final report

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Development of the Feedlot R&D Program Strategic Plan 2006-2011

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1 Executive summary

1.1 Plan purpose and alignment

The purpose of this plan is to outline a five year strategy for Meat & Livestock Australia's (MLA's) research and development (R&D) for the beef cattle feedlot sector for the period 2006-2011. This Feedlot Program strategic plan is part of a broader MLA livestock production R&D plan which builds on existing MLA livestock production plans and R&D activities, and is aligned with the Federal Government's National Research Priorities and Rural R&D priorities as well as key industry plans such as the *Meat Industry Strategic Plan* (MISP). Extensive consultation has been undertaken with other Rural Research and Development Corporations (RDCs), Cooperative Research Centres (CRCs), State Government entities, CSIRO and universities.

The overall framework, process and key elements of strategic planning for MLA investment into livestock production R&D are outlined in the MLA *Livestock Production Research and Development Strategic Plan 2006-2011*. This strategic plan for the Feedlot sector supports this overall plan along with other sector plans for Northern Beef, Southern Beef, Lamb and Sheepmeat and Goatmeat.

A one page diagram that summaries the Feedlot Program strategy for 2006-2011 can be found in Appendix 1 of this document.

1.2 Feedlot Program industry workshop and consultation

Feedlot operators and key industry service providers participated in a workshop in August 2005 to identify the priority R&D issues for the feedlot sector. Further development of the Feedlot Program strategic plan was undertaken in consultation with the R&D Committee of the Australian Lot Feeders' Association (ALFA). This committee provides MLA with both strategic and operational advice on the running of the Feedlot Program.

Following approval of the draft by the ALFA Council, the Feedlot Program strategic plan was circulated to researchers and extension officers for feedback and additional input. A final draft was then circulated to all accredited feedlots for their input and endorsement before being submitted to the ALFA Council and MLA Board for final approval in May 2006.

1.3 R&D priorities

Priority areas for the Feedlot Program to address during the 2006-2011 period, as identified through this consultation process, include the following:

- Resource security, especially in the areas of water, grain and other feedstuffs and labour supply;
- Use of market intelligence and development of end point specifications to address the consumer preferences of domestic and international customers, and permit the development of value-based marketing systems;
- Investment in strategic and applied research initiatives to improve productivity through access to animals of superior genetic potential and superior feedstuffs;
- Issues management in the areas of environmental management, resource usage and sustainability, animal health and welfare and food safety;
- Continued emphasis on natural resource management and sustainability to underpin industry security and address public perceptions;
- Animal health and welfare, particularly the improvement of the understanding and management of bovine respiratory disease, the 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 is 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.

1.4 Communication and research adoption

The lotfeeding sector is highly motivated to seek out new information and readily adopts and implements new concepts and technologies once their value has been demonstrated. Communication of research outcomes is currently undertaken through publishing of articles in *ALFA Lotfeeding*, *Feedback* and other industry magazines, conduct of workshops that address specific issues of interest, and participation in the annual ALFA conference and other industry events.

In addition to continuing these activities, the following undertakings are proposed for the 2006-2011 period:

- The development of an email distribution list for the delivery of project summary reports and other relevant information on a regular basis;
- Further enhancement of the project information on the MLA website;
- Development of a library database of technical information that can be accessed by operators;
- Collation of information contained in previous studies, literature reviews and industry definitions, into a series of best management practice handbooks that can be distributed to industry operators as reference documents.

1.5 Program management

The program developed as a result of this strategic planning exercise is funded from grain-fed levies, with a matching contribution from the Australian government, and is managed as a separate program of R&D activities by MLA. Ongoing management of the Feedlot Program strategic plan will be undertaken by MLA, in consultation with the ALFA R&D Committee.

2 Introduction

This document outlines the strategy for Meat & Livestock Australia's (MLA) livestock production research and development (R&D) for the beef cattle feedlot sector for the period 2006-2011.

2.1 MLA's mission and focus for livestock production

MLA's mission is 'to deliver world class services and solutions in partnership with industry and government'. In support of this mission, this plan focuses on managing R&D that will improve the profitability and sustainability of Australia's beef cattle feedlot businesses. Delivery of genuinely new knowledge and tools from R&D can empower producers to:

- Be aware of the drivers of their enterprises' productivity and profitability;
- Adapt to change;
- Be socially attuned and understand consumer needs;
- Plan for the sustainability of their production systems.

MLA delivers on its mission through four key strategies:

- Increase market access;
- Grow demand;
- Develop competitive advantage from paddock to plate;
- Partner industry to build capability.

All four areas are covered by livestock production R&D but the emphasis is on developing competitive advantage.

MLA sources and manages relevant R&D projects that have the potential to impact producers' profitability and sustainability. A key aspect of MLA's R&D management strategy is to ensure that there is a continuum between the generation of R&D knowledge, the presentation of that knowledge in a form that producers can take advantage of, and the ongoing implementation of new ideas and techniques within individual enterprises. MLA strives to ensure that R&D outcomes progress from being 'good ideas' into action by producers.

2.2 Alignment with MLA's Livestock Production R&D planning

This document sets down the broad directions, objectives, focus areas and priorities to be pursued within the Feedlot Program over the period July 2006 to June 2011. It is the framework that will be used for decisions on how and where producer levies and Commonwealth government funds will be invested in livestock production R&D and related communication and adoption.

The Feedlot Program strategic plan is a detailed plan that supports the high level national livestock production strategic plan.

The Feedlot Program and broader livestock production strategic plans build on existing MLA livestock production plans and R&D, while aiming for continuous improvement in decision-making, execution and delivery of outcomes.

The new livestock production strategic plan recognises the importance of:

- The Federal Government's National Research Priorities and Rural Research and Development Priorities;
- Delivery of benefits to both producer levy payers and the wider community;
- Ensuring R&D investments fill market gaps and complement the investments and innovations of producers, input manufacturers and suppliers, service providers and advisers.

The preparation of the new livestock production plan has involved extensive industry consultation, including meetings, workshops, correspondence and dialogues. We have drawn on expertise within and outside MLA, including reviewing the strategic plans of relevant organisations. Current and prospective industry threats and opportunities were evaluated. We have also undertaken quantitative analysis and evaluation of productivity and profit drivers and adoption scenarios for the livestock production industry and each of its sectors. The potential impact of different R&D investments has undergone economic analysis.

3 Strategy development

3.1 Overview

An additional year of project activities was added to the previous Feedlot R&D Program Strategic Plan to align it with MLA's livestock production plans for Northern Beef, Southern Beef, Lamb and Sheepmeat and Goatmeat R&D programs, which conclude in June 2006. This alignment ensures coordination, integration and synergies of the strategic planning activities and outcomes across the various MLA programs that are responsible for the delivery of livestock production R&D.

In developing the Feedlot Program strategic plan for the period 2006-2011, a significant level of review and analysis was undertaken internally by MLA as well as consultation with key industry stakeholders. The principal consultation exercise involved feedlot operators and key industry service providers who identified the priority R&D issues that have to be addressed to ensure the ongoing profitability and sustainability of the industry.

Extensive consultation was undertaken, with additional input to the strategic planning process invited from researchers, extension officers, and all operators of accredited feedlots in Australia.

3.2 Economic modelling

MLA has recently developed an economic model that can be used for the evaluation of both individual project proposals and the potential impact of R&D on profitability of the feedlot industry. In future the economic model will be routinely used to evaluate the impact of projects as part of the MLA approval process.

As part of the strategic planning process, the model was used to evaluate the relative economic benefits to the feedlot sector of:

- increasing feedlot capacity utilisation;
- decreasing mortality rate;
- increasing sale weight;
- reducing the age of sale;
- increasing unit sale price;
- increasing the efficiency of conversion of feed to liveweight;
- reducing animal health costs.

The modelling work identified the major drivers of productivity for the feedlot sector as:

- increasing sale price;
- increasing sale weight;
- reducing the age of sale.

Both reduced age at sale and increased sale weight resulted from increased rates of liveweight gain. The outcomes of the modelling reinforce the validity of current industry practice which concentrates on maximising the sale value of the animal.

The model is not able to evaluate the industry benefits from strategies such as addressing environmental and social sustainability issues, or R&D focussed on animal welfare, biosecurity and climate change.

3.3 Industry consultation

Feedlot operators and key industry service providers participated in a workshop, held in August 2005, to identify the priority R&D issues for the feedlot sector for the period 2006–2011. In undertaking the strategic planning exercise, workshop participants considered where the feedlot sector should be positioned within the beef industry in the future, and examined the drivers of, and impediments to, the changes required to achieve this positioning. A SWOT (Strengths Weaknesses Opportunities Threats) analysis was also used to identify the priority R&D issues that the industry needs to address to position itself to capture the opportunities and overcome any threats as they arise. The R&D priorities identified through this process are outlined in section 4.1.

Following the workshop, further development of the Feedlot Program strategic plan was undertaken in consultation with the ALFA R&D Committee, which provides MLA with both strategic and operational advice on the running of the Feedlot Program. In addition to the R&D priorities, this process also developed a range of project initiatives that could be implemented to address the identified priorities and these were consolidated into a draft Feedlot Program strategic plan.

Following consideration of the draft Feedlot Program strategic plan by ALFA Council, it was circulated to researchers and extension officers aligned with the industry for feedback and additional input. Feedback from this process was integrated into the draft plan in consultation with the ALFA R&D Committee.

A final draft Feedlot Program strategic plan was then circulated to all accredited feedlots for their input and endorsement before being submitted to the ALFA Council and MLA Board for final approval in May 2006.

4 Priority research areas

4.1 Issues to be addressed

During the strategic planning process, participants first identified the likely developments and characteristics of the feedlot sector in the future. This formed the basis for identifying and evaluating the issues that need to be addressed to ensure the industry meets its full potential.

4.1.1 Future development and characteristics of the feedlot industry

The Australian feedlot industry is currently growing at approximately 7% per annum, with an expectation that it will continue at this rate into the foreseeable future, reaching a capacity of 1.5 million head in the next five years and 2.0 million head in 10-15 years.

Looking to the future, the industry sees lotfeeding as enhancing its position to the point where it becomes the principal form of beef production. This will be underpinned by the following:

- Market driven demand for feedlot product, both domestically and internationally;
- The pivotal position that the industry holds in the beef supply chain where it provides a conduit for the transfer of market and performance information and supply and price signals from processors to producers;
- Improved public perception of the environmental and animal welfare performance of the feedlot sector, eg. the feedlot sector will be seen as a mitigating mechanism for land degradation and animal welfare issues associated with grass-fed production during periods of drought.

Likely areas for at least part of this expanded production include Western Australia and northern Australia, particularly as the genetic composition of the northern herd improves. Ultimately, feedlots will have the market power to drive improvements in genetics and feedstuffs and changes in infrastructure and service industries to service the industry's requirements.

While there are currently several new feedlot facilities either being constructed or proposed, along with current and planned expansions of existing facilities, the location and extent of future industry development will be governed by:

- Availability and access to water;
- Grain and cattle supply constraints;
- Labour supply constraints;
- Urban encroachment, although this is not seen as a problem in the short-term;
- Environmental considerations, particularly related to obtaining regulatory approvals;
- Impact of fuel prices.

Pressure on resources and inputs may constrain the expansion of large operations and there may be an increase in the number of smaller operations that are self-sufficient in terms of inputs and labour requirements (family).

Producers wanting to retain ownership of cattle through the supply chain will encourage the development of more custom feedlots and increased vertical integration, with breeders investing in both backgrounding and feedlot operations, as mechanisms for achieving this outcome.

Likewise, there is likely to be the development of a specialist weaner-background-feedlot supply chain and a specialist backgrounding industry that collects an assortment of cattle and tailors them to lines that meet the requirements of the various feedlots they supply. Processors, and to a lesser extent feedlots, may become more of a service provider.

Cattle supply pressure and market demand for reduced slaughter age will see the industry feeding younger cattle. This will necessitate an increased emphasis on managing stress, pre-conditioning, backgrounding and improved disease diagnostics to overcome the health problems associated with feeding these younger cattle. It will also change the dynamics of the industry, with more cattle being bred as a result of the earlier turnoff and more cattle numbers going through feedlots. There will also be an increase in the feeding of small ruminants (sheep and lambs).

4.1.2 Strategic issues

The issues that arose as a result of the strategic planning exercise can be broadly categorised into the following areas:

4.1.2.1 Inputs and production efficiency

It was recognised that there will be significant genetic breakthroughs from the work that is currently being undertaken on the bovine genome in the areas of feeding performance, meat quality, animal health and immuno-competence. Feedlots will be a major beneficiary of the investment in this area.

Identification of superior and alternative feedstuffs and security of supply were again highlighted as issues to be addressed. Improving grain quality, especially for sorghum, and yield accompanied by the development of rapid analytical tests that can be used to measure the energy content of both grains and the mixed diet (using Net Energy rather than Metabolisable Energy as the unit of energy measure) are required. There was a recognition that the industry would have to improve its relationship with the grains industry to achieve the structural changes required to address the feedstuff security issue.

Higher fuel prices will drive the development of new grain processing techniques and feedstuff selection practices and make new feedlot developments consider their location with respect to transport costs (both in and out of the feedlot). Feedlots relocating to grain producing areas and importing of grain and other feedstuffs from overseas were seen as viable options in the future. Feedlots will also become a lot more energy efficient in their operations.

4.1.2.2 Meeting market requirements/product quality

To ensure ongoing markets for expanded feedlot production, it was recognised that the industry needs to diversify its marketing options and invest resources in market development to achieve this outcome. Having said that, the industry also recognises that food safety must be a 'given' and its future is dependent on maintaining BSE and FMD freedom, therefore the need to overcome food safety issues and the continued importance of being involved in biosecurity, NLIS, QA, etc. Work should be progressed to deliver a practical cost-effective solution to the feedlot dags issue and the development of an *E. coli* vaccine.

To take advantage of the genetic gains that will become available the feedlot sector must define production efficiency in terms of dry matter conversion and percentage of body fat, and identify the physiological carcase endpoints for the various markets that the industry services. Once this is known, the genetics can be selected to ensure the market specifications are met.

Similarly, there will be potential to select animals that are more feed efficient, using gene markers and to develop systems that predict market endpoints for cattle at arrival time, thereby ensuring that they are fed to meet the target market requirements at minimum cost and feeding time.

Development of objective carcase measurements, a universal grading system and value-based marketing are seen as essential elements to ensure clarity of market signals along the supply chain and value realisation in different processing plants. Outcomes from the Beef CRC in the areas of meat quality, marbling and yield, will assist this process.

In marketing, perception is reality! The industry needs to collect the data to address the public perceptions regarding the use of ionophores, antibiotics and hormonal growth

promotants (HGPs). HGPs are an important part of beef production and an independent economic study is required to assess the costs and benefits associated with their continued use/non-use in terms of market impacts and meat consumption. At the same time, industry needs to be investing in strategic initiatives that look at 'life after HGPs, ionophores and antibiotics'.

4.1.2.3 Animal health

Although there are now three vaccines available that are being used for the control of bovine respiratory disease (BRD), it continues to be a major problem to the Australian feedlot sector. The move to feeding younger cattle will put more pressure on animal health in general and will certainly exacerbate the BRD problem. There is a need to take a more holistic view of the problem and map out a plan to address this whole issue – from the farm through to when the cattle leave the feedlot. Developing a solution to this problem is likely to involve epidemiological studies to understand the seasonal variation in BRD and the relative importance of animal, environment, geography and organism factors, development of improved diagnostic systems and technologies, vaccine development and gene therapy. The emergence of specialist backgrounding and pre-conditioning sectors has the potential to allow the industry to address the problem before the cattle arrive at the feedlot. An extension effort will be required to get the right message out, not only to the feedlot sector, but also the entire supply chain to improve the producer knowledge base and adoption rate of the required measures to achieve this outcome.

Other animal health issues that need to be addressed include foot abscess, pregnant heifers, sudden death syndrome and the management of the pen environment (mud). The same approach will be applied to these issues. There is also a need to establish uniform definitions for animal health parameters (eg, mortality and morbidity) across the different market specifications so that there is commonality in measurement and recording of industry statistics. Likewise, there is a lot of information already available on many of these issues and a starting point should be a literature review to pull it all together. Outcomes should be incorporated into a best management practice handbook.

It is recognised that there is a significant crossover between animal health and animal welfare, particularly in the areas of heat stress and livestock transport. These issues are addressed in the next section.

4.1.2.4 Animal welfare

The emergence of animal rights organisations has led to some confusion in the mind of the public between animal rights and animal welfare. The RSPCA, whose mandate is to improve animal welfare has clear public support and a very different mandate to animal rights groups who advocate no use of animals for any purpose. The animal industries need to involve the RSPCA in addressing key industry issues in a similar way to their involvement with previous heat stress losses.

There is a direct financial correlation with animal welfare, in that an animal that is not in a good state of welfare is not performing, so it is important to be able to identify those that are under stress. It is essential to clearly define what is meant by animal welfare and establish a combination of objective measures and animal behaviour observations that can be used to demonstrate compliance with animal welfare standards that meet consumer and public perceptions and to adopt a proactive approach in addressing animal welfare issues.

Current animal welfare issues to address include animal washing, livestock transport and climatic stress. It is important that work is conducted scientifically to underpin appropriate Codes of Practice, best management practice guidelines and Quality Assurance systems that can be implemented to demonstrate compliance with animal welfare considerations and to provide suitable training to those operators responsible for implementing these measures. Codes of Practice will become more stringent and defined as time goes on and it is important that industry be in a position to ensure that it is fairly represented in their development.

4.1.2.5 Environment and resource management

The most significant limitation on the growth potential and size of the feedlot sector is access to, and security of, water supply. While there is plenty of water in Australia, it is not available where it is required for the feedlot sector. Combined with the fact that the New South Wales and Queensland governments are only looking at assigning high security water licences for a period of 10 years, this may limit future investment in the industry. While this is largely a political issue, there is a need to demonstrate the returns that can be achieved from one megalitre of water, in terms of productive capacity and dollars, when used in lotfeeding and compare this to other uses. Some of this will be achieved through the current Life Cycle Analysis project. There is an expectation that outcomes of this work will give the industry direction on future environmental research requirements.

There is a need to complete previously commenced work on assessing contaminant load (pathogens, heavy metals, endocrine disruptors, pesticide residues and oestrogen outflows) in manure and effluent and development of treatment processes that ensure the final product is 'fit for purpose' for its intended application. Outcomes of this and previous work on the nutrient composition and sustainable application rates for land application of manure and effluent are to be incorporated into a handbook for manure users, including a calculator that enables users to value manure against the cost of artificial fertilisers.

Most of the feedlot-related environmental research in Australia has been conducted north of Armidale and work should be considered to fill the knowledge gap on how feedlots operate and perform in winter dominant rainfall areas. This is particularly relevant in the area of odour emissions and development of industry specific odour performance criteria. Further work will also be required to follow on from the current dust project, to examine any OH&S issues associated with worker exposure to feedlot dust.

Some strategic initiatives have been commenced to address the issue of greenhouse gas (GHG) emissions, particularly methane. However, there is no hard data on actual emissions from either feedlot cattle or feedlots per se. There is a need to address this so that the data is available to counter any potential impacts of GHG regulatory controls on the industry.

Feedlots have a very positive environmental management story to tell. Feedlots offer the grazing industry management flexibility and the ability to reduce grazing pressure, particularly during periods of drought, with a resultant reduction in land degradation, which benefits the whole environment. This story needs to be developed and promoted as part of a broader industry campaign.

4.1.2.6 Human resources

The feedlot industry mirrors the trend in the rest of Australia in that it is becoming increasingly difficult to source and retain staff. Staff generally are younger, more mobile and, increasingly, not from an agricultural background. This will require an increased commitment to staff training as the industry moves away from an agriculture-based workforce. Ongoing staff shortages will drive the development and adoption of new technologies to replace personnel. To attract staff, the industry will have to overcome the public perceptions associated with feedlots and develop closer relationships with educational institutions.

At the same time, there is a declining skills base in regulatory agencies and a shortage of suitably qualified R&D personnel. Industry will have to become self-sufficient in expertise and technology and will have to invest resources to ensure that the decision making processes for regulators are streamlined and industry consultants are kept up to date.

4.1.2.7 Knowledge management

There is recognition that much information already exists on many of the issues raised and a starting point when commencing any R&D should be the conduct of a literature review to assemble the disparate pieces of information. The collection and consolidation of the information contained in previous reports, along with industry definitions and literature reviews, to produce a best management practice handbook was seen as a worthy undertaking.

Similarly, it was seen that there was merit in preparing the data and information required to be proactive in managing any issues that may arise in areas such as health, environmental management, resource usage/sustainability and animal welfare.

4.2 Project areas

In order for the industry to improve its competitive position it must target project initiatives that decrease costs and improve the value of its products. Under normal circumstances, R&D activities that address this outcome would constitute the majority of the portfolio of work. However, because of the high profile nature of the feedlot industry, it remains the focus of a high level of attention and scrutiny in the areas of animal welfare, environmental management and food safety. Industry has to be in a position to proactively address issues that arise in these areas. To this end, much of the research work commissioned within the previous Feedlot Program has been 'protective'; addressing potential environmental and animal welfare issues and ensuring the long term sustainability of the industry.

Table 1 below outlines a mix of current and new R&D initiatives, which if implemented, will ensure that the feedlot sector is well placed to capitalise on the opportunities that it is presented with and overcome any challenges that it encounters in the next 5-10 year period.

Table 1 Current and new R&D initiatives to be implemented in the 2006-2011 period.

Issue	Feedlot industry desired outcome	Project areas and comments
Inputs and production efficiency		
Animals of superior genetic potential	Animals of superior genetic potential identified and available to industry: • feed conversion efficiency • feeding performance • marbling • meat quality • health status Mechanisms for measuring and identifying animals with superior genetic potential developed.	Being addressed within the CRC for Beef Genetic Technologies. Extension of currently available information and technologies to seed stock industry participants for incorporation into breeding and selection programs is important.
2020 Vision of beef industry	Demonstration of the industry wide benefit flow from stratification and differentiation of livestock production. Assess the future potential size of the feedlot sector and identify any impediments that would impact on the sector reaching this potential.	Initial scoping study to be undertaken this financial year. Full study to be implemented in next financial year.
Superior and alternative feedstuffs	Recognition of dry matter energy value of available feedstuffs and ability to price/trade on this basis. Ability to assign a value to weather damaged grain based on true energy availability. Rapid tests available to assess the nutritive value of grain and mixed rations at point of receival. Decision Support Systems available to industry participants to assist above decision-making process.	Use of Near Infra Red Spectroscopy (NIRS) technologies. CSIRO AusBeef Decision Support software. Plant breeding. Investment in this area needs to be re-visited following cessation of investment in the Premium

Issue	Feedlot industry desired outcome	Project areas and comments
	Improved availability of nutrients to ruminants from specific grains. Improved cereal varieties. Identification of alternative feedstuffs. Improved processing methods available for specific grains (especially sorghum).	Grains Project.
Feedstuffs security	Industry has access to secure supply of energy dense feedstuffs at all times through: • Ability to import grain and move up-country when necessary. • Improved analysis of supply demand information, particularly with respect to the impacts of drought. • Regional inventories of grain transparent. • Infrastructure impediments to feedstuffs movement within Australia addressed.	CSIRO grain devitalisation project. Integration of the ABARE regional feed supply/demand model and the APSRU seasonal conditions model. Collaboration with other intensive livestock industries and co-investment through the Australian Government Industry Partnership Program.
Acidosis Probiotic	Development of a probiotic feed additive containing efficient starch and lactic acid utilising bacteria.	Continuation of existing project with QDPI&F. Progress to commercialisation if research component of project is successful.
Cottonseed feeding levels	Recommendations to industry on maximum ration inclusion levels of cottonseed for different regimes and market end-points. Determine the impact of increasing ration inclusion levels of cottonseed on carcase attributes and feedlot performance.	Feeding and slaughter studies.
Meeting market requirements/ product quality		
Objective measures of physiological endpoint specifications x market segment	Improved compliance with market specifications through use of objective measures and value based marketing. Objective intake parameters that ensure cattle meet feedlot out specifications.	Physiological and serial slaughter studies.
Background certification (Passport) for cattle	Development of certification scheme detailing background and treatment history of feeder cattle. Relevant certification incorporated into on-farm QA programs.	Liaison with commercial companies implementing scheme and industry QA programs.
Environmental and seasonal impact on	Industry recommendations on breed x environment x season x marbling	Feeding and slaughter studies.

Issue	Feedlot industry desired outcome	Project areas and comments
marbling	interactions.	
Ionophores, antibiotics and hormonal growth promotants	Address the public perceptions about the use of ionophores, antibiotics and hormonal growth promotants. Develop alternatives that can be utilised in the 'life after ionophores, antibiotics and hormonal growth promotants' period.	Collation of relevant data and information in preparedness for media enquiries. Probiotics. Investment in strategic initiatives to develop alternatives to ionophores, antibiotics and hormonal growth promotants.
Economic contribution of hormonal growth promotants to Australian beef industry	Benefit cost analysis of the continued use/non-use of hormonal growth promotants and impacts on markets and meat consumption.	Independent economic analysis.
Impact of hormonal growth promotants on eating quality	Recommendations on optimal usage of hormonal growth promotants available to industry by: • livestock category • market specification, including impact on eating quality	Collation and extension of relevant information.
Pesticide Residue Rapid Tests	Development of rapid tests, for use at point of commodity receival, for all major chemical contaminant groups.	Test development.
Sorghum Ergot Alkaloid Rapid Tests	Development of rapid tests, for use at point of commodity receival, to screen for levels of sorghum ergot alkaloid that affect cattle performance.	Test development.
Feedlot Dags	Development of alternative processing procedures for daggy cattle. Enzyme treatment for daggy cattle that allows them to be presented clean for slaughter.	Continued liaison with processing sector on alternative treatments for feedlot cattle with dags. Continuation of current work to develop and commercialise a pre-slaughter enzyme treatment that removes dags from feedlot cattle.
Fly Control	Industry adoption of integrated fly control programs that minimise chemical usage. Development and demonstration of fly control techniques employing parasitic wasps and pathogenic fungi identified in initial fly control project.	Continuation of current work on development of fly control procedures.
Animal health		
Definitions	Uniformity of animal health definitions across different market specifications	Define and agree definitions for mortality, morbidity, etc. and circulate to industry.
Benchmarking	Prototype service for benchmarking animal health parameters in place for industry participants.	Initial project undertaking to establish benchmarking service for animal health parameters.

Issue	Feedlot industry desired outcome	Project areas and comments
	Protocols developed for service operation and participation in service.	Development of further services subject to industry demand after prototype service trialled.
Bovine respiratory disease	Industry access to a suite of measures to address the issue of bovine respiratory disease in feedlot cattle	Literature review to pull all existing information together. Epidemiology of seasonal variance in BRD – animal/ environment/ geography/ organism factors. Diagnostic tools: • real time PCR tests Vaccine development: • 2 in 1 vaccine (commercialise) • 5 in 1 vaccine (research) Backgrounding/pre-boosting/preconditioning Extension to supply chain
Pregnant heifers	Simple, cost-effective method for determining pregnancy status of heifers on-farm.	Diagnostic tests – adaptation of human urine test to cattle. Extension effort required to relay message to producers.
Sudden death syndrome	Reduction in the incidence of cattle deaths from sudden death syndrome.	Physiological studies
Foot abscess	Reduction in the incidence and improved management of foot abscess problems in feedlots.	Studies to assess and address the following as contributors/solutions to the problem: • transport injuries • yard surface condition • feed additives • genetics/structure
Animal welfare		
Animal welfare measures	Provide information and technologies to assist feedlot operators to meet legal requirements and exceed acceptable community standards in relation to animal welfare	Development of objective measures of animal welfare.
Heat stress	Implementation of recommendations from Prime City review. Development of predictors for potential heat stress conditions and management options that overcome the problems associated with heat stress in feedlot cattle.	Incorporation of latest research results into industry Codes of Practice and the National Feedlot Accreditation Scheme. Refine heat load models. Commercial heat load forecast service. Dietary manipulation of heat load.
Livestock transport	Certification of livestock transport operators – Quality Assurance	Development of objective measures of stress.

Issue	Feedlot industry desired outcome	Project areas and comments
	Development of science-based Codes of Practice for livestock transport	Evaluation of transport industry. Development of best management practice for livestock transport and extension to operators. Collaboration with the MLA Animal Welfare R&D program.
Environment and resource management		
Water	Returns from 1 megalitre of water, in terms of productive capacity and dollars, when used in lotfeeding, compared to other uses.	Comparative analysis, based on outcomes from current project assessing the environmental sustainability of the industry.
Manure pathogens	Manure seen as 'fit for purpose' for land application to the full range of agricultural and horticultural crops. Development of guidelines/protocols for treatment of manure to comply with application requirements for specific crops.	Research project to: • Quantify the contaminant load of manure and effluent • Demonstrate that treatment regimes are effective in reducing contaminants • Develop guidelines for treatment processes
Manure handbook	Reference and extension document for industry use, outlining best management practice requirements for sustainable application of manure and effluent.	Collation and extension of existing information.
Environmental sustainability assessment	Counter public misconceptions about the environmental sustainability of the feedlot industry by assessing the relative costs associated with the production of 1 kilogram of grain fed beef, compared to competitor products. Identify areas that Industry needs to address to ensure the long-term viability and sustainability of the feedlot production system.	Continuation of current project work. Implementation of R&D activities to address any issues identified during the current project.
Greenhouse gas emissions	Improved understanding of greenhouse gas emissions from beef cattle feedlots. Development of a probiotic mechanism for reducing rumen methane emissions and improving feed energetics.	Joint AGO/MLA research projects: • measure greenhouse gas emissions from feedlots • potential for rumen microflora manipulation to reduce methane emissions
Odour	Development and acceptance of feedlot odour modelling methodology and performance criteria by regulatory authorities.	Continuation of current project work, with possible extension of data collection to sites in southern Australia.
Dust	Quantification of dust emissions from Australian feedlots utilising contemporary measurement techniques. Dust emission data that can be utilised to validate the information used in the National Pollutant Inventory calculations.	Continuation of current project work.

Issue	Feedlot industry desired outcome	Project areas and comments
	Understanding of the impact of dust on the health of feedlot cattle and the OH&S implications for the feedlot workforce.	
Positive environmental impact of feedlots	Public informed of positive impact of feedlots on grazing land degradation during periods of drought.	Collation and dissemination of relevant material.
Business skills, communication and awareness		
Training	Development of a suite of competency based training packages. Australian Rural Leadership Program position awarded to feedlot industry representative.	Extension of current project activities. Annual review of participation in the Australian Rural Leadership Program.
Issues Management	Access to collated information that can be used to address issues as the need arises.	Collation of information sheets that address potential issues in the areas of: • environmental management • resource usage and sustainability • animal health and welfare • food safety
Education, Extension, Awareness	Resource material and extension/education program in place to ensure public well informed and have a positive perception of industry. Industry website seen as a relevant and regularly updated source of information. Industry access to current MLA information and research reports through: 1. website 2. MLA and ALFA 3. ALFA Journal Access to issue specific information and research project outcomes.	Collation and dissemination of appropriate material to highlight the positive aspects and address public concerns related to industry operations. Maintenance of website needs to be addressed within MLA. Continuation of regular articles in ALFA *Lotfeeding* and *Feedback* magazines. Conduct of issue specific workshops. Participation in industry conferences.
Knowledge management	Access to a series of best management practice handbooks.	Collation of information from previous reports, literature reviews, definitions, etc. into a series of best management practice handbooks. • manure handbook • managing bovine respiratory disease
Technical library	Access to an updated website containing feedlot related technical (refereed) materials, with links to other appropriate sites.	Specific project undertaking to establish website and upload relevant technical information. Regular updating required.

Issue	Feedlot industry desired outcome	Project areas and comments
ALFA Survey	Expanded or modified survey to address program requirements for measurement of key performance indicators and adoption rates. Statistics available to industry and MLA on achievement of program undertakings.	MLA and ALFA to work together to structure survey requirements.

5 Communication and research adoption

The overall objective of the Communication and Research Adoption program is to communicate, facilitate the use of, and help deliver the tools and information resulting from MLA's R&D to its stakeholders. These stakeholders include lotfeeders.

The feedlot sector is progressive and highly motivated to seek out new information. Once it has been demonstrated that benefits can be derived from adoption or implementation of a specific concept or technology, dissemination and uptake throughout the industry is very rapid. Feedlot Program outcomes are currently communicated to lotfeeders through a number of channels, including:

- Regular articles, outlining the outcomes of the latest research, in the *ALFA Lotfeeding* magazine which is circulated to all accredited feedlots;
- Inclusion of relevant articles in the MLA *Feedback* magazine that is circulated to all MLA members. In addition to operators of accredited feedlots, the MLA membership includes a number of operators of smaller, non-accredited feedlots;
- Direct mailout to all accredited feedlots, on an annual basis, of the current status of all research projects and relevant project summaries;
- Conduct of regular industry workshops that address specific issues of interest. These are usually run in conjunction with ALFA or the Beef CRC and impart technical information directly to feedlot operators and staff;
- Regular interaction with members of the ALFA R&D Committee and ALFA Council through the various committees that ALFA operates and presentations to the Council meetings;
- MLA participation in the annual ALFA conference, either by way of presentations and/or display of the latest research outcome.

In addition to continuing these activities, the following extra activities are proposed for the 2006-2011 period:

- The development of an email distribution list for the delivery of project summary reports and other relevant information on a regular basis;
- Further enhancement of the project information on the MLA website;
- Development of a library database of technical information that can be accessed by operators;
- Collation of information contained in previous studies, literature reviews and industry definitions into a series of best management practice handbooks that can be distributed to industry operators as reference documents.

6 Program management

MLA and ALFA, through the ALFA R&D Committee, have developed the Feedlot Program to address the major productivity, sustainability and business issues facing the feedlot sector. The program developed as a result of this strategic planning exercise is funded from grain-fed levies, with a matching contribution from the Australian government, and is managed as a separate program of R&D activities by MLA.

In addition to the day-to-day management of program activities, MLA management of the Feedlot Program includes the coordination of activities between this and other feedlot relevant R&D programs within MLA and coordination of R&D activities across organisational boundaries.

The ALFA R&D Committee has a membership composed of representatives from the ALFA Council plus other feedlot industry representatives and assists MLA in the development of programs and reviewing projects being undertaken on a regular basis.

At the commencement of each calendar year, MLA and the ALFA R&D Committee undertake a review of current project activities and develop a proposed program of work for the following financial year. Following ALFA Council consideration and agreement on the content of the program, MLA further develops the work plan, detailing performance criteria and project activities to address the identified priorities. An indicative budget for the program is also agreed with ALFA.

As part of this annual review and planning process, grain-fed levy payers are invited to provide feedback on, and prioritise activities within the program of work intended for the coming financial year. They are also invited to identify additional areas of work to be considered for inclusion in the program. The proposed program of work is circulated to all grain-fed levy payers by ALFA in March each year as part of the consultative requirements under the Red Meat Industry Memorandum of Understanding.

Feedback received from grain-fed levy payers is considered by MLA and the ALFA R&D Committee, and the program of work for the following financial year is finalised before being presented to the ALFA Council and the MLA Board for final approval at their May meetings. MLA then makes any required changes to their Operational Plan for the coming year.

Appendix 1: An overview of the Feedlot Program R&D strategy for the period 2006-2011

Feedlot Program R&D 2006-2011

Our Mandate

World-class R&D leadership focused on increasing the profitability & sustainability of producers in the red meat industry by:

- Sourcing and managing innovative R&D
- Providing tomorrow's tools for today's producers

Desired Outcome

An Australian red meat livestock production industry comprising profitable, sustainable businesses operated by lotfeeders who:

1. **Are aware of the drivers of their enterprise's productivity and profitability**
2. **Can adapt to change**
3. **Are socially attuned and understand consumer needs**
4. **Plan for the sustainability of their enterprise, and embed positive environmental and animal welfare outcomes in their productions systems**

Operational Methods

1. Industry consultation to determine effective R&D priorities
2. Balanced focus on profitability & sustainability to achieve triple bottom line outcomes
3. R&D investment via objective project assessment, industry consultation and continuous monitoring and evaluation

Our Strategy – Ideas into Action

Healthy Environments + **Improved Animal Welfare** + **Improved Productivity** + **Build Knowledge & Capacity** → **Profitable & Sustainable Lotfeeders**

Business Viability – Environment & Resource Management

1. Water
2. Sustainable co-product utilisation
3. Climate change & variability
4. Emissions
5. Public perception

Business Viability – Animal Welfare

1. Objective measures of animal welfare
2. Quality assurance
3. Husbandry procedures
4. Land transport
5. Communication & education
6. Public perception

Inputs & Production Efficiency

1. Improved animal genetics
2. Improved and alternative feedstuffs
3. Feedstuff security

Meeting Market Requirements

Animal Health

Business Skills, Communication & Awareness

1. Communication
2. Delivery
3. Building capacity
4. Monitoring & evaluation

Aspirational Industry Targets

1. Reduce the cost of production by 5%
2. Decrease mortality rate by 20%
3. Reducing the age at slaughter by 10%
4. Increase meat eating quality by 5 consumer points

Our Key Measures

Project cycle time indicating efficiency of project administration; satisfaction by staff in internal surveys; survey results from major communication/education events; ex-ante and ex-post evaluation of major projects; increased awareness and adoption of targeted practices