

# Improving productivity and profitability across the supply chain

MLA invests in research and development that creates opportunities for cattle, sheep and goat producers and supply chains to improve the productivity and profitability of their enterprises.

## MILESTONE SCORECARD

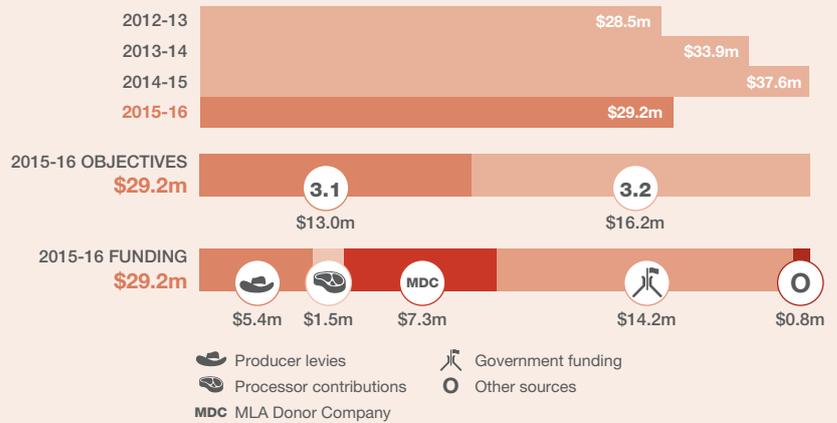
### 14 milestones

- 9 achieved
- 4 partly achieved
- 1 not achieved

### Objectives under this strategic imperative include:

- 3.1 Identify and deliver innovative opportunities to increase on-farm productivity and profitability through genetic and management interventions
- 3.2 Identify information platforms and technologies that drive productivity and innovation throughout supply chains

## INVESTMENT



### Meat Industry Strategic Plan 2010-2015 Strategic Themes

- Innovation
- Our people
- Economics and infrastructure

### Australian Government Science and Research Priorities

- Food

### Australian Government Rural Research and Development Priorities

- Productivity and adding value
- Supply chain and markets

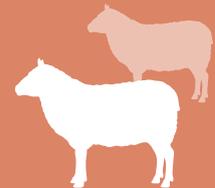
### Agricultural Competitiveness White Paper Priorities

- Advanced technology

## KEY ACHIEVEMENTS

### World-first multi-trait sheep genetics

Sheep Genetics has delivered a world first, a new multi-trait single-step carcass analysis that means eating quality breeding values can be calculated for a wide range of animals. In addition, Sheep Genetics has also developed a new eating quality index which enables producers to achieve further gains for growth and lean meat yield in their animals while maintaining eating quality.



## FACTS & FIGURES

Sides of beef processed by automated rib cutting machine	MSA compliance of graded beef carcasses	Accuracy of DEXA lean meat yield measurement	Producers trained in Livestock Data Link	Cost of dark cutting to Australian industry
<b>7,000/day</b>	<b>93%</b>	<b>85%</b>	<b>200</b>	<b>\$50m/yr</b>
Proportion of Australian cattle slaughter MSA graded	No. of Beef Industry Language White Paper recommendations	Accuracy of subjective lean meat yield measurement	Number of BladeStop™ units sold	Benefit-cost ratio of MDC automation program
<b>38%</b>	<b>40</b>	<b>30%</b>	<b>129</b>	<b>4.7:1</b>

**+ OPPORTUNITIES**

- Australia became part of the global eating quality conversation with MLA attending the International Eating Quality Conference in Paris, in late 2015, which aims to standardise eating quality research worldwide and create opportunities for research collaboration.
- The first *Australian Beef Quality Audit Report* was released at the MSA Excellence in Eating Quality forums held nationally during 2015-16, providing the opportunity for producers to benchmark their MSA performance.
- Advances in automation and objective measurement in beef and lamb have the potential to provide feedback to producers and the value chain that will ultimately enhance the consumer experience and improve market competitiveness.
- To encourage producer adoption, leucaena research outcomes need to be packaged with regionally relevant information on leucaena establishment strategies.

**■ CHALLENGES**

- The uptake of Livestock Data Link (LDL) by the processing sector remains relatively low, requiring its value to be clearly communicated and overcoming some technical challenges.
- Regardless of the pathway to slaughter, key challenges are to enable all Australian cattle to be MSA eligible and accurately predict the eating quality of all Australian cattle.
- Increasing the value of the carcase requires greater carcase utilisation and eating quality segregation.
- To remain a world leader in feedlot animal welfare, research outcomes are required that improve weather forecasting and the heat-load estimates of animals so industry is even better prepared to manage severe weather events.

**📌 OUTLOOK 2016-17**

- LDL will be rolled out to another three processing plants in southern Australia and will be introduced to two plants in northern Australia.
- Benchmarking tools in the myMSA feedback system will be introduced.
- In beef genetics, a DNA test for breed composition will continue to be developed which will help breeders achieve their desired breed composition mix in tropically adapted breeds and will eventually lead to predicting the genetic potential of composites.
- The development of a multi-energy X-ray system (MEXA) will commence, providing feedback to beef producers on lean meat yield and enabling the phenotype to be objectively measured.
- New management guidelines for non-Merino ewes will be delivered to optimise condition score profiles across the annual production cycle.

**World-leading automation**

Lamb and beef processing technologies saw new, world-leading cutting and objective measurement tools advance to working prototypes. The ability to accurately, reliably and objectively measure carcase attributes including lean meat yield will pave the way for producers to be paid on the actual value of the animal.

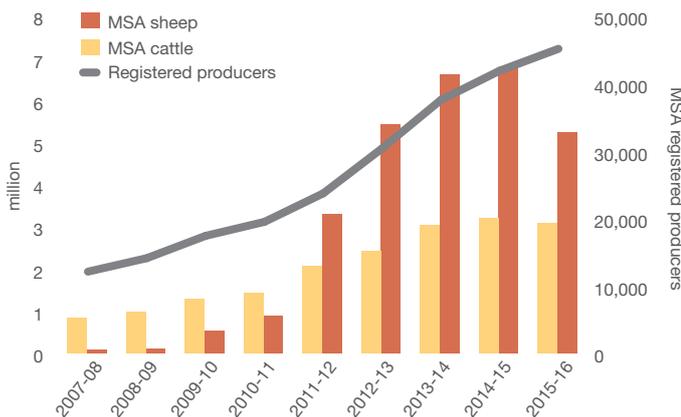


**Genetics collaboration**

MLA and MLA Donor Company collaborated with industry to launch the National Livestock Genetics Consortium which aims to double the annual rate of improvement in the industry's genetic value by 2022.



**Growth in MSA registered producers and MSA graded livestock**



Source: MSA

**OBJECTIVE 3.1**

**Identify and deliver innovative opportunities to increase on-farm productivity and profitability through genetic and management interventions**

MLA assists livestock producers to increase their on-farm productivity and profitability by investing in research and development that creates opportunities to enhance the genetic performance of livestock and the feedbase, and improve grazing and feedlot systems and eating quality.



**STRATEGIES**

**Enhanced** rates of animal and feedbase genetic improvement for the beef and sheep industries

Continued **investment** in knowledge of management and measurement technologies that predict variation in eating quality performance

**Improved** productivity in grazing and feedlot systems

**OBJECTIVE HIGHLIGHTS**

**Beef and sheep genetics**

Beef and sheep genetics continue to advance by pinpointing and influencing the key profit drivers of fertility, eating quality and yield.

Australian sheep genetics research produced a world first, delivering a new, multi-trait, single-step carcass analysis, meaning eating quality breeding values can be calculated for a wider range of animals. These new ASBVs accompany a new selection index incorporating eating quality which will assist commercial lamb producers to target, more precisely, the best genetics for their business. The breakthrough was the result of decades of information gathering and analyses from LAMBPLAN, MERINOSELECT, the Sheep CRC and MLA's Resource Flock.

In the field of beef genetics, the 'Northern Repronomics™ Fertility Project' is focused on enhancing the evaluation of reproduction traits, enabling genomic selection and rapidly increasing the rates of genetic improvement in tropically adapted breeds. The legacy of the Beef Cooperative Research Centre (CRC) continues with enhanced analyses of research outcomes, searching for new insights and information with a special focus on cow body condition and longevity. In other work, a DNA test for breed composition is being developed which will underpin brand integrity, help manage *Bos indicus* content in tropically adapted breeds

and contribute to the development of genomic selection for multi-breed populations.

**National Livestock Genetics Consortium launch**

Red meat producers will benefit from the National Livestock Genetics Consortium which aims to double the annual rate of improvement in industry genetic value by 2022. To date this new model of research, development and adoption has generated more than \$32 million in cash and attracted more than \$38 million of in-kind resources, in addition to \$52 million already invested by MLA, MLA Donor Company and others. The aim is to deliver affordable, accurate and easy-to-use technologies for genetic improvement, in beef cattle and sheep.

**MSA research**

To improve the accuracy of the MSA beef grading model and increase livestock compliance to MSA requirements, a 'mixing and stress trial' was commissioned. The aim of the research is to identify on-farm objective measures of stress, develop an infra-red camera to measure stress indicators and develop management guidelines to reduce the impact of stress on beef eating quality. Results are due in early 2016-17. Stress is a major cause of dark cutting in livestock, estimated to cost the industry more than \$50 million a year.

For the MSA lamb and sheepmeat program, key research includes the development of a cuts-based model for MSA lamb as well as a yearling sheepmeat project. The sheepmeat project is testing the eating quality of lamb, hoggets and young mutton and has been extended to understand international consumer responses to eating quality, with work being conducted in China and the US. The work will be finalised in 2016-17.

The first *Australian Beef Quality Audit Report* was released at the MSA Excellence in Eating Quality forums held nationally during 2015-16 (see page 59), providing the opportunity for producers to benchmark their MSA performance.

**Grazing advances**

An ongoing leucaena trial at Whitewater Station, Queensland, compared the palatability of five varieties including 'Wondergraze' and the new psyllid-resistant 'Redlands'. The trial found stock exhibited no significant preferences. During 2016-17, researchers will record further observations (such as persistence characteristics) as the plants mature. Research into the methane-inhibiting properties of the marine algae *Asparagopsis* (red algae), under the MLA-managed National Livestock Methane Program, has delivered promising results for reducing the industry's carbon footprint. A sheep trial conducted in WA showed reductions in methane emissions per animal by up to 80%.

**KEY MILESTONES**

MILESTONE	RESULT	COMMENTARY
Increased rate of genetic improvement in beef and lamb through higher rates of genetic gain principally focused on eating quality (lamb) and reproductive rate (beef) and higher numbers of recorded seedstock animals particularly in northern Australia	Achieved	Sheep Genetics has delivered new eating quality breeding values and selection indexes. Reproductive rate trends are improving in northern Australia, with over 46,000 new records for fertility measures added since January 2014
Development and implementation of an MSA cuts-based program for lamb in two supply chains	Partly achieved	Under the Sheep CRC, a cuts-based MSA prediction model for sheepmeat has been developed. Three supply chains have been briefed on the model. Application will depend on the development of real-time intramuscular fat measurement, which is a priority for a Rural Research and Development for Profit value chain project
Development of at least two technologies that can predict yield and elements of eating quality in beef and lamb supply chains	Achieved	DEXA has been validated to provide high-accuracy prediction (85% relative to CT) of lean meat yield (LMY) for sheep. 3D camera imaging has been developed to positive proof-of-concept to predict LMY in sheep and beef carcasses
Establishment of three R&D programs to improve reproductive performance, increase northern feedbase options and develop novel options for lifting growth rates as part of the new growNORTH initiative (subject to the Department of Agriculture and Water Resources approving the initiative)	Achieved	Four growNORTH projects commenced in management intervention to improve reproductive performance, calf alert technology and growth paths for increasing beef production (heifers and cull cows)
Quantify the economic impact (using producer case studies) of adopting recommended practices to improve breeder herd productivity	Partly achieved	The economics of improving reproduction of beef cattle in northern Australia has been assessed and case studies have been conducted. Significant work is required to translate this into a useful document for industry
Evaluated Sperm Chromatin Structure Assay and the Sperm Protamine Deficiency Assay as predictors of bull semen quality and female reproductive traits	Achieved	Genome-wide studies identified regions of chromosome X that were associated with sperm chromatin integrity, protamine deficiency and % normal sperm
Developed and tested prototype systems for the on-property production of algae as a protein and energy supplement in northern Australia, including determining the optimal growth conditions for dry matter and crude protein accumulation and developing simple methods to harvest and store algae from these ponds	Achieved	The project investigating the use of micro algae on farm was completed. Results have identified a fast-growing, protein-rich, saline- and heat-tolerant microalga, and detail a new hydrodynamic pond design, airlift for efficient mixing and a low-cost harvesting process.

**Feedlots**

MLA has funded several key feedlot projects, including improved weather forecasting and heat-load estimates for feedlots to enable better preparation for extreme events. Two new user manuals for industry are nearing completion: *Feedlot Design and Construction* which features world-leading design and technology options; and *The Manure Handbook* which outlines best practice management for disposing of effluent and manure in feedlots.

**Non-Merino ewe reproduction**

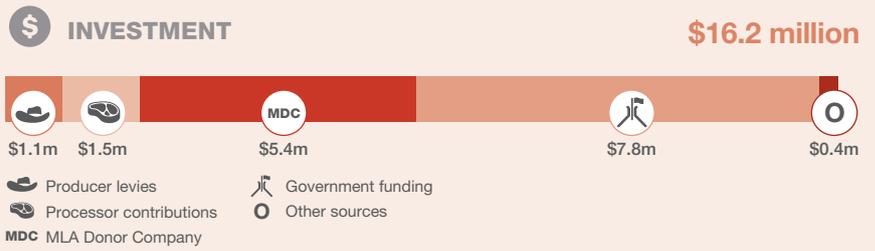
Working on both commercial properties and research stations, MLA has funded research to improve the management of non-Merino ewes through developing an improved understanding of the impact of condition score on ewe and lamb survival, growth rate and reproduction. The result will be a tailored management system for non-Merino ewes that offers specific guidelines and advice to help producers maximise their enterprise productivity and profitability.



**OBJECTIVE 3.2**

**Identify information platforms and technologies that drive productivity and innovation throughout supply chains**

Working in partnership with technology providers, individual processors and the Australian Meat Processor Corporation, MLA via MLA Donor Company manages a research and development portfolio to improve processing efficiencies, address labour availability and health and safety, and increase innovation and supply chain information.



**STRATEGIES**

**Develop and prove** technologies that improve carcass information

**Facilitate** improved information flows within value chains

**Develop** new technologies to improve value chain productivity and efficiency

**Implement** new practices and technologies to increase labour efficiency and compliance with market specifications

**OBJECTIVE HIGHLIGHTS**

**Objective carcass measurement**

In April 2016, MLA was successful in receiving a \$4.8 million Australian Government grant, through the Rural Research and Development for Profit program, to develop more accurate measurement technologies using, for instance, multi-energy X-ray (MEXA) and 3D digital imaging. This important project leverages the capacity of 19 research and industry partners to achieve accurate, consistent measurements of live animals and carcasses. This will create opportunities for value-based payments to producers based on objectively measured meat yield and eating quality attributes.

**Lamb automation**

Automation of beef and lamb processing is a fast-moving space with the significant achievements in the lamb sector in recent years through the successful LEAP program being fast-tracked into beef. Commercial interest in robotic cutting and measurement technology has created strong research-industry partnerships, through MDC, reflected in the uptake by lamb processors of LEAP III (primal cutting using DEXA X-ray), LEAP IV (middle cutting system) and LEAP V (forequarter processing). LEAP V, presently a high-throughput production prototype, will be introduced into

two new processing facilities during 2016-17. A six-way automated robotic cutting system for mutton and goat also reached working prototype phase. The focus for LEAP during 2016-17 is to further refine the technology and extend the adoption and commercialisation into the processing sector.

Uptake of the BladeStop™ bandsaw, which reduces serious workplace injuries, has increased to more than 100 units across the meat supply chain. During 2016-17, the retro-fitted DigitDetect™ system, developed by MDC and Scott Technology, aimed at increasing the safety of saw operators in butcher shops and smaller processing plants, will become commercially available.

During 2015-16 an impact study on the return on investment of MDC's automation program indicated a 4.7:1 benefit-cost ratio on investments.

**Livestock Data Link (LDL)**

LDL, an MLA-developed carcass feedback and information resource tool, was reviewed during 2015-16 with several enhancements recommended to improve its usability for producers. To encourage a wider adoption of the tool, MLA trained almost 200 producer members of the JBS Farm Assured program on how to access their carcass feedback information through LDL.

During 2016-17 it is expected another three processors will start delivering carcass feedback to producers via LDL, and animal health and disease feedback information for producers will be added. Uptake of LDL by industry is slower than anticipated, with the challenge ahead to demonstrate its value to the industry.

**Language review**

A review of the AUS-MEAT beef language, aimed at keeping descriptions meaningful and current, has resulted in more than 40 recommendations being delivered to industry through the development of an Australian Beef Industry Language White Paper. The review, initiated by peak industry councils and coordinated by MLA, focused on the language being customer rather than process driven, reducing complexity and aligning descriptions from the live animal through the supply chain. The AUS-MEAT language has significant influence internationally and has been adopted by the United Nations Economic Commission for Europe (UNECE) Meat Standards Working Group.

**KEY MILESTONES**

MILESTONE	RESULT	COMMENTARY
Develop and demonstrate in a supply chain a high-volume sensing system to increase capacity and productivity and provide accurate supply chain data on carcase quality which offer options that can directly benefit producers	Achieved	Dual-energy X-ray absorptiometry (DEXA) lamb carcase lean meat yield prediction was demonstrated at the JBS Bordertown plant, improving measurement accuracy to 85%, compared to CT scanning
Livestock Data Link (LDL) is demonstrated as adding value to both producers and processors through enhanced information flow and decision making abilities	Partly achieved	LDL is being successfully adopted within the JBS Farm Assured group, with two further processors having recently agreed to extend LDL to their producers. Animal health and disease feedback using the National Sheep Health Monitoring Program data was delayed due to technical issues, however, these have now been overcome
A whole-of-industry information exchange strategy endorsed by industry and implemented through key programs such as LDL	Not achieved	A report identifying the business requirements has been completed and a draft strategy has been developed for endorsement by industry
Realise net benefits of \$1 million/annum from processing technologies developed under the MLA Donor Company (MDC) program and for which installation is completed in 2015-16	Achieved	MLA's performance evaluation indicated \$2.51 million/year net benefits have been or will be realised from the following technologies that became operational in 2015-16: beef scriber/rib cutter, six-way cutting, LEAP III/IV primal and middle cutting and BladeStop™
Total aggregated net benefit of MDC-funded technologies installed in 2015-16 and previous years reaches \$10 million/annum	Achieved	MLA's performance evaluation indicated that for the period 2010-15, the aggregated net benefit of these technologies was \$345 million. This equates to \$69 million/annum
Five MDC-funded supply chain efficiency commercial innovations have achieved at least 80% of their annual adoption strategy targets, including associated cost-benefit analyses	Achieved	83% of targets achieved, with key achievements including: LEAP III/IV commercial sales to three processors, Australian BladeStop™ sales exceeding 129 units, X-ray guided beef rib cutter handed over to production, and mutton automated robotic six-way cutting system moves to full production. Four ex-post and two ex-ante cost-benefit analyses were also completed
Updated BeefSpecs tool includes prediction of eating quality attributes (carcase yield, MSA marble score, MSA ossification and MSA Index) and capability to assess the costs and benefits of changing livestock management for improved compliance	Partly achieved	A pilot is underway to assess prediction of carcase characteristics by using 3D cameras with a major vertically integrated supply chain

## Automated robotic beef rib cutting

The significant achievements in lamb automation in recent years started flowing through to the beef sector in 2015-16, with the development of the first automated robotic beef rib cutting prototype. The system uses advanced imaging based on dual energy X-ray, laser-line scanning and colour imaging. These technologies calculate precise cutting lines, objectively estimate the lean meat yield of the carcase and offer the option of value-based pricing of livestock.

Developed by Scott Technology in partnership with MLA Donor Company, this new system is faster, more accurate and consistent, safer and more efficient than the manual process of determining lean meat yield. Objective measurements using DEXA have achieved 85% accuracy/consistency in lamb and an encouraging result in beef, as calibrated to the gold standard of helical CT scanning. In comparison, subjective measurement is only about 30%. The working prototypes are now in production.

