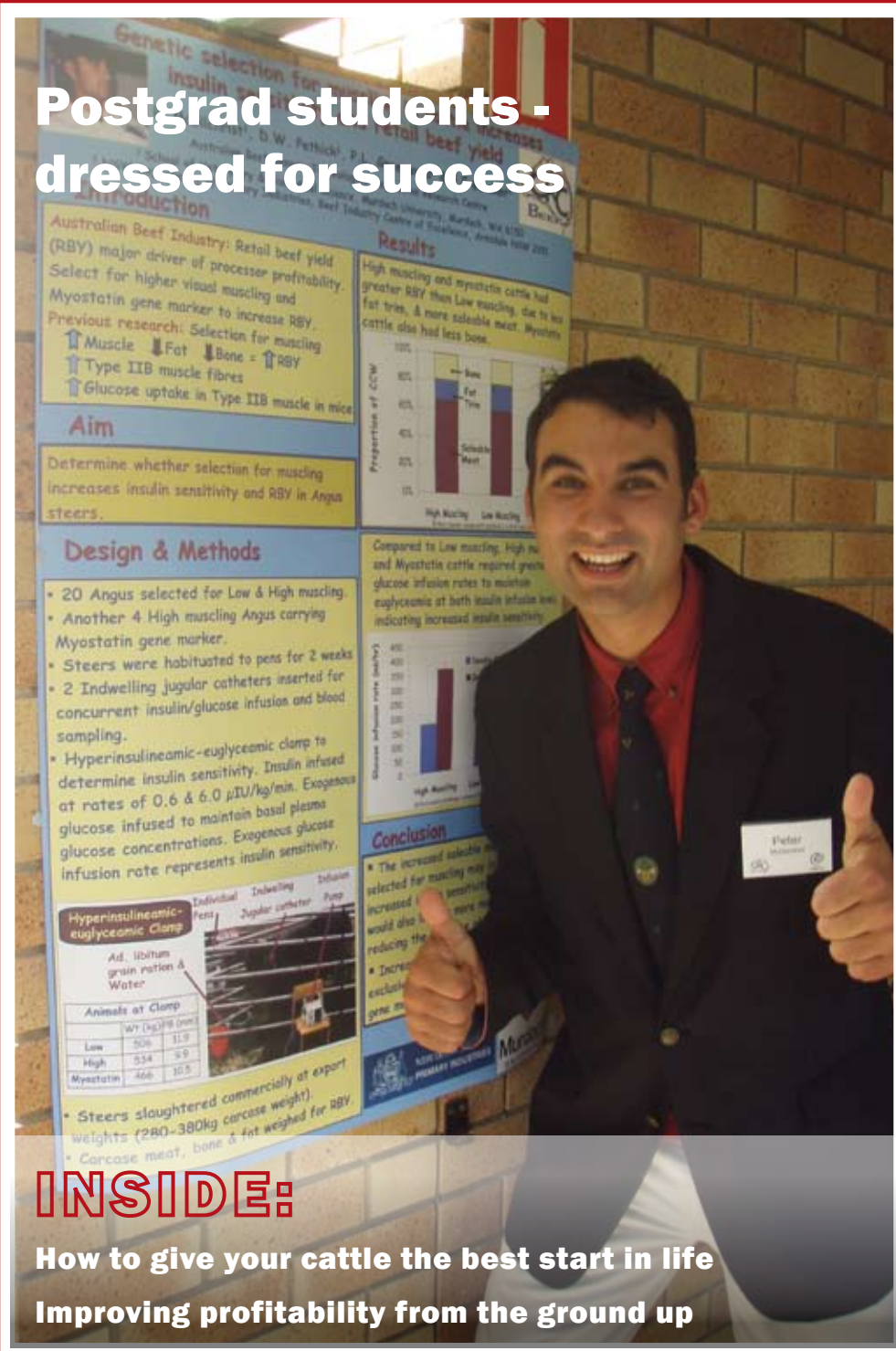




Postgrad students - dressed for success



INSIDE:

How to give your cattle the best start in life
Improving profitability from the ground up

Unlabeled Beef Summer 2008

Australia's largest
integrated beef research program

Summer 2008

How to give your cattle

Should backgrounders buy lighter, cheaper calves or pay more for heavier, better fed stock with supposedly greater potential for growth?

It's a question that has been testing beef producers for years. A recently-completed Beef CRC project has tackled the science underpinning the conundrum by looking at the long-term effects on growth and production in cattle which have been subjected to poor nutrition.

In the first stage of the experiment, researchers looked at the differences in the calves produced by cows on varying rates of nutrition during pregnancy. In the second phase, the growth and meat quality of calves on nutritional extremes was compared.

Led by Dr Paul Greenwood, principal research scientist with New South Wales Department of Primary Industries (NSW DPI), the project was conducted at Grafton Research Station a sub-tropical location which provides access to both irrigated fodder and some of the hardest grazing country in NSW.

The Hereford cows used in the trial were joined to either Waygu or Piedmontese sires. Bob Gaden, an extension officer with NSW DPI, says the Wagyu bulls were chosen for their high marbling quality while Piedmontese cattle are highly muscled with a lot of potential for growth and yield.

The cows were fed high or low nutrition diets during pregnancy. Between calving and weaning the cows and calves received either high or low nutrition. The experiment was designed specifically to produce calves with as much variation in prenatal and pre-weaning growth as possible.

Mr Gaden says one of the findings of the study was that cows on low nutrition diets produced calves with lower birth weights.

"The immediate effect of low cow nutrition was that calves were about 3 to 4 kilograms lighter at birth," says Mr Gaden. "This is then carried forward throughout the life of the calf. Even after low birth weight calves were taken out of the harsh

environment and put on good feed to grow out before finishing at the feedlot, their potential was restricted when compared to the growth rate of those calves which spent the prenatal and pre-weaning parts of their lives on good feed."

He believes the current drought will mean the growth potential of many calves is compromised before they are born - a penalty they will carry through their lives.

But perhaps a bigger issue, Mr Gaden says, is the impact that poor nutritional diets has on the fertility of cows.

"Cows are fairly sensitive to environmental influences. Most breeders expect one calf per year out of their cows. But cattle have a natural ability to preserve themselves if feed supplies are low. When times get tough, cows turn off their fertility and won't produce a calf. That means they are a lot less profitable to the beef producer."

The second phase of the experiment highlighted another aspect of the



the best start in life

nutrition story: how the calves themselves perform for the producer. Calves on a low nutrition diet between birth and weaning were about 70 kilograms lighter at weaning than those on the high nutrition diet.

Those with low birth weights showed no compensatory growth during backgrounding, and slower feedlot growth (1.48kg/d vs 1.62kg/d) than those with high birth weights. Calves with lower pre-weaning growth showed a small amount of compensatory growth during backgrounding (620 vs 560g/day), but produced similar growth rates in the feedlot (1.53 vs 1.57kg/day) as those grown well pre-weaning.

Having demonstrated nutrition's effects on growth rate, researchers turned their attention to meat quality.

Mr Gaden says the cattle were slaughtered at the same age. But despite the differences in weights, meat quality was virtually identical.

"There's a belief in industry that giving calves a hard time early on in life will toughen the meat and produce a poorer eating quality meat," he says. "But in the definitive experiment we ended up with meat of equally good quality as if they hadn't had any setback."

While that's good news for the consumer, there is a hit for the producer: researchers found a 30 kilogram reduction in meat yield from the diet-restricted animals.

What does all this mean for the commercial producer?

Mr Gaden says all the research to date has compared animals at the same time and at the same age. Dr Greenwood and his team re-analysed the data to make comparisons based on weight, to answer the question: "what if we carry the diet-restricted animals a few months longer until they get to the same feedlot entry weight as the cattle on good feed?"

The answer? Yield and quality remain consistent, but the extra time the poorer calves take to get to a higher slaughter weight is likely to bring them up against market acceptance boundaries. Mr Gaden

says most export markets have some sort of age limit, against which there is a significant price penalty for over-age animals.

In general terms, Mr Gaden says the project proves cattle which are faster growing and turned off quicker are much more profitable for producers. "Keeping enough food up to the cows to keep their body weight and fertility up is number one. Everything else is secondary," Mr Gaden says.

In light of the current climatic conditions, he acknowledges that is easier said than done.

For specialist backgrounders, the picture is a little more cloudy. When it comes to buying stock, Mr Gaden says a couple of questions need to be asked.

"You have to decide whether you'll buy the well-grown animals and pay more money for them, or you buy the ones that have had a bit harder time which are lighter and cheaper. In the end it's not so easy to evaluate the economics of this situation as you'll have to keep the poorer ones for longer and there's less potential for growth," he says.

"It'll depend on how you utilise your growing season. The restricted calves will never catch up to the ones who've had good diets. But they may in fact, during the backgrounding period, grow a bit faster than the well-fed calves. So when you put that together they may not make a bad buy after all, so long as they don't run up against those age limits which could exclude them from some markets."

Mr Gaden maintains buyers of Australian beef can be confident in the quality of our product despite the current dry conditions.

"Despite the broad range of environments our cattle are produced in, we continue to produce high quality beef. It is a comforting thing to know that varying the diets of beef cattle in early life is not as big an issue as we first thought," says Mr Gaden.

More of this research will be made available to producers through workshops to be held in 2008.



Postgrad students

The cutting-edge experience gained by students participating in the Beef CRC's post-graduate program is opening doors for them right across the beef industry.

Dr Graham Gardner from Murdoch University in Western Australia has been tracking the progress of recent Beef CRC graduates. He says most are walking into high-level, well-paid jobs across all sectors, "whether it is in the State Departments of Primary Industries, CSIRO or with universities. Others are continuing post-doctoral research overseas.

"The industry's high regard for Beef CRC graduates is testament to the rigour of the post-graduate program, and the importance the CRC places on training what is potentially its next generation of scientists", Dr Gardner says.

He says there are a number of factors which contribute to the success of the program, beginning with the current Beef CRC's focus on genetic technologies.

"There is a real interest in this field. These sorts of skills are 'sexy' areas in science at the moment; people are really switched on about genetics and gene markers and understanding DNA."

The calibre of the scientists involved in the Beef CRC is another factor. "These scientists are doing really good research and because of their quality, they can attract and supervise really good students."

Competition for Beef CRC scholarships is intense. In the last round, Dr Gardner notes, 20 students applied, all with 1st class or 2A honours. But only 10 applicants were awarded scholarships. Such competitive pressures ensure that students hone their projects to be 'right on the money'.

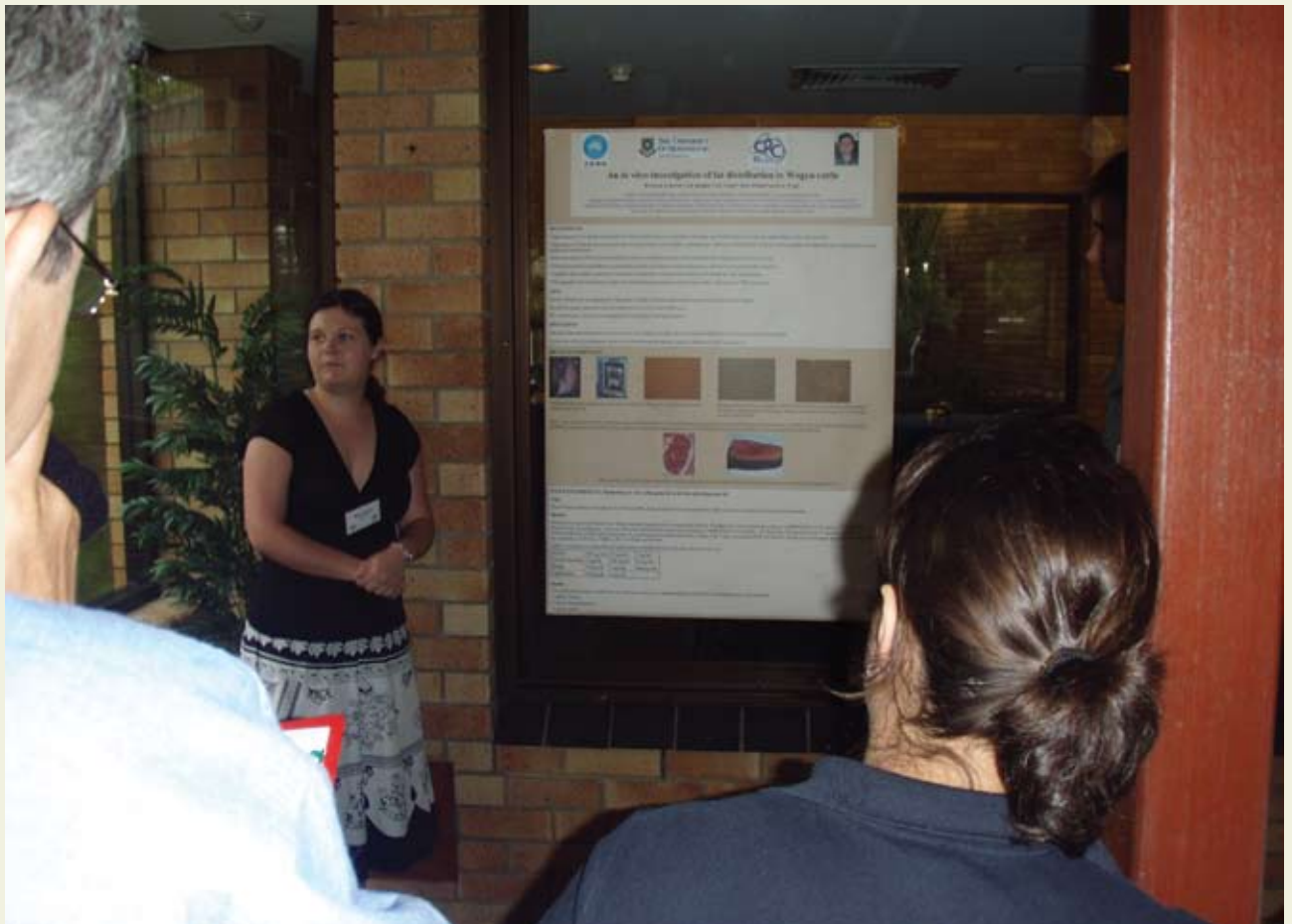
The post-graduate program is also uniquely popular with mature students. "I'd say 25 percent of our students would be older than 30," says Dr Gardner. "Many have gone out and spent some time in industry

and have come to a point in their career where they want to up-skill."

The Beef CRC encourages applications from this category of student with high-value scholarships. While the alternatives - University Post-graduate Awards (UPAs) or Australian Commonwealth Post-graduate Awards (APAs) - are worth less than \$20,000 per annum, a Beef CRC scholarship provides \$28,000 tax-free a year thanks to support from industry.

"The standard scholarships appeal to people fresh from an undergraduate degree, who are used to living frugally, but something extra is needed to attract high-calibre people from within the industry", Dr Gardner says. "At \$28,000 per annum tax free, that is starting to get into the realms of a relatively competitive salary."

An additional attraction of the Beef CRC is that it strives to give its post-graduate students a unique



Post-graduate students attend an annual conference. It gives them a chance to present their work, hone their public speaking skills and receive feedback from their peers.

dressed for success

experience. Dr Gardner says that too often, post-grads sit in a little lab quite isolated from the rest of the Australian scientific community.

“That is one of the real benefits of being part of the Beef CRC program. You’re doing research that is focussed on national industry goals. Every year we get the students together for a conference which serves a couple of purposes. It makes them recognise they are part of a bigger organisation, it gives them access to high-level scientists, they present their work and receive feedback from their peers,” he says.

Students also undertake a professional development workshop. The last workshop, held in October, looked at adoption science with Russell Barnett, CEO of Australian Venture Consultants Pty Ltd.

“Russell has some serious expertise in adoption science, and he was able to outline the barriers to adoption of scientific innovations. He also encouraged the students to come up with ways to design their research so its adoption is enhanced.”

Adoption of scientific outputs developed in CRCs, and the financial benefit they offer to industry, is used by the Commonwealth CRC Program as a key measure of a CRC’s success. Dr Gardner points out that because students are doing work which has to be underpinned by a potential financial benefit, they’re doing highly relevant, industry-focussed research.

Masters student Andrew Doljanin is one recent recipient of a Beef CRC scholarship. His work is focused on the Meat Standards Australia (MSA) system.

“He’s looking at creating a supply chain where cattle producers are rewarded for delivering quality and quantity, not just quantity,” Dr Gardner says. “It’s what consumers want - quality beef.”

“The supply chain pays the producer a constant proportion of what the carcass is worth over the counter. The wholesaler and butcher are essentially commission agents providing a service by which the producer can sell his product. In

effect the farmer gets paid for small increments in quality and yield, as opposed to the grid selling system which is largely insensitive to changes in quality and quantity.”

In fact, Dr Gardner comments, post-grad students are an undervalued commodity. “While the scholarships are quite lucrative, the CRC and the beef industry really see the benefit through the fantastic research output of these students”, he says.

If you want to make up your own mind about the importance of the post-graduate research make sure you keep reading the Beef Bulletin. We’ll be showcasing some of the projects, and how they apply to you, in coming editions.



PhD student Peter McGilchrist gives the postgrad program the ‘thumbs up’. Peter’s work surrounds the physiological responses of beef cattle to gene markers and EBVs for muscling and marbling.

Improving profitability

Australian and New Zealand beef producers are doing their own research on how to stay profitable in a run of poor seasons, thanks to a Beef CRC-sponsored project which enables them to explore options to improve their businesses.

The Beef Profit Partnerships (BPPs) are collaborative ventures involving producers, the CRC and State Departments of Primary Industries. The partnerships aim to improve profitability of beef enterprises, help producers adopt new technology, facilitate practice change and demonstrate improvements.

Emma Weatherly is a Beef Industry Development Officer with DPI Victoria. She facilitates a BPP with 20 producers in the Hamilton region, in Victoria's south-west.

"Our group only got together in February 2007 but we're very pleased with what they've achieved," says Ms Weatherly. In fact, the popularity of the project took her by surprise. "If anything, we were oversubscribed,

with more and more people wanting to join."

She thinks one reason why people are keen to get involved is the program's flexibility.

"The BPPs are not structured. The producers in each group decide the topics that group will focus on. Each individual identifies the key profit drivers for their business and then as a group we see where the main opportunities are to make some gains," she says.

Producers in the Hamilton group have identified three key areas to explore in their BPP group.

Ms Weatherly lists these as improved pasture systems, which involves looking at species and pest management for a five per cent increase in beef production (measured in kilograms/hectare); more efficient on-farm management systems incorporating use of NLIS technology and improved worm management programs.

Producers are looking at the benefits

of sowing more summer-active perennials to improve the feed supply for their enterprises. This includes setting up a trial site through the 'EverGraze More Livestock from Perennials' project.

She adds that the group is also aiming to have 75 per cent of its members reduce their cost of production, adjusted for drought, by the end of the program's second year.

But in order to go forward, Ms Weatherly says it is important to benchmark where the producers are starting from. To that end, Hamilton group members have used Meat and Livestock Australia's (MLA's) cost of production calculator to work out their cost of production and kilograms of beef produced per hectare.

"We've just sent initial benchmark figures to the CRC in Armidale. Economists there will analyse the data," says Ms Weatherly.

"The run of poor seasons has made analysis of raw figures difficult. Costs have blown out because of



February 2007: Host farm tour (Mark Wootton's property, Jigsaw Farms, Hamilton) & group discussion on opportunities to reduce cost of production and increase profitability.



September 07: Improved Pasture Systems field trip to the Mount Gambier district. Donovan's Dairy manager James Mann discussed with the group feed budgeting, rotational grazing systems and renovation programs.

things like additional supplementary feeding. I understand the CRC is going to try and adjust the data for the effect of season. That will help the producers identify where big impact improvements can be made when seasonal conditions are not so extreme and from there, measure the impact of new technologies and changes in practice."

Beef Profit Partnerships are a valuable tool for enabling producers to conduct on-farm research, Ms Weatherly notes. "Group members believe they will benefit from seeing what doesn't work locally, as well as what does," she says.

"The BPP is a supportive rather than competitive group. Every person's data is confidential if they wish. But I think one of the strengths of the Hamilton group is how comfortable they are with sharing thoughts on challenges and how to overcome them, and also openly exploring which opportunities offer the greatest potential."

Recently the Hamilton BPP undertook a field trip to Mount Gambier after securing some funds from the Beef CRC. During the tour they visited 'Coolah' a Techno-Graze beef enterprise, and 'Donovan's Dairy' an intensive pasture rotation operation.

At Coolah, stocking rates have increased four fold as a result of new fencing, feeding and watering regimes. Seeing how such technologies are applied on-farm was one of the highlights of the trip according to Ms Weatherly.

"Beef producers have access to so much information," she says. "One of the biggest challenges they face is determining what is going to work, and the practicalities of applying it to their own operations. I think getting 10 to 20 different people from a region to discuss the various options can be extremely useful."

The next Hamilton BPP workshop will explore methods of improving management of internal parasites.

"They want to try and keep worms in check in the medium to long term. Veterinarians are warning that cattle worms are beginning to develop resistance to drench. This group is trying to learn from the lessons in the sheep sector which has developed strong resistance to drench. We're trying to be proactive by exploring the best preventative strategies and most effective worm management practices," Ms Weatherly says.

While the group is still in its early stages, she comments that the Beef Profit Partnership is a project she thoroughly enjoys being a part of.

"It's great to be able to cover topics that are relevant and pertinent to that particular group's enterprises. It is a really practical program aimed at helping producers increase efficiency, improve productivity and long term profitability. Despite the tough seasons I'm confident this group will be successful in achieving improvements in business performance that is sustainable," Ms Weatherly says.

Beef - the smart meat

By rolling two powerful genetic selection tools into one, the Beef CRC is hoping to take genetic progress within the beef industry to a new level that will help breeders overcome some long-standing challenges.

Australian cattle breeders working with genetic technology are currently using either BREEDPLAN and its system of Estimated Breeding Values (EBVs), or the GeneSTAR® brand which has an expanding range of DNA markers.

But the Beef CRC's CEO, Heather Burrow, argues that having two competing technologies is less effective than having a single process that draws on the best points of both methods.

Enter a collaborative new project "*SmartGene for Beef*", which aims to incorporate both technologies into a single genetic tool known as "marker-assisted EBVs" (MAEBVs).

Dr Burrow says MAEBVs have practical implications for cattle breeders. "By integrating the EBVs and DNA tests for tenderness and other economically important traits, producers will be able to utilise MAEBVs to improve these traits in their herds. Tenderness is the first trait to be specifically targeted by "*SmartGene for Beef*", mainly because it is so important for consumers and it is so difficult to breed for, using BREEDPLAN or DNA markers alone" she said.

An example of where MAEBVs could revolutionise the beef industry lies in the northern cattle industry's own long-running battle with tenderness.

Tenderness is the quality that beef-eating consumers most seek. "Tenderness accounts for 60 to 70 percent of consumer complaints about beef palatability," Dr Burrow says.

"Tough beef and an inconsistent eating experience contributed to a major drop in beef consumption in Australia in the 1980s and 1990s. Because it was difficult to maintain consistency before introducing Meat Standards Australia (MSA), consumers turned off meat. Consumption dropped from around 60 kilograms per person per year to less than 40 kilograms per person per year. We realised something needed to be done, and quickly," says Dr Burrow.

But tenderness is something cattle producers in the north struggle with because of the region's harsh climate, and the predominance of tropically-adapted *Bos indicus* cattle suited to the region. Beef CRC work has shown that *Bos indicus* produce inherently tougher beef than the *Bos taurus* breeds mainly used in the south.

However an answer may lie in a broader approach to genetics, Dr Burrow says. By combining direct and indirect trait measurement, breeders may be able to exploit a range of influences in an animal's genetic makeup that will collectively bring about positive change in a specific trait.

In the case of tenderness, this might mean that indirect measurements like flight time (a measure of temperament's effect on tenderness), meat colour and marbling are used alongside direct DNA tests for tenderness to exert greater pressure on the tenderness trait than could be achieved by focusing solely on known genes for tenderness. MAEBVs will be central to this approach, Dr Burrow says.

The Beef CRC is aiming to discover and validate enough DNA markers to account for about 50 percent of the variation in a large range of economically important traits, including beef tenderness. Dr Burrow believes the development of MAEBV's will allow more producers of tropically adapted cattle to meet MSA standards for tenderness, leading to a direct economic benefit to the industry.

Using current market indicators, MSA

graded product attracts a premium of \$0.10 to \$0.30/kg liveweight with an average of \$0.20/kg. Assuming the average live weight at slaughter is 580kg for Queensland cattle, an increase in eating quality of 10 points can be estimated to be worth around \$33 per animal.

Dr Burrow says breeders should not have to wait too long for MAEBVs. Once the DNA marker results are available to the project, it should be less than a year until beef producers are able to use the new technology.

"That will not only provide significant benefits to the Australian beef industry but our global customers as well," says Dr Burrow.

The "*SmartGene for Beef*" project is partially funded by the Queensland Department of State Development and Innovation, and partners include Catapult Genetics, AGBU, ABRI, MLA and the Beef CRC in Australia and Cornell University in the USA.

