The impact of science on the Australian Feedlot Sector and the flow of benefits to other sectors

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The Australian feedlot industry today is playing a pivotal role between the meat processing sector and the cattle breeding sector. This situation has been slowly developing over the past 10 years as the feedlot sector has been growing and the advantages of using feedlots to finish cattle have become more accepted by both meat processors and cattle breeders.

The feedlot sector in Australia now has a capacity of over 1 million head and 30% of cattle being processed in this country are coming from feedlots. Prior to the development of the feedlot sector, there was very little selection of cattle for processing. Processors would literally harvest the cattle available at any one time and try to best fit the resulting production into the markets available. Little wonder therefore that Australian beef had the reputation for being inconsistent and unreliable for both quality and supply in domestic and export markets.

Today, feedlots take detailed carcass specifications from processors, most commonly selling on carcass weight and quality parameters, and through feeder cattle selection and feeding techniques deliver consistent cattle to processors to enable them to exactly match customer requirements. As a result, the reputation of Australian beef is steadily improving both at home and overseas and this is being reflected in increasing demand.

The feedlot process is one of selecting suitable feeder cattle, feeding an appropriate ration or rations for an appropriate length of time, maintaining the health of the cattle during the feeding process and then selecting the finished cattle when they best match the processors specifications. The feedlot industry has and continues to fund research and development aimed at improving these aspects of the feedlot process as well as its environmental performance.

Research and development in the feedlot sector is funded from transaction levies paid on the sale or processing of cattle derived from feedlots. The research projects undertaken are selected by the Australian Lot Feeders Association and the expenditure is managed by Meat & Livestock Australia. These levy funds are matched dollar for dollar by the Federal Government and over the last 10 years, the total expenditure on R&D on feedlot related activities in this country has been $13.5 million. Of this expenditure, $1.1 million has been directed to the first two cattle industry CRCs and $840,000 is now committed to the current CRC for Beef Genetic Technologies. There is no doubt that the adoption of the outcomes of this research has been a major factor in allowing the feedlot industry to grow to the extent that it has.

Unlike the feedlot industries in other countries that have developed as a result of scarcity of grazing land, harsh weather conditions or surplus grain production, the feedlot industry in Australia has developed specifically because of a need to improve the consistency of supply and quality of Australian beef. As such its output is directly targeting quite specific customer requirements from a large number of markets and market segments. The need therefore for research directed more specifically at carcass and meat quality characteristics both from the point of view of feeder cattle selection and feeding techniques has been high on the agenda. The investment in the CRC programs has been important from this point of view, although research outside the CRC programs has also played a major role.

One of the main areas where science has been used to improve feedlot operations has been in the area of feeder cattle selection. Important work has been done by the CRC and others in the area of net feed efficiency and better understanding the genetic variation and heritability of this trait. Feeding efficiency is of course vitally important to the lot feeding industry as we are in the business is converting feed to meat. We now have a blood test to assist in selecting animals with improved net feed efficiency and the CRC is working to identify gene markers to further assist in identification of superior animals.

Gene markers have now been identified and commercialised for marbling and tenderness. Whilst these markers do not account for all the variation in these traits they are nevertheless a move in the right direction and the three gene markers

for marbling are now being used by livestock breeders. These tests are still too expensive for general use by feedlots in the feeder cattle selection process but as technology improves this may well become a reality in the not-too-distant future. The core area of the new CRC is of course genetic technologies and so we are hopeful that more gene markers for production and quality traits will be identified. Importantly, we are also hopeful that appropriate management strategies will be discovered to enhance or restrict gene expression, thereby giving the industry the ability to increase positive attributes or reduce negative ones for improved production efficiency and meat quality.

Recent research by the CRC into the importance of cattle temperament on feedlot performance and meat quality has seen the introduction of flight time recorders into a number of feedlot processing areas so that unsuitable cattle can be detected before an expensive feeding program.

Research into the impact of early life nutrition on subsequent animal performance in the feedyard and ultimate carcass attributes has been important in understanding some of the variation that feedyard operators see in cattle performance and meat quality. It has also led to an increase in the practice of backgrounding cattle prior to feedlot entry. To date much of this has been carried out by individual feedlot operators but recently we are starting to see the emergence of commercial backgrounding operations taking weaner cattle and backgrounding them specifically for feedlot entry. Earlier work on the benefits of adapting cattle with bunk training and animal health treatments prior to feedlot entry is also starting to be incorporated in these backgrounding programs. As a result of this development the feedlot industry is being presented with feeder cattle ideally suited for their particular end market and feeder cattle that go onto feed quickly and easily with little animal health issues. This is a big step forward for our industry and has come purely as a result of research carried out by the industry over a number of years.

In the area of feeding management, Australian research has been directed at trying to better understand the regulation of intramuscular fat or marbling due to the importance of this meat quality attribute in Australia's major export markets. Whilst this has yet to result in any positive strategies for the manipulation of marbling through feedlot or pre-feedlot management approaches, it is important nevertheless to understand the mechanisms behind the development of marbling fat deposits before research into intervention strategies can commence. There is a lot of folklore in this country and others around the world in this area of marbling but little hard science available to guide feedlot operators. We are looking forward to the new CRC to progress this area of science.

The major Australian work carried out in the area of feedlot animal health has been directed towards the development and commercialisation of vaccines for the prevention of various diseases involved in respiratory challenges experienced by cattle usually soon after arrival at a feedlot. Whilst a number of these vaccines were available overseas, Australian quarantine restrictions prevented their importation and use in Australia. It was also important that vaccines were developed specifically for disease strains present in this country. This work is continuing with more recent research aimed at developing vaccines that will combine antibodies for a number of diseases.

Recent work studying the issue of heat load on cattle in feedlots has developed a number of practical outcomes to mitigate against serious losses in feedlots. A weather forecasting service has been developed and introduced that now predicts the likelihood and severity of a potential heat load event in most areas of Australia where feedlots are located. A range of management strategies have been developed to deal with these events when they occur. A computer based risk analysis program has been developed to enable feedlots to predict the long term likelihood of severe heat load events. The program uses past weather data from any region in Australia and then factors in the type of cattle being fed and the mitigation strategies in place at the feedlot such as shade. This program enables feedlots to take a long term view of the risk of heat load events in their area and with the type of cattle they are feeding and put strategies in place to prevent serious losses. This is the most detailed research on understanding and coping with heat load events in feedlots undertaken anywhere in the world.

In order to make feedlots more environmentally sustainable and thus enable the industry to grow with the support of government and community interest groups, significant research has been undertaken into environmental issues. Again, a lot of this work has been world-first as the feedlot industry in other countries is longer established and environmental issues are only recently becoming an issue. Research has been, and continues to be, undertaken in the area of odour, dust, the effective use of feedlot manure and effluent and methane gas production. Research undertaken in CRC1 developed a comprehensive knowledge of feedlot waste management was used to develop guidelines for the industry that have been adopted by regulators as best management practices. This science contributed to the refining of computer based models now in use to assist feedlots in planning waste management infrastructure. A

life cycle analysis of the industry as a whole is currently being undertaken to identify areas for further improvement.

There has been a significant body of research carried out in the USA specifically directed at animal performance and animal health in feedlots. The Australian industry has been fortunate in being able to adapt much of the outcomes of this research and this has avoided the need for a lot of local research effort in this area. The heavy focus of USA research on animal performance in feedlots highlights the differing perspectives of our two industries. With the USA having a feedlot industry that was established to better utilise surplus grain production, they have a strong production focus and have directed their research in that area. The Australian industry is however much more quality focused with the local feedlot industry growing on the need for improvements in the consistency of quality and supply of our product. As a consequence our research efforts have been directed this way. Being able to adopt the appropriate outcomes from the USA science in terms of animal production has helped better direct our limited resources.

One thing that was not clear from the US research was whether there needed to be different breeding programs for cattle that were best suited to grain feeding as compared to the cattle that were being bred for grass finishing. CRC 1 was able to clearly show that Australian bred cattle were equally adaptable to either finishing system.

There is no clearer example of research being targeted at the improvement of Australian beef quality than the science behind the Meat Standards Australia grading system. The concept of MSA was in fact started by the Australian Lot Feeders Association back in the early 1990's with lot feeders calling for better recognition of the superior quality of Australian grain fed beef. The need for research in this area was picked up by the then Meat Research Corporation and ultimately Meat & livestock Australia and the CRC. The Australian beef industry has spent in excess of $15 million on research to develop of this grading system that is now recognised as the best in the world.

The MSA system has highlighted the importance of weight for age and marbling on the overall eating quality of beef and in itself has contributed to the growth of the lot feeding industry in this country through ever increasing numbers of cattle on feed for the domestic market.

All of this research has not only had a profound effect on the feedlot industry itself but on both the cattle breeding industry and the meat processing industry. Feedlots are now much more specific on the feeder cattle they require, understanding as they now do the production and meat quality impacts of breed and pre-feedlot management of the cattle. Science is now delivering gene markers and more are on the way to enable cattle breeders to more accurately select breeding stock that match market requirements.

The more professional breeders are now targeting their breeding programs with a particular feedlot end market in mind and most feedlots supply feedback to breeders on the performance and meat quality results of their cattle. Breeders can then use this information to tailor their breeding programs to better fit their chosen market requirements.

As mentioned earlier, we are now seeing the development of a commercial cattle backgrounding industry that is taking weaners from breeders and drafting them into lines of cattle suitable for various feedlot requirements. These cattle are then managed and treated such that they are immediately ready for feedlot entry with all the necessary vaccinations having been carried out. Supplementary feeding is a regular part of these backgrounding programs when there is any drop in grazing potential. Delivery of these cattle direct to a feedlot means that the cattle go onto feed quickly with few health problems thus maximising feedlot performance and reducing costs.

The research work directed at feedlot performance is helping to reduce feedlot costs generally through better cattle performance and as feedlot operators are basically margin takers, the benefits of these savings are passed back to breeders or passed on to processors in the form of cheaper cattle. Either way the end result is to improve the efficiency of the Australian beef industry which makes us more competitive against overseas competitors and alternate meat proteins.

The benefits to the processing sector have been profound. Processors are now able to take orders for specific quantities and qualities of beef with confidence, knowing that the feedlot industry clearly understand their requirements and can deliver them reliably. This is a long way from the old days of killing what was available and then trying to find a market for the beef produced. It has been the Australian research focus on meat quality that has enabled the processing industry to become more customer focussed in their approach rather than the production focus that previously existed.

The ongoing research into environmental issues is keeping the feedlot industry up to speed with community expectations to ensure it can continue to operate and grow along with the demand for grain fed beef. Without this, the benefits that lot feeding have delivered for the Australian beef industry could be lost overnight.

With the backing of the science relating meat quality to animal production, the feedlot sector has been instrumental in effectively delivering end customer requirements back to the cattle breeder. This is a revolutionary change to the operation of the Australian beef industry and has separated it from almost every other beef producing country in the World. Australia is virtually producing beef to order rather than processing the cattle and then trying to find the best market for the product. This is a legacy of a viable and professional feedlot industry using a science-based approach to the targeted production of consistent quality cattle.

There is little doubt in my mind that these benefits will ensure ongoing and growing demand for Australian grain fed beef with the lot feeding industry continuing to grow. This process can only be aided by ongoing research to provide the tools for breeders and lot feeders to deliver more consistent and specific quality cattle to the processing sector so that it can better satisfy consumer demand in the many markets that it services.