final report

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Feedlot Program Research, Development & Extension Strategic Plan 2011-2016

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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, development and extension (RD&E) for the beef cattle feedlot sector for the period 2011-2016. This Feedlot Program strategic plan is aligned with the Australian Government's National and Rural Research and Development Priorities as well as key industry plans such as the *Meat Industry Strategic Plan 2010-2015* (MISP) and the *National Beef Production RD&E Strategy 2010*. In developing the plan, consultation has been undertaken with industry, industry service providers, the Cooperative Research Centre for Beef Genetic Technologies, State Government entities, CSIRO and universities.

The overall framework, process and key elements of strategic planning for MLA investment in livestock production RD&E are outlined in the *MLA Strategic Plan 2010-2015*. This strategic plan for the feedlot sector supports this overall plan and also addresses the RD&E priorities outlined in the *Australian Lot Feeders' Association* (ALFA) *Strategic Plan 2010-2015*.

1.2 Feedlot Program industry workshop and consultation

Feedlot operators and key industry service providers participated in a workshop in March 2010 to identify the priority RD&E 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 2011.

1.3 R&D priorities

New areas of focus have been introduced into the Feedlot Program strategic plan to better position industry to respond to changing economic, environmental and animal welfare demands. Priority areas for the Feedlot Program to address during the 2011-2016 period, as identified through this consultation process, include the following:

- Increased emphasis on investment in strategic and applied research initiatives to improve productivity through access to animals of superior genetic potential, superior feedstuffs, improved feeding and operational management.
- Identification and development of tools and technologies that reduce feedlot operational labour inputs and costs.
- Development of practical strategies to address the impacts of increased climate variability.
- Understanding and quantification of greenhouse gas emissions from feedlots and development of verifiable and practical mitigation strategies to reduce emissions.
- Information and technologies that permit the industry to secure inputs, including water, grain, other feedstuffs and labour supply.
- Supply of credible scientific data and information to support industry in the areas of environmental management, resource usage and sustainability, animal health and welfare and food safety.
- Animal health and welfare, particularly the improvement of the understanding and management of bovine respiratory disease, the identification and development of improved diagnostic tools, and development of objective stress measures and behaviour models.

- Strategic and applied initiatives to prepare for a time, which has been defined as 'life after hormonal growth promotants, ionophores and antibiotics', when the use of these products as we now know them may be restricted by the attitudes of the consuming public.
- Continued development and retention of the human resources (feedlot staff, consultants and researchers) that service the feedlot sector through education, training and development of appropriate career paths and opportunities.

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, participation in the annual ALFA conference and other industry events, and production of a searchable DVD that contains copies of all MLA feedlot related project reports.

In addition to continuing these activities, the following undertakings are proposed for the 2011-2016 period:

- Use of an email distribution list for the delivery of project summary reports and 'Webinars' for communication of other relevant topical information on a regular basis.
- Further enhancement of the project information on the MLA website.
- Increased involvement in communication and demonstration of research outcomes that require implementation on-farm (pre-feedlot) or at the feedlot enterprise level.
- 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 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, development and extension (RD&E) for the beef cattle feedlot sector for the period 2011-2016.

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 RD&E that will improve the profitability and sustainability of Australia's beef cattle feedlot businesses.

MLA delivers on its mission through five strategic imperatives:

- Improving market access;
- Growing demand;
- Increasing productivity across the supply chain;
- Promoting industry integrity and sustainability;
- Increasing industry and people capability.

While grainfed producer levies fund RD&E activities within all five strategic imperatives, the Feedlot Program specifically addresses activities within the last three strategic imperatives, with an emphasis on ensuring the lotfeeding sector is both profitable and sustainable.

A key aspect of MLA's RD&E 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 RD&E Planning

This document sets out the priorities to be pursued within the Feedlot Program over the period July 2011 to June 2016. It is the framework that will be used for decisions on how and where grainfed producer levies and Commonwealth government funds will be invested in livestock production R&D and related communication and adoption activities.

The Feedlot Program strategic plan is a detailed plan that supports the high level national RD&E priorities and builds on the range of plans relevant to the RD&E activities associated with grainfed beef production.

The Feedlot Program strategic plan recognises and addresses the priorities identified in the following:

- Australian Government's National Research Priorities and Rural Research and Development Priorities
- Meat Industry Strategic Plan 2010-2015
- National Beef Production RD&E Strategy 2010
- MLA Strategic Plan 2010-2015
- ALFA Strategic Plan 2010-2015

In developing the Feedlot Program strategic plan, the need to deliver benefits to both grainfed producers and the wider community has been recognised. Also recognised is the need to ensure RD&E investments fill market gaps and complement the investments and innovations of producers, input manufacturers and suppliers, service providers and advisers.

3 Strategy development

3.1 Overview

The Feedlot Program strategic plan for the period 2011-2016 was prepared in consultation with key industry stakeholders. The principal consultation exercise involved feedlot operators and key industry service providers who identified the priority RD&E issues that have to be addressed to ensure the ongoing profitability and sustainability of the industry.

Following preparation of a draft document in consultation with the ALFA R&D Committee, additional input was invited from researchers, extension officers, and all operators of accredited feedlots in Australia.

3.2 Economic modelling

MLA has 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. The Feedlot Economic Model is routinely used to evaluate the impact of projects as part of the MLA approval process.

As part of the previous 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.

This earlier modelling work was reviewed and updated, but again 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 current review identified a need to update a number of the parameters within the model and incorporate a mechanism to simply calculate and display the impact of potential project outcomes on the cost of production.

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. Projects of this nature are usually subjected to a qualitative assessment only utilising the IMAP proprietary project assessment module.

3.3 Industry consultation

Feedlot operators and key industry service providers participated in a workshop, held in March 2010, to identify the priority RD&E issues for the feedlot sector for the period 2011–2016. In undertaking the strategic planning exercise, workshop participants considered both the current market environment and where the feedlot sector was likely to be positioned within the beef industry in the future. They also 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 issues that the industry needs to address to position itself to capture the opportunities and overcome any threats as they arise. The RD&E priorities identified through this process are outlined in section 4.1.

3.3.1 Current market environment

Peak beef and cattle prices were reached in 2005-2006, at the time when the previous Feedlot Program strategic plan was being developed. At that time, the Australian feedlot industry was growing at approximately 7% per annum, and there was an expectation that growth would continue at this rate into the future, reaching a capacity of 1.5 million head by 2011 and 2.0 million head by 2020.

However, the intervening period has been a particularly difficult one for the Australian lotfeeding sector, and these projections have not come to fruition. Prolonged drought, the global credit crisis, recession across the major overseas markets, the return of the US to the major export markets (Japan and Korea), and more recently a high and volatile Australian dollar, had a significant negative impact on the industry. Numbers of cattle on feed fell from a high of almost 1.0 million head in 2006 to a low of 600,000 head in 2008, with a gradual recovery to around 750,000 head in 2010.

Many of these factors are still in play and are likely to continue to limit recovery of the sector in the short-to-medium term. Ultimate timing and extent of recovery is linked to a return to economic growth in the major export markets, increased demand for grainfed over grassfed beef, premiums that will be paid for grainfed product, and a lower and less volatile Australian dollar.

3.3.2 Future development and characteristics of the industry

Despite the current difficult trading position, the industry still has an optimistic view looking forward and sees lotfeeding as continuing to expand its share of Australian beef production to a position where 70% of slaughter animals will come from feedlots by the year 2021. This will be underpinned by the following:

- Market driven demand for feedlot product, both domestically and internationally;
- The need for intensification of agriculture to supply an expanding population and increased food requirement;
- Improved public perception of the greenhouse gas, environmental and animal welfare performance of the feedlot sector (e.g. the feedlot sector will be seen as a mitigating mechanism for land degradation and animal welfare issues associated with grassfed production during periods of drought).

Likely areas for at least part of this expanded production include Western Australia (WA) and northern Australia, particularly as the genetic composition of the northern herd improves. However, expansion in WA is dependent on resolution of issues associated with water access, tight margins and processor capacity/competition. There was also recognition that the WA industry lags behind the eastern states in a number of areas and the level of professionalism within the industry needs to be upgraded in order to reduce this gap.

While interest in expansion has been constrained due to the prevailing economic conditions, the location and extent of future industry development will be governed by:

- Availability and access to sufficient quantities of good quality water;
- Grain and cattle supply and price constraints;
- Labour supply constraints;
- Increased external stakeholder focus on industry and the need to be more accountable for resource usage;
- Urban encroachment, although this is not seen as a problem in the short-term;
- Environmental considerations, particularly related to obtaining regulatory approvals;
- Land use planning approvals and Local Government Area support/ resistance to expansion of the industry;

- Impact of fuel prices on transport and operating costs; and
- Foreign investment in the industry.

There were conflicting views on the number and size of feedlot operations looking forward. These perspectives were:

- 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).
- Decreasing margins and competition for resources will necessitate an increase in size and integration of enterprises to capture economies of scale. This increased industry consolidation will result in a smaller number of larger operations as small operations that are less efficient exit the industry.

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.

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.

3.4 Strategic plan development

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 refining the RD&E 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 all accredited feedlots, plus researchers and extension officers aligned with the industry, for feedback and additional input.

The final version of the Feedlot Program strategic plan was then submitted to the ALFA Council and MLA Board for approval in May 2011.

4 Priority issues

The issues that arose as a result of the strategic planning exercise have been categorised on the basis of MLA's strategic imperatives 2010-2015. It is recognised that not all issues are researchable, but they are included to assure a complete record of the workshop outcomes.

4.1 Increasing productivity across the supply chain

The need for the Feedlot Program to deliver productivity gains to the industry was highlighted to an extent not previously seen. In the past, many operators have undertaken much of the evaluation of feedstuffs, feeding systems and productivity enhancers internally and have viewed successful outcomes of these assessments as contributing to their competitive advantage. However, there was a clear message that industry was looking for the Feedlot Program to increase emphasis on investment in strategic and applied research initiatives to improve productivity through access to animals of superior genetic potential, superior feedstuffs, improved feeding and operational management and reduced operational costs.

4.1.1 Increasing productivity on farm

While progress to date has been slow, it was recognised that feedlots will be a major beneficiary if significant genetic breakthroughs eventuate 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.

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.

Competition for grain from other users (e.g. ethanol) and other intensive industries, as well as the inevitability of more drought events, highlighted the need to address the security of supply issue.

Identification of superior and alternative feedstuffs were also highlighted as issues to be addressed, particularly given the ongoing debates around the use of grain as human food versus animal feed and the efficiency of production of grain protein versus animal protein. Improvements in grain quality and yield, especially for sorghum, are required.

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 more energy efficient in their operations.

There was a need identified for industry to have access to technologies currently available overseas that improve feed conversion efficiency (e.g. β-agonists). In addition, a need was identified for independent testing to establish the efficacy and cost effectiveness of the numerous productivity enhancers on the market. While not seen as a direct undertaking of the Feedlot Program, industry should be encouraging those marketing these products to obtain and supply independent and scientifically robust data on their performance, through the likes of the Tullimba research feedlot.

While it was deemed important that industry continue to address the public perceptions regarding the use of ionophores, antibiotics and hormonal growth promotants (HGPs), there

was also a need identified to invest in strategic initiatives that look at 'life after HGPs, ionophores and antibiotics'.

4.1.2 Improving animal health and biosecurity

To ensure ongoing markets for expanded feedlot production, it was recognised that the industry needs to diversify its marketing options. While this is outside the scope of the Feedlot Program, the industry also recognises that maintaining these markets is dependent on maintaining a good food safety record. 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. Industry also requires access to an *E. coli* vaccine.

Bovine respiratory disease (BRD) continues to be the major animal health problem for the Australian feedlot sector. The move to feeding younger cattle will put more pressure on animal health in general and will exacerbate the BRD problem. While a major epidemiological study is currently progressing to understand the seasonal variation in BRD and quantify the relative importance of animal, environment, geography and organism factors, other initiatives were also identified. These include the development of improved systems and technologies that can be utilised for:

- The remote detection of sick animals, thereby reducing the need for highly qualified pen riders;
- The real time and remote diagnosis of animal health problems, allowing veterinarians to diagnose animal health problems when they are unable to attend feedlots in person. This was seen as an important initiative to address the current lack of qualified feedlot veterinarians in WA.
- Identification of immuno-compromised animals;
- Gene therapy or immuno-stimulation of cattle;
- Multivalent BRD vaccines to reduce the number of times vaccines need to be administered.
- Different methods of non-injectable vaccine delivery.

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. However, a whole of supply chain approach to the management of BRD is required. A major extension/demonstration effort was seen as an integral component to get the right message out, not only to the feedlot sector, but the entire supply chain to improve the producer knowledge base and adoption rate of the required measures to achieve this outcome. Demonstration of the economic benefit to producers of yard weaning and vaccination programs was seen as a critical component of this undertaking.

Other animal health issues to be addressed include the role of *Mycoplasma bovis* and *Histophilus somni* in BRD, swollen leg syndrome, foot abscess, pregnant heifers and management of the pen environment (mud).

Some of these issues also have animal welfare implications and 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.

4.2 Promoting industry integrity and sustainability

There is an increasing focus on the production systems used to supply food to Australian consumers by both government and the community, and an expectation that this food production will be coming from enterprises that are both efficient and sustainable. Industry recognises that it must be proactive in responding to these issues when raised by consumers and the wider community.

The role of the Feedlot Program is to provide the scientific knowledge, information, tools and technology to position the industry so that it can show it operates with integrity and can demonstrate its credentials in terms of environmental management and animal welfare.

4.2.1 Ensuring sustainability and demonstrating environmental stewardship

The most significant limitation on the growth potential and size of the feedlot sector is access to, and security of, water supply. Except for the period of the year when water is used for cattle washing, 91% of water use at feedlots is for cattle drinking water. This information should be used to underpin a science based negotiation with regulators to ensure intensive livestock industry water supply is recognised as an industrial use (guaranteed) water requirement. 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.

The research work, implemented as a result of the last strategic planning exercise, on assessing contaminant load (pathogens, heavy metals, endocrine disruptors, pesticide residues and oestrogen outflows) in manure and effluent is almost completed. Outcomes of this work will include the development of treatment processes that ensure the final product is 'fit for purpose' for its intended application. There is a need to incorporate the outcomes of this, and previous work on the nutrient composition and sustainable application rates for land application of manure and effluent, 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 examine the OH&S issues associated with worker exposure to feedlot dust.

From both an industry and individual feedlot perspective, environmental stewardship is demonstrated through compliance with the National Feedlot Accreditation Scheme (NFAS). While feedlots do not have to be accredited with NFAS if they only supply the domestic market, ALFA has a policy of pursuing mandatory NFAS accreditation for all feedlots as a mechanism to ensure the total industry is seen as a good custodian of the environment. Pursuit of this position was endorsed at the planning workshop.

The *National Guidelines for Beef Cattle Feedlots in Australia* and *National Beef Cattle Feedlot Environmental Code of Practice* are the reference documents on environmental management that must be addressed by NFAS accredited feedlots. Both these documents are currently being reviewed to address inconsistencies and differences between the various state and national publications and updated to incorporate the latest research and practical information.

Harmonisation of regulations across states was highlighted as an issue to be pursued. To this end, the review process associated with the above documents has also been used as an opportunity to reach a consensus between regulatory authorities in the various states on environmental management, so that similar conditions apply to feedlot developments throughout Australia. This process, which is currently nearing completion, has been actively supported by the various states and could well be used as a template for resolution of other issues.

4.2.2 Responding to climate change

Industry sees this issue as having two aspects – responding to increased climate variability and understanding and mitigating greenhouse gas (GHG) emissions. Both aspects were identified in the last strategic planning exercise in 2005, but were given a much longer timeframe (10 years) before it became necessary to implement a significant research effort to address them. However, with the change of government and a heightened public awareness of the issues, it became necessary to expedite research activities earlier than anticipated.

Some strategic initiatives have been commenced to address the issue of GHG emissions. Measurement of methane emissions from feedlots indicate that they are in line with figures obtained by use of the formulae currently employed by the Department of Climate Change and Energy Efficiency. Further work on measurement and mitigation of methane emissions is being undertaken within the Reducing Emissions from Livestock Research Program.

There is, however, little hard data on actual GHG emissions from feedlot pads and manure management practices, and efforts during the coming period will be directed to completion of work to answer the current range of outstanding questions on GHG management for the beef lot-feeding industry, including emissions data for Australian systems and validated emissions mitigations. A comprehensive project with the Queensland Department of Employment, Economic Development and Innovation has been put in place to do this. Prioritisation of the research effort was assisted by the results of Life Cycle Assessments previously commissioned and a literature review of available emission data.

A successful project outcome will provide a management responsive emissions calculation protocol detailing emissions reductions from alternative management options. It would also offer equitable rewards for improved management and the ability to capitalise on the carbon sequestration potential of manure. The targeted outcome will also provide the solid data and science that industry and stakeholders need to formulate effective and reasonable policy.

The need to address practical issues such as the impact of increased climate variability on the sizing of effluent ponds, feedlot water requirements and incidence of heat stress events were seen as priorities.

4.2.3 Continued improvement in animal welfare

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, climatic stress, confinement, health issues caused/ exacerbated by the intensive animal environment, stocking density and development of protocols/practices for management of dust, mud and handling of animal welfare cases (including appropriate euthanasia guidelines) within the feedlot. Further work is required to better understand the effect of relative humidity on the heat load index following periods of significant rainfall events and to develop nutritional solutions to reduce/manage heat 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. It is also important that industry keeps abreast of and meets community expectations regarding animal welfare to ensure that any retailer initiated campaigns do not negatively impact on the industry.

4.2.4 Community communications

Feedlots have a very positive environmental management story to tell. Because beef production is more efficient in a feedlot, there is less land required, fewer cattle needed, less stress placed on the environment and lower GHG emissions to produce the same amount of beef. They also 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. These stories should be developed and promoted as part of a broader industry campaign.

Similarly, industry should develop a series of information sheets that address potential issues in the areas of resource usage and sustainability, animal health and welfare and food

safety to support and defend their position on these issues. The role of the Feedlot Program is to supply the credible scientific data to underpin the messages in the information sheets, which can then be utilised as necessary.

4.3 Increasing industry and people capability

The objective of this imperative is to have the outcomes of Feedlot Program R&D adopted and successfully implemented by industry, while at the same time developing the innovation capability of the industry.

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. However, the workshop outcomes did clearly indicate that there is potential for the Feedlot Program to improve both communication methods and messages to better target operators of smaller feedlots and consultants that service the industry. Given they have regular contact with lotfeeders, there is also potential to harness these industry professionals (consulting environmentalists, nutritionists and veterinarians) to interface between research and industry to drive adoption and impact across the industry.

4.3.1 Increasing adoption of innovation

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 mail-out 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 outcomes.
- Production of a searchable DVD that contains copies of all MLA feedlot related project reports.

In addition to continuing these activities, the following undertakings are proposed for the 2011-2016 period:

- Use of an email distribution list for the delivery of project summary reports and ‘Webinars’ for communication of other relevant topical information on a regular basis.
- Further enhancement of the project information on the MLA website.
- Increased involvement in both communication and demonstration of research outcomes that require implementation either on-farm (pre-feedlot) or at the feedlot enterprise. The Tullimba and Gatton research feedlot facilities were seen as potential venues where feedlot related demonstration activities could be undertaken.
- 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.
- The development of returns on investment information for particular R&D projects to educate lot feeders regarding the benefits of the R&D program.

4.3.2 Working with industry to attract, develop and retain world-class people

It is becoming more difficult for feedlots to source and retain staff, a trend reflected through much of rural Australia. Increasingly, employees are younger, better educated, more mobile and less likely to be from an agricultural background. An increased commitment to training will be required 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 invest resources to ensure that the decision making processes for regulators are streamlined and industry consultants are kept up to date.

In addition to assisting industry to develop strategies to address the issues above, the Feedlot Program will also develop delivery materials that allow the flexible delivery (e.g. web-based) of the competency based training package and fund one Australian Rural Leadership Program position on an annual basis for a feedlot industry representative.

5 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. This has not been the case in recent years.

The high profile nature of the feedlot industry means it remains the focus of a high level of attention and scrutiny in the areas of animal welfare, environmental management and food safety. Much of the research work commissioned within the previous Feedlot Program has been of a 'protective' or 'risk management' nature, addressing potential environmental and animal welfare issues and ensuring the long term sustainability of the industry. The current Feedlot Program will address this imbalance and place more emphasis on productivity based RD&E.

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 2011-2016 period.

Issue	Feedlot industry desired outcome	Project areas and comments
1. Increasing productivity on farm		
Animals of superior genetic potential	Animals of superior genetic potential identified and available to industry: • feed conversion efficiency • feeding performance • meat quality • health status Mechanisms for measuring and identifying animals with superior genetic potential developed.	Address within the CRC for Beef Genetic Technologies and potential successor consortium. Extension of currently available information and technologies to seed stock industry participants for incorporation into breeding and selection programs.
Superior feedstuffs	Ability to assign a value to weather damaged grain based on true energy availability. Ability to assess the nutritive value of grain and mixed rations. Improved availability of nutrients to ruminants from specific grains. Improved cereal grain varieties.	Continue participation in Feedgrain R&D Partnership • Investment in sorghum breeding. • Identification of and investment in priority issues across grain and intensive animal industries.
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. Access to grain supply demand information, particularly with respect to the impacts of drought.	CSIRO grain devitalisation project. Collaboration with other intensive livestock industries and co-investment through the Feedgrain R&D Partnership.
Pesticide Residue Rapid Tests	Rapid tests available, for use at point of commodity receival, for all major chemical contaminant groups.	Test development.

Issue	Feedlot industry desired outcome	Project areas and comments
Feedlot Dags	Development of alternative processing procedures for daggy cattle. 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 treatment that removes dags from feedlot cattle.
Fly Control	Commercial availability of pathogenic fungi previously identified as fly control agent.	Continuation of work on development of fungal fly control procedures and identification of commercial partner.
2. Improving animal health and biosecurity		
Bovine respiratory disease	Industry access to a suite of measures to address the issue of bovine respiratory disease in feedlot cattle.	Finalisation of epidemiology study of seasonal variance in BRD – animal/ environment/ geography/ organism factors. Extension and demonstration of study outcomes. Role of *Mycoplasma* and *Histophilus* in BRD complex. Remote and early detection of sick animals. Development of diagnostic tools: • real time remote diagnostics capability • immuno-compromised animals Vaccine development: • 2 in 1 vaccine (commercialise) • 5 in 1 vaccine (research) Demonstration and extension to supply chain of returns to producer on investment in yard weaning and pre-feedlot vaccine delivery.
Animal health survey	Baseline data on disease incidence and identification of emerging feedlot disease issues. Baseline data for BRD project and subsequent extension efforts.	Progress work to address any identified problems.
Pregnant heifers	Simple, cost-effective method for determining pregnancy status of heifers.	Review and demonstration of available diagnostic tests and technologies: • human urine test • E-preg device
Foot abscess	Reduction in the incidence and improved management of foot	Collation of relevant information on contributors and solutions to

Issue	Feedlot industry desired outcome	Project areas and comments
	abscess problems in feedlots.	the problem, including: • transport injuries • yard surface condition • feed additives • genetics/structure
Swollen leg syndrome	Reduction in the incidence and improved management of cattle with swollen leg syndrome.	Collation of relevant information on contributors and solutions to the problem.
3. Ensuring sustainability and demonstrating environmental stewardship		
Water	Feedlots issued licences for high security water. Returns from 1 megalitre of water, in terms of productive capacity and dollars, when used in lotfeeding, compared to other uses. Improved water use efficiency	Comparative analysis, based on outcomes from project assessing the environmental sustainability of the industry and current LCA projects. Study on the options, costs and benefits of various approaches to reduce water use at the feedlot.
Manure	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. Manure valued on basis of both its nutrient profile and soil organic amendment value.	Completion of current 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 Field trials to evaluate value of manure for nutrient delivery and soil amendment.
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: • Manure contaminants • Application rates • Nutrient cost calculator
Odour	Development and acceptance of feedlot odour modelling methodology and performance criteria by regulatory authorities.	Review 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. Assess the impact of dust on the health of feedlot cattle and the OH&S implications for the feedlot workforce.	Review of literature and implementation of work to fill identified knowledge gaps.
4. Responding to climate change		

Issue	Feedlot industry desired outcome	Project areas and comments
Life Cycle Analysis	Counter public misconceptions about the environmental sustainability of the feedlot industry by assessing the resource use and relative costs associated with the production of 1 kilogram of grain fed beef. 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	Quantification of greenhouse gas emissions, both enteric and manure, from beef cattle feedlots. Development of a probiotic mechanism for reducing rumen methane emissions and improving feed energetics. Development of mitigation strategies for emissions associated with manure management. Management responsive emissions calculation protocol detailing the quantity of emission reductions from alternative management options. Equitable rewards for improved management and the ability to capitalise on the carbon sequestration potential of manure. Improved efficiency in relation to electricity, gas and fuel usage.	Continuation of involvement with the Reducing Emissions from Livestock Research Program and progression of initiatives that emanate from this work. Continuation of project with DEEDI on manure management emissions and mitigations. Continuation of project with CSIRO to measure methane emissions from effluent ponds. Implementation of new initiatives as need identified. Literature review of options and their cost versus benefit that could be implemented at a feedlot level.
Climate change	Impact of climate change on practical aspects of lotfeeding.	Modelling exercises to establish impact of increased climate variability on: • Size of effluent ponds • Water requirements • Incidence of heat stress events
5. Continued improvement in animal welfare		
Animal welfare measures	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. Continuation of current work to address animals perception of the feedlot environment. Specific animal welfare issues: • Animal washing • Livestock transport • Climatic stress • Confinement • Stocking density • Health issues caused/

Issue	Feedlot industry desired outcome	Project areas and comments
		exacerbated by the intensive animal environment Develop protocols/guidelines for management of: • Dust • Mud • Animal welfare cases, including euthanasia guidelines
Heat stress	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. Refine heat load indices, for: • Relative humidity • Night-time cooling Commercialise heat load forecast service Mark II. Nutritional manipulation of heat load.
6. Community communications		
Positive promotion of feedlots	Public informed of positive impact of feedlots on grazing land degradation during periods of drought. Resource material and extension/education program in place to ensure public well informed and have a positive perception of industry.	Provision of appropriate material for use to highlight the positive aspects of industry operations.
Issues management	Access to collated information that can be used to address issues as the need arises.	Provision of relevant information for collation into information sheets that address public concerns related to industry operations: • Environmental management • Resource usage and sustainability • Animal health and welfare • Food safety
7. Increasing adoption of innovation		
Education, Extension, Awareness	MLA website provides a relevant, user friendly and regularly updated source of information. Industry access to current MLA information and research reports through:	Maintenance of website needs to be addressed within MLA. Continuation of regular articles in ALFA *Lotfeeding* and *Feedback* magazines.

Issue	Feedlot industry desired outcome	Project areas and comments
	• Website • MLA and ALFA • ALFA Journal Access to issue specific information and research project outcomes. Improved communication with industry consultants and operators of smaller feedlots. Utilisation of industry consultants as extension agents. Increased involvement of MLA in communication and demonstration of research outcomes.	Conduct of issue specific workshops and 'Webinars'. Participation in industry conferences. Direct electronic delivery of project reports. Specific training exercises with industry consultants to equip them as extension agents for research outcomes. Activities at on-farm and feedlot level to demonstrate research outcomes and quantify benefits.
Knowledge management	Access to a series of best management practice handbooks. DVD of all relevant MLA project reports.	Collation of information from previous reports, literature reviews, definitions, etc. into a series of best management practice handbooks: • manure handbook • managing bovine respiratory disease • feedlot design Regular update and dissemination of DVD to all accredited feedlots and MLA feedlot members.
8. Working with industry to attract, develop and retain world-class people		
Training	National delivery of feedlot competency based training package. Australian Rural Leadership Program position awarded to one feedlot industry representative. Maintenance of research capacity to service industry requirements.	Development of web-based system allowing flexible and remote delivery of package. Ongoing promotion and support of Australian Rural Leadership Program. Mentor and project support for Post-doctoral Fellowship in research area of health, welfare and productivity of feedlot cattle.
9. Program evaluation		
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.

6 Program management and evaluation

6.1 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 RD&E 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 RD&E programs within MLA and coordination of RD&E 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 approval at their May meetings. MLA then makes any required changes to their Operational Plan for the coming year.

6.2 Performance evaluation

Evaluating the performance of the Feedlot Program is necessary to demonstrate both the value of the work and its impact. It also ensures accountability to stakeholders by quantifying returns on the industry levy contributions and government matched funding.

Individual project proposals are evaluated using the Feedlot Economic Model as part of the approval process. This ex-ante evaluation, which is based on expected benefits from a successful project outcome, assists MLA to predict the impact of these projects in advance and guides investment of grainfed levies. Similarly, once the actual project outcomes are known, an ex-post evaluation is undertaken to update the project impact.

In addition, MLA has invested in the development of an independent evaluation framework. This framework was developed on MLA's behalf by the Centre for International Economics (CIE) and enables an objective assessment of program outcomes against the MLA strategic imperatives, allowing MLA to report back to stakeholders on the impact of their investment. Individual projects or clusters of feedlot related projects are included in the CIE evaluation framework where they contribute to achievement of a specific MLA strategic imperative.