

# evaluation series

3.1 Increasing cost efficiency & productivity – on-farm (beef)



## **Increasing efficiency & productivity in beef production**

### **The industry impact**

**Improved performance or product quality at farm level and assurance that feedlots will remain a viable and sustainable pathway to market for producers.**

## DEFINITIONS

**Age at sale** Minimum age at which an animal meets desired market specifications.

**Benefit:Cost Ratio (BCR)** Total project benefits divided by total costs. The BCR for agricultural R&D projects is typically in the range 1.5 to 5.

**Internal Rate of Return (IRR)** The discount rate that makes the net present value equal zero. Can also be the rate of growth the project is expected to generate.

**Capacity building** Fostering the ability of livestock producers, advisers, researchers, scientists and students to achieve goals.

**Cost of Production (CoP)** Broad indicator of beef production cost efficiency measured in cents per kilogram of liveweight.

**Estimated Breeding Values (EBVs)** Estimates of the value of an animal's genes for a particular trait.

**Feedlot R&D program** MLA program supported by the Council of the Australian Lot Feeders' Association (ALFA) that focuses on management of key industry risks.

**The North Australia Beef Research Council (NABRC)** Central council of northern beef research committees that provides strategic advice on the development and implementation of beef research, development, extension, education and training.

**Northern beef producers** Producers in QLD, the NT and Kimberley/Pilbara regions of WA.

**Pasture utilisation** The proportion of pasture grown that is consumed for livestock maintenance and production.

**The Southern Australia Beef Research Council (SABRC)** Central council of southern beef research committees that provides strategic advice on the development and implementation of beef research, development and extension programs.

**Southern beef producers** Producers in the temperate beef production zones of NSW, VIC, SA, TAS and WA.

**Total Factor Productivity (TFP)** Compares changes in the value of outputs with changes in the value of inputs used.

## BACKGROUND

Meat & Livestock Australia (MLA), as the service provider to the Australian red meat industry, strives to build demand, improve access to global markets, develop a competitive advantage from 'paddock to plate' and, by partnering with industry, build capability.

Remaining accountable to stakeholders and providing quantifiable returns on government and industry investment are central to demonstrating performance against these goals.

In 2005 MLA engaged the Centre for International Economics (CIE) to conduct an independent review, and to develop an effective evaluation framework\* for assessing the impact of its programs and their compliance with government priorities.

The framework provides independent estimates of net benefits of MLA programs – including achievements relative to targets and industry benefits relative to a situation where the program did not exist.

It also provides for interactions between the meat and livestock sectors and wider Australian economy, allowing national benefits to be measured. These benefits are not only economic, but also environmental and social, thereby supporting a rigorous triple bottom line evaluation of MLA initiatives.

\* MLA's evaluation framework is explained in full in the booklet, *Why does MLA need a framework for independent evaluation?*, that accompanies the MLA program evaluation series.

All benefit-cost ratios in this report come from the MLA program evaluation framework unless otherwise stated. The figures in this report represent the net present value of industry value added between 2001 and 2015 and are based on the MLA global meat industry model (CIE).

Evaluations completed: 1.1 *Enhancing product integrity*; 1.2 *Maintaining and liberalising access to world meat markets*; 2.1 *Improving eating quality*; 2.2 *Enhancing the nutritional reputation of red meat*; 2.5 *Aggressive promotion in the market place*.

Information in this brochure is based on the CIE report: *An Evaluation of MLA's beef on-farm programs*, 2009.

## Where we started

During the 1980s and 1990s, development of the Australian cattle industry was hampered by reduced livestock productivity due to declining pasture sustainability and grazing system performance. The market-driven growth in feedlot production stimulated a need to address animal welfare constraints and improve livestock management practices during extreme weather events.

## A strategic response

In an endeavour to improve production efficiency and sustainability in the on-farm and feedlot sectors, MLA responded by funding research and development (R&D) focusing on: genetic and genomic information; improved pasture utilisation; new approaches to control diseases and other causes of production loss; alternative grazing systems; and evaluation of new pasture species.

MLA partnered closely with producer bodies such as the Cattle Council of Australia, the Australian Lot Feeders' Association, North Australia Beef Research Committee and Southern Australia Beef Research Committee to determine research priorities.

To achieve on-farm and feedlot adoption of the tools and information generated from the R&D investment, MLA focused on using effective channels to create awareness and to demonstrate the commercial benefits of the new technologies.

The MLA investment in on-farm research, development and extension (RD&E) for the beef industry includes matching funding from the Australian Government, but it represents only a proportion of the total investment made by RD&E agencies including state and territory Departments of Primary Industry (DPIs), CSIRO, the Beef Cooperative Research Centre (CRC) and universities, who have all contributed to the industry outcomes achieved between 2000 and 2007.

### MLA FUNDED R&D ADDRESSES FOUR ASPIRATIONAL TARGETS

- Increasing reproductive rates
- Decreasing mortality
- Reducing age at sale
- Lowering cost of production



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# PROGRESS

High adoption of information and tools, and strong participation in extension activities, are enabling a large proportion of beef producers and lot feeders to apply R&D outputs to their livestock operations.

## What we did

### Genetics

MLA assumed a leadership role in Australian beef genetics, using producer levy funds matched by the Australian Government to invest in a broad portfolio of genetics research and development, from scientific capacity building to delivery of genetic improvement tools such as BREEDPLAN and gene marker research.

### Southern Australia

R&D specific to southern Australia underpinned the development of tools, procedures and practices to address animal health and welfare issues, maintain groundcover, reduce run-off and minimise erosion. MLA's work helped to reinforce producer confidence to implement changes to reduce cost of production (CoP) and age at sale.

### Northern Australia

R&D targeting northern Australian producers improved understanding of nutrition management through programs to assess diet quality and optimise pasture utilisation. R&D to increase reproductive rates focused on bull fertility management, diagnosis of reproductive diseases, causes of calf loss, and the impact of selection for increased carcass yield on fertility.

### Feedlots

MLA launched R&D backed by the Australian Lot Feeders' Association (ALFA) which delivered cost-effective management practice recommendations to prevent and control risks contributing to feedlot mortality rates including heat stress.

The following pages provide a snapshot of some of the key programs that make up the portfolio of work in 3.1 Increasing cost efficiency & productivity – on-farm (beef).



† All results are net present values in 2007-08 dollars

‡ 2001-2015

\* IRR estimates for agricultural R&D investments are typically between 20 and 60 per cent

\*\* Northern Australia: QDPI&F, DRDPiFR, WADAF; southern Australia: NSWDPi, Vic DPI, Tas DPIW, SARDI; others: CSIRO, CRCs and universities

# PERFORMANCE

The \$98 million<sup>†</sup> invested by MLA between 2000 and 2007 has contributed to improved on-farm productivity, product quality and feedlot sustainability, generating an additional \$374 million<sup>†</sup> in industry value.

## What we've achieved

An independent review by CIE estimated that MLA and state and territory DPI investments would be responsible for between 40 and 80 per cent of observed and forecast productivity growth in Australia between 2000 and 2015. MLA and DPI funding would also facilitate animal welfare and productivity gains over this period through feedlot compliance with the National Feedlot Accreditation Scheme (NFAS).

### FAST FINANCIAL FACTS<sup>†</sup>

#### Total MLA beef R&D investment (excluding feedlots)

- Total investment 2000 to 2007: \$90 million (including \$45 million in matching Australian Government contributions)
- Total industry value added over 15 years<sup>‡</sup>: \$307 million
- Internal rate of return: 38%\*
- Benefit-cost ratio: 3.4:1

#### Total DPI and others\*\* investment (excluding feedlots)

- Total investment 2000 to 2007: \$735 million
- Total industry value added over 15 years<sup>‡</sup>: \$1.74 billion
- Internal rate of return: 36%\*
- Benefit-cost ratio: 2.4:1

## Leveraging co-investment

The beef industry, through MLA, has strategically invested \$1 for every \$7 outlaid by partners (Australian Government, state and territory DPIs, CSIRO, the Beef CRC and universities). Benefits attributable to collaborators are based on their estimated relative share of the investment over the evaluation period. A breakeven analysis shows that MLA would only need to have contributed 5 to 6 per cent of the total benefits from RD&E as estimated at farm gate level in order to 'pay-back' the MLA investment in beef R&D.

## Lessons learned

- 1 The collaborative approach to beef R&D co-investment has proven efficient and effective.
- 2 A 20-year useful life horizon is assumed for most agricultural research outcomes. This includes a lag period of up to 10 years before benefits begin to flow to producers. The benefit flow in this analysis was consistent with this profile. MLA had invested 100 per cent of the R&D outlay by 2007-08, yet by this time only 20 per cent of the estimated benefit had been realised on-farm.
- 3 The connection between MLA/DPI program outcomes and observed changes in total factor productivity (TFP) is poorly understood, so caution should be exercised when interpreting program contributions.
- 4 Facilitating adoption of profitable, sustainable farming practices is an MLA priority, but the aggregate effect of widespread adoption on industry productivity is poorly understood.

- BREEDPLAN delivers additional on-farm returns totalling up to \$20 million each year through improved growth rates, carcass composition, feed efficiency and maternal ability.
- Between 70 and 80 per cent of bulls come from herds using BREEDPLAN with available EBV data.



## Changing breed composition

Genetic developments dedicated to increasing cost efficiency and productivity in the Australian beef industry are dependent on R&D focusing on genetic evaluation and trait improvements.

MLA's investment has enhanced the BREEDPLAN and BreedObject technologies that constitute Australia's principle genetic evaluation system for the southern and northern beef cattle industries. In collaboration with the Beef CRC and CSIRO, MLA has also supported research into gene markers to simplify selection for traits that are difficult to measure such as marbling, tenderness and feed efficiency. Research into tenderness markers has proven successful, with slower progress in the other areas.

The industry investment in beef cattle genetics R&D between 1975 and 2005 delivered total benefits valued at \$11.5 billion, including consumer gains amounting to \$5.75 billion and producer gains of \$3.8 billion. Of the \$11.5 billion return, about \$10.2 billion was attributed to the infusion of tropically adapted *Bos indicus* cattle, with the balance due to selection, cross-breeding and breed change in the beef industry.<sup>1</sup>

MLA and its research partners have made a sustained strategic investment in beef genetics research and genetic evaluation systems since 1975, with early investment targeting improved genetic evaluation facilitated through the Animal Genetic and Breeding Unit (AGBU) at the University of New England (UNE).

The MLA northern program also supported adoption through Tropical Beef Technology Services, which conducts workshops on BREEDPLAN and promotes Beef CRC outcomes, while the CRC for Beef Genetic Technologies played a pivotal role in coordinating beef genomics across all collaborating agencies.

## BREEDPLAN

Launched in 1985, BREEDPLAN technology was developed by AGBU – an MLA-supported joint venture between UNE and NSW DPI.

### Investment

\$4.7 million\* from 1997 to 2008.

### Inputs to outputs

MLA's investment in genetics R&D has underpinned the continuous development and delivery of BREEDPLAN genetic improvement tools. BREEDPLAN provides performance recording systems that predict an individual animal's ability to produce progeny that meet current and future market requirements, and allows producers to select bulls using estimated breeding values (EBVs) for a series of traits in conjunction with the bull breeding soundness examination (BBSE) and visual appraisal. It also provides objective information on stock sold to commercial breeders. BreedObject combines individual BREEDPLAN trait EBVs into an index of overall genetic merit for profitability.

## Outcomes

- The number of cattle evaluated through BREEDPLAN has increased by 11 per cent (1997-2008).<sup>2</sup>
- 29 per cent of southern beef producers and 37 per cent of northern beef producers use EBVs or breeding indices in sire selection and purchase.<sup>3</sup>
- About 70 per cent of bulls entering the southern beef market come from herds using BREEDPLAN with available EBV data, and about 80 per cent of bulls used in northern herds are bred by bulls, or sons of bulls, with BREEDPLAN EBVs.<sup>2</sup>

## Impacts

- Increased commercial animal growth rate and reduced age of turn-off at the same weight.
- Average rate of genetic improvement has quadrupled from an approximate \$0.40 increase in gross margin per cow joined per year (1997) to an approximate \$1.75 increase per year (2008).<sup>2</sup>

## Benefits

- Additional on-farm returns totalling between \$15 and \$20 million each year through continued improvement in growth rates, carcass composition, feed efficiency and maternal ability. These benefits are cumulative, so the total annual benefit on-farm grows each year.

## Backed by objective breeding

Australia's largest privately owned Angus seedstock business – Lawsons Angus – has been a strong supporter of BREEDPLAN since it was introduced in 1985.

Based in Yea, Victoria, the business mates over 2,000 registered cows individually through artificial insemination each year and generates 700 to 800 embryos for embryo transfer.

Stud principal Harry Lawson says he never loses perspective on the role of objective breeding. It has been a key part of his enterprise, which has now been expanded to include breeding herds in Queensland and Western Australia.

"We would not be able to make the genetic progress for our commercial clients without tools such as BREEDPLAN," Mr Lawson says.

"Even considering we now have three enterprises in different types of production systems, BREEDPLAN has made this possible. It provides a National Genetic Evaluation system that not only allows us to compare the performance and genetic merit for our animals across key economic traits (calving ease, growth, fertility and carcass traits) in our own breeding programs, but also allows us to compare our animals with all other Angus breeders Australia-wide and across the Tasman to New Zealand."

<sup>1</sup> Harris, J & Rycie, C 2005, *Outcomes of MLA's livestock production research and development*, MLA

<sup>2</sup> Banks, Dr R. 2008, MLA

<sup>3</sup> Hooper et al, 2007

\* MLA investment only (actual dollars)

“The (BREEDPLAN) genetics trial has allowed us to emphasise how we can increase growth and feed conversion efficiency potential in commercial herds, while maintaining a highly productive cow herd.”

– Harry Lawson, Lawsons Angus Managing Director



## BEEF COOPERATIVE RESEARCH CENTRES

MLA has leveraged funding investments through partnerships with institutions including Beef CRCs, which unite government, research and industry bodies. The southern, northern and feedlot programs have been key partners in Beef CRC I, II and III. CRCII (CRC for Cattle and Beef Quality, 1997-2004) and CRCIII (CRC for Beef Genetic Technologies, 2005-2012) were active during the investment period evaluated. State DPIs, universities and Meat and Wool New Zealand were also core CRCIII partners.

### Investment

Approximately \$12 million\* in CRCII and CRCIII from 1997 to 2012.

### Inputs to outputs

Through its partnerships with Beef CRCs, MLA has supported research into eating quality (CRCI), other economically important traits (CRCII), and emerging gene technology to address industry priorities including beef quality (CRCIII) through integration of molecular and quantitative genetics, meat science, animal nutrition and health. Eating quality improvements (see 2.1 *Improving eating quality*) facilitated retail value-adding and promotion, contributing to increased demand and a steady price rise since 1998.

Collaboration between MLA, the Beef CRC and CSIRO supported the development of gene markers for critical cattle traits. Ongoing research is developing markers and marker panels for hard-to-measure but economically important traits. Training was another output.

### Outcomes

- Increased rate of genetic gain and product enhancement to better meet market demand and consumer needs (CRCII).<sup>4</sup>
- Anticipated increase in availability and adoption of genetic technologies and other technological improvements (CRCIII).<sup>5</sup>

### Impacts

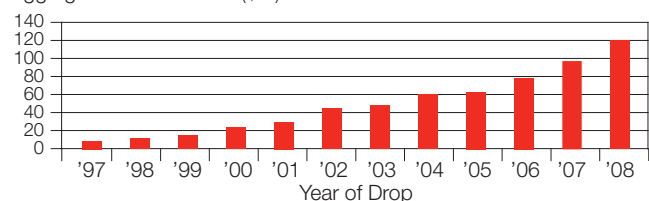
- More effective livestock feed utilisation.

### Benefits

- Increased beef productivity and increased industry innovation capacity.

## Industry aggregate value of beef genetic improvement (on-farm)

Aggregate on-farm value (\$m)



The value estimate uses a trend analysis of BREEDPLAN data for traits known to impact on-farm profitability. Contribution to the aggregate is based on relative market share for each of the major cattle breeds.

<sup>4</sup> Beef CRC Annual Report 2004

<sup>5</sup> Beef CRC Annual Report 2008

\* MLA investment only (actual dollars). Additional funding was invested in individual projects which are captured in the northern and southern R&D programs – see pp 6 & 7

## Grazing and pasture management

The need for grazing and pasture management RD&E to boost the southern Australian cattle industry's productivity and profitability has seen the development of programs including More Beef from Pastures (MBfP), which has empowered southern beef producers to tactically manage pastures for improved productivity; and Grain & Graze – an initiative to improve on-farm profitability and sustainability in Australia's wheat-sheep zone.

### Total MLA southern beef investment<sup>†</sup>

- Total investment 2000 to 2007: \$44 million
- Total industry value added over 15 years<sup>‡</sup>: \$193 million
- Internal rate of return: 44%\*\*
- Benefit-cost ratio: 4.4:1

Decision-making for industry RD&E investment by MLA in the south is informed by consultation with the independent Southern Australia Beef Research Council (SABRC), whose members represent the interests of industry and RD&E providers. MLA and state agencies in southern Australia are active in RD&E planning, funding and coordination, while organisations including CSIRO, breed societies, producer groups, consultants and educational groups are also important participants.

## MORE BEEF FROM PASTURES

The MBfP program was developed by MLA in 2004 to provide producers with cost-effective ways to improve pasture utilisation and maximise enterprise productivity in southern Australia.

### Investment

\$2.25 million\* from 2004 to 2009.

### Inputs to outputs

MLA's investment in MBfP has supported the development of communication tactics including a producer manual, e-newsletter and more than 350 events; produced decision-support tools; and involved demonstration sites and forums to improve pasture utilisation, maximise property performance and minimise risk.

### Outcomes

- Strong MBfP participation (20,000-plus producers over five years).
- On average, 50 per cent of MBfP attendees have been motivated to change management practices as a result of participation.<sup>1</sup>
- 66 per cent of southern beef producers who participated in the MBfP program implemented management practice changes<sup>1</sup>, predominantly in pasture and grazing management.

<sup>†</sup> All results are net present values in 2007-08 dollars

<sup>‡</sup> 2001-2015

\*\* IRR estimates for agricultural R&D investments are typically between 20 and 60 per cent

\* MLA investment only (actual dollars)

<sup>1</sup> Axiom Research 2007, *MLA Awareness & Adoption KPI Evaluation*

- Adoption of practices advocated by More Beef from Pastures (MBfP) can double the return per hectare while improving the natural resource base and risk management.
- The Grain & Graze program has achieved significant success in practice adoption and capacity-building, delivering a benefit:cost ratio of 1.5:1 to core partners.

“I have been utilising the concepts from the More Beef from Pastures course and have found them helpful in developing our business.”



– Stephen Binnie,

‘Maeranie Homestead’, Singleton, NSW.

Pictured with MLA adoption manager – beef, Jane Weatherley.

## Impacts

- 40 per cent of producers who participated in MBfP activities reported increases in pasture utilisation.<sup>2</sup>
- 20 per cent of participants in MBfP activities reported the program had contributed to productivity increases.<sup>2</sup>
- 23 per cent of participants in MBfP activities reported improved natural resource management (NRM).
- 10 per cent of participants in MBfP activities reported the program contributed to increased profit.<sup>2</sup>

## Benefits

- Modelling has indicated a 10 per cent increase in pasture utilisation using MBfP principles would result in a net present value of \$280 million (based on a 30 per cent adoption rate).
- Application of key principles for genetic selection alone would result in a net present value of \$70 million over 20 years.
- On a single enterprise basis, adoption of decision-making processes advocated by MBfP has been shown to double the return per hectare while improving the natural resource base and reducing climate variability and market volatility risks.<sup>3</sup>

## GRAIN & GRAZE

A joint initiative between MLA, the Grains Research & Development Corporation (GRDC), Australian Wool Innovation Limited (AWI) and Land & Water Australia (LWA), Grain & Graze<sup>®</sup> research and extension (2003 to 2008) encouraged producers to implement management changes to increase crop, pasture and animal production while enhancing natural resource condition.

### Investment

\$6.3 million\* from 2003 to 2008.

### Inputs to outputs

MLA's investment in Grain & Graze supported the delivery of on-farm trials implemented in southern Australia's medium rainfall sheep-wheat zone. More than 8,000 producers were actively engaged in Grain & Graze<sup>®</sup> activities and more than 5,000 producers trialled Grain & Graze<sup>®</sup> recommended practices. More than 200 publications and information tools were developed.<sup>4</sup>

### Outcomes

- More than 3,200 producers adopted recommended practices, attributing changes to Grain & Graze<sup>®</sup> participation.<sup>4</sup>
- 800 participants improved farming practices on Grain & Graze<sup>®</sup> advice.<sup>5</sup>
- New enterprises or production processes introduced to existing farming systems.

### Impacts

- Average nine per cent profit increase can be achieved from adoption of Grain & Graze<sup>®</sup> recommended practices.<sup>5</sup>
- Five per cent crop production profitability increase.
- Improved climate risk management and environmental benefits.

## Benefits

- The benefit:cost ratio\*\* for MLA investment in Grain & Graze<sup>®</sup> was 2.6:1.<sup>6</sup>
- Satisfaction of key stakeholder expectations at national and regional levels.<sup>6</sup>

## ANIMAL HEALTH AND WELFARE

MLA commissioned Strategic Bovine Services to conduct a national survey of beef producers in 2002-03 to investigate factors surrounding the incidence of calf scours, or neonatal calf diarrhoea (NCD), in Australia.

MLA supported calf scours research to reduce the incidence of, and costs associated with, the condition, which can lead to newborn calf mortality rates of up to 10 per cent and costs industry about \$20 (mean) per breeding cow<sup>7</sup>.

### Investment

\$114,430\* from 2003 to 2008

### Inputs to outputs

MLA's investment produced national survey results that found 8 per cent of calves treated for NCD only make a partial recovery, while a further 8 per cent are considered 'poor doers'.<sup>8</sup> MLA initiated a literature review and produced information explaining management principles to control and prevent calf scours that has been distributed to animal research laboratories, producers and veterinarians.

### Outcomes

- Acknowledgment of the need for vaccination against calf scours.
- Improved producer, laboratory and veterinarian awareness of calf scours management and prevention practices.
- Potential avoidance of calf contact with infection sources.
- Expected farm protection against new infection sources.

### Impacts

- A calf scours vaccine is now due for commercial release in 2011.
- Anticipated improvements to herd health and reduced producer costs.

### Benefits

- Development of a calf scours vaccine would mitigate economic loss.

<sup>2</sup> Axiom Research 2008, *MLA Awareness & Practice Change Survey*

<sup>3</sup> Harris, J & Ryce, C 2005, *Outcomes of MLA's livestock production research and development*, MLA

<sup>4</sup> Price, R 2008, *G&G Program Report*

<sup>5</sup> MLA 2008, *Economic Evaluation of Lamb Production RD&E Investment 1990/91 – 2007/08*

<sup>6</sup> Viv Read and Associates and Advanced Choice Economics Pty Ltd 2008, *Grain & Graze Program Evaluation (Summary Report) Version 3*, October 2008

<sup>7</sup> Clarke & Golding P/S 2004, *Project AHW.026 Calf Scours in Southern Australia – A review of the impact of calf scours on beef enterprises*

<sup>8</sup> Strategic Bovine Services 2006, *National NCD Producer Survey*, MLA

\* MLA investment only (actual dollars)

\*\* The average benefit:cost ratio for agricultural R&D projects ranges from 1.5 to 5



“Bulls that pass a breeding soundness examination (BBSE) with 50 per cent normal semen morphology have recommended joining rates of 2.5 to 3 per cent and can be used to increase reproductive efficiency and reduce costs.”

– Dr Richard Holroyd, QDPI&F

- Bullpower is generating higher calf output of bulls with desired genetics in northern Australia.
- Beef Up participants reported pasture and environmental benefits and reduced CoP.
- Grazing Land Management (GLM) has improved land use and boosted profitability.
- Leucaena-based pasture systems are expected to deliver multi-million-dollar returns.

## Breeding and diet boost production

Acknowledgment that efficiency gains in animal nutrition and reproduction affect beef enterprise profitability has motivated studies to understand animal nutrition needs and the effectiveness of various nutrition options on production. MLA's investment in breeding and fertility research has underpinned the development of programs including Bullpower, which has enabled northern producers to select fewer better quality bulls and to reduce costs; Beef Up forums, which focus on profit drivers and sustainability practices; and EDGEnetwork® Grazing Land Management (GLM) workshops, which encourage producers to integrate productivity and sustainability management. MLA also supported Leucaena research to meet the need for a nutritious drought-resistant feed alternative. Future investment will identify gene markers for lifetime calf output.

### Total MLA northern beef investment†

- Total investment 2000 to 2007: \$46 million
- Total industry value added over 15 years‡: \$114 million
- Internal rate of return: 25%\*\*
- Benefit-cost ratio: 2.5:1

Decision-making for industry RD&E investment by MLA in the north is informed by consultation with regional beef research committees of the North Australia Beef Research Council, whose producer members advise MLA at strategic and operational levels. MLA and state agencies in northern Australia play important roles in RD&E planning, funding and coordination. Organisations including CSIRO, universities and breed societies are also critical players.

## BULLPOWER

The MLA-funded Bullpower project, undertaken in two phases from 1994, identified key drivers of bull breeding soundness and management strategies to maximise the calf output of bulls with desired genetics in northern Australian herds.

### Investment

\$375,000\* since 1994.

### Inputs to outputs

MLA's investment in the Bullpower project supported research conducted by the Queensland Department of Primary Industries and Fisheries (QDPI&F) and collaborators that explored effects of relocation on bull reproductive traits; sexual development in yearling bulls and the effect of mating on calving rates; the importance of sperm morphology as a reproductive trait; and the effect of herd dispersion and bull mating percentages on pregnancy rates. Bullpower results informed the development of standardised testing by Australian Cattle Veterinarians – the bull breeding soundness examination (BBSE).

### Outcomes

- 47 per cent of northern beef producers use a bull joining rate of three per cent or less<sup>1</sup> (industry average is 5 per cent).
- 34 per cent of producers test bulls for reproductive soundness.<sup>1</sup>
- Reduced time to conception.

### Impacts

- Calves born at optimal times.
- Heavier weaners.

### Benefits

- Higher calf output of bulls with desired genetics.
- Reduced bull cost per calf born.

## BEEF UP

Beef Up forums conducted by MLA from 2006 helped northern beef producers to enhance reproductive performance and liveweight gain, and to effectively manage northern grazing lands.

### Investment

\$750,000\* from 2006-07 to 2008-09.

### Inputs to outputs

MLA's investment in Beef Up forums delivered knowledge and tools to support improved on-farm management. To date, 34 Beef Up forums have been attended by 1,890 producers, influencing management of 60 million hectares and 3.2 million head of cattle.

### Outcomes

- 47 per cent of participants who indicated they would manage part of their business differently had implemented management changes at the time of MLA follow-up evaluation.<sup>2</sup>
- 50 per cent of participants planned changes within 12 months.<sup>2</sup>

### Impacts

- 43 per cent of Beef Up participants anticipated profit increases.<sup>3</sup>
- 40 per cent reported a reduction in CoP.<sup>3</sup>
- 37 per cent reported environmental benefits.<sup>3</sup>
- 34 per cent reported improved pasture persistence.<sup>3</sup>

### Benefits

- Stimulated changes in cattle enterprises to increase performance.

## GRAZING LAND MANAGEMENT (GLM)

The need to collate and evaluate relevant information on grazing management in northern Australia motivated MLA and the QDPI&F, through the Queensland Beef Industry Institute, to develop customised EDGEnetwork® GLM workshops.

### Investment

\$592,000\* since 2000.

† All results are net present values in 2007-08 dollars  
‡ 2001-2015

\*\* IRR estimates for agricultural R&D investments are typically between 20 and 60 per cent \* MLA investment only (actual dollars)

<sup>1</sup> Harris, J & Ryce, C 2005, *Outcomes of MLA's livestock production research and development*, MLA

<sup>2</sup> MLA 2007, *Follow-up evaluation survey with participants of 13 Beef-Up forums*

<sup>3</sup> Axiom Research 2007, *Meat & Livestock Australia Awareness & Adoption KPI Evaluation*

Research into leucaena-based pasture systems is meeting needs for higher energy protein forage in northern Australia.



### Inputs to outputs

MLA's investment in GLM workshops addressed learning outcomes based on market research. Workshops were customised to recognise different operating environments and deliver relevant information.

### Outcomes

- Northern producer participation in GLM workshops trebled between 2003-04 (58 participants) and 2005-06 (175 participants).
- 73 per cent of northern producers implemented changes in grazing land management after attending a GLM workshop.<sup>4</sup>
- Improved NRM, particularly in relation to land condition, stocking rates and wet season spelling.<sup>5</sup>

### Impacts

- Anticipated productivity and sustainability improvements.

### Benefits

- Improved land use and profitability of northern cattle enterprises.

## LEUCAENA

The need for higher energy protein forage in northern Australia prompted MLA to support research (in cooperation with the University of Queensland) to develop and promote establishment of *Leucaena leucocephala* (leucaena)-based pasture systems.

### Investment

\$1.05 million\* since 2002 (past and committed investments).

### Inputs to outputs

MLA's continued investment in leucaena-based beef production systems supports: the ongoing development of a new variety resistant to psyllid (bug) that restricts plantings in wetter coastal areas; demonstration sites; a guide to leucaena establishment and management; research into mimosine (a toxic compound found in leucaena); and Leucaena Network extension activities.

### Outcomes

- Capacity for producers to grow and manage a high energy protein legume forage.

### Impacts

- Improved cattle growth rates at critical times (250-300kg per year).<sup>6</sup>
- Capacity to produce liveweight gains in excess of 1kg per day.<sup>6</sup>
- Improved soil fertility and sustainability.
- Reduced risk of dryland salinity.
- Increased stocking rates and production per hectare.
- Potential to increase leucaena adoption by 28 per cent (1.2 million hectares) due to availability of the new psyllid-resistant hybrid.

### Benefits

- Expected increase in farm returns from leucaena-based pasture systems in northern Australia.

<sup>4</sup> Solutions Marketing and Research, 2004

<sup>5</sup> Desert Uplands Qld Inc 2008, *GLM participant survey*

<sup>6</sup> MLA 2006, *Leucaena – A guide to establishment and management*



## Feedlots: health and welfare

MLA's animal health and welfare research program is testament to its commitment to delivering cost-effective management practice recommendations to prevent and control feedlot issues including heat stress, ventilation and animal diseases. MLA's investment has produced tools to improve cattle health and wellbeing, supporting industry productivity, product quality and market access while addressing community concerns. Industry initiatives supported by MLA have also underpinned vaccine development.

### Total MLA feedlot investment<sup>†</sup>

- Total investment 2000 to 2007: \$8 million
- Total industry value added over 15 years<sup>‡</sup>: \$67 million
- Internal rate of return: 62%<sup>\*\*</sup>
- Benefit-cost ratio: 8.2:1

## HEAT LOAD

Since 2002, MLA has funded research to investigate the effect of heat load on feedlot cattle, developing mechanisms and strategies to predict its likely onset and reduce its impact.

### Investment

\$1.2 million\* over six years since 2000.

### Inputs to outputs

MLA's contribution to heat load R&D has generated management tools including a thermal index that has been released to the Australian cattle feedlot industry. MLA-funded research led to the development of the Excessive Heat Load (EHL) Standard, which was distributed to accredited feedlots through the National Feedlot Accreditation Scheme (NFAS) for implementation by December 2007.

### Outcomes

- Adoption of MLA-backed management interventions guaranteed through compliance with NFAS (80 per cent of Australia's lot-feeding capacity).<sup>\*\*\*</sup>

### Impacts

- Reduced incidence of heat stress and risk of mortality.
- Improved cattle productivity.

### Benefits

- Improved cattle welfare and reduced mortality has generated a benefit of \$2.66 million over 25 years.<sup>1</sup> Importantly it is a tool that addresses community concerns about animal welfare.

<sup>†</sup> All results are net present values in 2007-08 dollars

<sup>‡</sup> 2001-2015

<sup>\*\*</sup> IRR estimates for agricultural R&D investments are typically between 20 and 60 per cent

\* MLA investment only (actual dollars)

<sup>\*\*\*</sup> Based on NFAS figures

<sup>1</sup> Agrans Research, *Economic Evaluation of MLA Feedlot Investment 2001-2006*

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