and evaluated production systems based on perennial pastures in the high rainfall zone of southern Australia that could be demonstrated to increase profit by 50 per cent while at the same time reducing regional natural resource impacts including ground water recharge and soil loss by water and wind.

- Work on zonal management of pastures for more efficient resource use and remote digital collection of pasture and livestock performance to inform grazing and other management optimisation is still underway but confirms assumptions made within ex ante analyses.
- The Future Farm Industries (FFI) CRC reported total benefits from EverGraze at greater than \$300m. For example, as a result of EverGraze, 200 000 ha new pasture was sown with an average increase in gross margin per ha of \$300, rotational grazing was implemented on greater than 300,000 hectares (valued at least \$60 per hectare), increasing lucerne from 20-40 per cent of the farm reduced supplementary feeding by \$100/hectare, and improved soil nutrient management on greater than 600,000 hectares, through improved targeting of fertiliser use. An ex-post evaluation

conducted by AgTrans in 2012 estimated a NPV of \$129 million over 20 years, a BCR of 5.4 to 1 and an IRR of 27 per cent.

In the low to medium rainfall zones of southern Australia, the Enrich project progressed a whole farm approach using native shrubs with native and other grasses.

- In study areas, land has been transformed from degraded magnesium soils with saline problems to being completely covered with vegetation.
- The project identified multiple species with favourable attributes for grazing systems across a range of soil types and environments, developed a detailed information package, and commercialised 1 saltbush line.
- MIDAS whole farm modelling indicated that, for a farm with a higher proportion of poor soils, the average expected improvement in profit was 24 per cent for an optimal 10 per cent of farm with shrubs.

ii) Develop new cultivars and/or agronomic practices to improve persistence and/or quality attributes of forage plants

- Outcomes have included 3 improved Panicum, 2 cocksfoot and 1 tall fescue pasture lines, the old man salt bush line, and a psyllid resistant leucaena.
- Pre-commercial evaluation of Tedera show that this new southern legume remains green all year, most importantly from summer to early winter in Mediterranean-like regions with low annual rainfall (300 mm) to high annual rainfall (more than 800 mm). Whole-farm bio-economic modelling analysis indicated that Tedera offers the potential to significantly increase farm profit associated with savings in supplementary feeding, higher stocking rate and reduction in labour. Seednet is the commercial partner and seed increase is underway with likely release in 2-4 years.
- Selection, preliminary seed grow out and commercialisation of the new psyllid-resistant leucaena variety 'Redlands' have been completed, with commercial quantities of seed expected by 2018. Extension activities have contributed to a 50 per cent increase in the area established to leucaena-based pasture since 2010, now estimated to be over 250 000 ha, yielding about 50 000t of liveweight gain annually and valued at \$100 million. The new 'Redlands' variety is expected to increase the area available to leucaena based beef production by approximately 1.5 million hectares. Establishment of leucaena within 30 per cent of this available area within 10 years would increase liveweight gain by a further 10 000 t annually, valued at \$30 million.

Buffel grass is the most widely established sown species in Queensland (more than 75% of plantings) and has been estimated to be 'dominant' on 5.8 million hectares and 'common' on a further 25.9 million hectares.

- Guidelines for improved production from rundown buffel grass by introducing legumes have been produced. Raising awareness has occurred during the research phase with producer trials and extension actions now underway.
- Ex ante analyses indicate that more effective use of pasture legumes will result in an industry NPV benefit over 25 years of \$191 million, an IRR of 16 per cent, BCR of 2.2.

Research into more effective, efficient and economic use of phosphorus for pasture production in southern pastures has demonstrated approaches through which highly productive temperate pastures can be maintained with up to 30% per cent less P-fertiliser through fertilising to 'critical P level' and use of P efficient species.

- Savings will be about \$15 per hectare as a result of reduced fertiliser requirements; probably about \$1 to \$1.50 per DSE, depending on stocking rate.
- Additional environmental outcomes are expected from this research including more effective application of nutrients at lower rates with reduced risk off-farm environmental pollution (for example, P in waterways causing algal blooms).

Projects totalling \$1.7 million have investigated opportunities to improve pasture agronomy and management in southern production systems. These projects have delivered

- options for increased pasture yield, improved persistence, consistent legume and companion species performance. Information for producers and advisors on temperate and tropical legumes and grasses, including establishment, companion species and hydrologic response has been disseminated.
- New hard-seeded annual legume solutions in the cereal zone with cost savings from reduced purchase of N-based fertilisers, supplementary feeding and annual re-sowing of pastures. Ex ante analyses indicate NPV of \$75 million and BCR of 2.60, with completed research already delivering low cost, low risk establishment (less than \$100 per hectare) across a range of regions x species and regenerating as on-demand break options in the rotations compared to traditional pastures costing more than \$200 per hectare and requiring resowing after each crop phase. Current impact from new sowing is estimated at 120 000 ha sown per year (600 000 ha by 2020). Estimates of benefits include N-fertiliser, labour and application savings of \$30 million; crop/fallow weed control savings of \$18 million; no pasture resowing after crop phase \$15 million; increase in livestock production — weight gain equivalent to \$15 million; increase in livestock production — fertility/offspring survival of \$5M and savings in supplementary feeding \$6 million.
- Since 2011, these projects have engaged around 2,600 end and next users through approximately 74 extension activities.
- Since 2000, more than 400,000 ha of tropical grasses have been sown in northern NSW and adoption continues to increase, while in Western Australia more than 60 000 ha has been sown. It is estimated that the area of sub-tropical perennial grasses will continue to increase by approximately 7 500 ha each year. Based on the 2012 producer survey of 50 farm businesses, 78 per cent of those with some perennials (less than 200 hectares) were planning to expand their area over the next two to three years.
- The Pasture Variety Trial Network (PVTN) was a \$1.5 million investment in a multi-site program through which new pasture varieties are trialled and objectively evaluated, providing key production data to assist informed decisions with pasture variety selection. The PVTN aims to assist selection decision, encourage uptake of improved varieties and capture the benefit from superior plant genetics across

southern Australia. A subsequent project has now commenced with seed company investment via the MLA Donor Company, to expand the number of evaluation sites.

- When completed in 2015 Australian meat producers will have access to evaluated new pasture varieties that can increase productivity and profitability by 10 per cent (as estimated by an expert group of producers)
- Independent evaluation by AgEcon Plus suggests benefits modelled as improvements in profitability, and adoption are limited to the 20 per cent of producers (southern beef and sheep) who manage approximately 40 per cent of grazed areas. A conservative analysis estimates NPV, IRR and BCR for investment in pasture species evaluation are \$3.0 million, 4.7 per cent and 3:1, respectively.

3. Develop and implement information, resource and precision livestock management technologies

i) Evaluate, develop and implement technologies, tools and strategies to increase labour efficiency and reduce cost of production

The evaluation of benefits, costs and labour-saving opportunities of using five precision livestock management technologies in northern Australian beef herds concluded that they are currently not suitable for broad-scale commercial use and no impact from this research will be claimed.

Other research on Real Time Pasture Biomass measurement is currently evaluating the potential for automated optical sensors to measure pasture biomass across beef and sheep properties in the temperate highland, temperate slopes and plains, and wet temperate zones of NSW, Victoria, Tasmania and WA. A series of regional, seasonal and species specific calibrations and a self-calibration process is being developed that will enable producers to generate their own location specific calibrations. This will enable improved pasture management leading to liveweight increases estimated at 12 per cent in sheep and 7.5 per cent in cattle.

Investments through the Sheep CRC and other research in this area aimed at improving labour efficiency and reducing cost of production. The development of breeding values for selecting sheep with improved resistance to fly strike and internal parasites were key outputs - these benefits are captured in the genetics evaluation. Work applicable to both beef and sheep targeting labour efficiency has produced a calculator to enable consultants and producers to estimate relative value of investment into labour saving infrastructure and a standardised method of defining and valuing labour efficiency benchmarks endorsed by key industry consultants. Twelve case studies with economic analyses of the benefits for a range of labour saving options in beef and sheep businesses were also developed. Strategic investments included research to discover the genomic regions that are important to underpin future genetic selection of working dogs (Kelpie). No impact of this research will be claimed.

ii) Increase producer capacity to make management decisions from more precise information leading to improved market compliance

Research has estimated that 28 per cent of short-fed feedlot cattle missed carcass weight (HSCW) specifications resulting in lost returns of \$5.50 per head and 16 per cent missed P8 fat specifications reducing returns by \$17.70 per head, with non-compliance of pasture fed cattle varying from 15 to 88 per cent for HSCW and 0.7 to 58 per cent for P8 fat.

A major output of this work has been a greatly improved version of the BeefSpecs management tool including potential prediction of eating quality attributes (prediction of carcass yield, MSA marble score, MSA ossification, and MSA carcass index) and capability to assess the costs and benefits of changing livestock management for improved compliance. Benefits of this R&D are likely to be significant and have been considered in the MSA analysis.

4. Utilise producer participatory R&D to maximise rate and effectiveness of development and evaluation of new technologies

i) Develop, demonstrate and evaluate technologies, tools and management strategies in conjunction with producers and key intermediaries

The target audiences from feedbase plan investments are ‘lead producers’ — those who are seeking information and want to make a change to their grazing and livestock business. Participatory research processes, engaging lead producers closely with the research process are a feature of this plan. Producer input in the research phase has been to assist design, implementation and interpretation of the science. ‘Implementation’ with producers explores local relevant ‘treatments’ of the main science project as well as assisting with collection and validation of data. ‘Interpretation’ (near the project’s end), addresses topics not covered by the research and could include comment on labour efficiency, workload, fit with other enterprises and capitalisation. This input ensures research presents a ‘complete message’ and is portable to the many contexts of livestock production across southern Australia. The Pasture Updates initiative across southern Australia is a subsequent key step in broader dissemination of research underway and its output.

- An estimated 180 producers are actively involved in feedbase research via 25 Producer Research Sites projects across southern Australia. This program has been running for 2 years (2014-2015) with a forward target of 300 producers engaged during the coming years. Similar processes were undertaken in the EverGraze project establishing a network of regional producers around each of the 6 core research sites to interact with the science and program implementation.
- Within the Enrich program a significant strategy to achieve similar practice change has facilitated producer groups (for example, Landcare, farming systems groups or NRM organisations) in the application of new grants for forage shrub planting and demonstrations. At least 13 groups over four states have applied for their own funding to establish forage shrub plantings.

Workshop evaluation of performance / industry impact

The MLA presentation outlined their overall strategy: to create new knowledge, tools and technologies that identify opportunities for producers to become more productive and efficient through:

- enhanced rates of genetic improvement of the feedbase (livestock genetics will be covered in a separate evaluation)
- optimising productivity in grazing (feedlot productivity will be covered in a separate evaluation)
- developing and implementing information, resource and management technologies
- utilising participatory R&D to increase technology adoption.

The workshop had considerable difficulty in considering the marginal enterprise-level and industry level-benefits when aggregated across many different programs/projects, particularly where the industry impact was common, for example, increased sheep reproduction or reduce cow mortality. In general, the MLA staff estimates of benefits largely relied on original, and often outdated, ex-ante benefit/cost analyses, in which both marginal benefits and adoption levels and rates were considered overly optimistic, when compared with the views of workshop participants, particularly those familiar with the northern industry.

Given 1) the large number of projects funded in the evaluation period and the overlapping outputs of many of these (in terms of targeting the same producers and contributing to the same industry benefit), and 2) many projects require further MLA funding to deliver an outcome, a number of broad themes were identified to facilitate discussion of the workshop. These themes and the main project areas most likely to produce benefits with no further MLA investment are shown in the table below. These areas accounted for \$15.4 million out of \$20 million in investments made in 2014-15 (table 2.8).

16.2 Projects/cluster areas of greatest impact identified by MLA

Theme/Project cluster	Investment in 2014-15
	\$m
Southern feedbase	
Enhanced rates of genetic gain	4.3
New pasture and forage species	1.2
Agronomy and Pasture Management	1.9
Northern feedbase	
Buffel pre-breeding and rundown	2.0
Psyllid resistant leucaena	0.25
Sheep mortality and reproduction	
Ewe and lamb survival including reproduction	3.0
Beef mortality and reproduction	

Theme/Project cluster	Investment in 2014-15
	\$m
Breeder mortality and phosphorus supplementation	1.8
Calf loss: Cash Cow + Econ and Beef CRC	0.9
Others	
BeefSpecs on-farm calculator	0.34
Long-distance transport (captured in the on-farm animal health and welfare workshop)	0.15
Total	15.4

The MLA background paper and presentation also provided an assessment of payoffs in terms of benefit cost ratios (BCRs), almost entirely dependent on internal ex-ante BCAs. The input assumptions provided a focus for the workshop discussion of areas of greatest likely benefit, which are summarised below.

Acid tolerant lucerne

The development of lucerne that is more tolerant to low pH and high aluminium levels has the potential to increase dry matter yield by up to 18 per cent across a large part of southern grazing systems, relative to less tolerant varieties.

MLA has supported SARDI's national lucerne breeding program for over 20 years, most recently by reinvesting royalties earned on seed sales back into the program. In 1992, SARDI entered an alliance with Heritage Seeds that has produced a series of new lucerne varieties for different conditions. A current focus is an acid-tolerant lucerne and companion rhizobium strain, with funding support from the MLA Donor Company (2013-2016).

Therefore, no benefits are likely going forward without additional investment. A number of points were made about the rationale and potential benefits of the program.

- It was stated that while there was little or no market failure internationally for varieties that span countries (ryegrass and lucerne), with a number of commercial players in the area, there is little commercial investment in species specific to Australian conditions (for example, dryland grazing lucernes for acid soils).
- It was questioned if the answer to the rundown of the southern feedbase was new varieties, rather than more fertiliser or better management of existing varieties. The Feedbase Strategic Plan is an investment of \$22.9 million of which improving varieties is just one component.
- Whilst MLA had identified a potential market for an acid-tolerant lucerne of around 1m ha, the Workshop suggested only 1 to 3 per cent would be re-sown each year.
- The 500 kilograms of beef production benefit was questioned, noting that the average beef producer in Southern Australia produces approximately 30 kilograms of beef per hectare per 100 mm of available annual rainfall, that is, with 600mm of annual rainfall, the average level of beef production is 180 kilograms per hectare from improved pastures.

- It was agreed the seed cost of new varieties was likely to be 100 per cent greater than existing pasture like-for-like, but the establishment costs would likely be the same.

The workshop also agreed that there would be no benefits from the pre breeding work from new genomic tools for selecting new pasture varieties without further investment.

Estimation of economic impact

Not evaluated. MDC-funded R&D continues to at least 2016 and further D&E investment needed to quantify productivity and persistence under commercial grazing conditions and ROI for adopters. This will be evaluated in the next impact review 2015-2020.

EverGraze

EverGraze was a partnership between Australian Wool Innovation (AWI), MLA, and (then) Future Farm Industries CRC (FFI CRC). It focused on perennial pasture farming systems in different environments across the high rainfall zone (HRZ) of southern Australia by 'stacking various technologies' to improve grazing profitability in a 'systems' approach to best utilise different soil types and slopes on farms.

The benefits identified by the MLA presentation were based on an evaluation by Agrtrans Research in September 2012 (MLA project B.GSM.0002). The Workshop discussed the following issues and assumptions:

- the research phase ran from 2004 to 2012. Additional benefits occurred during 2010-15, but the question was one of attribution to this period, and also distinguishing these benefits from practice change benefits claimed for the Majority Market adoption programs More Beef from Pastures and Making More from Sheep (see separate review of Program 3.5 below).
- during the evaluation period, there was a large delivery component. Phase VI (2011-2014) was an adoption phase including packaging of national research outcomes to make them more accessible and regionally relevant. It included development and delivery of training for service providers and producers, finalisation of native pasture sites, and modelling to improve understanding of the potential impact of decisions within the farming systems designed on the Proof Sites. Sixty per cent of total benefit proportion was claimed for this period, compared to the earlier R&D phase.
- In the ex-ante report, the net increase in profit per hectare assumed was \$50. This estimate should be raised as livestock prices have gone up since that report was completed in 2012.
- Observations were made that, anecdotally, fertiliser use is falling in response to falling terms of trade, but it was noted that promotion of increased fertiliser use was not a major focus of Evergraze.
- It was agreed that the 20 per cent of producers in the HRZ who are regarded as 'active information seekers' is the realistic 'target market,' and that the average increase in net farm profit (ex-post analysis) of \$50 per hectare is applicable to 200 000 hectares or benefits of \$10 million.

- It was pointed out that the Agtrans report was 2012 (3 100 producers had adopted), but subsequent investments were made to 2014 (\$1.6 million in investment). Around 30 per cent of the HRZ farm area is improved pastures or sown perennials, but the EverGraze program also developed and promoted improvements to native pasture systems.
- Subsequent analysis showed that in 2014, ABARES estimated 20 256 farms in the HRZ. Twenty per cent adoption suggests an increase of about 1 500 producers in the period 2010-2015. The Workshop agreed that adoption will probably achieve a maximum of 30 per cent without any further investment (that is, 6 000 farms) by 2030, with new entrants during this period replacing existing adopters who may cease the practices or leave the industry. The assumption that adoption could reach 75 per cent was found to be implausible without further investment in extension.
- MLA contribution (funding percentage as reported by MLA) = 14 per cent. MLA attribution (the percentage of benefits to be directed to MLA = 100 per cent (because MLA initiated and was a major funder).

Estimation of economic impact:

Impact evaluated in conjunction with Majority Market programs that occurred concurrently — see below.

Enrich Program — shrub / pasture systems for low-medium rainfall zones

Enrich was a large multi-organisational program with high profile, run as part of the Future Farm Industries CRC (2007-2014), evaluating new farming systems incorporating perennial fodder shrubs to give both productivity and environmental benefits in the rehabilitation of degraded soils and saline country.

Ex-post potential impacts were estimated using MIDAS whole farm modelling: 24 per cent increase in profitability/hectare for an optimal 10 per cent of a farm planted to perennial fodder shrubs, generated through 20 per cent increase in sheep carrying capacity, 5 per cent increase in wool cut, and 60 per cent lower costs in supplementary feeding.

There are already commercialised lines of salt bush available in the market, but this program also examined alternative fodder species (over 87 species evaluated) and system optimisation. The target market for this new farming system are farmers in the rangelands and more marginal areas of the wheat-sheep zone such as the Mallee.

- The workshop identified that this estimate of benefit per hectare may be over-estimated as the farming system is more complex, not all adopters will plant the optimal combination and there will be a long time lag to full benefit (that is, 12 per cent profit improvement is more realistic).
- It was noted that the realised benefits are less than the potential at the moment, as it will take at 3-5 years after establishment to attain an initial productivity benefit — therefore no benefit was claimed for the 2010-15 period.

- To date, 583 producers have adopted some aspects and/or purchased forage shrub species. It was noted that farming profitability is low in this marginal cropping country, but MLA indicated some take up in less 'marginal' areas. Again it was suggested that 20 per cent of the target market will be receptive to the new system, given the high profile of salinity problems and increasing interest in bringing sheep back into mixed farming systems to improve resilience as an adaptation to climate change.
- MLA contribution
 - MLA funding in the total investment= 14 per cent.
 - MLA attribution = 100 per cent (part of FFI CRC).

Estimation of economic impact:

The source for the quantification of economic impact includes the Workshop, MLA reports, literature.

- Given only 583 producers in WA, SA, Vic and NSW have adopted significant recommendations of the Enrich program recommendations up to 2015 (from MLA evaluations), this adoption level may double by 2030 to 1200 producers with no further MLA investment.
- Assuming 3 years after establishment is required to attain an initial full-year productivity benefit, no benefit was claimed for the 2010-15 period, but benefits start from 2016 (100 producers) and phase up to 2030 (1 200 producers).
- Average property size is 2000 hectares and 1 300 ewes, with total impact on 1.6 million ewes (approx. 4 per cent of national flock).
- Given the scepticism from the workshop to the MIDAS model predictions, a conservative benefit per ewe after 3 years of establishment is 5 per cent increase in turnoff per ewe and 60 per cent reduction in supplementary feed costs, but no increase in stocking rate.
- Costs of establishing the recommended 10 per cent coverage (200 hectares) are assumed at \$150 per hectare (annualised at 7 per cent) with 3 years to first full year increase in productivity.

Phosphorus use efficiency

This research involved identification of optimal levels of P application and development of more P efficient pasture varieties.¹⁸ Longer-term benefits of breeding more P efficient varieties would require additional MLA funding. Therefore, the benefit discussion focused on the benefits from reducing P fertiliser applications where soil P is above recommended levels.

- This project provided additional content for the Five Easy Steps phosphorus calculator (developed in the Pastures Australia initiative) which allows producers to

¹⁸ A more complete explanation can be found at <http://www.mla.com.au/Publications-tools-and-events/eNewsletters/fridayfeedback/Mixed/Opportunities-to-increase-phosphorus-efficiency>

assess the economics of applying phosphorus fertiliser and advice on avoiding over-fertilising some parts of their farm while under-fertilising other parts. All of the material is now in the public domain but more investment would be needed to achieve the full benefit.

- The workshop estimated that in the medium to high rainfall zone, not more than 5 per cent of producers would be using P fertilisers excessively and that 20 per cent of these farmers would adopt the practice without further MLA funding. The workshop accepted the benefit of \$15 per hectare identified for adopters in medium and high rainfall areas, particularly in dairying areas.
- One comment was that care should be taken with the messaging —given that many more farmers under-use, rather than over-use, fertiliser, and this is supported by a general decline in use of fertiliser across the broadacre industries.
- With the cost of fertiliser likely to rise further, this would result in a higher adoption figure as producers increase fertiliser use efficiency.
- MLA attribution is 100 percent.

Estimation of economic impact:

The source for the quantification of economic impact includes the Workshop, and the literature.

- A possible \$15 per hectare saving in P fertiliser costs by those producers with excessive soil P levels would be limited to not more than 5 per cent of all properties, of which 20 per cent might adopt this practice without further MLA funding (from workshop).
- The ABARES survey in 2014 indicated 20 256 farms in the High Rainfall Zone and (say) 20 per cent of the 30 700 farms in the medium rainfall Wheat Sheep Zone, estimating the total target market of around 25 000 farms. A level of, 20 per cent adoption by 5 per cent of target farms is equal to 250 farms.
- The average farm size with excess soil P is 800 hectares, with all farms likely to adopt doing so by 2016, and the saving maintained to 2030 (that is, application rates based on specific paddock requirements rather than blanket applications to all paddocks).

Tedera

Tedera is a drought-tolerant legume resulting from a collaboration between the (then) Future Farm Industries Cooperative Research Centre (CRC), Landmark, MLA and the Department of Agriculture and Food Western Australia (DAFWA).

- It is seen as an alternative to lucerne in southern pasture systems and the wheat belt in WA, remaining green all year round in Mediterranean zones with low (300mm) through to high (800mm) rainfall, with greatest value in filling the summer/autumn feed gap.
- Profitability improvement comes from savings in supplementary feed, and higher stocking rate or finishing stock earlier.

- Although palatability for sheep has been demonstrated, the Workshop noted the new species has a long establishment period and that the plant is very different to other forage species, so it will most likely take longer for acceptance by producers.
- Likely first release is 2017-18, with first benefit around 2020. MLA's ex-ante analysis assumed that it will take 16 years to achieve peak adoption with a 0.5 per cent improvement in sheep industry net incomes by 2030.
- MLA has claimed 40 per cent of the potential impact in this period. That is, without further MLA funding, adoption would likely be slower.
- MLA contribution
 - MLA funding in the total investment = 5 per cent.
 - MLA attribution = 100 per cent.

Estimation of economic impact:

Not evaluated. Further D&E investment needed to quantify productivity and persistence under commercial grazing conditions and ROI for adopters. This will be evaluated in the next impact evaluation 2015-2020.

New legumes in cereal zone

The objective is to find new hard-seeded annual legume varieties for twin sowing with cereal crops to reduce costs of nitrogen fertilisers, supplementary feeding and annual re-sowing of ley pastures.

MLA ex-ante analysis assumed that a 15 per cent increase in stocking rate (that is, 1 additional DSE per ha would be possible, with significant cost savings.

- The workshop agreed that 1 DSE/ha was not unrealistic, based on a current 5-6 DSE carrying capacity. One view was that from a producers' perspective, you wouldn't bother if you were going to get less than this — especially in the cereal zone.
- The size of target audience is a population of 14 000 to 16 000 producers.
 - to date, a handful of producers have adopted over the period 2010-15
- 50 per cent of the audience is targeted for adoption, such that the target adoption is 7 000 producers over the next 15 years
- MLA attribution was set to 50 per cent.
- R&D is completed and a company is licenced to grow out and sell new varieties.

Without investing any more in extension — and having commercially available products — adoption would most likely be limited to 20 per cent (the base level of engaged farmers).

Estimation of economic impact:

Impact is evaluated in conjunction with Majority Market programs that occurred concurrently.

Buffel grass rundown

Buffel grass is the dominant pasture over 5.8 million hectares across Queensland. There has been a 50 per cent productivity decline in dry matter production over time due to soil nitrogen depletion, primarily in the Brigalow country. There are 5 million animal equivalents across that area, according to ABARE figures (2011) for cattle in the Brigalow Belah belt of northern Australia.

The potential benefits of new legumes would be to reclaim 30-50 per cent of the lost production:

- The MLA presentation assumed a 15 percent increase in average daily gain, leading to increased turnoff weights. This was considered reasonable by the workshop.
- These benefits are based on an ex-ante analysis: the current project finishes in 2015 and a number of promising commercially-available candidates have been evaluated and recommended for key regions (Desmanthus, Caatinga stylo, Burgundy bean, Butterfly Pea).
- A couple of candidates have been identified, but at trial sites, have suffered over the last couple of years due to the bad seasons. One general problem to the development of varieties is the lack of persistence of legumes that are highly palatable to stock and require a relatively long establishment phase.
- In terms of adoption, the workshop thought that 10 per cent of the total area was realistic by 2030 without further MLA support.
- Concern was expressed that the science capability in this area has dramatically declined — primarily in CSIRO.
- MLA contribution.
 - MLA funding in the total investment= 50 per cent.
 - MLA attribution = 100 per cent.

Estimation of economic impact:

The source for the quantification of economic impact includes the Workshop, and the literature.

- Without further MLA funding, the workshop believed that 10 per cent of a possible 6 million hectares of rundown buffel-dominant pastures could be sown to current commercially-available legume species by 2030, starting 2021 (assuming 4-5 years to establish and gain improved annual production).
- 15 per cent improvement in live weight gain per heat per year (that is, 23 kilograms), after establishment costs of \$120 per hectare and \$7.50 per hectare maintenance costs each year.¹⁹

The workshop identified buffel rundown as a high priority topic with some potential for economic benefit from research to date in the absence of further MLA funding. However, the considerable uncertainty about the long term persistence of the candidate legumes under commercial grazing and the extent to which they can fully or partially restore

¹⁹ G. Niethé.

buffel grass productivity, plus the lack of adoption to date, suggest that possible significant economic benefits without further RD&E are speculative. However, the size of the potential impact area and the potential productivity impacting on some 5 million animals indicate that it should remain a high priority topic for MLA investment in either evaluating and accelerating adoption or finding alternative solutions.

Psyllid Resistant Leucaena

Planting of leucaena as a forage crop in medium to high rainfall areas of Queensland is currently restricted by psyllid infestations. Replacement of unimproved pasture with this new variety 'Redlands' could produce a 50 per cent increase in liveweight per hectare (leucaena over unimproved pasture). The seed for the new variety is licensed to seed producers and is in the 'bulk-up' stage. The MLA presentation estimated that the potential target area could be 1.5 million hectares — which extends the current range of leucaena into the higher rainfall coastal areas where psyllids infest plantings.

The workshop focused on adoption given the high costs and risks in establishing leucaena.

- With around 300 000 hectares of leucaena already planted, the workshop estimated that only 15 per cent of the higher rainfall target area might adopt the new variety by 2030, assuming further MLA funding, noting that much of the target area has low cattle numbers and competing land uses, and fewer specialist cattle producers. This amounts to a 75 per cent increase on existing plantings.
- Adoption will be facilitated by the Leucaena Network. An MDC project is investigating optimum row spacing, plant density, impacts on establishment costs, water use efficiency, and cattle productivity for leucaena varieties in general.
- Even in traditional areas, current varieties suffer from psyllid — the workshop identified that current users want to plant more leucaena but are waiting for the psyllid resistant variety.
- The workshop observed that a 50 per cent increase is probably optimistic - it is probably more likely to average 30 per cent.
- For an individual producer, these investments could be high risk and low IRR, given establishment costs, and the probability of a successful establishment. In a marginal area it can be difficult to establish, requiring 3 attempts by one producer.
- Costs were estimated to be around \$400 per hectare for planting leucaena with a high chance of failure. With 30 per cent chance of establishment failure, the expected cost would be \$600 per hectare.
- In terms of likely adoption without further MLA investment, the Workshop estimated only 70 per cent of the 15 per cent maximum will be achieved by 2030, which equals 157 500 new hectares by 2030. ²⁰
- MLA contribution.
 - MLA funding in the total investment= 50 per cent.

²⁰ As a check, plantings of existing varieties were estimated to have increased by 120 000 ha since 2010

- MLA attribution = 100 per cent.

Estimation of economic impact:

The source for the quantification of economic impact includes the Workshop, and MLA.

- 1. Potential area of 1.5 million hectares for a new psyllid-resistant leucaena could see 10 per cent of this area planted by 2030 (from workshop) given around 300 000 hectares are already planted in areas of low psyllid impact, and high profile, including Leucaena Network.
- First plantings occur 2018-19, with first significant benefit in 2021.
- Liveweight gain per hectare increases by 150 kilograms per year, after establishment costs of \$600 per hectare (accounting for 1 out of 3 failures) and \$28 per hectare annual costs.

Southern mortality and reproduction

The National Sheep Reproduction RD&E Strategy aims to increase national flock reproductive rate by 10 per cent. A stocktake in 2012 indicated an 8 per cent increase over the preceding 5 years, and anecdotal evidence suggests between 15-20 per cent of specialist lamb producers are mating some ewe lambs now.

- The Workshop noted that the project is funded over the period 2013-18 and so is not yet 50 per cent complete.
- Although some in the workshop believed that a 10 per cent increase nationally was technically possible, others thought that a further 10 per cent increase was too high.
- Another observation was that the benefits of improving the survival of lambs per se would be greater than the gains from mating ewe lambs.
- Adoption specifically from this program investment over the 2010-15 period was negligible, although a sizable proportion of the 8 per cent increase in flock reproductive rate reported previously was likely due to the Sheep CRC's extensive RD&E program, for which MLA was a major contributor.
- The workshop believed that 30 per cent uptake with a 10 year lag time estimated by MLA was a reasonable target for adoption of the technology, and given strong interest in sheep productivity, market demand and AWI co-funding, that 20 per cent over 10 years could occur without further MLA funding.
- The observation was made that the benefits would be greatest for producers moving from traditional merino wool production into non-merino breeds and learning new skills in managing for higher turn-off rates. The non-merino ewe base is around 25 per cent.²¹

²¹ MLA/AWI survey: merino ewes accounted for around 30.5 out of 40.5 million as at June 2015.

Estimation of economic impact:

Not evaluated. Current R&D continues beyond 2015 - this will be evaluated in the next impact evaluation for 2015-2020. Any impact during 2010-15 is evaluated in conjunction with Majority Market programs that occurred concurrently.

Phosphorus supplementation in Northern Beef

Potentially one of the biggest payoffs for investment is overcoming phosphorus deficiency in northern Australian cattle herds. Supplementation has been promoted for many years, but can be logistically difficult and is often under-utilised.²²

- The challenge is the identification of areas and properties that are acutely P deficient, which involves testing cattle in marginal areas.
- Phosphorus deficiency is a major contributor to cow loss, seasonal weight loss (up to 50 kilograms each year in growing animals) and low weaning rates in the northern industry.

The new innovation is a more reliable diagnostic test for phosphorus deficiency, based on biochemical markers in plasma or faecal samples that should give producers more confidence to invest in remediation.

The potential increase in gross margin claimed by MLA is \$20 per animal equivalent per year from supplementation, over and above the additional costs (through 10 per cent increase in weaning rate, 50 per cent reduction in mortality; 4 per cent reduction in carrying capacity).

- In a 2012 survey, producers reported a benefit range between \$40-\$70 per animal equivalent (AE), even up to \$100 per AE, depending on season and effectiveness of supplementation.
- Since 2012, the increase in prices for the live trade compared with those used in the ex-ante analysis suggest that the \$20 marginal benefit is conservative. The workshop suggested taking the mid-point of \$40-70 and adjusting for cattle prices since 2012.
- The most significant unknown is the number of hectares that are phosphorus deficient. There are an estimated 4.5 million cattle in phosphorus deficient areas — but not every paddock/property is P deficient. Fifty per cent of 6 million (3 million) cattle are currently thought to be fed phosphorus supplements, but this needs verification.
- Sixty per cent adoption is possible (with additional work)
- Subsequent investigation showed that, whilst both tests show promise as possible diagnostics, both require further investment from MLA to determine their applicability and value, and to develop guidelines for use.²³

²² Holmes B 1990, Phosphorus and beef production in northern Australia: A Case study approach to the economic assessment of phosphorus supplementation, Tropical Grassland Volumes 24 250-255.

²³ MLA Final Report B.NBP.0537 2015: Validation and demonstration of a diagnostic tool for phosphorus status of beef cattle,

Estimation of economic impact:

Not evaluated. Requires further RD&E investment, and will be evaluated in the next impact evaluation 2015-2020.

Breeder mortality / Cash Cow

The Breeder Mortality project completed in 2012-13 identified wide variations in mortality between pastoral enterprises (3-18 per cent each year) and five key contributing factors that can be managed to reduce this loss. An on-line mortality calculator is available from MLA to assist producers to keep appropriate records and calculate these losses using a standardised approach.

Reducing breeder losses to 2 to 3 per cent has a major impact on operating margins. A 25 per cent reduction in breeder cow losses has been valued at \$50 million benefit by MLA, who estimate that half of this benefit is likely with no further MLA investment.

- In total, 36 properties that contributed data for this study collectively run about 528 000 breeders in any given year.
- We assume that the worst performing 50 per cent have since made changes that will reduce breeder mortality by on average 2 per cent per year from 2016 onwards (allowing for 2 year lag effect).
 - This may last for the next ten years, creating a value of 260 000 by 0.02 by \$500 per head by 10 years = \$26 million, but this will wane unless reinforced by further promotion.
- A conservative assumption is that no other properties adopt these practices without further MLA investment. High prices and herd re-building after the current drought could drive adoption in other companies.

Cash Cow was a large benchmarking project involving 72 northern producers and 78 000 cows, completed in 2013-14. The output was a substantive report that identified 11 'critical control points' affecting reproductive outcomes. An extension package is now under development. MLA invested \$900 000 in Cash Cow since 2010, and \$2.2 million in total on the 5 year project which commenced in 2007.

- The outputs, formally released in 2015, have not been widely adopted but those properties involved probably have addressed issues identified by the analysis.
- Whilst Cash Cow was a more intensive study than that used to quantify breeder mortality, MLA advises that the 78 000 cows studied were only sub-sets of the total cow herds run by these companies, which totalled some 284 000 breeders, and that these were largely not the same companies involved in the Breeder Mortality project.
- The workshop noted that on average, reproduction rates were declining in northern Australia and that if there was no further investment, there would be no further benefits into the future, and no adoption by companies not directly involved in the Breeder Mortality or Cash Cow projects.
- To achieve the 2.3 percent out to 2030 identified by the MLA presentation, further funding would be required. Cash Cow has clearly demonstrated calf loss as a major

problem in reproductive efficiency, relative to conception rate — the challenge now is how to develop viable strategies to address major causes.

- Attribution of benefits to MLA is assumed to be 100 per cent.

Estimation of economic impact:

The source for the quantification of economic impact includes MLA and research reports.

- Managers of the herds participating in both the Breeder Mortality and Cash Cow benchmarking projects have adopted at least some of the recommended practices since 2013 that will reduce cow mortality by 2 percentage units in their worse performing herds.
- These 108 managers manage some 800 000 breeders in aggregate, with the worst performing herds recording up to 18 per cent annual mortality.
- Without further MLA funding, 50 per cent of these breeding herds will achieve at least 2 per cent point reduction in annual cow mortality, at an average cost of \$10 per breeder²⁴, with first benefits in 2016, rising to 50 per cent adoption in 2020, which is maintained through to 2030.
- Unless the animals at greatest risk of dying can be specifically targeted, a \$10 per head cost of treating all animals in low performing herds to achieve a 2 percentage point reduction in mortality provides only a small benefit of around \$2 per breeder (this assumes there are no other benefits, that is, increases in weaning rates).

Entire males

The workshop thought this was an area of MLA investment that delivered benefits over the evaluation period. This project quantified the productivity advantages and meat quality impacts of not castrating *Bos indicus* bull calves and then turning them off before 2 years of age before they become aggressive:

- research suggested this strategy has the potential to improve turnoff value of male animals by an average \$57 per head, which included \$25 to \$30 in increased feed efficiency. This benefit was presumably measured in feedlot finishing, so may inflate benefits when extrapolated across all grass-finished bulls, but also applies to other finishing systems (for example, leucaena, forage crops, higher quality native pastures).
- the target audience for this is potentially every male animal in northern Australia, especially those destined for the live export and milk tooth beef markets, but is not yet tested in *Bos taurus* males
- the Workshop noted that:
 - one reasonably sized NT producer has already gone in this direction, and that a recent live export grid had no price per kilogram difference between steers and entire males

²⁴ G. Niethé.

- Israel is a promising market where prices are between \$1.80 and \$2.30 per kilogram liveweight
- there are increasing entire males coming through the Roebuck export depot with producers responding to market forces.
- the benefits are potentially high if there is no discount on live animal price grids and if no HGP can be used for Indonesia — as most markets are moving to no HGPs
- markets will drive adoption of non-castration when there are greater restrictions on HGP use.
- the project also proved the eating quality pathways in the higher end of the boning groups (that is, groups 8 to 10).

The Workshop suggested adoption could reach 50 per cent by 2030 with MLA investing no more money, as market forces would likely drive non-castration, but attribution to the MLA project would be relatively low.

Estimation of economic impact

The source for the quantification of economic impact includes the Workshop and MLA.

- The MLA research showed, when compared with castrated males, a 7 per cent increase in carcass weight and \$52 increase in carcass value for those young *Bos indicus* males not downgraded as ‘bulls’ due to secondary sex characteristics (only 69 per cent qualified) after 75 days grain finishing to around 420 kilograms liveweight, and concluded that more would have qualified if slaughtered at a younger age.²⁵
- The standard use of HGP implants during the finishing phase (the industry counterfactual) would have produced a similar growth stimulus to the observed in the bulls (10 per cent), so the only advantage is minor (the cost saving of not using HGPs).
- Future benefit may become significant if markets change significantly in preferring entire male cattle, or in banning use of HGPs, but, given the entire male export was already happening on a small scale, the attribution to the MLA project would be small (that is, awareness of potential and potentially faster ramp up of supply if market demands change).

Other projects

The MLA presentation also identified other key areas of activity that were not directly discussed by this workshop.

- Long distance transport including the release of guidelines for cattle transport for up to 48 hrs - benefits will be captured in the welfare portfolio evaluation.
- Updated BeefSpecs calculator to assist producers to comply with market specifications – benefits will be captured in the Eating Quality evaluation.

²⁵ Fitzpatrick L.A. 2014 Growth and meat quality of grain finished entire male *Bos indicus* cattle, MLA Project B.NBP.0486.

Opportunities to improve impact achieved

The workshop participants and MLA staff made the following comments/suggestions:

- The loss of research capacity is critical — there is no Plan B. This especially applies to the rangelands. There have been big issues out there like calf mortality which haven't had nearly enough attention.
- It was observed that MLA may have been over reliant on research calls. There has not been enough 'top-down' planning through programs, work out what needs to be done and then develop major programs to deal with it. MLA seems to have done more of this for its southern programs than in the north.
- The composition of projects across the portfolio was questioned with the suggestion of more blue sky research and the courage to stick with projects over the long term.
- There has been a poor connection between R&D and extension and over-investment in R&D without extension (MLA-expressed view).
- Getting the balance between R&D and marketing was also seen as important.
- Additional suggestions were provided by MLA in the background paper.

MLA Summary of Producer Engagement Program Outputs and Outcomes

This portfolio review covers 3.5 'Producer engagement with MLA information and tools to build capability' with some 583 projects. These projects have been aggregated into three program areas based on the different engagement objectives (inform, influence, involve), which are outlined in the 3.5 business plan.

MLA's core business is to create opportunities for Australian livestock producers from their collective investment in R&D and marketing activities. An important part of this remit is developing and delivering information, tools and services that assist producers to make sound business decisions, manage challenges and capture opportunities to boost productivity and profitability.

Building producer capability through effective engagement with MLA information and tools ensures receptive producers benefit from a return on their investment in MLA. Effective engagement means providing multiple opportunities for producers to access and engage at different levels with various information, tools and activities that provide knowledge and skills to benefit their business — either directly with MLA, or in collaboration with delivery partners.

It is fundamental that MLA maximises engagement with producers to ensure they are informed of valuable and relevant information; that MLA motivates and *influences* their enquiry and experimentation; and MLA *involves* producers and stakeholders to allow them to influence future activity targeted to industry's needs. The vision for the producer engagement strategy was:

Cattle, sheep and goat producers maximise the benefits of MLA research and marketing services to improve profitability and sustainability'.

More details on MLA's approach during 2010-15 to achieve effective producer engagement and the comprehensive delivery framework established is outlined in the background paper developed for this workshop.

During 2010-15, MLA focussed on producer engagement and sought to act predominantly as a 'wholesaler' of R&D information and extension program packages. MLA was - and continues to be - dependent on external public and private organisations to interface directly with producers for program delivery. These organisations are the key influencers in building knowledge, skills and practice change, and act as the 'retailer' for MLA programs.

This complexity makes it difficult to robustly assess impact and achieve direct attribution for MLA investment. Therefore, MLA's role in the adoption process and measuring impact was to ensure:

- MLA had systems that enable an understanding of producer needs and use was made of this information to determine adoption strategies for R&D
- all producers were provided with access to the fundamental best practices/principles/tools at the time generated from R&D to adapt into their system
- that MLA created demand across producers wanting to build their capacity through a variety of communication and engagement mechanisms
- that the right mix of communication and engagement activities were available in a timely manner to ensure the right level of support is provided for adaptation and practice change to occur
- that barriers to adoption were identified and managed through strategy planning
- that the engagement activities were delivered through appropriate public and/or private (retail) mechanisms
- that the right level of co-investment occurred based on the public-private good outcomes of the activity.

1. Inform: Informing producers of the opportunities to engage with - and benefit from — on-farm research, development and marketing investment

Primarily this strategic initiative aimed to generate strong industry awareness of MLA research, development and adoption (RD&A) investments and also marketing initiatives. Evaluation metrics were largely output focused, with awareness and satisfaction levels measured through the annual membership survey.

feedback magazine: Over \$1M per year has been allocated to the delivery of ten issues of MLA's member magazine feedback, signposting members to timely and valuable MLA tools and information from across the business. Content has remained relevant (membership survey 2015) and appropriately balanced across company initiatives. Overall the magazine has been delivered in line with reader requirements for a majority of practical, timely production information. A process of continually improving the format and delivery of information in line with audience requirements has been achieved, along with closely integrating content with cross-promotion of other MLA communication channels, particularly online, and utilise magazine flysheet for high level

promotions. The introduction of the weekly online newsletter Fridayfeedback has increased traffic to the MLA website and online viewing of feedback articles.

Events: With an investment of \$1.3M from 2010-2015, MLA delivered a series of ‘flagship’ MLA producer events across Australia to deliver R&D and marketing information and tools to producers face-to-face. This included:

- Meat Profit Days (MPDs), Beef Ups, Ewe Time forums, targeted producer meetings and field days to gain optimum regional coverage ‘in-field’ and to demonstrate the value of the levy investment at a local level on local issues with a balanced program of content. Options for new event approaches that attempt to demonstrate the value of MLA programs with more hands-on, practical demonstrations that deliver ‘take home and do’ opportunities for producers, were trialled at different events (for example, Beef Up). Also events such as MPDs were leveraged online with videos, discussion forums etc. to reach those unable to travel
- a series of ‘Beyond the gate’ tours were delivered which aimed to demonstrate producer levies at work throughout the red meat supply chain. The success of these varied, depending on location. While MLA hasn’t continued with the tours, McDonald’s took on the model as part of their beef industry sustainability program to engage producers
- at least 15 ‘Pasture Updates’ were delivered each year from 2013-15 across the southern Australian states to increase awareness of MLA’s pasture research and provide producers with take home actions and next steps for further skill development and adoption. As an average the events had 50 producer participants and were held across southern Australia, and utilised local content to ensure relevance to producers. Continued producer demand for Pasture Updates demonstrates success of the events.
- events that were not delivered included the intended series of events that were targeted at southern beef production and young producers and the hosting of a series of ‘back veranda’ producer meetings providing MLA members with an accessible forum for two-way discussion with senior MLA managers about key levy-funded programs.

Website and mobile platforms: Investments of \$500 000 between 2010 -15 were allocated to enable the MLA website to be redesigned and upgraded. The strategy aimed to continually increase traffic to the MLA website and have it positioned as a vital producer resource. Key upgrades updating on-farm content, market information and other relevant resources for producers; improved navigation and effective search functionality for easy access to content (as well as search engine optimisation) and; ensuring the continued usability of online functionality around industry systems such as MSA, NVDs and NLIS.

The introduction of an online ‘community’ for MLA members, including blogs and discussion forums on issues of core business remains to be completed. Mobile technologies were introduced to support further traffic to the MLA website. Producers are able to access information through a mobile version of the MLA website and mobile applications to deliver market information.

Sponsorship program: Between 2010 -15, MLA invested \$1.4 million into 137 third-party industry events that are beyond the reach of MLA’s flagship producer event

program. The aim of this investment was to deliver localised information from MLA programs via MLA speakers and branded materials as appropriate. The program management was amended to a process where a sponsorship call out to industry was initiated to improve contracting of applications for sponsorship in a timelier manner and also increase the transparency on how applications were assessed according to strict criteria that aligned with the engagement strategy goals. Events were proactively targeted that provided a platform to reach levy-paying producers with MLA information and tools and ensuring any content provided is aligned with follow-up opportunities including practical workshops, educational publications and online tools.

It should be noted that other broad company awareness raising investments such as the MLA media program were also funded from this area of the AOP but are not included in this paper.

2. Influence: Engage producers with MLA information, tools and learning opportunities to influence improved practices.

Primarily this strategic initiative aimed to provide opportunities for producers to build knowledge, skills and confidence to improve their business performance and to support adoption and practice change. Evaluation metrics were largely outcome focused, with improvements in skill, knowledge and confidence measured, along with intention or actual practice change achieved.

More Beef from Pastures (MBfP) and Making More from Sheep (MMfS): These programs aimed to engage the ‘average’ performing producers and consisted of state based delivery of R&D for sheep (Making More from Sheep) and southern beef producers (More Beef from Pastures). The overall goal of both programs is to achieve sustainable increases in the productivity and profitability of southern Australian beef and sheepmeat enterprises. The programs’ performance is measured against agreed KPIs for program awareness (category A activity), building knowledge skills and confidence (category B activity) and supporting practice change (category C activity). A key element of these programs is a consistent and comprehensive monitoring and evaluation (M&E) which allows tracking and assessing the impact of all activities undertaken as part of MMfS or MBfP.

Both programs are based on best practice manuals that contain modules outlining the fundamental principles and practices that will optimise business performance. The most commonly delivered MMfS module was Wean More Lambs (175) followed by Healthy & Contented Sheep (168) and Plan for success (101). In regards to MBfP, the most commonly delivered modules were Pasture growth (272), Pasture utilisation (247) and Setting direction (244).

Making More from Sheep (MMfS) commenced in 2007 while More Beef from Pastures (MBfP) started in 2004 (although evaluation data provided is based on 2010-2015 period). The activity delivery approach was designed to be flexible to meet the needs of the audience and included — but was not limited to — case studies, workshops, field days, demonstration sites, webinars, e-learning activities, producer advocates and forums.

Total MLA investment for MBfP 2010-15 was \$2.32 million and for MMfS there was an investment of \$1.5 million for both development and delivery. MMfS is a jointly funding

program with Australian Wool Innovation (AWI) 50:50. Prior to 2010, state departments co-invested in the program delivery by providing in-kind resources. The program is now required to fully fund all delivery as the majority of state departments have withdrawn their investment into extension services.

Targeted campaigns, MLA Challenge: The MLA Challenge was a novel and innovative communication and extension campaign that aimed to encourage the adoption of better farm management practices by showcasing the learning journey of a selected number of 'Challengers'. The MLA challenge was a 12 month program that saw six farming families make improvements to their businesses with the support of online tools, research outcomes, mentors and benchmarking. MLA invested \$241 000 in the initiative, along with program sponsors who provided an additional \$200 000 of cash and in-kind support.

On-line tools: MLA has developed a number of on-line tools and calculators to assist red meat producers in making decisions in their businesses. Current tools on-line include the cost of production calculators (beef, sheep and goat), Feed Demand Calculator, Rainfall to Pasture Growth Outlook tool, Beef Specs, Stocking rate calculator, health cost calculator, calving histogram, breeder mortality calculator, pasture improvement calculator, Phosphorous calculator and FarmGas. Most of these tools were developed prior to 2010 as part of the MBfP program. Between 2010-15, the focus has been to develop an integrated package of online decision-support tools and information. This included improving online resources to ensure on-farm information is current, accurate, easy to use and find. Intended initiatives that did not get completed include the development of best fit online solutions to fill producer knowledge gaps and aid adoption which was to include the development of new tools, calculators, apps etc, online learning modules, online video tutorials (including user-generated) and online discussion forums. Investment into tool development was \$605K for the review period.

Educational publications: Over \$1.54 million was invested in updating existing educational publications and developing new resources. Overall the aim of continuing to fund educational publications is to distil the science of MLA-funded R&D, market information and industry systems into practical, accessible information that aligns with MLA campaigns and MBfP and MMfS programs to enhance the support to producers on-farm.

3. Involve: Facilitate the involvement of innovative producers and delivery partners to enhance producer engagement with MLA programs and activities

Primarily this strategic initiative aimed to generate partnerships with producers and delivery organisations and also set up systems for market research and evaluation. Evaluation metrics were varied, and in most programs output focused.

FutureBeef: This program was developed on the basis of a three year Memorandum of Understanding (MoU) between MLA and the three northern Australian departments of primary industry. The MoU was set up with the intention to co-ordinate extension activities and leverage resource commitments across the program partners to achieving the program KPIs.

Activities and delivery style aimed to be flexible to meet the needs of the audience and included promotion of BeefUp forums, Business/Nutrition/Grazing/BreedingEDGE, Beef Industry Breakfasts, webinars, print and electronic media, case studies, field days, producer demonstration sites, web site, e-newsletter, e-learning activities and producer advocates. MLA commitment to the FutureBeef program was \$1.1million, which was allocated to supporting strategy development, reviewing and improving delivery packages and promoting delivery. The intent of the MoU was based on the opportunity to improve co-ordination and leverage resources. Evaluation of the FutureBeef framework and objectives prior to June 2016 is expected to occur.

Producer Demonstration Sites: MLA's producer demonstration sites (PDS) program continued to support producer groups and extension staff to demonstrate, develop and adopt MLA research findings and technologies as well as seek research and development solutions to on-farm problems. Through the PDS program, 67 projects were funded and supported producers through a practical, hands on environment that enabled them to share experiences and participate in the commercial application of research outputs. A national strategy for the PDS program has been developed along with a robust monitoring and evaluation process to better monitor the impact of these projects. Overall MLA has invested more than \$2.36 million in the PDS program between 2010 -15. Examples of successful PDS projects are detailed in the Background paper for the workshop.

Monitoring and evaluation: MLA has requirements for M&E at government, corporate and on ground activity levels. Across the producer engagement portfolio, existing M&E structures were reviewed and a new monitoring, evaluation and reporting framework has been developed which will enable reporting against the Meat Industry Strategic Plan 2020 (MISP). The new approach to evaluation will ensure alignment with broader company M&E imperatives. Efficient and effective M&E data collection structures are central to the strategy and will utilise online tools where possible including:

- consistent and efficient data collection systems (clickers technology)
- efficient data entry
- Effective reporting systems
- delivery partner engagement
- case study monitoring – qualitative analysis.

Other significant investments in this area have included market research projects, skills needs analysis and economic situation analyses across industries. These projects have informed MLA RD&A priorities and enabled greater understanding of industry needs.

A total investment of \$2.26 million was invested in this area over 2010-15.

Farm300: In 2013, MLA received a grant of \$955,580 from the Department of Agriculture Carbon Farming Futures' Extension & Outreach program to conduct the Farm300 project. The aim of the project was to upskill livestock advisors and producers to increase productivity and profitability by reducing on-farm greenhouse gas emissions through changes to on farm management practices. A key methodology used was coaching of producers in small groups and one to one, enabling an increase in skills and

confidence to change on-farm practises. The methodology provided MLA with significant learnings for future adoption programs.

Further detail of the outputs, outcomes and impact of these program investment areas are presented in the Background Paper.

Workshop evaluation of performance / industry impact

The MLA presentation summarised the three strategic initiatives, and the proportional expenditure for each as follows: creating awareness (*Inform*) 28 per cent; facilitating uptake (*Influence and Involve*) 60 per cent, and industry collaboration and partnerships 12 per cent.

- In addition to feedback and regional magazines (received by around 48 000 members), the website (29 per cent of members visit at least every 3 months), and e-newsletters and mobile platforms that inform producers, significant awareness events were 5 Meat Profit Days (in total 1 000 attendees), Ewetime forums (1 500), BeefUp forums (1 240), and Pasture Updates (2 200) – on average 60 per cent of producers said they would consider changing practices as a result of attending.
- External event sponsorship also reached large numbers of producers, for example, Beef Australia (2 500); LambEx (650).
- The major influence programs for southern producers targeted middle to slightly above-average producers to increase adoption of recommended best practice
 - More Beef from Pastures engaged 17 000 southern producers— 12 per cent said they had changed practices by 2014
 - Making More from Sheep engaged 10 000 southern producers— 32 per cent of the southern sheep industry — 15 per cent (1 553) said they had changed practices by 2014.
 - The participatory research project EverGraze change targets were achieved with an estimated 2300 to 4400 producers prompted to make changes on between 642,000 and 1.2 million hectares as a result of EverGraze activities. The project reported a very large reach through participation in its activities, recipients of publications, delivery through next users, and through its website.

In northern Australia a less structured approach has been taken through the FutureBeef Program co-investment with Queensland DPI.

- ‘Involve’ activities also included a program of producer group-initiated Producer Demonstration Sites (PDS) to allow groups to validate one or more of the key best management practices advocated in the Majority Market programs— 370 northern and southern producers have been involved in that program, with 70 per cent reporting practice change.

Substantial ex-post evaluation of the More Beef from Pastures for the southern region (MMfP) and Making More from Sheep (MMfS) has been completed:

- 126 case studies of businesses were conducted.

- the external analysis estimated that MMfS had resulted in 3.9 per cent Total Factor Productivity (TFP) increase by 2013, with 1 533 of engaged producers actually changing practices to achieve an average increase in annual net income for the most likely scenario of approximately \$11 900 per farm (\$10 per hectare). Lamb production per DSE was 6 per cent higher relative to baseline data for MMfS farms, wool production per DSE rose by 1 per cent, average stocking rate per hectare increased by an average of 2 per cent, while labour efficiency (DSE per labour unit) increased marginally by 1.5 per cent.
- The conduct of 103 specialist Bredwell Fedwell (BFWF) workshops to further upskill interested 2 773 producers by providing more specific knowledge to support practice change around using improved genetics and feeding practices and encourage participation in Lifetime Ewe Management adoption groups promoted through the Sheep CRC was considered to have significantly contributed to this estimated productivity gain
- The workshop considered that the numbers adopting would be partially additive (say 50 per cent), but the TFP increase would be similar. There is no change in TFP per farm but more farms involved, so the aggregate outcome is better.
- The external analysis estimated that MBfP had resulted in a 5.4 per cent TFP increase by 2013, with 24 per cent of southern producers engaged, and 2 000 of these actually changing practices to achieve an average Increase in annual net income for the most scenario of approximately \$6 000 per farm (\$9 per hectare). Average beef production per hectare improved 7 per cent increase, stocking rate 4.7 per cent and labour efficiency by almost 5 per cent.
- Northern beef — no independent ex-post analysis has been undertaken — but the workshop thought any gains were less than 1 per cent. The MLA presentation claimed 0.2 per cent increase in northern TFP.

The workshop discussed whether there might have been a steady decline in the TFP increase without the MLA project investments in R&D and extension, and the following issues:

- have we upskilled the private sector sufficiently to adopt future technologies and tools?
- MBfP — is the private sector coming in now? Is this because MLA is engaging (and paying) them?
- Evergraze was running at the same time — is this audience also additive?
- The workshop also discussed attribution to the MLA –supported Sheep CRC and AWI-funded RD&E activities on sheep management and reproduction (such as Lifetime Ewe Management courses and ParaBoss management guidelines for worms, flies and lice in sheep).

The Southern Beef program was considered successful with engagement around 25 per cent of the herd, and with good linkages between the MMfS and MBfP programs.

It was stated at the workshop that by and large the northern cattle industry has gone backwards during the evaluation period, with TFP going up by 1 per cent over the period but terms of trade declining by 2 per cent.

- attribution of 20 per cent of this 1 per cent increase in TFP to MLA over the evaluation period was considered maximal.
- northern participants stated that the north has lacked the investment, cohesion and breadth of the approach used in the more intensive production systems in the south.
- timing of industry events was important — for example, MMfS was run at a time when there was change from wool sheep to meat sheep.
- without further MLA investments beyond 2015, the workshop identified that there would be no additional adoption in the northern beef zone, while adoption would increase by 10 per cent in the southern livestock systems due to further promotion by consultants and producer groups.
- attribution of benefits to MLA were estimated at 100 per cent.

As when previously considering the impacts of the productivity R&D programs, the workshop had considerable difficulty in assessing the overall impacts of these engagement and adoption programs, which had so many component projects and other parties and co-investors involved. In general it was agreed that the ‘tops-down’ assessment of industry TFP was the only reasonable approach, rather than trying to assess the separate impact of individual components, but insufficient data were available to do this with confidence, other than for the two majority market programs that had been evaluated externally in 2013.

Estimation of economic impact

As discussed by the workshop, an evaluation based on the Total Factor Productivity changes reported for southern beef and sheep producers by Howard, Beattie and Graham (2014) has been used to estimate a combined attribution to all of the MLA investments with significant producer participation. The significant number of awareness / extension / adoption activities that were running during this period is described in the information from the MLA Background Paper prepared for the workshop and reproduced above.

A compelling reason for this approach, particularly in the south, is that the large number of awareness events and communications under the Making More from Sheep and More Beef from Pastures Programs deliberately directed interested producers to specific EverGraze or Lifetime Ewe management courses or groups, or to run a Producer Demonstration Site, for more ‘hands-on’ knowledge and skill development. This added considerable strength to integrating MLA, Sheep CRC (Program 2 — increasing weaning rate) and some separately-funded AWI adoption initiatives (BESTWOOL BESTLAMB) in program delivery and no doubt contributed to overall effectiveness, but also means that these programs cannot be evaluated in isolation.

Each of these large MLA-initiated or -supported (that is, the Sheep CRC) programs has an comprehensive ex-post analysis of benefits based on survey results, but with little attempt to consider and attribute benefits across programs, and many of the participating southern producers were no doubt exposed to several or all of them.

This is less complex for the northern beef sector due to fewer concurrent programs and fewer co-investors, but applies on a smaller scale to activities like Future Beef, Grazing Land Management training and the Wambiana Project extension activities.

As all of the major programs were running before 2010, one would suspect the majority of practice change up until 2015 to have occurred during the evaluation period, and most were promoting best practice to ‘average producers’ so there was little R&D lag.

The average TFP changes reported by Howard, Beattie and Graham (2014) from monitoring 111 ‘before and after’ case studies of producers were applied to the 2013-14 period. We assume this caused a transient rise in annual TFP growth and then gradual fall over a 6 year period on average, after which the annual TFP growth reverted to pre-adoption levels. The number of producers achieving this gain due to participation in Making More from Sheep was assumed to be 1 533 and More Beef from Pastures 2000, with a smaller average TFP gain across all other producers engaged in these and related programs.

In addition to the economic benefits from increased adoption of recommended best practice flowing from the Majority Market programs, EverGraze and the other linked adoption programs during the evaluation period, the ex-post evaluations captured very significant non-monetary benefits, including:

- reduced stress levels due to lower risk (both price and production risk), and more confidence in management decisions as well as due to lower expected livestock deaths
- improved environmental outcomes .from increased ground cover/less erosion, better weed management, and improved soil health.
- more than 80 per cent of MMfS and 60 per cent of MBfP producers reported positive impacts of their practice changes on animal welfare, with 38 per cent of MMfS and 32 per cent of MBfP producers reporting a very high expected animal welfare benefit. ²⁶
- EverGraze was originally established to increase the establishment of perennial pastures in recharge areas to assist in reducing increasing soil salinity problems — the extent of reported adoption over more than 600 000ha would indicate very significant benefits in this regard.

Opportunities to improve impact achieved

The workshop participants and MLA staff made the following comments/suggestions, in addition to those made by MLA staff in the Background paper:

- MLA’s adoption strategy needs more focus, particular for the northern beef industry, (where public sector capacity has declined significantly and there is less private sector takeup):
- the industry has lost the lessons of working in groups that were learnt from the 1990s (although still common in the south)
- lessons can be learnt from the south (more intensive) and applied to the north (extensive) (and vice versa)
- development planning is needed, benchmarking, before commissioning the projects
- extension was largely passive: where the recipients were largely self-selectors:

²⁶ MLA Report E.COM.1300 Beattie, L. and Howard, K (2013) Benefit Cost Analysis (BCA) of the MLA Majority Market Programs Making More from Sheep and More Beef from Pastures.

- there needs to be a lot more targeting and intelligence on how to engage producers.
- more integration is needed — from a producer perspective, the approach is too compartmentalised (including this workshop format). Information needs to be packaged up in a more meaningful way.

A number of broader issues were also identified:

- why does the industry have so many plans (when they all have the same building blocks)?
- attribution and leverage is often elusive in the current co-investment environment: the workshop wondered about how much effort should be made in quantifying these and the risk that worthwhile activities have been missed
- less money should be spent on Meat Profit Days and ‘flag waving exercises’, and more investment on activities that drive adoption.
- MLA RD&E closes the knowledge gap but there is a real gap in the way things are implemented — between very well and very badly.

Increasing On-Farm Productivity — Livestock Genetics

Program Outputs and Outcomes

Context

The vision of the 3.1 Increasing Productivity — On Farm 2010 -2015 business plan was to invest \$85 million in R&D across 4 key strategies that create new knowledge, tools and technologies that identify opportunities for producers to become more productive and efficient. The four key investment strategies, which were developed from, and are aligned with, the priorities in the R&D plans for the goat, feedlot cattle, sheep meat and beef cattle sectors, were:

- enhance rates of genetic improvement in livestock and feedbase performance
- optimise productivity in grazing and feedlot systems
- develop and implement information, resource and precision livestock management technologies
- utilise producer participatory R&D to maximise rate and effectiveness of development and evaluation of new technologies.

This section reports on outputs and an analysis of benefits arising from investments addressing the sub-objective ‘enhance rates of genetic improvement in livestock performance’ for the period 2010-2015.

This sub-objective is one of a number of MLA investment portfolios that were not peer-reviewed under the workshop format as a substantive independent benefit/cost analysis had been completed within the evaluation period, The industry benefit arising from

MLA's investments in beef and sheep genetics and genomics for the period 2002-2012 was estimated by Abacus Bio and IDA Economics Pty Ltd in 2014.²⁷

Program objectives

The 2013-15 Business Plan for On-Farm Productivity (3.1) lists the following KPIs for investment in livestock genetics.

16.3 Objectives and KPIs for livestock genetics

Objectives	Key performance indicators
1. Provide genetic and genomic evaluation tools and information for cattle, sheep and goat breeding enterprises	Develop information and tools that allow: <ul style="list-style-type: none"> ▪ Maternal and terminal ram breeders to maintain current rates of genetic gain, and maintain genetic merit for eating quality relative to 2010 ▪ Sheep meat breeders to increase lean meat yield by 2% in lamb ▪ Merino breeders to increase rate of genetic gain in Merinos by 25% over 2010 ▪ Beef breeders to double the weighted average rate of genetic gain in \$index across the major breeds ▪ Tropical beef breeders to achieve a significant positive genetic trend for fertility while increasing frequency of the polled gene and tenderness genes ▪ Goat producers to improve carcass weight, reproduction rate and reduce the impact of internal parasites

MLA Summary of Outputs against KPIs

Develop information and tools that allow:

1.1 Maternal and terminal ram breeders to maintain current rates of genetic gain, and maintain genetic merit for eating quality relative to 2010

- Achieved (Sheep Genetics)
- Outputs include:
 - o New genomic tests + improvements to LAMBPLAN genetic analysis
 - o Extension and capacity building
 - ... Service provider training, leading breeder conference, regional forums, on-farm visits
 - Improved delivery of tools through website upgrades
- Evidence: Sheep Genetics annual report 2015 (draft only) + trends²⁸

1.2 Sheep meat breeders to increase lean meat yield by 2% in lamb

- Partially Achieved (Sheep CRC / MLA)
- Outputs include

²⁷ MLA Report B.EVA.0001 & B.EVA.0002: *Evaluating the impact of animal genetics and genomics RD&E investment 2014*.

²⁸ <http://www.sheepgenetics.org.au/About-us/Annual-report>

- genomic breeding values for lean meat yield,
 - Participatory R&D through producer demonstration site program
 - New index accounting for Lean Meat Yield and Eating Quality
 - Evidence: results presented at Sheep Genetics Leading Breeder forum 2015²⁹
- 1.3 Merino breeders to increase rate of genetic gain in Merinos by 25 per cent over 2010
- Partially Achieved (Sheep Genetics)
 - Outputs include:
 - New genomic tests + improvements to LAMBPLAN genetic analysis
 - Extension and capacity building
 - ... Service provider training, leading breeder conference, regional forums, on-farm visits
 - Improved delivery of tools through website upgrades
 - Evidence: Sheep Genetics annual report 2015 (draft only) + trends
 - Note that while Merinos have only improved by 10 per cent, the number of animals pa have increased by 7 per cent each year over the past 5 years³⁰
- 1.4 Beef breeders to double the weighted average rate of genetic gain in \$index across the major breeds
- Achieved (MLA + ABRI + Breed Societies)
 - Activities documented in the SBTS / TBTS reports include:
 - Undertook extension activities and provided technical support to implement both new and existing BREEDPLAN related technologies.
 - Undertook regular extension initiatives to inform the seedstock and beef breeding industry in general on the relevance and application of DNA technology for accelerating genetic progress in economically important production traits.
 - Maintained and supported the Selection Indexes published by Stakeholder Breed Associations to ensure they remain relevant to current and future markets and production systems.
 - Defined Key Statistics (KS) for genetic progress in beef seedstock herds and develop an automated process of reporting the KSs.
 - Maintained and expanded the extension material relating to BREEDPLAN related technologies, particularly the new tools.
 - Evidence: SBTS/TBTS annual reports + trends
- 1.5 Tropical beef breeders to achieve a significant positive genetic trend for fertility while increasing frequency of the polled gene and tenderness genes.
- Achieved (MLA)
 - Revision and commercialisation of genomic Poll test, with 12,780 sold at June 2015³¹

²⁹ <http://www.sheepgenetics.org.au/Resources/Leading-Breeder-2015>

³⁰ <http://www.sheepgenetics.org.au/About-us/Annual-report>

- Launch of genomic test to predict fertility (Days To Calving EBV) with 960 tests sold at Oct 2015³²
- TBTS has significantly increased the number of fertility records supplied to BREEDPLAN — with the increased number of records supplied since January 2013 listed in table 16.4 below.

16.4 Increase in fertility records for tropical cattle

	Brahman	Santa Droughtmaster	Belmont Red	Brangus	
Natural	31 298	4 988	181	1 725	67
AI (Observed Heat)	65	3		194	11
AI (Fixed time)	930	24		31	
Pregnancy Test	5 808	1 662	829	966	27
Total	38 036	6 677	1 010	2 916	105

1.6 Goat producers to improve carcase weight, reproduction rate and reduce the impact of internal parasites

- Achieved (MLA)
 - Development of a KIDPLAN website ³³
 - Operational upgrade of KIDPLAN support materials ³⁴
 - Proof of profit through Boer Select Buck Evaluation Program ³⁵

Outcomes, in terms of changes in the rate of genetic gain and estimated industry benefit, are summarised in the next section for the beef and sheep industries. The outputs for the goat breeding sector are unlikely to generate significant benefit without further MLA investment beyond 2015.

³¹ <http://www.mla.com.au/Research-and-development/Search-RD-reports/RD-report-details/Animal-Welfare/Genetic-markers-for-polled-African-Horn-and-Scurs-genes-in-tropical-beef-cattle/134>

<http://www.mla.com.au/Research-and-development/Search-RD-reports/RD-report-details/Animal-Health-and-Biosecurity/Polled-gene-marker-refinement-Refinement-of-the-CSAFG29-Microsatellite-Marker-Test-for-Polled/188>

³² http://www.brahman.com.au/technical_information/reproduction/IncorporationOfGenomicValues.html

³³ <http://www.sheepgenetics.org.au/Breeding-services/KIDPLAN-Home>

³⁴ <http://www.mla.com.au/Research-and-development/Search-RD-reports/RD-report-details/Extension-Producer/Operational-upgrade-of-KIDPLAN-materials/301>

³⁵ <http://www.mla.com.au/Research-and-development/Search-RD-reports/RD-report-details/Productivity-On-Farm/Boer-Select-Buck-Evaluation-Program/2846>

*Evaluation of performance / industry impact*³⁶

Inputs

The technology platforms that deliver continuous improvement in genetic gain to beef (BREEDPLAN) and sheepmeat producers (LAMBPLAN, MERINOSELECT) are well established, with international reputations as amongst best-in-class in their field.

Over the 5 year evaluation period 2010-2015, increased annual co-investment in underpinning RD&E and new innovation came from industry sources when compared with the previous decade reviewed by Abacus Bio — with the cessation of the Beef CRC, this was largely coordinated through MLA and the leading national genetics R&D agency AGBU (Animal Genetics and Breeding Unit), a joint venture between UNE and NSW DPI). Major project investments are shown in the table 16.5 below (in nominal dollars).

This increased investment came from the larger beef breed societies that invested \$5.8 million over the evaluation period, primarily in breed-specific beef information nucleus projects (BINs), matched with government investment via MDC funding through MLA. BIN herds allow progeny testing of leading young sires within the breed, generate phenotypic information for new EBVs for hard-to-measure traits, and are essential to calibrate DNA markers which hasten genetic gain through more accurate EBVs and lower generation interval. The beef breed societies also collectively invested with MDC support in the Tropical (TBTS) and Southern Beef Technology Services (SBTS) to provide extension services to breeder members and their commercial clients.

In addition to annual ‘core’ funding provided by MLA and AWI to AGBU, significant additional levy funds were invested over this period through the Beef CRC III (2011-12) and Sheep CRC II & III (2011-15) programs related to genetic improvement. MLA invested significantly in two genetic fertility projects after the closure of the Beef CRC to refine and develop new genetic tools for breeders from CRC research, particularly related to improving fertility in tropical breeds.

Meat sheep and Merino breeders continued to fund their routine services via service fees to Sheep Genetics.

In addition to this direct cash investment into R&D programs, there was also extension and advisory support which has not been recorded as part of these programs (for example, MLA’s *Making More from Sheep* and *More Beef from Pastures*), as well as the investment and operational costs of stud breeders in data collection for BREEDPLAN, LAMBPLAN and MERINO SELECT, and the on-farm implementation costs for stud and commercial breeders adopting the findings of R&D.

³⁶ The assistance of Dr Robert Banks, Director of the Animal Genetics and Breeding Unit, UNE, in developing the use of industry \$index values as a new approach to assessing the returns from investment in livestock genetics RD&E is also gratefully acknowledged.

16.5 Cash investment in genetics RD&E for beef and sheepmeat industries 2010-11 to 2014-15 (nominal \$)^a

Investor/Project	10/11	11/12	12/13	13/14	14/15	Grand Total
Beef	\$ 2,839,676	\$ 3,546,295	\$ 3,622,474	\$ 4,251,957	\$ 3,449,411	\$ 17,709,813
Breed Societies	\$ 863,888	\$ 1,214,898	\$ 1,356,837	\$ 1,356,763	\$ 1,017,546	\$ 5,809,932
Angus BIN	\$ 315,650	\$ 315,650	\$ 315,650	\$ 315,650	\$ 315,650	\$ 1,578,248
Brahman BIN	\$ 128,667	\$ 187,847	\$ 258,334	\$ 293,383	\$ 237,866	\$ 1,106,097
Charolais BIN	\$ 63,662	\$ 63,662	\$ 64,571	\$ 64,571		\$ 256,467
Herefords BIN	\$ 118,409	\$ 225,555	\$ 240,025	\$ 221,773	\$ 79,445	\$ 885,206
Herefords Black Baldy					\$ 46,902	\$ 46,902
Limo BIN	\$ 142,479	\$ 258,098	\$ 233,167	\$ 158,522		\$ 792,266
SBTS	\$ 95,021	\$ 127,049	\$ 130,188	\$ 135,041	\$ 243,389	\$ 730,688
TBTS		\$ 37,037	\$ 76,158	\$ 79,399	\$ 81,713	\$ 274,306
Wagyu Stage 1			\$ 38,745	\$ 88,425	\$ 5,373	\$ 132,543
Wagyu Stage 2					\$ 7,209	\$ 7,209
MDC	\$ 863,888	\$ 1,214,898	\$ 1,356,837	\$ 1,356,763	\$ 1,017,546	\$ 5,809,932
Angus BIN	\$ 315,650	\$ 315,650	\$ 315,650	\$ 315,650	\$ 315,650	\$ 1,578,248
Brahman BIN	\$ 128,667	\$ 187,847	\$ 258,334	\$ 293,383	\$ 237,866	\$ 1,106,097
Charolais BIN	\$ 63,662	\$ 63,662	\$ 64,571	\$ 64,571		\$ 256,467
Herefords BIN	\$ 118,409	\$ 225,555	\$ 240,025	\$ 221,773	\$ 79,445	\$ 885,206
Herefords Black Baldy					\$ 46,902	\$ 46,902
Limo BIN	\$ 142,479	\$ 258,098	\$ 233,167	\$ 158,522		\$ 792,266
SBTS	\$ 95,021	\$ 127,049	\$ 130,188	\$ 135,041	\$ 243,389	\$ 730,688
TBTS		\$ 37,037	\$ 76,158	\$ 79,399	\$ 81,713	\$ 274,306
Wagyu Stage 1			\$ 38,745	\$ 88,425	\$ 5,373	\$ 132,543
Wagyu Stage 2					\$ 7,209	\$ 7,209
MLA	\$ 1,111,900	\$ 1,116,500	\$ 908,800	\$ 1,538,430	\$ 1,414,320	\$ 6,089,950
AGBU - Beef R&D	\$ 631,900	\$ 676,500	\$ 798,800	\$ 821,700	\$ 742,600	\$ 3,671,500
Beef CRC III - Maternal Productivity	\$ 300,000	\$ 270,000	\$ 30,000			\$ 600,000
Beef CRC III - Northern Fertility	\$ 180,000	\$ 170,000				\$ 350,000
Genetic Fertility Predictors			\$ 80,000	\$ 60,000		\$ 140,000
Northern Fertility Project				\$ 666,730	\$ 671,720	\$ 1,328,450
Sheep	\$ 4,254,164	\$ 4,205,730	\$ 5,524,141	\$ 6,040,320	\$ 4,916,806	\$ 24,941,161
AWI	\$ 900,384	\$ 996,856	\$ 1,210,618	\$ 1,628,497	\$ 312,055	\$ 5,048,410
AGBU - Sheep R&D	\$ 96,935	\$ 100,100	\$ 106,105	\$ 115,500	\$ 95,350	\$ 513,990
Sheep CRC II	\$ 630,000	\$ 740,000	\$ 838,000	\$ 1,329,500		\$ 3,537,500
Sheep Genetics	\$ 173,449	\$ 156,756	\$ 266,513	\$ 183,497	\$ 216,705	\$ 996,920
Breeders	\$ 496,047	\$ 566,163	\$ 619,425	\$ 624,210	\$ 642,079	\$ 2,947,924
SG - Routine Evaluation	\$ 52,400	\$ 101,460	\$ 171,467	\$ 57,967	\$ 104,572	\$ 487,866
Sheep Genetics	\$ 443,647	\$ 464,703	\$ 447,958	\$ 566,243	\$ 537,507	\$ 2,460,058
MLA	\$ 1,385,798	\$ 1,326,890	\$ 2,294,054	\$ 2,461,774	\$ 2,400,912	\$ 9,869,428
AGBU - Sheep R&D	\$ 290,805	\$ 300,300	\$ 318,315	\$ 346,500	\$ 286,050	\$ 1,541,970
Sheep CRC II	\$ 883,000	\$ 835,000	\$ 1,250,000	\$ 941,000		\$ 3,909,000
Sheep CRC III					\$ 600,000	\$ 600,000
Sheep Genetics	\$ 211,993	\$ 191,590	\$ 325,739	\$ 224,274	\$ 264,862	\$ 1,218,458
Sheep Resource Flock			\$ 400,000	\$ 950,000	\$ 1,250,000	\$ 2,600,000
Sheep CRC	\$ 1,471,935	\$ 1,315,821	\$ 1,400,044	\$ 1,325,839	\$ 1,561,760	\$ 7,075,399
Sheep CRC II	\$ 1,471,935	\$ 1,315,821	\$ 1,400,044	\$ 1,325,839		\$ 5,513,639
Sheep CRC III					\$ 1,561,760	\$ 1,561,760
Grand Total	\$ 7,093,840	\$ 7,752,025	\$ 9,146,616	\$ 10,292,277	\$ 8,366,217	\$ 42,650,975

^a Note that significant in-kind investments from the many contributors to the CRCs and from QDAF into the northern fertility projects, plus MLA support costs, are not shown here.

Data source: Personal Communication with MLA (Sam Gill).

Methodology to estimate benefits

The complexities in evaluating marginal industry impact of MLA's major genetic improvement programs are well discussed in the Abacus Bio review, which emphasised that the impact of genetic improvement cannot be estimated directly in commercial flocks or herds.

Their methodology to assess the benefits of the investment in the period 2001-2012 included the following steps:

- generate genetic trends in recorded flocks/herds derived from EBVs (with the basic premise of a cumulative and permanent change from genetics)

- convert these trends to the genetic trend in productivity expressed as kilograms of carcase sold per female mated
- generate profit functions (including recognition of the additional cost of feed for heavier breeding females)
- estimate the impact for the commercial producer/industry with the key factors being level of adoption and the degree to which the commercial environment might limit the capture of the 'potential' genetic benefits calculated at the seedstock level (a 'realisation factor' of 75 per cent was assumed)
- assessment of a counter-factual position in terms of what might have happened had MLA not invested in the period from 2001-02 to 2011-12.

Because of the complexities involved with each of these steps across many breeds making very different rates of genetic gain, Abacus restricted their analysis of seedstock- level genetic gain to key traits directly rewarding commercial producers for increased meat production (that is, growth, adult size and fertility). In doing this, they acknowledged that their analysis ignored the 'total commercial value' or 'balanced trait' approach that drives the selection indexes used by the majority of beef and sheep seedstock breeders today.

This approach generates genetic improvement in additional traits that contribute to the total commercial value of a carcase (as opposed to kilograms carcase sold per breeding female), and underpins progress towards the development of value-based payment systems in the meat industry. For sheep, this includes traits influencing wool quantity and quality, worm resistance, meat yield and ewe longevity, and for beef, meat quality, meat yield, calving ease, gestation length, docility and residual feed intake.

An alternative methodology that estimates the economic benefit of genetic improvement in total commercial value' over time is based on an assessment of the change in \$index values reported by each breed society. An explanation follows of how \$index values are derived for beef cattle — the same process is used for ranking sheep on genetic merit for multiple traits.

How \$index values are derived

As livestock production has become increasingly market driven, seedstock breeders have met the demands of their commercial ram- and bull-buying clients by measuring more traits of commercial importance to those clients and balancing different market traits and herd production traits when selecting breeding stock.

Barwick and Yeates³⁷ described derivation of the \$index methodology as follows:

BREEDOBJECT was originally developed in 1992 as a selection tool for use with BREEDPLAN. It is a PC software package that helps with selection by drawing all the estimated breeding value (EBV) performance figures on a bull into a combined EBV for profit which describes how well that bull suits the user's purpose. BREEDOBJECT performs a trait-level analysis of what affects profit in the commercial herd that the user specifies. The user

³⁷ Barwick, S.A. and Yeates, A.P. (1997). Using BREEDOBJECT to help breed more profitable cattle. Proc. Assoc. Advmt. Anim. Breed. Genet. Vol12.

defines the herd by providing production and cost estimates about it via a questionnaire. The results of this financial analysis define the breeding objective, i.e., how much improvement of different traits is worth in the commercial herd. In a second step, all available information on genetic relationships is used by BREEDOBJECT to estimate the linear function of available EBVs that is most correlated with the objective. This function is the \$Index. It is an EBV for profit in the commercial herd. Ranking seedstock on their \$Index sorts them for their progeny's expected profitability in the user's commercial herd.

Note that because one step in this process involves estimating the likely distribution of the phenotypic expression of each trait in different commercial environments relevant to the specific index, it addresses the issue of commercial environment 'realisation' raised in the Abacus review (Banks, pers. comm.).

A \$Index is the sum of the EBVs of the animal, each weighted by:

- the marginal value of the trait (that is, income — cost associated with a unit change in that trait) in the users herd
 - multiplied by
- the number of expressions of the animal's genes (in future generations), each weighted by when they occur in time (by applying a reasonable discount rate for delays in when future expressions of inherited genes occur in future generations).

Thus a beef \$Index estimates the Net Present Value of the genes of the animal, expressed in terms of \$ per cow mated, and it provides the basis for estimating future industry-wide benefits from R&D investment that increases genetic gain in multiple traits.

Using changes in \$index values to estimate Return on Investment from MLA RD&E in beef genetics during 2010-15³⁸

All of the indexes used by beef breeds in Australia are derived using this method, and each follow a thorough procedure to identify the ways in which their cattle are valued in different markets, and the marginal values and discounted genetic expressions that arise in each case. Overall, there are 3-4 \$Indexes developed for each of the 8 main breeds in Australia, and the indexes reflect the different market pathways for sale progeny in those breeds. The Sheep Genetics evaluation service develops similar indexes for meat, wool and dual purpose sheep breeds.

The \$index value for a particular bull is an overall EBV for 'Profit per Mating' expressed in Net Present Value terms, and can be used to directly compare different bulls for potential ROI for supplying progeny to a particular market. The individual \$index values will change in each year of a bull's life as the component trait EBVs become more accurate or new trait information is added.

The overall weighted average \$Index value for a particular year is the average \$Index value of recorded seedstock animals available for mating in that year in a particular breed or breed group (for example, British breeds, Euro breeds, Tropical breeds or all breeds), averaged across the 3 or 4 indexes used by that breed or by all the breeds comprising the breed group).

³⁸ R. Banks. (pers comm)

This is thus an aggregate measure of the future genetic value available to the industry, on a 'profit per mating' basis. The trends in weighted average \$index (all breeds) across years provide a measure of how this potential future genetic value is changing, that is a measure of the rate and value of genetic improvement. The actual future industry benefit from using these bulls depends on the numbers of matings to commercial cows each year.

Table 16.6 contains the actual data on numbers of animals enrolled in BREEDPLAN for Australasia, plus the weighted average genetic trend.

The annual industry \$ increment is calculated as the number of enrolments by the increase in genetic merit on the previous year for each sector, each then weighted by the following assumptions about proportion of enrolments that are bulls, and cows mated per bull lifetime (table 16.6)

16.6 Genetic merit - key assumptions for \$ increments

	British	Euro	Tropical
Bull ratio (bulls as proportion of total enrolments)	0.55	0.67	0.7
Lifetime matings	125	125	100

A counterfactual scenario for what might have happened during 2010-15 without MLA funding is one in which the industry \$ increment continues through 2010-2015 at the same rate as 2005-10.

Note that the magnitude of the annual \$ increment, although positive each year, was actually declining through the period to 2010, because the increase in the rate of genetic progress did not offset a significant decline in enrolments.

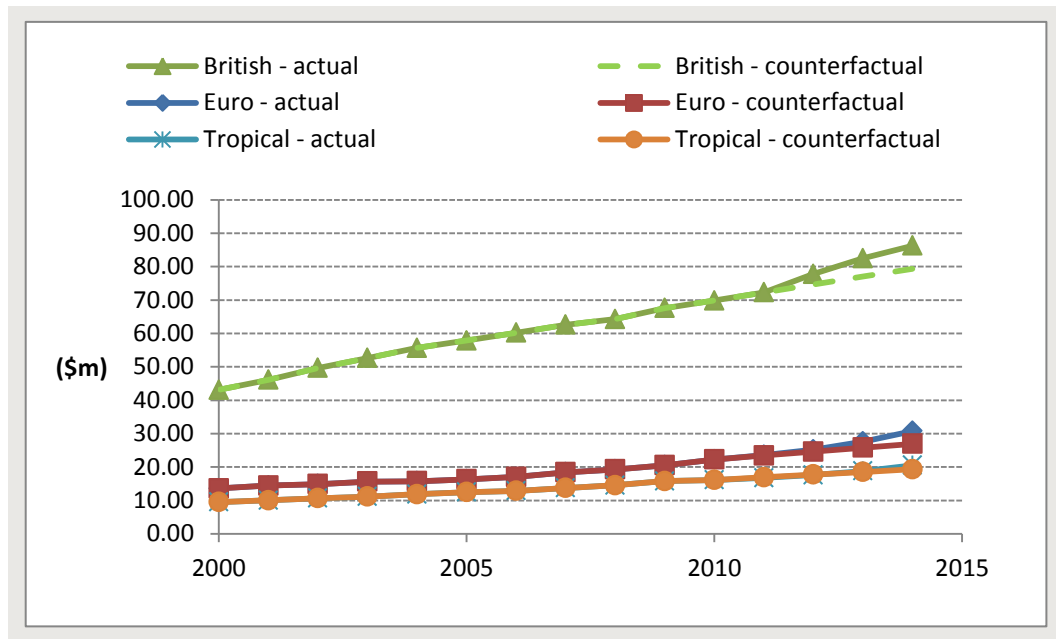
The industry \$ increments for the actual and the counterfactual can then be accumulated — reflecting that they are cumulative, and this is shown in chart 16.7.

The difference between the 2 lines in each sector is the extra value of what actually happened, compared with what would have happened if the 2005-2010 trend had continued.

The total value of the differences in cumulative value is the last column in the table 16.11, and is \$130.67 million. This is the estimated Net Present Value of faster genetic improvement developed through the period 2010-2015, which will largely be realised beyond 2015.

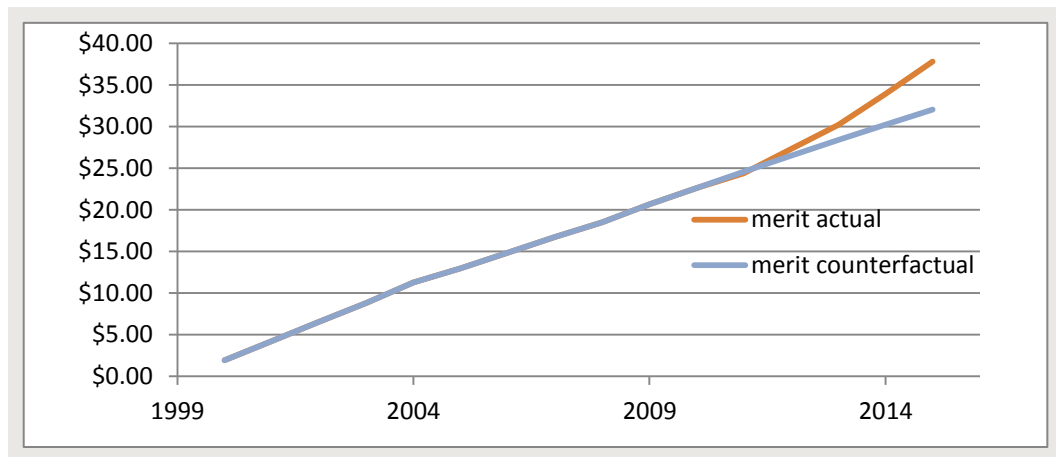
The data used for the previous section also show the actual weighted average genetic merit values, shown in chart 16.8. This illustrates that there has been a steady increase in rate of genetic gain through the period 2010-2015, and this occurred in northern and southern breeds.

16.7 Cumulative Industry Value –actual and counterfactual



Data source: Rob Banks Personal communication

16.8 Actual and counterfactual weighted across breeds



Data source: Rob Banks Personal communication

The most likely explanation is the strong focus during this period on the message of how to get the most out of genetic improvement, rather than simply having EBVs and \$Index values for clients, through the very significant co-investment of breeders (through their breed societies) in BINs, SBTS and TBTS, and through MLA’s southern industry extension programs such as Evergraze and More Beef from Pastures. These have resulted in:

- a steady improvement in recording multiple traits (in addition to basic weight and weight gain) by breeders, which in turns means that the accuracy of EBVs rise, which in turn means that faster progress is possible
- breeders becoming more confident and willing to pick the best animals on \$Index as stud sires and dams.

- stronger demand for this information from commercial bull buyers.

A major contributor to this trend has likely been the fact that Angus cattle, and to a lesser extent Wagyu, have become an increasing proportion of the total population of recorded seedstock (and therefore in the makeup of the weighted average \$ index), breeds in which multi-trait recording is essentially mandatory.

A further contributing factor has likely been major breed societies investing more in running BREEDPLAN international benchmarking comparisons, so that their members have become steadily better at identifying the best genetics to import based on objective, and more accurate, performance measures.

To what extent are \$Index-based estimates of value reflected in changes in commercial herd profitability or Total Factor Productivity?

As noted above, \$Indexes as calculated in BREEDOBJECT are Net Present Values. Thus the calculation of \$ increment over time captures all future flows of net benefits that are estimated to flow to the commercial industry from use of these recorded breeding stock.

Commercial beef producers will only 'see' a small portion of these future benefits in any one year or over a short period of time because:

- improved genes impact on future productivity as they are inherited and expressed in succeeding generations – the expression in each future year or generation depends on the trait involved. In terminal sire systems where all progeny are sold, 100% of the value of genetic gain is potentially captured in the first generation of progeny, whereas in systems where heifers are retained for breeding, 64 per cent will be expressed in the F1 generation, 26 per cent in F2, and 9 per cent in F3 generations (when discounted for time)
- the \$index NPV is based on whole of chain value, which means that producers using BREEDPLAN-recorded bulls will only capture benefit for improvements in those traits which reduce costs or for which they receive payment through current livestock and carcase payment systems - this depends on the production system and target market. In simple terms commercial producers would be expected to retain most of the benefits of improving fertility and a significant share of growth rate, feedlots capture a significant portion of the benefits of feed efficiency and probably marbling, and retailers and consumers receive much of the benefits of increasing retail yield and eating quality. Generally 24-34 per cent of the benefits from improving on-farm productivity are estimated to be retained by the producer sector.
- genetic variation in gross margin is only a proportion of the variation that producers see in practice because year-to-year variation in weather, prices, etc adds greater variation in observed enterprise gross margins and profitability;
- not all commercial producers adopt BREEDPLAN — there are large differences between enterprises in the extent to which they use top genetics and capture benefits;
- in addition to point 4, variations in management skill determine the degree to which improved genetic potential will be expressed in terms of greater productivity.

- Note that although this is often considered as a major cause of ‘loss’ between the genetic potential measured by seedstock producers and the average amount actually realised on commercial properties, and may be a significant issue under drought conditions, the Regional Combinations project in Beef CRC III showed that for growth and carcass traits there was essentially no dilution effect, at least under average commercial production conditions. In addition, as described above, the development of a \$index explicitly involves estimating the expected profitability in the user’s commercial herd of each component trait, including consideration of the degree to which environment will influence the expression of the trait, for example for energy intake and marbling.
- the \$Index trends are based on assumed constant prices and costs, whereas producers see both those variables changing. A standard approach is used in \$Index formulation in genetic improvement programs worldwide, typically incorporating a recent average for both income and cost, over the last, say, 5 years.

Using changes in \$index values to estimate Return on Investment from MLA RD&E in sheep genetics during 2010-15.

The same process was used to estimate industry \$ increments from average weighted \$ index values for terminal breeds, maternal breeds and merinos recorded in the Sheep Genetics database. As for beef, \$index values reflect whole-of-chain value and are expressed as NPVs in \$2014, in this case with a discount rate of 7 per cent. The results are summarised in the following tables 16.9 and 16.10.

Total Industry Returns from Genetic Improvement (before considering counterfactual):

16.9 Total Industry Returns from Genetic Improvement (before considering counterfactual):

Years	Total industry value of genetic improvement			Total
	Terminals	Maternals	Merinos	
	\$m	\$m	\$m	\$m
to 2000	65.72	22.23	63.88	151.83
2001-2005	142.46	61.37	122.48	326.31
2006-2010	265.15	157.42	261.62	684.19
2011-2014	308.97	234.00	333.29	876.26
1990-2014	782.29	475.02	781.27	2 038.57

Note: 2014 is an incomplete report, as approximately 67% of records expected are reflected in the trend data to hand. If the data were extrapolated for the additional 33% of records, the total value for 2014 would rise by c. \$10m

16.10 Cumulative industry \$ value 2010-2015: actual – counterfactual

Year	Cumulative industry value of genetic improvement			Total
	Terminals	Maternals	Merinos	
	\$m	\$m	\$m	\$m
2010	\$0.00	\$0.00	\$0.00	\$0.00
2011	-\$0.82	\$1.06	-\$2.10	-\$1.86
2012	-\$1.15	\$4.51	-\$5.24	-\$1.87
2013	-\$0.84	\$8.76	-\$2.85	\$5.07
2014	\$5.33	\$21.64	\$4.01	\$30.98

Note: 2014 is an incomplete report, as approximately 67% of records expected are reflected in the trend data to hand. If the data were extrapolated for the additional 33% of records, the total value for 2014 would rise by c. \$10m

The total value of the differences in cumulative value is \$30.98m, the estimated Net Present Value of faster genetic improvement through the period 2010-2015.

In this case the counterfactual chosen was the extrapolation of the 2000-2010 trend in actual weighted average \$index values through the 2010-15 evaluation period. This is problematic for the following reasons:

- the 2014 data is incomplete, as noted above. This has been partially accounted for by assuming that the total enrolments for 2014 would be the average of the previous 4 years.
- The selection direction for terminal breeds changed significantly during the evaluation period reflecting new information on Eating Quality and Lean Meat Yield EBVs. These traits are not yet incorporated into industry \$Indexes.
- Both the Total Values and the comparison with counterfactual reflect declining total numbers enrolled, which to some extent reflect declining ewe numbers in the national flock, plus incomplete records in the final two years. This occurs because recording animals is a 2 year + process and many breeders do not provide information until the time of measurement – thus the 'final' index values and numbers for the 2014 year are only known at the end of 2016 (the same problem occurs in using the beef \$index values to evaluate return of investment for a recently-completed period)
- In addition, the large Merino Validation project during 2005-2010 period is thought likely to have transiently inflated values for Merinos over that period
- For these reasons the \$Index trend values for 2000-2010, which are slightly lower than for 2005-2010, has been used as a means of taking account of these factors in the counterfactual, without actually modelling some more pessimistic scenario of decline in ewe numbers leading to decline in animals enrolled, especially in Merinos. This would provide a more robust estimation, but is beyond the scope of this impact review.

16.11 Data for Calculation of benefits from genetic improvement for cattle (actual #s and weighted average genetic trend)

Year	# animals enrolled	Weighted average genetic merit actual	Weighted average genetic merit - counterfactual	delta G - actual	delta G counterfactual	industry \$ increment: actual - counterfactual	cumulative industry \$ value: actual - counterfactual
		\$31.50	\$31.50				
2000	169,302	\$33.75	\$33.75	\$2.24	\$2.24	\$0.00	\$0.00
2001	171,084	\$36.42	\$36.42	\$2.67	\$2.67	\$0.00	\$0.00
2002	173,259	\$39.07	\$39.07	\$2.65	\$2.65	\$0.00	\$0.00
2003	159,323	\$41.29	\$41.29	\$2.22	\$2.22	\$0.00	\$0.00
2004	166,994	\$43.05	\$43.05	\$1.76	\$1.76	\$0.00	\$0.00
2005	169,855	\$44.69	\$44.69	\$1.65	\$1.65	\$0.00	\$0.00
2006	169,145	\$46.08	\$46.08	\$1.39	\$1.39	\$0.00	\$0.00
2007	161,583	\$47.54	\$47.54	\$1.46	\$1.46	\$0.00	\$0.00
2008	164,184	\$49.01	\$49.01	\$1.47	\$1.47	\$0.00	\$0.00
2009	159,483	\$51.38	\$51.38	\$2.37	\$2.37	\$0.00	\$0.00
2010	155,644	\$53.53	\$53.53	\$2.15	\$2.15	\$0.00	\$0.00
2011	165,479	\$56.65	\$55.29	\$3.12	\$1.76	\$0.26	\$0.26
2012	161,561	\$61.25	\$57.05	\$4.60	\$1.76	\$25.99	\$26.25
2013	145,025	\$66.60	\$58.81	\$5.36	\$1.76	\$43.23	\$69.47
2014	156,927	\$68.28	\$60.56	\$1.68	\$1.76	\$61.20	\$130.67

Note: The number enrolled for 2014 has been estimated as the average for the years 2000 to 2013, and the weighted average genetic merit actual for 2014 is predicted from the actual trend for years 2009-2013 for the British breeds

Impact Assessment

16.12 MLA Impact – benefits and investments^a: 3.1 On-farm productivity

	Support on-farm productivity
	3.1
Expected benefits	
Red meat industry net income - total ^b	349
– 2010-11 to 2014-15	19
– > July 2015	330
Red meat gross value of production- total ^c	458
– 2010-11 to 2014-15	31
– > July 2015	427
Actual investment	
– 2010-11 to 2014-15 inclusive	130
Benefit cost ratio	
Red meat industry net income - total	2.7
Red meat gross value of production - total	3.5

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Saleyard equivalent GVP excluding processing (basis for levies). ^d Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

16.13 MLA Impact – benefits in terms of red meat net income^a: 3.1 On-farm productivity

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	
3.1 On-farm productivity	0	349	349	2.7
– % of impact benefits	0	100	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

16.14 MLA Impact – benefits in terms of GVP^a: 3.1 On-farm productivity

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	
3.1 On-farm productivity	0	458	458	3.5
– % of impact benefits	0	100	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

16.15 Budgets for On-farm productivity

Budgets by Program	\$,000		\$,000		\$,000		\$,000		\$,000		\$,000	
	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
3.1 Identify and deliver opportunities to increase on-farm productivity												
3.1 Identify and deliver opportunities to increase on-farm productivity (producer elements only - no feedlots or processors)	11,559	10,527	12,660	13,990	14,110	14,767	14,317	14,929	13,085	14,472	65,731	68,685
Less 3.1.3.2 Increase producer capacity to make management decisions based on more precise information and lead to improved market compliance	-452	-438	-364	-397	-539	-541	-364	-614	-614	-849	-2,333	-2,840
3.5 Increase producer engagement with MLA tools and information to support productivity – (producer elements only - no feedlots or processors - apportioned across programs)	3,621	2,833	3,678	2,753	4,709	4,067	4,834	4,685	5,168	4,875	22,011	19,213
MLA Donor Company projects	0	3,850	0	3,385	0	3,110	0	4,106	0	4,923	0	19,373
Overheads (Corporate Services / Communications)	1,947	1,676	1,688	1,916	1,549	1,667	1,665	1,625	1,669	2,076	8,518	8,960
TOTAL	16,675	18,448	17,662	21,646	19,829	23,070	20,453	24,731	19,309	25,496	93,927	113,391

17 3.2 Off-farm productivity

Top Line result – MLA expenditure on the Off-farm Productivity portfolio provide industry returns of \$323 million, from expenditure of \$69m with a BCR of 4.7:1

Tables 17.3, 17.4 and 17.5 provide a summary of the payoffs from investment in the *Off-farm Productivity* portfolio.

17.1 MLA Impact - benefits and investments^a: 3.2 Off-farm productivity

		Off-farm productivity
		3.2
Expected benefits		
Red meat industry net income - total ^b	\$m	323
– 2010-11 to 2014-15	\$m	114
– > July 2015	\$m	209
Actual investment^c		
– 2010-11 to 2014-15 inclusive	\$m	69
Benefit cost ratio		
Red meat industry net income – total		4.7

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

Summary

Overall, the workshop was supportive of investments made under the program over the evaluation period. Benefits of the successful investments have provided a significant payoff for the wider industry.

- The assessment of the workshop was that the performance of the program had improved significantly compared to the previous planning period. A key driver of this outcome was the shift of investment out of the general levy program into joint investments with individual enterprises through the MLA Donor Company (MDC).
- The benefits from innovations in processing plants are largely from improvements in meat yield, with secondary benefits from savings in labour and WHS costs.
- Failed investment areas helped to better identify areas that are unlikely to have payoffs for the wider industry.

- Significant triple bottom line benefits were generated by the program through the investment in BLADESTOP. With conventional bandsaws there is about a 15-20% chance of injury per saw per year. BLADESTOP prevents these injuries from occurring.
- Program impact was measured at \$323m (net industry income) with a BCR of 4.7:1. Some 35% of the benefit accrued during the assessment period with 65% to be captured in coming years.

17.2 Benefits identified by the workshop by portfolio outputs^a

z	MLA contributions	Higher yield	Labour and OHS savings	Type of benefit	
				Throughput and energy savings	Social license
Leap III, IV and chining	New technology	***	*	*	
Spray Chilling	'De-risk' existing technology	***			
BladeStop	New technology		**		

^a More stars indicates greater impact/benefits.

Objectives from MLA 5 year business plan

Develop tools, services and solutions that will help the processing sector to improve their productivity & profitability while minimising net costs.

Develop occupational health systems and measures meeting the expectations of industry, government and the community.

MLA Summary of Program Outputs and Outcomes

MLA's program investment addresses market failure in the development of supply chain technology

Technology providers have been shown to be highly unlikely to invest in the development of processing technology primarily due to the high R&D cost, the associated risk, the significant lag in adoption and resulting low commercial return.

Adoption barriers include reluctance to embrace change in complex and highly optimised traditional manually operated plants, lack of physical space for automation systems, disruption during implementation, and reluctance to long term investment in view of livestock variability and changing processing specifications.

Many plants would view themselves as 'fast followers' once all technical risk was addressed, and an example of an operational production system was sighted. Plants, while strong in operational capability, often lack technology development and support capability – both factors exacerbating adoption lag.

Providers are well aware of the equipment cost barrier to adoption, due to:

- Very high return on investment (ROI) expectations of processors for their technology investments (required payback period less than 2 years, and generally less than 12 months),
- Tight profit margins (3% on turnover IBIS 2010),
- Unplanned business critical investments in food safety and environmental protection,
- High business risk due to uncontrolled variables such as exchange rate exposure and livestock supply restrictions due to drought.

MLA has worked with service providers on innovative business models to address and mitigate the above, including:

- Facilitated adoption, whereby the technologies are placed in a production environment for in-plant R&D and to demonstrate benefit. These also manage technical risks by acting as a platform for in-plant development and optimisation, and manage adoption risk by tangibly demonstrating to processors the commercial and practical feasibility of its use.
- Focus on high return technologies (less than 2 year payback).
- Innovative purchase models (rental or lease, 'try before you buy').
- A focus on independent ex ante and ex post cost/benefit analyses to demonstrate that the expected returns have been achieved.

These approaches have successfully addressed the above, with:

- Technologies evolving into third generation designs (LEAP III Version 1 at CRF Colac, to LEAP III Version 2 at Finegand New Zealand, to Version 3 at Sunshine Australia),
- Comparison of differing solutions to the one task area (for example, ROC versus LEAP),
- Proving that certain technologies were not technically or commercially viable at this stage (for example, beef splitting).

Innovation sourcing

MLA attempts to scan for, and import, applicable technologies from outside Australia. With the exception of spray chilling and the successful collaboration with Scott Technology in New Zealand, technology transfer has had limited impact and very few successes. Key reasons include:

- Red meat industries in other countries either have lower labour costs (USA, South America) or smaller scale plants (Europe). Hence there has not been the incentive to develop sophisticated automation solutions for transfer to Australia.
- Where automation technologies exist for example, pork industry in Scandinavia, modification of these for Australian livestock has been technically challenging and largely unsuccessful owing to the difference between these species. Technology transfer of non-meat technologies for example, HookAssist cobotics have been even more challenging due to harsh operating environment within meat plants.

- The Australian red meat industry is a very small market for automation compared to other industries and countries, with a very long R&D development time frame (5-10 years) before commercial sales are viable. Examples include LEAP primal cutters and BladeStop, none of which would have been successfully developed for Australia without co-funding from MLA.

Hence, while MLA continues to work with overseas sourced technologies, the outcomes of the last five years support a conclusion that a low level of technology transfer would exist in the absence of MLA direct investment and capability building of local suppliers.

While there were no sophisticated automation suppliers to the Australian meat industry prior to MLA's investment in this area, this has been successfully addressed via MAR and Scott Technology as commercial providers and strategic partners.

Contribution of strategic technology partners

The program has maintained and developed the relationship between technology providers, industry partners and MLA.

Red meat innovation was maintained as a key element of Scott Technology's (STA) commercial program offering, approximately, 15% of their business. Given the financial size, technical complexity, and risk, associated with the red meat program, it is pleasing to note Scott's continued focus and commitment to providing solutions, and with their ability to apply appropriate resources given they are a substantial NZ publicly listed entity.

Similarly, Machinery Robotics & Automation (MAR) maintained their commitment to the industry (also, approximately, 15% of business), with both collaborative R&D to develop new solutions, and commercial successes with their lamb automation (brisket cutter, vacuum sanitising) and safety equipment (BladeStop™).

The value created by the program was well demonstrated in 2014 with the merger of both the Scott's and MAR businesses, including Applied Sorting, to consolidate the capabilities and technology intellectual property, to better serve their stakeholders and the red meat industry. This was further validated with the 2015 announcement of the intended investment by JBS in the merged automation business. This private investment in red meat technology development and commercialisation all contributes to the positive growing momentum of technological change sweeping the sector.

Workshop evaluation of performance / industry impact

It was noted that the portfolio's overall strategy was based on:

- develop the technology
- work with strategic partners
- measure performance against KPIs
- identify evolving insights throughout the period.

Key initiatives in value chain technology were:

- spray chilling (15 beef and 4 lamb plants)
- lamb automation (chining/deboning), under the 'Leap' technologies, restricted to small stock at the moment
- BladeStop
- manual assist automation (beef puller).

The program benefits identified were increased yield and throughput and risk mitigation of evaluation and implementation of the technology.

- A significant component of the benefits is improved cutting accuracy in boning rooms.
- Over 90 per cent of the benefits come from the top 6 technologies as detailed below.

Leap III

At this stage, this technology is restricted to small stock, largely because carcasses are more uniform with higher throughput than for cattle. The key benefits of this technology are:

- increased yield (from scalloped as well as linear cutting) compared to manual boners who fatigue through the shift
- improved time management by freeing up the labour of senior sawmen, who are generally skilled and experienced, to move to other tasks; supervising the machine or provide backup in case the machine breaks down³⁹
- increased throughput in the boning room (the target throughput is 10 carcasses per minute for one processor)

In facilities where the technology is currently installed, Leap III sets the 'tone' in the boning room and dictates what throughput is possible for following manual or automated operations such as LEAP IV or a standalone chining machine.

In terms of demonstrated ex-post benefits for LEAP III within a large plant: net benefits were \$1.62 per head comprised of:

- 62 cents per head — improved cutting accuracy and reduced bandsaw dust
- 60 cents per head — scalloped cut/shelf life
- 20 cents per head — higher throughput
- 19 cents per head — lower labour costs
- plus 10 cents per head for maintenance and other costs⁴⁰.

Apart from increased yield, there were improved WHS outcomes (for example, 4 people would be removed from saws) plus small savings in labour and consumables.

³⁹ It was noted that these skills need to be maintained in case of breakdowns etc.

⁴⁰ The final report on LEAP III can be found in MLA report P.PIP.0327 and provides a range of net benefits depending on the plant processing specifications and throughput assumptions.

In terms of the capital cost of the technology: Leap III is commercial, with its capital cost at around \$2.69 million. In terms of additional costs, there are site-related costs which could be negligible for a greenfield site or could be similar to the purchase cost for a retrofit installation.

Greenleaf has done the majority of evaluation in this area:

- there were ex-ante benefits of \$2.04 per head for Leap III
- up to \$5 per head benefit for tandem Leap III and IV
- these may be higher with improved lamb prices.

It was discussed whether some of the benefits may be on the high side, depending on the baseline accuracy of manual boning lines now, but the following observations were made:

- boning accuracy changes over the shift and falls away to the end
- benefits could be in the order of \$1.50 for Leap III and \$3 per head for tandem Leap III and IV.

On the costs side, downtime is an issue especially following installation and the following period where:

- there is adjustment required (change management) while staff come to grips with the new machine
 - staff need to be ‘comfortable’ with the technology
 - the head sawman is one of the most experienced and important roles — a machine is replacing a highly skilled but hazardous job
- increased maintenance is required (engineers also are required to develop additional skills and become familiar with component parts that are likely to fail).

It was agreed that downtime was generally small. For example, downtime for Leap III could be 15 minutes per week, during which time they revert to manual boning.

- Overall, the workshop confirmed/were comfortable with the magnitude of benefits presented in the workshop paper.

Adoption

MLA presented an adoption target of one new installation per year until 2020, this was subsequently discounted to 0.75 new installations per year.

Lessons learnt

The workshop outlined a number of additional benefits, including:

- the capacity to attract a commercial partner into this space, which has proved to be successful
- it is anticipated that there will be significant spillovers from lamb to beef in the future, while recognising that the first installation of LEAP III was unsuccessful
- modularisation of LEAP could prove to be of benefit for smaller plants especially a ‘tower’ version of LEAP III such as the standalone chining machine

- the MDC facility has provided the opportunity to test and evaluate the technology at lower cost for processors
 - Payback periods of 1.25 years were cited.
 - Risk is an important consideration.
- in addition, royalties would be earned on sales in Australia or overseas would be in the range of 3 to 8 per cent of the machine's sales revenue.

Leap IV

LEAP IV rack and loin boning, was designed to integrate with LEAP III, especially in high throughput plants.

- The net benefits of \$2.95 per head from improved accuracy are high where chine removal represents about half of this benefit. ⁴¹
- With gross benefits of \$3.13 per head, there are marginal economic benefits from WHS and labour savings (although the social benefits from improved WH&S outcomes should not be ignored).
- There would be a 3-4 month payback period for a \$2.1 million investment.
- Possible annual throughput would be in the order of 1.2 to 2 million head.

Chining machine

The benefits are improved accuracy and yield. The workshop identified the following benefits:

- improved yield — \$1.02 to \$1.40 per head
- labour — \$0.15 per head
- gross benefit — \$1.17 to \$1.58 per head
- net benefit — \$1.16 to \$1.56 per head.

Therefore, the benefit would be in the order of \$1 to 1.4 million per plant for chining.

Spray chilling

The benefits from spray chilling are improved yields from a reduction in loss from 2 to 0.5 per cent of the carcass weight. These improvements are from an investment of \$1 to \$1.5 million per plant.

- Comments were made that the yield improvements used by MLA could be conservative but every plant and their chillers are different. Older sites could have 2.3 to 3 per cent shrinkage.
- The analysis prepared for the workshop was straightforward: 300 kg cwe, 75 per cent boning and average return \$6.40/head.

⁴¹ This component can be sold as a standalone machine.

The most significant barrier to the adoption of spray chilling were perceptions around the impact on shelf life, which is a competitive advantage for the Australian industry.

Without MLA investment case

A key assumption of the benefits identified in the workshop paper was that MLA investments in this area brought forward industry adoption of spray chilling by 3 years. This is in contrast to the ACIL Allen's evaluation which used an estimate of less than 3 months.

- One processor noted that the first trial-site was installed in one of their plants in 2008, through an MDC funded partnership project (PIP), and then expanded to the majority of their remaining sites after 2010. That is, the original investment 'tipped' the decision for this company.
- The workshops view was that the benefits from spray chilling for all of the sites subsequently adopted by this processor should be excluded from the evaluation because the original investment, that enabled adoption, was made in the previous MLA planning period.
- Given this, the workshop supported the assumption that MLA investment brought forward spray chilling adoption for all other plants by three years.

Bladestop

The key assumption identified in the analysis prepared in the workshop paper was that benefits were valued at \$80 000 per saw per year. There were 64 machines installed across 10 plants in Australia. This benefit comprised of two components:

- avoided injuries that occur with the use of conventional bandsaws
- cost of each injury of about \$80 000.

The cost of one machine is in the vicinity of \$80 000, so it was observed that if Bladestop prevented on amputation per year, it payed for itself.

The starting point of the discussion was the probability of a major finger or hand injury in a plant with conventional bandsaws:

- one processor indicated that there was 20 per cent probability of one incident per saw year.
- another said that at their plant, there had been 2 events across 14 saws over a two period (around 15 per cent).

The workshop settled on a probability of an incident would be between 10 and 20 per cent without Bladestop. The next point to be discussed was the cost of a major finger or hand injury:

- participants from industry observed the fact that landing on an 'average' number was very difficult because of the way these incidents were recorded by injury type rather than the cause/machine involved
- casual observation of compensation paid suggested that \$80 000 was the minimum for such an injury

- often compensation paid is only one part of the total costs and may only represent 20 per cent of total costs paid by the employer.

The Consulting Team have consequently determined that an appropriate value for such an avoided injury would be between \$120 000 and \$140 000.

In terms of adoption, the number of saws installed could be lumpy over time:

- conventional saws would be upgraded as they were retired from service
- but replacement would be on an 'all-in all-out basis' in a plant or across a business because of the OHS benefits.

MLA estimated that 260 installations would be feasible by 2020. The workshop thought that this was conservative: if all saws in the industry and the wider retail applications were replaced with Bladestop, the total market could be in the order of 1 000 units.

Goats head browner

It was noted that this was an innovation for one processor who was targeting a niche market, and it replaced two labour units. However, technology provider (Furnace Engineering) has provided quotes to at least two additional abattoirs to extend this processing efficiency and value adding process innovation to other products.

Royalties

MLA highlighted potential future royalties the program:

- 2015-16, \$1 million
 - Sales of 2 LEAP III and IV overseas with 8 per cent royalty — approximately \$720 000.
 - Sales of 1 LEAP III and IV in Australia plus BladeStop and beef puller sales domestically with a 3 per cent average royalty — approximately \$250 000
- 2016-17, \$250 000-350 000
- 2017-18, \$250-350 000 (saturated market for BladeStop, Beef pullers, LEAP lamb, but DEXA OCM starting)
- 2019-20, \$350 000 (LEAP beef starting, DEXA continuing)
- 2020-21, \$500 000 (beef market expands).

Opportunities to improve impact achieved

Workshop participants noted that while the objective of the program was to develop new technology, there was also an opportunity to facilitate change management around the installation of new equipment, especially management of the people who will be working with the machine.

- Installation of the technology, and its ongoing use, could be facilitated by bringing people along. Sharing success and ownership with employees is also important.

Adoption of new technology could be made faster: increased awareness could be the result of rolling out the generic BCA template already developed by MLA

Lessons learnt from failed projects are just as important as for successful ones. This reduces the costs paid by others in relearning previous experiences.

Additional suggestions were provided by MLA in the background paper.

Impact Assessment

17.3 MLA Impact – benefits and investments^a: 3.2 Off-farm productivity

		Off-farm productivity
		3.2
Expected benefits		
Red meat industry net income – total ^b	\$m	323
– 2010-11 to 2014-15	\$m	114
– > July 2015	\$m	209
Red meat gross value of production- total ^c	\$m	329
– 2010-11 to 2014-15	\$m	124
– > July 2015	\$m	205
Actual investment^d		
– 2010-11 to 2014-15 inclusive	\$m	69
Benefit cost ratio		
Red meat industry net income - total		4.7
Red meat gross value of production - total		4.8

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Saleyard equivalent GVP excluding processing (basis for levies). ^d Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

17.4 MLA Impact – benefits in terms of red meat net income^a: 3.2 Off-farm productivity

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	
3.2 Identify and deliver opportunities to increase off-farm productivity and capability	0	323	323	4.7
– % of impact benefits	0	100	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

17.5 MLA Impact – benefits in terms of GVP^a: 3.2 Off-farm productivity

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
3.2 Identify and deliver opportunities to increase off-farm productivity and capability	0	329	329	4.8
– % of impact benefits	0	100	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

17.6 Budgets for Off-farm productivity

Budgets by Program	\$,000		\$,000		\$,000		\$,000		\$,000		\$,000	
	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
3.2 Identify and deliver opportunities to increase off-farm productivity and capability												
3.2 Identify and deliver opportunities to increase off-farm productivity and capability	3,531	2,345	4,062	1,689	3,778	1,170	3,486	1,764	4,530	2,418	19,387	9,385
MLA Donor Company projects	0	10,984	0	6,614	0	10,468	0	10,878	0	11,252	0	50,196
Overheads (Corporate Services / Communications)	31	12	0	0	0	0	0	0	0	3	31	15
TOTAL	3,562	13,341	4,062	8,303	3,778	11,637	3,486	12,642	4,530	13,673	19,418	59,596

18 3.3 Market information

Top Line result – MLA expenditure on the Market Information program provide industry returns of \$315m, from expenditure of \$40m with a BCR of 7.9:1

Tables 18.2, 18.3 and 18.4 provide a summary of the payoffs from investment in the *Market Information* program.

18.1 MLA Impact – benefits and investments^a: 3.3 Market information

		Market Information
		3.3
Expected benefits		
Red meat industry net income - total ^b	\$m	315
– 2010-11 to 2014-15	\$m	300
– > July 2015	\$m	15
Actual investment^c		
– 2010-11 to 2014-15 inclusive	\$m	40
Benefit cost ratio		
Red meat industry net income - total		7.9

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

Summary

It is concluded that the availability and quality of MLA market information had improved in the evaluation period (compared to previous years) and that greater use was now being made of this information both within and outside the industry. The workshop recommended that a Benefit Cost Ratio (BCR) of between 8:1 and 12:1 be applied as a measure of impact in the 2010-11 to 2014-15 period.

It is concluded that in some southern production systems benefits from LDL had commenced prior to the public launch of LDL and that the program is likely to give rise to large future benefits, but only if MLA continues to invest in this area.

It is concluded that MLA's research work on policy issues during the evaluation period had provided value to the industry — often in the form of averting (or minimising the potential for) downside risk. It was agreed that the same BCR be applied to these activities as for MLA General Market Information.

It is noted that the final report on the Beef Language Review was not finalised and published in the Evaluation Period — so no benefits are assigned from this work. The work, however, is viewed as vital for the future of the Australian industry — and one needed to realise the benefits foreshadowed as part of MISP2020.

Program impact was measured at \$315m (net industry income) with a BCR of 7.9:1. Some 95 per cent of the benefit accrued during the assessment period with 5 per cent to be captured in coming years.

Objectives from MLA 5 year business plan

To inform business management decisions in the red meat and livestock industry by ensuring ‘information gaps’ are identified, and appropriate, valued, information is collected, analysed and communicated in a timely, user friendly and readily accessible manner.

Market Information Program

For the purposes of the impact assessment the program was divided into 4 subprograms:

- the collection and dissemination of general, industry level, market information, such as the work conducted by the National Livestock Reporting Service (NLRS) and the collection of export market data, including forecasting future market trends
- Livestock data link (LDL), an initiative which links slaughter data from the National Livestock Identification System (NLIS) and Meat Standards Australia (MSA) databases with analytical tools and the provision of benchmarking reports — with the aim of assisting producers achieve greater levels of market compliance
- the Industry Issues Research program under which MLA commission’s independent and apolitical research to inform industry on priority issues and support policy development
- development of the Beef Language White Paper, an R&D project that will provide information to the industry on how future developments in science and technology and a growing understanding of consumer and customer requirements can shape the Australian beef trading language.

MLA Summary of Subprogram - Collection & dissemination of general, industry level, market information

Sub-Program Outputs and Outcomes

Highlights in terms of MLA’s work during the Evaluation Period in collecting and disseminating general, industry level, market information included the following:

- maintaining and increasing the relevancy of MLA collected and reported information:

- A realignment of saleyards covered by the NLRS occurred so that all saleyards of State significance are reported. Reporting commenced on nine new markets, while a number of other markets, deemed to be no longer regionally significant, were dropped from NLRS reports. The resource realignment resulted in NLRS markets in 2014-15 reporting on sales of 540 000 more cattle and 208 000 more lambs.
- collection of over-the-hooks prices was improved with additional processors now providing information, so that 80 per cent of processing capacity in Australia now supplies this information
- new live export price indicators were developed through the progression of a project undertaken by Bush Agribusiness
- the Western Young Cattle Indicator (WYCI) was developed, designed to complement the Eastern States Young Cattle Indicator (EYCI)
- on a monthly basis a new report was published, the ‘North of the Tropic Beef Report’, designed to deliver improved market information to northern producers
- new data was collected relating to economic conditions, livestock production, consumer trends and competitor activity for the emerging markets of China and Indonesia as well as maintenance of this data for Australia’s traditional meat markets
- also, a major research project on India as a potential competitive threat was completed in 2013
- accessibility to MLA information was increased:
 - A greater range of data was made available online, with much of the 10 000 price, demand and supply indicators collected by MLA now accessible via tools on the internet.
 - A market information mobile application was launched in 2014 to improve the reach of all MLA market news stories, individual sale reports and market indicators — in the first 12 months the application had over 11 000 downloads.
 - Each release of MLA Industry Projections is now accompanied with a three minute YouTube video —with statistics to date showing 2 500-4 000 unique views for each video.
- producers were equipped with increased risk management options – although options continue to be limited.
 - While there has been limited interest/commercial incentive for the Australian industry to recommence a futures trading platform, MLA has worked with other commercial operators to enhance price forecasting and strategies.
 - In 2011-12 a Confident Livestock Marketing workshop was developed to equip producers with an understanding of how best to apply market information in their short and longer-term business decision making.
 - Through the MDC, MLA Market Information assisted the development of Mecardo, a livestock, wool and grains market Analysis Company. Mecardo has varying levels of service, with the premium service requiring producers to pay a fee for comprehensive analysis, which includes livestock price forecasting and offering strategies around livestock marketing, with extensive use being made of MLA data.

- Various media outlets and financial institutions also value add to MLA market information. These distribution mechanisms offer many producers, particularly in remote regions and with limited Internet services, the ability to access market data, keep abreast of market trends and make more informed business decisions.
- The above points mainly highlight areas of change. In addition to the above many activities were continued, including:
 - completion of regular industry surveys (OTH indicators, slaughter, financial performance, etc)
 - publication of beef and lamb projections (moved to a quarterly update basis)
 - involvement in industry presentations (average 50 per year, average audience of 50)
 - publication of Market Snapshots / Red Meat Market Reports
 - publication of market news through the MLW (1,250 stories each year)
 - regular updating of information on the Web, resulting in 1.49 million page views in 2014-15

Workshop evaluation of performance / industry impact

A wide set of users and uses were identified for MLA's general, industry level, market information, but generally uses of the data fell into two categories:

- tactical use — for short term decision making, when, where and how to sell, decisions on the short term level of operations, etc
- strategic use – industry planning, policy research, longer term decisions about whether to enter / exit the industry, type of operations, etc

Specific uses identified for the MLA information were as follows:

- as an input into research reports written by financial institutions for clients on the state of the industry both domestically and globally and, to a more limited extent, for critical 'one-on-one' discussions with clients
- as an input into internal assessments by financial institutions of exposure and risk
- as input into forecasts and analysis by private firms who value add to MLA market information.
- by media outlets who both use the information in a primary manner (for example, directly publishing NLRs saleyard reports) and as background information to provide insights which is then used in discussions with industry. For one significant industry media outlet about 10 per cent of page views related to MLA market information.
- by processors to gauge general market conditions — the weekly kill data is particularly heavily referenced. Also some processors use the MLA data in models to set levels for forward contracts
- by Peak Councils in planning and to gauge in a general sense 'how the industry is tracking'
- by Government as an input into policy formulation

- by large pastoral companies who use the data:
 - To benchmark their own results.
 - To track markets in which they might not be directly involved.
 - As an independent, trustworthy source of information to investors in these companies.
- by consultants in researching industry issues for Government, industry organisations and private clients — the extent of data held by MLA and the extended temporal span of this data is often useful for detailed research.
- by smaller producers, who often access the data through secondary sources (for example, ABC Country Hour or through print/online media), to inform their market decisions.
 - In this context it was noted that awareness of Roma saleyard prices (this awareness arising partly from the commencement of NLRS reporting of this market in the Evaluation Period), during the current Queensland drought, influenced decisions by northern Queensland producers to incur additional costs to sell at this yard. Prices at Roma, due to the presence of southern buyers, were higher than in north Queensland, meaning that the extra trucking expenses were worthwhile.

It was unanimously agreed that MLA should continue to be involved in the provision of market information — indeed, it was argued by some that it should be regarded as an overhead, that is, an absolutely vital function for the industry as a whole and for players within the industry to operate to optimal levels.

The following additional observations were made.

- If not for the collection of market information by MLA, information asymmetries would grow over time — certain parties in the supply chain would have better information and the overall supply chain would not as operate as transparently and efficiently.
- There is generally a greater availability of good information both from MLA and other sources. At times, however, there is almost too much data and this encourages reference to simple indices like the EYCI which may not be reflective of particular operations or the broader set of circumstances operating in the industry. The EYCI may be a reasonable indicator of fluctuations in the market, but not necessarily of overall market level.
- The tools and databases continue to improve in functionality and also improve in terms of relevance and user friendliness. The new MLA MIDAS database, in particular, received positive comment. It was noted that on average about 100 MIDAS data queries are made each day with about 75 per cent of the data requests coming from Australia (the most common being Australians seeking information on cattle prices), with the remainder mostly coming from countries who purchase Australian meat (Japan, United States and Korea).
- Greater use is being made of available data by industry players — that ‘producers are using market information more than they ever have’.
- Additionally there are now some private Australian firms providing ‘second stage’ analysis of MLA data, a relatively new development, allowing greater tailoring of

market information to specific client needs and more detailed price forecasts to be made.

It was noted that, with the Australian industry beginning to enter a period of herd/flock rebuilding and lower slaughter levels, the availability of accurate, up-to-date data would be more important than ever. Also adding to the importance of market information was the breadth of overseas markets to which Australian beef and sheepmeat is now sold. It was recognised, however, that forecasts are the critical factor in making optimal decisions, not information about what has occurred in the past — historical data sets are a tool to be used in these forecasts, but that future developments will be heavily influenced by the weather.

Industry impact 2010-11 to 2014-15

It was agreed that placing a value on market information is difficult. In terms of outcomes it was noted that:

- surveys indicated that levels of satisfaction with MLA market information had remained high during the Evaluation Period:
 - Market information was rated by MLA members as the most valued of all of MLA's functions
 - More than 51 per cent of MLA market information subscribers rated the service as 'extremely valuable' and over 90 per cent as 'valuable'.
- The number of market information page views on the MLA website had almost tripled from 0.55 million in 2010-11 to 1.49 million in 2014-15.

In terms of forecast accuracy:

- The following errors were made in forecasting beef production during the Evaluation Period (recognising that forecasts will never be 100% accurate):
 - For MLA's January Projections the (absolute) difference between forecast production and actual production averaged 6.1 per cent (against a 10-year average of 5 per cent)
 - For MLA's July Projections this difference averaged 4.6 per cent (against a 10-year average of 3 per cent)
- Similarly, the following errors were made in forecasting lamb production during the Evaluation Period:
 - For MLA's January Projections the (absolute) difference between forecast production and actual production averaged 8.8 per cent (against a 10-year average of 6 per cent)
 - For MLA's July Projections this difference averaged 4.2 per cent (against a 10-year average of 4 per cent)

It was noted that the increase in forecasting errors between the Evaluation Period and the 10 year average was hardly surprising as this was a very difficult forecasting period (with weather conditions playing a huge role).

It was agreed that MLA market information represented an invaluable industry resource and that the costs of the program are low, compared to its widespread use.

In terms of impact, it was noted that in 2009 for MLA's market information program was reviewed with an estimated BCR ranging from 5.6:1 to 12.9:1 based on the following considerations:

- reduced costs and risks in the red meat industry and better opportunities and profitability from better information — resulting in greater price stability
- increased demand for Australian red meat as a result of information provided to international customers
- improved effectiveness of MLA programs and peak industry bodies; and
- more favourable policy decisions made by the Australian Government.

It was agreed that the BCR used for 2010-11 to 2014-15 should be at the high end of the 2009 range as:

- the availability and quality of MLA market information had improved since 2009; and
- greater use was now being made of this information both within and outside the industry.

It was agreed that a BCR in the range 8:1 to 12:1 be used as a measure of the impact of MLA market information in the period 2010-11 to 2014-15.

Residual industry impact beyond 2015 of investments made by MLA in market information between 2010-11 to 2014-15

In terms of the residual impact beyond 2015 of investments made by MLA in market information between 2010-11 and 2014-15, it was agreed that this would be small — the vast majority of benefits are only there while the information continues to be produced. It was noted that the historical data generated from the 2010-11 to 2014-15 investments would have 'some benefit and use' in the future, but only to a limited degree. It was determined that the future value of MLA market information for 2015-16 be set at 5 per cent of its 2014-15 value, reducing to zero over 10 years.

Opportunities to improve impact achieved

The following were noted as areas for program improvement:

improving the accuracy of MLA saleyard and OTH data:

- workshop participants observed that prices reported by MLA sometimes bore only a 'remote relationship' to the levels that are witnessed in the same saleyard by their buyers.
- It was advocated that more resources be devoted to ensuring the parameters used by NLRS reporters in price estimates are accurate.

- For OTH prices it was recognised that grids are often complex, with different specifications used by every processor and MLA has to place a ‘line of best fit’ through these. It was noted that most processors now provide MLA with their actual grids, but processors are reluctant for MLA to publish a range that would reveal the highest and lowest quote. It was suggested that more sophisticated measures of the variation in OTH quotes could potentially be used by MLA (for example, by discarding the highest and lowest quote).
- It was also noted that more information and more accurate information was needed on meat and by product values, especially as the industry moved towards value based marketing. It was noted that the collection of export price information was more limited than in the past — this was attributed to reporting fatigue by industry members who supply these prices.
- It was noted that MLA market information is used by all industry participants — and all benefit from its availability and use. However, the producing sector is solely contributing to the funding of this service. When MLA was established, market information (specifically, ‘Database Collection’) was recognised as a ‘joint industry function’ and all sectors contributed to meeting the costs of this service (albeit in different proportions). A contribution from the processing sector to market information was recommended.
- The development of additional indicators to the EYCI was viewed as desirable — such as a cow or medium steer index. It was noted that upgrades to the online database system planned for early in 2016 would provide access to ‘raw’ NLRS data, allowing anyone to construct a specific index from this data — it would allow weighted average prices to be calculated.
- The overwhelming view was that the future direction of MLA market information had to be a move away from generic market information to allowing tailored information to be easily accessed and constructed. Producers and processors do not operate in average markets — increasingly niche market opportunities are being pursued. MLA with its extensive datasets and acting as a central resource for the industry is in a unique position to provide tailored, specific access to information.

Additional suggestions were provided by MLA in the background paper.

MLA Summary of Subprogram — Livestock Data Link (LDL)

Sub-Program Outputs and Outcomes

LDL is an initiative from MLA, first piloted in 2010, which aims to transform the way in which carcass feedback data is presented to producers. Historically producers have received feedback information in the form of Feedback Sheets and grids, but the information can also be provided as a data file (including NLIS data). For all cattle, other than cows and bulls, individual carcass data must be provided on hot standard carcass weight, P8 fat measurement (mm), dentition and bruise score, but often additional items

of data are also provided⁴². Irrespective of the form in which feedback is provided (data file or sheets) and the extent of feedback provided, most producers have a limited capacity to analyse and act on the data. LDL aims to rectify this by:

- providing critical feedback information in a graphical format
- allowing producers to benchmark the performance of their carcasses within a regional, state or national level
- also allowing producers to compare the performance of their herd over time
- where non-compliance is identified, allowing producers to directly link to an online library of relevant information and solutions.

In addition to carcass data, where relevant, MSA grading data is integrated into LDL for both cattle and lambs. Finally, scoping exercises have been completed for the integration of animal health and disease feedback into LDL.

Workshop evaluation of performance / industry impact

It was noted that:

- 8 supply chains are currently piloting LDL across 13 plants (beef and sheep)
- information on 1.02 million cattle and 5.68 million sheep carcasses were uploaded onto the LDL database in 2014-15
- for the first time, LDL feedback is accessible to a small number of producers — through the JBS Farm Assured network to 2 400 producers.

It was noted that ex-ante BCAs conducted on LDL benefits had identified BCRs ranging from 2.4:1 to 20.7:1 based on observations that:

- the Australian beef industry loses \$127-\$163 million each year by producing cattle that do not meet customer requirements (ProAnd Associates 2012); and
- estimates of the ability of LDL responses to drive practice change on-farm.

It was recognised by MLA staff that formal processor feedback to producers as part of the LDL system had only commenced in May 2015, right at the end of the Evaluation Period. As a result MLA staff concluded that benefits within the Evaluation Period should be set at zero.

However, Workshop participants disputed this conclusion. It was noted that LDL had been used by a large lamb processor for 3-4 years to benchmark buyers. That large lamb processor was also a large beef processor and LDL had been used in its beef business for 1-2 years prior to the formal launch of the program. It was noted that benefits had certainly accrued to this business from LDL, but also that benefits had accrued to producers through higher prices. It was further noted that, although formal feedback to producers had only commenced in May, buyers had been providing informal feedback to producers on compliance rates throughout the period.

⁴² Slightly different mandatory feedback provisions apply to cows and bulls and for lambs and sheep — the latter can be provided in group form.

Furthermore, it was noted that the program was likely to give rise to large future benefits. A range of views were expressed from:

- no future benefit would arise from MLA's 2010-11 to 2014-15 investments in LDL unless MLA investment also continued into the future; to
- some processors saw both value to their operations and to the industry from LDL — and would continue to provide enhanced feedback to their suppliers even if MLA investment in the program ceased. A 25 per cent non-compliance rate on MSA specifications was reported which was expensive both to the business and to suppliers — there was clear value in addressing this issue, even if MLA did not exist.

A significant value of LDL, was in providing a common platform for feedback — in the absence of MLA this commonality would rapidly disappear.

After consultation with industry, quantification of the benefits were made on the following outcomes and key assumptions in the without MLA investment case.

Without MLA investment, industry consultation indicates that non-compliance rates would have been significantly higher for producers participating in the program estimated to be in the range of:

- 20 and 30 per cent for grass fed cattle (depending on the plant)
- 12 and 15 per cent for lambs.

Following implementation of LDL, non-compliance rates improved dramatically over a 3 year period:

- 6 per cent for grass fed cattle
- 5 per cent for lambs.

The other component of the benefit is from discounts avoided. Industry estimates indicate the following ranges of discounts were relevant:

- between 25 and 50 per cents per kilogram cwe for grass fed cattle (mid-point of 35 per cents was used)
- up to 20 per kilogram cwe for lambs (an estimate of 15 cents used).

The total number of livestock applicable was assumed to apply to the carcasses of all livestock that were uploaded to LDL, and which were slaughtered at average weights recorded for the MSA scheme for the southern region. The total benefit in the first round was, therefore, equal to the total number of livestock recorded by LDL, multiplied by the reduction in non-compliance rates as a result of MLA investment and applied discounts for non-compliance with MSA and processor specifications.

- It was estimated that due to the approach taken by the industry player (which included both on-farm assurance program and improved feedback through LDL) that an attribution of 30 per cent of the total benefits over the period 2010-11 to 2014-15 was appropriate.

In terms of benefits after 2014-15, it was assumed conservatively that without MLA investment, there would be no residual benefits although the major industry proponent would consider funding a replacement feedback mechanism without MLA involvement.

The first round analysis shows that total calculated benefits from LDL could be as high as \$23.7 million in nominal terms over the period 2010-11 to 2014-15. After attribution to MLA, this falls to \$7.1 million.

The resulting benefit cost ratio of 2.1:1 is conservative.

Opportunities to improve impact achieved

The following were noted as areas for program improvement:

- LDL was seen as an important move towards providing tailored information to processors and producers. Processors, however, noted that there was a need to better integrate NLIS, MSA and LDL data. They observed that currently two sets of identical data were being uploaded to MLA. Furthermore, MSA feedback mechanisms to producers were described as ‘terrible’. There should be a need to just upload one set of data to MLA and LDL should be used as the feedback mechanism to producers.
- It was recognised that non-compliance to specifications is a real problem for the industry and producers need to be advised on why they are not complying and how to address it. It was noted that ‘some producers do not understand grids’, but also indicated that ‘grids are not easy to understand’. It was noted that many producers (‘the target market for LDL’) are 60-70 years old, so it was important that information is readily assimilated by this cohort. At the same time it was recognised it was important that LDL information be also interesting and relevant to young producers.

Other suggestions for LDL were:

- all data should be pooled — the industry would benefit enormously from making available LDL type information, right down the supply chain to the seedstock producer. It was noted that information from only a very small number of the 3.2 million cattle graded for MSA last year was included in estimating BREEDPLAN EBVs — information from less than 1 000 cattle – this was a tremendous waste of valuable information. It was advocated that the breeder should have access to LDL if he wants to, but there are potentially privacy implications with this that would need further research.
- animal health data should also be included on LDL — participants were aware there were plans to do this. It was noted that AQIS collect animal health data on beef, and this data is made available to the processor, but AQIS do not collect animal health data on lamb. Before data is gathered there would be a need to develop standards for data collection in this area. This is currently being progressed through the food safety R&D program area, and will be jointly funded by MLA and AMPC. While LDL will have the ability to capture and report on animal health and disease conditions for cattle and sheep (including lambs), it is understood that limited health data is collected on lambs due to the fact that disease prevalence is low. Programs like the National Sheep Health Monitoring project focus their data collection on older sheep (mutton) where disease prevalence is much higher.

Additional suggestions were provided by MLA in the background paper.

MLA Summary of Subprogram — Analysis to underpin improved policy

Sub-Program Outputs and Outcomes

The Industry Issues research program was designed to arm Peak Councils with information in order to:

- support policy development within the industry on priority issues, and
- to allow a productive interaction between Peak Councils and Government on these issues.

Under this program the following projects were completed during the Evaluation Period:

- Implication of the Australian Government's Carbon-farming Initiatives for Cattle Producers (March 2011)
- Impact of carbon price on Australian Farm Businesses: Sheep and Cattle Production (June 2011)
- Carbon price impacts on red meat producers and processors (November 2011)
- Effect of alternate heavy vehicle charges on Australia's red meat industries (February 2012)
- Regulatory costs and assistance to the red meat and livestock industry (September 2012)
- Principles for negotiating appropriate co-existence arrangements for agricultural landholders (April 2013)
- Coal seam gas operations on livestock property (April 2014)
- Australian Beef Language White Paper — Technical papers (March 2015)

In addition to the above the following research projects are underway:

- Australian Beef Language White Paper — Final Report
- Process for registering members and determining voting entitlements (identifying levy payers project) – responds to Recommendation 2 in the grassfed levy inquiry
- Assessment of price transparency in beef supply chain — responds to Recommendation 7 in the grassfed levy inquiry
- Infrastructure constraints in cattle supply chains — CSIRO TRANSIT project
- The effect of competition law on producers.

In terms of outcomes 100 per cent of peak councils surveyed in 2011 indicated they were 'informed' or 'well informed' as a result of policy research conducted by MLA.

Workshop evaluation of performance / industry impact

MLA's policy research program was designed to equip Peak Councils with sound, well-researched information on which to argue policy positions. During the Evaluation Period only one survey of Peak Councils was completed on this program — with 100 per cent of Peak Councils in 2011 indicating that they had been 'informed' or 'well informed' as a result of MLA's policy research.

It was noted that Peak Councils face tight financial circumstances and required independent analysis, funded by MLA, to provide 'intellectual grunt' to underpin policy positions. Peak Council participants stated that from their viewpoint the 'program had been quite effective'.

Some other observations made were:

- much of the program's activities involved mitigating downside risk — minimising a potentially negative impact also provides a benefit. Research falling into this category included the extensive work done towards the beginning of the Evaluation Period on carbon pricing. As one of Australia's most trade exposed industries the Australian meat and livestock industry had the potential to be severely impacted by the indiscriminate introduction of a carbon tax. The research and policy arguments amassed by the red meat and livestock industries, as well as by agriculture generally, resulted in the extreme measures proposed by some in the community being avoided
- MLA's research from a political point of view is highly regarded — making the program valuable.
- a direct relationship between the quality of research undertaken, policy arguments amassed and the policy decisions made does not always exist — political factors, as well as economic information, can heavily influence policy decisions.

It was noted that policy research are part of industry overheads — absolutely necessary, but difficult to value.

In terms of impact, it was argued that a similar BCR should be used as for the general market information work. It was recognised, however, that some policy research can have a longer residual value than market information generally 'since the same issues seem to keep on coming around'.

Opportunities to improve impact achieved

The following were noted as areas for program improvement:

- the Productivity Commission is about to commence a review of regulatory costs for agriculture generally. The red meat industry needs to submit to this review. The important research completed by MLA a number of years ago on regulatory costs to the red meat industry requires updating.
- MLA needs to ensure that sufficient resources are available to oversight policy research activities. Significant variations in the policy workload can occur, since the need for policy research is substantially influenced by Government processes – with

sometimes only one research project being undertaken and, at other times, 3 or 4 are required.

Additional suggestions were provided by MLA in the background paper.

MLA Summary of Subprogram — Beef Language White Paper

Sub-Program Outputs and Outcomes

During the Evaluation Period MLA and AMPC, in response to industry requests, commissioned research to inform industry on how future developments in science and technology and a growing understanding of consumer and customer requirements can shape the Australian beef trading language into the future.

The existing beef language predominantly describes visual appearance or source animal attributes; there is an argument that this may transition toward description of an end result directly reflecting consumer value in addition to traditional physical specification.

The outcome of the project will be a scientifically-based 'White Paper' which will consider existing and potential new descriptors (objective and subjective) at each stage in the red meat pipeline. The 'White Paper' will develop a range of recommendations for industry consideration, with a focus on progressive modifications to the language. Importantly the recommendations will not preclude the ability to continue to trade under the current language, but will allow new options for those who wish to use them.

The White Paper will be completed in January 2016 with recommendations in the following categories:

- transition to an outcomes based language
- on-going development of industry standards
- alignment of live animal and carcass languages
- objective measurement and system integrity
- data capture for seamless information flow
- global beef descriptions.

Workshop evaluation of performance / industry impact

- The final report on the Beef Language Review was not finalised and published in the Evaluation Period — so no benefits flowed from this work.
- The work, however, was viewed as vital for the future of the Australian industry — and one needed to realise the benefits foreshadowed as part of MISP2020.
- It was indicated that the Beef Language White Paper was likely to be released in early 2016. It would then receive consideration by various industry committees such as the AUSMeat Standards and Language Committee.

- It was noted that the value provided by the investment in the Beef Language White Paper will be dependent on the decisions the industry makes as a result of this paper.

Opportunities to improve impact achieved

No items were noted as areas for program improvement.

Impact assessment

18.2 MLA Impact – benefits and investments^a: 3.3 Market information

Market Information		
		3.3
Expected benefits		
Red meat industry net income - total ^b	\$m	315
– 2010-11 to 2014-15	\$m	300
– > July 2015	\$m	15
Red meat gross value of production- total ^c	\$m	274
– 2010-11 to 2014-15	\$m	261
– > July 2015	\$m	13
Actual investment^d		
– 2010-11 to 2014-15 inclusive	\$m	40
Benefit cost ratio		
Red meat industry net income - total		7.9
Red meat gross value of production - total		6.9

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Saleyard equivalent GVP excluding processing (basis for levies). ^d Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

18.3 MLA Impact – benefits in terms of red meat net income^a: 3.3 Market information

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	
3.3 Deliver valued supply chain and market information	0	315	315	7.9
– % of impact benefits	0	100	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

18.4 MLA Impact – benefits in terms of GVP^a: 3.3 Market information

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	
3.3 Deliver valued supply chain and market information	0	274	274	6.9
– % of impact benefits	0	100	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

18.5 Budgets for Market Information

Budgets by Program	\$,000		\$,000		\$,000		\$,000		\$,000		\$,000	
	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
3.3 Deliver valued supply chain and market information												
3.3 Deliver valued supply chain and market information	5,567	5,320	5,801	5,473	6,100	5,354	6,199	6,294	6,357	5,480	29,024	27,244
Plus 3.1.3.2 Increase producer capacity to make management decisions based on more precise information and lead to improved market compliance	452	438	364	537	539	541	364	614	614	849	2,333	2,979
MLA Donor Company projects	0	24	0	-7	0	124	0	384	0	0	0	524
Overheads (Corporate Services / Communications)	654	681	619	672	608	577	606	628	694	719	3,181	3,276
TOTAL	6,673	6,462	6,784	6,676	7,247	6,595	7,169	7,920	7,665	7,048	35,538	34,701

19 3.4 On-farm animal health and biosecurity

Top Line result – MLA expenditure on the On-farm Animal Health program provide industry returns of \$195m, from expenditure of \$43m with a BCR of 4.6:1

Tables 19.2, 19.3 and 19.4 provide a summary of the payoffs from investment in the *On-farm Animal Health program*.

19.1 MLA Impact – benefits and investments^a: 3.4 On-farm animal health and biosecurity

		On-farm animal health and biosecurity
		3.4
Expected benefits		
Red meat industry net income - total ^b	\$m	195
– 2010-11 to 2014-15	\$m	11
– > July 2015	\$m	184
Actual investment^c		
– 2010-11 to 2014-15 inclusive	\$m	43
Benefit cost ratio		
Red meat industry net income - total		4.6

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

Summary

Overall, the workshop was strongly supportive of investments made under the program over the evaluation period.

- Increasing producer understanding and confidence is important in much of this portfolio's R&D — individual herd/flock impacts can be financially devastating even though the specific disease does not have a large national impact.
- The MDC investments have been important to encourage industry investment in R&D in topics which are largely defensive in terms of potential industry benefit (for example, minimising the risk or extent of FMD, bluetongue and Johne's Disease) and in encouraging commercial investment in innovative approaches to existing constraints which might otherwise be neglected due to relatively small market size (for example, BarberVax vaccine).

- Program impact was measured at \$195m (net industry income) with a BCR of 4.6:1. Some 6% of the benefit accrued during the assessment period with 94% to be captured in coming years

Objectives from MLA 5 year business plan

- Key Initiative 1. Deliver improved diagnostic methods, enhanced understanding and improved control methods for external threats such as Foot and Mouth Disease (FMD), Bluetongue, Capripox and Screwworm fly (OWSF).
- Key Initiative 2. Improved biosecurity measures adopted that minimise risks on farm and disruption to trade from endemic, emerging and exotic diseases.
- Key initiative 3 Feedlot herd health (covered program 3.6).
- Key Initiative 4. Make investments in priority endemic diseases to reduce the cost of endemic diseases compared with 2006.

MLA Summary of Program Outputs and Outcomes

Some 80 projects were undertaken in the evaluation period, addressing a very wide range of disease and plant toxins that either currently impact, or could in future impact, negatively on the health and productivity of grazing ruminants in Australia. The following research areas were highlighted as the topics of greatest importance during the evaluation period, with many requiring ongoing investment to deliver industry benefit.

FMD preparedness

Efficacy of vaccines in the Australian (FMD) vaccine bank against FMD virus serotypes circulating in South-East Asia was evaluated. The potential role of feral pigs as a reservoir following an FMD incursion was assessed and found to probably be self-limiting.

Bluetongue

Rapid molecular diagnostic tests were developed to identify midges and viruses from light trap catches, as part of the front line surveillance strategy under the North Australian Monitoring Program. The vector potential of Victorian *Culicoides* spp. was assessed and found to be negligible (preferred hosts are native wildlife and birds). This finding indicates that should BTV reach Victoria, it is unlikely to spread rapidly or widely in sheep.

Capripox

A serological test was developed for post-eradication testing to hasten return to disease freedom in the event of an incursion. The test has met with international interest.

Old World Screw-worm Fly (present in PNG)

Several chemicals currently available in Australia were evaluated for their efficacy against OWSF on struck livestock.

Bovine Anaemia due to the Theileria orientalis group (BATOG)

Research involved identification and mapping of the distribution of the three main subtypes of T orientalis. Ikeda subtype, consistently found in clinical cases. The vector in eastern Australia was confirmed to be the Bush Tick (*Haemaphysalis longicornis*). The only effective candidate for the treatment of clinically ill cattle was found to be unsuitable due to long withholding period (WHP).

Biserrula photosensitivity

Biserrula pelecinus, a nutritious and palatable legume fodder crop newly introduced to Australia causes a primary photosensitivity. Further investigation will address the causative toxic principle and the plant growth stage of greatest risk.

Johne's Disease

A new liquid culture medium was developed to replace the withdrawn Bactec medium used for pooled faecal cultures in herd and flock diagnosis. A molecular test (the High-Throughput Johne's test; HTJ) was developed for rapid screening of pooled faecal samples allowing rapid detection of infection in flocks, herds and the environment. The disease's pathophysiology and epidemiology were investigated, partly through the use of novel experimental models and including possible sheep breed differences in susceptibility. The impact of vaccination on the clinical occurrence of Ovine Johne's Disease and faecal shedding of bacteria was investigated and characterised allowing accurate recommendations to be made to control disease and symptoms in flocks.

Internal parasites

A vaccine against Barber's Pole Worm of sheep was developed and commercialised under MDC funding, with high initial uptake by producers. Capacity building in adoption of integrated parasite management (IPM) in meat sheep is ongoing. The epidemiology and economic impact of Sheep Measles has been assessed more closely.

Plant toxicity

The pathogenicity, epidemiology and possible prevention and treatment of annual and perennial ryegrass toxicities were investigated including a web-based prediction model for Annual Ryegrass Toxicity in WA and the discovery of a treatment for Lolitrem B intoxication (Perennial Ryegrass Toxicity). The economic impact of fluoroacetate poisoning on cattle in affected regions of Australia was assessed and recommendations made for its management. The prevalence of indospicine residues in cattle was

determined and the risk of toxicity in cattle and other species, including man, was assessed.

Anthrax

The molecular epidemiology of anthrax in the Murray-Goulburn Valley was characterised, the longevity of anthrax spores in soil confirmed and the use of an immuno-chromatographic diagnostic kit promoted.

Ectoparasites

An in vitro breeding colony of Buffalo Fly was established, obviating the continued maintenance of a donor animal to simulate the natural life cycle. This will make future experimentation more affordable, such as investigating the possible use of Wolbachia as a biocontrol agent.

Other

A comprehensively updated survey of the cost of endemic diseases of cattle, sheep and goats was completed.

Workshop evaluation of performance / industry impact

Program financial benefits identified were primarily reduced current costs through reduced mortality and morbidity of livestock, or reduced longer term costs, for example from reducing the impact of a possible exotic disease incursion or countering emerging drug resistance in intestinal parasites. The following investments were considered to have produced benefits either within the evaluation period or are likely to produce future benefits even with no further MLA investment.

The consensus workshop view was in broad alignment with that presented by MLA in the workshop background paper, with emphasis on the value of the MDC funding mechanism to attract industry investment in biosecurity and commercial investment in product development for niche markets. Participants were most cautious in estimating the benefit that can be captured directly by industry from improving bluetongue surveillances technologies and in the likely adoption of IPM principles for managing intestinal worms, but emphasised the importance of continuing research to develop management solutions for minor diseases which can have large financial impacts, and create significant management uncertainty, at the individual property level.

Impact of FMD work funded by MLA via the Donor Company

During the evaluation period, research was undertaken to improve diagnostic capability for FMD strains in the region and to perform vaccine efficacy studies particularly on newly emerging strains.

- Workshop participants noted that this work potentially both (i) reduced the risk of an outbreak and (ii) the severity of impact if an outbreak did occur.
- offshore surveillance and working with regional Governments is likely to reduce the risk of an FMD outbreak in Australia, through the monitoring of regional viruses; capacity building, etc — but this reduction in risk is likely to only occur over a long period of time. In the short term, however, the work undertaken is likely to provide an improved ability to respond to an FMD outbreak if one did occur — potentially reducing the severity of an outbreak through faster diagnostics and choice of appropriate vaccines.
- Australian Government policy is to order vaccine as soon as an FMD outbreak is confirmed.
- Workshop participants recognised that the critical element in early detection of an FMD outbreak is notification from a producer to a veterinarian to Government — and the improved diagnostic tests did nothing to reduce this period. The improved test, however, might prove useful in the ‘proof of freedom’ stage, allowing trade to return slightly quicker than would otherwise be the case.

The major benefit, however, was likely to arise from use of more effective vaccines. In this regard Workshop participants noted that vaccination would only be used (or would receive greater use) in the case of a large FMD outbreak — which has a smaller probability of occurring.

- The workshop agreed that the severity of an outbreak could be reduced by 5 per cent due to the work on vaccines and testing that had occurred over the last 5 years – this equates to an 18 day reduction in a 1 year outbreak. Some participants thought this might be conservative.
- It was also noted that the DAFF Ausvet model might be helpful in measuring impact.

Estimation of economic impact:

Estimated as a reduction in likely risk and extent of future outbreak, using a similar approach to MISP 2020.

Impact of improvements in Bluetongue diagnosis

Bluetongue is a major impediment for trade in live animals and semen and embryos. Some strains of bluetongue in Australia have been shown experimentally to cause severe disease and death in sheep, but these are currently confined to the far north of Australia. The spatial spread of bluetongue is determined by insect vectors which are in turn influenced by climatic conditions, most notably temperature and rainfall. An active monitoring program (NAMF) exists to measure the spatial spread of bluetongue with the demarcation between affected and free areas determining conditions of trade. Current methods for detection and identification of specific bluetongue strains may take weeks. New testing methods developed during the evaluation period now allow results for several hundred samples to be obtained in a day. Furthermore, the new testing methods are extremely sensitive. They have the potential to detect a single exotic midge in a collection containing more than 20 000 other insects. For virus identification, at present a

single test can identify a maximum of 5 serotypes from the potential 10 serotypes present in Australia, or the 26 identified globally.

The new BTV Polymerase Chain Reaction (PCR) methods have three main NAMF program uses at present:

- BTV8 PCR for confirmation of freedom is applied to a number of BTV isolates each year. This is additional to other testing, so there are no cost savings through reducing other tests.
- BTV PCR as part of BTV identification of isolates. This is used to speed up identification but has no real impact in test reduction.
- Screening BTV seroconversion bloods and vector pools to select samples for virus isolation. This should mean some reductions depending on the season — but as jurisdictions already do far more isolations than are funded by industry it may not affect the costs to industry.

Workshop participants identified a number of potential impacts from the bluetongue work:

- The new tests will primarily improve the integrity of Australia's bluetongue surveillance program, but are unlikely to reduce the costs of surveillance
- It was recognised that for a period of time both the existing monitoring procedures and the new methods would have to be run concurrently, resulting in short term cost increases. It was further stated that it may take 'years' to transition from existing monitoring procedures to the new tests. The new tests will allow more effective testing strategies on vector collections and pooled sera to improve the integrity of zoning and return to market.
- Whilst the workshop considered that the increased speed of new testing methods may reduce the time to detection and thus reduce movement of viraemic animals and rapid spread of the virus, subsequent feedback suggested this is unlikely because Bluetongue is primarily an endemic asymptomatic disease of cattle, and diagnosis of viraemic animals in the field is in many cases impossible. Advantages of the new tests during an initial response to an outbreak of clinical disease include:
 - an immediate assessment of the epidemiological situation, including vector monitoring and sero-surveillance of susceptible animals to determine the zone of active transmission;
 - quarantine and movement controls over ruminant livestock in declared areas;
 - tracing and surveillance to determine the source and extent of infection, and to provide proof of freedom from the disease;
 - zoning to define infected and disease-free areas.
- this suggests the benefit will more likely be greater confidence in our national biosecurity capabilities to handle a future outbreak.

Other benefits are intangible, but a significant defensive aspect of the new tests cannot be ignored. More precise and accurate diagnosis will bolster Australia's international reputation and support zonal freedom. The new tests would also allow more information

to be collected on the potential spatial spread of bluetongue due to climate change in the future.

Therefore, the workshop concluded that the future benefits may come from increased surveillance efficiency from the use of the PCR tests, and possibly enhanced reputation.

Estimation of economic impact:

Not evaluated as no significant reduction in likely risk or extent of outbreak.

Impact of Barber's Pole Worm vaccine (Barbervax)

Barber's Pole worm is an important gastrointestinal parasite of sheep and goats in Australia. The parasite is particularly common in the summer rainfall zone, especially in North Eastern NSW and Southern Queensland, as it prefers warm, moist conditions, but the disease can occur sporadically in any State. Workshop participants estimated that 40 per cent of national sheep flock can be exposed to the worm via summer rainfall — and Barber's Pole worm can cause very high mortality/morbidity if not treated.

- Barber's Pole worm is typically controlled by anthelmintic drugs, but strains resistant to these chemicals are common and widespread in endemic areas.
- In a recent survey of sheep producers, 'internal parasites' was viewed as the number one problem in terms of impact on profitability, with Barber's Pole worm specifically listed as the ninth largest issue. In a similar survey of veterinarians, Barber's Pole worm was listed as the highest issue.
- In an ex-ante Benefit Cost Analysis, the enterprise level benefit from those using the Barbervax vaccine was estimated at \$757 each year. Assumptions in the MLA internal ex-ante BCA have not been revised since release of vaccine in 2014, when a first production run of 60 000 sheep doses was sold out. MLA staff stated that the price of the vaccine 'had come in better than modelled in the BCA'.
- The enterprise level benefit is derived from replacement of existing drenches (2-3 per season) at a cost saving of about 50 per cent (although 5 applications of Barbervax are needed per season at \$0.60 per shot). There is also benefit from reducing the risk of drug resistance emerging in worms — a strong defensive element in reducing future risk. It was noted that use of Barbervax by producers over an extended period of 2-3 years should significantly reduce worm burdens on pastures, thereby extending the life of current drenches.
- The maximum adoption rate assumed in the ex-ante BCA was 5-10 per cent within 5 years based on 40 per cent of the national sheep. Workshop participants suggested that a maximum adoption rate of 10 per cent was probably a more accurate figure — with 5 per cent suggested by Workshop participants within 3 years.

Estimation of economic impact:

- Benefit is replacement of existing drenches (2-3 per season) at c. 50% of cost (although 5 vaccinations needed per season @\$0.60/shot) and reducing risk of drug resistance emerging in worms

- the annual cost of worms to a self-replacing Merino enterprise under typical regional management in the summer high rainfall zone (where Barber's Pole worm predominates) is \$11.09/ewe (Kelly, 2011 unpublished on WormBoss website: <http://www.wormboss.com.au/worms/roundworms/the-cost-of-roundworms.php>)
- At-risk areas in summer rainfall zones in northern NSW and Southern Qld carry 2.5m ewes, or about 4.3m sheep (approx. 6% total flock).
- Adoption started in 2014 with 60,000 doses and assume will peak at 2020 with 600,000 doses and be maintained thereafter due to capacity constraints at the vaccine production facility (J Schroder).
- Assume vaccine reduces per ewe cost (all worms) by 70% - saving is \$7.70 pa plus cost of one drench, offset by \$3 vaccine cost and 2 additional musters.

Impact of work completed in Integrated Parasite Management

Of the endemic diseases that affect sheep in Australia, worm parasitic diseases have the largest financial impact on enterprise productivity.

- integrated parasite management (IPM) involves having the right genetics, strategic use of drenches, monitoring worm burdens, good nutrition and manipulating local climatic, seasonal and pasture fluctuations to minimise exposure to intestinal worms
- MLA-funded research has found the risks of poor intestinal parasite control include a potential 12 per cent reduction in lamb growth rates and delayed finishing by almost six weeks. Ewe health and productivity can also be severely limited by gastrointestinal worms. Internal parasites were estimated to cost the sheep/lamb industry \$420 million per year and the cattle industry \$100 million per year.
- An MLA ex-ante BCA had suggested an enterprise level benefit of \$1 411 per flock per year.⁴³ Workshop participants suggested net benefit of \$2 per head per year for those producers adopting.

It was recognised, however, that adoption rates would be low as IPM requires more complex record keeping and pasture/animal management, with potentially higher risk. In the view of Workshop participants, it was unlikely that producers representing more than 5 per cent of the flock would adopt IPM. Moreover, Workshop participants suggested that the year that benefits would commence would be 2016, with the year of maximum adoption, without further MLA extension activities, being 2019.

Estimation of economic impact:

- IPM can provide an average net benefit of \$2/sheep pa through reduced drench costs, mortality and morbidity (from workshop), applicable to all flocks except in the pastoral zone; therefore potential target is 67.3m sheep

⁴³ The primary benefits are to sheep through the saving of drench costs. IPM is also applicable to cattle, however, there are currently lower levels of drenching of adult cattle.

- Without MLA funding, adoption will be low, due to management complexity – assume adoption benefits start in 2016 and reaching a maximum of 4% of target population, that is, 2.69m sheep, by 2020, which is maintained thereafter to 2030.

Impact of work completed on Theileria orientalis

Theileria are protozoan parasites carried by ticks. When ticks carrying Theileria feed on cattle, the parasite gets into their bloodstream and enters red blood cells. In some animals, sufficient red blood cells are destroyed to cause anaemia — a reduction in the red blood cell numbers. This reduces the ability of blood to carry oxygen and makes the animal ill. In recent years, there has been an increase in the number of animals with disease caused by Theileria. Disease is seen in calves born in coastal districts and in the eastern foothills of the Great Dividing Range. In adults, disease can be spread if cattle carrying Theileria (having red blood cells infected with the parasite) are moved to a property that was previously uninfected. Typically actual transmission has involved movement of coastal cattle to tableland or slopes districts. Current treatment options are limited.

- While noting that Theileria had a low incidence across the nation, Workshop participants also noted that Theileria could be devastating to impacted producers, causing mortalities of up to 30 per cent on initial exposure, but reducing to 1-2 per cent per year as survivors developed immunity.
- The main benefit of the research conducted by MLA is improved understanding of epidemiology of Theileria, reducing uncertainty. The main control is through management practices — assessing the risk of cattle movements prior to the movement occurring and, in particular, avoiding introducing or mixing cattle from areas where Theileria infection is widespread (generally coastal districts) with cattle in districts where Theileria infection is uncommon. The work also uncovered a compelling new reason for tick control.
- Workshop participants supported work being undertaken by MLA on emerging diseases which are surrounded by a high degree of uncertainty in terms of their potential long term impact.

Estimation of economic impact⁴⁴

- 23% of 19,743 northern beef herds show some level of infection (1% severe; 5 moderate; 17% low) with an average annual cost (production loss) in those highly or moderately infected of \$1,700 (includes initial mortality).
- 45% of 54,730 southern beef herds show some level of infection (1% severe; 5 moderate; 17% low) with average annual cost in highly or moderately infected herds of \$2,300.
- Assume that without MLA investment's investment, high to moderate infection rates would have been 10% units higher by 2015, that is, an additional 197 northern herds @ \$1,700 average cost pa and an additional 547 southern herds @ \$2,300.

⁴⁴ Richard Shephard — personal communication.

- Given year of first concerns was around 2006, and the national Theileria workshop occurred in 2009, assume 5 years of benefit during the evaluation period, that is, 2011-2015.
- Assume that without further MLA investment, benefit decays gradually from 2016 so that only 20% is retained by 2030.

Impact of work undertaken on Johne's Disease — MDC funded project.

Johne's Disease is a chronic wasting disease caused by the bacterium *Mycobacterium avium* subsp. *paratuberculosis*. The bacteria that cause Johne's Disease live in the animal's intestines and cause thickening of the bowel wall that interferes with normal absorption of nutrients. Johne's Disease causes progressive weight loss and emaciation in older animals despite a good appetite.

- OJD is estimated to cost sheep farms \$28 million per year and BJD is estimated to cost cattle producers \$2 million per year. The number of Australian sheep flocks currently infected by OJD is low, but the disease could spread widely if left uncontrolled. In 2005, the average death rate on properties affected with OJD was 6.2 per cent of the adult flock each year, more than double the accepted annual mortality rate of 2–3 per cent.
- From 1 July 1999 until 1 March 2016, MLA will have invested approximately \$21.5 million in 46 research projects on Ovine Johne's Disease (OJD) and, to a lesser extent, Bovine Johne's Disease (BJD). In 2006, MLA's investment in OJD research as part of the National OJD Control and Evaluation Program 1998-2004 was analysed by Agrans Research. Based on the assumptions made, the investment returns were positive, with a net present value of \$18.7 million at a 5 per cent discount rate, a benefit-cost ratio of 1.8 to 1 and an internal rate of return of just less than 14 per cent.
- A vaccine for OJD is available which, while not a 'silver bullet', does significantly reduce the number of sheep that die from OJD and over time reduces transmission rates. The long-term performance of the Gudair® vaccine has been investigated, with results continuing to demonstrate declining prevalence of disease with continued use of the vaccine in most vaccinated flocks.
- In the evaluation period, further work was undertaken on the efficacy of Gudair. This work concluded that despite a rapid decrease in OJD mortality in flocks following the commencement of a vaccination program, shedding of bacteria persisted for at least 5 years in a majority of flocks. The findings suggest that vaccination needs to be continued over an extended period of time and combined with other farm biosecurity measures.
- In determining the impact of the work completed in the evaluation period, Workshop participants noted that high levels (>90 per cent) of vaccination use occurred in infected areas prior to 2010. Participants, therefore, concluded that the benefits from the new research are likely to be marginal in that the new research made producers more aware of the need to keep vaccinating over an extended time period.
- Workshop participants agreed that it was likely that, in the absence of the new research, 20-30 per cent of producers would otherwise go through a cycle of stopping

vaccination, becoming re-infected, and vaccinating again, at a cost of at least \$10 000 per flock.

- The Silirum vaccine for cattle was also tested under an MLA research project during the Evaluation Period and demonstrated a similar need to continue vaccination.

As a final point, Workshop participants assessed that there was a significant chance that Johne's Disease would at some future point in time be declared a food safety threat as the cause of chronic Crohn's Disease (bowel inflammation) in humans. The significant investment in OJD and BJD may, therefore, include a defensive, risk minimisation objective (that is, to identify, isolate and reduce, the number of infected flocks). It was noted that the link between Johne's Disease and Crohn's disease had a high profile in Japan.

Workshop participants suggested that there may be an element of the endemic disease R&D that counters the risk of loss of demand — similar to the animal welfare work.

Estimation of economic impact⁴⁵

- Without research recommendations, assume 25% of producers currently vaccinating would stop at some point over the period 2014-2019 (5% units in each year).
- The current number of flocks vaccinating is approx. 12,750 (based on 2015 vaccine sales of 5.1m from Zoetis, and assuming the average flock vaccinates 400 lambs per year (primarily the females to be retained — vaccine is only effective between 4-16 weeks of age))
- Assume that if vaccination is stopped, nothing much happens for 2 years, then mortality increases by 1% unit per year. At about 5%, producers will realise the problem and re-start vaccination, but again nothing happens for 2-3 years (because older unvaccinated sheep remain susceptible whilst in the flock), and it takes 6 years of vaccination to re-establish flock immunity and cull older susceptible sheep.
- Average loss of \$31,250 per flock over 15 years (@ \$75/mortality), whilst continuing vaccination costs around \$700 per flock per year, or \$10,500 over 15 yrs, so average net saving is \$20,750 per flock over 15 years.

Opportunities to improve impact achieved

The following comments were made by the workshop, in addition to those made by the MLA staff:

- There is a need to create greater awareness, and increase dissemination, of new results and tools. Producers see endemic disease almost as a fact of life — they accept it. This also applies to some of the plant toxicity work. In both cases, rates of adoption can be low even though the economic case is compelling. There is a need to include adoption as part of an integrated animal disease/welfare program to take a technology to market. It was noted that the Cattle Council of Australia was moving to make the Animal Health Statement compulsory and this may help focus further attention on this area.

⁴⁵ Bruce Allworth — personal communication.

- The sheep abattoir surveillance program seems useful — this could be introduced for the cattle industry with feedback to producers.
- There is a need to develop better ways of measuring costs of diseases and determine value in analysing down to regional scales due to diversity across the industry (see GHD report for MLA on this topic).
- Northern herds have fewer vets on properties, and therefore reduced capability for on-farm diagnosis and exotic disease detection. Managing endemic disease is the best method to maintain a response capacity for an exotic disease incursion.
- MLA should raise the profile of the role of livestock veterinarians and the need for disease management — many producers do not proactively use well-established preventative treatments. Economic benefits should be emphasised in extension material.
- Increasing producer understanding and confidence is important in much of this portfolio's R&D — individual herd/flock impacts can be devastating even though the specific disease does not have a large national impact.
- Tick vaccines, economic alternatives to spaying and castration are perennial issues, not yet solved despite large investment.

Impact assessment

19.2 MLA Impact – benefits and investments^a: 3.4 On-farm animal health and biosecurity

		On-farm animal health & biosecurity
		3.4
Expected benefits		
Red meat industry net income - total ^b	\$m	195
– 2010-11 to 2014-15	\$m	11
– > July 2015	\$m	184
Red meat gross value of production- total ^c	\$m	89
– 2010-11 to 2014-15	\$m	17
– > July 2015	\$m	72
Actual investment^d		
– 2010-11 to 2014-15 inclusive	\$m	43
Benefit cost ratio		
Red meat industry net income - total		4.6
Red meat gross value of production - total		2.1

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Saleyard equivalent GVP excluding processing (basis for levies). ^d Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

19.3 MLA Impact – benefits in terms of red meat net income^a: 3.4 On-farm animal health and biosecurity

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	
3.4 Support industry to improve animal health and biosecurity	34	161	195	4.6
– % of impact benefits	17	83	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

19.4 MLA Impact – benefits in terms of GVP^a: 3.4 On-farm animal health and biosecurity

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	
3.4 Support industry to improve animal health and biosecurity	62	27	89	2.1
– % of impact benefits	70	30	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

19.5 Budgets for Animal health and biosecurity

Budgets by Program	\$,000		\$,000		\$,000		\$,000		\$,000		\$,000	
	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
3.4 Support industry to improve animal health and biosecurity												
3.4 Support industry to improve animal health and biosecurity (producer elements only - no feedlots or processors)	3,676	2,375	4,057	3,833	5,485	5,194	5,337	4,295	5,015	2,557	23,570	18,253
3.5 Increase producer engagement with MLA tools and information to support productivity (producer elements only apportioned across programs)	1,220	700	1,334	737	1,892	1,437	1,734	1,344	2,033	825	8,240	5,343
MLA Donor Company projects	0	2,145	0	3,085	0	2,016	0	2,524	0	1,384	0	11,154
Overheads (Corporate Services / Communications)	663	410	573	564	615	618	614	515	669	378	3,134	2,485
TOTAL	5,586	5,630	5,963	8,218	7,992	9,265	7,685	8,677	7,718	5,144	34,944	36,934

20 3.6 Feedlot programs: productivity, health, welfare & environment.

Top Line result – MLA expenditure on the Feedlot program provide industry returns of \$195m, from expenditure of \$26m with a BCR of 7.6:1

Tables , 20.4 and 20.5 provide a summary of the payoffs from investment in the *Feedlot* program.

20.1 MLA Impact – benefits and investments^a: 3.6 Feedlot programs

		Feedlot programs
		3.6
Expected benefits		
Red meat industry net income - total ^b	\$m	195
– 2010-11 to 2014-15	\$m	81
– > July 2015	\$m	114
Actual investment^c		
– 2010-11 to 2014-15 inclusive	\$m	26
Benefit cost ratio		
Red meat industry net income - total		7.6

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

Summary

The workshop determined that, across the feedlot portfolio, investments made by MLA in the Evaluation Period (2010-11 to 2014-15) had made a significant contribution to feedlot total factor productivity. Investments made within the Evaluation Period both had an impact within the Period itself and future benefits were also likely to arise from the work.

- Workshop participants observed that, conservatively, productivity growth for feedlots over the five year Evaluation Period had totalled about 8 per cent (equivalent to 1.6 per cent per year). This improvement was attributed to many factors: feed conversion efficiencies through better genetics and improved practices, technical upskilling, extension activities, etc. The Workshop settled on 20 per cent attribution to MLA of these productivity gains comprising of a 15 per cent attribution for large corporate

feedlots (80 per cent of turnoff) and 40 per cent attribution for smaller feedlots (20 per cent of turnoff).

- In addition, Workshop participants concluded that the work undertaken by MLA on heat stress over the Evaluation Period (including extension activities) had materially reduced a significant downside risk for the feedlot industry — with an impact estimated by the industry avoiding one-off regulatory imposed costs of \$14.4 million.
- Workshop participants also identified that future benefits were likely to arise from research undertaken by MLA during the Evaluation Period — especially in the investment areas related to heat load and bovine respiratory disease (BRD). The consensus view of Workshop participants in terms of future impacts (under the assumption of no additional MLA investment in these areas) is summarised in table 20.5.
- Feedlot program impact was measured at \$195m (net industry income) with a BCR of 7.6:1. Some 42% of the benefit accrued during the assessment period with 58% to be captured in coming years.

Objectives from MLA 5 year business plan

An amalgam of the priority objectives for the Feedlot Program to address during the 2010-2015 period, as identified through the consultation processes for the Feedlot Program 2006-11 and Feedlot Program 2011-16, include the following:

- Increased emphasis on investment in strategic and applied research initiatives to improve productivity through access to animals of superior genetic potential, superior feedstuffs, improved feeding and operational management.
- Identification and development of tools and technologies that reduce feedlot operational labour inputs and costs.
- Development of practical strategies to address the impacts of increased climate variability.
- Understanding and quantification of greenhouse gas emissions from feedlots and development of verifiable and practical mitigation strategies to reduce emissions.
- Supply of credible scientific data and information to support industry in the areas of environmental management, resource usage and sustainability, animal health and welfare, and food safety.
- Animal health and welfare, particularly the improvement of the understanding and management of bovine respiratory disease, the identification and development of improved diagnostic tools, and development of objective stress measures and behaviour models.
- Strategic and applied initiatives to prepare for a time, which has been defined as ‘life after hormonal growth promotants, ionophores and antibiotics’, when the use of these products as we now know them may be restricted by the attitudes of the consuming public.

- Continued development and retention of the human resources (feedlot staff, consultants and researchers) that service the feedlot sector through education, training and development of appropriate career paths and opportunities.

MLA Summary of Program Outputs and Outcomes

MLA investment in feedlot programs during the evaluation period spanned a broad cross-section of MLA AOP Program Areas, including on-farm productivity, animal health and biosecurity, animal welfare, the environment (including responding to climate change), engagement with the community over environmental and animal welfare issues and associated extension activities. The sum total of the feedlot sector's planned investment in these programs areas for the period 2010-11 to 2014-15 was \$23.9 million. Actual expenditure was slightly less than planned — at \$22.7 million.

Major RD&A investment areas and achievements are listed against the objectives they deliver on:

3.1. Identify and deliver opportunities to increase on-farm productivity (\$6.37m)

3.1.1. Enhance rates of genetic improvement in livestock and feedbase performance

- The Feedlot Program invested in all phases of the Beef CRC, which wrapped up in 2012. Lot feeders continue to benefit from the genetic advances that resulted from that investment. This investment has been evaluated as a separate exercise (Abacus Bio reports B.EVA.0001 & B.EVA.0002), along with other MLA investments in animal genetics, and appropriate attributions of impact will be made to the feedlot sector.

3.1.2. Improve productivity in grazing and feedlot systems

- Net Feed Intake (NFI) testing of the progeny of the elite young sires in the Angus, Hereford, Charolais and Limousin breeds involved in the Beef Improvement Nucleus (BIN) herds. The BIN projects involve progeny testing approximately 85 elite young bulls each year (Angus 40 bulls, Hereford 15, Charolais 15 and Limousin 15). The breed society partners are investing approximately \$1.3m pa in total in these projects, which is being matched through the MLA Donor Company. The Feedlot Program is investing \$0.2m pa to enable the NFI testing component to be completed. The Angus Society now has sufficient data available to calculate NFI-F (feedlot) EBVs for the sires being tested and has included the NFI-F values in BREEDPLAN and incorporated them in to the Angus Breeding Index.
- Co-investment with GRDC, APL, RIRDC Chicken Meat Program and AECL to develop a genetically modified sorghum variety. CSIRO Plant Industries have discovered a method for improving both the yield and digestibility of wheat cultivars by a process of selection for a particular form of a single gene. Laboratory trials have indicated an increase of around 15% and 5-7% for yield and starch digestibility

respectively for wheat lines that possess the trait. The same trait exists in sorghum and the cross-industry consortium of R&D organisations was formed to further research whether the same improvements can be realised by applying the technology to sorghum cultivars. Still under development, the next step is to identify a company to undertake the required transformation of the genetic material into sorghum.

- Implementation of a 5-year program of work to address the impact of summer heat load on feedlot cattle through nutritional means. A comprehensive review of the nutrition and metabolism of heat stressed beef cattle has been undertaken and delivered to industry a succinct summary of the current knowledge base on heat stress nutrition in cattle, plus a recommended R&D program to address identified research gaps and opportunities. The R&D priorities were developed during a workshop with industry participants (veterinarians, nutritionists and operators) held in Brisbane during September 2012. Workshop attendees recognised that rumen and gut health were core to minimising heat stress damage to feedlot cattle and a comprehensive and intense program of both applied and basic research activities has been put together to address the problem.
- Feedlot dags remain a major issue for the lotfeeding sector and work to date has been largely unsuccessful in developing a solution. Several initiatives have been pursued during the current program. A chemical/washing system was successfully trialled in New Zealand, where the chemical is registered. However, a permit has yet to be obtained from APVMA to conduct a trial in Australia with the chemical wash.
 - An MLA Donor Company project is currently progressing with Intellectual Ventures, a company that uses a world-wide network of over 1,000 inventors to work on difficult to solve problems. Thirty seven separate potential invention solutions were put forward for consideration. Seven of these were selected to progress to proof of concept stage, five being for development of protective chemical coats that stop the mud material adhering to the hair on an animal's coat, and two for chemical solutions that degrade the dags after they have formed. Trials are progressing, but a number of the protective solutions are showing good promise.
 - Funding is also available for a PhD or Post Doc student to work on the enzyme degradation of formed dags, an area of work where we had some initial success. However, a student interested in taking this on as a project has yet to be secured.
- Further development of a non-chemical fly control product that addresses an industry desire to move away from the use of chemicals for social licence/community perception reasons and to minimise the potential for chemical contamination. Flies are resistant to most currently available controls, so a successful outcome to the project offers a viable alternative.

3.1.3. Develop and implement new practices and technologies to increase labour efficiency and compliance to market specifications

- Two scoping studies were completed to review available technologies that could remotely and autonomously detect and locate sick or non-eating animals within a feedlot pen. The principal aim is to provide an aid for pen riders that detects sick animals at an earlier stage, with resultant decrease in the use and cost of antibiotic

treatments, plus a better recovery rate. Conclusions from both studies were that there was no single technology currently available to do this, with the exception of the Canadian GrowSafe feeders system, which is generally considered too expensive for use in a commercial feedlot operation. Further development work is required to combine two or more of the technologies that are currently available to achieve a cost-effective solution to this problem.

3.1.4. Use producer participatory R&D to maximise rate and effectiveness of development and evaluation of new technologies

- Numerous publications and other resources were developed during this period to collate latest scientific knowledge and best practice management and present it in a form suitable for industry to utilise. These include:
 - National Guidelines for Beef cattle Feedlots in Australia 3rd Edition
 - National Beef Cattle Feedlot Environmental Code of Practice 2nd Edition
 - Guidelines for managing contaminants in feedlot manure and effluent
 - Beef cattle feedlots: Waste management and utilisation
 - Beef cattle feedlots: Design and construction
 - BRD Best practice prevention manual
 - Industry WH&S manual and training materials
 - Environmental management manual and training materials
 - Caring for cattle DVD – cattle handling
 - Caring for cattle DVD – backgrounding and feedlot induction
 - Technical library DVD – collation of all MLA research reports and communication materials
 - Animal welfare officer training and certification module
 - Euthanasia guidelines for feedlot cattle
- A number of impact evaluation studies were undertaken to provide industry with appropriate information on which to base investment decisions. These include:
 - Impact of ethanol mandate on sorghum prices in Queensland
 - Meta-analysis of effects of zilpaterol and ractopamine in feedlot cattle
 - Survey of antibacterial product use in the Australian cattle industry
 - Regional investment study update
- Several series of Australia wide workshops are conducted each year in conjunction with ALFA to provide training for feedlot operators and staff, and to support the adoption and use of the resources that have been produced for industry. Attendance at these workshops usually numbers 150-200 persons. Workshop series conducted include:
 - Animal health and welfare, with a focus on BRD and heat load management
 - Managing summer heat, to provide specific training and information on using the Katestone Forecast Service and other aspects of heat load management during summer
 - Environmental management training, with a focus on the identification and management of potential environmental risks and hazards experienced at a feedlot

- Nutrition and milling, to update operators on the latest advances in animal nutrition and commodity processing
- WH&S, to update operators on the latest changes in regulations and introduce the updated WH&S management module
- Animal Welfare Officer training, to equip feedlot operators and staff to better address animal welfare within the feedlot environment. Participants who successfully complete the course receive certification of their competency from TAFE QLD South West
- In addition to delivery of workshops to industry, MLA and ALFA also ran workshops with the various service providers to industry (veterinarians, nutritionists, environmental consultants) as a means of keeping them up to date with industry initiatives and obtaining feedback from them on industry issues. These workshops were held every six months, and were implemented in recognition that these service providers are, due to their ongoing contact with feedlot operators, one of the main extension and change agents for industry.
- A dedicated Facebook page and website was developed for feedlot operators and staff to access technical information, and responses to any technical queries they might have. This initiative was implemented to target a broader range of feedlot operators, including the younger feedlot staff members who may not have the same degree of access to information as those higher up the organisational structure within the feedlot operation.
- A part-time Technical Services Officer was jointly funded by MLA and ALFA to provide technical assistance to feedlots on a one-on-one basis, and to undertake a range of risk assessment and mitigation activities on behalf of industry. Feedback on this initiative was very positive and it has been recently funded for a further two years.
- The Feedlot Operations Certificate III competency based training course for feedlot staff was updated to an online format to allow greater access by feedlots that are located more remotely or have a small number of staff with training requirements. This reduces lost time for employers, time away from work for participants and travel costs for trainers and assessors as much of the course can now be delivered and tested online.

3.4. Support industry to improve animal health and biosecurity (\$2.91m)

3.4.1. Improve animal health and biosecurity

- A major BRD epidemiological study was completed and the results have been extended to industry. The study confirmed many of the critical risk factors previously identified as important, including breed, induction weight (which may be due in part to age and/or body condition), size of pre-arrival groups, season of induction, yard weaning, prior vaccination with Pestigard™ and prior vaccination with Bovilis MH™. In addition, the study made novel use of data from the National Livestock Identification System to investigate time-specific effects of mixing and transfers through saleyards and the timing and duration of the move to the feedlot.

- Two further research projects were implemented to examine aspects of BRD risk that were highlighted as a result of the study. These included a study to examine the impact of backgrounding and pre-feedlot vaccinations, individually and in combination, and the effects of acclimation of cattle post-arrival.
- Project work continued on the development of a 2in1 BRD vaccine. Discussions with potential commercial partners identified an interest in the vaccine, subject to further work to support the efficacy of the pestivirus component of the vaccine. This work is near completion.

4.1. Support on-farm environmental sustainability (\$4.88m)

4.1.1. Natural resource management

- The manure, effluent and mortality by-products of cattle feedlots contain valuable nutrients that can replace inorganic fertilisers in farming systems and home gardens. However, they can also contain a range of microbiological and chemical contaminants. To address any potential human health risks associated with these contaminants, a major research project (B.FLT.0333) was undertaken. This project quantified the contaminants in feedlot wastes; examined the inactivation or decomposition rates for these contaminants under different processes; examined how feedlot workers, contractors and visitors could become exposed to these contaminants; estimated the exposure risks for these people in a wide range of situations; and then identified practical ways to reduce the exposure risk. While the project identified some areas for concern, it also identified management practices that can quite easily reduce the human health risks to acceptable levels. Guidelines were produced to describe the contaminants found in feedlot waste products, the human health risks these pose and the practices that can be used to safely manage and use these wastes. These Guidelines were subsequently incorporated into the Manure Handbook, which collated Best Practice Management for the management and utilisation of feedlot manure and effluent.
- Another comprehensive series of projects reviewed earlier work to develop a new methodology for assessing the impact of feedlot odour on the surrounding community. New knowledge, generated after the original project (FLOT.323) was completed in 2005, allowed the outcomes of the original project to be revisited within the context of the current regulatory environment and thinking on odour measurement and assessment techniques. The process started with an expert's workshop, held in May 2011, which engaged the main consultants and researchers working in the feedlot odour modelling arena. The outcome of the workshop was recommendations on a program of work that could be implemented to address the identified shortcomings in the original project. This program of work was undertaken and progressed successfully to the development of a new proposed methodology for assessing feedlot odour impact. The new methodology is currently being employed by a number of feedlots, who were previously not able to expand their operations under the prevailing regulatory assessment processes, to apply for expansions of their facilities. No feedback is currently available on whether the new methodology will be accepted or challenged by regulatory agencies.

- An environmental performance review of Australian feedlots was undertaken in 2012. The objective of this study was to undertake a detailed survey and review of the environmental performance to document current practices and identify, quantify and report key performance indicators (KPIs). The KPIs were to address water usage, nutrient production, energy usage, GHG emissions, solid waste management, liquid waste management, feed management, nuisances such as odour and noise, and overall site management. Unfortunately, it was not possible to calculate any KPIs. However, there was clear evidence that the environmental performance of Australian feedlots has improved significantly over the past 20 years, as the result of the combined effects of well-funded research, improved regulation and guidelines, and the implementation of the industry quality assurance system. Recommendations were made on instrumentation, data collection and analysis requirements to allow KPIs to be generated and assessed in future reviews.

4.1.2. Responding to climate change

- Two studies were completed to examine the impacts of future climate change on several practical aspects of feedlot design and operation, including the sizing requirements for feedlot effluent ponds, drinking water requirements and the incidence of heat stress events. Three climate change scenarios were examined, ranging from mild to extreme. In all but the most extreme climate change scenario, current requirements for sizing of effluent ponds, drinking water requirements, and management practices for heat stress are adequate through to 2100. Under the extreme climate change scenario, there may be a requirement to modify effluent pond sizing requirements for the central NSW region, where increased rainfall variability will likely impact the frequency of pond overflows post 2050. Additionally, feedlots in central and southern Queensland, and northern NSW may have to consider the type of cattle they feed, as the number and severity of heat stress events will increase for British breed cattle over the same timeframe.
- Several major projects that quantified methane, nitrous oxide and ammonia emissions from the feedlot system were completed during this period. Research was also conducted to accurately determine livestock numbers, days on feed and diets fed, in order to predict emissions using available prediction equations in the Life Cycle Assessment area. All of this research underpinned a full revision of the Australian National Greenhouse Gas Inventory, released in 2015. A summary of the major changes, underpinned by MLA research, are as follows:
 - Revised input data for prediction of enteric methane – underpinned by data collected in MLA life cycle assessment projects
 - Revised inventory data to predict average days on feed for feedlot cattle – underpinned by data analysis in several projects, and the ALFA/MLA feedlot survey statistics.
 - Application of new best practice GHG estimation method for manure management– based on mass balance research funded. Major changes include revision of nitrogen and volatile solids excretion methods to apply a tier 3 method in the national inventory.
 - Application of new methane emission factors for feedpads

- Application of new emission factors (methane, nitrous oxide) for feedlot manure stockpiles
 - Application of new emission factors for ammonia from feedlots
 - Application of new emission factors for leaching and runoff containment
 - Revised inventory of manure management practices for the feedlot industry, based on the feedlot environmental survey and previous research
 - Identification of manure nitrous oxide as an area requiring review and/or change during the current reporting period, based on research by Redding et al., funded by MLA⁴⁶.
- These recommended changes to the national inventory resulted in the following change in reportable emissions:
 - Reportable emission sources for feedlot beef production increased from 5 to 11, with a marginal increase in reported emissions per animal.
 - Predicted feed intake and manure excretion decreased per animal.
 - Inventory numbers (total number of livestock head days) decreased by 30-39% depending on the inventory year.
 - Net reduction in reportable emissions of approximately 30-40%.
 - A separate project examined the potential mitigation of ammonia and nitrous oxide emissions from feed pads through the use of lignite addition to the pen surface, and clearly demonstrated that direct emissions of ammonia could be reduced by up to 67%. Ammonia emissions are an important precursor to potential nitrous oxide emissions. When re-deposited to the landscape, ammonia has the potential to be re-emitted as nitrous oxide. Nitrous oxide abatement was more variable and no clear pattern of abatement was noted. The ammonia was sequestered in the lignite in the form of ammonium and showed an increased retention of N in manure of 20 to 40%, which was then demonstrated to be available for plant growth when the manure was used as a fertiliser replacement for urea.
 - An economic analysis of the use of lignite in feedlot systems was undertaken. The analysis is sensitive to transport costs (especially diesel and freight distance) of lignite to the feedlot and fluctuations in the price of synthetic fertilisers and other inputs to the farming system. It was estimated that when manure was used as a fertiliser replacement in a forage production system that returned the forage to the feedlot system, a net income gain of \$4.72 to \$6.67 per head was possible (based on urea price of \$500 per tonne), depending on the rate of lignite application.
 - Further it was estimated (using average abatement of ammonia and nitrous oxide emissions from these studies) that the abatement potential of lignite is 2.04 kg CO₂e/kg lignite added to the feedlot systems (without liabilities for transport or fugitive emissions). If a CFI method was to be developed for the abatement technology the net abatement return for the 13,750 head feedlot system modelled would be equivalent to approximately \$104,150 in credits or \$7.57 per head.

⁴⁶ Redding, M. R., Devereux, J., Phillips, F., Lewis, R., Naylor, T., Kearton, T., Hill, C. & Weidemann, S. 2015, Field measurement of beef pen manure methane and nitrous oxide reveals a surprise for inventory calculations, *Journal of Environmental Quality*, 44 (3), 720-728.

- A number of projects examined the potential for the reuse of manure and effluent and their inherent greenhouse gases as a source of energy. Assessments included the use of covered anaerobic lagoons to capture methane emissions from effluent, combustion or gasification of manure, and use of more conventional anaerobic digester technologies. While these technologies could significantly reduce greenhouse gas emissions and manure disposal costs, generate significant amounts of green energy and electricity and in the case of gasification, sequester significant amounts of carbon in the char, none appear to be economically viable under current electricity and carbon pricing regimes. Significant issues to be addressed to ensure maximum utilisation of the volatile solids content of manure include the elimination of soil contamination in the harvested product and subsequent re-hydration to a slurry form.

4.3. Provide industry with solutions to meet high standards of animal welfare without reducing productivity levels (\$2.44m)

4.3.1. Manage and improve livestock welfare to meet community expectations

- Management of heat load in feedlot cattle remains a major research focus. The Katestone Heat Load forecast service moved from the research phase to an implementation phase in 2013, and the ongoing annual operational costs of the service are covered by Animal Health Australia. However, as technologies change and understanding of heat load improves, there is a need to update the service on an ongoing basis to incorporate the new research outcomes. MLA continues to fund this aspect of the service, along with the training of feedlot operators and staff, and actively promotes its uptake by industry. Training materials were completely revised and updated in 2014 and a series of workshops delivered across eastern Australia to promote the service and provide training to feedlot operators.
- Adoption of the forecast service has increased significantly in the current review period, from 20 feedlots in 2010-11 to 176 feedlots in 2014-15. 2014-15 feedlot membership represents just under 990,000 head of capacity or 85% of the current feedlot capacity reported in the ALFA/MLA Feedlot Survey (June 2015). This level of service utilisation has been achieved through both incorporation of the heat load requirements into the National Feedlot Accreditation Scheme and ongoing promotion of the benefits of the service through ALFA and MLA activities.
- 31 feedlots have also integrated their onsite weather stations in to the Forecast Service so they can receive forecasts on a twice daily basis that are corrected for their onsite conditions. Accuracy of these forecasts has been improved by around 10% on their prior non-adjusted forecasts.
- An animal welfare officer training and certification module was developed and delivered to industry through a series of workshops. 156 feedlot personnel completed the training and assessment process required to obtain the certification from TAFE QLD South West, who acted as the RTO for the training. The objective of the course was to provide those people employed in the feedlot that have overall responsibility for monitoring and supervising animal welfare practices throughout the operation

with the skills necessary to undertake their work, with a particular focus on animal welfare audits.

- There has been increasing interest over the past several years in the use of bedding materials in Australian cattle feedlots. While the primary interest relates to the potential for improvements in production and animal health and welfare during the wet winter period, there are many other reasons these options are being examined (for example, heat load amelioration, dag reduction, odour and greenhouse gas emissions reduction). A scoping study (B.FLT.0379) found that, although there was strong interest from lot feeders, no formal trials of bedding materials had been conducted in Australia and no information about the use of bedding had been collated. A subsequent series of trials looked at available bedding types, how they were used, and quantified, where possible, the benefits obtained from their use. Unfortunately, production data was not able to be obtained, but the study did show that bedding can play a useful role in some sections of feedlots, but is not viable to cover whole production pens due to issues with availability of sufficient quantities of the required materials, cost and handling issues.
- A series of three projects (two completed, the third underway) have used preference testing to address a public perception that animal welfare is reduced under intensive animal farming systems compared with extensive or free-range systems. In the first project (B.FLT.0349), free choice testing was conducted to determine how the preference of cattle for a commercial feedlot or pasture environment changes with different pasture availabilities. It was found that cattle chose to spend 25-30% of their time in the feedlot and this was not influenced by pasture availability. Feedlot feeding periods peaked at the start of the day around 08:00h with cattle preferring to be in the feedlot during the day and at pasture at night, where they spent between 50-80% of their time lying. The second project imposed a cost on the animals for their choice. If they chose to go to the pasture or feedlot, they were locked there until the next testing period. Results indicated a preference to gain their feed intake from the feedlot, regardless of the 'cost' imposed. However, there was some suggestion that the timing of feed placement may have biased outcomes. The current project will re-evaluate the previous results from the feed choices project when the feed reward is removed and ad lib feeding methods applied. A second component of this project will examine the impact on the animals' preference when feedlot pens are muddy. CSIRO are undertaking the project, utilising the custom built Y-maze and feedlot facility constructed at the Chiswick research facility, Armidale.

4.5 Develop sustainable innovation capability within the industry and its service providers (\$0.76m)

4.5.2. Collaborate with industry to implement professional and skills development programs

- Each year, MLA funds one lotfeeder to undertake the Australian Rural Leadership Program. This has been a particularly successful and rewarding undertaking with 5 of the current 14 ALFA councillors having been recipients of the scholarship. Two positions were also funded each year in 2014 and 2015 for feedlot operators to participate in the Australian Rural Leadership Foundation TRAIL program.

4.5.3. Support the development of essential science, research, technical and extension capabilities

- MLA funded three PhD positions within the BRD epidemiology project and one position is currently being funded within the heat load nutrition program.
- Having access to suitably qualified researchers was identified as a priority issue for industry during the 2009 strategic planning process. Of particular concern was the loss of knowledge and expertise associated with the retirement of experienced researchers. MLA has introduced a program of research mentors to address the identified shortage of suitably qualified researchers and to ensure that retiring researchers pass on their expertise to young, upcoming researchers.
- As part of this initiative, MLA supported a postdoctoral fellow under Dr Ian Colditz's supervision at the CSIRO, to build and maintain research capacity in the areas of immunology and health, welfare and productivity of feedlot cattle. Brad Hine, a previous CSIRO employee, was attracted back to Australia to take up this position. The project was successful in that Dr Colditz has since retired, and Brad Hine has been awarded a full time position with CSIRO.

Workshop evaluation of performance / industry impact

Impact between 2010-11 to 2014-15

The workshop began by considering the possible impact between 2010-11 to 2014-15 on the feedlot industry of MLA investments made over the same period.

- across the sector, on average productivity growth of at least 2 per cent per year had occurred after normalisation for seasonal and environmental factors
 - a more specific estimate was 2.3 per cent in weight gain per year including a 1.7 per cent improvement in feed efficiency and a 3 per cent reduction in mortalities
 - another lotfeeder estimated the improvement was 8 per cent improvement over 5 years
 - the workshop acknowledged that, while on average productivity had increased, productivity may have fallen in some smaller feedlots
- throughout this period large variations in capacity utilisation had occurred, driven by seasonal conditions and demand fluctuations, with utilisation rates dropping to as low as 60 per cent at one point — this possibly retarded the uptake of new R&D.

An observation was made that improvements in feed conversion also resulted in less waste and improved environmental outcomes.

Attribution of productivity gains

The workshop then discussed the attribution of these productivity gains between internal and external factors (including MLA). It was recognised that many factors influenced productivity gains, including genetic gain, improved rations and feeding management, better disease management, improved pen management, improved heat stress

management, ‘about getting the small things right,’ etc, and improvements applied by individual feedlots in these areas were partly due to MLA research and extension and partly sourced from elsewhere. One lotfeeder revealed that two major productivity improvements had been implemented in their feedlot operations during the Evaluation Period, one of which was unrelated to MLA work, with the other in part using background knowledge and data from MLA.

While acknowledging that attribution was complicated, the following judgements were made:

- the attribution could be as high as 40 per cent and as low as 10 to 25 per cent
- the differentiation between corporate and smaller feedlots was identified as being important—for larger operations, the MLA input is less critical, but for smaller feedlots technical upskilling and assistance with acquiring new knowledge and implementing new research is important.

It was noted that adoption rates of MLA research, especially by smaller operators and particularly in the area of heat stress and backgrounding, had ‘jumped’ over the last 5 years, with technical upskilling resulting in better overall management.

The workshop settled on an 8 per cent improvement in productivity over the last 5 years (equivalent to a productivity improvement of 1.9 per cent each year), with 20 per cent of this attributable to MLA comprising of:

- 15 per cent for the corporates (80 per cent of turnoff)
- 40 per cent for smaller feedlots (20 per cent of turnoff).

The major benefits were identified as:

- a 3 per cent reduction in the incidence of BRD over the 5 years, resulting in a drop in annualised mortality rates from 1.69 to 1.64 per cent.
- a 7 fold reduction in heat loss mortalities, probably worth more than \$5 million which is based on an Agtrans ex-ante BCR of 2.6:1.
- improved feed efficiency and reduction in dark cutting
- technical upskilling and adoption has enabled uptake of these initiatives.

Management of downside risks

In addition to the above, Workshop participants concluded that the work undertaken by MLA on heat stress in feedlots over the Evaluation Period (including extension activities) had materially reduced a significant downside risk for the industry. Currently 62 per cent of cattle on feed have access to shade. If the industry had not addressed heat stress, in the view of Workshop participants there was a 100 per cent probability that regulations would have been introduced imposing shade requirements across the entire feedlot industry at a (one off) cost of \$14.4 million.⁴⁷

⁴⁷ The avoided cost of shade implementation on 50 per cent of the current capacity not shaded.

Future impact from MLA investments

The workshop next considered the future impact of MLA investments made in the period 2010-11 to 2014-15 under the assumption that no further MLA investment occurs. Workshop assessments in each of the areas where future benefits were likely to occur are outlined below.

Net feed intake

MLA staff, by referring to ex-ante benefit cost analyses, identified potential future benefits to the feedlot sector from research into developing estimated breeding values for net feed intake:

- a 1 per cent improvement in the efficiency with which energy is used for production (not maintenance), reflected as a 1 per cent reduction in feed intake, resulting in a 0.54 per cent decrease in costs.
- assumed application to Angus and Hereford cattle only, comprising 50 per cent of cattle on feed
- benefits to only begin in 2018, a reflection of the time needed for the new EBVs to begin spreading through the herd
- calculated adoption was 21 per cent with 66 per cent attribution (in recognition of the investment of breed societies in BIN animals)

The most significant comment from the workshop was that the adoption would be significantly less than the 20 per cent (of throughput) assumed in the ex-ante BCA. Testing would occur for only a limited number of sires, but most likely the top sires. Workshop participants initially indicated that adoption would be more likely to be 30 000 head out of turnoff of 900 000 head, so therefore 3.3 per cent. After further discussion this was revised down further to 2.5 per cent. It was also observed that for impacts to be realised it was necessary to assume that breed societies would be willing to fund testing in their own right.

GM sorghum variety

A new variety of GMO sorghum, developed partly with MLA investments in the period 2010-11 to 2014-15, is now under consideration by a commercial partner. The new variety could deliver a 15 per cent increase in yield and a 5 to 7 per cent increase in starch. Based on an ex-ante evaluation, benefits should accrue to the feedlot sector from the new sorghum variety:

- the price of sorghum is forecast to drop by 5 per cent
- in terms of feed ration costs the drop will be 1.25 per cent as sorghum comprises 50 per cent of grain usage and would be available to only 50 per cent of feedlot capacity
- energy available from grain will increase by 6 per cent, which will manifest itself as a reduced time on feed as result of an increase in ADG

The major comment from the workshop was that sorghum is no longer as important to the feedlot sector as it once was plus the policy environment had changed:

- feedlots would now be a minority user of sorghum in southern Queensland especially considering its use in the intensive livestock industries plus with the recent introduction of the ethanol mandate
- in the long term it was likely that sorghum would represent less than 5 per cent of the feedlot rations.

Furthermore, GM sorghum is unlikely to be available until 2022, with a noticeable impact not occurring until 2025, reaching 5 per cent of rations by 2030. For these reasons the workshop concluded that the potential benefits from this area are likely to be very small.

Improved summer rations/heat load management

Previous research conducted by MLA had identified that average daily weight gain in feedlots over summer is 0.1 kilogram per day (5 per cent) below spring performance. Generally the first response of cattle exposed to hot conditions is to decrease their dry matter intake (DMI). This reduction in DMI is an attempt by the animal to bring metabolic heat production in line with their heat shedding capabilities. Different feed ingredients may produce different amounts of body heat despite having similar energy levels. The use of feed additives and highly digestible, high energy diets produce the lowest amount of metabolic heat per unit of production and are the most efficient type of summer ration.

Research has been conducted by MLA into improving summer rations by using feed additives. In an ex-ante BCA, benefits were modelled on basis of recouping half of the summer production loss at an additional cost of \$4.50 per tonne of feed, based on the additional costs associated with the feed additive. The modelling was also done on the basis that the production gains and the ration use is confined to the 90 days of summer.

The workshop identified that this area was actually the feeding component of the heat load project. Heat stress leads to decreased productivity over summer and higher mortalities. Every feedlot has at least one heat event a year. The Workshop, therefore, considered the heat stress work in total.

Workshop participants calculated that the average increase in productivity across the year from improved summer rations could range between 0.25 — 0.4 per cent — say, an average of 0.33 per cent.

- This would amount to an industry benefit of \$8 to \$10 million with an adoption rate of 90 per cent in an average year.

Additionally, on average every five years a large heat event occurs with costs three times greater than in a normal year (with costs broadly apportioned into one-third mortalities and two-thirds productivity losses).

- Therefore, the future benefits from improved summer rations / heat stress management should average \$12 million each year.

Adoption of a range of improved techniques for managing heat stress has occurred progressively over the last five years. As a result, Workshop participants recommended that:

- between 2010-11 and 2014-15 the benefit assigned to MLA's heat stress work be half of the longer term benefit, or \$6 million per year.
- In terms of additionality to the improvements in total productivity identified above, it is difficult to segregate out that part due to heat load from the balance of more generic productivity growth.

Dag treatments

'Dags' on cattle in feedlots involve removal costs of \$5 to \$15 per head prior to transport. There are also other benefits of addressing the issue including managing downside food safety risks in processing and even reducing the number of dark cutters that result from washing.

A number of promising new treatments are being explored to address the 'dags' issue. None of these treatments, however, are at the stage of commercialisation. As result Workshop participants concluded that further MLA investment would be required. If benefits arose from this work, they should be captured in later evaluations and not assigned to the current Evaluation.

Improved BRD management

Bovine respiratory disease (BRD) is the most common cause of illness and death in Australian feedlot cattle, accounting for about 65 per cent of all feedlot mortalities, being most common in the first four weeks after entry to the feedlot. BRD is caused by a combination of stress and disease causing agents, including viruses and bacteria. As well as higher mortalities, clinical and sub-clinical BRD cases also result in reduced productivity. Evidence from previous MLA research shows that during autumn (the main BRD period) average daily gain is 0.1 kilogram per day (5 per cent) below annual average performance.

MLA research concluded during the Evaluation Period has the potential to reduce the impact of BRD — through better backgrounding procedures, pre-feedlot vaccination, etc.

An ex ante BCA conducted by MLA was based on the premise that MLA R&D would deliver knowledge to enable operators to reduce the incidence of BRD by 10 per cent.

- Treatment cost and death loss to be reduced by 10 per cent.
- Gains in productivity to also result.

The workshop identified that if all feeders were pre-vaccinated before feedlot entry, then the incidence of BRD would fall by 10 per cent.⁴⁸ This is only happening to a limited extent where backgrounders are vaccinating their feeders prior to entry.

In terms of benefit and impact, the workshop estimated that there would be a 40 per cent reduction in death loss from BRD. Therefore, the industry benefit would be a 24 per cent reduction in mortalities (that is, 40 per cent multiplied by 65 per cent).

⁴⁸ JBS announced premiums for pre-vaccinated feeder cattle for BRD.

<http://www.beefcentral.com/lotfeeding/industry-embracing-pre-vaccination-for-feeders-as-productivity-tool/>

- Industry adoption was estimated to be 15 per cent because of the effort involved and practice change needed in properly backgrounding cattle.
- The workshop also estimated a small improvement in weight gain of 0.125 per cent, and indicated a need to determine the value in addressing clinical and sub-clinical BRD across all animals.

2 in 1 BRD vaccine

Research undertaken by MLA during the Evaluation Period is likely to lead to a new vaccine being developed that addresses BRD as a result of both herpesvirus and pestivirus. At this point of time, discussions have occurred with potential commercial partners with an interest in the vaccine, subject to further work to support the efficacy of the pestivirus component of the vaccine. This work is near completion — and if MLA investment were to cease commercial parties may conclude the work. The product still requires registration.

An ex-ante BCA conducted by MLA proposed that the new vaccine would result in a 5 per cent reduction in treatment costs and death loss from BRD

- The current pestivirus vaccine involves two doses to be administered 4-6 weeks apart. The new vaccine addressing both herpesvirus and pestivirus in a single shot would encourage adoption.

While the MLA presentation proposed a 0.8 per cent reduction in costs (\$12 per head on a \$1500 animal), the workshop estimated that the benefits would involve a 0.4 per cent reduction in costs after allowing for the purchase price of the vaccine.

- Industry adoption would be 60 per cent. Adoption would be fast because the product is a substitute for the market incumbent.
- Given further work on the 2 in 1 vaccine may be required, the workshop queried whether benefits be included in this Evaluation.
- The Program Manager identified that discussions have been held with one of five potential commercialisers. However, it is likely that they would look to utilise the MLA Donor Company to assist with the further development of the vaccine, so the outcome is uncertain.

Lignite pen surface ameliorant

In open beef feedlot systems, more than 50 per cent of dietary nitrogen (N) is lost as ammonia (NH₃). Research completed by MLA over the Evaluation Period points to the potential of reducing ammonia emissions through spreading lignite over feedlot pens. In small scale research conducted by the University of Melbourne the application of lignite in a feedlot pen decreased NH₃ loss by approximately 66 per cent.⁴⁹ In addition to this environmental benefit, the research also highlighted the value associated with retained nitrogen nutrient in the lignite treated manure.

⁴⁹ Chen, D. et al. A new cost-effective method to mitigate ammonia loss from intensive cattle feedlots: application of lignite. *Sci. Rep.* 5, 16689; doi: 10.1038/srep16689 (2015).

- It was estimated that when manure was used as a fertiliser replacement in a forage production system that returned the forage to the feedlot system, a net income of \$4.72 to \$6.67 per head was possible (based on urea price of \$500 per tonne), depending on the rate of lignite application.
- Further it was estimated (using average abatement of ammonia and nitrous oxide emissions) that the abatement potential of lignite is 2.04 kilogram CO₂e per kilogram lignite added to the feedlot systems (without liabilities for transport or fugitive emissions). If a CFI/ERF method was to be developed for the abatement technology, the net abatement return for the 13 750 head feedlot system modelled would be equivalent to approximately \$104 150 in credits or \$7.57 per head.
- In addition to the fertiliser benefit, a reduction in odour was identified
- The workshop made the following comments:
 - the fertiliser benefit and reduction in odour are the primary benefits enabling feedlotter to remain where they are in some cases, but the reduced costs of 0.2 per cent assumed in the MLA presentation were identified as being conditional on the feedlot being integrated with a pasture or cropping enterprise.
 - the ERF benefits may be a zero sum game due to the costs of compliance and auditing etc.
 - the cost of the lignite delivered is very sensitive to transport distance as it is a low value product and would effectively limit the number of feedlots that use it.

Industry adoption was assumed to be 20 per cent across Victorian, Southern NSW and South Australia.

- For the reasons identified above, the workshop identified that 20 per cent was probably optimistic and that a target audience within the feedlot sector of 10 per cent of national turnover was most likely.
- Within this group, the first comment was that this initiative had limited potential. The workshop went on to estimate a 50 per cent adoption or 5 per cent of national turnover.
- It seems from the Background Paper that further (large scale) work on lignite may be required. There are a number of feedlots that are keen to utilise the technology to enable them to expand, and they will likely proceed with it in their own right.
- However, the majority will be looking for further quantification of benefits on a larger scale. Discussions have been held with Brown Coal Innovation. If these discussions are successful, no further MLA input would be required. Given the uncertainties involved, these benefits will be included in next evaluation period.

Extension materials, workshops, training

This area of activity covered a wide range including:

- high levels of engagement with members representing 80 per cent of industry capacity and improving engagement with the balance of members
- improving probability of adoption for the initiatives identified above

Adoption of heat load forecast service and other heat load management practices was a good example of time lags, even with extension and incorporation of requirements in to the National Feedlot Accreditation Scheme.

Attribution to MLA in this area was nominated as 100 per cent, but further improvements would require future investment in extension.

- The feedlot sector has good uptake because it is more process driven and intensive than the pastoral sector. Therefore, some of the benefit realised over 2010-11 to 2014-15 will not decay in the 'without MLA' investment case because practice change has been embedded into systems.
- In absence of MLA investing in this area, ALFA would fill some of the gap left in adoption activities.

The workshop concluded that benefits realised during the evaluation period would decay over 10 years.

Other areas of future benefit in managing downside risks

The presentation identified a number of additional areas of potential benefit:

- the reduction in the risk of a food safety incident was also identified but the workshop assessed that the benefits were negligible
- the 30 to 40 per cent reduction in reportable emissions by the sector and the change in the base for greenhouse gas inventory were mentioned — this will be of value if a carbon tax is introduced at some future point in time.

Opportunities to improve impact achieved

The workshop made the following observations and suggestions.

- The requirement for more and accurate data, especially from the commercial sector on impacts to assist with evaluation and to improve industry models.
 - there is a need for improved definitions, consistency and accessibility to industry data.
 - more needs to be known about commercial drivers for R&D and the link with adoption. This is especially true where the program is moving towards 'fuzzy' areas where data is either low quality or non-existent,
- There is scope for MLA to provide customised data and information to members (too generic at the moment) and find new pathways for dissemination such as webinars.
- There should be testing by R&D providers in commercial-scale pens to avoid incorrect conclusions:
 - but there are big opportunities to improve the attractiveness of the feedlot sector to institutions through the development of research networks
 - the industry is good at identifying relevant R&D but it must be more proactive in developing these networks.

- The industry has to be more proactive in dealing with animal welfare in the processor's lairage — by improving connectivity along the supply chain.

In conclusion, the workshop identified three things as important for the feedlot sector:

- the way animal value is derived (value based marketing)
- the lack of sophistication in the cattle trading environment with nearly 100 per cent of cattle being traded near term in the physical market. There is a need for more sophisticated market mechanisms to better manage risk.

Impact assessment

20.2 MLA Impact – benefits and investments^a: 3.6 Feedlot programs

		Feedlot programs
		3.6
Expected benefits		
Red meat industry net income - total ^b	\$m	195
– 2010-11 to 2014-15	\$m	81
– > July 2015	\$m	114
Red meat gross value of production- total ^c	\$m	516
– 2010-11 to 2014-15	\$m	189
– > July 2015	\$m	327
Actual investment^d		
– 2010-11 to 2014-15 inclusive	\$m	26
Benefit cost ratio		
Red meat industry net income - total		7.6
Red meat gross value of production - total		20.2

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Saleyard equivalent GVP excluding processing (basis for levies). ^d Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

20.3 MLA Impact – benefits in terms of red meat net income^a: 3.6 Feedlot programs

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	
3.6 Feedlot programs	13	182	195	7.6
– % of impact benefits	7	93	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

20.4 MLA Impact – benefits in terms of GVP^a: 3.6 Feedlot programs

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	
3.6 Feedlot programs	19	497	516	20.2
– % of impact benefits	4	96	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

20.5 Summary of agreed impacts from MLA investments 2010-11 to 2014-15

Project Area	Agreed impact	Industry Adoption % of Impact	Time Period of Impact
Net feed intake	1 per cent increase in feed efficiency	2.5	> 2017
Improved sorghum varieties	Minimal impact	5.0	>2025
Improved summer rations/ heat stress	0.45 per cent increase in TFP	90.0	> 2018
Dag removal	No outputs		
Improved BRD management	24 per cent reduction in mortality	15.0	>2018
2 in 1 BRD vaccine	-0.4 per cent in costs	60.0	>2022
Lignite pen surface ameliorant	0.2 per cent in costs	5.0	>2018
Adoption materials, workshops, training	Further investment required	na	na

20.6 Budgets for Feedlot Programs

Budgets by Program	\$,000		\$,000		\$,000		\$,000		\$,000		\$,000	
	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
3.6 Feedlot programs												
3.1 Identify and deliver opportunities to increase on-farm productivity (feedlots only)	788	405	840	1	1,712	1,041	1,440	1,420	1,686	1,714	6,466	4,581
Less 3.1.1.1 Provide genetic and genomic evaluation tools and information for cattle, sheep and goat breeding enterprises (note this was included in Program 3.1) - feedlots only	-222	-262	-132	0	0	-5	0	-5	0	-2	-354	-274
3.4 Support industry to improve animal health and biosecurity (feedlot elements only)	896	714	770	586	602	659	1,134	1,074	630	619	4,032	3,652
4.3 Provide industry with solutions to meet high standards of animal welfare without reducing productivity levels (feedlot elements only)	272	157	614	418	238	305	966	663	1,236	960	3,326	2,504
4.1 Support on-farm environmental sustainability (feedlot elements only)	1,310	1,574	1,018	1,088	1,396	1,283	1,320	1,391	920	886	5,964	6,222
3.5 Increase producer engagement with MLA tools and information to support productivity (feedlot elements only)	281	93	347	183	293	256	293	194	305	243	1,702	968
4.4 Support industry's effective engagement with the community (feedlot elements only)	210	255	230	238	230	211	226	254	183	213	1,079	1,170
MLA Donor Company	0	115	0	89	0	0	0	85	0	1,729	0	2,018
Overheads (Corporate Services / Communications)	389	306	333	302	394	378	407	442	378	479	1,902	1,907
TOTAL	3,924	3,357	4,020	2,905	4,865	4,127	5,786	5,518	5,338	6,840	23,934	22,746

21 3.7 Goat Industry

Top Line result – MLA expenditure on the Goat Industry program provide industry returns of \$8m, from expenditure of \$3m with a BCR of 2.6:1

Tables 21.11, 21.12 and 21.13 provide a summary of the payoffs from investment in the *Goat Industry* program.

21.1 MLA Impact – benefits and investments^a: 3.7 Goat industry

		Goat industry
		3.7
Expected benefits		
Red meat industry net income - total ^b	\$m	8
– 2010-11 to 2014-15	\$m	5
– > July 2015	\$m	3
Actual investment^c		
– 2010-11 to 2014-15 inclusive	\$m	3
Benefit cost ratio		
Red meat industry net income - total		2.6

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

Summary

MLA investments, across goat-related R&D, make a significant contribution to addressing supply-side constraints such as attracting producers into the sector and providing tools and information for producers to make more informed decisions.

Note: this program assessment includes written comments on all aspects of the goat industry program – however, only the impact from the ‘on-farm’ R&D aspects are included in the \$ impact assessment. Impacts from other aspects of the goat industry program are included in other program areas as noted in the program and expenditure table below.

Program impact was measured at \$8m (net industry income) with a BCR of 2.6:1. Some 63 per cent of the benefit accrued during the assessment period with 37% to be captured in coming years.

Objectives from MLA 5 year business plan

R&D - To achieve:

- Profitable goat production enterprises
- Skilled and enthusiastic producers
- Proactive and innovative Australian goat industry.

Marketing

- To be a respected, consistent and profitable supplier of quality goatmeat to the domestic and international market

MLA Summary of On-farm R&D

Program Outputs and Outcomes

Australia is the world's largest goatmeat exporter with approximately 95% of production exported. The industry's growth since 2010 (as shown in table 21.2) was underpinned by strong demand from export markets and the sale of rangeland goats derived from extensive production systems. Rangeland goats account for approximately 90% of total animals slaughtered⁵⁰. Farmed meat breeds account for the remaining 10%.

21.2 Key goat industry statistics

	2010	2014
Goatmeat export value (AU)	\$113M	\$241.8M
Head slaughtered	1.676M	2.129M
Tonnes produced (cwt)	26,500T	32,900
Head exported live	77,400	88,530
Live export value (AU)	\$10.3M	\$8.6M

Source: Australian Bureau of Statistics (ABS) and Department of Agriculture

Average Over the Hook (OTH) prices have recently been at record highs, at the beginning of 2016 over 500c per kg carcase weight. Averages OTH prices were 438c per kg in June 2015 compared to approximately 200c in 2013 and 300c in 2014 (MLA 2015).

BCS Agribusiness in 2011 estimated the total Australian goat herd was between 3 to 4.4 million⁵¹. Managed herd numbers in 2011-12 had reached more than 500,000 head (Australian Bureau of Statistics (ABS)). The Australian goat industry supports a small

⁵⁰ Stokes, Tara (October 2009) *Is it Feasible to increase the supply of goatmeat in Australia given the nature, variability and risks in the market?* Undergraduate Dissertation prepared as a part of a Degree of Bachelor of Agriculture and Resource Economics University of New England.

⁵¹ BCS Agribusiness (2011) *Australian Goat meat Supply Profile. B.GOA.0052.* Meat & Livestock Australia, Sydney

live export trade primarily to Malaysia for immediate slaughter. MLA currently has approximately 2,400 goat producer members.

Much of the goat investment has been targeted at provision of tools and information for producers to make more informed decisions. Areas of significant impact on the Goat industry RD&E outcomes have been attributed under the following areas.

Communication, tools, resource development Total invested: \$777k

Outputs from this program of investment (see table 21.3) include delivery of a Cost of Production (CoP) calculator, a new Rangeland Management module within Going into Goats (GiG), updating of several other GiG modules and delivery of the Goats On The Move (GOTM) e-newsletter.

These projects assisted in disseminating key information to the producer base for improved awareness and decision making. The GiG Rangeland Management module is a vital addition to GiG as it focuses specifically on the issues relevant for production in the rangelands where 90% of goat production occurs. Improvements in this production area provide the greatest opportunity for industry growth and improved sustainability due to the low cost production system and reduced risk of management issues such as internal parasites.

Revision of the Parasite Management, Nutrition and Depot Management modules within GiG are due to conclude in 2015-16 and will provide updated best practice information to producers in both extensive and intensive production. The Parasite Management Module will be more relevant for intensive goat enterprises (approximately 10% of production). The *Australian Goatmeat industry RD&E strategy 2012 Benefit Cost Analysis (BCA)* indicated that if the following strategies were undertaken successfully they would have the following effects on turnoff, probability of success and adoption.

21.3 Potential impact from goat industry communication strategies

Strategy	Turnoff increase (%)	Probability of success (%)	Adoption (%)	Likely time (years) from completion of research investment to market ready state
Capacity building	1	50	25	1
Communications	0.5	50	25	1
Grazing systems	1.5	80	25	5

Health, genetics, welfare Total invested: \$596k

Outputs from this program of investment and their impacts include upgrades to the KIDPLAN website and resources for improved usability and accuracy, development of guidelines for optimal administration of oral anthelmintics and development of a vaccine for Barbers Pole Worm (*Haemonchus contortus* (ongoing)) funded through the MDC with National Residue Survey (NRS) levies. These are summarised in table 21.4.

Projects delivered improved services and information primarily targeting farmed goat producers who account for approximately 10% of production where, anecdotally, industry reports indicate the number of animals behind wire is increasing. The *Australian Goatmeat industry RD&E strategy 2012 BCA* indicated that if the following strategies were undertaken successfully they would have the following effects on turnoff, probability of success and adoption.

21.4 Potential impact from goat industry health, welfare & genetics strategies

Strategy	Turnoff increase (%)	Probability of success (%)	Adoption (%)	Likely time (years) from completion of research investment to market ready state
Genetics	0.5	50	90	10
Animal welfare and health	1	80	25	3

Strategic planning, surveys, evaluations *Total invested: \$479K*

This area of investment largely focused on the provision of industry information, supply potential and development of realistic targets and KPIs for MLA investment and the industry as a whole — therefore the impact of this investment should be absorbed into the other program areas listed (table 21.5). Outputs from this program of investment and their impacts include development of two strategic plans along with a BCA on the first of those plans (referenced in this paper), goat population estimates, a review of relevant Federal and South Australian (SA) Government legislation and policies and a review of goatmeat export market requirements.

These programs have delivered improved producer information (practices and attitudes) which have been used to better tailor extension and adoption activities to producer needs. The SA legislation and policy review identified impediments to expansion of rangeland goat meat production and supply in South Australia, along with recommended changes. Further, access to up to date information regarding the risks, volatilities, opportunities and areas of stability within the Australian goatmeat export market will assist in informing future MLA marketing levy investment and businesses development for exporters. The *Australian Goatmeat industry RD&E strategy 2012 BCR* indicated that if the following strategies were undertaken successfully they would have the following effects on turnoff, probability of success and adoption.

21.5 Potential impact from goat industry supply chain strategies

Strategy	Turnoff increase (%)	Probability of success (%)	Adoption (%)	Likely time (years) from completion of research investment to market ready state
Supply chain management and marketing	1	80	25	3

Workshop evaluation of performance / industry impact

It was noted that the main features of the goat industry over the 2009-10 to 2014-15 review period included:

- 18 per cent increase in goat turnoff (domestic slaughter and live)
- 16 per cent increase in goat meat production (27 780 to 32 285 tonnes)
- 180 per cent increase in the value of goat meat exports (from \$86 million to \$241 million)
- trade in live exports that had dipped after the introduction of ESCAS, but now had returned to previous levels⁵².

Outputs of the programs during the evaluation period were noted as:

- in the area of communications, tools and resource development:
 - delivery of a Cost of Production (CoP) calculator (January 2015).
 - release of a Rangeland Management module within the Going into Goats (GiG) initiative (2013).
 - evaluation of the economic impact of predation on WA industry (April 2015).
 - revision of the Goat Selection (June 2014), Parasite Management, Nutrition and Depot Management modules within GiG (ongoing).
 - publication of the Goats on the Move quarterly newsletter providing information on the latest developments in MLA's goat program and the broader Australian goatmeat industry.
- in the area of health, genetics and welfare the focus was mainly on farmed goat producers (between 10 to 15 per cent of production) with outputs including
 - upgrades to the KIDPLAN website
 - development of guidelines for optimal administration of oral anthelmintics (2014)
 - dosages, WHPs and ESIs of parasiticides registered for use in goats in Australia (2013)
 - development of a vaccine for Barbers Pole Worm (ongoing):
- in the area of strategic planning, surveys and evaluations, the focus was largely on the provision of market and industry information, highlighting particularly good demand for goat meat and opportunities for supply.
 - two strategic plans were developed with an aim of delivering better and more targeted services especially in the area of extension and adoption.
 - review of goatmeat export market requirements summarising the risks, volatilities, opportunities and areas of stability within the Australian goatmeat export market to inform future MLA marketing levy investment and business development for exporters.

⁵² It was noted that the average return from live exports had declined over the evaluation period. With Malaysia being the primary market, the proportion of the trade had switched away from breeders (nannies) to slaughter goats which are lower in \$ per head.

The two major areas of contribution on-farm that were identified by the workshop were (i) the production of communication materials with the objective of attracting more producers to the industry and (ii) R&D designed to improve on-farm productivity through better understanding of predation by feral dogs and improvements in animal health and productivity. During the evaluation period, the number of properties selling goats increased by 3 376 to reach 11 464.

The workshop found difficulty in separating the impact of R&D innovation from the wider industry drivers including strong export returns and supply side-constraints. Overall, they believe that the program had delivered benefits.

Discussion at the workshop suggests the following methodology be used to calculate benefits from MLA's R&D investments during the evaluation period (2010-11 to 2014-15) in terms of assisting growth in the industry:

- the growth in goat turn-off during the period of 18 per cent form the basis of the calculation
- that the growth in turnoff that would have been expected due to higher goat prices be deducted from this figure (using a price elasticity of supply)
- that a further deduction be applied to reflect that a portion of MLA's work is directed at farmed goats.

In terms of future impact, the Workshop agreed that while the communication material would have benefits into the future, this benefit would decay without further investment.

Opportunities to improve impact achieved

The workshop made the following observations in addition to those made in the background paper

- Keeping the programs relevant in a fast changing world — it can take up to 2½ years after the investment decision is made by industry before the R&D project is up and running — by that time the market and general environment has changed.
 - The decision making process through MLA needs to speed up.
- In terms of productivity, survival of kids is crucial - what producers require is more information on the losses of kids through mortalities from diseases and vertebrate predators.
 - There is the potential to achieve up to a 30-40 per cent increase in surviving kids through R&D and its communication.
- There is also potential for rangeland producers to achieve major increases in productivity from finding 'the right' bucks for rangeland conditions (improved genetic selection).
 - There is significant potential in rangelands nannies to improve genetics quickly between the generations and using the available genetic pool to identify high performers.
 - This would add significantly through increased turnoff weights of offspring.

- There should be further work on why people are not going into goats as a business and how to address misconceptions around the industry.
 - Feral dogs are prevalent in many production areas, but this is not the only issue why people are not looking at goats —some ‘mythbusting’ is required.
 - It was noted that in Western Australia, even if dogs were under control tomorrow, there would still be problems in getting people into the industry due to the stigma in being involved in the goat industry.
- In terms of constraints to growth and increasing production, a number of issues were identified:
 - Drenching and using off-label products, with registration of common sheep drenches required for goats.
 - Numerous and more effective drenches need to be registered for goats — an issue for the farmed industry. It could be argued this is an issue for all of industry as, if they breach withholding periods or residue limits, this would impact on export markets
 - Tagging in the rangelands. This issue is around the threat of losing current tagging exemptions for goats going to depots or direct to slaughter. GICA are arguing that the exemptions should be kept as to tag would be an unnecessary OHS issue for businesses, and create unnecessary stress on a wild animal. This issue must be balanced with need to ensure traceability in the system for our export markets.

Other Program areas

MLA Summary of Live Exports Program Outputs and Outcomes

Live export *Total invested: \$332k*

Many of the goat live export R&D activities completed during the Evaluation Period were directed at supporting the LEP’s animal welfare work, specifically, assisting with ESCAS compliance. Amongst other things, this involved developing Standard Operating Procedures (SOP) templates that could be used by overseas facilities and the design of training materials and videos. More recently outputs in this area include the development and piloting of a Global Assurance Program for the Livestock Export Industry (LGAP) which will offer long term sustainability for the industry.

Other live export R&D work involved the investigation of ventilation conditions, case study of animal deaths and development of a best practice manual. These were across industry programs of work.

W.LIV.0159: Preparation of rangeland goats for live export is an ongoing goat specific project which will deliver information to assist in the development of a domestication management process for wild goats addressing optimum domestication periods, optimum nutritional and dietary fibre requirements, options for minimising buck dominance behaviour, feed assimilation and susceptibility to disease. While the domestication management process will not be used as originally intended for long haul live export given industry currently uses airfreight, it will have wider application with industry.

The impact of this investment is maintaining access to and social licence for the live export trade. Without this investment the industry risked losing the market which in the evaluation period was worth approximately \$29M. The *Australian Goatmeat industry RD&E strategy 2012 BCA* indicated that if the following strategies were done successfully they would have the following effects on turnoff, probability of success and adoption (table 21.6).

21.6 Potential impact from goat industry live export strategies

Strategy	Turnoff increase (%)	Probability of success (%)	Adoption (%)	Likely time (years) from completion of research investment to market ready state
Animal welfare and health	1	80	25	3

Workshop evaluation of performance / industry impact

Malaysia is the largest and most complicated market for live goats. The Live Export workshop concluded that without the Live Export Program (LEP), that there would have been a 50 per cent probability of closure of that trade in 2011-12. Goats in the main are exported by airfreight (5 000 per month).

In terms of the MLA investment (both R&D and marketing), the majority of the effort was in training and gap analysis in-market.

- After accounting for matching government funding, the split between R&D and marketing was 60-40 per cent.

The workshop agreed that MLA activities had made a significant positive impact, especially with the training and gap analysis undertaken in response to the introduction of ESCAS in 2012 and so played a significant part in the return of the trade.

It was observed however, that the dependence on one export market was a huge risk.

- Improvements in market access and greater market diversification are a priority moving forward. The current focus is on China and India for both goatmeat and live animals.

Opportunities to improve impact achieved

The industry requires protocols to allow expansion to markets outside of Malaysia. Currently, there are no protocols in place or they are unworkable (for example, China).

MLA Summary of Marketing Program Outputs and Outcomes

Objective 1: Increase the volume and value of goatmeat exports and domestic consumption

Below is a summary of the performance of goatmeat export markets, comparing the base year 2009-10 with 2014-15. MLA export marketing programs, in conjunction with commercial industry partners, would have contributed towards these impacts:

- Export volume to all destinations increased by 6,513 tonnes, from 27,840 tonnes to 34,354 tonnes. This represents an increase of 23% on 2009-10.
- Export value increased by A\$154 million, from \$104 million to \$258 million FOB. This represents an increase of 148% on 2009-10. The significant value growth was driven by the increase in demand for goatmeat within the US, at the same time as their own goat production levels declined.
- Average value per kg of goatmeat exports increased from \$3.80/kg to \$7.07/kg, an increase of 86% per kg.
- Market Diversification: Whilst the US still dominates as by far the largest export market, there has been further diversification in markets, with the Top 3 markets of US, Taiwan and the Caribbean representing 87% of total goatmeat exports in 2009-10, which reduced to 75% in 2014-15, as other markets developed (see table 21.7).

21.7 Goat industry export market diversification

Destination	Export Vol tonnes swt - DA			Export value (A\$ 000) - GTA			Ave \$/kg - GTA		
	2004/2005	2009/2010	2014/2015	2004/2005	2009/2010	2014/2015	2004/2005	2009/2010	2014/2015
Canada	940	1,586	2,200	4,206	6,177	14,041	4.25	3.99	6.44
US	9,689	15,273	19,262	38,489	59,933	155,095	3.82	4.05	8.10
Caribbean	1,489	3,889	2,520	3,748	12,345	12,860	3.98	3.48	5.35
China			772		108	5,251		1.64	6.29
Hong Kong			1,444		175	7,378		2.33	6.55
Taiwan	5,933	4,205	3,885	20,397	12,963	20,781	3.37	3.14	5.35
Indonesia			418			2,441			5.00
Malaysia	75	177	462	315	880	2,041	4.49	4.18	5.51
Japan	170	188	398	578	853	2,187	3.31	4.98	5.57
Korea	126	652	1,781	601	2,535	11,516	4.26	4.13	6.40
Pacific Islands	3	20	140	8	70	722	4.47	3.54	5.08

Objective 2: To be internationally recognised as the preferred supplier of quality goatmeat

Australia's share of world goat meat exports has expanded over the past five years. Whilst the latest global goatmeat export data is only available up to 2013, comparing to the base year of 2009, Australia's share of global goatmeat exports has increased from 49% to 58%.

In the US, Australia's largest goat meat export market, an analysis of goat meat imports (from all sources) indicates that total imports increased by 39% over the 5 year period, and that Australia's market share of imports remained around 97% of all US goatmeat imports. This meant that with the declining US production of goatmeat, the increase in demand within the US has entirely been supplied by Australia.

The second largest exporter of goatmeat is Ethiopia — with goat exports about 1/3 those of Australia (that is, exports of about 11 000 tonnes) — however, Ethiopia would not have the market access or reputation of Australia.

It is internationally recognised that Australia is the preferred supplier of quality goatmeat to key export markets.

True Aussie Goat:

Until 2014, there were inconsistent logos used internationally for goatmeat. To focus on communicating a consistent message in all export markets, and to bring efficiencies to implementation across multiple export markets, the True Aussie ‘brand Australia’ for Australian goatmeat commenced in 2014, and has been rolled out globally in over 30 markets.

With one core brand for Australian goatmeat, customised for local markets, MLA and the industry are now better positioned to further build trade and consumer awareness of Australian goat product attributes.



Identifying ‘preferred supplier’ export markets:

To identify markets in which Australia could be a preferred supplier, and to provide input for future market strategy development, a market research project on Australian goatmeat exports was undertaken by Queensland Trade and Investment in 2013-14.

The research included an exploration of the fundamentals driving increased demand in Asia, particularly China – a market which offers great potential but about which little is known. Other markets examined were the United States of America, Caribbean, South Korea, Taiwan, India, the Middle East and the European Union.

- Key findings from the report included:
 - Data available within markets was difficult to obtain and when available was either unreliable and/or included sheepmeat
 - Distinct lack of supply chain transparency in most markets
 - Goatmeat is traded as a commodity, affordable protein alternative in most markets and is often substituted with mutton (if mutton is cheaper, demand for goatmeat will reduce)
 - There is limited capacity for markets to improve their local production to satisfy increasing demand, which underpins ongoing demand for Australian goatmeat
 - Increased awareness of food safety globally creates opportunities for Australian product to be differentiated and valued

- Key recommendations suggested in the report to industry are:
 - Better market the story of Australian goatmeat production (generic promotional material differentiating Australian goatmeat from local product)
 - Continue to gather more specific supply chain and consumption information in key markets
 - Specific to China (but should be done in other markets), track Australian goatmeat exports through to the end consumer to understand how products are used in market
 - Support co-funded marketing initiatives of Australian exporters which increase the appeal and opportunities for Australian goatmeat

Objective 3: To strengthen awareness of Australian goatmeat globally

Global Consumer Tracker consumer research commenced in 2013 in 7 countries to collect consistent data across key markets with the same methodology. This research was expanded to 12 countries by 2015, with detailed goatmeat data available in 5 countries.

The Global Consumer Tracker research provided consumer insights for strategy development, as well as a consistent usage and attitude measurement across regions.

The outcome the 2015 research indicates a healthy increase year on year in the perception of goatmeat attributes in those market where goat meat data was collected (table 21.8).

21.8 Goat consumer research results in export markets

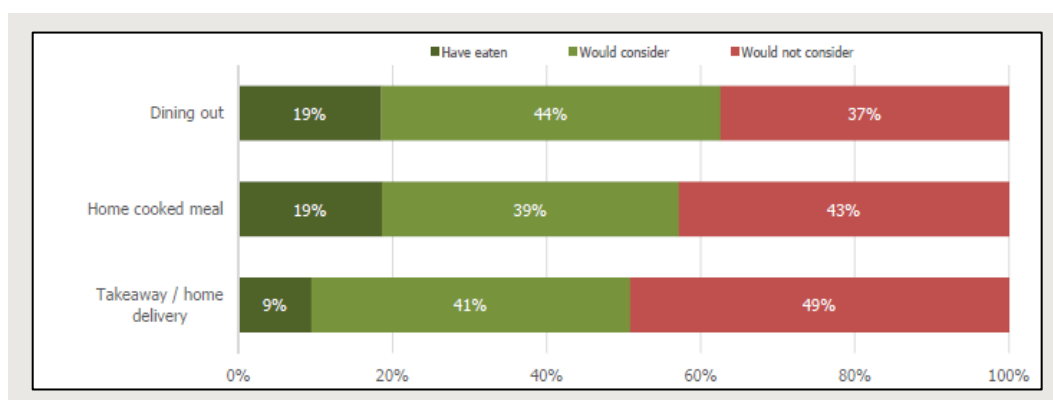
	Delicious		Safety		Nutrition	
	2015(%)	2014(%)	2015(%)	2014(%)	2015(%)	2014(%)
Indonesia	35	29	32	26	24	22
Malaysia	33	28	34	31	31	30
Philippines	22	20	27	25	20	14
Saudi Arabia	27	9	28	26	26	21
UAE	26	14	25	16	22	12

Source: Millward Brown 2015

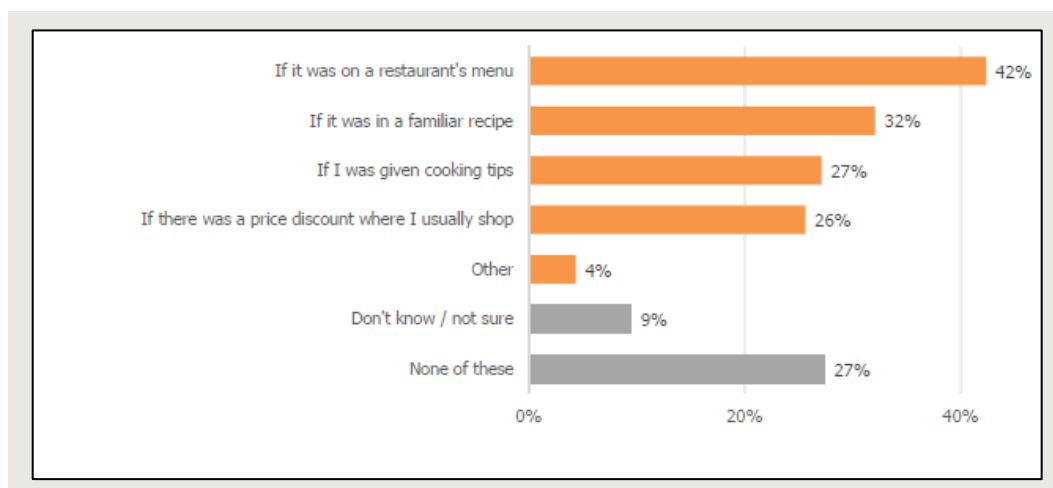
Australian consumer perceptions research:

An Australian omnibus survey conducted in 2015 indicates the following awareness and consumption patterns for goatmeat in Australia. The information gathered is a good measure of current awareness, usage and attitudes towards goatmeat in Australia and a good benchmark to compare with future consumer awareness research results (charts 21.9 and 21.10).

21.9 Have you ever eaten or would you consider eating goatmeat on each of the following occasions



21.10 Which of these would encourage you to try goatmeat



Workshop evaluation of performance / industry impact

It was noted that highlights of the program included:

- the roll out of the True Aussie Goat brand out over the evaluation period and the benefits for goat meat from leveraging off beef and lamb promotional programs.
- implementation of programs regionally and through ICAs
- increased diversification of export markets
 - In the United States there had been an increase in shipments to Caribbean and Muslim enclaves partially in response to lower US supplies.
 - Australia is the preferred supplier of goatmeat into the US market and our share of the total market has increased

The domestic consumption of goat meat was also discussed. In particular, what were MLA activities in the domestic market during the period and how has demand increased?

- In terms of investment, the annual split was around \$50 000 for the domestic market and \$250 000 for exports.

One of the conclusions was that it was difficult to measure change in domestic consumption due to lack of good production statistics — it was concluded that less than 5 per cent of production was sold onto the domestic market. In terms of increased demand for goat meat:

- there has been some ICA work with some supermarkets now picking up goat meat on a seasonal basis and in some stores, off the back of strong demand especially from multicultural communities and consumers looking for a different eating experience
- recently a small promotional campaign for goats in Adelaide went very well — with interest from SBS and Taste.com (who had 6 000 downloads for goat recipes following the event)
- in Western Australia, there isn't an export abattoir, so the only avenue to promote the goat industry is the domestic market
- the comment was made that the domestic market is currently too small and lacks the pull-through in terms of volumes and prices (compared to export demand) although the local potential is substantial

It was recognised again how difficult it is to distinguish MLA impact from all of the other drivers and to determine how much of the observed growth could be attributable to MLA. A better understanding of the contribution of the drivers would make the judgement around attribution more informed.

It was noted that as goat meat exports had grown, so had MLA support for the trade. For instance, in the past, at trade shows it was common for MLA to have no marketing materials relating to goats, whereas now goat promotional materials are available at relevant trade shows.

In terms of industry impact over the past five years, \$1.1 million had been invested by MLA in export and domestic marketing, predominantly in export marketing.

- Workshop participants saw value in the work – particularly in export marketing.
- Workshop participants suggested that for marketing a benefit cost ratio of 5:1 be used — this suggests a benefit from MLA activities over the 5 years of \$5.5 million for an export trade worth \$775 million (a value of 0.7 per cent from MLA activities compared to the total value of the trade).
- The Workshop concluded that significantly more value flowed from MLA's export marketing activities than for domestic marketing, but an average 5:1 BCR could apply.

Opportunities to improve program impact

The workshop made the following observations and comments.

- With regard to the potential growth in the domestic market — there was the need to know where it is being invested and how it is being used.

- Will the True Aussie brand be used in the domestic market as well as the export market?
- There is an opportunity if Islamic butchers can access goat marketing material domestically available in different languages — including Indonesia and Arabic.
- Because of different market conditions state-by-state, rather than generic promotions, promotional activities should be targeted — working with local wholesalers and retailers.
- Rather than analysis of consumers' perceptions, better knowledge of how goat meat was used domestically would be useful information for the industry.
- For export markets, is there an opportunity to differentiate product and improve market segmentation —for example, wet markets in Asia versus restaurants in the United States.
- It was also suggested that the marketing program consider the Global Animal Partnership — which is US certification around improved welfare outcomes.
 - It was noted that promotion of voluntary certification programs is not usual in generic marketing programs (as we cannot claim all goat is produced under such certified systems) but these can be used by commercial players to promote their own brand.
- There is a need for some investment in a standardised goatmeat language — especially for chevon which is described inconsistently in the domestic market.
- In the case of Western Australia, goatmeat comes in as a 'six-way cut' from Victoria.
 - The use of a uniform language is compulsory for export, but not domestic plants.
 - AUSMEAT should separate goat meat from the sheepmeat language.

It was noted that to sustain export growth, an improvement in product integrity is desirable which would be a significant challenge for the industry

Impact assessment

21.11 MLA Impact – benefits and investments^a: 3.7 Goat industry

		Goat industry Total
		3.7
Expected benefits		
Red meat industry net income - total ^b	\$m	8
– 2010-11 to 2014-15	\$m	5
– > July 2015	\$m	3
Red meat gross value of production- total ^c	\$m	20
– 2010-11 to 2014-15	\$m	12
– > July 2015	\$m	8

		Goat industry Total
		3.7
Actual investment^d		
– 2010-11 to 2014-15 inclusive	\$m	3
Benefit cost ratio		
Red meat industry net income - total		2.6
Red meat gross value of production - total		6.7

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Saleyard equivalent GVP excluding processing (basis for levies). ^d Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

21.12 MLA Impact v benefits in terms of red meat net income^a: 3.7 Goat industry

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	
3.6 Goat industry programs	0	8	8	2.6
– % of impact benefits	0	100	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

21.13 MLA Impact – benefits in terms of GVP^a: 3.7 Goat industry

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	
3.6 Goat industry programs	0	20	20	6.7
– % of impact benefits	0	100	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

21.14 Budgets for Goat Programs

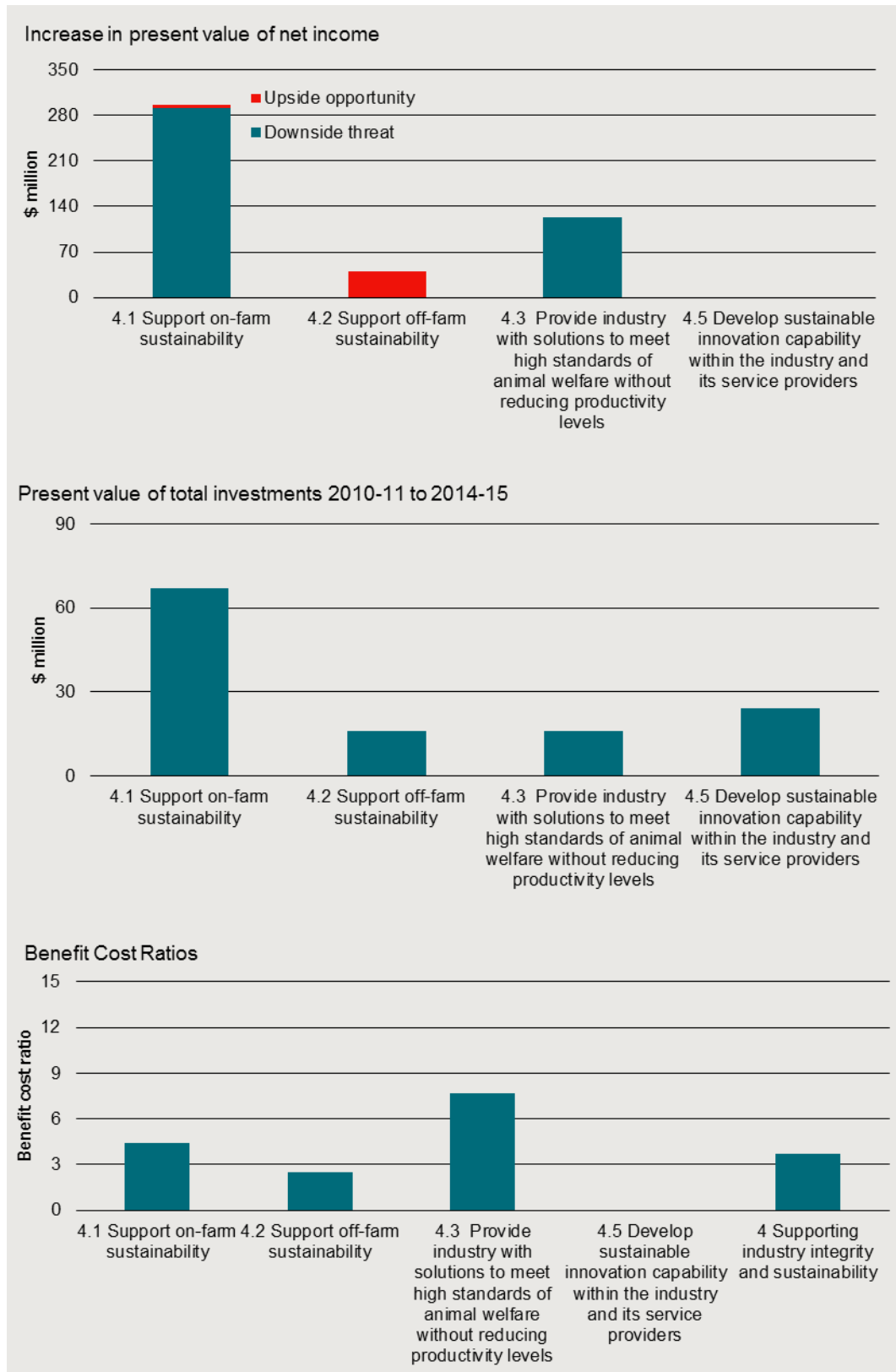
Budgets by Program	\$,000		\$,000		\$,000		\$,000		\$,000		\$,000	
	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
3.7 On-farm goat industry program												
(3.7) On-farm goat industry program	316	322	414	546	568	545	568	444	564	470	2,430	2,325
MLA Donor Company	0	0	0	0	0	0	0	0	0	0	0	0
Overheads (Corporate Services / Communications)	46	38	39	42	56	59	55	63	54	58	250	261
TOTAL	362	360	453	588	624	604	623	507	618	528	2,680	2,586

22 #4 Industry Integrity and Sustainability

Top line result - MLA expenditure on Integrity & Sustainability programs provide industry returns of \$464 million from expenditure of \$123 million with a BCR of 3.8:1.

Chart 22.1 and tables 22.2, 22.3 and 22.4 provide a summary of the payoffs from investment in *Integrity & Sustainability* programs. Supporting details behind the impact for each individual program are provided in the following sections. *Note: potential industry impact from program 4.5 was not assessed — it is assumed that some of the benefits will be captured in other MLA programs.*

22.1 Summary of MLA benefits, investments and returns



22.2 MLA Impact – benefits and investments^a: 4 Supporting industry integrity and sustainability^a

		Support on-farm sustainability	Support off-farm sustainability	Provide industry with solutions to meet high standards of animal welfare without reducing productivity levels	4.5 Develop sustainable innovation capability within the industry and its service providers ^e	Supporting industry integrity and sustainability Total
		4.1	4.2	4.3	4.5	4
Expected benefits						
Red meat industry net income - total ^b	\$m	300	40	124	na	464
– 2010-11 to 2014-15	\$m	-8	4	53	na	49
– > July 2015	\$m	308	36	71	na	415
Red meat gross value of production- total ^c	\$m	-679 ^f	70	125	na	-484 ^f
– 2010-11 to 2014-15	\$m	-109 ^f	7	76	na	-26 ^f
– > July 2015	\$m	-570 ^f	63	49	na	-458 ^f
Actual investment^d						
– 2010-11 to 2014-15 inclusive	\$m	67	16	16	24	123
Benefit cost ratio						
Red meat industry net income - total		4.5	2.5	7.7	na	3.8
Red meat gross value of production - total		-10.1 ^f	4.4	7.8	na	-3.9 ^f

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Saleyard equivalent GVP excluding processing (basis for levies). ^d Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent. ^e No impact assessment was undertaken for program 4.5. ^f The logic for this apparent 'anomaly' where net income is positive yet GVP is negative is detailed later in the report – the major factor is a reduction in carrying capacity in northern beef to achieve sustainability leading to a fall in cattle slaughtered (and GVP) but with reductions in costs leading to an increase in net income.

22.3 MLA Impact – benefits in terms of red meat net income^a: 4 Supporting industry integrity and sustainability

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
4.1 Support on-farm sustainability	296	4	300	4.5
4.2 Support off-farm sustainability	0	40	40	4.3
4.3 Animal welfare	124	0	124	7.7
4.4 Support industry's effective engagement with the community	Analysis included under Programs 4.1 and 4.3			
4.5 Sustainable innovation capability	Not quantified			
Total - 4 Supporting industry integrity and sustainability	419	44	464	3.8
<i>– per cent of impact benefits</i>	<i>90</i>	<i>10</i>	<i>100</i>	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent

22.4 MLA Impact – benefits in terms of GVP^a: 4 Supporting industry integrity and sustainability

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
4.1 Support on-farm sustainability ^b	-680	1	-679	-10.1
4.2 Support off-farm sustainability	0	70	70	4.7
4.3 Animal welfare	125	0	125	7.8
4.4 Support industry's effective engagement with the community	Analysis included under Programs 4.1 and 4.3			
4.5 Sustainable innovation capability	Not quantified			
Total - 4 Supporting industry integrity and sustainability	-555	71	-484	-3.9
<i>– per cent of impact benefits</i>	<i>114</i>	<i>-14</i>	<i>100</i>	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b The logic for this apparent 'anomaly' where net income is positive yet GVP is negative is detailed later in the report – the major factor is a reduction in carrying capacity in northern beef to achieve sustainability leading to a fall in cattle slaughtered (and GVP) but with reductions in costs leading to an increase in net income

Key Points

Impact

MLA expenditure on *Integrity & Sustainability* programs provide industry returns of \$464 million from expenditure of \$123 million with a BCR of 3.8:1. Some 11 per cent of the benefit accrued during the assessment period with 89 per cent to be captured in future years.

Of the component programs in the portfolio on-farm sustainability delivered 65 per cent of the benefits followed by animal welfare at 27 per cent.

In terms of return on investment, animal welfare delivered the highest BCR of 7.7:1, followed by on-farm sustainability (4.5:1).

Observations from commercial / technical workshops

On-farm environmental sustainability — the considerable defensive value of research investment into environmental issues of public concern and long term sustainability of the feedbase was acknowledged. In the majority of research projects examined, adoption of R&D outputs remained a significant challenge. Looking forward, there should be greater focus on the impacts of R&D in terms of how to increase adoption of outputs and measure ongoing improvement through monitoring and evaluation.

Off-farm environmental sustainability — the performance of the program had improved significantly compared to the previous planning period. A key driver of this outcome was the shift of investment out of the general levy program into joint investments with individual enterprises through the MLA Donor Company (MDC). The major benefits from investments in environmental-related assets were enabling plants to continue operating, especially in peri-urban areas, and over the long term, to reduce energy costs. There were also significant ‘triple bottom line’ benefits generated by the program

Animal welfare — overall, there was support for investments made under the program over the evaluation period. It was concluded that MLA’s animal welfare activities were important in supporting red meat demand, particularly domestically and MLA’s work in securing cooperation from animal welfare groups was viewed as critically important.

Innovation capability — program information was provided by MLA and, as no impact is attributed and no workshop was held, the information has not been verified by the impact assessment team.

MLA Donor Company — MDC based projects provided significant benefits in some program areas and complement levy funded priority areas

Impact team recommendations

- Improve the standard of ex-ante analyses by educating all relevant on-farm Managers in the use of the AWIMLA economic model developed by RMCG, and ensure internal peer review of assumptions including expertise, external where necessary, on

likely marginal benefit and extent of adoption in the target markets and the counterfactual assumptions.

- Use independent external expertise to update ex-ante analyses with most recent industry and research project information prior to future MLA impact assessment workshops, and focus the workshop participants on discussing the updated key assumptions.
- Continue and build on the strong approach to monitoring and evaluation taken in assessing benefits in Majority Market programs
- Expand efforts to move from relying on self-assessed practice change to quantifying not only level but extent of adoption
- Invest in commercial validation trials and/or commercial case studies with early adopters to develop compelling business propositions for producers who might consider adopting each of the various innovations promoted by MLA, and include more prominently in adoption communications packages

23 4.1 On farm environmental sustainability (including 3.5 producer engagement)

Top Line result – MLA expenditure on the On-farm Environment program provide industry returns of \$300 million, from expenditure of \$67 million with a BCR of 4.5:1

Tables 23.4, 24.5 and 24.6 provide additional detail of the payoffs from investment in the *On-farm Environment* program.

23.1 MLA Impact – benefits and investments^a: 4.1 On-farm environment (incl 3.5)

		Support on-farm environment
		4.1
Expected benefits		
Red meat industry net income - total ^b	\$m	300
– 2010-11 to 2014-15	\$m	-8
– > July 2015	\$m	308
Actual investment^c		
– 2010-11 to 2014-15 inclusive	\$m	67
Benefit cost ratio		
Red meat industry net income - total		4.5

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

Summary

This workshop evaluated a diverse cluster of RD&E projects targeting on-farm environmental sustainability in the grazing industries. The approach of the portfolio is to determine productivity benefits while concurrently addressing environmental issues, to ensure that:

- the natural resource base continues to support livestock production
- market and consumer concerns are recognised and the industry is seen to be responsive to those concerns.
- future risks from climate change and related environmental impacts, including a tax on carbon emissions, are understood and management options identified.

The conclusion was that, due to the long term nature of the investments, and even longer lag times before environmental changes can be quantified, minimal additional economic

benefits could be claimed for R&D outputs over the period 2010-11 to 2014-15, beyond those claimed in the On-Farm Productivity portfolio evaluation reported earlier. Additional benefits from environmental R&D outputs developed during the evaluation period will commence beyond 2015, with the majority occurring beyond 2020, but most will require additional MLA investment, and therefore be evaluated in future 5 year reviews.

Maintaining and improving long-term productive capacity and social licence brings the program components together. Although MLA survey results indicate that animal welfare has become more front-of-mind for the community and government, the environment could easily re-emerge as a priority issue. Therefore, continuing investment in the industry's environmental performance, including in community engagement activities, is seen as an important for addressing downside risks for the industry, in addition to promoting long-term sustainability.

In the majority of cases examined by the workshop, adoption of R&D outputs remained a significant challenge. Looking forward, there should be greater focus on the impacts of R&D in terms of how to increase adoption of outputs and measure ongoing improvement through monitoring and evaluation.

The considerable defensive value of research investment into environmental issues of public concern and long term sustainability of the feedbase was acknowledged.

Program impact was measured at \$300 million (net industry income) with a BCR of 4.5:1. All of the benefits to be captured in coming years. Note:

- The negative income impact for 2010-11 to 2014-15 is a result of the Wambiana assumptions starting in 2014-15 (for one year only).
 - Destocking in the north starts in 2014-15, when cattle are already short.
 - The lower supply reduces the profitability of processors (by lowering throughput) which is more than the benefits on-farm in these initial years.
 - there is a similar negative effect also in 2015-16 and 2016-17.
- The impact becomes positive following 2016-17 for two reasons:
 - the on-farm benefits start flowing
 - the reduction in cattle turnoff from the simulation becomes a smaller proportion of (recovering) cattle numbers.
- In GVP terms the impact is negative at all times (even when net income is positive) – the major factor is a reduction in carrying capacity in northern beef to achieve sustainability leading to a fall in cattle slaughtered (and GVP) but with reductions in costs leading to an increase in net income.

Objectives from MLA 5 year business plan

The vision of the 4.1 Support on-farm environmental sustainability portfolio is to improve the long-term profitability and sustainability of on-farm red meat production systems across four initiatives:

- 4.1.1.1 Develop new pasture and animal management systems to enhance natural resources and reduce off-farm impacts

- 4.1.1.2 Develop strategies to minimise off-site impacts of manure and effluent in feedlots
- 4.1.2.1 Develop adaptation strategies to climate change to improve resilience of production systems
- 4.1.2.2 Develop mitigation strategies to reduce Greenhouse Gas Emissions

The vision for program 4.4 community communications is also relevant:

- Respond and defend the industry's credentials to ensure the urban community remains confident in the industry

Further information and analysis on investments relating to 4.1.1.2 'Develop strategies to minimise off-site impacts of manure and effluent in feedlots' has been included within the Program 3.6 — Feedlot Programs.

MLA Summary of Program Outputs and Outcomes

MLA investment in environmental sustainability programs during the evaluation period spanned a broad cross-section of MLA AOP Program Areas, including on-farm and feedlot productivity, the environment (including responding to climate change), engagement with the community over environmental and animal welfare issues and associated extension activities.

Environmental outcomes (that is, reduction in soil erosion or biodiversity decline) from R&D investments in the 2010 – 2015 period cannot yet be measured, so outputs or lead indicators are the only meaningful metrics of progress towards objectives.

It is noteworthy that, before and during the evaluation period, MLA was able to attract some \$13 million of grant funds from the then Commonwealth Government's contestable Climate Change R&D funding programs to support initiatives in the red meat industry in relation to adaptation to climate change and reducing green-house gas emissions, as part of a risk management strategy for the industry. In addition, the investment in the Managing Climate Variability Program is one of the cross-sectoral initiatives strongly promoted by the Commonwealth for RDC co-investment.

Major RD&A investment areas and outputs are listed against the objectives they deliver on:

4.1.1.1 Develop new pasture and animal management systems to enhance natural resources and reduce off-farm impacts:

1) Pasture and animal management (to assist NRM) in northern and southern Australia

Natural resource management. Total Investment \$2.6 million

Water, sustainable soil 'health' and biodiversity value underpin forage production. These three are directly impacted by short and long term management decisions.

- Robust and practical approaches to assess land resource condition were developed and delivered with widespread uptake in northern Australia

- Improved grazing management was demonstrated to reduce sediment runoff in Great Barrier Reef catchments. Approx 16 per cent of a 46 per cent increase in ground cover can be attributed to Grazing Land Management (GLM) (and not increased rainfall)
- An RD&E Fire & Grazing program was scoped towards incorporating fire into sustainable property management. This has not been progressed.
- An estimated 24 million ha of pasture is unproductive due to dung. Two species of climate-matched dung beetles from France and Spain were imported, adapted and released at three targeted test sites (WA, NSW, SA).

Grazing - Southern Australia: Total (Environment) Investment \$0.38 million

Combined investment in research on southern grazing systems management investment was \$1.93 million from Productivity and Environment nodes over the 2010-1015 period.

Economic benefits are reported in the program 3.1 On-farm Productivity chapter, and were derived from:

- High rain fall zone: EverGraze researched and developed production systems that can be demonstrated to increase profit by 50 per cent while at the same time reducing ground water recharge and soil loss by water and wind. An extensive range of new knowledge and a broad array of producer and advisor products were developed.
- Low to medium rainfall zone: Multiple benefits from multi-purpose shrubs. From the research output for a farm with a higher proportion of poor soils, the average expected improvement in profit was 24 per cent for an optimal 10 per cent of farm with shrubs.
- Sustainability outcomes (via increasing perennality of the feedbase to reduce soil erosion, capture water and nutrients to reduce off site impacts) were supported by pasture and shrub improvement (3 improved Panicum, 2 cocksfoot and 1 tall fescue pasture varieties, and one old man salt bush line being commercialised).

Grazing - Northern Australia: Total (Environmental) Investment \$1.9 million

The Wambiana grazing trial has been critical in demonstrating the linkages between moderate stocking, good land condition, reduced runoff and erosion, reduced risk, and increased productivity and profitability.

- Profitability was maximised and land condition maintained or improved by adjusting stocking rates in a flexible, risk averse fashion around long-term carrying capacity as seasons change. Total LWG per ha was markedly lower than under heavy stocking, but moderate stocking was far more profitable due to lower costs and higher product value.
- Rules of thumb/guidelines were included into FutureBeef and general QDAF extension activities, the impact of which was reported in the program 3.1 section of this report.

2) Weed management: Total Investment \$4.1 million

MLA has invested significantly in biological control options for existing, high-priority weeds. As well, basic biology and chemical control options for emerging weeds are under

investigation to assist in achieving successful early intervention programs. Work was 'enabling' with no impacts over the reporting period. Projects included:

- Bellyache bush - exotic agents were identified and imported for testing
- Prickly acacia - three insects & one rust were identified as potentially effective
- Giant Rats Tail Grass - native agent investigated but deemed unsuitable
- Parkinsonia - Mass-rearing and releases of two looper caterpillars in the WA, NT and QLD has enabled over 700,000 larvae and nearly 140,000 pupae to be released across 82 sites. A native fungus is awaiting approval for release by the APVMA
- Developing the best management approach for the summer perennial silverleaf nightshade has taken an action research approach, establishing >130 sites across three southern states with evidence that 51,000ha of infected land is under BMP from the 2014-15 season
- Low and non-chemical approaches to weed control, and reducing herbicide resistance R&D is underway.

3) Pest Animals Total MLA Investment \$2.6 million

Feral pigs, rabbits and wild dogs all have impacts on the profitability and environmental sustainability of grazing enterprises. MLA continues to work with the Invasive Animals CRC to develop innovative and novel control methods but importantly with R&D to address jurisdictional constraints in delivery approaches, triggering effective landholder behaviours and community engagement programs to enable a 'whole of landscape approach to pest animal management'. MLA investment during the 2010-2015 period has enabled multiple pest animal products to proceed for registration for commercialisation and release. Work is 'enabling' with no impacts/outcomes (that is, decreased infestation of pest animals) reportable in the evaluation period.

- PigOut baits based on the toxin 1080 now commercially available.
- Sodium nitrite is being investigated to replace 1080 for pigs
- Co-Management Solutions For Wild Dogs in Agri- Ecosystems. Work is ongoing to experimentally determine ecological responses to lethal dog control where high value livestock production co-occurs with wild dogs and foxes.
- Aerial baiting for dogs and foxes using PAPP (more humane, but unregistered). Option was not supported by producers due to the longer potential bait degradation time.
- Registration approval of PAPP active and finished product baits with poisons schedule of S7
- Development of computer-assisted recognition 'spray tunnel' - under development
- Proof of concept - fertility control can be achieved by administration of an oral or nasal active ingredient
- Evaluation of new strains of the Rabbit Haemorrhagic Disease Virus (RHDV) has been completed, one Korean RHDV strain (RHDV K5) is progressing through regulatory approval
- RHD Accelerator — to ensure ongoing access to virulent strains of RHDV.

- High wallaby densities - developing underpinning knowledge and the partnerships towards implementation of a management plan

4.1.2.1 Develop adaptation strategies to climate change to improve resilience of production systems Total Investment \$5.7 million

1) Adaptation to climate change. Total Investment of \$4.5 million

There are no reportable outcomes during the evaluation period. These projects are developing an understanding of climate change risks and establishing options to manage that risk.

- *Southern Livestock Adaptation 2030.* At 46 locations in major production regions, adaptation strategies that were modelled against various climate change scenarios indicated that the potential pay-off from climate adaptation is significant and may be in the vicinity of \$1.1 billion p.a. even using the currently known and incremental adaptation options.
- Northern Australian grazing system bio-economic modelling identified the biophysical and economic impacts of climate change, and assessed the potential of the best-management strategies of moderate flexibility stocking. A second 'social research' component highlighted the benefit of improving strategic planning skills and networking among producers.
- The 'Climate Clever Beef' project engaged beef producers in five regions of northern Australia via a benchmarking and options analysis approach to identify management options for resilience of beef businesses.

2) Managing Climate Variability Program (MCVP). Total Investment \$1.2 million ex MLA (plus \$4.9 million from other RDC's).

This program's goals are based on managing the risks and exploiting the opportunities afforded by Australia's variable and changing climate. They include:

- Improving forecasting accuracy, lead-time and ease of use;
- Providing tools and services for managing climate risk
- Enabling more farmers to manage their climate risk

Climate forecasting has been improved from multi-week to seasonal to assist livestock producers facilitate key management decisions and activities with an improved seasonal climate prediction model (POAMA) that was trialled and released by the Bureau of Meteorology.

4.1.2.2 Develop mitigation strategies to reduce Greenhouse Gas Emissions (GHG). Total Investment of \$9.3 million

Reducing Emissions from Livestock Research Program 2009-2012 and National Livestock Methane Program 2012-15 (with 11 co-investment partners).

There are no reportable outcomes during the evaluation period. These two contiguous programs quantified livestock GHG emissions under different production systems, including dairying, and explored options to potentially reduce these emissions. The areas of R&D addressed were:

- Nutrition and physiology: nutritional strategies to abate methane (and to a limited extent, nitrous oxide)
- Rumen microbial processes: for improved nutrition, and abate GHG emissions
- Animal genetics and selection: heritability of the 'low methane' trait
- Synthesis: Integrate knowledge identifying prospective areas for demonstration.
- Production systems and management: nutrition, microbiology and genetics will fit within farming systems.

Key outputs from the National Livestock Methane Program were:

- Leucaena plantations can lift productivity by up to 23 per cent and lower methane emissions by up to 28 per cent
- Feeding wheat to dairy cows can lift milk production by up to 20 per cent and lower methane emissions by up to 40 per cent
- Introducing Australian native shrubs with methane-reducing properties can help lift productivity in sheep during the autumn feed gap and lower emissions by 4 per cent
- Feeding red macro-algae has the potential to lift productivity and reduce emissions by up to 60 per cent in cattle and sheep
- This research informed the national greenhouse inventory and account, lowering the liability in GHG emissions that had previously been attributed to beef cattle production by 6 per cent.
- Two new methodologies for acquiring carbon credits were proposed, based on nitrate supplementation and best practice beef management.

Life Cycle Analyses. Total Investment \$0.6 million

A 30 year Life Cycle Assessment Beef Study (1981-2011) determined productivity and environment outcomes are not in conflict:

- Greenhouse Gas Emissions decreased 15 per cent per kilograms LW due to higher growth rates, more grain finishing in feedlots
- Consumptive water use for beef production dropped to almost a third over the three decades from 1981, from 1 465 to 515 litres per kilograms liveweight
- Fossil fuel energy demand increased by almost two-fold from 6.3-11 MJ/ kilograms LW, as a result of intensification in the supply chain.
- Land use declined (grazing area per unit of production) by around 19 per cent

- GHG emissions associated with direct land for grazing estimated to have declined by approximately 42 per cent.

A life cycle analysis was completed for export of lamb and beef from Australia to the United States. Results have been published and communicated to industry.

4.4 Community communications. Respond and defend the industry's credentials to ensure the urban community remains confident in the industry

During the evaluation period, MLA developed a consumer-facing program branded Target 100 that is designed to engage with customers and consumers to promote community trust (social licence) and reinforce that the meat industry is an ethical and responsible custodian of livestock, land and resources.

MLA uses Target 100, media opportunities and events to actively engage with urban-based consumers to promote our existing high standards and the ongoing investment being made to continually improve these standards and to build trust that Australian red meat producers are an ethical and responsible part of the food production industry.

The increasing focus from consumers on issues such as environmental sustainability, health-conscious food choices, responsible farming and animal welfare mean that the expectations on our industry are increasingly higher and subject to more scrutiny. To ensure that we have a broad understanding of these issues and that the most appropriate steps are taken, MLA fosters transparent and open relationships with other related agricultural industries to establish factual and consistent processes to communicate.

MLA has worked to establish a baseline and ongoing data to measure and to monitor the impact of our industry on perceptions of environmental sustainability and ethical custodianship of animals by instituting annual quantitative and qualitative consumer research into attitudes, buying behaviour and industry awareness. Tracking over the past 5 years has revealed a steady incremental increase in concerns and to a smaller degree, reduction in the consumption of red meat due to environmental and animal welfare concerns. Success in achieving KPIs were as follows:

- Increase consumer trust scores to 80 per cent agreeing the industry is ethical and trustworthy:
 - MLA educated more than 2.7 million people about livestock production at Australia's five major agricultural shows. Exit research showed that by 2014-15 the trust score averaged 79%, just under the 80% KPI
- Increase engagement in Target 100 by 10 per cent through the key platforms of the website, social media channels and events:
 - In 2014-15 engagement with Target 100's social platforms saw YouTube video views increase 720 per cent; Facebook likes increase 304 per cent; Twitter followers increase 31 per cent; and visits to the Target 100 website increase 32 per cent
- The percentage of consumers stating they are reducing red meat consumption due to environmental reasons maintained below 5 per cent:

- In 2015 reduction in red meat consumption for environmental reasons was 3.9 per cent, and for animal welfare reasons was 3.3 per cent
- 300 producers actively engaged in industry advocacy activities utilising MLA developed resources:
 - 350 producers were involved in advocacy activities for Target 100, including 100 who attended advocacy events at Beef Australia.

Workshop evaluation of performance / industry impact

The Workshop participants agreed that, due to the long term nature of the investments and the long lag time to achieve changes in environmental health indicators, minimal additional economic benefits could be claimed for R&D outputs over the evaluation period, beyond those claimed in the On-Farm Productivity portfolio evaluation reported earlier (noting that this evaluation included the economic benefits of the long-term southern grazing system programs *EverGraze* and *Enrich*, which also have environmental benefits).

In the majority of cases examined by the workshop, promoting and measuring adoption of R&D outputs remains a significant challenge. Looking forward, there should be greater focus on the impacts of R&D in terms of how to increase adoption of outputs and measure ongoing improvement through monitoring and evaluation.

The consensus workshop view was that there is generally insufficient data to confidently estimate both recent and future benefits from the environment R&D investment portfolio. Given the long-term nature and high risk of many of the projects, ex-ante benefit cost analyses are speculative and of very limited value for this task.

The workshop generally reduced the size of benefits estimated in ex-ante MLA analyses either through reducing adoption levels or rates for a number of projects (that is, dung beetles) and were sceptical about any benefits achieved to date for improved seasonal climate forecasts, and in the future from the awarding of ERF contracts to graziers. The significant defensive value of research into soil runoff, particularly in sensitive catchment areas, biocontrols for pest species and in exploring ways to reduce methane emissions was acknowledged.

Below is a summary of identified industry impacts across areas of MLA activity considered by Workshop participants, many of which required additional analysis after the workshop to acquire data to form the basis for impact assessment. Some of the projects will require additional research and/or impact assessment in future.

Northern grazing systems — Wambiana/grazing land management

The potential benefits for northern systems were discussed in the context of the Wambiana grazing trial, running since 1997⁵³, together with other related ‘Grazing Land Management’ projects.

The workshop paper documents ex-post benefits of \$16 000 per annum for the Wambiana enterprise, a property representative of the Charters Towers region (net benefits after costs such as fencing), with the research indicating that the key driver of profitability (per adult equivalent (AE)) was a flexible and conservative (essentially reduced by 50 per cent) stocking rate that increased individual sale weight and decreased turn-off age on average and better coped with seasonal conditions.

The results are regarded as generally applicable to the northern industry with long term profitability gains through conservative stocking rates and good pasture management, more flexibility and less pressure on the system, ‘destock early restock slowly’ and maintain the land in good condition. The reduction from high to medium stocking rates resulted in better finished cattle — the biggest impact being greater compliance with the grid and so higher return per kilogram.

The workshop agreed that a significant benefit was the reduction in supplementary feeding (fodder, molasses and cottonseed), which was standard practice when land was overstocked. This was particularly the case for north-east Queensland, where price per kilogram received and input costs are more important than total kilograms for determining profitability. Moving towards the Territory and in more marginal country, there was a lower prevalence of higher stocking rates and supplementary feeding practices, and the main profitability driver is more kilograms per hectare.

- Because of the uncertainties involved extrapolating across different regions, the conservative approach would be to assume no change in costs.

In terms of level of adoption, a QDAFF survey across 4 regions (including Burdekin, Herbert, up to Cape York, and Gulf) over the period 2006 to 2013 was quoted as revealing that 32 per cent of properties changed grazing practice (42 of 130 properties surveyed) due to involvement in extension programs. An exit survey from a recent Wambiana field day revealed 73 per cent of producers intended to change, and 53 per cent were already using some/all practices recommended.

- It was agreed that there could be 25 per cent adoption across the target area in terms of cattle numbers by 2040.

The workshop agreed that a strength of this research was the development of a ‘solid message’ to producers over many seasons, including drought years to give robust, credible results, with the past 5 years vital in developing and promoting these recommendations to producers, with attribution to MLA in the review period of 100 per cent.

Assuming 20-30 per cent of cattle are already conservatively stocked, the workshop suggested:

⁵³ MLA 2014 Review of the Wambiana Grazing Trial, Project B.ERM.0099 and B.ERM.0100, commencing near Charters Towers in 1997.

- 5 percentage units of this adoption could be attributed to the 2010-15 period and
- A further 25 per cent of total cattle would be run under the recommended conservative stocking rate practices by 2040.
- A conservative estimate of the benefit is a 5 per cent increase in average sale weight across these cattle populations offset by a lower turn-off number or more likely smaller breeding herd.
- Significant non-quantifiable environmental benefits include greater ground cover and biodiversity, less soil erosion, improved water quality, and less nutrient and soil run-off in catchment areas over potentially large areas of grazing lands.

Estimation of economic impact:

- 1 Most likely adoption without further MLA funding will be Queensland specialist beef producers in all regions other than the SE sector of the state, where significant supplementary feeding supports stocking above the carrying capacity of the feedbase.
- 2 This target population comprises 6400 businesses carrying 9.3 million cattle (from MLA's R&D Evaluation model).
- 3 The workshop assumed 5 per cent of these businesses have adopted conservative stocking between 2010-2015 and a further 15 per cent might adopt conservative stocking by 2030, that is, 1280 businesses, carrying 1.9 million cattle, noting that MLA assumed any benefit during the evaluation period would be accounted for in the Majority Market program evaluation.
- 4 Based on the Wambiana data for a steer only enterprise, the adoption of conservative stocking rates reduces total AEs per property by 50 per cent, increases turnoff weight by 90 kilograms per head, increases sale price by average price received by 20c/kilogram, and reduces fodder costs from on average \$21.80 per AE to zero, halves other variable costs but also halves turnoff numbers sold each year. [Note: It is assumed that this applies equally to breeding enterprises, but this needs to be tested in detailed case studies as part of the adoption program].
- 5 In a run of average years, the practice change to a conservative stocking rate results in a very small positive margin (\$6 500) over the current high stocking rate, but this increases to around \$10 000 each year if a poor dry season or drought occurs once every 5 years and reduces turnoff weights by an average of 20 kilograms.
- 6 However, this profit estimate is highly sensitive to assumptions of input costs, particularly for feeder steers and supplementary feed, and prices received, and therefore involves considerable risk to businesses with very low profitability and high debt repayments
- 7 The moderate stocking rate option was modelled to assess the impact that widespread adoption might have on beef supply. With the above assumptions of a 20 per cent adoption by 2030, reducing carrying capacity by 950 000 head would increase beef prices nationally by 1.5 cents per kilogram. Given the considerable business risk involved and the unprecedented impact on supply, this scenario seems unlikely, particularly when in average years the turnoff weight advantages are small.

- 8 It appears likely that the reported adoption of Wambiana project results to date, and in future, will be through changes that increase flexibility in stocking rate and grass cover (by reducing grazing pressure in particular seasons or more rapidly in poorer years) and minimise the very large losses that impact on average profitability per year, as was indicated in this conclusion for the 2011 field day report: *'no strategy was optimal and all had deficiencies that either caused, or had the potential to cause, degradation and economic loss. We suggest that the optimal strategy would contain the best elements from those tested. This would include moderate stocking at or about long-term carrying capacity, some flexibility in stocking rates in response to seasonal condition, wet season spelling, control or amelioration of area selective grazing and, if required, periodic fire to control woodland thickening.'* [Source: The Wambiana grazing trial: Key learnings for sustainable and profitable management in a variable environment. 1 November 2011. PJ O'Reagain and JJ Bushell. Agri-Science Queensland]. This was reinforced by additional analysis in 2014 (MLA project report B.NBP.0635).
- 9 More detailed financial information from quantifying, as case studies, the actual practice changes by some of these current adopters, including the results in breeding herds, is required to more confidently predict the industry impacts.
- 10 A second more conservative analysis is reported, assuming only some 2.5 per cent of businesses (160) in the target area reduce long term stock numbers to the 50 per cent level with similar enterprise-level outcomes to those reported at Wambiana, reflective of graziers under environmental regulatory pressure in the most sensitive reef catchment areas, and/or smaller properties with low debt able to comfortably accommodate this practice change.
- 11 Far beyond any marginal economic benefit from adoption of more conservative stocking practices, the strong support from northern workshop participants for MLA's long-term investment in this project and indications of widespread interest indicate the potential high returns in terms of widespread environmental benefits and long-term sustainability of cattle grazing applicable to a large portion of the northern region. The expected environmental improvements in land condition, ground cover, infiltration rates and reduced water and soil runoff are likely to be very significant but have not been evaluated in economic terms, and are likely to take 1-2 decades to achieve.
- 12 Note: These results lead to the apparent 'anomaly' where net income is positive yet GVP is negative as detailed later in the report – the major factor is a reduction in carrying capacity in northern beef to achieve sustainability leading to a fall in cattle slaughtered (and GVP) but with reductions in costs leading to an increase in net income.

Dung beetles for southern grazing regions

The workshop paper reported an ex-ante analysis of the following possible benefits of introducing new varieties of dung beetle for niche locations where current species do not survive:

- 2 per cent increase in spring stocking rate (20 per cent increase in dry matter; for 3 months benefit), 1 per cent increase steer sale weight

- change in costs: the ex-ante BCA proposed between 5 and 10 per cent lower fertiliser costs
- per cent of the national herd / flock potentially impacted: 60 per cent (southern)
- Likely maximum adoption: 30 per cent (of southern beef and sheep)
- Time to reach full adoption: 30 years (+10 years build up, +20 years release)
- MLA contribution: 56 per cent

This project involves the importation and breeding of two new species that will fill the seasonal gaps that currently exist in dung beetle activity during late winter/early spring. The benefits from dung beetles are potentially significant. They increase effective grazing area and access to dry matter, improve nutrient recycling, improve water movement, increase earthworm activity, nutrient flow to plant root zones.⁵⁴

The workshop tested the assumptions of benefits from improved turnoff weights and forage conservation.

- Steers - an increase of 2.5 per cent in turnoff weights.
- Sheep - initially the same benefit was assigned, but then was adjusted to zero reflecting that sheep will forage around dung and their dung is not attractive to the beetles. This contradicts other evidence.⁵⁵
- In terms of costs, the ex-ante BCA indicated a 10 per cent reduction in fertiliser. The workshop identified that there would be no difference in fertiliser application as the dung beetles will not impact on P levels, which are addressed primarily by fertiliser.
- The workshop identified that a target area of 30 per cent of the high rainfall zone was more likely by 2030, but this was dependent on which areas were populated with the beetles and the speed of their population growth and dispersion, dependent on soil types and topography.
- Currently, the beetle is still in the 'build-up' phase across only three sites and this could take up to 10 years. After reproducing naturally, it could take 20 years before these populations are well established across the target regions in sufficient numbers to provide an economic benefit.
- Without further MLA investment, there is a commercial player (Dung Beetle Solutions Australia) who has an interest in breeding and sale of the new varieties, so there may be future benefits. This provider now sells the winter-active dung beetle *Bubas bison* and several summer-active beetles in southern Australia.⁵⁶
- No benefits can be attributed back to MLA during the 2010-11 to 2014-15 period. Given the time period to build active colonies of dung beetles after initial release (more than 5 years) and the slow dispersal rate away from release sites, future wide scale benefits are likely to take many years to eventuate, and are not considered in this review.

⁵⁴ Doube, B. (2008). The pasture growth and environmental benefits of dung beetles to the southern Australian cattle industry. MLA Project B.ERM.0211.

⁵⁵ Coldham, J and Granite Borders Landcare Committee 2011, Dung Beetles and Internal Parasites of Sheep. MLA Project B.PRS.0502 / S2005/NO3, June.

⁵⁶ <http://www.dungbeetlesolutions.com.au/>

Estimation of economic impact:

Not evaluated as benefits considered minor to 2030 due to slow rate of spread without further MLA investment.

Bio-controls and novel approaches to manage pest plants and animals

The MLA presentation reported a wide range of program investments that are aimed at reducing the costs of pest plants (Parkinsonia, bellyache bush, prickly acacia, silverleaf nightshade) and animals (rabbits, feral dogs, feral pigs, wallabies). The majority are long term investments and will require additional MLA support to produce future industry benefits.

Whilst not questioning the importance of addressing these pest issues, the Workshop considered the high risk and long term investments needed with biocontrol research, and focussed discussion on the three most advanced pest control innovations most likely to deliver significant industry economic benefits without further MLA funding.

1) Rabbits and RHDV

The impact of rabbits on Australia's grazing industries is significant. Between 12 and 15 rabbits is equivalent to 1 DSE. An average warren can have 10 to 50 rabbits.

- Gong et al (2009) estimated the total annual loss to broadacre farming from vertebrate pests at \$285 million (see table below) and expenditure by governments at \$122 million. The loss to rabbits was identified as \$206 million each year.⁵⁷ See table 23.2 below.
- Without rabbit biocontrol agents, however, these impacts would be much worse: the combination of myxoma virus (MV) and rabbit haemorrhagic disease virus (RHDV) still limits rabbit numbers to about 15 per cent of their potential numbers, and without them the cost for agriculture alone would be in excess of \$2 billion each year.
- The cumulative economic benefits for agriculture alone from MV and RHDV over 60 years are estimated at \$70 billion, or an average of \$1.17 billion per year.⁵⁸

23.2 Estimated losses to vertebrate pests in Australia in 2014-15 dollars

Industry	Output losses	Additional losses	Total loss
	\$m	\$m	\$m
Beef	240.5	12.0	252.5

⁵⁷ Gong W, Sinden J, Braysher M, and Jones R 2009, The economic impacts of vertebrate pests in Australia, Report prepared for the Invasive Animals Cooperative Research Centre Detection and Prevention's Project 12.D.6: Measuring the Social, Environmental and Economic Impacts of Vertebrate Pests.

⁵⁸ Cox TE, Strive T, Mutze G, West P and Saunders G 2013, Benefits of Rabbit Biocontrol in Australia. PestSmart Toolkit publication, Invasive Animals Cooperative Research Centre, Canberra, Australia

Industry	Output losses	Additional losses	Total loss
Wool	34.8	1.9	36.7
Lamb	23.0	0.7	23.8
Grains	298.3	14.6	312.9
Total	240.5	12.0	252.5

Data source: Gong et al 2009 and eve

The Workshop discussed MLA's contribution with other research agencies to the introduction and testing of a new RHDV strain (K5) by the Invasive Animals CRC. The new strain is not the 'silver bullet', but could achieve around a 20 per cent knockdown depending on the region:

- knockdown estimates are between 10 and 40 per cent, depending on region, with greater efficacy in higher rainfall areas where the current 'Czech' strain is less effective.
- blowflies are the transmission vector
- The new strain will now be released (pending APVMA approval in 2016) without further MLA funding.
- Rabbit populations are likely to show a 'sawtooth' response as can be seen in the chart in page one of Cox et al (2013) estimating the effect of a new RHDV strain brought in to control rabbits, with an initial rapid drop followed by a slow build-up as resistance develops. The K5 strain is not expected to have the 90 per cent knock-down estimated for the initial RHDV release in 1995, due to other calicivirus strains already circulating in the rabbit population.

Subsequent ex-ante analysis into the costs of rabbits resulted in these key assumptions:

- an average 20 per cent reduction in rabbit populations for areas above 400 mm annual average rainfall, beginning 2017, with 4 years to reach full effect.
- 'lost' livestock production is now \$250 million each year (up 20 per cent from \$200 million each year estimated by Gong et al. in 2009), and wool production now accounts for around 20 per cent;
- 20 per cent 'effectiveness' will last for the period 2020-2030 by which time other strains of RHDV will be released and established, significantly diluting further K5 impact.
- The benefit is around \$40 million each year at no significant additional cost to meat producers to adopt, plus significant environmental benefits.
- Attribution to MLA = 100 per cent (assumes this CRC research would not have proceeded without strong industry support).

Significant non-quantifiable environmental benefits include greater ground cover and biodiversity, greater regeneration of native species, less soil erosion, improved water quality, less nutrient and soil run-off in catchment areas over large areas of both farming and public lands.

Estimation of economic impact:

- 1 Rabbit numbers over the period 2015-2030 were estimated from projected rabbit abundance estimates (Cox TE, Strive T, Mutze G, West P and Saunders G 2013, Benefits of Rabbit Biocontrol in Australia. PestSmart Toolkit publication, Invasive Animals Cooperative Research Centre, Canberra, Australia), rising to 449 million in the absence of a new biocontrol release.
- 2 The workshop's more conservative estimate for the likely impact of the K5 strain of RHDV of 20 per cent initial significant knockdown starting in 2018, waning to 15 per cent by 2030 was used to estimate the proportional reduction in costs to each industry after K5 is released, based on the estimated industry impact of rabbits on beef and lamb sectors respectively, ignoring wool (Gong et al. 2009).
- 3 In addition to the estimated economic benefits, the following significant non-monetary benefits have been reported for rabbit biocontrol⁵⁹:
 - Environmental
 - Increased regeneration of native vegetation and habitats, and in the long term improved biodiversity of fauna and flora
 - Increase in standing biomass via regeneration leading to absorption of carbon dioxide.
 - Greater ability to capitalise on summer rains as native grasses re-establish
 - Improved biodiversity from reduced numbers of feral cats and foxes
 - A possible cost in the potential increase in greenhouse gas emissions if ruminant livestock numbers increase
 - Reduced soil erosion and land degradation
 - Social
 - Continuance of a more humane method for limiting rabbit numbers and reduced externalities from poisoning control methods
 - Stronger rural communities from 'drought proofing' and enhancing the continuing viability of some pastoral properties.
 - Improved landscape amenities.

2). Feral dog control

Research co-funded through the Invasive Animals CRC has enabled continued social licence for the control of feral dogs in the future. The research challenged assertions that feral dogs are essential in maintaining a stable ecosystem and preserving native animal populations (via cat and fox predation) by showing that dog control made no difference to populations of key prey species in study regions. In the absence of this evidence, calls for banning dog control may have increased, at least in some regions.

This benefit and possible additional benefits arising from the IACRC development of the alternative dog and fox toxin 'PAPP' and its antidote for use in manufactured baits were

⁵⁹ Agtrans Research 2011

also considered in a discussion of the On-Farm Welfare portfolio, as recorded in section 4.3 below. The following discussion points were recorded in this workshop:

In terms of the effectiveness of baiting programs:

- a big factor in the non-participation of 1080 baiting programs is perceptions around poisoning farm dogs and non-target species, which has led to a piecemeal approach to regional baiting programs across farms, and reduced effectiveness.
- PAPP will not replace 1080, due to non-target mortalities, but will encourage participation in community baiting programs by at least some of the 25 per cent of producers who currently will not use 1080 because it has no antidote, whereas PAPP comes with an antidote.

The potential impacts identified by the workshop were:

- a significant reduction from 10 to 15 percent lamb deaths (could almost go to zero with good control)
- a reduction from typically 2 percent calf mortalities due to dog predation.
- These gains would be from the adoption of baiting by 20 per cent of producers who are not using it at the moment. The current participation rate for baiting is between 40 and 65 per cent, depending on the region, and the impact is cumulative over time.
- ABARES has already completed a report on the economic costs of wild dogs.⁶⁰
- Significant non-quantifiable benefits include maintaining biodiversity and reducing stress for producers and their livestock exposed to feral dog predation.

3) *Parkinsonia biocontrol*

This shrubby weed increases mustering costs and reduces carrying capacity in the Northern Beef zone with particularly large Parkinsonia infestations in the Gulf of Carpentaria and Fitzroy regions and the Kimberleys and Pilbara.⁶¹ It is declared as a Weed of National Significance, and occurs over 3.4 million hectares, with potential to more than double this range. Parkinsonia forms dense, often impenetrable, thorny thickets along watercourses and bore drains, and in flooded country, providing haven for feral pigs, which prey on livestock, damage crops, and degrade the environment.

- The output of the research was a new biocontrol for Parkinsonia — two *Eueupithecia* moth species from Parkinsonia's native range in South America. Both agents have been released since 2013 but will require future investment for mass rearing and distribution.
- The workshop confirmed a number of impacts from the ex-ante analysis, which suggested that the release of a successful control agent could produce industry benefits of \$46 million over a 20 year period (BCR = 4.4 on R&D funds invested):

⁶⁰ Wicks, S, Mazur K, Please P, Ecker S and Buetre B, 2014, An integrated assessment of the impact of wild dogs in Australia, ABARES Research report no. 14.4, Canberra, April.

⁶¹ <https://www.business.qld.gov.au/industry/agriculture/species/declared-pests/weeds/parkinsonia>

- The weed reduces productive dry matter for cattle — up to 10 per cent reduction in carry capacity, but only in heavily infested country.⁶²
- Infestation increases mustering costs and requires active weed control — 5 per cent increase in operating costs. A 1995 report indicated control costs of up to \$5000 per year on individual properties, with 46 per cent of all landholders in the major areas of infestation spending money on Parkinsonia control.⁶³
- In terms of adoption, the impact in the evaluation period would be less than 1 per cent of the total area infested and the workshop believed that it would take at least 20 years to achieve its full impact, which could be considerable, given that up to 90 per cent defoliation of plants has been observed, however the extent of Parkinsonia control remains to be quantified.

Estimation of economic impact:

Not evaluated as insufficient evidence of economic impact at this stage. This requires further RD&E to establish rate of spread, extent of reduction in plant density and ROI once established, and will therefore be evaluated in the next evaluation period 2015-2020.

Develop of adaptation strategies to climate change to improve resilience of production systems

The MLA presentation outlined the relevant program outputs that include:

- an improved version of the seasonal climate prediction model (POAMA) was successfully trialled enabling superior forecasts (compared to statistical forecasts) of the three month season ahead.
- the launch of CliMate, a free mobile application that can interrogate recent weather and climate — already achieved over 12 000 downloads
- accurate measurement of, and management options to reduce, carbon emissions were developed, as was data to enable assessment of the impacts of climate change policies.
- adaptation management options were identified (generally are location specific) for various production systems in northern and southern Australia
- development of a climate adaptation strategy.

The Workshop noted that the most beneficial responses to climate change involve the adoption of best practice that is already known and improvements beyond this will require further investment in the development of new tools. Although POAMA is an improved predictor of rainfall in extreme years and will be useful for prediction of pasture growth, there are a number of competing products on, or coming onto, the market.

⁶² Heard T and van Klinken R, 2014, Assessment of new biocontrol agents of Parkinsonia, MLA Project B.NBP.0620

⁶³ http://www.weeds.org.au/WoNS/Parkinsonia/docs/Parkinsonia_Mgmt-2.pdf

Improved seasonal forecasts using POAMA

For improved seasonal forecasts, studies have previously identified benefits for cropping systems rather than grazing industries.⁶⁴ The MLA presentation proposed the following impacts, based on this and a more recent evaluation of the MCV Program.⁶⁵

- 1 per cent increase of net farm value of farm production over the last 5 years, due to improved 3 month forecasting of seasonal pasture growth.

The Workshop questioned whether the current accuracy has any benefit for livestock producers. The following comments were made:

- an analysis has been completed around Charters Towers to report pasture growth
- a producer at Longreach used it in a decision to destock his property a couple of years ago
- for Victoria this year, POAMA got forecasts very wrong — don't assume that accuracy for one year will lead to accuracy in every year
- rather than rainfall per se, POAMA is probably more suited to predicting pasture growth.

The workshop was more sceptical about current benefits and agreed that this area of activity will require more investment to capture future benefits for livestock producers.

Estimation of economic impact:

Not evaluated as the workshop agreed this needs further RD&E to establish benefits for livestock producers. This will be evaluated in the next review period for 2015-2020.

Develop mitigation strategies to reduce Greenhouse Gas Emissions (GHG)

The focus of this area was to develop technologies and management practices to reduce methane emissions and to assist development of opportunities for alternate income sources from carbon markets. The research had identified the following strategies producers can use now that could potentially lift productivity by up to 23 per cent and reduce emissions by up to 40 per cent:

- using leucaena plantations in northern cattle systems can lift productivity by up to 23 per cent and lower methane emissions by up to 28 per cent
- introducing Australian native shrubs with methane-reducing properties can help lift productivity in sheep during the autumn feed gap and lower emissions by 4 per cent over the year
- northern cattle fed on tropical grasses emit 30 per cent less methane than had been previously estimated, potentially reducing the averages used to calculate the industry's carbon footprint

⁶⁴ Agrtrans Research 2008, An Economic Analysis of GRDC's Investment Climate Research (2002-2007), GRDC Impact Assessment Report Series: GRDC Project Code: ATR00002, May.

⁶⁵ Centre for International Economics 2014, Analysis of the benefits of improved seasonal climate forecasting for agriculture, Prepared for Managing Climate Variability Program, March.

- soil carbon sequestration opportunities were quantified
- research into genetics, forages and novel supplements has demonstrated increased productivity and reduced methane, some exceeding the KPI target.

It was agreed at the Workshop that these more promising options require further development before the industry can derive additional benefits beyond that achieved through current best practice.

Estimation of economic impact:

Not evaluated, as this requires substantial further R&D investment and will be included in the next review period for 2015-2020.

GHG mitigation and ERF methodology development

MLA research looked at a range of novel methane mitigation options including the use of nitrates, biochar and options for developing a vaccine against methane-producing rumen microbes. More specifically, MLA was involved in the development of two new ERF methodologies:

- Whole herd management — 2015 (adoption of BMP)
- Nitrate supplementation.

The MLA presentation identified that livestock producers had benefited via sequestration projects in the first two rounds of ERF auctions, with 47 contracts for avoided deforestation, 5 contracts for increasing soil carbon in grazing systems, and 17 contracts involving native forest regeneration and planting.

The benefits were approximately \$330 million in Auction 1 and another \$300 million in Auction 2.

23.3 Possible ERF benefits from Herd Management Method

Scenario	Total ACCUs	Total Revenue	Total Expenses	Net income
	No.	\$m	\$m	\$m
1. Kimberley: 70 per cent weaning, 10,000 breeders	21 000	292 950	100 000	192 950
2. VRD: 70 per cent weaning + heavier weaning weight	35 000	585 900	100 000	485 900

Source: MLA presentation

MLA case studies encouraged graziers to apply for ERF funding. However, the table above also shows that there are large fixed costs in compliance with auditing requirements of the methodologies. The workshop made some general observations and conclusions:

- these initiatives are not expected to have delivered benefits during the evaluation period, and most will require further investment from MLA
- there has been little economic/financial incentive for adoption due to the changing landscape of carbon policy (carbon prices are uncertain)

- unless the management change was profitable based on productivity gains alone, receiving payment for carbon emission reductions made little difference
- the best options were adopting recommended BMP to increase kilograms of meat sold per kilograms breeder maintained to reduce emissions intensity, through high reproduction rate and efficient growth management
- ERF agreements could have longer term negative productivity effects, with soil carbon targets imposing an ongoing liability and possible reductions in future carrying capacity under reduced tree clearing agreements. It was noted that Queensland data on soil carbon indicated that there was no difference in soil carbon between degraded country and country that was well looked after
- nitrate supplementation to reduce methane emissions is not commercially viable given that urea is a cheaper N supplement
- if the 'whole herd management' methodology is restricted to aggregates of at least 20 000 AE, it is likely to be restricted to large corporates who can manage the paperwork and verification needed, and may have an incentive from a corporate responsibility viewpoint. Possibly 1 million breeders out of 2.5 to 3 million AEs would qualify, with 50 per cent adoption possible
- other livestock-based methodologies may not be competitive under ERF — the successes to date have been very low cost methodologies (that is, savannah burning and avoided tree clearance).

Estimation of economic impact

- 1 The Whole Herd methodology developed and advocated by MLA was approved in 2015 as an abatement method that will enable grass-fed beef producers to compete against other greenhouse gas emitters to gain carbon credits for improving productivity per cow under the current Emissions Reduction Fund.
- 2 The minimum herd size for application of 20,000 AEs and the compliance complexity and costs suggests that only northern corporate beef companies would apply.
- 3 The workshop agreed that 500,000 head accredited by 2019 might be feasible, commencing 2017, with indications from one case study that \$15/ head is indicative of the possible return over 10-12 years.

Community engagement

The MLA presentation outlined the impact areas that were proposed for the workshop:

- consumers stating they are reducing red meat consumption due to environmental reasons maintained below 5 per cent (at 3.9 per cent in 2015)
- maintained high levels of trust in the industry trust levels at 83 per cent
- Target 100 — the website was set up to tell the sustainability story — receives more than 4 000 visits per month
 - In 2013, Target 100 was awarded the Sustainability Education Award at the United Nations Association of Australia World Environment Day Awards. It was

also awarded the Gold Banksia Award and Education Award at the 2012 Banksia Awards for excellence in sustainability and innovation

- growing social media following with more than 1 000 'Likes'
- schools' program, also participation in foodie trade shows.

This program has been working on a number of fronts including:

- communicating with the wider community (Great Barrier Reef issues were highlighted)
- engagement with NGOs, for example, working with the Nature Conservancy in Northern Australia.

The same observation was made as for the animal welfare workshop, that animal welfare issues was now front-of-mind for the community, compared to before 2011 when drought resulted in the environment being a key issue.

- 3.9 per cent of consumers claimed to have reduced red meat consumption due to environmental considerations and this may have been higher but for the MLA program.

The workshop observed that the environment program was risk proofing the industry. The question was asked: had MLA had an impact in terms of maintaining social licence?

- The risk identified was that 3 or 4 issues coincide to impact on social licence (say, the live trade and transport welfare).
- Target 100 was designed to address these issues and address the range of different information requirements of the community and relate them back to 'real people' in the industry.
- Product labelling is also potentially an important driver for enhanced welfare and the environment.
- The Consultant Team did not include these benefits in the quantification of MLA impact.

Management of downside risks

The consensus of the workshop was that the community engagement investments within the environment portfolio was going in the right direction and a worthwhile defensive investment in terms of offsetting downside risks, but benefits cannot easily be quantified in terms of maintaining consumer demand.

- In terms of quantification, the workshop referred to the MISP 2020 analysis as probably the best indication of benefit that was available.
- Importantly, such activity prevents smoking issues coalescing into an industry firestorm.

Opportunities to improve impact achieved

The workshop made the following observations and suggestions.

- Consider the use of the Future Farm Industries CRC ‘Adopt’ model in estimating future adoption levels, based on innovation and target audience characteristics.
- For pests and weeds, a risk-based proactive approach is supported (rather than a defensive or responsive approach).
- MLA’s database of R&D should be more accessible/searchable with improved links to decision makers — the current keyword search facility is very poor.
- Work to reduce government/program regulations and red tape especially for addressing invasive species — multiple organisations and messages cause fatigue for producer groups and individuals.
- Current program funding cycles are not sufficiently long enough to be effective in areas where sustained research is required. Adoption and cultural change takes years, particularly to see measurable impacts in environmental health measures.
- There are large opportunities in the environment space: beef is the only enterprise that can be run on a large proportion of Australia’s land mass.
- How are RDCs addressing adoption, especially in the use of paid consultants?
- The change in woodland density (woody weeds) is reducing stocking rates in the northern Australia. If stocking rates are maintained, encroachment increases grazing pressure on remaining grasslands and degradation.
- Modelling and other capability has moved out of the pastoral industries in Queensland to the Reef where all of the policy money is now.
- Include focus on impact measurement during program execution, particularly for baseline practice levels — this is currently under-funded.

Impact Assessment

23.4 MLA Impact – benefits and investments^a: 4.1 On-farm environment

		Support on-farm environment
		4.1
Expected benefits		
Red meat industry net income - total ^b	\$m	300
– 2010-11 to 2014-15	\$m	-8
– > July 2015	\$m	308
Red meat gross value of production- total ^c	\$m	-679
– 2010-11 to 2014-15	\$m	-109
– > July 2015	\$m	-570
Actual investment^d		
– 2010-11 to 2014-15 inclusive	\$m	67
Benefit cost ratio		
Red meat industry net income - total		4.5
Red meat gross value of production - total		-10.1

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Saleyard equivalent GVP excluding processing (basis for levies). See earlier explanation for negative GVP numbers ^d Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

23.5 MLA Impact – benefits in terms of red meat net income^a: 4.1 On-farm environment

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	
4.1 Supporting on-farm environmental sustainability	296	4	300	4.5
– per cent of impact benefits	99	1	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

23.6 MLA Impact – benefits in terms of GVP^a: 4.1 On-farm environment practices and performance

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	
4.1 Supporting on-farm environmental sustainability	-680	1	-679	-10.1
– per cent of impact benefits	100	0	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

23.7 Budget for on-farm environmental sustainability

Budgets by Program	\$,000		\$,000		\$,000		\$,000		\$,000		\$,000	
	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
4.1 Support on-farm environmental sustainability												
4.1 Support on-farm environmental sustainability (producer elements only - no feedlots or processors)	13,382	9,993	11,318	9,856	7,161	5,401	5,828	6,085	3,764	5,465	38,453	36,800
3.5 Increase producer engagement with MLA tools and information to support productivity (12/13, 13/14, 14/15, producer elements only - no feedlots or processors - apportioned across programs)	1,858	2,094	2,426	1,872	2,386	1,442	2,085	2,080	1,550	2,105	10,307	9,592
4.4 Support industry's effective engagement with the community (producer only - no feedlots or processors - distributed across Workshops 6 & 7)	1,039	1,293	1,278	1,362	1,217	923	1,044	960	814	988	5,392	5,525
MLA Donor Company projects	0	0	0	0	0	0	0	0	0	57	0	57
Overheads (Corporate Services / Communications)	1,177	1,306	1,316	1,287	928	672	829	802	602	932	4,852	4,999
TOTAL	14,456	14,687	16,339	14,377	11,692	8,437	9,787	9,926	6,730	9,546	59,003	56,973

24 4.2 Off-farm environmental sustainability

Top Line result – MLA expenditure on the Off-farm Environment portfolio provide industry returns of \$40 million, from expenditure of \$16 million with a BCR of 2.5:1

Tables 24.5, 24.6 and 24.7 provide a summary of the payoffs from investment in the *Off-farm Environment* portfolio.

24.1 MLA Impact – benefits and investments^a: 4.2 Off-farm environment

		Support off-farm environment
		4.2
Expected benefits		
Red meat industry net income - total ^b	\$m	40
– 2010-11 to 2014-15	\$m	4
– > July 2015	\$m	36
Actual investment^c		
– 2010-11 to 2014-15 inclusive	\$m	16
Benefit cost ratio		
Red meat industry net income - total		2.5

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

Summary

Overall, there is support for investments made under the program over the evaluation period. Benefits of the successful investments have provided a significant payoff for industry.

- The assessment of the workshop was that the performance of the program had improved significantly compared to the previous planning period. A key driver of this outcome was the shift of investment out of the general levy program into joint investments with individual enterprises through the MLA Donor Company (MDC).
- The major benefits from investments in environmental-related assets were enabling plants to continue operating, especially in peri-urban areas, and over the long term, to reduce energy costs.
- There were also significant 'triple bottom line' benefits generated by the program. For example, the program was seen as responsible for reducing CO₂e emissions by 21,600

tonnes through the implementation of twelve Energy Efficiency projects (the total CO₂e savings by the industry are much greater than this – but the program brought these triple bottom line benefits forward). Additionally, the installation of just two Covered Anaerobic Lagoons, to which MLA partly contributed, reduced CO₂e emissions by more than 42,000 tonnes per annum.

- Program impact was measured at \$40 million (net industry income) with a BCR of 2.5:1. Some 10 per cent of the benefit accrued during the assessment period with 90 per cent to be captured in coming years.

24.2 Benefits identified by the workshop by portfolio outputs^a

	MLA contributions	Type of benefit	
		Throughput and energy savings	Social license
CALs	“De-risk’ and adapt existing technology	*	***
Energy efficiency		***	

^a More stars indicate greater impact/benefits

Projects funded through the MDC accounted for 44 per cent of the total investment.

24.3 Type of investments made by MLA over the evaluation period

	Levy portfolio	MDC	Total investment
	\$m	\$m	\$m
Off-farm environment	7.6	6.1	13.7
Animal welfare	0.1	0.0	0.1
Total	7.7	6.1	13.8

Objectives from MLA 5 year business plan

Contribute to reduce the environmental footprint of the meat processing sector and ultimately make the industry sustainable in the long-term

MLA Summary of Program Outputs and Outcomes

In 2010, when the Off Farm Environment Strategy was being developed, funding from the AMPC Core Portfolio for 14 projects was valued at \$686K with an additional 2 MDC projects valued at \$4 300. Executing on an MLA-strategy using AMPC core funding was challenging as the project selection process involved an AMPC Project Advisory Committee (PAC) comprising of representative processors who were naturally focused on shorter-term, often enterprise specific issues. For this and a number of reasons, a decision was made to focus on the development of value proposition to improve the environmental sustainability of the off-farm sector and to use MDC-funding with

individual enterprises to execute adoption and improvement. These value propositions typically involved reducing costs through resource (water, energy) use efficiency or through increased use of renewables / re-usables, reducing compliance costs through minimising environmental impacts and most importantly ensuring maintenance of the *license to operate* for existing and/or expanded operations. The philosophy behind this approach was that the development of compelling value propositions would identify the *'low hanging fruit'* where MLA/MDC could most effectively reduce the environmental impact of the industry. Furthermore, the identification of a value proposition would facilitate adoption and working through a network of industry players (service providers, meat processors) would provide a route to adoption.

With no levy funds directly linked to the 4.2 program (from 2013 onwards), the challenge was to transition from >95 per cent processor-levy funded initiatives in 2010 to a new business model dependent on partnerships funded *via* the MDC model. This transition was successful with the growth in the total portfolio from 16 projects (\$690K) (14 AMPC-Core) in 2010 to a total of 25 projects valued at \$2.12 million in 2014, all of which were supported through the MDC mechanism. With currently contracted projects of \$1.8 million and additional projects under development of \$1.5 million, growth in the portfolio is forecast to continue in 2016. During this period the average size of projects under management has more than doubled leading to project management efficiencies.

MLA works with AMPC in the off-farm environment area and some of the AMPC core funded projects have provided useful background information for subsequent MDC-funded projects. However, whilst there may have been useful outputs (such as factsheets, reports, surveys), MLA has been unable to identify and quantify direct impacts from the AMPC core portfolio. This is a reflection of the early stage investments made by AMPC, the selection process, focus on outcomes (rather than impacts) and MLA limited ability to track impacts from a portfolio it no longer manages. The impacts described below are thus all from MDC-funded initiatives.

Resource Use Efficiency

From the 24 MDC energy efficiency projects 12 demonstrated potential energy savings. In aggregate these potential energy savings amount to \$3.15 million per annum. Of these savings \$757,810 pa were efficiencies from natural gas utilisation; \$2.4 million pa were generated from savings in electricity. Of the savings in electricity over 90 per cent were from refrigeration efficiency.

Energy efficiency has the knock-on environmental benefit of reducing greenhouse gas emissions. These greenhouse gas emission savings have been captured in mitigation of greenhouse gas emissions

Only 2 MDC water efficiency projects run over the period 2010 – 2015 demonstrated potential improvements in water efficiency. The water savings from these two projects totalled 40 ML per day, providing an estimated cost saving of \$344K pa .

Waste Management and Value-Add to waste

From the 22 MDC waste-management and value add to waste projects, 9 demonstrated potential improvements to wastewater quality in terms of reduced Biological Oxygen Demand (BOD) - 80 per cent - and Chemical Oxygen Demand (COD) - 64 per cent. These improvements in wastewater quality, if adopted, would have direct economic impact in reducing compliance costs associated with a processors environmental *license to operate*. MLA has been unable to quantify the compliance cost-savings as processing plants are unwilling to share either their cost structures or advise when they are fined as a result of lack of compliance, however MLA is aware that for one plant compliance costs for sewer discharge were in the region of \$611,000 pa with additional fines for non-compliance if wastewater loadings were not compliant. Additionally, another medium sized processor has recently advised that there annual costs for discharging to the sewer is \$915K pa mainly due to high nitrogen and phosphorus levels.

Importantly these reductions in wastewater emissions are critical to a processing plant's *license to operate*; failure to comply can result in plant closure, restrictions on the numbers of animals that can be processed or environmental planning limitations placed on expansion.

Projects in one technology area, covered anaerobic lagoons (CALs) have demonstrated COD reductions between 80-92 per cent, BOD reductions of about 94 per cent and TSS reductions of (>82 per cent). Other wastewater treatments investigated have shown reductions in COD of between 50 – 74 per cent and BOD by 99 per cent. Clearly this scale in reduction of wastewater emissions is critically important to meat processors in terms of maintaining their *license to operate*, opportunities for increased kill rate and compliance costs associated with discharge (for example, to sewers).

Significant economic outcomes can be attributed to installation of CALs that are attributable to capturing and utilising methane. As all CAL projects have involved adoption of the technology these potential benefits have been translated into actual outputs and impacts and are captured below and not included here to avoid repetition.

Mitigation of greenhouse gas emissions

There have only been 7 MDC projects classified as mitigating greenhouse gas emissions however 6 waste-to-energy projects and 12 energy-efficiency projects demonstrated potential savings in greenhouse gas emissions.

CAL projects in particular have the potential to significantly reduce greenhouse gas emissions. The reason for this is that wastewater emits methane that is 25X more potent than carbon dioxide as a greenhouse gas. Wastewater treatment is the largest contributor to greenhouse emissions from meat processing plants (35.2 per cent of scope 1 emissions⁶⁶). There are additional savings in greenhouse gas emissions if the biogas captured is used to replace fossil fuel (rather than being simply flared) mitigating CO₂e from use of fossil fuels.

⁶⁶ Environmental Performance Review: Red Meat Processing Sector 2010

Calculated potential savings of CO_{2e} saved from MLA supported CALS at 2 processors were 27,200 and 15,000 tonnes per annum respectively. Although it is recognised that there is no significant carbon trading in Australia at present, at a conservative carbon pricing of \$10 per tonne this equates to \$272K and \$150K for the two plants. Carbon prices in excess of \$20 per tonne have been reported.

Environmental Stewardship and Responding to Regulatory/ Market Requirements

MLA has published a number of reports that contribute to environmental stewardship / responding to regulatory market requirements. These projects were funded from the AMPC core portfolio. During the period 2010 – 2015 these reports have included:

- Environmental Performance Review: Red Meat Processing Sector 2013
- Environmental Performance Review: Red Meat Processing Sector 2010
- Review of Contaminant Emissions 2011
- Mintrac Environmental Network 2011
- Biogas safety guideline manual 2012

These deal specifically with Stewardship and Responding to Regulatory/ Market Requirements. Additionally the 126 off-farm environment final reports available on the MLA website will contribute to this initiative.

Capability, Knowledge and Adoption of New Technologies

It is clear is that over the period 2010 to 2015 there has been a significant increase in the capability and interest of meat processors in the environment. Certainly the capability of many CISP partners in this area has markedly increased and most now have capable environmental staff, many of whom are also innovation managers.

Tangible evidence of this increased capability is difficult to quantify, however both the increase in investment by meat processing enterprises (total \$4 300 in 2010 rising to \$2.12 million in 2014-15) and number of R&D MDC-funded environment projects (2 in 2010 rising to 25 in 2015), provides evidence of a growing awareness and capability in sustainability / environment.

Workshop evaluation of performance / industry impact

MLA indicated that the principal outcome from this portfolio is the maintenance of the social license to operate for processing plant — especially in peri-urban areas where many are located. MLA made the observation that the KPIs from 2010 are output rather than outcome or impact based.

- The investment strategy changed over the evaluation period as the portfolio moved to the MDC-investment partner model where total investments have grown.
- There has been an increased focus on the value proposition for processors to reduce resources costs, increase the use of renewables and reduce compliance costs.

- The objective of the portfolio is to reduce the risk for early adopters.
- Unlike processing technology, lessons learnt are more likely to be shared between industry members because it is seen as precompetitive.

Projects were evaluated utilising the following impacts:

- direct — calculated from advancing adoption by 5 years
- indirect — calculated from advancing adoption by 1 year
- these are conservative because these assets have economic lives of greater than 20 years.

MLA identified that the two major areas of investment that have delivered investments include Covered Anaerobic Lagoons (CALs) and projects that improve plant energy efficiency particularly in refrigeration.

CALs

The calculated benefits are based on:

- an annual energy saving of \$730 000 for a large plant
- projected numbers of plants adopting CALs going forwards with 10 large installations already in place – past and projected CAL numbers are:
 - 2005: 3 installations
 - 2010: 11 installations
 - 2015: 26 installations
 - 2016: 36 installations
 - 2020: 58 installations
 - 2020: 83 installations

The key parameter is how much MLA brought forward the commissioning of CALs:

- The adoption of CALs is a success because investments were still being made even after the impetus from the introduction of the regulations leading up to the Emission Trading Scheme, and associated investment by government through the Clean Technology Investment Program (CTIP), were withdrawn.
- It could be argued that lagoons would have been installed anyway, given the further increase in energy prices and tightening of the regulatory environment.
- That without MLA funding counterfactual scenario would most likely be that CALs would have been installed anyway but due to lack of technical support, the CALs would not have operated as efficiently, most likely would have a short operational life and would have been installed later. The R&D was ongoing and contributed to industry knowledge.
- It was noted that MLA had completed a lot of work to de-risk investments in CALs. It was also noted that the program enabled larger processors to operate in their current locations.
- It was agreed that:
 - the length of benefit for current installations be limited to 5 years;

- for anticipated installations out to 2020, these would have been brought forward by 1 year.

Overall the workshop was happy with the MLA scenario for post 2015 benefits which will see the number of CALs grow to 36 in 2016, 58 in 2020 and 83 in 2025.

Energy efficiency

The second largest area of investment for this portfolio was energy efficiency, for example from better refrigeration: there were a wide variety of projects that have been completed.

The workshop accepted the analysis provided by the MLA team as follows: Of the 12 Energy Efficiency Projects that demonstrated potential savings, 6 have been adopted and are generating aggregate annual savings of 5,382 MW/h worth \$2,022,449 p.a. saving or an equivalent of 4,700 T GHG_e per annum. Based on the assumption that the program has brought forward the investment by 5 years in the period 2010 – 2015 this is equivalent to \$2,759,076 and 21,560 T of GHG_e.

24.4 Savings from processor energy efficiency projects

Year	Processor 1	Processor 2	Processor 3*	Processor 4	Processor 5	Processor 6	Total
2011	0	0	0	0	0	0	2 759 076
2012	0	0	0	0	0	0	
2013	0	0	0	0	0	0	
2014	0	0	0	607 810	180 511	0	
2015	0	338 500	150 000	607 810	180 511	693 934	

* 2 separate projects at this processor

Opportunities to improve impact achieved

Given the good quality of information in the workshop paper, discussion focussed on the key assumptions and these were subsequently accepted. It was noted that these projects do not only address an additional cost to business (compliance) but are also an avenue for processors to differentiate themselves.

- In many cases, customers were interested in the environmental credentials of individual plants, with ongoing improvement in this area at minimum expected to be part of third-party auditing of plant operations.
- The conclusions were these activities were primarily compliance-based and that was why processors were happy to collaborate through industry programs.

In addition, it was noted that following increasing acceptance and ‘de-risking’ of CALs, the rationale for further investment by MLA has fallen and the program will now focus on other areas such as energy efficiency and nutrient recovery.

While the workshop accepted the importance and success of MDC projects, it was observed that core funding was still required for pre-competitive activities such as literature reviews, overseas benchmarking and basic research.

It was also noted that greater agility was required in MLA: while the elapsed time for program approval had been reduced to one week, the issuing of contracts by MLA could take several months. During this time, windows of opportunity could easily close.

Impact Assessment

24.5 MLA Impact – benefits and investments^a: 4.2 Off-farm environment

			Support off-farm environment
			4.2
Expected benefits			
Red meat industry net income - total ^b	\$m		40
– 2010-11 to 2014-15	\$m		4
– > July 2015	\$m		36
Red meat gross value of production- total ^c	\$m		70
– 2010-11 to 2014-15	\$m		7
– > July 2015	\$m		63
Actual investment			
– 2010-11 to 2014-15 inclusive	\$m		16
Benefit cost ratio			
Red meat industry net income - total			2.5
Red meat gross value of production - total			4.4

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Saleyard equivalent GVP excluding processing (basis for levies). ^d Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

24.6 MLA Impact – benefits in terms of red meat net income^a: 4.2 Off-farm environment

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
4.2 Support off-farm environment	40	0	40	2.5

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
— per cent of impact benefits	100	0	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

24.7 MLA Impact – benefits in terms of GVP^a: 4.2 Off-farm environment

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
4.2 Support off-farm environment	70	0	70	4.4
— per cent of impact benefits	100	0	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

24.8 Budgets for off-farm environmental sustainability

Budgets by Program	\$,000		\$,000		\$,000		\$,000		\$,000		\$,000	
	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
4.2 Support off-farm environmental sustainability												
4.2 Support on-farm environmental sustainability	2,457	1,487	2,374	2,311	2,436	1,209	2,440	1,520	1,076	1,135	10,784	7,664
MLA Donor Company projects	0	574	0	1,504	0	921	0	1,996	0	1,081	0	6,075
Overheads (Corporate Services / Communications)	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	2,457	2,061	2,374	3,815	2,436	2,130	2,440	3,516	1,076	2,216	10,784	13,739

25 4.3 On-farm animal welfare

Top Line result – MLA expenditure on the on-farm animal welfare portfolio provides industry returns of \$124 million, from expenditure of \$16 million with a BCR of 7.7:1

Tables 25.2, 25.3 and 25.4 provide additional detail of the payoffs from investment in the *On-farm Animal Welfare* program.

25.1 MLA Impact – benefits and investments^a: 4.3 Animal welfare

		Provide industry with solutions to meet high standards of animal welfare without reducing productivity levels
		4.3
Expected benefits		
Red meat industry net income - total ^b	\$m	124
– 2010-11 to 2014-15	\$m	53
– > July 2015	\$m	71
Actual investment^c		
– 2010-11 to 2014-15 inclusive	\$m	16
Benefit cost ratio		
Red meat industry net income - total		7.7

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

Summary

Overall, the workshop was supportive of investments made under the program over the evaluation period.

- Workshop participants concluded that MLA's animal welfare activities were important in supporting red meat demand, particularly domestically.
- Program impact was measured at \$124 million (net industry income) with a BCR of 7.7:1. Some 43 per cent of the benefit accrued during the assessment period with 57 per cent to be captured in coming years.

Objectives from MLA 5 year business plan

- Develop replacements for aversive procedures.
- Reduce mortality rates on farms.
- Increase uptake and demonstration of welfare best practices across the whole supply chain.
- Develop ways to minimise the pain of aversive procedures.

MLA Summary of Program Outputs and Outcomes

MLA's animal welfare program between 2010-11 and 2014-15 was deliberately focused on four key initiatives and a structured community engagement strategy, rather than dissipating effort across a wide range of issues. Major developments under the key initiatives were as follows:

Develop replacements for aversive procedures;

The principle achievement in this initiative was the development, optimisation and then commercialisation of the poll genetics test for cattle. This is commercially available and 67 Brahman breeders have utilised the test since its release. There was significant investment in non-surgical alternatives to the spaying of cattle with no practical alternative ready to commercialise, despite achieving proof of concept.

Reduce mortality rates on farms

Predator control work was funded through the Invasive Animal CRC, and Program 1 of the current Sheep CRC (2014-19) was funded to reduce the risk of compromised wellbeing of individual sheep. Both require substantive additional funding to realise industry benefits. There have also been some small projects aimed at improving wild dog control.

Increase uptake and demonstration of welfare best practices across the whole supply chain

The major adoption elements have been four publications including 'the fit to load guide' which is MLAs most requested publication (more than 56,000 hard copies ordered since its revision in 2012) and one which has likely contributed to improvements in land transport of livestock within Australia, although this has not been quantified. The other guides are associated with the industry objective of benchmarking husbandry practices and enabling gradual improvement to safeguard the reputation of the industry. Providing a rigorous scientific underpinning to the guides was critical, as was the acceptance of the work by the key animal welfare groups. Work commenced during the period on understanding farmers' attitudes to lamb mortality and understanding barriers to adoption of best practice lambing and weaning.

Develop ways to minimise the pain of aversive procedures

This high profile topic recognises that painful practices are distasteful or repugnant to the broader community. A major achievement was the commercial launch of Bucalgesic® in May 2015. The Numnuts device was developed in 2010-11 – 2014-15 and will be commercialised within the next four years. Other R&D has looked at the pharmacology of a range of analgesics in sheep as there are none registered.

Community engagement

During the evaluation period MLA developed a consumer facing program branded Target 100 that was designed to engage with customers and consumers to promote community trust (social licence) and reinforce that the industry is an ethical and responsible custodian of livestock, land and resources.

MLA uses Target 100, media opportunities and events to actively engage with consumers to promote existing high standards and the ongoing investment being made to continually improve these standards.

The increasing focus from consumers on a range of issues, including animal welfare, means that the expectations on the industry are increasingly higher and subject to more scrutiny.

MLA has established a baseline and ongoing data to measure and monitor the impact of our industry on ethical custodianship of animals (and environmental sustainability) by instituting annual quantitative and qualitative consumer research into attitudes, buying behaviour and industry awareness. Tracking over the past 5 years has revealed a small number of consumers (7.2 per cent in 2014-15) report reducing red meat consumption for animal welfare or environmental reasons (this does not include vegetarians who are filtered out of the survey results). The number reducing consumption for animal welfare reasons increased slightly in the period 2010-11 to 2014-15.

A large part of the Target 100 program has been designed around producers telling their story to the public both through traditional media and social media, but occasionally ‘celebrities’ are also used to convey the message. Communications activities have been successful — for instance, the GoodMeat YouTube and social media campaign, made up of 12 YouTube videos, received over 200,000 views in 2015.

Workshop evaluation of performance / industry impact

The view of Workshop participants was that MLA’s animal welfare RD&E activities were important in supporting red meat demand, particularly domestically, and in maintaining the industry’s social licence to continue to operate.

Demand impact of MLA’s animal welfare activities

- An MLA survey in 2014-15 indicated that 3.3 per cent of consumers stated that they were reducing their red meat consumption for animal welfare reasons. Workshop

participants were of the view that this figure would have been higher still without MLA's animal welfare-related investment. Participants especially noted that without MLA's animal welfare investment, a limited number of practices used on-farm in the raising of cattle, sheep and goats might have become a target for animal welfare activists. If this occurred, a significant fall in demand was likely, estimated to be in the order of 5 per cent.

- Amongst the critical work done by MLA in this period was engaging with a number of animal welfare related organisations such as RSPCA and Animal Angels and securing their support for some of the industry's animal welfare activities (eg. the 'fit to load' guides). This significantly reduced the chances of an attack on some of the industry's land transport activities — at the beginning of the period this was an area of high vulnerability.
- The impact from publicity over mulesing was cited as something that could be repeated with the red meat industries. In 2004, PETA threatened the Australian wool industry and major international clothing retailers with an international boycott of Australian wool if farmers continued to mules their sheep. The publicity caused a number of international retailers (for example, AB Lindex, Kukdong, Perry Ellis, H&M, Adidas, Hugo Boss, Gap Inc, Next, Liz Claiborne and John Lewis) to ban garments made from the wool of mulesed sheep. A practical method of pain relief has now been introduced and is used by well over 50 per cent of producers when mulesing.
- It was noted that for the red meat and livestock industries, the attention of activists on the live trade reduced the chances of on-farm practices also being targeted — the live trade acted as a bulwark for the rest of industry.

Other points made included the following:

- the demand impact of not meeting consumer expectations on social issues such as animal welfare is greater when prices are high since consumers are looking for excuses/reasons not to buy the product
- if community trust were to erode in areas like animal welfare, this may lead to fundamental shifts in attitudes to farms and farming which could have very serious consequences. For example, an erosion in community trust may result in a reduced propensity by Government to provide support for the industry in times of crisis (for example, drought) or increased regulation being imposed.

Overall it was the view of Workshop participants that risks on demand clearly existed, that MLA activities had ameliorated this risk and that the measure proposed in the paper was probably conservative. The measure proposed in the MLA Background Paper was that the work on Animal Welfare was helpful in avoiding the risk of a 5 per cent chance of a 5 per cent fall in demand due to a sustained attack on the industry by animal activists. The view of Workshop participants was that without the work of MLA, there was greater than a 5 per cent chance of the industry coming under attack.

- It was further considered that the initial impact on demand might be greater than 5 per cent — say 20 per cent — but this would reduce over time as the issue faded so that, over a 5 year period, a 5 per cent demand fall was considered reasonable.

- Workshop participants noted that MLA should initiate studies on this possible demand impact so more precise measurement could occur at the next evaluation (foreshadowed to be done in 2020).
- Workshop participants also noted that evidence was required on real practice change — for example, did the ‘fit to load’ guides actually change what was being done. The standards that have been developed need to be respected by all of industry — industry needs to lead practice change, not Governments.

Estimation of economic impact:

This was estimated as a reduction in risk of a 5 per cent chance of a 5 per cent fall in red meat domestic demand due to negative publicity pertaining to welfare issues in the domestic supply chain

Impact of extending the legal transport time from 36 hours to 48 hours

- A significant development over the 2010-15 period was the adoption of The Australian Animal Welfare Standards for the Land Transport of Livestock. The Standards, which are enforceable, defined specific requirements in relation to livestock transport in Australia and replaced the individual state/territory livestock transport provisions of the Australian model codes of practice for the welfare of animals, so the same rules apply nationwide for livestock transport.
- For cattle over 6 months of age and for sheep over 4 months old, the Standards provide for a maximum period of 48 hours off water. Many animal activists argued for a maximum time off water of 28 hours (Animal Angels) or less (Animals Australia). The fact that RSPCA did not challenge the industry-proposed 48 hours reflects both the scientific studies conducted by MLA and the consultation work undertaken. The industry relied particularly on MLA-funded research conducted by the CSIRO into welfare outcomes of land transport under Australian conditions. This research showed that both cattle and sheep ‘in good physiological condition can cope with transport for periods up to 48 hours without any major compromise to their welfare’. Although this research was conducted prior to the current evaluation period, the review team understands that some limited additional work was required post 1 July 2010 to ensure that the research was fully incorporated into the standards.
- In terms of the benefit of increasing the maximum time off water from 36 hours to 48 hours, Workshop participants noted that trips of this magnitude represent a minor proportion of total trips — even trips of greater than 12 hours are unusual. Routes that were noted as possibly benefitting from the extended hours were from northern Australia to southern Australia, which increased in importance during the live export crisis, and sheep/lamb movements from West Australia to the east. The cost of transporting northern cattle can be high, for example, per head road transport costs from Newcastle Waters to southern processing works can cost \$250 (because cattle have to be spelled twice during the trip).

In addition to the transport cost savings, Workshop participants noted the following benefits:

- Cull cows can now move from northern Australia to processing plants in southern Australia more easily. Rather than dying on-farm, cull cows could be sent to market at an early stage, increasing on-farm productivity. It was suggested that, perhaps, up to one million cows could benefit through the lift in restrictions.
- The longer hours effectively reduced the cost of entry into distant markets and this would likely prices generally available in local markets — this should also be taken into account
- The certainty provided to the industry by the regulations also represented an intangible benefit.

On the other hand, Workshop participants noted that driver hours regulations effectively place a limit on the benefits of extending the maximum number of hours cattle and sheep could be off water.

The Workshop recommended that information contained in the Regulatory Impact Statement conducted for the Primary Industries Ministerial Council into the Land Transport of Livestock Standards be used as a basis for the evaluation.

As a final point the industry was urged to ensure the regulations were properly understood and applied — industry must take a lead on this. In this regard, it was noted that some transport operations shifting northern cattle (for example, from the Kimberley) to southern Australia (for example, Warrnambool) resulted in unacceptable levels of mortalities.

Estimation of economic impact:

PRIMARY INDUSTRIES MINISTERIAL COUNCIL Australian standards and guidelines for the welfare of animals. Land transport of livestock. Regulatory Impact Statement March, 2008]

- 1 Although the original land transport R&D was done before 2010, the adoption, fit to load guide revision, research confirmation and extension work resulted from 2010 -15 investment (around \$280,000).
- 2 Given that the previous standard allowed 48hr transport, the benefit is a future cost avoided rather than a new productivity benefit.
- 3 Evaluation of Option E in the RIS analysis estimated the cost of imposing the 36hr limit instead of the existing 48hrs would be around \$52 million pa for beef and \$36 million pa for sheep).
- 4 These costs have been adjusted in proportion to changes to livestock populations since 2008, and the beef industry costs apportioned 90 per cent northern beef and 10 per cent southern beef.
- 5 As the timing of introduction of the changes to the relevant legislation varied between states (2012-2015), it is assumed that on average, the full-year benefits of avoided cost are first attributable to 2014.
- 6 Because the major portion of the land transport R&D that influenced the standards was completed before 2008, and the Primary Industries Ministerial Council approved the standards in May 2009, the attribution of benefits to MLA investment after this

time is limited to 5 per cent (for the development of a communications package plus some confirmatory research).

Impact from improved DNA tests for poll genes

MLA staff provided the following information as a basis for evaluating an improved DNA test for poll genetics, particularly in *Bos indicus*-derived breeds, developed by the Beef CRC and CSIRO:

- herd statistics suggest that 26 per cent of calves born have horns
- the average age of dehorning is 4½ months
- assume that 13 per cent of calves born are dehorned at this age (that is, 50 per cent de-horning), resulting in a mortality rate of about 1.5 per cent.

If 10 million calves are born each year, the above assumptions suggest that 19 500 calves die from dehorning. Assuming an 80 per cent adoption by 2030, with calves costing about \$300 in present value terms, the productivity gain would be about \$4.7 million pa at full adoption.

The calculations above were generally accepted by Workshop participants, with the following comments being made:

- The permanence of the horn gene in Brahmans is very high around 90 per cent — an accurate test for polledness has the potential to add considerable value.
- Current premiums exist for poll bulls — indicating market value for polledness.
- The group was of the view that competitive elements between seedstock providers would ensure a high distribution of poll genetics
- The MLA value calculation did not take into account labour savings — this should be included.
- The calculation assumes that only half of the horned calves are currently dehorned, confining benefits to reductions in mortalities from eliminating dehorning. There will be benefits (for example, reductions in bruising associated with poll genes in calves that are not currently dehorned, greater value of these calves as feedlotters do not like horned animals, etc) — should these be taken into account?

Estimation of economic impact:

- 1 Maximum benefit is prevention of an estimated 19 500 calf deaths pa due to de-horning (26 per cent calves born with horns; 50 per cent are de-horned; 1.5 per cent mortality) (Source: MLA).
- 2 Assume first benefits begin in 2015 and an increasing proportion of polled calves are born each year until 80 per cent of possible deaths are avoided in 2030, value at \$300/calf saved.
- 3 Assume cost of DNA tests is offset by reduced labour costs and other savings such as bruising in slaughter cattle. (Actual labour savings through avoided de-horning are small as usually done in conjunction with other tasks (branding, tagging, vaccination).

Impact of research conducted into baiting of wild dogs

Two major research projects into wild dogs were completed by the Invasive Animals CRC with MLA support in the Evaluation Period with potential triple bottom line impact.

The first of these research projects challenged assertions that feral dogs are essential in maintaining a stable ecosystem and preserving native animal populations (via cat and fox predation) by showing that dog control made no difference to populations of key prey species in study regions. Published in the *Frontiers in Zoology* journal, researchers monitored nine properties from the Gulf of Carpentaria to the Strezlecki Desert in South Australia, baiting half of them. They found the same wildlife results in both baited and unbaited areas. Wildlife populations fluctuated independently of wild dog control programs. This research has enabled continued social licence for the control of feral dogs in the future. In the absence of this evidence, calls for banning dog control may have increased, at least in some regions.

The second of these projects was conducted with substantial AWI funding and will result in a new bait likely being approved — Para-aminopropiophenone (or ‘PAPP’) is the active ingredient for the broad-scale management of wild dogs and foxes, but will only be registered for use in manufactured baits. The material used to make these baits has been shown to be less palatable to other native carnivores, but care will be needed when developing control programs using the toxin. The PAPP bait was developed with two reasons in mind:

- PAPP could be used if 1080 is phased out on welfare grounds.
- PAPP could prove complementary to 1080 and used by producers who do not wish to use 1080 for fear of the impact it might have on their farm dogs (unlike 1080, PAPP has an antidote) or on non-target species.

In terms of the impact of this research, it was noted that:

- research conducted into the economic impact of wild dogs was very patchy. Research suggests that the cost of wild dogs to livestock industries is \$50-100 million per year, with greater impact on the sheep industry.

To evaluate the returns from wild dog management strategies a recent ABARES report examined three case-study areas in different parts of Australia

- In a case study for South Western Queensland, absence of wild dog management strategies was found to potentially cost the livestock industry up to \$54 million over 20 years — in an area that represents just 23 per cent of the state's sheep and 4 per cent of the state's cattle.
- Impacts beyond the direct costs of livestock losses include the impact of industries shifting away from sheep farming, loss of associated jobs and skills, reduction in employment and flow-on effects to local communities such as loss of facilities and services. Non-market impacts of wild dogs could include adverse impacts on households, native species and public areas.

- This study found that the non-market impacts of wild dogs in the South Western Queensland case study could reach \$344 million over 20 years if no action was taken to mitigate attacks.

One view of the workshop was that benefits should be calculated by reference to a risk put on the future banning of 1080 and the benefits of the new bait. By 2030 there could be a 50 per cent chance that 1080 would be banned. Allowance should also be made for the complimentary use of 1080 and PAPP.

While Workshop participants believed that it was likely that at some future time use of 1080 would be severely restricted, they were not convinced that PAPP would completely replace 1080 — PAPP was not as good as 1080 and the industry still wants to use 1080.

Given that any ban of 1080 would be in the future, it was concluded that the expected benefits were from increased participation in baiting programs. If the expected annual cost was \$50 million a year, PAPP might be expected to reduce this by 5 per cent (due to a 20 per cent increase in number of people participating in baiting that would not use 1080 because of the impact on domesticated dogs and non-target species).

No further MLA expenditure was required to realise future benefits.

- AWI was the major funder of PAPP so the question was raised about whether the research would have proceeded without MLA funding. It was agreed that the research would have proceeded, but that MLA funding allowed results to become available at an earlier stage.

Estimation of economic impact:

Not evaluated as management confirmed that the MLA contribution was minor (~5 per cent) compared with AWI's contribution.

Opportunities to improve impact achieved

The following comments were made, in addition to the recommendations from MLA staff:

- Impact measurement across a lot of the animal welfare work was observed as being poor, although this was recognised as being difficult and expensive to measure, Workshop participants were of the view that substantial improvements could be made — 'know why you are doing stuff and then measure it'!
- The work MLA had done in securing cooperation from animal welfare groups was viewed as critically important. It was also observed that until recently a forum had existed for the industry to come together with the animal welfare lobby — the Australian Animal Welfare Strategy — but this had now been disbanded by Government. It was viewed as important that another forum be established to ensure regular meetings with animal lobby groups – it was stated that AWI now meets on a regular scheduled basis with animal welfare groups.

- The Dairy Australia Sustainability Framework was favourably commented upon — with animal welfare representing just one component of this forum. A similar framework was viewed as desirable for the livestock / red meat industries.
- In terms of future improvements that could be made, it was noted that when MLA commissioned work as part of a cooperative program (for example, Invasive Animals CRC) MLA should insist on strong reporting back on likely impact.

Impact Assessment

25.2 MLA Impact – benefits and investments^a: 4.3 Animal welfare

		Support on-farm animal welfare
		4.3
Expected benefits		
Red meat industry net income - total ^b	\$m	124
– 2010-11 to 2014-15	\$m	53
– > July 2015	\$m	71
Red meat gross value of production- total ^c	\$m	125
– 2010-11 to 2014-15	\$m	76
– > July 2015	\$m	49
Actual investment^d		
– 2010-11 to 2014-15 inclusive	\$m	16
Benefit cost ratio		
Red meat industry net income - total		7.7
Red meat gross value of production - total		7.8

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent. ^b Net income across all red meat industry sectors including processing. ^c Saleyard equivalent GVP excluding processing (basis for levies). ^d Actual present value of investments from 2010-11 to 2014-15 in 2014-15 dollars using a real rate of return of 5 per cent.

25.3 MLA Impact – benefits in terms of red meat net income^a: 4.3 Animal welfare

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
4.3 Animal welfare	124	0	124	7.7
– per cent of impact benefits	100	0	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

25.4 MLA Impact – benefits in terms of GVP^a: 4.3 Animal welfare

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
4.3 Animal welfare	125	0	125	7.8
– <i>per cent of impact benefits</i>	100	0	100	

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

25.5 Budgets for Animal welfare

Budgets by Program	\$,000		\$,000		\$,000		\$,000		\$,000		\$,000	
	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
4.3 Provide industry with solutions to meet high standards of animal welfare without reducing productivity levels												
4.3 Provide industry with solutions to meet high standards of animal welfare without reducing productivity levels (producer elements only - no feedlots or processors)	1,122	393	984	304	1,152	1,553	1,762	1,791	1,474	1,368	6,494	5,408
3.5 Increase producer engagement with MLA tools and information to support productivity (producer elements only - no feedlots or processors - apportioned across programs)	390	119	314	69	422	494	576	566	578	445	2,281	1,694
4.4 Support industry's effective engagement with the community (producer only - no feedlots or processors - apportioned across programs)	777	568	709	584	771	1,011	898	871	1,024	584	4,179	3,619
MLA Donor Company projects	0	0	0	125	0	364	0	1,504	0	545	0	2,539
Overheads (Corporate Services / Communications)	306	147	233	126	224	312	311	316	314	283	1,388	1,183
TOTAL	2,595	1,226	2,240	1,208	2,568	3,734	3,547	5,049	3,390	3,225	14,341	14,442

26 4.5 Sustainable Innovation Capability

Summary

This program information has been provided by MLA and, as no impact is attributed and no workshop was held, the information has not been verified by the impact assessment team.

Objectives from MLA 5 year business plan

To develop sustainable innovation capability within the industry and its service providers by:

- Working with stakeholders to promote opportunities for innovative people across the industry
- Collaborating with industry to implement professional and skills development programs
- Supporting the development of essential science, research, technical and extension capabilities

MLA Summary of Program Outputs and Outcomes

Key Collaborative Innovation Strategy Program (CISP) achievements during the review period (100 per cent MDC funded)

The CISP is a flexible value chain innovation capability building program that is customised for large and small participants throughout the red meat value chain.

Value chain innovation capability within the context of this program is defined as the underlying capacities that enable entire value chains to innovate successfully on a sustained basis rather than being constrained either by the narrow lens through which the opportunity is considered or the inability to respond to commercial opportunity in creating new value.

The program involves the co-development of comprehensive innovation strategies with individual enterprises which meet commercial imperatives in addition to focusing on the implementation of key industry and government innovation priorities.

The initial CISP stage 1 program is run over 3 years within each partner business and details are tailored for each partner with some common and key concepts employed:

- Strategic innovation planning involving the collaborative partner's leadership team, designed to align the program with business strategy - the development of a documented innovation strategy

- The development of a plan for a suite of innovation projects over the project period
- Identification of strategic opportunities for research and development projects
- Identification of gaps in partners capability to manage / plan and achieve results
- Development of an action plan to address capability gaps
- Identification and engagement of additional internal support resources for example, Innovation Manager / cross functional innovation teams
- Establishment of baseline measures and new processes to ensure program impact is being measured
- The development of a successful enterprise level innovation system
- Dissemination of innovation outcomes to the broader industry
- Service delivery framework for information sharing for key MLA and industry themes and programs to be presented and actions captured via account management processes whilst not restricting multiple engagement points with the client

MLA's continued support of the partner innovation programs subsequent to the first stage are contingent on the partner's program innovation focus and objectives being extended beyond their immediate enterprise to incorporate the development of complete value chain innovation strategies.

Stage 2 programs again run over 3 years and are customised for each client and the value chains within which they operate. The following key concepts are relatively consistent between clients:

- The partner has validated the benefit of investing in Innovation Managers and the reliance on co-funding is reduced or removed.
- Innovation thinking is applied to business strategy development and often expands vertically or horizontally through the partner's value chain.
- Strategic innovation planning is taken to the next level across the entire value chain

To date, participating clients in the CISP program represent 66 per cent of total processed beef and sheepmeat numbers with 18 export facilities involved in the program over the 5 year review period.

Program KPIs has been achieved:

- A review of CISP clients have identified achievements against agreed objectives across the overall client base – achieving > 80 per cent achievement against documented innovation KPIs
- An increase in the portfolio of client activity to ensure impactful whole of value chain benefit - a number of collaborative partners now have in place producer programs providing farm gate premiums for livestock which are meeting specific market requirements.
- Producer workshops delivered across multiple value chain partners to network of producers in various partner value chain programs (producer group activity)
- Secured partner investment in long term transformational objective measurement projects with collaborative value chains.

- Broadening the program footprint to a complete value chain perspective – building on the enterprise capability development activity and increasing the program focus, moving beyond individual enterprises to encompass complete value chain innovation capability building opportunities and a portfolio of innovation themes that focus on growing red meat demand, efficiency and compliance and design.
- The broader value chain capability building program includes the development of ‘Flagship value chain programs’. These programs intend to develop industry capability to identify and respond to emerging market diversification opportunities through the designing of a whole of value chain innovation program.

Intercollegiate Meat Judging (ICMJ)

The objective of the ICMJ program is to provide an opportunity for students to learn and to build the pool of intelligent young meat industry representatives, fired with enthusiasm and who will give the Australian meat industry the expertise and drive to compete in the meat quality world of the future.

Objectives are achieved through:

- Delivery of a 5 day annual industry training workshop and competition for tertiary students including professional development workshops and Careers Expo. Consistently this attracts at least 150 students each year
- Coordination of 3 annual secondary school meat judging contests involving approximately 300 students annually
- 5 day Industry Development program for top 10 tertiary finalists
- US industry tour for Australian national meat judging team.

Graduate program (100 per cent MDC funded)

The program is designed to address a shortage of skilled professionals in the red meat industry with participants were drawn from a diverse range of fields including environmental, engineering, agriculture, food science, marketing and human resource management.

The Graduate program placed 69 graduates in employment in the red meat industry. Graduates were employed in processing plants, feedlots, service provider companies, breed societies and value adding companies. Graduates participated in a twice yearly professional development program, where they gained an understanding of all aspects of the red meat industry, beyond the particular sector they were employed in.

- 24 graduate program participants (~1 in 3 from the program) are still working in the red meat industry. Many of them have been promoted, or have moved to other sectors or companies within the industry.
- 24 graduates left the red meat industry. A number of these people continued working in the industry for a period of time after participating in the graduate program.
- 21 graduates were unable to be contacted, so it is unknown if they were retained in the industry.

Undergraduate program (100 per cent MDC funded)

The Undergraduate program matched 134 undergraduates with companies in the red meat industry. The program was initiated in 2001, with the last program being completed in 2010. A review was carried out in 2012. Of the 71 students we were able to contact, retention into the meat industry was approximately 20 per cent with some progress during the prescribed 5 years up to 2014. A further 10 per cent expressed an interest in working in the industry but were unable to find jobs.

Support the development of essential science, research, technical and extension capabilities. Build professional capability and scientific knowledge of RD&E providers in key on farm disciplines

This objective was directed at ensuring the education of scientists to provide RD&E capacity to the on-farm sector. It funded PhD scholarships, scientific events, travel grants to scientists and occasionally students and also saw the building of a post-doctoral mentors program building on the success of the feedlot pilot program. Most recently a MDC project has started to train veterinarians to be useful as farm advisors through the Mackinnon Project at the University of Melbourne.

This program was assessed and evaluated in 2013 and found that MLA's return on investment is highest for students towards the end of the education pipeline. Consequently, the focus in this 5 year period has been on doctoral candidates and post-doctoral fellows.

During the period 2011-2015, 32 PhD scholarships were funded in the on-farm area – that includes scholarships that started before 2010-11 and finished after 2014-15 – with 5 years expenditure of \$1,398,241. These students nearly all finished their PhDs and were trained and available to provide technical services into the red meat sector. Additional students were trained in the Sheep CRC, Invasive Animal CRC and the Future Farm Industry CRC – these students are not specifically counted here. From survey results about 50 per cent of the MLA students intended to continue working in the red meat industry after graduation. High numbers of CRC graduates intended to stay working in red meat relevant areas

There were 5 post-doctoral fellows funded in areas of vital importance to the red meat industry but declining R&D capacity, with expenditure of \$1,955,392 over the 5 years. These early career researchers are contributing to red meat R&D needs and are expected to remain active.

Finally the beef and sheep industry veterinary residency program commenced but only \$20,253 was spent during the period of review.

Over the 5 years sponsoring scientific conferences and meetings had expenditure of \$377,164 for 38 separate events. This sponsorship has contributed to the scientific life and activity in areas relevant to the red meat industry with broad, yet diffuse, benefits during the 5 years. Conferences are essential for scientists to remain up to date and engage with recent developments and for networking – all adding to the development of scientific outputs.

Industry Impact

No additional industry impact is assigned to this program. Some of the benefits of this program are captured in the impact from other programs. Although the innovation capability was enhanced by this program, the industry impact was captured in the many other programs that participants in this program are involved in.

Another area where the benefits of innovation capability are not fully recognised in this impact assessment is the enhanced R&D and marketing capability that result from involvement in MLA funded R&D and marketing projects.

A specific CISP investment was funding a Masters student, Jose Webb, to manage the rollout of Livestock Data Link across JBS's Farm Assurance program and develop the useability of the feedback system and user capability.

Livestock Data Link (LDL), a web-based application that allows processors and producers to analyse carcass performance information, is being rolled out on a supply chain basis. Embraced by JBS Southern, MLA is working with a further five supply chains to ensure this feedback service is available to a wide range of producers over the coming year. So far it is accessible to 2,300 producers under the JBS Farm Assurance program.

LDL connects slaughter data from the National Livestock Identification System and Meat Standards Australia database with analytical tools and benchmark reports and the 'Solutions to Feedback' library. The library is an online resource that helps producers address non-compliance issues on farm. MLA is continuing to enhance its functionality by adding an animal health and disease feedback module.

The aim for 2015-16 is to increase LDL's uptake by processors and producers and to enhance its functionality to make it more user-friendly.

Opportunities to improve impact achieved

AMPC/MLA Strategy & Coordination

With the change in MLA and AMPC management of processor funded R&D, coordination of R&D strategies between MLA and AMPC, as well as effective use of processor levy 'core' funding, has been and continues to be challenging because:

- MLA has limited to no input into the AMPC selection, management or outcomes of industry funded projects.
- AMPC selection of projects is primarily driven by an annual call for eligible projects, followed by an open forum processor based evaluation and selection process. This contrasts with MLA's long term, strategic project selection process, informed by confidential expert advice and close links to commercial providers via the MDC.

26.1 Budgets for Innovation Capability

Budgets by Program	\$,000		\$,000		\$,000		\$,000		\$,000		\$,000	
	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
4.5 Develop sustainable innovation capability within the industry and its service provide												
4.5 Develop sustainable innovation capability within the industry and its service providers	2,707	1,694	2,074	1,462	1,758	2,318	2,786	3,378	5,296	4,227	14,621	13,080
MLA Donor Company projects	0	1,609	0	1,280	0	278	0	1,849	0	2,773	0	7,790
Overheads (Corporate Services / Communications)	159	165	144	137	80	105	88	100	118	112	589	619
TOTAL	2,866	3,469	2,218	2,880	1,838	2,701	2,874	5,328	5,414	7,111	15,210	21,489

27 5.4 MLA Donor Company (MDC)

Top Line result – MLA expenditure on the MDC program provide industry returns of \$517m, from expenditure of \$128m with a BCR of 4.0:1

Summary

MDC based projects provided significant benefits in some program areas and complement levy funded priority areas. In this impact assessment the MDC is treated as a funding vehicle not as a R&D program — as such the impact / benefits from MDC projects are captured in the relevant program areas. Impact data included in this chapter is provided to gain an overall picture of the sum of MDC projects over all program areas.

27.1 MLA Impact - benefits in terms of red meat net income^a: 5.4 MLA Donor Company

Program areas	Total benefits	Investments	Benefit Cost Ratio
	\$m	\$m	BCR
1 Market access	12	2	8.3
2 Growing demand	54	12	4.3
3 Increasing productivity	412	96	4.3
4 Integrity & sustainability	39	18	2.1
<i>Total</i>	<i>517</i>	<i>128</i>	<i>4.0</i>

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

Objectives from MLA 5 year business plan

- To significantly increase the level of enterprise investment in innovation in the Australian red meat industry.
- To enhance the outcomes of commercially focussed innovation thereby ensuring quantifiable benefit to individual enterprises and ultimately to the industry overall.
- To accelerate the commercialisation of R&D thereby adding to the quantum of innovations available to the industry.
- To assist the Australian red meat industry to develop an innovation culture and capability.

MLA Summary of Program Process, Outputs and Outcomes

Partners in R&D

The Australian Government matches voluntary partner contributions (up to 50 per cent) through the MDC, where eligible projects deliver outcomes that address broader industry and/or government priorities and benefit the entire industry.

The partner may, or may not, be a provider to the project, that is, carry out the work.

MDC partners have included breed societies, pastoral companies, processors, value-adders, pharmaceuticals, state departments and technology providers, including some international collaboration.

While no MLA producer levies are invested in MDC-funded projects, the model complements levy investment through voluntary contributions and supports some of the more commercial aspects of R&D, benefiting the whole supply chain. There is a small number of projects whereby MDC partners with other organisations who access non-MLA managed producer levies for example the Animal Health Australia investment in Johne's Disease.

Benefits for industry

The MDC model injects new investment into red meat industry R&D and commercialisation, with a number of potential benefits:

- Improved sustainability on- and off-farm
- Reduced production costs along the entire value chain leading to a more competitive industry
- Higher standards of occupational health and safety
- New value-added products
- Enhanced supply chain collaboration
- Increased innovation capability

MDC Strategy

The MDC Annual Operating Plan is closely aligned to MLA's corporate plan. This approach ensures that MDC investments complement MLA industry priorities with particular focus in the following areas.

- Eating quality (2.1)
- New products, (2.3)
- Productivity on-farm (3.1)
- Processing efficiency (3.2)
- Animal health and bio-security (3.4)
- Off-farm environmental sustainability (4.2)

- Animal welfare (4.3)
- Collaborative innovation strategies (4.5)

In addition to the emphasis on an 'MLA-led' strategic application of the MDC mechanism, individual MDC projects submitted by external partners are considered and approved where they have the potential to deliver industry and/or public benefit and where they align with industry and government R&D priorities.

Business guidelines

The MDC works with both partners and providers. In some instances the (funding) partners and the provider (of the work) are one and the same. In other investments they vary. There can be more than one funding partner for example Plant Initiated Projects (PIPs) where there is always AMPC (up to 25 per cent) and individual processor investment. However Partnership projects can also include more than one partner.

Government funds can only be matched against cash contributions not in-kind. All cash contributions must be first received by MLA (for eligibility) prior to be paid out to the provider. No MLA producer levies are used via the MDC and an administration fee of 8 per cent (for levy payers) to 12 per cent (for others) is used to off-set the support costs of managing the program.

International partnerships are reported to the Department of Agriculture via the annual MDC Final Report.

Partner benefits

The economic benefit for the Australian Red Meat industry is one the key criteria for investing via the MDC. However there are other intangible benefits to partners including:

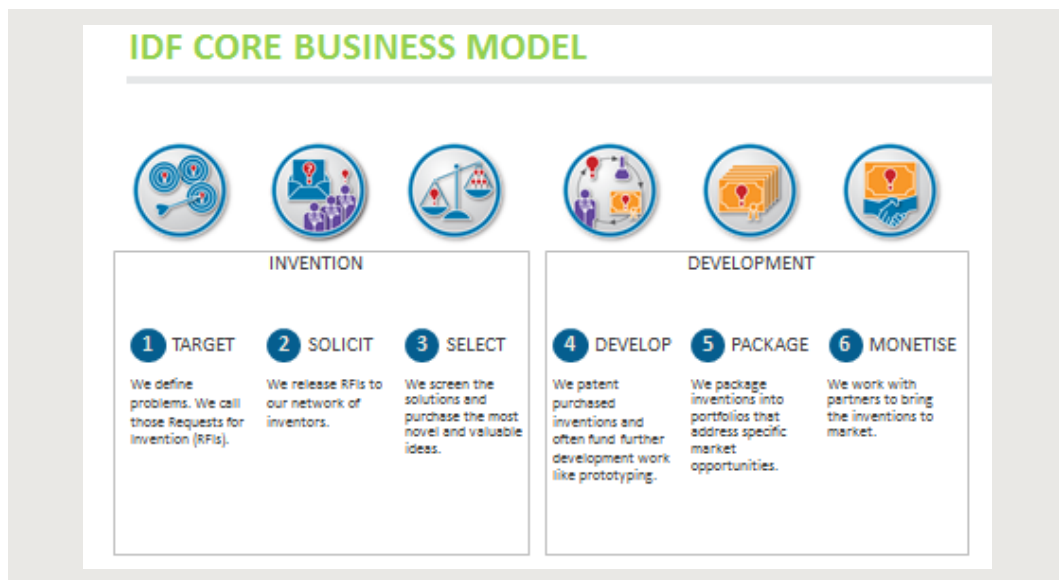
- Networks
- Focus groups
- Investment funds
- De-risk R&D

MDC investments also play a key role in in-plant R&D, facilitated adoption, taking R&D prototypes through to commercialisation and getting critical mass take-up by industry. On occasion MDC funds a small proportion of production systems, for example, to road test in different real live scenarios. An example of this is the Bladestop investments made via the MDC. Different plant environments were causing various R&D challenges to the technology not encountered in the previous installation. Through investing in multiple systems with different partners the R&D provider was able to address most environmental and production system challenges prior to full production of the final products.

Case study partner benefit – Intellectual Ventures (IV)

Other benefits include the serendipitous enhancements to programs from working with MLA. An example of this is whereby MLA invests with Innovation Development Fund (trading as Intellectual Ventures) to invent solutions for industry challenges, that is, Objective Carcase Measure, Meat Quality management, Feedlot Dags, Packaging solutions and Live Animal Identification. The business model that IDF use is captured below.

27.2 MLA Donor Company case study – Intellectual Ventures



Historically the inventor programs were closed off to all but the IV facilitators and the inventors. MLA requested, as part of the MDC partnership, to have access to these invention sessions as observers and if appropriate participants. IV held concerns that the inventors may be less comfortable to ‘invent’ and verbally share their ideas in front of the client (due to personality conflicts, or for fear of having their concepts and ideas stolen). MLA and IV trialled the new model with clear guidelines by the facilitator of the confidential nature of the session and also how the inventors’ concepts were being documented in order to accurately reward any ideas selected to the appropriate inventor/inventors.

Feedback received is that participation by MLA staff and MLA nominated industry experts delivered a much more engaging real time feedback scenario to the invention session. This model is now more widely used by IV throughout their invention service offered throughout the world. This business model enhancement is something that neither partner was anticipating as part of the outcome of the R&D investment.

Case study partner benefit – Scott Technology

Part of the industry vision 20 years ago was for processing automation. The MDC has been a crucial investment and partner model to develop capability and technology in this space. The drivers for automation have been significant for the Australian red meat

industry due to the significantly higher resource costs of staff when compared to other international providers of red meat. Although there were existing automation technologies available in Europe for pork these technologies were not a solution that was able to be re-engineered for Australian conditions. To make the automation work the European pork producers reduced the variability in the product going through the processing rather than make the technology handle variable product.

Standardising product for Australian red meat producers is virtually impossible due to the high variability of climatic and environmental conditions for beef and to some extent sheep production. Therefore it was necessary for MLA to seek out multiple providers to work on and develop the technology for Australia. MLA sourced companies including Machine Automation Robotics, Scott Technology, AST and ATTEC. Over 2010-2015 there has been recent consolidation of some of these providers including Machine Automation Robotics acquisition by Scott Technology. This now positions Australia as a leading world player in red meat automation.

Evaluation and performance

The MDC model performs well as private investors tend to invest where there is a greater likelihood of benefit and are also more likely to terminate if likely to not to be successful. Encouraging fast failures for high risk investments which are not achieving their milestone targets offsets a common failing in the research environment.

Workshop evaluation of performance / industry impact

Key areas of industry impact reviewed by impact assessment workshops include:

- New products, (2.3)
 - \$33 million NPV increase in net industry income from projects that were either 50 or 100 per cent MDC funded
- Productivity on-farm (3.1)
 - \$69 million NPV increase in net industry income from animal genetics work that was partially (14 per cent) MDC funded
- Processing efficiency (3.2)
 - \$194 million NPV increase in net industry income from a selection of processing productivity projects that were significantly MDC funded
- Animal health and bio-security (3.4)
 - Not quantified benefits from MDC funded development of vaccines
- Off-farm environmental sustainability (4.2)
 - \$40 million NPV increase in net industry income from a selection of processing sector environment projects that were significantly MDC funded

Opportunities to improve impact achieved

- Ensure that protection of intellectual property and inefficient funding approval times are not impediments to potential partners' involvement.

27.3 MDC expenditures (\$ million)

Budgets by Portfolio/Program	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
MDC expenditure by programs												
1.1 Product integrity		0.296		0.223		0.242		0.250		0.294		1.306
2.1 Eating quality	-	0.254	-	0.079	-	0.084	-	1.370	-	1.138	-	2.925
2.3 Develop new products	-	1.023	-	1.094	-	0.605	-	1.024	-	4.824	-	8.570
3.1 On farm productivity	-	3.850	-	3.385	-	3.110	-	4.106	-	4.923	-	19.374
3.2 Off-farm productivity and capability	-	10.984	-	6.614	-	10.468	-	10.878	-	11.252	-	50.196
3.3 Market Information	-	0.024	-	-0.007	-	0.124	-	0.384	-	0.000	-	0.524
3.4 Animal Health	-	2.145	-	3.085	-	2.016	-	2.524	-	1.384	-	11.154
(3.6) Feedlots	-	0.115	-	0.089	-	0.000	-	0.085	-	1.729	-	2.018
4.1 On-farm environment	-	0.000	-	0.000	-	0.000	-	0.000	-	0.057	-	0.057
4.2 Off-farm environment	-	0.574	-	1.504	-	0.921	-	1.996	-	1.081	-	6.075
4.3 Animal Welfare	-	0.000	-	0.125	-	0.364	-	1.504	-	0.545	-	2.537
4.5 Sustainable innovation capability		1.609		1.280		0.278		1.849		2.773		7.790
Total	22.000	20.874	30.000	17.471	22.000	18.213	24.000	25.970	28.000	30.000	126.000	112.527

28 *Background to recommendations*

The following strategic, operational and program specific recommendations are provided to assist MLA consider approaches that could further enhance industry impact from future R&D and marketing activities.

Strategic recommendations

Recommendation 1

Clear strategic focus — MLA impact can be improved by ensuring there is absolute clarity and company focus regarding a single strategic plan that provides the blueprint for MLA operations and aligns with achieving the industry impact identified in total industry plans (MISP2020 is the prescribed plan). This includes:

- alignment of MLA programs to achieve outcomes at the MISP2020 Imperative level
- implementing a ‘tops-down’ budget for the MLA 2020 strategic plan that follow the funding changes recommended in MISP2020 for each Imperative.
 - Note: the only variations to MISP thinking that came through the impact assessment are:
 - ... The domestic market for beef and lamb should be viewed as defensive strategies to minimise downside impact (rather than growth opportunities).
 - ... There is strong support for MLA export marketing activities in developed markets as well as for developing markets (the impact assessment team would still support the MISP recommendation to propositionally increase funding emphasis in developing markets).

Background — the issue of numerous competing strategic plans leading to lack of focus on key strategic initiatives by MLA was raised during impact workshops and follow up discussions. This replicated discussion in earlier MISP2020 workshops. The issue can be avoided by following the MISP2020 structure and implementing the funding changes necessary to action the strategic recommendation in MISP to optimise industry returns from MLA investment.

Recommendation 2

Improved performance measurement — MLA impact (and objective evidence of impact) can be improved by developing and implementing a renewed monitoring, evaluation and reporting system. This includes:

- developing KPIs that meet two criteria (a) providing a quantified impact statement for achieving major outcomes prescribed under each program, and (b) explaining how the industry impact of each MLA program will be measured.
 - It is noted that this is an expectation at the Imperative level in MISP2020.

- implementing monitoring and evaluation processes to measure performance against KPIs, including allocation of adequate funding within each business plan to measurement
- reducing the number of KPIs to those necessary to cover each key program area (based on MISP2020 Imperatives) rather than the large number of business plan and AOP KPIs evidenced in the assessment period
- maintaining the Integrated Framework as well as the Global Meat Industry models up-to-date to be utilised in measuring impact with consideration given to merging the two models into one and broadening the linkage to the Australia wide economy.

Background - MLA staff and management are well aware of this problem which was discussed within the impact assessment project and in follow up work on future MLA KPIs. Additional detail (as provided earlier to MLA) is attached at the end of this chapter.

Recommendation 3

Value chain approach — MLA impact (including, most importantly, impact to producers) can be improved by ensuring a whole of supply/value chain approach to delivering industry impact. This includes:

- ensuring improved collaboration between programs and managers where joint activities are required to achieve program KPIs
- improving and developing effective working relationships with other relevant industry organisations. This includes clarifying MLA responsibility for effectiveness of expenditure that is under the 'joint' responsibility of MLA and AMPC.

Background – The importance of a value chain approach to achieving industry impact was demonstrated in MISP2020 and reinforced in the impact assessment project. This logic can be difficult to achieve without improved collaboration in many program areas between MLA teams and between MLA and AMPC. On the other hand the Live Export Program appears to demonstrate the sort of coordination and collaboration that can be achieved.

Recommendation 4

Viability of northern cattle industry — MLA impact can be improved by looking at the environmental sustainability issue of the northern cattle industry as an industry viability issue which is a significant economic risk to the industry as a whole. This includes:

- recasting the current work in the Wambiana trial, Buffel grass rundown and other associated areas to have a significant focus on economic as well as environmental concerns.

Background

- Given the large number of properties and millions of cattle potentially impacted by both the Wambiana and buffel run-down research topics, the review team was surprised by the 'lack of profile' of these projects within MLA's research portfolio, and that neither topic had been raised as a future supply issue in the MISP 2020 consultations. Whilst it is understood that a significant investment in R&D has been

made in both topics over many years, there was only limited data or recent information (that is, less than 4-5 years) presented to the review team, and no detailed modelling of different enterprise scenarios and input costs, nor detailed attitudinal surveys of potential adopters, that would provide a much better picture of both likely adoption levels in future and the scope of possible future impact.

- This was exemplified by the considerable lack of agreement amongst northern workshop participants on the likely benefits (particularly cost savings) and adoption levels of the Wambiana conservative/flexible stocking rate recommendations across different enterprises and different regions (that is where, and under what circumstances, adoption might be beneficial). Whilst the Wambiana project is clearly considered primarily as providing environmental benefits within MLA's northern beef portfolio, the level of adoption will likely be driven primarily by enterprise financial benefit, debt levels and managers' attitudes to risk.

Operational recommendations

Recommendation 5

Align structures and responsibilities — MLA impact can be improved by resetting advisory structures and responsibilities to align with industry impact KPIs. This includes:

- Committee structures that support achievement of the KPIs (and associated MLA business plans).
- Committee responsibilities that are clarified to eliminate (as much as possible) the current duplication of roles and responsibilities. The need for and benefits from consultation should not be confused with the benefits from following the strategic focus in recommendation 1.

Background – again an issue identified in workshops. While some competitive friction can be positive, the level of duplication and/or confusion in roles and responsibilities that was evident leads to more 'heat' than 'light'.

Recommendation 6

Program focus — MLA impact can be improved by firmly focussing on integrated programs of activity (based on business plans to achieve industry impact KPIs) as opposed to the funding of many disparate projects. This includes:

- development of business plans for each major area of industry impact
- allocation of budgets as discussed previously for the full term of the business plan and in alignment with MISP2020 recommendations.
- reporting that focusses on progress with achieving the industry impact KPIs rather than outcomes from individual projects.
- monitoring impact (see recommendation 2) at the program rather than project level and, where multiple programs contribute to practice change in the same producers, at the KPI level rather than the program level (that is, through integrated M&E processes).

Background — in MLA the need for a program approach is a truism that requires no more justification – however, perhaps due to the issues identified above, the program approach in many areas appears to have been lost and replaced by a multitude of individual projects. The industry has proved over many years that big issues of importance to industry are only progressed through a long term strategic program approach.

Recommendation 7

Efficient contracting — MLA impact can be improved by substantially speeding up the contracting of programs/projects once consultation is concluded. This includes:

- establishing best practice benchmarks for efficient contract approval times
- monitoring and transparent reporting of performance against these benchmarks.

Background – this issue was raised in many workshops – administrative efficiency is an issue that can be speedily rectified.

Recommendation 8

Maximise available funding — MLA impact can be improved by increasing funding for the implementation of business plans to achieve industry impact KPIs, in a period of levy reductions, through better utilisation of the MLA Donor Company (MDC). This includes:

- establishing targets for MDC funding, in total and for business plans, particularly in areas that require implementation through commercial supply chains.
- ensuring that protection of intellectual property and inefficient funding approval times (as discussed earlier) are not impediments to potential partners involvement.
- increasing focus on partnering with MLA producer and lot feeder members.

Background – the MISP2020 and the impact assessment discussions noted that MLA has insufficient funds to address all strategic issues. At the same time the levy stream will be reduced in future years with the rebuilding of the cattle herd and value chain alliances will be necessary to implement many new initiatives. The MDC provides an opportunity in this regard, however feedback received suggests that some potential partners are put off by MDC administrative processes.

Program specific recommendations

Recommendation 9 — Maintaining and improving market access

- **Recommendation** - Achieve consolidation of the meat industry's integrity systems and move all systems from paper based to electronic transfer of data.

- **Background** – an opportunity clearly articulated in MISP2020
- **Recommendation** - Devote more effort to measuring industry returns from Market Access Programs operated by MLA.
 - In the market access area increase the accuracy with which MLA’s contribution to outcomes is measured.
 - Undertake analysis of the contribution of MLA’s product integrity programs to price premiums achieved in overseas markets.
 - **Background** – this is a common theme in all program areas and the impact assessment process identified clearly the shortcomings in this area.
- **Recommendation** - Inject further resources into technical market access issues — this is the growth area in trade impediments for the meat and livestock industry. Examine the benefits of integrating the meat safety science research more fully into MLA’s market access program.
 - **Background** – As economic barriers to trade are reduced there will be an expansion in technical barriers that could reduce the potential gains achieved recently if not addressed adequately.
- **Recommendation** - Going forward defence of market access conditions will increase in importance — this needs to be recognised in program strategies and outcome measurement.
 - **Background** – this is self-explanatory.
- **Recommendation** - Significant dangers continue to exist to the Live Export trade. Community expectations of the trade will keep on increasing and further work will be required to meet these expectations on an ongoing basis - for example, the work on the Livestock Global Assurance Program (LGAP).
 - **Background** – this is self-explanatory.

Recommendation 10 - Growing demand

- **Recommendation** - Develop a strategic approach for domestic beef marketing with consistent execution that recognises the defensive nature of marketing activities in this market.
 - **Background** – the review period was challenging for beef marketing and MLA was faced with reduced expenditure to address these challenges. In these circumstances, which are likely to continue into the future, MLA needs an appropriate strategic approach and excellence in execution which were not evident over the review period.
- **Recommendation** - Improve communications with domestic and export commercial industry partners on marketing activities.
 - **Background** – Impact assessment workshop participants were supportive of MLA export marketing in almost all areas but requested improved communication to allow commercial partners to maximise the opportunities provided. Improved communication was also requested in the domestic market.
- **Recommendation** - Globalise MSA with better integration of MSA knowledge into marketing strategy.

- **Background** – MSA has become of major importance in the domestic initiative and is also underpinning of brands in global markets. Global recognition of MSA will support brands. Despite this importance there does not appear to be full integration between the MSA and marketing teams with resultant loss of opportunities.
- **Recommendation** - Discontinue the new products program except through individual MDC projects.
 - **Background** – The analysis demonstrated that benefits from this Program were small and, to a degree, limited to the firms involved. Also relevant is that there is a general history of failure with product development projects if there is not direct commercial input through the MLA Donor Company.
- **Recommendation** - Develop a global approach with individual market execution to measure the commercial impact from domestic and export marketing programs on an ongoing basis. This approach will facilitate measurement of progress made against industry impact KPIs.
 - **Background** – the need to have a rigorous and robust basis for evaluating the impact of programs applies generally within MLA but was highlighted especially in the marketing programs.
- **Recommendation** - Supermarkets to supply scan data, rather than utilising the Nielsen consumer panel data, to evaluate and better understand the impact of domestic marketing.
 - **Background** – while purchase of scan data is perhaps too expensive, it is suggested that the Supermarkets supply scan data to MLA as part of the partnership. This data would enable the update of key demand elasticities and help evaluate the impact of MLA marketing activities on the domestic market.
- **Recommendation** - Improving understanding of, and linkages between, key MLA programs.
 - **Background** – this is a general issue that became evident between marketing and R&D programs and between R&D programs.

Recommendation 11 — Increasing productivity across the supply chain

- **Recommendation** - Improve the standard of ex-ante analyses by training all relevant on-farm Managers in the use of the AWIMLA economic model developed by RMCG, and ensure both peer review of assumptions including expertise, external where necessary, on likely marginal benefit and extent of adoption in the target markets and the counterfactual scenario, and the recording and retention of these analyses.
 - **Background** - The AWIMLA economic model provides a very useful tool for discussing input assumptions regarding likely enterprise-level benefits and adoption rates. However, this model is not understood by some MLA managers and the counterfactual scenarios are not always defined in sufficient detail. The model's strength lies in peer discussion, consensus and 'ground-truthing' of input assumptions – where MLA managers lack sufficient knowledge, this should be sought externally. The input assumptions for all analyses should be centrally recorded so that analyses can be easily updated as more knowledge of the

innovation is developed through the R&D phase or from commercial validation trials, and as key prices of relevant inputs and outputs change.

- **Recommendation** - Use independent external expertise to update ex-ante analyses with most recent industry and research project information prior to future MLA impact assessment workshops, and focus the workshop participants on discussing the updated key assumptions.
 - **Background** - Relying on outdated ex-ante economic analyses is of little use in impact reviews with industry professionals, when clearly much more knowledge of likely benefits and costs has been developed during the RD or E phases. Outdated and unbelievable benefit or adoption assumptions do little to improve MLA staff credibility in the eyes of industry consultants and leading producers. Updated, credible analyses should form the basis of informed peer review discussions in future workshops.
- **Recommendation** - Continue and build on the strong approach to monitoring and evaluation taken in assessing benefits in Majority Market programs but integrate where multiple adoption activities occur to allow evaluation at the impact KPI level rather than at the project or program level.
 - **Background** - The ex-post evaluations of the Making More from Sheep and More Beef from Pastures programs were very comprehensive and detailed but limited in scope to considering inputs from these specific programs. It appears highly likely that concurrent MLA-funded programs with substantive awareness, skill development and adoption activities (for example, Pastures Australia, EverGraze, the Sheep CRC's improving reproduction program), and possibly others funded by AWI and state government agencies, contributed to overall adoption rates in southern beef and sheepmeat producers. Given the difficulty and expense involved in quantifying and attributing practice change, future M&E investment by MLA should consider a comprehensive integrated before-and-after assessment coordinated across all major service providers.
- **Recommendation** - Expand efforts to move from relying on self-assessed practice change to quantifying not only level but extent of adoption.
 - **Background** - Workshop participants were critical of survey-based adoption measures based on self-assessment by producers, which tend to over-estimate both adoption level and attribution to particular programs, leading to considerable 'double-counting' when applied at the individual project/program level. In particular, surveys generally do not quantify how well, or to what degree, an innovation was adopted, and its longevity or impact in the enterprise.
- **Recommendation** - Invest in commercial validation trials and/or commercial case studies with early adopters to develop compelling business propositions for producers who might consider adopting each of the various innovations promoted by MLA, and include more prominently in adoption communications packages.
 - **Background** - The impact review team was surprised at the lack of commercially-robust enterprise-level value propositions put forward by MLA to support assertions of actual or potential industry benefit, particularly for large projects that had been through, or were currently in the extension/adoption phase (for example, Wambiana, buffel rundown, Cash Cow, new pasture recommendations, etc), and

the lack of identification of the additional costs, risks or management complexities involved in adopting a new innovation. This information should both improve the level of information going to producers and assist significantly in future assessments of RD&E impact, but needs to be based on credible case studies with early adopters or specifically-planned and resourced validation trials in relevant commercial settings.

- **Recommendation** - Review the development and use of \$ index values for the future estimation of return on R&D investment in livestock genetics programs.

Their use for future R&D impact evaluation would be considerably enhanced and greatly simplified by using independent technical expertise to:

- establish rules for the creation and updating of the underlying assumptions related to future input costs and product prices, discount rates, frequency of updates and the transparency of this information, particularly for beef indexes, with standardisation across breed societies
- certify all updates and make the underlying assumptions available to industry in easy-to-understand extension material
- develop recommendations on the most appropriate methodology to calculate both weighted average \$ index industry values to account for changes in breed composition and trait addition over time, and annual \$ increment values using these \$index values to best reflect future industry value added; and
- develop recommendations on the most appropriate methodology to account for incomplete records in the two years prior to any impact assessment, and to estimate counterfactual scenarios, taking account of changes to both seedstock enrolments and industry breeding females over time, so that future impact estimates more accurately reflect the incremental genetic value added in any time period and the distribution of that value in future years.
- **Background** - The seedstock sectors spend a considerable effort to calculate and publish \$index values to allow breeders to rank and value bulls or rams based on their genetic merit across multiple traits that influence whole-of-chain value. Because for this purpose, breeders, and their bull/ram-buying clients, are only interested in relative values of different bulls/rams within the same \$index - the underlying assumptions of input costs and trait values, discount rates for estimating NPVs, etc that go into calculating the \$ index values are of minor importance. However, as the \$index approach is also the most comprehensive data set available for estimating marginal benefit from RD&E investment across the seedstock sector, MLA should consider the changes outlined above that are needed to provide transparency and consistency in the calculation and reporting of \$index values, and to provide guidance on future estimation of annual \$ increment values using these \$index values and counterfactual estimation to best reflect future industry value added. This is needed to give confidence to third parties in the methodology, and to ensure that the return on investment estimated from different periods of investment can be validly compared.

Recommendation 12 — Supporting industry integrity and sustainability

As for supply chain productivity:

- **Recommendation** - Improve the standard of ex-ante analyses by training all relevant on-farm Managers in the use of the AWIMLA economic model developed by RMCG, and ensure both peer review of assumptions including expertise, external where necessary, on likely marginal benefit and extent of adoption in the target markets and the counterfactual scenario, and the recording and retention of these analyses..
 - **Background** – see above in recommendation 11
- **Recommendation** - Use independent external expertise to update ex-ante analyses with most recent industry and research project information prior to future MLA impact assessment workshops, and focus the workshop participants on discussing the updated key assumptions.
 - **Background** – see above in recommendation 11
- **Recommendation** - Continue and build on the strong approach to monitoring and evaluation taken in assessing benefits in Majority Market programs but integrate where multiple adoption activities occur to allow evaluation at the impact KPI level rather than at the project or program level.
 - **Background** – see above in recommendation 11
- **Recommendation** - Expand efforts to move from relying on self-assessed practice change to quantifying not only level but extent of adoption.
 - **Background** – see above in recommendation 11
- **Recommendation** - Invest in commercial validation trials and/or commercial case studies with early adopters to develop compelling business propositions for producers who might consider adopting each of the various innovations promoted by MLA, and include more prominently in adoption communications packages.
 - **Background** – see above in recommendation 11

Additional information – MLA KPIs - Recommendation 2

MLA is currently developing Key Performance Indicators (KPIs) for both the 2020 Strategic Plan and component annual plans in readiness for discussion with Peak Industry Councils.

Measuring MLA performance

At the end of the MLA 2020 Strategic Plan, MLA will inevitably be required to demonstrate the value of its programs using two criteria:

- It will need to show progress against meeting relevant objectives in the Meat Industry Strategic Plan (MISP2020).
- It will need to show returns to industry from investments made.

Although there is a direct inter-relationship between these criteria, it will be important for MLA to keep both criteria ‘front of mind’ when establishing KPIs and impact measurement procedures to be used.

A hierarchy of KPIs is envisaged under MISP2020

Under MISP2020 increased focus is placed on monitoring, evaluation and reporting (MER). The MER framework has four hierarchical layers:

- an 'industry performance dashboard' with KPIs providing an assessment of progress against the core pillars on which MISP 2020 was built;
- a system of KPIs to capture quantitative and qualitative performance against each MISP 2020 priority;
- KPIs to be developed by Service Companies in association with Peak Industry Councils to quantify impact from each of the MISP 2020 imperatives;
- KPIs to be developed by Service Companies for the objectives that need to be achieved in order to deliver the impact attributed to each imperative.

MLA has drafted actions together with associated KPIs (at a fifth layer) that are required to deliver the objectives identified in MISP2020, as a first step.

Responsibilities in reporting against MISP2020

Delivery of MISP2020 also requires MLA to contribute to an annual reporting schedule - to be developed and integrated with existing consultative and planning cycles between Service Companies, Peak Industry Councils, RMAC, co-investment partners and levy payers.

Service companies (notably MLA given its relative industry investment) are assigned responsibility for:

- developing the industry dashboard (working with RMAC on this task);
- developing indices and qualitative surveys to measure progress against MISP priorities (again working with RMAC on this task); and
- developing program KPIs against MISP imperatives (working with Peak Councils on this task).

Service companies have a role in all three top levels of the hierarchy because each level of measurement was designed to feed into the next highest level – the measurement framework is envisaged as an integrated arrangement. It should be noted that MISP2020 deliberately does not develop KPIs at the imperative level as it is believed that these can be best developed by the service companies responsible for achieving the outcomes.

It is important for MLA to keep all KPI levels in mind when designing KPIs at each level – including considering how the component KPIs at the lower levels will be integrated together at a higher level.

It is also important to note that MISP2020 recommendations for investment are made on the basis of 2030 impact, with 2020 being the first 5 years of progress. KPIs should be established for both 2030 and 2020. Flowing from this, AOP KPIs would be an articulation of the annual progress required to achieve the KPI in the 5-15 year time horizon – industry impact would not be measured on an annual basis.

Types of MISP objectives against imperatives

For the purposes of considering the dual measurement criteria that MLA will be required to meet in demonstrating the value of its programs, it is useful to classify MISP objectives against imperatives into two categories.

First, there are a number of MISP objectives that either directly involve measurement of economic returns to industry or involve measurement of factors that can be directly inputted into economic return calculations (with minimal further information required). Examples of MISP objectives that fall into this category are:

- Vaccines and other measures are developed to reduce costs of endemic diseases, including ticks in cattle and parasites in sheep, by \$50 million by 2020 and \$250 million by 2030
- Through progress in reducing technical barriers to trade new market opportunities are made available or cost savings achieved worth \$100 million by 2020 and \$250 million by 2030 with stakeholders satisfied with service providers' contribution to these results
- Demonstrated independent evidence that industry marketing efforts in developing export markets are providing a return to Australian livestock producers of \$6 for every dollar of expenditure and \$3 for every dollar of expenditure in developed markets.
- Minimum, whole-of-sector increases in productivity growth above baseline levels:
 - Northern beef production sector: 0.5% by 2020 and 2.5% by 2030
 - Southern beef production sector: 1.75% by 2020 and 7% by 2030
- Participate in global partnerships to conduct R&D that provides technical solutions to convert 25% of the energy lost in methane emissions into gains in animal productivity by 2030 with demonstrable progress towards this goal by 2020.

For these objectives the KPI measure to be used by MLA will automatically meet both of the criteria required of MLA to demonstrate the value of its programs. However, the component parts that lead to the aggregated impact will need to be articulated (and measured) – for example:

- Northern beef production sector: 0.5% productivity growth by 2020 and 2.5% by 2030:
 - Is this net mortality improvements, daily weight gain, reduced costs at animal/farm level
 - What is the subset of industry to which this is applicable (% of animals / properties)
 - What is the expected level of adoption.
- Demonstrated independent evidence that industry marketing efforts in developing export markets are providing a return to Australian livestock producers of \$6 for every dollar of expenditure and \$3 for every dollar of expenditure in developed markets:
 - What is the evidence that 'joins the dots' between MLA funded marketing activities and generating improved market demand.

A second set of MISP objectives, probably more numerous, involve the achievement of outcomes or outputs. Examples of objectives in this category are:

- Active alignment of farm animal welfare practices and community expectations
- Indicators of animal welfare developed along the entire livestock supply chain

- R&D vaccines are available to meet relevant strains of FMD and other relevant emergency diseases
- Government policy and health professionals continue to support the inclusion of red meat three to four times per week consistent with the Australian Dietary Guidelines
- Changes are implemented to the meat and livestock specification language to achieve improved alignment through the supply chain with end user requirements
- Tools are developed to provide objective and accurate measurement of all key attributes included in the meat language

For this category of MISP objective it will be relatively easy for MLA to construct a KPI to meet the MISP objective. However, measurement of the KPI will not automatically lead to MLA meeting the second criteria listed to demonstrate the value of its programs – the criteria of demonstrating returns to industry from investments made.

It is necessary that MLA considers now (that is, at the time when KPIs are set) how this second requirement will be approached. MLA needs to have firm methodologies in place, at the time of constructing the MLA 2020 plan, for assessing industry impact from each program. Firm plans are also needed for obtaining missing pieces of information to allow a thorough and rigorous ‘triple bottom line’ assessment of industry and community impact to be made at the conclusion of the Plan.

- Again it is necessary to provide the evidence that ‘joins the dots’ between undertaking activities / achieving outcomes and generating industry impact. MISP2020 is the reference point for the expected level of industry impact.

A MLA expenditure – budget and actual – 2010-11 to 2014-15

A.1 Budgets by all MLA programs – in nominal dollars

Budgets by Program	\$,000		\$,000		\$,000		\$,000		\$,000		\$,000	
	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
1. Maintaining & improving market access												
1.1 Develop and deliver industry systems that underpin product integrity												
1.1 Develop and deliver industry systems that underpin product integrity	12,417	10,533	12,559	11,287	9,040	8,775	9,554	8,869	10,884	10,795	54,454	50,260
Less 1.1.4.3 Communicate the integrity of Australian red meat products internationally and provide a response capability IMES (10/11, 11/12)	-3,431	-3,280	-3,523	-2,589	0	0	0	0	0	0	-6,954	-5,869
MLA Donor Company projects	0	296	0	223	0	242	0	250	0	294	0	1,306
Overheads (Corporate Services / Communications)	609	478	564	648	514	521	564	559	764	866	3,015	3,072
TOTAL	9,595	8,027	9,600	9,569	9,554	9,539	10,118	9,678	11,648	11,956	50,515	48,769
1.2 Support industry and government to maintain and liberalise world meat markets												
1.2 Support industry and government to maintain and liberalise world meat markets	4,061	3,178	4,520	3,427	8,041	6,862	8,041	7,355	8,041	7,400	32,704	28,222
Plus 1.1.4.3 Communicate the integrity of Australian red meat products internationally and provide a response capability IMES (10/11, 11/12)	3,431	3,280	3,523	2,589	0	0	0	0	0	0	6,954	5,869
MLA Donor Company	0	0	0	0	0	0	0	0	0	0	0	0

Budgets by Program	\$,000		\$,000		\$,000		\$,000		\$,000		\$,000	
	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
Overheads (Corporate Services / Communications)	505	455	495	399	443	368	463	444	470	506	2,376	2,172
TOTAL	7,997	6,913	8,538	6,416	8,484	7,230	8,504	7,799	8,511	7,905	42,034	36,263
1.3 Maximise market options for producers and exporters in the livestock export market												
1.3 Maximise market options for producers and exporters in the livestock export market	6,976	7,020	9,390	8,339	8,025	7,546	7,317	7,766	7,367	7,637	39,075	38,308
MLA Donor Company	0	0	0	0	0	0	0	0	0	0	0	0
Overheads (Corporate Services / Communications)	557	623	1,075	1,020	718	662	681	669	629	822	3,660	3,796
TOTAL	7,533	7,643	10,465	9,359	8,743	8,208	7,998	8,435	7,996	8,459	42,735	42,104
TOTAL - Maintaining & improving market access	25,125	22,583	28,604	25,344	26,781	24,977	26,620	25,912	28,154	28,321	135,284	127,136
2. Growing demand												
2.1 Develop practices and drive programs that help industry deliver consistent and optimal eating quality												
2.1 Develop practices and drive programs that help industry deliver consistent and optimal eating quality	7,724	7,434	8,374	8,520	7,972	8,200	8,203	8,205	9,501	7,727	41,774	40,087
MLA Donor Company projects	0	254	0	79	0	84	0	1,370	0	1,138	0	2,925
Overheads (Corporate Services / Communications)	909	918	900	1,028	747	736	802	728	817	717	4,174	4,127
TOTAL	8,633	8,606	9,274	9,627	8,719	9,021	9,005	10,303	10,318	9,583	45,948	47,139
2.3 Develop new products, packaging and value chains												
2.3 Develop new products, packaging and value chains	2,004	1,687	2,006	1,808	2,072	1,828	2,793	2,466	1,544	1,529	10,419	9,318
MLA Donor Company projects	0	1,023	0	1,094	0	605	0	1,024	0	4,824	0	8,570
Overheads (Corporate Services / Communications)	161	130	127	138	108	117	195	175	78	97	668	657
TOTAL	2,165	2,840	2,133	3,040	2,180	2,550	2,988	3,665	1,622	6,450	11,087	18,545

Budgets by Program	\$,000		\$,000		\$,000		\$,000		\$,000		\$,000	
	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
2.4 Domestic beef marketing												
2.2 Enhance the nutritional reputation of beef and lamb (beef elements)	5,587	5,623	5,587	5,711	4,442	4,165	4,072	3,615	4,080	3,891	23,768	23,005
2.4 Aggressive promotion in the domestic market (beef elements 10/11, 11/12)	9,947	10,658	10,168	10,213	0	0	0	0	0	0	20,115	20,871
2.4 Aggressive promotion of beef in the domestic market (12.13, 13/14, 14/15)	0	0	0	0	10,117	10,199	9,274	9,472	9,232	8,855	28,623	28,526
Ausmeat (allocation to domestic beef marketing)	184	182	185	187	189	184	182	169	185	181	924	904
MLA Donor Company projects	0	0	0	0	0	0	0	0	0	0	0	0
Overheads (Corporate Services / Communications)	1,900	2,093	1,886	2,047	1,537	1,500	1,478	1,553	1,489	1,569	8,290	8,763
TOTAL	17,618	18,557	17,826	18,158	16,284	16,048	15,006	14,809	14,987	14,496	81,721	82,069
2.5 Domestic sheepmeat marketing												
2.2 Enhance the nutritional reputation of beef and lamb (sheepmeat elements)	2,228	2,240	2,228	2,248	1,773	1,747	1,743	1,623	1,879	2,103	9,851	9,960
2.4 Aggressive promotion in the domestic market (sheepmeat elements 10/11, 11/12)	7,227	7,550	8,256	8,554	0	0	0	0	0	0	15,483	16,105
2.5 Aggressive promotion of lamb in the domestic market (12.13, 13/14, 14/15)	0	0	0	0	8,285	8,204	8,120	8,174	8,057	7,573	24,462	23,951
Ausmeat (allocation to domestic sheepmeat marketing)	65	66	68	69	68	65	68	64	67	64	335	327
MLA Donor Company projects	0	0	0	0	0	0	0	0	0	0	0	0
Overheads (Corporate Services / Communications)	1,163	1,278	1,243	1,366	1,090	1,042	1,095	1,106	1,110	1,159	5,700	5,951
TOTAL	10,683	11,134	11,794	12,237	11,216	11,058	11,026	10,968	11,112	10,898	55,831	56,295
2.6 Aggressive promotion of beef in export markets												

Budgets by Program	\$,000		\$,000		\$,000		\$,000		\$,000		\$,000	
	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
2.6/2.5 Aggressive promotion of beef in export markets (note 10/11, 11/12 = Program 2.5, 12/13, 13/14, 14/15 = Program 2.6)	23,349	23,023	23,431	21,467	20,914	19,920	20,383	20,956	19,830	18,300	107,907	103,667
Ausmeat (allocation to export beef marketing)	276	258	275	253	271	256	278	271	275	259	1,376	1,296
MLA Donor Company projects	0	0	0	0	0	0	0	0	0	0	0	0
Overheads (Corporate Services / Communications)	2,890	3,022	2,849	2,804	2,261	2,134	2,296	2,525	2,260	2,415	12,557	12,900
TOTAL	26,516	26,303	26,555	24,524	23,447	22,310	22,957	23,752	22,365	20,974	121,840	117,862
2.7 Aggressive promotion of sheepmeat in export markets												
2.7/2.6 Aggressive promotion of sheepmeat in export markets (note 10/11, 11/12 = Program 2.6, 12/13, 13/14, 14/15 = Program 2.7)	7,243	6,540	7,322	6,539	7,014	6,795	6,914	7,036	7,156	7,070	35,649	33,979
Ausmeat (allocation to export sheepmeat marketing)	50	44	47	41	47	45	47	46	48	46	240	223
MLA Donor Company projects	0	0	0	0	0	0	0	0	0	0	0	0
Overheads (Corporate Services / Communications)	902	872	882	840	771	722	775	802	807	883	4,137	4,119
TOTAL	8,195	7,456	8,251	7,421	7,833	7,562	7,736	7,884	8,011	7,999	40,026	38,321
TOTAL - Growing demand	73,809	74,895	75,832	75,007	69,679	68,549	68,718	71,380	68,415	70,400	356,453	360,231
3. Increasing productivity across the supply chain												
3.1 Identify and deliver opportunities to increase on-farm productivity												
3.1 Identify and deliver opportunities to increase on-farm productivity (producer elements only - no feedlots or processors)	11,559	10,527	12,660	13,990	14,110	14,767	14,317	14,929	13,085	14,472	65,731	68,685
Less 3.1.3.2 Increase producer capacity to make management decisions based on more precise information and lead to improved market compliance (12/13, 13/14, 14/15)	0	0	0	0	-539	-541	-364	-614	-614	-849	-1,517	-2,004

Budgets by Program	\$,000		\$,000		\$,000		\$,000		\$,000		\$,000	
	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
Less 3.1.3 Optimise business performance in supply chains (10/11, 11/12)	-452	-438	-364	-397	0	0	0	0	0	0	-816	-836
3.5 Increase producer engagement with MLA tools and information to support productivity (12/13, 13/14, 14/15, producer elements only - no feedlots or processors - apportioned across programs)	0	0	0	0	4,709	4,067	4,834	4,685	5,168	4,875	14,712	13,627
5.1 Increasing adoption of innovation (10/11, 11/12, producer elements only - no feedlots or processors - apportioned across programs)	2,854	2,393	2,927	2,502	0	0	0	0	0	0	5,781	4,895
5.3 Building industry innovation capability (10/11, 11/12, producer elements only - no feedlots or processors - apportioned across programs)	767	440	751	251	0	0	0	0	0	0	1,518	691
MLA Donor Company projects	0	3,850	0	3,385	0	3,110	0	4,106	0	4,923	0	19,373
Overheads (Corporate Services / Communications)	1,947	1,676	1,688	1,916	1,549	1,667	1,665	1,625	1,669	2,076	8,518	8,960
TOTAL	16,675	18,448	17,662	21,646	19,829	23,070	20,453	24,731	19,309	25,496	93,927	113,391
3.2 Identify and deliver opportunities to increase off-farm productivity and capability												
3.2 Identify and deliver opportunities to increase off-farm productivity and capability	2,450	1,555	2,898	1,017	3,778	1,170	3,486	1,764	4,530	2,418	17,142	7,923
5.1 Increasing adoption of innovation (10/11, 11/12, processor elements only)	1,011	475	819	486	0	0	0	0	0	0	1,830	961
5.3 Building industry innovation capability (10/11, 11/12, processor elements only)	70	315	345	186	0	0	0	0	0	0	415	501
MLA Donor Company projects	0	10,984	0	6,614	0	10,468	0	10,878	0	11,252	0	50,196
Overheads (Corporate Services / Communications)	31	12	0	0	0	0	0	0	0	3	31	15
TOTAL	3,562	13,341	4,062	8,303	3,778	11,637	3,486	12,642	4,530	13,673	19,418	59,596
3.3 Deliver valued supply chain and market information												

Budgets by Program	\$,000		\$,000		\$,000		\$,000		\$,000		\$,000	
	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
3.3 Deliver valued supply chain and market information	5,067	5,052	5,301	5,064	6,100	5,354	6,199	6,294	6,357	5,480	29,024	27,244
Plus 3.1.3.2 Increase producer capacity to make management decisions based on more precise information and lead to improved market compliance (12/13, 13/14, 14/15)	0	0	0	0	539	541	364	614	614	849	1,517	2,004
Plus 3.1.3 Optimise business performance in supply chains (10/11, 11/12)	452	438	364	537	0	0	0	0	0	0	816	975
5.4 Supporting industry with policy research (10/11, 11/12)	500	268	500	409	0	0	0	0	0	0	1,000	677
MLA Donor Company projects	0	24	0	-7	0	124	0	384	0	0	0	524
Overheads (Corporate Services / Communications)	654	681	619	672	608	577	606	628	694	719	3,181	3,276
TOTAL	6,673	6,462	6,784	6,676	7,247	6,595	7,169	7,920	7,665	7,048	35,538	34,701
3.4 Support industry to improve animal health and biosecurity												
3.4 Support industry to improve animal health and biosecurity (producer elements only - no feedlots or processors)	3,676	2,375	4,057	3,833	5,485	5,194	5,337	4,295	5,015	2,557	23,570	18,253
3.5 Increase producer engagement with MLA tools and information to support productivity (12/13, 13/14, 14/15, producer elements only apportioned across programs)	0	0	0	0	1,892	1,437	1,734	1,344	2,033	825	5,659	3,606
5.1 Increasing adoption of innovation (10/11, 11/12, producer elements only - no feedlots or processors - apportioned across programs)	962	591	1,050	659	0	0	0	0	0	0	2,012	1,250
5.3 Building industry innovation capability (10/11, 11/12, producer elements only - no feedlots or processors - apportioned across programs)	285	109	284	78	0	0	0	0	0	0	569	187
MLA Donor Company projects	0	2,145	0	3,085	0	2,016	0	2,524	0	1,384	0	11,154
Overheads (Corporate Services /	663	410	573	564	615	618	614	515	669	378	3,134	2,485

Budgets by Program	\$,000		\$,000		\$,000		\$,000		\$,000		\$,000	
	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
Communications)												
TOTAL	5,586	5,630	5,963	8,218	7,992	9,265	7,685	8,677	7,718	5,144	34,944	36,934
(3.6) Feedlot on-farm programs												
3.1 Identify and deliver opportunities to increase on-farm productivity (feedlots only)	788	405	840	1	1,712	1,041	1,440	1,420	1,686	1,714	6,466	4,581
Less 3.1.1.1 Provide genetic and genomic evaluation tools and information for cattle, sheep and goat breeding enterprises (note this was included in Program 3.1) - feedlots only	-222	-262	-132	0	0	-5	0	-5	0	-2		
Less 3.1.3.2 Increase producer capacity to make management decisions based on more precise information and lead to improved market compliance (12/13, 13/14, 14/15) - feedlots only	0	0	0	0	0	0	0	0	0	0	0	0
Less 3.1.3 Optimise business performance in supply chains (10/11, 11/12) - feedlots only	0	0	0	0	0	0	0	0	0	0	0	0
3.4 Support industry to improve animal health and biosecurity (feedlot elements only)	896	714	770	586	602	659	1,134	1,074	630	619	4,032	3,652
4.3 Provide industry with solutions to meet high standards of animal welfare without reducing productivity levels (feedlot elements only)	272	157	614	418	238	305	966	663	1,236	960	3,326	2,504
4.1 Support on-farm environmental sustainability (12/13, 13/14, 14/15, feedlot elements only)	0	0	0	0	1,396	1,283	1,320	1,391	920	886	3,636	3,560
4.1 Ensuring sustainability and demonstrating environmental stewardship (10/11, 11/12, feedlot elements only)	200	273	156	197	0	0	0	0	0	0	356	470
4.2 Responding to climate change (10/11, 11/12, feedlot elements only)	1,110	1,301	862	891	0	0	0	0	0	0	1,972	2,192
3.5 Increase producer engagement with MLA tools and information to support productivity (12/13, 13/14, 14/15, feedlot elements)	0	0	0	0	293	256	293	194	305	243	891	693

Budgets by Program	\$,000		\$,000		\$,000		\$,000		\$,000		\$,000	
	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
5.1 Increasing adoption of innovation (10/11, 11/12, feedlot elements only)	265	85	331	176	0	0	0	0	0	0	596	261
5.3 Building industry innovation capability (10/11, 11/12, feedlot elements only)	16	8	16	7	0	0	0	0	0	0	32	14
4.4 Support industry's effective engagement with the community (feedlot elements only)	210	255	230	238	230	211	226	254	183	213	1,079	1,170
MLA Donor Company	0	115	0	89	0	0	0	85	0	1,729	0	2,018
Overheads (Corporate Services / Communications)	389	306	333	302	394	378	407	442	378	479	1,902	1,907
TOTAL	3,924	3,357	4,020	2,905	4,865	4,127	5,786	5,518	5,338	6,840	23,934	22,746
(3.7) Goat industry on-farm program												
3.1 Identify and deliver opportunities to increase on-farm productivity (goats only)	0	0	48	140	542	555	504	358	504	420	1,598	1,473
Less 3.1.1.1 Provide genetic and genomic evaluation tools and information for cattle, sheep and goat breeding enterprises (note this was included in Program 3.1) - goats only	0	0	-48	0	0	-44	0	-3	-6	-37		
Less 3.1.3.2 Increase producer capacity to make management decisions based on more precise information and lead to improved market compliance (12/13, 13/14, 14/15) - goats only	0	0	0	0	0	0	0	0	0	0	0	0
Less 3.1.3 Optimise business performance in supply chains (10/11, 11/12) - goats only	0	0	0	-140	0	0	0	0	0	0	0	-140
3.4 Support industry to improve animal health and biosecurity (goat elements only)	114	4	6	2	2	2	40	63	40	49	202	120
4.3 Provide industry with solutions to meet high standards of animal welfare without reducing productivity levels (goat elements only)	0	8	8	0	0	10	0	14	0	0	8	32
4.1 Support on-farm environmental sustainability (12/13, 13/14, 14/15, goat elements only)	0	0	0	0	0	0	0	0	0	0	0	0

Budgets by Program	\$,000		\$,000		\$,000		\$,000		\$,000		\$,000	
	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
4.1 Ensuring sustainability and demonstrating environmental stewardship (10/11, 11/12, goat elements only)	0	0	0	0	0	0	0	0	0	0	0	0
4.2 Responding to climate change (10/11, 11/12, goat elements only)	0	0	0	0	0	0	0	0	0	0	0	0
3.5 Increase producer engagement with MLA tools and information to support productivity (12/13, 13/14, 14/15, goat elements)	0	0	0	0	24	21	24	12	26	37	74	70
5.1 Increasing adoption of innovation (10/11, 11/12, goat elements only)	80	212	230	363	0	0	0	0	0	0	310	575
5.3 Building industry innovation capability (10/11, 11/12, goat elements only)	122	98	170	180	0	0	0	0	0	0	292	278
4.4 Support industry's effective engagement with the community (goat elements only)	0	0	0	0	0	0	0	0	0	0	0	0
MLA Donor Company	0	0	0	0	0	0	0	0	0	0	0	0
Overheads (Corporate Services / Communications)	46	38	39	42	56	59	55	63	54	58	250	261
TOTAL	362	360	453	588	624	604	623	507	618	528	2,680	2,586
TOTAL - Increasing productivity across the supply chain	36,783	47,598	38,943	47,976	44,335	55,299	45,201	59,995	45,177	58,729	210,441	269,954
4. Supporting industry integrity and sustainability												
4.1 Support on-farm environmental sustainability												
4.1 Support on-farm environmental sustainability (12/13, 13/14, 14/15, producer elements only - no feedlots or processors)	0	0	0	0	7,161	5,401	5,828	6,085	3,764	5,465	16,753	16,951
4.1 Ensuring sustainability and demonstrating environmental stewardship (10/11, 11/12, producer elements only - no processor or feedlots)	2,574	2,753	3,540	2,575	0	0	0	0	0	0	6,114	5,328

Budgets by Program	\$,000		\$,000		\$,000		\$,000		\$,000		\$,000	
	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
4.2 Responding to climate change (10/11, 11/12, producer elements only - no processor or feedlots)	7,808	7,240	7,778	7,281	0	0	0	0	0	0	15,586	14,521
3.5 Increase producer engagement with MLA tools and information to support productivity (12/13, 13/14, 14/15, producer elements only - no feedlots or processors - apportioned across programs)	0	0	0	0	2,386	1,442	2,085	2,080	1,550	2,105	6,021	5,626
5.1 Increasing adoption of innovation (10/11, 11/12, producer elements only - no feedlots or processors - apportioned across programs)	1,509	1,824	1,957	1,741	0	0	0	0	0	0	3,467	3,565
5.3 Building industry innovation capability (10/11, 11/12, producer elements only apportioned across programs)	349	270	469	131	0	0	0	0	0	0	819	401
4.4 Support industry's effective engagement with the community (producer only - no feedlots or processors - distributed across Workshops 6 & 7)	1,039	1,293	1,278	1,362	1,217	923	1,044	960	814	988	5,392	5,525
MLA Donor Company projects	0	0	0	0	0	0	0	0	0	57	0	57
Overheads (Corporate Services / Communications)	1,177	1,306	1,316	1,287	928	672	829	802	602	932	4,852	4,999
TOTAL	14,456	14,687	16,339	14,377	11,692	8,437	9,787	9,926	6,730	9,546	59,003	56,973
4.2 Support off-farm environmental sustainability												
4.2 Support off-farm environmental sustainability (12/13, 13/14, 14/15)	0	0	0	0	2,096	1,009	2,294	1,391	930	1,027	5,320	3,427
4.1 Ensuring sustainability and demonstrating environmental stewardship (10/11, 11/12, processor elements only)	430	219	932	731	0	0	0	0	0	0	1,362	950
4.2 Responding to climate change (10/11, 11/12, processor elements only)	1,050	633	464	516	0	0	0	0	0	0	1,514	1,149
3.4 Improving animal health and biosecurity (10/11, 11/12, processor elements only)	0	0	140	37	140	43	0	0	0	0	280	80
4.3 Continued improvement in animal welfare	80	18	54	21	54	21	0	0	0	0	188	60

Budgets by Program	\$,000		\$,000		\$,000		\$,000		\$,000		\$,000	
	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
(10/11, 11/12, processor elements only)												
5.1 Increasing adoption of innovation (10/11, 11/12, processor elements only)	711	291	449	625	0	0	0	0	0	0	1,160	916
5.3 Building industry innovation capability (10/11, 11/12, processor elements only)	50	193	189	239	0	0	0	0	0	0	239	432
4.4 Support industry's effective engagement with the community (processor elements only)	137	133	146	143	146	136	146	130	146	108	721	650
MLA Donor Company projects	0	574	0	1,504	0	921	0	1,996	0	1,081	0	6,075
Overheads (Corporate Services / Communications)	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	2,457	2,061	2,374	3,815	2,436	2,130	2,440	3,516	1,076	2,216	10,784	13,739
4.3 Provide industry with solutions to meet high standards of animal welfare without reducing productivity levels												
4.3 Provide industry with solutions to meet high standards of animal welfare without reducing productivity levels (producer elements only - no feedlots or processors)	1,122	393	984	304	1,152	1,553	1,762	1,791	1,474	1,368	6,494	5,408
3.5 Increase producer engagement with MLA tools and information to support productivity (12/13, 13/14, 14/15, producer elements only - no feedlots or processors - apportioned across programs)	0	0	0	0	422	494	576	566	578	445	1,576	1,506
5.1 Increasing adoption of innovation (10/11, 11/12, producer elements only - no feedlots or processors - apportioned across programs)	313	100	250	63	0	0	0	0	0	0	564	163
5.3 Building industry innovation capability (10/11, 11/12, producer elements only - no feedlots or processors - apportioned across programs)	77	19	64	6	0	0	0	0	0	0	141	25
4.4 Support industry's effective engagement with the community (producer only - no feedlots or processors - distributed across Workshops 6 & 7)	777	568	709	584	771	1,011	898	871	1,024	584	4,179	3,619

Budgets by Program	\$,000		\$,000		\$,000		\$,000		\$,000		\$,000	
	2010-11		2011-12		2012-13		2013-14		2014-15		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
MLA Donor Company projects	0	0	0	125	0	364	0	1,504	0	545	0	2,539
Overheads (Corporate Services / Communications)	306	147	233	126	224	312	311	316	314	283	1,388	1,183
TOTAL	2,595	1,226	2,240	1,208	2,568	3,734	3,547	5,049	3,390	3,225	14,341	14,442
4.5 Develop sustainable innovation capability within the industry and its service providers												
4.5 Develop sustainable innovation capability within the industry and its service providers (12/13, 13/14, 14/15)	0	0	0	0	1,758	2,318	2,786	3,378	5,296	4,227	9,840	9,923
5.2 Working with industry to attract, develop and retain world-class people (10/11, 11/12)	2,707	1,694	2,074	1,462	0	0	0	0	0	0	4,781	3,157
MLA Donor Company projects	0	1,609	0	1,280	0	278	0	1,849	0	2,773	0	7,790
Overheads (Corporate Services / Communications)	159	165	144	137	80	105	88	100	118	112	589	619
TOTAL	2,866	3,469	2,218	2,880	1,838	2,701	2,874	5,328	5,414	7,111	15,210	21,489
TOTAL - Supporting industry integrity and sustainability	22,374	21,443	23,172	22,280	18,535	17,003	18,647	23,819	16,611	22,099	99,338	106,644
MLA Donor Company												
5.2 MLA Donor Company (R&D partnerships)	22,000	N/A	30,000	N/A	22,000	N/A	24,000	N/A	28,000	N/A	126,000	N/A
TOTAL - MLA Donor Company	22,000	included above	30,000	included above	22,000	included above	24,000	included above	28,000	included above	126,000	included above
GRAND TOTAL	180,091	166,520	196,552	170,965	181,330	165,826	183,187	181,106	186,357	179,548	927,517	863,965

B Workshop attendees

Workshop # 1 — Beef marketing

- Workshop programs (based on 2014-15 AOP)
 - 2.2 Enhance the nutritional reputation of beef
 - 2.3 New products
 - 2.4 Aggressive promotion of beef in the domestic market
 - 2.6 Aggressive promotion in export markets — beef
 - 5.1 AUS-MEAT
- Workshop attendees
 - Mark Ellison (Teys)
 - Ray Kelso (Retail butcher/AMIC)
 - Andrew Moore (Rangers Valley)
 - Peter Greenham (Greenhams)
 - Sam Reilly (Sangers)
 - Kate Brabin (Certified Angus Group)
 - Lachlan Bowtel (Woolworths)
 - Jo Goddard (Millward Brown)
 - Alistair Allen (Millward Brown)
 - Andrew McDonald (NH Foods)
 - Russel Rankin (Food Innovation Partners)
 - Brenden Tatt (JBS)
 - John Webster (AgStrat, Chair)
 - Peter Barnard (Oliver & Doam)
 - Derek Quirk (CIE)
 - Terry Longhurst (MLA)
 - Michael Finucan (MLA)
 - Duncan Veal (MLA)
 - Michael Lee (MLA)
 - Lisa Sharp (MLA)

- Andrew Howie (MLA)
- Sam Jamieson (MLA)
- Veronique Droulez (MLA)
- Tertia Dippenaar (MLA)
- Workshop date: 16 November 2015

Workshop # 2 Sheepmeat marketing

- Workshop programs (based on 2014-15 AOP)
 - 2.2 Enhance the nutritional reputation of beef and lamb sheepmeat (part)
 - 2.5 Aggressive promotion of sheepmeat in the domestic market
 - 2.7 Aggressive promotion of sheepmeat in export markets
 - 5.1 AUS-MEAT
- Workshop participants
 - Jeff Murray (SCA)
 - Brad DeLuca (JBS)
 - Greg Darwell (Mulwarra)
 - Craig Burgess (Top Cut)
 - Jo Goddard (Millward Brown)
 - Alistair Allen (Millward Brown)
 - Lachlan Bowtell (Woolworths)
 - Paul Ibbotson (Sanger)
 - Brett Slade (Oasis)
 - Kevin Cottrill (AMIC)
 - John Webster (AgStrat, Chair)
 - Peter Barnard (Oliver & Doam)
 - Derek Quirke (CIE)
 - Terry Longhurst (MLA)
 - Rob Barker (MLA)
 - Andrew McCallum (MLA)
 - Tertia Dippenaar (MLA)
 - Sam Jamieson (MLA)
 - Veronique Droulez (MLA)
 - Andrew Howie (MLA)

- Workshop date: 18 November 2015

Workshop # 3 Off-farm efficiency and environmental sustainability

- Workshop portfolios (based on 2014-15 AOP)
 - 3.2 Identify and deliver opportunities to increase off-farm productivity and capability
 - 2.3 Support off-farm sustainability
- Workshop participants
 - Graham Treffore (JBS)
 - Mike Johns (Consultant)
 - John McGueren (AMPC)
 - Nekta Nicolau (TFI)
 - Liam McNamara (Teys)
 - John Webster (AgStrat, Chair)
 - Peter Barnard (Oliver & Doam)
 - Derek Quirk (CIE)
 - Terry Longhurst (MLA)
 - Christine Pitt (MLA)
 - Duncan Veal (MLA)
 - George Waldthausen (MLA)
 - Christian Ruberg (MLA)
- Workshop date: 20 November 2015

Workshop # 4 On-farm productivity (and adoption)

- Workshop programs (based on 2014-15 AOP)
 - 3.1 Identify and deliver opportunities to increase on-farm productivity (excluding animal genetics and feedlot productivity)
 - 3.5 Increase producer engagement with MLA tools and information to support productivity
- Workshop attendees
 - Mike Stephens (Meridian Agriculture)
 - Jason Trompf (Industry Consultant)

- Angus Hobson (RMAC)
- Ralph Shannon (SAMRC)
- Lee Fitzpatrick (NABRC)
- Erin Gorter (WALRC)
- Jim Shovelton (Industry Consultant)
- Phil Holmes (Industry Consultant)
- Brett Hall (CCA)
- Simon Vogt (Rural Directions)
- Geoff Neithe (Industry Consultant)
- John Webster (AgStrat, Chair)
- Peter Barnard (Oliver & Doam)
- Derek Quirke (CIE)
- Ian Johnsson (ISJ Investments)
- Terry Longhurst (MLA)
- Julie Petty (MLA)
- Alex Ball (MLA)
- Cameron Allan (MLA)
- Richard Apps (MLA)
- Irene Sobotta (MLA)
- Nigel Tomkins (MLA)
- Jane Weatherly (MLA)
- Matt McDonagh (MLA)
- Workshop date: 25 November 2015

Workshop # 5 On-farm animal health and welfare

- Workshop programs (based on 2014-15 AOP)
 - 3.4 Support industry to improve animal health and biosecurity
 - 4.3 Provide industry with solutions to meet high standards of animal welfare without reducing productivity levels
 - 3.5 Increase producer engagement with MLA tools and information to support productivity (part)
 - 4.4 Support industry's effective engagement with the community (part)
- Workshop participants

- Andrew Fisher (University of Melbourne)
- Justin Toohey (Consultant to CCA)
- Kevin de Witte (AHA)
- Geoff Niethe (MLA consultant)
- Bruce Watt (Sheepmeat Council Australia)
- Heidi Reid (Sheepmeat Council Australia)
- Geoff Lindon (AWI)
- Enoch Bergmann (Swans Veterinary Services)
- Richard Shephard (Herd Health)
- Drew Ferguson (CSIRO)
- Bruce Allworth (Charles Sturt University)
- Sam McCullough (CSIRO)
- John Webster (AgStrat Associates, chair)
- Peter Barnard (Oliver & Doam)
- Derek Quirke (CIE)
- Ian Johnsson (ISJ Investments)
- Terry Longhurst (MLA)
- Matthew McDonagh (MLA)
- Jim Rothwell (MLA)
- Johann Schroder (MLA)
- Des Rinehart (MLA)
- Marine Empson (MLA)
- Clair Cameron (MLA)
- Anna Bradley (MLA)
- Workshop date: 27 November 2015

Workshop # 6 On-farm environmental sustainability

- Workshop programs (based on 2014-15 AOP)
 - 4.1 Support on-farm environmental sustainability (excluding feedlots)
 - 3.5 Increase producer engagement with MLA tools and information to support productivity (part)
 - 4.4 Support industry's effective engagement with the community (part)
- Workshop participants

- Nicholas Newland (Rabbit Free Australia)
- Paul Martin (UNE)
- Cam Nicholson (Industry Consultant)
- Richard Eckard (university of Melbourne)
- Michael Friend (CSU)
- Russell Pattinson (Industry Consultant)
- Jim Shovelton (Meridian Agriculture)
- John Tracey (NSW DPI)
- Greg Mifsud (Invasive Animals CRC)
- Geoff Neithe (Consultant to MLA)
- Andy Shepherd (CSIRO)
- Bob Shepherd (QLD DAF)
- Tony Hegardy (CCA)
- Marie Vitelli (Agforce QLD)
- Robyn Cowley (NT DPI)
- John Webster (AgStrat, Chair)
- Peter Barnard (Oliver & Doam)
- Derek Quirke(CIE)
- Ian Johnsson (ISJ Investments)
- Terry Longhurst (MLA)
- Des Rinehart (MLA)
- Cameron Allan (MLA)
- Irene Sobotta (MLA)
- Matthew McDonagh (MLA)
- Claire Stanwick (MLA part of meeting)
- Tom Davison (MLA by phone for part of meeting)
- Workshop date: 30 November 2015

Workshop # 7 Live exports

- Workshop programs (based on 2014-15 AOP)
 - 1.3 Maximise market options for producers and exporters in the livestock export market
- Workshop attendees

- Geoff Pearson (CCA)
- David Kennedy (AUSVET, LGAP Standards Committee)
- Peter Kane (ALEC)
- Alison Penfold (ALEC)
- Peter Schuster (Industry consultant)
- Kate Joseph (SMC)
- Steve Meerwald (Industry consultant)
- Richard Trivett (AUSTREX)
- Sam Brown (LiveCorp)
- Terry Enwright (LiveCorp)
- Wayne Collier (LiveCorp)
- John Webster (AgStrat, Chair)
- Peter Barnard (Oliver & Doam)
- Derek Quirke (CIE)
- Terry Longhurst (MLA)
- Des Rinehart (MLA)
- Rashelle Levonian (MLA)
- Peter Dundon (MLA)
- Allister Lugsdin (MLA)
- Sharon Dundon (MLA)
- Workshop date: 2 December 2015

Workshop # 8 Eating quality

- Workshop programs (based on 2014-15 AOP)
 - 2.1 Develop practices and drive programs that help industry deliver consistent and optimal eating quality
- Workshop participants
 - David Hill (CCA)
 - Lachie Hart (Stockyard Beef)
 - Paul Wightman (JBS)
 - Alexander McLachlan (SMC)
 - Kate Joseph (Sheepmeat Council of Australia)
 - Paul Saward (CCA)

- Christian Mulders (AMIC)
- Paul Wightman (JBS)
- Graham Gardner (Murdoch University)
- Dave Pethick (Murdoch University)
- Mark Inglis (JBS)
- John Thompson (Industry Consultant)
- Rod Polkinghorne (Industry Consultant)
- John Webster (AgStrat, Chair)
- Peter Barnard (Oliver & Doam)
- Derek Quirke(CIE)
- Terry Longhurst (MLA)
- Alex Ball (MLA)
- Jane Weatherly (MLA)
- Michael Crowley (MLA)
- Alana McEwan(MSA)
- Terry Farrell (MSA)
- Janine Lau (MSA)
- Sarah Strahan (MSA)
- Workshop date: 4 December 2015

Workshop # 9 Market information and compliance

- Workshop programs (based on 2014-15 AOP)
 - 3.3 Deliver valued supply chain and market information
- Workshop participants
 - Russel Pattinson (Miracle Dog)
 - Rob Davidson (WAMMCo)
 - Angus Gidley-Baird (Rabobank)
 - Jenianne Hall (Mercado)
 - Winfred Perkins (ProAnd Australia)
 - Dougal Gordon (ALFA)
 - Jon Condon (Beef and Sheep Central)
 - Peter Greenham (Greenhams)
 - Mark Harvey-Sutton (SCA)

- Troy Setter (Consolidated Pastoral Company) by phone
- Rod Polkinghorne (Industry consultant)
- Peter Hall (CCA)
- Mark Inglis (JBS)
- David Rutley (TFI)
- John Webster (AgStrat, Chair)
- Derek Quirke (CIE)
- Peter Barnard (Oliver & Doam)
- Terry Longhurst (MLA)
- Jo Quigley (MLA)
- Ben Thomas (MLA)
- Clair Cameron (MLA)
- Alex Gash (ACIL Allen)
- Workshop date: 7 December 2015.

Workshop # 10 Feedlot programs: productivity, animal health and welfare and environment

- Workshop programs (based on 2014-15 AOP)
 - 3.1 Identify and deliver opportunities to increase on-farm productivity (feedlots only)
 - 3.4 Support industry to improve animal health and biosecurity (feedlots only)
 - 3.5 Increase producer engagement with MLA tools and information to support productivity (feedlots only)
 - 4.1 Support on-farm environmental sustainability (feedlots only)
 - 4.3 Provide industry with solutions to meet high standards of animal welfare without reducing productivity levels (feedlots only)
 - 4.4 Support industry's effective engagement with the community (feedlots only)
- Workshop participants
 - Scott Braund (Mort & Co)
 - Grant Garey (Teys)
 - Tony Batterham (Quirindi Feedlot Services)
 - Dougal Gordon (ALFA)
 - Peter Watts (FSA Consulting)
 - Matthew George (Bovine Dynamics)

- Jim Cudmore (ALFA)
- Tess Herbert (Gundamain Feedlot)
- James Palfreeman (JBS)
- Chris Fenwick (Nippon Meats)
- John Webster (AgStrat, Chair)
- Peter Barnard (Oliver & Doam)
- Derek Quirke (CIE)
- Terry Longhurst (MLA)
- Des Rinehart (MLA)
- Joe McMeniman (MLA)
- Amanda McAlpine (MLA)
- Workshop date: 9 December 2015

Workshop # 11 Goat Industry

- Major areas of MLA work considered by the Workshop in terms of impact on the goat industry (based on 2014-15 AOP)
 - 2.5 Aggressive promotion in the domestic market (part)
 - 2.7 Aggressive promotion in export markets (part)
 - 3.1 Identify and deliver opportunities to increase on-farm productivity (part)
 - 3.4 Support industry to improve animal health and biosecurity (part)
 - 3.5 Increase producer engagement with MLA tools and information to support productivity (part)
- Workshop participants (by phone)
 - Rick Gates (GICA)
 - Jon Mander (SAMEX)
 - Colin Ramsay (Dudauman Park)
 - Campbell McPhee (Western Meat Exporters)
 - Fiona Lander (Capricorn Pastoral)
 - Matt Young (Industry consultant)
 - John Webster (AgStrat, Chair)
 - Peter Barnard (Oliver & Doam)
 - Derek Quirke (CIE)
 - Ian Johnsson (ISJ Investments)

- Terry Longhurst (MLA)
- Julie Petty (MLA)
- Samantha Jamieson (MLA)
- Majella Fernando (MLA)
- Allister Lugsdin (MLA)
- Plus comments from Bob Crouch (GICA)
- Workshop date: 14 December 2015.

C Summary of key model inputs

The report *‘Impact Assessment of MLA Expenditure 2010-11 to 2014-15’* contains significant detail on:

- the outcomes of a series of workshops held with industry that were focussed on quantifying the impact of MLA’s programs in the period 1 July 2010 to 30 June 2015 (the Evaluation Period)
- How the Consulting Team have used the workshop outcomes and other information in economic modelling designed to measure return on investment of MLA programs during the Evaluation Period..

This report provides further information on the parameters used in the economic models.

Overview of key model inputs

Table 1 below summarises the simulations conducted to assess the impact of MLA’s programs during the Evaluation Period.

Table 1 is arranged into major areas under which impacts were aggregated. These major areas mostly align with the 2-digit codes of MLA’s Annual Operating Plan (AOP) 2014-15. In a small number of cases, however, exact alignment does not occur:

- For domestic market impacts *MLA Program 2.2 Enhance the nutritional reputation of beef and lamb* was combined with *Program 2.4 Aggressive promotion of beef in the domestic market* (for beef impact) and *Program 2.5 Aggressive promotion of lamb in the domestic market* (for lamb impact).
- Outcomes and expenditures on *Program 3.5 Increase producer engagement with MLA tools and information to support productivity* were assigned to *Program 3.1 Identify and deliver opportunities to increase on-farm productivity*, *Program 3.4 Support industry to improve animal health and biosecurity*, *Program 4.1 Support on-farm environmental sustainability* and *Program 4.3 Provide industry with solutions to meet high standards of animal welfare without reducing productivity levels* — with costs proportionately distributed based on relative levels of expenditure in Programs 3.1, 3.4, 4.1 and 4.3.
- Outcomes and expenditures on *Program 5.1 AUS-MEAT* were combined with domestic and export marketing programs for impact measurement purposes (that is, the beef elements of *Program 5.1 AUS-MEAT* were combined with *Program 2.4 Aggressive promotion of beef in the domestic market* and *Program 2.6 Aggressive promotion in export markets – beef* and the sheepmeat elements were combined with *Program 2.5 Aggressive promotion of lamb in the domestic market* and *Program 2.7 Aggressive promotion in export markets – Sheepmeat*).

- Outcomes and expenditures on *Program 4.4 Support industry's effective management with the community* were assigned to *Program 4.1 Support on-farm environmental sustainability* and *Program 4.3 Provide industry with solutions to meet high standards of animal welfare without reducing productivity levels* – with costs proportionately distributed based on relative levels of expenditure in Programs 4.1 and 4.3.
- Impacts achieved and expenditure incurred under *Program 5.2 MLA Donor Company* were distributed across other relevant MLA 2 digit program codes. For instance, if an MLA Donor Company project related to off farm productivity the impacts and expenditures of this project were considered under *Program 3.2 Identify and deliver opportunities to increase off-farm productivity and capability*.
- In terms of impact assessment for feedlots and goats activities scattered across a range of programs (*Program 3.1 Identify and deliver opportunities to increase on-farm productivity*, *Program 3.4 Support industry to improve animal health and biosecurity*, *Program 3.5 Increase producer engagement with MLA tools and information to support productivity*, *Program 4.1 Support on-farm environmental sustainability*, *Program 4.3 Provide industry with solutions to meet high standards of animal welfare without reducing productivity levels* and *Program 4.4 Support industry's effective engagement with the community*) were considered in combination for that sector.

For each aggregated impact category, Table 1 contains descriptions of component simulations required to quantify the impact. The number of individual simulations required depended on:

- the combination of impacts to be quantified and the capacity for these to be aggregated
- different probabilities or levels of adoption that are applied to impact components
- the nature of the impact — either *Mitigating Industry downside threat* or *Industry upside opportunity*.

Information on the timeframe used in the analysis of each impact component is also to be found in Table 1. The timeframe defines the years over which benefits are accrued and any implementation costs are incurred.

Finally, table C.1 contains information on how, in general terms, the impact was specified in a modelling sense — in terms of either a demand shift (for example through higher prices being realised or greater quantities being demanded) or a supply shift (for example productivity improvements at various points along the supply chain).

28.2 Overview of simulations conducted for MLA Impact Assessment

#	AOP 2 digit level and major areas of model analysis	Upside / downside	Summary of application to GMI / IF model system ^a	Timeframe of analysis	Integrated framework component	
					Value chain model	GMI
#1 Market access						
1.1 Product Integrity						
1.	— Premiums from Integrity Systems	Upside	Demand shift — increase in average export price of beef, lamb, mutton and goat meat received using information from previous studies.	2011-30	Yes	Yes
2.	— Reductions in costs incurred in the event of a disease outbreak	Downside	Reductions in expected losses from major disease outbreaks (FMD and BSE) — derived from previous studies.	2011-30	Yes	No
1.2 Market access						
3.	— Reduction in economic barriers	Upside	Demand shift — increase in average export prices for beef, lamb, mutton and goat meat brought about by improvements in market access (using actual negotiated increases in market access and an attribution factor for the work of MLA).	2015-30	Yes	Yes
1.3 Live Export Portfolio (see table below for detail)						
4.	— Cattle exports to Indonesia	Downside	Demand shift — increase in quantity of live cattle exported to Indonesia due to LEP assistance in meeting ESCAS obligations (derived from workshop input).	2012-18	Yes	Yes
5.	— Cattle exports to Vietnam	Downside	Demand shift — increase in quantity of live cattle exported to Vietnam due to LEP assistance in meeting ESCAS obligations (derived from workshop input).	2012-20	Yes	Yes
6.	— Sheep exports to Middle East	Downside	Demand shift — increase in quantity of live sheep exported to the Middle East due to LEP assistance in meeting ESCAS obligations	2012-20	Yes	Yes

#	AOP 2 digit level and major areas of model analysis	Upside / downside	Summary of application to GMI / IF model system ^a	Timeframe of analysis	Integrated framework component	
					Value chain model	GMI
			(derived from workshop input).			
	7. – Goat exports to Malaysia	Downside	Demand shift – increase in quantity of live goats exported to Malaysia due to LEP assistance in meeting ESCAS obligations (derived from workshop input).	2012-20	Yes	No ^c
	8. – R&D to reduce on-board sheep mortalities	Up	Demand shift – increase in average return from live sheep exported due to a reduction in on board sheep mortalities brought about by MLA research (derived from workshop input / previous research).	2017-30	Yes	Yes
	9. – Improved market access (general) and reduced compliance costs	Upside	Demand shift – increase in average returns brought about by improvements in market access and reduced compliance costs (compared to counterfactual) – derived from workshop input.	2015-30 2017-30	Yes	Yes
#2 Growing Demand						
2.1 Eating Quality						
	10. – Cattle and sheep numbers graded and associated premiums	Upside	Demand shift – increase in value received for grass and grain fed beef and lamb due to MLA MSA activities (derived from workshop input and information supplied by MLA).	2011-30	Yes	No
	11. – Averting decline in eating quality of lamb	Downside	Demand shift – shift in demand and price for lamb relative to counterfactual (derived from workshop input and information supplied by MLA).	2013-21	Yes	No
2.3 New products						
	12. – Value adding in beef and lamb processing	Upside	Productivity improvement: increase in net value of output given	2011-30	Yes	No

#	AOP 2 digit level and major areas of model analysis	Upside / downside	Summary of application to GMI / IF model system ^a	Timeframe of analysis	Integrated framework component	
					Value chain model	GMI
			the same level of all inputs including livestock (derived from workshop input).			
	2.4 and 2.2 Beef domestic marketing and nutrition					
	13. – Domestic marketing	Downside	Demand shift – increase in value of expenditure for domestic market estimated from a consideration by workshop participants of the degree that MLA domestic marketing activities during the Evaluation Period prevented further falls in demand.	2011-16	Yes	Yes
	2.5 and 2.2 Lamb domestic marketing and nutrition					
	14. – Domestic marketing	Downside	Demand shift – increase in value of expenditure for domestic market estimated from a consideration by workshop participants of the degree that MLA domestic marketing activities during the Evaluation Period prevented further falls in demand.	2011-17	Yes	Yes
	2.6 Beef export marketing					
	15. – Upside export markets	Upside	Demand shift – increase in value of expenditure by individual export market estimated by workshop participants to be as a result of MLA activities.	2011-16	Yes	Yes
	16. – Downside export markets	Downside	Demand shift – prevention of further falls in export sales to some markets estimated by workshop participants to be as a result of MLA activities.	2011-18	Yes	Yes
	2.7 Sheepmeat export marketing					
	17. – Upside export markets	Upside	Demand shift – increase in value of expenditure by individual export market estimated by workshop participants to be as a	2011-17	Yes	Yes

#	AOP 2 digit level and major areas of model analysis	Upside / downside	Summary of application to GMI / IF model system ^a	Timeframe of analysis	Integrated framework component	
					Value chain model	GMI
			result of MLA activities.			
	18. – Downside export markets	Downside	Demand shift – prevention of further falls in export sales to some markets estimated by workshop participants to be as a result of MLA activities.	2011-17	Yes	Yes
#3 Increasing Productivity						
3.1 Increasing Productivity On-farm (including 3.5 producer engagement)						
	19. – Animal Genetics	Upside	Productivity improvement at farm level <ul style="list-style-type: none"> ▪ increase in value of output for the same level of inputs ▪ insufficient information for distribution along chain (derived from extensive consultation with relevant researchers and consideration by the Evaluation Team of previous studies).	2017-30	Yes	No
	20. – On-farm productivity R&D	Upside	Productivity improvement at farm level including increased costs where appropriate <ul style="list-style-type: none"> ▪ See table 2 for details on components (derived from workshop input, extensive additional consultation with relevant workshop participants and consideration by the Evaluation Team of previous research).	2015-30	Yes	No
	21. – On-farm productivity extension	Upside	Productivity improvement at farm level (derived from workshop input and information supplied by MLA)	2011-30	Yes	No
3.2 Off-farm productivity						

#	AOP 2 digit level and major areas of model analysis	Upside / downside	Summary of application to GMI / IF model system ^a	Timeframe of analysis	Integrated framework component	
					Value chain model	GMI
	22. – Processing efficiency	Upside	Industry specific productivity shifters including: <ul style="list-style-type: none"> ▪ Yield increases (productivity improvement on meat production) ▪ Labour savings (reduction in per unit labour cost) ▪ Throughput savings (reduction in other costs) (derived from workshop input following consideration of evaluation information supplied by MLA).	2011-25	Yes	No
3.3 Market information						
	23. – Market Information and policy	Upside	Reduction in the industry costs: distributed along the red meat value chain, in proportion to sector costs (derived from workshop input).	2011-30	Yes	No
	24. – Livestock Data Link	Downside	Productivity improvement: increased value of farm-level southern cattle and sheep realised as a result of improved compliance (derived from workshop input).	2012-15	Yes	No
3.5 On-farm animal health and biosecurity						
	25. – On-farm productivity animal health	Upside	Productivity improvement at farm level including increased costs where appropriate <ul style="list-style-type: none"> ▪ See table 3 for details on components 	2011-30	Yes	No
	26. – Improved FMD diagnostics and regional capability	Downside	<ul style="list-style-type: none"> ▪ See table 3 for details on components 	2010-30	Yes	No
Feedlot programs: productivity, health, welfare and environment.						
	27. – Improvements in industry TFP and specific enhancements	Upside	Increase in productivity and reduction in costs <ul style="list-style-type: none"> ▪ See table 4 for details on components 	2011-30	Yes	No

#	AOP 2 digit level and major areas of model analysis	Upside / downside	Summary of application to GMI / IF model system ^a	Timeframe of analysis	Integrated framework component	
					Value chain model	GMI
	28. – Reduction in regulatory costs	Downside	Reduction in industry costs ▪ See table 4 for details on components	2011-15	Yes	No
	Goat Industry					
	29. – Goat Industry productivity and expansion	Upside	Increase in industry goat slaughter and live export (derived from workshop input)	2011-19	Yes	No
	#4 Industry Integrity and Sustainability					
	4.1 On-farm environmental sustainability					
	30. – GHG mitigation and ERF Methodology	Upside	Increase in farm-level revenue for northern cattle ▪ See table 5 for details on components	2023-30	Yes	No
	31. – Northern Grazing Land Management and Rabbit Control with RHD	Downside	Reduction in costs (avoided) for farm level industries ▪ See table 5 for details on components	2015-30	Yes	No
	4.2 Off-farm environmental sustainability					
	32. – CALs and energy efficiency projects	Downside	Reduction in operational costs for processing sector (derived from workshop input following consideration of evaluation information supplied by MLA).	2014-30	Yes	No
	4.3 On-farm animal welfare					
	33. – Reduction in transport times and MLA's community engagement on animal welfare	Downside	Increase in Reduction in costs (avoided) for on-farm sectors ▪ See table 6 for details on components	2015-30	Yes	No

#	AOP 2 digit level and major areas of model analysis	Upside / downside	Summary of application to GMI / IF model system ^a	Timeframe of analysis	Integrated framework component	
					Value chain model	GMI
	4.5 Sustainable Innovation Capability					
	– no quantification					

^a In the first round, relative to counterfactual or without MLA investment scenario. ^b Time over which benefits are assumed to flow including decay .For example, 2011-30 is 2010-11 to 2029-30. ^c Live goat exports not included in GMI model.

Product integrity

MLA's *Program 1.1 Develop and deliver industry systems that underpin product integrity* was evaluated by examining impact in two areas:

- Price premiums achieved in overseas markets by maintaining world leading meat safety and integrity systems
- Reductions in expected costs in the event of a major (emergency) disease outbreak.

The report *'Impact Assessment of MLA Expenditure 2010-11 to 2014-15'* contained a significant level of detail on the assessment approach used in each of these areas. Below is some additional information.

Integrity systems

Using information from the MISP, price premiums in some global markets were assumed to have arisen from industry investment in meat safety and product integrity systems. Compare to the counterfactual the price premiums assumed from MLA's investment in integrity systems during the Evaluation Period were conservatively assumed to be quite minor — beginning at a price premium of just 0.03 per cent in 2011 and expanding to a price premium of about 0.4 per cent by 2030. The following additional assumptions were made in application of these price premiums across markets and species:

- applied to meat products only
 - any benefits applicable to the live trade were captured in the Live Exports portfolio
- applied to developing markets *only*
 - That is, markets were excluded where Australia does not compete head-on with other suppliers for which we earn a premium for the same product, such as Brazil and India. These include Japan, Korea and the United States.

This difference in prices received, due to MLA investments in product integrity, was applied to the Integrated Framework as an equivalent demand shift across markets other than Japan, Korea and the United States.

Livestock traceability/Disease-free status

The second area of benefit from MLA's investment in product integrity systems was identified as reductions in expected costs in the event of an emergency disease outbreak. These reductions in costs arise from improvements in livestock traceability – from an average traceability level of 65 per cent in the case of traditional mob based systems to traceability levels of 97 per cent for cattle and 90 per cent for sheep under NLIS. Continued investment is required by MLA to maintain the NLIS infrastructure.

Table C.2 sets out the key parameters used in the analysis and discussed in the report.

C.2 Key parameters used for the benefits of maintaining Australia's disease-free status

		Without MLA investment	With MLA investment
Traceability	%	65	Cattle=97, Sheep=90
Total outbreak costs^a			
FMD in 2010-11	\$ billion	88.8	42.8
BSE in 2010-11	\$ billion	7.0	4.2
Total	\$ billion	95.8	47.0
Duration of outbreak over which costs incurred			
FMD	years	15.0	10.0
BSE	years	4.5	3.0
Probability of outbreak in 2014-15			
FMD	%	0.60	0.60
BSE ^a	%	0.21	0.21
FMD: Expected losses by species^a			
Beef	\$ billion	67.4	32.5
Sheep	\$ billion	20.5	9.9
Goats	\$ billion	0.9	0.4
Total red meat	\$ billion	88.8	42.8
BSE : Expected losses by species^a			
Beef	\$ billion	7.0	4.2
Sheep	\$ billion	0.0	0.0
Goats	\$ billion	0.0	0.0
Total red meat	\$ billion	7.0	4.2

^a Net present value terms over outbreak duration. ^b Probability in 2015, in 2011 assumed to be 0.4% declining to 0.2% by 2030.

Source: Consultant Team, Beutre et al (2013).

Table C.3 takes these inputs to quantify the expected annual benefits from MLA investments over the period 2010-11 to 2014-15. This involved a number of steps:

- adjusting the expected losses from an outbreak, over the duration of the outbreak and subsequent regaining of market access, in line with the value of the industry (in nominal terms)
- annualising the expected losses based on a discount rate of 5 per cent and the expected duration of the outbreak as shown in table **Error! Reference source not found.**

C.3 Quantifying benefits of maintain Australia's disease-free status

	2010-11	2011-12	2012-13	2013-14	2014-15	2019-20	2029-30
Expected losses in annual terms							
65 % traceability							

		2010-11	2011-12	2012-13	2013-14	2014-15	2019-20	2029-30
FMD	\$ million	51.3	54.8	49.4	65.3	82.3	97.4	121.0
BSE	\$ million	7.1	6.4	4.9	5.6	6.0	3.2	0.8
97 % traceability								
FMD	\$ million	33.3	35.5	32.0	42.3	53.3	63.1	78.4
BSE	\$ million	6.1	5.6	4.3	4.8	5.2	2.8	0.7
Total industry GVP benefits to MLA (difference between 97 and 65% traceability)								
FMD	\$ million	18.1	19.3	17.4	23.0	29.0	34.3	42.6
BSE	\$ million	0.9	0.8	0.6	0.7	0.8	0.4	0.1
Total	\$ million	19.0	20.2	18.1	23.7	29.8	34.7	42.7
Total benefit by species								
Beef	\$ million	14.4	15.3	13.7	18.0	22.6	26.4	32.4
Sheep	\$ million	4.4	4.6	4.2	5.5	6.9	8.0	9.8
Goats	\$ million	0.2	0.2	0.2	0.2	0.3	0.3	0.4
Total	\$ million	19.0	20.2	18.1	23.7	29.8	34.7	42.7
Annual cost avoided as a proportion of Industry GVP								
Beef	%	0.15	0.15	0.15	0.15	0.14	0.14	0.14
Sheep	%	0.12	0.12	0.13	0.12	0.14	0.12	0.12
Goats	%	0.12	0.12	0.10	0.10	0.10	0.09	0.07
Total	%	0.14	0.14	0.14	0.14	0.14	0.14	0.14

^a Cumulative losses over the expected duration of an outbreak has been annualised using an interest rate of 5 per cent in real terms
Source: Consultant Team

- calculating the benefit attributable to industry investments by calculation of the difference in avoided losses between 97 and 65 per cent traceability.

Table C.3 shows that across the red meat industry, this is equivalent to around 0.14 per cent of industry gross value of production.

Market access

The draft report identified the key improvements in market access for the red meat industry over the Evaluation Period to include:

- the ASEAN-Australia-New Zealand FTA
- the Korea-Australia FTA (KAFTA)
- the Japan-Australia Economic Partnership Agreement (JAEPA).
- China FTA
- Trans-Pacific Partnership (TPP) – this was concluded subsequent to the Evaluation Period, but much of the work on meat occurred during the Evaluation Period.

In summary, the following summarises improvements in market access under these agreements:

- Japanese beef — average tariff falls from 38.5 to 22.5 per cent by 2030 while safeguard volumes increase from 300 to 370 kt product weight with a penalty tariff of 38 per cent (including transition to TPP arrangements)
 - No change in zero sheepmeat tariffs
- Korean beef — average tariff falls from 40 to 0 per cent by 2028 while safeguard volumes increased from 155 to 204 kt product weight with a penalty tariff of 24 per cent.
- China beef — average tariffs are phased out from 13 per cent by 2023 while safeguard levels increase from 170 to 249 kt product weight at a penalty tariff of 12 per cent
 - Sheep and goat meat — average tariffs are phased out from 15% by 2022
- Trans Pacific Partnership
 - Japanese beef — all tariffs are phased to 9% by 2030 with elimination of safeguards.
 - Canadian beef — phase-out of over-quota tariffs by 2020.
 - Mexican beef — phase-out of 25 per cent tariffs by 2020
 - Peru beef and sheepmeat — phase-out of 13 and 6 per cent tariffs by 2027

These impacts from these agreements (which entail reduction in tariffs and safeguard quotas) had been previously simulated using the Global Meat Industries (GMI) model – the results from this work are to be found in the report *'An evaluation of MLA's market access program - An update of the evaluation conducted in 2007'*.⁶⁷

The assumed attribution to MLA of the market access outcomes achieved is shown in table C.4

C.4 Attribution to MLA for Market Access outcomes

		Beef	Sheepmeat	Total
JAEPA	%	20	20	20
KAFTA	%	30	30	30
China FTA	%	30	30	30
AANZFTA	%	20	20	20
TPP	%	20	20	20

Source: Consultant Team.

Table C.5 shows the output from the GMI model and indicates the relative size and timeframe of the benefits that flow from the improved market access.

⁶⁷ Centre for International Economics 2014, *An evaluation of MLA's market access program: An update of the evaluation conducted in 2007*, September.

C.5 Increase in industry GVP from GMI model applied to Integrated Framework

Year		Red meat				Live exports			
		Grass fed beef	Grain fed beef	Lamb	Mutton	Goat meat	Cattle	Sheep	Goats
2015	%	0.4	1.0	0.1	0.0	0.0	0.1	0.0	0.0
2016	%	0.6	1.2	0.0	0.2	0.2	0.1	0.0	0.0
2017	%	0.7	1.3	-0.1	0.3	0.3	0.1	0.0	0.0
2018	%	0.8	2.0	-0.1	0.4	0.4	0.1	0.0	0.0
2019	%	0.7	1.5	-0.2	0.5	0.5	-0.1	0.0	0.0
2020	%	0.9	2.3	-0.2	0.7	0.7	0.1	0.0	0.0
2021	%	1.1	2.4	-0.2	0.8	0.8	0.1	0.0	0.0
2022	%	1.0	2.0	-0.3	1.0	1.0	0.1	0.0	0.0
2023	%	1.2	3.1	-0.2	1.1	1.1	0.1	0.0	0.0
2024	%	1.3	3.4	-0.2	1.1	1.1	0.1	0.0	0.0
2025	%	1.4	3.7	-0.2	1.1	1.1	0.1	0.0	0.0
2026	%	1.4	3.0	-0.2	1.1	1.1	0.1	0.0	0.0
2027	%	1.6	4.3	-0.1	1.1	1.1	0.1	0.0	0.0
2028	%	1.8	4.5	-0.1	1.1	1.1	0.1	0.0	0.0
2029	%	1.8	3.5	-0.2	1.1	1.1	0.1	0.0	0.0
2030	%	1.8	3.6	-0.2	1.1	1.1	0.1	0.0	0.0

Source: GMI model.

Live export program

Table C.6 shows the key inputs to the Integrated Framework used in the evaluation of the Live Export Program (LEP) — run jointly by MLA and Livecorp). The first four components of the estimated benefits are the result of LEP investments to assist industry with the transition to Exporter Supply Chain Assurance System (ESCAS). The final components are productivity-based (reduction in on-board sheep mortalities), improved market access and lower compliance costs.

C.6 Key model shocks for live export program

Project areas identified in workshop	Maximum and industry impact	Probability
Cattle exports to Indonesia	Reduction in export numbers: <ul style="list-style-type: none"> ▪ 2010-11 –32% ▪ 2011-12 – 36.5% ▪ 2012-13 to 2014 – 20% phased down to ▪ 2017-18 – 2.5% 	▪ 100%
Cattle exports to Vietnam	Reduction in export numbers: <ul style="list-style-type: none"> ▪ -2010-11 –50% ▪ 2011-12 to 2014 – 100% phased down to 	▪ 20%

Project areas identified in workshop	Maximum and industry impact	Probability
	<ul style="list-style-type: none"> 2019-20 – 20% 	
Sheep exports to the Middle East	Reduction in export numbers: <ul style="list-style-type: none"> -2010-11 –50% 2011-12 to 2014 – 100% phased down to 2019-20 – 20% 	<ul style="list-style-type: none"> 10%
Goat exports to Malaysia	Reduction in export numbers: <ul style="list-style-type: none"> -2010-11 –50% 2011-12 onwards – 100% 	<ul style="list-style-type: none"> 50%
R&D to reduce on-board sheep mortalities	Reduction in on-board deaths of 0.4 percentage points <ul style="list-style-type: none"> Phased in during 2016-17, full impact by 2017-18 	<ul style="list-style-type: none"> 100%
Improved market access (general) and reduced compliance costs	<ul style="list-style-type: none"> Market access benefits of \$2.8 million each year in 2015 terms sufficient to achieve a benefit cost ratio of 10:1 on a present value of investment of \$5.6 million over 5 years Reduction in annual compliance costs of \$2.8 million each year Adoption in both cases is industry wide. 	<ul style="list-style-type: none"> 100%

Eating quality

Chapter 9 of the report *Impact Assessment of MLA Expenditure 2010-11 to 2014-15* contains detailed information on the development of scenarios used to assess the impact of MLA's onvestments in Eating Quality during the Evaluation Period. Table C.7 shows how the benefits were calculated from the workshop input and the MLA Background Paper. While the workshop output did not distinguish grass and grain components, the first step in table C.7 disaggregates the 'with MLA investment' and 'without MLA investment' scenarios into these two parts.

- It is most likely that with contraction of MSA under the counterfactual, that cattle graded would retract to grain fed cattle (as was the case during its implementation).
- In addition to the grass fed price differentials observed between MSA graded product and ungraded product (information on which can be found in *Impact Assessment of MLA Expenditure 2010-11 to 2014-15*), it was assessed that grain fed price differentials were constant at around 10 cents per kilogram dressed weight over the Evaluation Period.

C.7 Quantifying the benefits of the Eating Quality program

	2010-11	2011-12	2012-13	2013-14	2014-15	2019-20	2029-30	
Disaggregating the counterfactual into grass and grain								
With MLA investment 2010-11 to 2014-15 (workshop)								
Total graded cattle numbers	000s	1 422	2 069	2 436	3 036	3 220	1 727	881
- Grass fed graded cattle numbers	000s	711	1 065	1 291	1 655	1 803	379	0

		2010-11	2011-12	2012-13	2013-14	2014-15	2019-20	2029-30
- Grain fed graded cattle numbers	000s	711	1 003	1 145	1 381	1 417	1 348	881
Proportion grain fed	%	50	48.5	47	45.5	44	78	100
Without MLA investment 2010-11 to 2014-15 (workshop)								
Total graded cattle numbers	000s	1 104	914	803	709	546	391	441
- Grass fed graded cattle numbers	000s	460	305	201	118	46	0	0
- Grain fed graded cattle numbers	000s	644	609	602	591	501	391	441
Proportion grain fed	%	58.3	66.7	75.0	83.3	91.7	100	100
Calculating the counterfactual - cattle								
Calculations for grass fed								
Differences in numbers of grass fed cattle graded in the 'with' & 'without' investment scenarios	000s	251	761	1090	1537	1758	379	0
Carcass weight	kg cwe	249	249	246	244	249	262	262
Differences in total weight of graded grass fed cattle produced ('with' vs 'without')	kt cwe	63	189	268	375	437	99	0
Average price differentials	Ac/kg cwe	1.0	8.1	19.4	21.6	28.4	18.9	2.5
	\$m	0.6	15.4	51.9	81.2	124.0	18.7	0.0
Counterfactual for grain fed								
Differences in numbers of grain fed cattle graded in the 'with' & 'without' investment scenarios	000s	67	394	543	791	916	957	441
Carcass weight	kg cwe	249	249	246	244	249	262	262
Differences in total weight of graded grain fed cattle produced ('with' vs 'without')	kt cwe	17	98	133	193	228	250	115
Average price differentials	Ac/kg cwe	3.0	2.5	3.8	5.0	6.3	6.0	2.5
	\$m	0.5	2.5	5.0	9.7	14.3	15.0	2.9
Counterfactual for all cattle								
Differences in numbers of all cattle graded in the 'with' & 'without' investment scenarios	000s	318	1155	1633	2327	2674	1336	441
Carcass weight	kg cwe	249	249	246	244	249	262	262
Differences in total weight of all graded produced ('with' vs 'without')	kt cwe	79	287	402	569	665	349	115
Total price differentials – all cattle	Ac/kg cwe	1.4	6.2	14.2	16.0	20.8	9.6	2.5
	\$m	1.1	17.8	57.0	90.9	138.3	33.7	2.9
Calculating the counterfactual - lambs								
Lambs graded	000s	484	2970	5195	6494	6768	3500	1142
Lambs trademarked	000s	0	0	1217	2887	3443	3500	1142
Average differentials	\$/head	0.0	0.0	1.0	1.0	1.0	0.0	0.0

		2010-11	2011-12	2012-13	2013-14	2014-15	2019-20	2029-30
	\$m	0.0	0.0	1.2	2.9	3.4	0.0	0.0
Processing level differentials								
Grass fed cattle								
Livestock acquisition ('with' vs 'without')	\$m	0.6	15.4	51.9	81.2	124.0	18.7	0.0
Compliance and other costs ^a	\$m							
Total benefit to processors	\$m	0.6	15.4	51.9	81.2	124.0	18.7	0.0
- % increase in revenue		0.0	0.1	0.2	0.3	0.3	0.0	0.0
Grain fed cattle								
Livestock acquisition ('with' vs 'without')	\$m	0.5	2.5	5.0	9.7	14.3	15.0	2.9
Compliance and other costs ^a	\$m							
Total benefit to processors	\$m	0.5	2.5	5.0	9.7	14.3	15.0	2.9
Lamb								
Livestock acquisition ('with' vs 'without')	\$m	0.0	0.0	1.2	2.9	3.4	0.0	0.0
Compliance and other costs ^a	\$m							
Total benefit to processors	\$m	0.0	0.0	1.2	2.9	3.4	0.0	0.0
Benefits in present value terms								
Grass fed cattle	\$m	0.8	19.0	59.8	86.7	124.0	13.0	0.0
Grain fed cattle	\$m	0.7	3.1	5.8	10.4	14.3	10.4	1.0
Lambs	\$m	0.0	0.0	1.4	3.1	3.4	0.0	0.0
Total	\$m	1.5	22.1	67.0	100.2	141.7	23.3	1.0

^a Provision has been made for additional costs for processors in terms of compliance and license fees including profitability, the workshop indicated that these were close to zero.

Source: Consultant Team.

The second half of table C.7, calculates the benefits as the number of livestock multiplied by the differential between the 'with MLA investment' and 'without MLA investment' cases. The total benefit for processors must be at least the additional value that they pay for livestock – in other words, for convenience, we assume zero net benefit to processors.

Provision was made for additional compliance costs and differentials earned by processors in participating in the MSA scheme that would add to the total benefit at the processing or wholesale level. The workshop indicated these costs and benefits would be close to zero, and therefore have been left empty.

Table C.7 indicates that grass fed cattle account for the majority of the benefits that flow from MLA investments over the Evaluation Period. These benefits were applied to the Integrated Framework as an increase in demand by domestic consumers. Attribution to MLA was 100 per cent.

New Products

Table C.8 identifies four new products arising out of MLA investments during the Evaluation Period and their reported net benefit from the Workshop Background Paper.

To enable application to the model, specific benefit time paths were developed based on the innovations' life (10 years) and background information on installation dates, that were consistent the net present values shown in in table 8.

C.8 Summary of benefits identified in the New Products workshop paper

Innovation	MDC funding	NPV benefit reported		Species split		Commercially available?
		2010-15	2015+	Beef	Sheep	
	%	\$m	\$m	%	%	
Pulled meats	46	3.099	3.563	72	28	Yes
Smartshape	46	1.474	5.604	72	28	Yes
Thin slice technology	100	0.469	0.539	100	0	Yes
Very fast chilling and salting	100	17.524	0.000	100	0	Yes
Total		22.566	28.753			

Attribution to MLA was assumed to be 100 per cent.

The benefits from this program were incorporated as a shift in demand that resulted in an increase in value to beef and sheepmeat processing from 2010-11 out to 2024-25.

Beef and sheep meat marketing

The calculation of the model shocks for beef and sheepmeat marketing programs are summarised in table C.9 and C.10 below. The % *impact on sales* is applied to the Integrated Framework as a shift in demand to increase the value of exports for each market by the required amount.

C.9 Calculation of first-round impact by market – beef marketing

Region	Export equivalent value 2014-15	MLA expenditure including overheads	Suggested BCR for MLA activity	Calculated impact on sales	% impact on sales (Model shock)	Benefit type		
						Downside	Upside	Decay period
	\$m	\$m		\$m	%	%	%	no years
Korea	1 068	3.804	10.0	38.0	3.56	25.0	75.0	2
United States	3 234	0.767	10.0	7.7	0.24	0.0	100.0	0
Japan	1 860	6.282	7.0	44.0	2.36	75.0	25.0	3
China	760	1.718	7.0	12.0	1.58	0.0	100.0	0
Other Asia	380	1.523	5.0	7.6	2.01	0.0	100.0	0
Middle East	425	0.841	5.0	4.2	0.99	0.0	100.0	0
EU	400	0.554	5.0	2.8	0.69	0.0	100.0	0
Others	923	4.059	5.0	20.3	2.20	0.0	100.0	0
Total export	9 049	19.549	7.0	136.6	1.51	31.1	68.9	1.5
Domestic including nutrition	3 500	13.616	1.1	15.0	0.43	100.0	0.0	0.5
Total domestic and export	1 2549	33.165	4.6	152.0	1.21	37.9	62.1	1.4

Source: MLA Impact Assessment workshops

C.10 Calculation of first-round impact by market – sheepmeat marketing

Region	Export equivalent value 2014-15	MLA expenditure including overheads	Suggested BCR for MLA activity	Calculated impact on sales	% impact on sales (Model shock)	Benefit type		
						Downside	Upside	Decay period
	\$m	\$m		\$m	%	%	%	no years
North America	706	3.54	5.0	17.7	2.5	0.0	100.0	0.5
China	456	0.93	4.0	3.7	0.8	0.0	100.0	0.5
SE Asia	239	0.40	3.0	1.2	0.5	0.0	100.0	0.5
MENA	712	1.45	8.0	11.6	1.6	20.0	80.0	2.0
Europe/Russia	201	0.33	1.1	0.4	0.2	0.0	100.0	0.5
Japan / Korea	152	0.24	6.0	1.5	1.0	50.0	50.0	2.0
PNG/Pacific/other	138	0.03	2.0	0.1	0.0	0.0	100.0	0.0
Global/other/ICAs		0.54	5.0	2.7		0.0	100.0	0.0
Exports	2 604	7.455	5.2	38.8	1.5	7.9	92.1	1.0
Domestic including nutrition	1 400	10.203	6.0	61.2	4.4	100.0	0.0	2.0
Total domestic and export	4 004	17.658	5.7	100.0	2.5	64.3	35.7	1.6

Source: MLA Impact Assessment workshops

On-farm productivity

Animal genetics

The inputs for quantifying the benefits of the genetics program are detailed in the report *Impact Assessment of MLA Expenditure 2010-11 to 2014-15*. The primary inputs included the marginal and cumulative gains, all in present values of future benefits across the chain, in the \$indexes across breeds. Using this data required a number of assumptions:

- the difference between the \$index for 2013-14 between the with and with MLA investment scenarios provided a total benefit for cattle of \$130.7 million and for sheep \$31 million
- genetic gain for the northern beef industry used Tropical breed information while southern beef industry included both British and European breeds
 - From the \$index information, gains from British breeds accounted for 90 per cent of total gains in cattle
- genetic gain for sheep was the total across terminals and maternal breeds and Merinos
 - Gains in maternals accounted for 70 per cent of the total gains for sheep.
- the present value of the \$indexes in 2013-14 terms was then distributed as annual benefits between 2017 and 2027 based on indicative time paths of benefits provided by MLA for a bull and a ram
 - The present value of the annual flows was then adjusted to equal the 2013-14 estimate of the \$index provided by MLA.
 - The annual flow of benefits used is shown in table C.11 below.

In absence of better information, the benefits in terms of \$ indexes between the ‘with MLA investment’ and ‘without MLA investment’ cases were applied at farm level as a total factor productivity shock. Attribution to MLA was assumed to be 100 per cent.

C.11 Key model shocks for livestock genetics

	Northern	Southern	Beef	Sheep
	\$m	\$m	\$m	\$m
Present value of benefits ^a	1.9	128.8	130.7	31.0
2017	0.0	0.0	0.0	3.0
2018	0.2	12.4	12.6	2.8
2019	0.2	11.5	11.7	3.9
2020	0.2	16.3	16.5	4.8
2021	0.3	20.0	20.3	3.4
2022	0.2	14.0	14.2	4.2
2023	0.3	17.3	17.5	3.9
2024	0.2	16.0	16.3	2.7

	Northern	Southern	Beef	Sheep
2025	0.2	11.3	11.4	1.7
2026	0.1	7.0	7.1	0.8
2027	0.0	3.1	3.2	0.0
2028	0.0	0.0	0.0	0.0
2029	0.0	0.0	0.0	0.0
2030	0.0	0.0	0.0	0.0
% of industry GVP (Model shock)				
	%	%	%	%
2018	0.00	0.35	0.18	0.09
2019	0.00	0.34	0.17	0.09
2020	0.01	0.50	0.25	0.13
2021	0.01	0.64	0.32	0.17
2022	0.01	0.48	0.24	0.12
2023	0.01	0.62	0.31	0.16
2024	0.01	0.61	0.31	0.16
2025	0.01	0.45	0.23	0.11
2026	0.00	0.29	0.15	0.07
2027	0.00	0.14	0.07	0.04
2028	0.00	0.00	0.00	0.00
2029	0.00	0.00	0.00	0.00
2030	0.00	0.00	0.00	0.00

^a The benefit is the difference between the 2013-14 \$index with and without MLA investment.

Source: Personal Communication, Rob Banks.

On-farm R&D

Tables C.12 and C.13 provide a summary of the key model shocks for the on-farm productivity program.

C.12 Overview of simulations for on-farm R&D

Project areas identified in workshop	Benefits quantified?	Summary of application to IF ^a	Timeframe of analysis ^b
New Cultivars—Acid tolerant lucerne	No		
Evergraze	Yes	Productivity improvement: included in top-down analysis for 3.5 Producer Engagement	2010-30
Enrich program	Yes	Productivity improvement: increase in turnoff of sheep industry offset by forage establishment costs	2011-30
Phosphorus use efficiency	Yes	Productivity improvement: reduction in costs of sheep industry	2015-30
New cultivars —Tedera	No		

Project areas identified in workshop	Benefits quantified?	Summary of application to IF ^a	Timeframe of analysis ^b
New legumes for cereal zone	No		
Buffel grass run down	Yes	Productivity improvement in Northern Beef: offset by pasture establishment costs	2019-30
Psyllid resistant Leucaena	Yes	Productivity improvement in Northern Beef (higher turnoff per hectare): offset by pasture establishment costs	2019-30
Southern Sheep mortality and reproduction	Yes	Productivity improvement: included in top-down analysis for 3.5 Producer Engagement	2010-30
P supplementation in northern beef	No		
Breeder Mortalities/Cash Cow	Yes	Productivity improvement in Northern Beef: offset by increased operational costs	2015-30
Entire males	Yes	Costs avoided (HGP) for Northern cattle.	2021-30

^a In the first round, relative to counterfactual or without MLA investment scenario. ^b Time over which benefits are assumed to flow including decay. For example, 2011-30 is 2010-11 to 2029-30.

C.13 Key model shocks for on-farm R&D

Project areas identified in workshop	Maximum Impact	First round impact adjusted for adoption	Attribution to MLA
Enrich program	<ul style="list-style-type: none"> New forage increases turnoff of ewes in wheat sheep zone by 5% (\$6 per ewe) and reduces costs of supplementary feed by \$10 per ewe in 2015 terms Establishment costs are \$14 per hectare (annualised). It is assumed that only 10 of each property would be planted or 200 hectares 	<ul style="list-style-type: none"> By 2014, 400 producers had already adopted technology. By 2030, maximum adoption is 1200 producers accounting for 3.8% of a total of 41 million ewes. Total maximum benefit by 2030 is \$17 million in 2015 terms 	100%
Phosphorus use efficiency	<ul style="list-style-type: none"> Fertiliser savings of \$15 per hectare for those currently over-using P fertiliser 	<ul style="list-style-type: none"> Target audience is 250 producers in the high rainfall zone with average property size of 800 ha 100% adoption by 2015 onwards Total savings are \$3 million in 2015 terms. 	100%
Pastures to counter buffel grass run down	<ul style="list-style-type: none"> Increase in live weight gain of 23 kg/head/year of improved over unimproved pasture in Northern beef Annualised establishment plus ongoing costs of improved pasture is \$18.80 per hectare in 2015 terms. 	<ul style="list-style-type: none"> Total applicable area is 6 million ha with 5 million AEs in Northern beef. Maximum adoption is 5 per cent by 2030 phasing commencing in 2021. Total maximum benefit by 2030 is \$12 million in 2015 	20%

Project areas identified in workshop	Maximum Impact	First round impact adjusted for adoption terms	Attribution to MLA
Psyllid resistant Leucaena	<ul style="list-style-type: none"> ▪ Increase in turnoff of 150 kg lw per ha per year from Leucaena relative to unimproved pasture ▪ Annualised establishment plus ongoing costs of \$85 per hectare in 2015 terms. 	<ul style="list-style-type: none"> ▪ Total applicable area (high rainfall) is 1.5 million ha. ▪ Maximum adoption is 10 per cent achieved by 2029 starting in 2021. ▪ Total maximum benefit by 2030 is \$59 million in 2015 terms 	<ul style="list-style-type: none"> ▪ 100%
Breeder Mortalities/Cash Cow	<ul style="list-style-type: none"> ▪ Reduction in 2% points for cow mortalities in northern industry or around 8 000 cows valued at \$600 in 2015 terms. ▪ Costs are \$10 per head in 2015 terms 	<ul style="list-style-type: none"> ▪ Maximum adoption involves producers accounting for 400 000 cows out of 812 000 cows held by participants in Cash Cow by 2020. ▪ Benefits phase-in from 2016. ▪ Total maximum benefit by 2030 is \$0.8 million in 2015 terms 	<ul style="list-style-type: none"> ▪ 100%
Entire males	<ul style="list-style-type: none"> ▪ Benefit is avoided \$8 per head cost of HGP 	<ul style="list-style-type: none"> ▪ Potential market is 1 million northern cattle ▪ 5% adoption in 2020 increasing to 50% by 2030 ▪ Total maximum benefit by 2030 is \$4 million in 2015 terms 	<ul style="list-style-type: none"> ▪ 20%

Producer engagement programs

The development of the model inputs for MLA's Producer engagement programs involved the observed increases in total factor productivity from those producers who had participated in *More Meat from Sheep* and *More beef from Pastures*. Also, the workshop identified that producers making practice change in the Northern beef industry were achieving 1 per cent each year.⁶⁸ These benefits were assumed to be applicable to the period 2012-13 to 2014-15. For simplicity, the calculations in table C.14 apply to 2014-15 only.

C.14 Calculation of model shocks for 3.5 Producer Engagement 2014-15

		MMFS Sheep	MBFP southern beef	Northern Beef
Increase in TPF from those changing practice (1)	%	2.3	2.2	1.0
Producers who have changed practice (2)	no	1533	2000	400
- proportion of total producers (herd basis) (3)	%	5.7	10.1	20
Increase in TPF across industry (4) = (1) x (3)	%	0.09	0.15	0.13

⁶⁸ They also noted that this did not offset the decline in farmer's terms of trade.

		MMFS Sheep	MBFP southern beef	Northern Beef
- adjustment for duplication of programs (5)	%	50	20	25
Adjusted increase in TPF across industry (6) = (4) x (5)	% points	0.04	0.03	0.03
Contribution from wider programs				
Increase in TPF from wider programs (6)	%	0.17	0.00	0.00
- adjustment for duplication of programs (7)	%	10.0	0.0	0.0
Adjusted increase in TPF across industry (8) = (6) x (7)	% points	0.02	0.00	0.00
Increase in TPF across industry				
Total direct and wider industry programs (9) = (6) + (8)	% points	0.06	0.03	0.03
TFP index				
With MLA investment (observed index values from ABARES) (9)	Index ^a	124.6	89.2	89.4
Observed annual increases in TFP for sheep and northern and southern beef from ABARES (10)	annual %change	4.5	-2.26	-2.21
Without MLA investment (11) = (9) * (100-(8))	Index ^a	124.2	89.1	89.3
	annual %change	4.44	-2.29	-2.24
- change in TFP index	%	-0.32	-0.17	-0.19

^a The index for each year is equal to the index in the previous year multiplied by the annual % change.

For example Lifetime ewe management and other programs

These TFP estimates were then adjusted for the number of producers who had already made practice changes in the total population, to get to industry improvements, and accounting for assumed attribution of MLA investments in the evaluation period to these benefits. In addition, an adjustment was made to reflect the contribution of MLA to wider industry programs such as Evergraze and Sheep reproduction and mortality (covered by the Lifetime Ewe program), as identified in table 4.2 above.

The total contribution of engagement with MLA attribution is equal to the sum of direct and wider industry programs. For example in table 14.5, without MLA's involvement in producer engagement in the sheep industry, TFP growth would have been 0.06 percentage points lower than otherwise the case in 2014-15 (see number highlighted in red in the table). Translating this growth into the TFP index, industry value of production would have been 0.32 per cent lower than otherwise the case.

Because these estimates are all in net terms (benefits less costs), the shocks were applied to the model as output-based TFP improvements.

Off-farm productivity

The Consulting Team was provided with comprehensive 'bottoms-up' data on net benefits for the range of technologies commercialised over the Evaluation Period. The original analysis supplied by MLA identified benefit streams out to 2020.

The original inputs required modification in a number of ways:

- The benefits from spray chilling required a time dimension using the supplied information
 - In the original analysis, all benefits were aggregated and assumed to apply for 3 years (2011-12 to 2013-14). These benefits were modified according to installation dates that were identified.
 - Also, benefits for JBS installations were excluded as a result of Workshop deliberations on this issue.
 - These changes reduced the benefit from spray chilling in present value terms.
- The type of benefits generated by each innovation needed to be identified (increased yield, reduced labour costs and lower throughput costs) – as the distribution of impact depends on the benefit type. While the type of benefit in some cases was obvious (for example spray chilling resulted in increased yield), in other cases it was less obvious (especially for the LEAP technology). The benefit splits used by the Consulting Team were supplied by the Program Manager.
- Benefits also had to be disaggregated by species. Where the benefits were non-specific (for example, Bladestop), they were allocated across species according to industry value.

Table C.15 show the calculated benefits by type and by processing sector that are the result of this approach. Behind this table are a large number of data from individual processors and assumptions, which can be supplied upon request. The MLA data provided includes:

- an assessment of attribution to MLA on a plant-by-plant basis
- a conservative assignment of benefits up until 2019-20 - although the economic life of the technologies is 10 years.

C.15 Benefits from investments in in Off-farm efficiency^a

		Total 2010-20	2010- 11	2011- 12	2012- 13	2013- 14	2014- 15	2015- 16	2019- 20
Improved yield									
Grass fed processing	\$m	107.9	3.1	3.4	20.9	19.4	25.0	12.9	2.3
Grain fed processing	\$m	52.4	1.5	1.6	10.1	9.4	12.1	6.2	1.1
Lamb processing	\$m	176.8	0.0	0.0	1.1	6.8	10.5	18.4	41.1
Mutton	\$m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Goats	\$m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total red meat	\$m	337.0	4.6	5.0	32.1	35.6	47.6	37.5	44.5
Lower labour costs									
Grass fed	\$m	29.6	0.0	0.4	0.6	1.3	1.9	3.0	7.0
Grain fed	\$m	14.4	0.0	0.2	0.3	0.6	0.9	1.5	3.4
Lamb	\$m	49.6	0.3	0.8	1.6	2.8	3.5	4.9	10.8

		Total 2010-20	2010- 11	2011- 12	2012- 13	2013- 14	2014- 15	2015- 16	2019- 20
Mutton	\$m	13.0	0.0	0.0	0.0	0.1	0.2	1.2	4.4
Goats	\$m	1.6	0.0	0.0	0.0	0.0	0.1	0.2	0.4
Total red meat	\$m	108.2	0.4	1.5	2.7	4.9	6.6	10.8	26.0
Higher throughput									
Grass fed	\$m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Grain fed	\$m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lamb	\$m	24.5	0.0	0.0	0.1	1.1	1.7	2.6	5.5
Mutton	\$m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Goats	\$m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total red meat	\$m	24.5	0.0	0.0	0.1	1.1	1.7	2.6	5.5
Total nominal benefits by industry									
Grass fed	\$m	137.5	3.1	3.8	21.5	20.7	26.9	15.9	9.4
Grain fed	\$m	66.7	1.5	1.8	10.4	10.0	13.1	7.7	4.5
Lamb	\$m	250.9	0.3	0.8	2.8	10.8	15.7	26.0	57.3
Mutton	\$m	13.0	0.0	0.0	0.0	0.1	0.2	1.2	4.4
Goats	\$m	1.6	0.0	0.0	0.0	0.0	0.1	0.2	0.4
Total red meat	\$m	469.8	5.0	6.5	34.8	41.6	56.0	51.0	76.1
- NPV terms ^b		414.7	6.6	8.0	40.1	44.4	56.0	47.3	52.7
Benefits as a % of meat revenue only									
Grass fed	%		0.1	0.1	0.5	0.3	0.3	0.2	0.1
Grain fed	%		0.0	0.1	0.3	0.3	0.3	0.2	0.1
Lamb	%		0.0	0.0	0.1	0.4	0.5	0.8	1.4
Mutton	%		0.0	0.0	0.0	0.0	0.0	0.1	0.4
Goats	%		0.0	0.0	0.0	0.0	0.0	0.1	0.1
Total red meat	%		0.0	0.1	0.3	0.3	0.3	0.3	0.4

^a In nominal terms ^a In present value terms in 2015 dollars.

The benefits were applied to the model in the following way:

- yield improvement — increase in industry output of meat per unit of costs
- labour savings — lower unit labour costs
- higher throughput savings — lower costs for selected variable costs.

Overall the total benefits over the period 2010-20 in the first round are estimated to be \$470 million in nominal terms and \$415 million in present value terms with the lamb processing sector accounting for 53 per cent of the benefits.

- Around 70 per cent of the benefits are from innovations that improve yield (spray chilling for beef and LEAP for sheepmeat).

On-farm animal health and biosecurity

Tables C.16 and C.17 provide a summary of the key model shocks for the on-farm animal health and biosecurity program.

C.16 Overview of simulations for on-farm animal health and biosecurity

Project areas identified in workshop	Benefits quantified?	Summary of application to IF ^a	Timeframe of analysis ^b
Improved FMD diagnostics and regional capability	Yes	Increase in response time represented as a reduction in potential losses from a FMD outbreak (similar approach to Product Integrity)	2011-30
New ability to rapidly detect <i>Culicoides</i> species and Bluetongue virus	No	Benefits to be captured in next review	
Barbers Pole Worm Vaccine	Yes	Productivity improvement /reduction in costs for sheep from Barbers' Pole Worm offset by cost of vaccine.	2014-30
Integrated Pastures Management (IPM) to reduce reliance on anthelmintics to control sheep worms	Yes	Output productivity improvement for sheep industry	2016-30
<i>Theileria orientalis</i> epidemiology	Yes	Net productivity increase for Northern and Southern cattle	2011-30
Johnes Disease vaccine optimisation	Yes	Net Productivity increase for Sheep industry	2016-30

^a In the first round, relative to counterfactual or without MLA investment scenario. ^b Time over which benefits are assumed to flow including decay. For example, 2011-30 is 2010-11 to 2029-30.

C.17 Key model shocks for on-farm animal health and biosecurity

Project areas identified in workshop	Maximum Impact	First round impact adjusted for adoption	Attribution to MLA
Improved FMD diagnostics and regional capability	<ul style="list-style-type: none"> Reduce potential costs (reduction in export prices) of an FMD outbreak by 5 per cent (see text below) 	<ul style="list-style-type: none"> Applicable to all species, all regions in red meat industry. 	<ul style="list-style-type: none"> 100%
Barbers Pole Worm Vaccine	<ul style="list-style-type: none"> Avoided economic losses of \$11 per ewe with 70% attribution to the vaccine 	<ul style="list-style-type: none"> Target market is 2.5 million ewes in summer rainfall areas Adoption limited by vaccination doses: 60 000 in 2014 to 600 000 in 2020 and thereafter 	<ul style="list-style-type: none"> 100%
IPM to reduce reliance on anthelmintics to control sheep worms	<ul style="list-style-type: none"> Net benefit of \$2 per sheep in 2014 terms in high rainfall areas 	<ul style="list-style-type: none"> Target market is sheep in Wheat Sheep and High Rainfall zones Maximum adoption phases to 4% by 2020 	<ul style="list-style-type: none"> 20%
<i>Theileria orientalis</i> epidemiology	<ul style="list-style-type: none"> Net benefits in 2015 terms of – \$0.335 million for Northern beef 	<ul style="list-style-type: none"> Adoption increases from 40% in 2010 to 100% by 2015, which then falls to 20% by 2030 	<ul style="list-style-type: none"> 10%

Project areas identified in workshop	Maximum Impact	First round impact adjusted for adoption	Attribution to MLA
	– \$1.258 million for Southern beef		
Johnes Disease vaccine optimisation	<ul style="list-style-type: none"> ▪ Economic losses avoided from producers continuing vaccinations ▪ Estimated loss is \$75 per sheep in 2015 terms 	<ul style="list-style-type: none"> ▪ Of 15 000 producers now vaccinating, by 2018, 25% or 400 producers would not continue without MLA investment. 	<ul style="list-style-type: none"> ▪ 100%

Improved FMD diagnostics and regional capability

Using a similar approach to that for the maintenance of disease-free status and using the same assumptions as found in table C.2, table C.18 calculates the benefits of reducing expected FMD losses at 97 per cent traceability, by 5 per cent as a result of MLA investments over the period 2010-11 to 2014-15.

C.18 Quantifying benefits of Improved FMD diagnostics and regional capability

		2010-11	2011-12	2012-13	2013-14	2014-15	2019-20	2029-30
Expected losses in annual terms								
FMD	\$ million	33.3	35.5	32.0	42.3	53.3	63.1	78.4
Expected losses in annual terms by species, 97% traceability								
Beef	\$ million	25.3	27.0	24.3	32.1	40.5	47.9	59.5
Sheep	\$ million	7.7	8.2	7.4	9.7	12.3	14.6	18.1
Goats	\$ million	0.3	0.4	0.3	0.4	0.5	0.6	0.8
Total	\$ million	33.3	35.5	32.0	42.3	53.3	63.1	78.4
Benefit: reduce annual expected losses from FMD by 5 per cent								
Beef	\$ million	1.3	1.3	1.2	1.6	2.0	2.4	3.0
Sheep	\$ million	0.4	0.4	0.4	0.5	0.6	0.7	0.9
Goats	\$ million	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	\$ million	1.7	1.8	1.6	2.1	2.7	3.2	3.9
Annual cost avoided as a proportion of Industry GVP								
Beef	%	0.014	0.013	0.013	0.013	0.013	0.013	0.013
Sheep	%	0.010	0.010	0.011	0.011	0.012	0.011	0.011
Goats	%	0.010	0.010	0.009	0.009	0.009	0.008	0.007
Total	%	0.014	0.013	0.013	0.013	0.013	0.013	0.013

^a Cumulative losses over the expected duration of an outbreak has been annualised using an interest rate of 5 per cent in real terms
Source: Consultant Team

Market Information

Market Information and policy

The workshop agreed that the benefit cost ratio from MLA's investment in market information program in the Evaluation Period would be between 8 and 10 to 1. This has been modelled as a simple cost reduction that has been applied across the red meat chain and species in proportion to net income in the first round. The results were adjusted to achieve the 8:1 benefit cost outcome.

Livestock data link (LDL)

Table C.19 calculate the benefits from livestock data link as a function of:

- the number of animals uploaded to the LDL system
- average carcass weights (taken from MSA data)
- the difference between compliance rates without LDL (supplied by an industry source) and those with LDL (current compliance rates for MSA for adopting processors)
- the discounts avoided (supplied by an industry source) by meeting MSA and processor specifications.

Attribution of the benefits to MLA was assumed to be 30 per cent because the program worked in collaboration with a private on-farm assurance program. The table indicates that the majority of benefits accrue to the southern cattle industry.

C.19 Benefits from Livestock Data Link

		2010-11	2011-12	2012-13	2013-14	2014-15
LDL uploads						
Cattle - Grass fed Southern	000s		0	0	510	1020
Lambs	000s		1420	2840	4260	5680
Average carcass weights (assumed MSA weights)						
Cattle - Grass fed Southern	kg cwe		249	246	244	249
Lambs	kg cwe		22	22	22	22
Non-compliance rates under no investment case						
Cattle - Grass fed Southern	%		25	25	25	25
Lambs	%		13.5	13.5	13.5	13.5
Non-compliance rates under MLA investment (use MSA compliance rates)						
Cattle - Grass fed Southern	%		25	25	16	6
Lambs	%		13.5	11	8	5
Improvement in non-compliance						
Cattle - Grass fed Southern	%		0	0	10	19

		2010-11	2011-12	2012-13	2013-14	2014-15
Lambs	%		0	3	6	9
Meat equivalent						
Cattle - Grass fed Southern	kt cwe		0.0	0.0	11.8	48.2
Lambs	kt cwe		0.0	1.8	5.3	10.6
Discounts avoided						
Cattle - Grass fed Southern	Ac/kg cwe		35	35	35	35
Lambs	Ac/kg cwe		15	15	15	15
Benefit in nominal terms						
Cattle - Grass fed Southern	\$m		0.0	0.0	4.1	16.9
Lambs	\$m		0.0	0.3	0.8	1.6
Total	\$m		0.0	0.3	4.9	18.5

Source: Consultant Team and Industry Sources.

Feedlot programs

Tables C.20 and C.21 provide a summary of the key model shocks used to evaluate the impact of MLA's investments in Feedlot productivity, animal health and welfare and environment programs during the Evaluation Period.

C.20 Overview of simulations for feedlot programs

Project areas identified in workshop	Benefits		Timeframe of analysis ^b
	quantified?	Summary of application to IF ^a	
Current benefits			
Contribution to industry TFP	Yes	Increase in net productivity in feedlot sector agreed by Workshop participants as attributable to MLA.	2011-17
Reduction in regulatory cost	Yes	Productivity improvement: reduction in 'one-off costs' to feedlot sector	2011-15
Future benefits			
Net feed intake	Yes	Productivity improvement: increase in feedlot feed efficiency	2017-30
Improved sorghum varieties	No		
Improved summer rations/heat stress	Yes	Productivity improvement: increase in outputs (reduction in mortality)	2018-30
Dag treatments	No		
Improved BRD management	Yes	Productivity improvement: increase in outputs (reduction in mortality)	2018-30
2 in 1 BRD vaccine	Yes	Productivity improvement: reduction in industry costs	2018-30
Lignite pen surface ameliorant	Yes	Productivity improvement: reduction in industry costs	2018-30
Extension to industry (general)	No		2023-30

^a In the first round, relative to counterfactual or without MLA investment scenario. ^b Time over which benefits are assumed to flow including decay .For example, 2011-30 is 2010-11 to 2029-30.

C.21 Key model shocks for feedlot programs

Project areas identified in workshop	Impact	Industry adoption	First round impact adjusted for adoption	Attribution to MLA
Current benefits				
Contribution to industry TFP	<ul style="list-style-type: none"> The increase in TFP over the Evaluation Period provided by feedlot operators and experts was 1.55% p.a. Workshop participants indicated that MLA R&D contributed 20% of this. 	100%	1.55%	20%
Reduction in regulatory cost	<ul style="list-style-type: none"> \$14.4 million per year 	100%	-14.4 million	100%
Future benefits				
Net feed intake	<ul style="list-style-type: none"> 1% increase in feed efficiency 	2.5%	0.025%	100%
Improved summer rations/heat stress	<ul style="list-style-type: none"> 0.45% increase in TFP 	90%	0.405%	100%
Improved BRD management	<ul style="list-style-type: none"> 24% reduction in mortality 	15%	3.6%	100%
2 in 1 BRD vaccine	<ul style="list-style-type: none"> -0.4% reduction in costs 	60%	-0.24%	100%
Lignite pen surface ameliorant	<ul style="list-style-type: none"> -0.25% reduction in costs 	5%	-0.01%	100%

Goat Industry

Following the suggested methodology from the workshop, table C.22 shows the data and assumptions used to determine MLA's contribution to growth in the total output of the Australian goat industry.

To reflect the fact that a significant proportion of MLA's activity was focused on the farmed sector, the attribution of benefits to MLA was assumed to be 20 per cent.

C.22 Key model shocks for goat industry

		2010-11	2011-12	2012-13	2013-14	2014-15
Change in average real price of slaughter and export goats ^a	%	27.6	-12.0	-25.9	31.0	25.3
Assumed supply elasticity	%				0.40	0.40
Expected increase in supply	%				18.7	17.1
Increase in 'unexplained' supply	%	3.40	6.80	10.20	17.0	15.3

		2010-11	2011-12	2012-13	2013-14	2014-15
Attribution to MLA	%	20.0	20.0	20.0	20.0	20.0
Change in supply with MLA investment	%	0.68	1.36	2.04	3.40	3.07

^a Nominal prices deflated by the CPI.

Source: Consultant Team.

On-farm environment

Tables C.23 and C.24 provide a summary of the key model shocks for On-farm environment programs.

C.23 Overview of simulations for on-farm environment

Project areas identified in workshop	Benefits quantified?	Summary of application to IF ^a	Timeframe of analysis ^b
Northern Grazing Land Management/Wambiana	Yes	Increase in net productivity. Reduction in outputs (stocking rate and turnoff) offset by lower feeder and variables costs	2015-30
Dung Beetles for Southern Grazing systems	No		
Rabbit Control with RHDV	Yes	Increase in net productivity: higher outputs and lower input costs. Southern cattle primary beneficiary.	2018-30
Feral Dog control - release of PAPP	No		
Parkinsonia biocontrol	No		
Improved seasonal forecasts	No		
GHG mitigation and ERF Methodology	Yes	Increase in income/reduction in cost for Northern beef industry	2023-30

^a In the first round, relative to counterfactual or without MLA investment scenario. ^b Time over which benefits are assumed to flow including decay. For example, 2011-30 is 2010-11 to 2029-30.

C.24 Key model shocks for on-farm environment

Project areas identified in workshop	Impact	First round impact adjusted for adoption	Attribution to MLA
Northern Grazing Land Management/Wambiana	<ul style="list-style-type: none"> Halving stocking rates across 2.5% of northern beef businesses 	<ul style="list-style-type: none"> 2% reduction in value of output of northern beef industry offset by a 5.6% reduction in selected operating costs. Net benefit of 0.05% GVP equivalent 	100%
Rabbit Control with RHDV	<ul style="list-style-type: none"> 20% reduction in rabbit numbers falling to 16% reduction over timeframe 	<ul style="list-style-type: none"> Net benefit of \$50 million or 1.1% GVP equivalent for southern beef and \$4.8 million or 0.11% GVP equivalent for sheep.^a 	100%
GHG mitigation and ERF Methodology	<ul style="list-style-type: none"> Additional revenue/reduction in costs for northern beef. 	<ul style="list-style-type: none"> Applies to 1 million northern cattle in corporate hands 	100%

Project areas identified in workshop	Impact	First round impact adjusted for adoption	Attribution to MLA
	<ul style="list-style-type: none"> Total maximum benefit is \$1.8 million by 2025 	<ul style="list-style-type: none"> Adoption 20% in 2023 increasing to 50% in 2025 and thereafter 	

^a Reduction in rabbit numbers was applied to the economic cost of Rabbits to Cattle and Sheep industries as estimated by Gong et al (2009).

Off-farm environment

MLA provided detailed ex-post and ex-ante information on program benefits for *Program 4.2 'Support off-farm environmental sustainability'* (including associated MDC expenditure) on a plant-by-plant basis. Total benefits were the sum of three components, all with different time dimensions:

- direct benefits of Covered Anaerobic Lagoons (CALs) for installations already commissioned (from 2011 to 2018)
- indirect benefits of CALs likely to be brought into operation (2016 to 2025)
- direct benefits from investments in energy savings over the period 2013 to 2015
- indirect benefits from energy savings from 2015 to 2025.

This data had to be aggregated and organised by year to be applied to the model – as summarised in table C.25. Total nominal benefits across all components quantified between 2010-11 and 2029-30 amounted to \$63.5 million in nominal terms and \$47 million in present values terms in 2015.

- These cost savings was applied as a reduction in selected variable operating costs, applied across species according to gross value of production weights. Attribution to MLA was assumed to be 100 per cent.
- By 2020, the annual cost savings were comparatively small accounting for around 0.03 per cent of processing industry gross value of production.

C.25 Summary of cost savings from investments in CALs and energy projects^a

	Cost savings			Potential CO2 savings		
	Direct \$m	Indirect \$m	Total \$m	Direct \$m	Indirect \$m	Total \$m
CAL investments						
2010	0.000	0.000	0.000	0.000	0.000	0.000
2011	0.000	0.000	0.000	0.000	0.000	0.000
2012	0.000	0.000	0.000	0.000	0.000	0.000
2013	0.000	0.000	0.000	0.000	0.000	0.000
2014	0.730	0.000	0.730	1.360	0.000	1.360
2015	0.730	0.000	0.730	1.360	0.000	1.360
2016	2.235	0.730	2.965	3.765	0.228	3.993
2017	2.235	1.095	3.330	3.765	0.342	4.107

	Cost savings			Potential CO2 savings		
	Direct	Indirect	Total	Direct	Indirect	Total
	\$m	\$m	\$m	\$m	\$m	\$m
2018	2.506	1.533	4.039	3.990	0.479	4.469
2019	1.776	1.898	3.674	2.630	0.593	3.223
2020	1.776	2.336	4.112	2.630	0.730	3.360
2021	0.271	2.044	2.315	0.225	0.638	0.863
2022	0.271	1.971	2.242	0.225	0.616	0.841
2023	0.000	1.898	1.898	0.000	0.593	0.593
2024	0.000	1.898	1.898	0.000	0.593	0.593
2025	0.000	1.825	1.825	0.000	0.570	0.570
Energy investments						
2010	0.000	0.000	0.000	0.000	0.000	0.000
2011	0.000	0.000	0.000	0.000	0.000	0.000
2012	0.000	0.000	0.000	0.000	0.000	0.000
2013	0.788	0.000	0.788	0.000	0.000	0.000
2014	1.971	0.000	1.971	0.000	0.000	0.000
2015	2.022	0.000	2.022	0.000	0.000	0.000
2016	1.234	0.092	1.326	0.000	0.007	0.007
2017	1.234	0.184	1.418	0.000	0.014	0.014
2018	0.052	0.276	0.328	0.000	0.021	0.021
2019	0.052	0.368	0.420	0.000	0.028	0.028
2020	0.000	0.460	0.460	0.000	0.035	0.035
2021	0.000	0.460	0.460	0.000	0.035	0.035
2022	0.000	0.460	0.460	0.000	0.035	0.035
2023	0.000	0.460	0.460	0.000	0.035	0.035
2024	0.000	0.460	0.460	0.000	0.035	0.035
2025	0.000	0.460	0.460	0.000	0.035	0.035

^a In nominal terms.

On-farm animal welfare

Tables C.26 and C.27 provide a summary of the key model shocks for On-farm animal welfare programs.

C.26 Overview of simulations for on-farm animal welfare

Project areas identified in workshop	Benefits quantified?	Summary of application to IF ^a	Timeframe of analysis ^b
Demand impact of MLA's community engagement activities	Yes	Shift in demand – quantities – all species across all markets	2011-19
Extending Transport times from 36 to 48	Yes	Reduction in transport costs	2014-30

Project areas identified in workshop	Benefits quantified?	Summary of application to IF ^a	Timeframe of analysis ^b
hours		primarily at farm level for cattle and sheep	
Improved poll gene test for Bos Indicus derived cattle	Yes	Productivity increase/reduction in costs from calf dehorning in Northern cattle	2015-30
Reducing impacts from wild dogs development of PAPP	No		

^a In the first round, relative to counterfactual or without MLA investment scenario. ^b Time over which benefits are assumed to flow including decay .For example, 2011-30 is 2010-11 to 2029-30.

C.27 Key model shocks for on-farm animal welfare

Project areas identified in workshop	Impact	First round impact adjusted for adoption	Attribution to MLA
Demand impact of MLA's community engagement activities	<ul style="list-style-type: none"> 0.25% increase in demand for all species 	<ul style="list-style-type: none"> 0.25% increase 2011 to 2015 which then phases down to zero by 2020 	<ul style="list-style-type: none"> 100%
Extending Transport times from 36 to 48 hours	<ul style="list-style-type: none"> Benefit is avoided additional transport costs (reduction in transport costs) 	<ul style="list-style-type: none"> In 2014 terms, benefit are <ul style="list-style-type: none"> – Northern beef \$65 million – Southern beef \$7 million – Sheep \$45 million 	<ul style="list-style-type: none"> 5%
Improved poll gene test for Bos Indicus derived cattle	<ul style="list-style-type: none"> Benefit is avoided deaths of up to 19 500 calves in Northern beef at \$300 per calf. 	<ul style="list-style-type: none"> Maximum 80% adoption by 2030 starting in 2015 	<ul style="list-style-type: none"> 100%

D Summary of benefits by sector

This appendix details the distribution of benefits from MLA investments across red meat sectors.

All MLA programs

Tables D.1 and D.2 provides the benefits from all MLA programs including benefits by sector.

D.1 MLA Impact - benefits in terms of red meat net income: All MLA programs^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
1 Maintaining and improving market access	1 098	1 067	2 165	14.8
2 Growing demand	879	1 276	2 155	5.2
3 Increasing productivity along the supply chain	47	1 338	1 385	4.5
4 Supporting industry integrity and sustainability	419	44	464	3.8
Total – All MLA programs	2 444	3 725	6 170	6.2
– % of impact benefits	40	60	100	
Present values – benefits by sector				
Grass fed cattle	1 662	2 366	4 028	8.8
Grain fed cattle	66	213	279	4.1
Sheep	618	599	1 217	4.3
Goats	19	22	41	6.7
Processing	-1	506	505	3.0
Live export	80	20	100	7.8
Total red meat industry	2 444	3 725	6 170	6.2

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

D.2 MLA Impact - benefits in terms of GVP: All MLA programs^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
1 Maintaining and improving market access	1 701	2 262	3 963	27.1
2 Growing demand	1 613	2 225	3 838	9.2

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
3 Increasing productivity along the supply chain	81	1 605	1 686	5.4
4 Supporting industry integrity and sustainability	-555	71	-484	-3.9
Total – All MLA programs	2 840	6 163	9 003	9.0
– % of impact benefits	32	68	100	
Present values – benefits by sector				
Grass fed cattle	1 174	3 736	4 910	
Grain fed cattle	602	1669	2 271	
Sheep	1 036	716	1 752	
Goats	29	41	70	
Total red meat industry	2 840	6 163	9 003	9.0

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

#1 Maintaining and improving market access

Tables D.3 and D.4 provides the benefits across *Maintaining and improving market access* including benefits by sector.

D.3 MLA Impact – benefits in terms of red meat net income: 1 Maintaining and improving market access^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
1.1 Develop and deliver industry systems that underpin product integrity	462	0	462	8.3
1.2 Support industry and government to maintain and liberalise world meat markets	0	999	999	24.0
1.3 Maximise market options for producers and exporters in the livestock export market	637	68	705	14.5
Total – 1 Maintaining and improving market access	1 098	1 067	2 165	14.8
– % of impact benefits	51	49	100	
Present values – benefits by sector				
Grass fed cattle	809	854	1663	30.1
Grain fed cattle	8	99	107	16.0
Sheep	185	19	205	6.6
Goats	16	14	30	23.8
Processing	-7	75	68	1.7
Live export	87	6	93	7.3
Total red meat industry	1 098	1 067	2 165	14.8

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

D.4 MLA Impact - benefits in terms of GVP: 1 Maintaining and improving market access

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
1.1 Develop and deliver industry systems that underpin product integrity	856	0	856	15.4
1.2 Support industry and government to maintain and liberalise world meat markets	0	2167	2167	52.0
1.3 Maximise market options for producers and exporters in the livestock export market	845	95	940	19.3
Total – 1 Maintaining and improving market access	1 701	2 262	3963	27.1
– % of impact benefits	43	57	100	
Present values – benefits by sector				
Grass fed cattle	1 191	1 355	2 546	
Grain fed cattle	165	864	1 028	
Sheep	321	22	343	
Goats	24	21	45	
Total red meat industry	1 701	2 262	3 963	27.1

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

1.1 Product integrity

Tables D.5 and D.6 provides the benefits across the Product integrity program including benefits by sector.

D.5 MLA Impact – benefits in terms of red meat net income: 1.1 Product Integrity ^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
1.1 Develop and deliver industry systems that underpin product integrity	462	0	462	8.3
– % of impact benefits	100	0	100	
Present values – benefits by sector				
Grass fed cattle	293	0	293	16.7
Grain fed cattle	17	0	17	3.5
Sheep	124	0	124	9.8
Goats	6	0	6	9.0
Processing	22	0	22	1.1
Live export	-1	0	-1	-2.4
Total red meat industry	462	0	462	8.3

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

D.6 MLA Impact – benefits in terms of GVP: 1.1 Product Integrity^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
1.1 Develop and deliver industry systems that underpin product integrity	856	0	856	15.4
– % of impact benefits	100	0	100	
Present values – benefits by sector				
Grass fed cattle	469	0	469	
Grain fed cattle	165	0	165	
Sheep	213	0	213	
Goats	10	0	10	
Total red meat industry	856	0	856	15.4

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

1.2 Market Access

Tables D.7 and D.8 provides the benefits across the Market Access program including benefits by sector.

D.7 MLA Impact – benefits in terms of red meat net income: 1.2 Market access^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
1.2 Support industry and government to maintain and liberalise world meat markets	0	999	999	24.0
– % of impact benefits	0	100	100	
Present values – benefits by sector				
Grass fed cattle	0	815	815	67.8
Grain fed cattle	0	100	100	53.3
Sheep	0	-3	-3	-0.4
Goats	0	13	13	268.9
Processing	0	76	76	3.9
Live export	0	-2	-2	na
Total red meat industry	0	999	999	24.0

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

D.8 MLA Impact – benefits in terms of GVP: 1.2 Market access^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
1.2 Support industry and government to maintain and liberalise world meat markets	0	2 167	2 167	52.0
– % of impact benefits	0	100	100	
Present values – benefits by sector				
Grass fed cattle	0	1 300	1 300	
Grain fed cattle	0	865	865	
Sheep	0	-18	-18	
Goats	0	20	20	
Total red meat industry	0	2 167	2 167	52.0

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

1.3 Live Export Portfolio

Tables D.9 and D.10 provides the benefits across the Live Export portfolio including benefits by sector.

D.9 MLA Impact – benefits in terms of red meat net income: 1.3 Live Export Portfolio^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
1.3 Maximise market options for producers and exporters in the LEP	637	68	705	14.5
– % of impact benefits	90	10	100	
Present values – benefits by sector				
Grass fed cattle	515	40	555	21.7
Grain fed cattle	-9	-1	-9	na
Sheep	62	23	84	8.3
Goats	10	0	10	20.5
Processing	-29	-2	-31	na
Live export	87	8	95	7.7
Total red meat industry	637	68	705	14.5

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

D.10 MLA Impact – benefits in terms of GVP: 1.3 Live Export Portfolio^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
1.3 Maximise market options for producers and exporters in the LEP	845	95	940	845
– % of impact benefits	90	10	100	
Present values – benefits by sector				
Grass fed cattle	723	55	778	
Grain fed cattle	0	-1	-1	
Sheep	108	40	148	
Goats	15	1	15	
Total red meat industry	845	95	940	19.3

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

#2 Growing demand

Tables D.11 and D.12 provides the benefits across the *Growing demand* including benefits by sector.

D.11 MLA Impact – benefits in terms of red meat net income: 2 Growing demand ^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
2.1 Eating Quality	107	572	679	12.5
2.2 Nutrition	Analysis included under Programs 2.4 and 2.5			
2.3 New products	0	33	33	1.6
2.4 Beef Domestic Marketing (incl nutrition)	108	0	108	1.1
2.5 Lamb Domestic Marketing (incl nutrition)	265	0	265	4.1
2.6 Beef Export Marketing	394	527	921	6.7
2.7 Sheepmeat Export Marketing	6	144	150	3.4
Total – 2 Growing Demand	879	1 276	2155	5.2
– % of impact benefits	41	59	100	
Present values – benefits by sector				
Grass fed cattle	413	976	1 389	5.8
Grain fed cattle	37	23	60	2.0
Sheep	369	189	558	4.6
Goats	1	1	2	1.3
Processing	65	91	156	5.7
Live export	-5	-4	-10	na
Total red meat industry	879	1 276	2 155	5.2

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

D.12 MLA Impact – benefits in terms of GVP: 2 Growing Demand^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
2.1 Eating Quality	182	988	1 170	21.5
2.2 Nutrition	Analysis included under Programs 2.4 and 2.5			
2.3 New products	0	62	62	3.0
2.4 Beef Domestic Marketing (incl nutrition)	248	0	248	2.6
2.5 Lamb Domestic Marketing (incl nutrition)	434	0	434	6.6
2.6 Beef Export Marketing	739	923	1 662	12.1
2.7 Sheepmeat Export Marketing	10	252	262	5.9
Total – 2 Growing Demand	1 613	2 225	3 838	9.2
– % of impact benefits	43	57	100	
Present values – benefits by sector				
Grass fed cattle	620	1 556	2 175	
Grain fed cattle	353	342	695	
Sheep	639	326	965	
Goats	2	1	3	
Total red meat industry	1 613	2 225	3 838	9.2

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

2.1 Eating quality

Tables D.13 and D.14 provides the benefits across the Eating Quality program including benefits by sector.

D.13 MLA Impact – benefits in terms of red meat net income: 2.1 Eating Quality^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
2.1 Deliver consistent and optimal eating quality	107	572	679	12.5
– % of impact benefits	16	84	100	
Present values – benefits by sector				
Grass fed cattle	4	520	524	18.3
Grain fed cattle	1	6	7	1.1
Sheep	93	4	97	7.4
Goats	0	0	0	0.0
Processing	9	43	52	9.0
Live export	-1	-1	-2	na
Total red meat industry	107	572	679	12.5

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

D.14 MLA Impact – benefits in terms of GVP: 2.1 Eating Quality

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
2.1 Deliver consistent and optimal eating quality	182	988	1 170	21.5
– % of impact benefits	16	84	100	
Present values – benefits by sector				
Grass fed cattle	6	830	837	
Grain fed cattle	10	150	161	
Sheep	165	8	173	
Goats	0	0	0	
Total red meat industry	182	988	1 170	21.5

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

2.3 New products

Tables D.15 and D.16 provides the benefits across the New Products program including benefits by sector.

D.15 MLA Impact – benefits in terms of red meat net income: 2.3 New Products^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
2.3 New Products	0	33	33	1.6
– % of impact benefits	0	100	100	
Present values – benefits by sector				
Grass fed cattle	0	25	25	3.7
Grain fed cattle	0	2	2	2.1
Sheep	0	3	3	0.7
Goats	0	0	0	-1.2
Processing	0	3	3	0.3
Live export	0	0	0	na
Total red meat industry	0	33	33	1.6

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

D.16 MLA Impact – benefits in terms of GVP: 2.3 New Products^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
2.3 New Products	0	62	62	3.0

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
– % of impact benefits	0	100	100	
Present values – benefits by sector				
Grass fed cattle	0	40	40	
Grain fed cattle	0	17	17	
Sheep	0	5	5	
Goats	0	0	0	
Total red meat industry	0	62	62	3.0

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

2.4 and 2.2 Beef domestic marketing and nutrition

Tables D.17 and D.18 provides the benefits across the Beef Domestic Marketing program including benefits by sector.

D.17 MLA Impact – benefits in terms of red meat net income: 2.4 Beef Domestic Marketing (including Nutrition)^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
2.4 Beef Domestic Marketing (incl nutrition)	108	0	108	1.1
– % of impact benefits	100	0	100	
Present values – benefits by sector				
Grass fed cattle	97	0	97	1.2
Grain fed cattle	5	0	5	0.6
Sheep	4	0	4	na
Goats	0	0	0	na
Processing	2	0	2	0.2
Live export	0	0	0	na
Total red meat industry	108	0	108	1.1

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

D.18 MLA Impact – benefits in terms of GVP: 2.4 Beef Domestic Marketing (including Nutrition)^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
2.4 Beef Domestic Marketing (incl nutrition)	248	0	248	2.6

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
– % of impact benefits	100	0	100	
Present values – benefits by sector				
Grass fed cattle	118	0	118	
Grain fed cattle	124	0	124	
Sheep	6	0	6	
Goats	0	0	0	
Total red meat industry	248	0	248	2.6

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

2.5 & 2.2 Lamb domestic marketing and nutrition

Tables D.19 and D.20 provides the benefits across the Lamb Domestic Marketing program including benefits by sector.

D.19 MLA Impact – benefits in terms of red meat net income: 2.5 Lamb Domestic Marketing (including Nutrition)^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
2.5 Sheepmeat Domestic Marketing (incl nutrition)	265	0	265	4.1
– % of impact benefits	100	0	100	
Present values – benefits by sector				
Grass fed cattle	9	6	15	na
Grain fed cattle	4	0	4	na
Sheep	239	135	374	6.2
Goats	0	0	0	1.4
Processing	22	2	24	5.4
Live export	-2	0	-2	na
Total red meat industry	271	144	415	4.1

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

D.20 MLA Impact – benefits in terms of GVP: 2.5 Lamb Domestic Marketing (including Nutrition)^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
2.5 Sheepmeat Domestic Marketing (incl nutrition)	434	0	434	6.6

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
– % of impact benefits	100	0	100	
Present values – benefits by sector				
Grass fed cattle	13	0	13	
Grain fed cattle	20	0	20	
Sheep	400	0	400	
Goats	0	0	0	
Total red meat industry	434	0	434	6.6

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

2.6 Beef export marketing

Tables D.21 and D.22 provides the benefits across the Beef Export Marketing program including benefits by sector.

D.21 MLA Impact – benefits in terms of red meat net income: 2.6 Beef Export Marketing^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
2.6 Beef Export Marketing	394	527	921	6.7
– % of impact benefits	100	0	100	
Present values – benefits by sector				
Grass fed cattle	303	425	727	5.9
Grain fed cattle	27	15	42	2.9
Sheep	33	47	80	na
Goats	1	1	2	na
Processing	32	43	76	na
Live export	-2	-3	-6	na
Total red meat industry	394	527	921	6.7

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

D.22 MLA Impact – benefits in terms of GVP: 2.6 Beef Export Marketing^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
2.6 Beef Export Marketing	739	923	1 662	12.1
– % of impact benefits	100	0	100	

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
Present values — benefits by sector				
Grass fed cattle	482	676	1 158	
Grain fed cattle	198	163	361	
Sheep	58	82	140	
Goats	1	2	3	
Total red meat industry	739	923	1 662	12.1

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

2.7 Sheepmeat export marketing

Tables D.23 and D.24 provides the benefits across the Sheepmeat Export Marketing program including benefits by sector.

D.23 MLA Impact — benefits in terms of red meat net income: 2.7 Sheepmeat Export Marketing^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
2.6 Beef Export Marketing	6	144	150	3.4
— % of impact benefits	4	96	100	
Present values — benefits by sector				
Grass fed cattle	0	6	6	na
Grain fed cattle	0	0	1	na
Sheep	5	135	141	3.3
Goats	0	0	0	0.1
Processing	0	2	3	na
Live export	0	0	0	na
Total red meat industry	6	144	150	3.4

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

D.24 MLA Impact — benefits in terms of GVP: 2.7 Sheepmeat Export Marketing^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
2.6 Beef Export Marketing	10	252	262	5.9
— % of impact benefits	4	96	100	
Present values — benefits by sector				

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
Grass fed cattle	0	9	9	
Grain fed cattle	0	11	12	
Sheep	9	231	241	
Goats	0	0	0	
Total red meat industry	10	252	262	5.9

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

#3 Increasing productivity

Tables D.25 and D.26 provides the benefits across *Increasing productivity* including benefits by sector.

D.25 MLA Impact - benefits in terms of red meat net income: 3 Increasing productivity across the supply chain^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
3.1 Identify and deliver opportunities to increase on-farm productivity	0	349	349	2.7
3.2 Identify and deliver opportunities to increase off-farm productivity and capability	0	323	323	4.7
3.3 Deliver valued supply chain and market information	0	315	315	7.9
3.4 Support industry to improve animal health and biosecurity	34	161	195	4.6
3.6 Feedlot programs	13	182	195	7.6
3.7 Goat Programs	0	8	8	2.6
Total – 3 Increasing productivity across the supply chain	47	1 338	1 385	4.5
– % of impact benefits	3	97	100	
Present values – benefits by sector				
Grass fed cattle	31	497	528	4.9
Grain fed cattle	6	90	96	3.4
Sheep	7	387	394	3.9
Goats	0	7	7	2.2
Processing	3	339	342	4.9
Live export	0	18	18	0.1
Total red meat industry	47	1 338	1 385	4.5

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

D.26 MLA Impact - benefits in terms of GVP: 3 Increasing productivity across the supply chain^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
3.1 Identify and deliver opportunities to increase on-farm productivity	0	458	458	3.5
3.2 Identify and deliver opportunities to increase off-farm productivity and capability	0	329	329	4.8
3.3 Deliver valued supply chain and market information	0	274	274	6.9
3.4 Support industry to improve animal health and biosecurity	62	27	89	2.1
3.6 Feedlot programs	19	497	516	20.2
3.7 Goat Programs	0	20	20	6.7
Total – 3 Increasing productivity across the supply chain	81	1 605	1 686	5.4
– % of impact benefits	5	95	100	
Present values – benefits by sector				
Grass fed cattle	49	774	823	
Grain fed cattle	20	450	470	
Sheep	12	362	374	
Goats	0	19	19	
Total red meat industry	81	1 605	1 686	5.4

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

3.1 Increasing Productivity On-farm (including 3.5 producer engagement)

Tables D.27 and D.28 provides the benefits across the On-farm Productivity program including benefits by sector.

D.27 MLA Impact – benefits in terms of red meat net income: 3.1 On-farm productivity^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
3.1 On-farm productivity	0	349	349	2.7
– % of impact benefits	0	100	100	
Present values – benefits by sector				
Grass fed cattle	0	123	123	1.8
Grain fed cattle	0	35	35	67.5
Sheep	0	119	119	2.0

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
Goats	0	-1	-1	-9.0
Processing	0	65	65	na
Live export	0	8	8	na
Total red meat industry	0	349	349	2.7

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

D.28 MLA Impact – benefits in terms of GVP: 3.1 On-farm productivity^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
3.1 On-farm productivity	0	458	458	3.5
– % of impact benefits	0	100	100	
Present values – benefits by sector				
Grass fed cattle	0	323	323	
Grain fed cattle	0	81	81	
Sheep	0	56	56	
Goats	0	-2	-2	
Total red meat industry	0	458	458	3.5

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

3.2 Off-farm productivity

Tables D.29 and D.30 provides the benefits across the Off-farm Productivity program including benefits by sector.

D.29 MLA Impact – benefits in terms of red meat net income: 3.2 Off-farm productivity^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
3.2 Off-farm productivity	0	323	323	4.7
– % of impact benefits	0	100	100	
Present values – benefits by sector				
Grass fed cattle	0	89	89	523
Grain fed cattle	0	1	1	25
Sheep	0	92	92	831
Goats	0	0	0	na

Processing	0	141	141	2.1
Live export	0	0	0	na
Total red meat industry	0	323	323	4.7

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

D.30 MLA Impact – benefits in terms of GVP: 3.2 Off-farm productivity^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
3.2 Off-farm productivity	0	329	329	4.8
– % of impact benefits	0	100	100	
Present values – benefits by sector				
Grass fed cattle	0	129	129	
Grain fed cattle	0	35	35	
Sheep	0	165	165	
Goats	0	0	0	
Total red meat industry	0	329	329	4.8

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

3.3 Market information

Tables D.31 and D.32 provides the benefits across the Market Information program including benefits by sector.

D.31 MLA Impact – benefits in terms of red meat net income: 3.3 Market Information^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
3.3 Deliver valued supply chain and market information	0	315	315	7.9
– % of impact benefits	0	100	100	
Present values – benefits by sector				
Grass fed cattle	0	188	188	7.5
Grain fed cattle	0	5	5	2.7
Sheep	0	78	78	6.6
Goats	0	3	3	8.2
Processing	0	40	40	57.3
Live export	0	0	0	na
Total red meat industry	0	315	315	7.9

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

D.32 MLA Impact – benefits in terms of GVP: 3.3 Market Information^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
3.3 Deliver valued supply chain and market information	0	274	274	6.9
– % of impact benefits	0	100	100	
Present values – benefits by sector				
Grass fed cattle	0	188	188	
Grain fed cattle	0	5	5	
Sheep	0	78	78	
Goats	0	3	3	
Total red meat industry	0	274	274	6.9

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

3.4 On-farm animal health and biosecurity

Tables D.33 and D.34 provides the benefits across the On-farm Productivity program including benefits by sector.

D.33 MLA Impact – benefits in terms of red meat net income: 3.4 On-farm animal health and biosecurity^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
3.4 Support industry to improve animal health and biosecurity	34	161	195	4.6
– % of impact benefits	17	83	100	
Present values – benefits by sector				
Grass fed cattle	22	-11	11	0.8
Grain fed cattle	1	-1	1	na
Sheep	7	106	113	3.9
Goats	0	-1	0	na
Processing	2	58	60	na
Live export	0	10	10	na
Total red meat industry	34	161	195	4.6

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

D.34 MLA Impact – benefits in terms of GVP: 3.4 On-farm animal health and biosecurity^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
3.4 Support industry to improve animal health and biosecurity	62	27	89	2.1
– % of impact benefits	70	30	100	
Present values – benefits by sector				
Grass fed cattle	36	-37	-1	
Grain fed cattle	14	-12	2	
Sheep	12	77	89	
Goats	0	-1	-1	
Total red meat industry	62	27	89	2.1

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

3.6 Feedlot programs: productivity, health, welfare & environment.

Tables D.35 and D.36 provides the benefits across the Feedlot Programs including benefits by sector.

D.35 MLA Impact – benefits in terms of red meat net income: 3.6 Feedlot Programs^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
3.6 Feedlot Programs	13	182	195	7.6
– % of impact benefits	7	93	100	
Present values – benefits by sector				
Grass fed cattle	8	107	116	na
Grain fed cattle	4	50	54	2.1
Sheep	0	-8	-8	na
Goats	0	0	0	na
Processing	1	33	34	na
Live export	0	0	0	na
Total red meat industry	13	182	195	7.6

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

D.36 MLA Impact – benefits in terms of GVP: 3.6 Feedlot Programs^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
3.6 Feedlot Programs	19	497	516	20.2
– % of impact benefits	4	96	100	
Present values – benefits by sector				
Grass fed cattle	13	171	183	
Grain fed cattle	6	340	347	
Sheep	0	-13	-13	
Goats	0	-1	-1	
Total red meat industry	19	497	516	20.2

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

3.7 Goat Industry

Tables D.37 and D.38 provides the benefits across Goat Industry programs including benefits by sector.

D.37 MLA Impact – benefits in terms of red meat net income: 3.7 Goat Industry^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
3.7 Goat Industry	0	8	8	2.6
– % of impact benefits	0	100	100	
Present values – benefits by sector				
Grass fed cattle	0	0	0	na
Grain fed cattle	0	0	0	na
Sheep	0	0	0	na
Goats	0	7	7	2.3
Processing	0	1	1	na
Live export	0	0	0	0.0
Total red meat industry	0	8	8	2.6

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

D.38 MLA Impact – benefits in terms of GVP: 3.7 Goat Industry^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
3.7 Goat Industry	0	20	20	6.7

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
– % of impact benefits	0	100	100	
Present values – benefits by sector				
Grass fed cattle	0	0	0	
Grain fed cattle	0	0	0	
Sheep	0	0	0	
Goats	0	20	20	
Total red meat industry	0	20	20	6.7

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

#4 Industry Integrity and Sustainability

Tables D.39 and D.40 provides the benefits across *Industry Integrity and Sustainability* including benefits by sector.

D.39 MLA Impact - benefits in terms of red meat net income: 4 Supporting industry integrity and sustainability ^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
4.1 Support on-farm sustainability	296	4	300	4.5
4.2 Support off-farm sustainability	0	40	40	4.3
4.3 Provide industry with solutions to meet high standards of animal welfare without reducing productivity levels	124	0	124	7.7
4.4 support industry's effective engagement with the community	Analysis included under Programs 4.1 and 4.3			
4.5 Develop sustainable innovation capability within the industry and its service providers	Not quantified			
Total – 4 Supporting industry integrity and sustainability	419	44	464	3.8
– % of impact benefits	90	10	100	
Present values – benefits by sector				
Grass fed cattle	410	38	448	7.6
Grain fed cattle	15	0	15	6.9
Sheep	56	4	60	1.9
Goats	2	0	2	27.6
Processing	-62	1	-60	-2.0
Live export	-2	0	-2	na
Total red meat industry	419	44	464	3.8

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

D.40 MLA Impact - benefits in terms of GVP: 4 Supporting industry integrity and sustainability^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
4.1 Support on-farm sustainability	-680	1	-679	-10.1
4.2 Support off-farm sustainability	0	70	70	4.7
4.3 Provide industry with solutions to meet high standards of animal welfare without reducing productivity levels	125	0	125	7.8
4.4 support industry's effective engagement with the community	Analysis included under Programs 4.1 and 4.3			
4.5 Develop sustainable innovation capability within the industry and its service providers	Not quantified			
Total – 4 Supporting industry integrity and sustainability	-555	71	-484	-3.9
– % of impact benefits	115	-15	100	
Present values – benefits by sector				
Grass fed cattle	1 174	3 736	4 910	
Grain fed cattle	602	1669	2 271	
Sheep	1 036	716	1 752	
Goats	29	41	70	
Total red meat industry	2 840	6 163	9 003	9.0

^a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

4.1 On-farm environmental sustainability

Tables D.41 and D.42 provides the benefits across the On-farm environmental sustainability program including benefits by sector.

D.41 MLA Impact – benefits in terms of red meat net income: 4.1 On-farm environment^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
4.1 Supporting on-farm environmental sustainability	296	4	300	4.5
– % of impact benefits	99	1	100	
Present values – benefits by sector				
Grass fed cattle	341	4	345	7.5
Grain fed cattle	10	0	10	na
Sheep	16	0	16	0.8
Goats	1	0	1	na
Processing	-71	0	-70	na

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
Live export	-2	0	-2	na
Total red meat industry	296	4	300	4.5

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

D.42 MLA Impact – benefits in terms of GVP: 4.1 On-farm environment^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
4.1 Supporting on-farm environmental sustainability	-680	1	-679	-10.1
– % of impact benefits	100	0	100	
Present values – benefits by sector				
Grass fed cattle	-742	1	-741	
Grain fed cattle	38	0	38	
Sheep	22	0	22	
Goats	1	0	1	
Total red meat industry	-680	1	-679	-10.1

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

4.2 Off-farm environmental sustainability

Tables D.43 and D.44 provides the benefits across the Off-farm environmental sustainability program including benefits by sector.

D.43 MLA Impact – benefits in terms of red meat net income: 4.2 Off -farm environment^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
4.2 Support off-farm environmental sustainability	40	0	40	2.5
– % of impact benefits	100	0	100	
Present values – benefits by sector				
Grass fed cattle	35	0	35	na
Grain fed cattle	0	0	0	na
Sheep	4	0	4	na
Goats	0	0	0	na
Processing	1	0	1	0
Live export	0	0	0	na

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
Total red meat industry	40	0	40	2.5

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

D.44 MLA Impact – benefits in terms of GVP: 4.2 Off -farm environment^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
4.2 Support off-farm environmental sustainability	70	0	70	4.4
– % of impact benefits	100	0	100	
Present values – benefits by sector				
Grass fed cattle	50	0	50	
Grain fed cattle	13	0	13	
Sheep	7	0	7	
Goats	0	0	0	
Total red meat industry	70	0	70	4.4

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

4.3 On-farm animal welfare

Tables D.45 and D.46 provides the benefits across the On-farm animal welfare including benefits by sector.

D.45 MLA Impact – benefits in terms of red meat net income: 4.3 On-farm animal welfare^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
4.3 Provide industry with solutions to meet high standards of animal welfare without reducing productivity levels	124	0	124	7.7
– % of impact benefits	100	0	100	
Present values – benefits by sector				
Grass fed cattle	69	0	69	8.1
Grain fed cattle	4	0	4	na
Sheep	40	0	40	5.6
Goats	1	0	1	na
Processing	9	0	9	30.0
Live export	0	0	0	na

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
Total red meat industry	124	0	124	7.7

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

D.46 MLA Impact – benefits in terms of GVP: 4.3 On-farm animal welfare^a

	Industry downside threat	Industry upside opportunity	Total benefits	Benefit Cost Ratio
	\$m	\$m	\$m	BCR
4.3 Provide industry with solutions to meet high standards of animal welfare without reducing productivity levels	125	0	125	7.8
– % of impact benefits	100	0	100	
Present values – benefits by sector				
Grass fed cattle	56	0	56	
Grain fed cattle	26	0	26	
Sheep	41	0	41	
Goats	2	0	2	
Total red meat industry	125	0	125	7.8

a Expected present value of benefits in 2014-15 dollars using a real rate of return of 5 per cent.

E Estimates of Community benefits from MLA investments

As part of MLA's performance review, the Australian Government is also interested in the benefits that accrue outside of the red meat industry. The 2011-16 Statutory Funding Agreement identifies that the review must take into account

delivery of the benefits to the Industry and/or the community in general from investments in Research and Development as foreshadowed by Strategic and annual Operating Plans.

The area of interest for community benefits for the Australian Government lies from those that result from R&D investments only, as it contributes matching dollars to producers' levies. As there is no equivalent contribution for marketing and promotion, demonstration of spillover benefits is not required.

In addition to direct benefits to the Australian red meat industry in terms of net income, other benefits from MLA investments can be observed through a number of mechanisms:

- flow-on benefits to domestic consumers and those overseas
 - The focus being domestic consumers representing the taxpayer base.
- economic flow-on or multiplier benefits to other industries in the Australian economy
- other social/community benefits.

Given the scope of the economic analysis undertaken, the same economic framework can also be used to calculate part of these community benefits — economic benefits to domestic consumers as calculated by changes in consumer expenditure and consumer surplus.

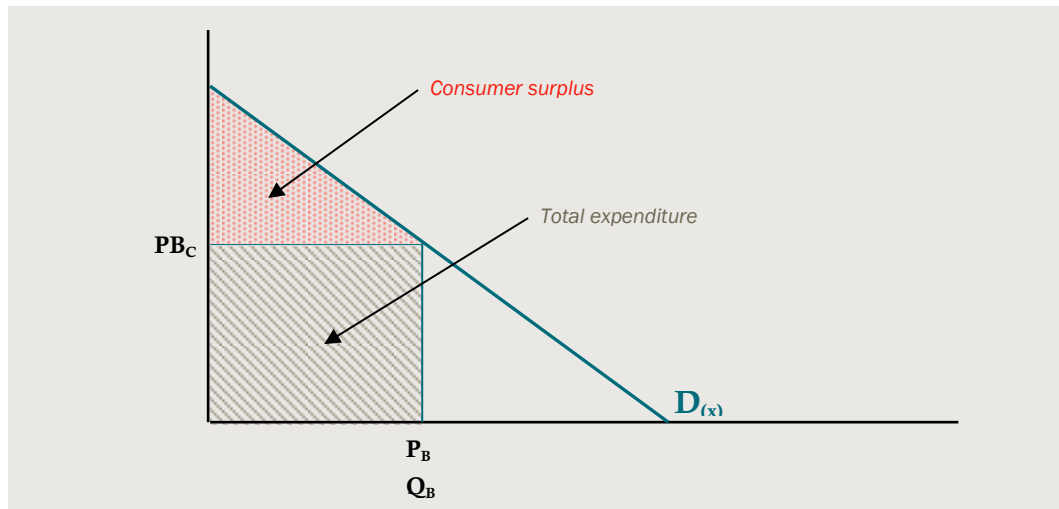
Overview of consumer surplus

Consumer benefits are generally measured in terms of positive changes in what economists term 'consumer surplus' which is the difference between the price consumers are willing to pay and the actual price paid.

- Willingness to pay reflects the individual's utility or benefit derived from consumption.
- Simply put, if a consumer is willing to pay more than the market price, then this difference is an indication of benefit (that is, how much they 'saved').

Consumer surplus is the total utility (area under the demand curve $D(x)$ up to the quantity that is consumed) less the total expenditure. Chart E.1 illustrates how *changes* in consumer surplus would be estimated as a result of a change in price.

E.1 Measuring consumer surplus in principle



Data source: CIE.

In addition, changes in consumer benefit can also result when there is a shift in the demand curve (an increase in quantity demanded changes at a given price).

Calculation of community benefits for *domestic consumers only* involved the estimation of changes in expenditure and changes in consumer surplus across MLA programs—for those areas for which R&D funding constitutes 50 per cent or more of program funding (relative to marketing dollars). Therefore, those programs excluded from the analysis include predominantly marketing activities:

- 1.1 Develop and deliver industry systems that underpin product integrity
- 1.2 Support industry and government to maintain and liberalise world meat markets
- 1.3 Maximise market options for producers and exporters in the livestock export market
- 2.4 Beef Domestic Marketing (including nutrition)
- 2.5 Lamb Domestic Marketing (including \ nutrition)
- 2.6 Beef Export Marketing
- 2.7 Sheepmeat Export Marketing.

These benefits were calculated at two levels:

- consumer or retail level (based on retail prices)
- wholesale or export level (using export-equivalent prices).

Estimates of consumer surplus

Table E.2 lists the estimates of changes in consumer expenditure and consumer surplus across MLA's R&D-based programs. Two of these programs include R&D components but also involve shifts in demand (at the same price):

- 2.1 Eating Quality
- 4.3 Animal welfare.

E.2 Impact on domestic consumer expenditure and surplus at retail level^a

Programs using matching R&D dollars	Consumer expenditure	Consumer surplus
	\$m	\$m
2.1 Eating Quality ^b	526	168
2.3 New products	27	4
3.1 Identify and deliver opportunities to increase on-farm productivity	-139	369
3.2 Identify and deliver opportunities to increase off-farm productivity and capability	-55	164
3.3 Deliver valued supply chain and market information	0	0
3.4 Support industry to improve animal health and biosecurity	-50	152
3.6 Feedlot programs	-106	178
3.7 Goat Programs	0	0
4.1 Support on-farm sustainability	-43	132
4.2 Support off-farm environmental sustainability	-2	4
4.3 Provide industry with solutions to meet high standards of animal welfare without reducing productivity levels ^b	159	149
Programs predominantly funded by matching Government dollars	318	1 320
– Excluding 2.1 Eating Quality and 4.3 Animal Welfare	-367	1 003

^a Present value of consumer expenditure and surplus at retail level dollars in 2014-15 dollars using a real rate of return of 5 per cent.

^b Impacts include a shift in demand.

Table E.2 shows that over all R&D-based activities, the present value of consumer expenditure over the period 2010-11 to 2029-30 is found to have increased by \$318 million at retail level in present value terms. Excluding the two programs which resulted in an increased in demand, consumers would have benefited by spending \$ 367 million less than without MLA investment.

The benefits to consumers increase considerably moving to estimates of consumer surplus. Across the programs in table E.2, the present value of consumer surplus over the 20 year period at retail level would have increased by \$1.3 billion as a result of MLA investments. ⁶⁹

Considering these benefits at an equivalent wholesale or export level, the present value of consumer surplus for domestic consumers increases by \$616 million or \$30 million a year as a result of MLA investments over the period 2010-11 to 2014-15 (see table E.3 below).

E.3 Impact on domestic consumer expenditure and surplus at export level^a

Programs using matching R&D dollars	Consumer expenditure	Consumer surplus
	\$m	\$m
2.1 Eating Quality ^b	252	74
2.3 New products	13	2

⁶⁹ This is equivalent to an annual benefit of \$66 million or 1 per cent of the total present value of consumer expenditure over the period 2010-11 to 2029-30.

Programs using matching R&D dollars	Consumer expenditure	Consumer surplus
	\$m	\$m
3.1 Identify and deliver opportunities to increase on-farm productivity	-72	173
3.2 Identify and deliver opportunities to increase off-farm productivity and capability	-30	73
3.3 Deliver valued supply chain and market information	0	0
3.4 Support industry to improve animal health and biosecurity	-30	65
3.6 Feedlot programs	-47	96
3.7 Goat Programs	0	0
4.1 Support on-farm sustainability	-22	63
4.2 Support off-farm environmental sustainability	-1	2
4.3 Provide industry with solutions to meet high standards of animal welfare without reducing productivity levels ^b	74	68
Programs predominantly funded by matching Government dollars	130	616
– Excluding 2.1 Eating Quality and 4.3 Animal Welfare	-115	542

^a Present value of consumer expenditure and surplus at retail level dollars in 2014-15 dollars using a real rate of return of 5 per cent.

^b Impacts include a shift in demand.

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