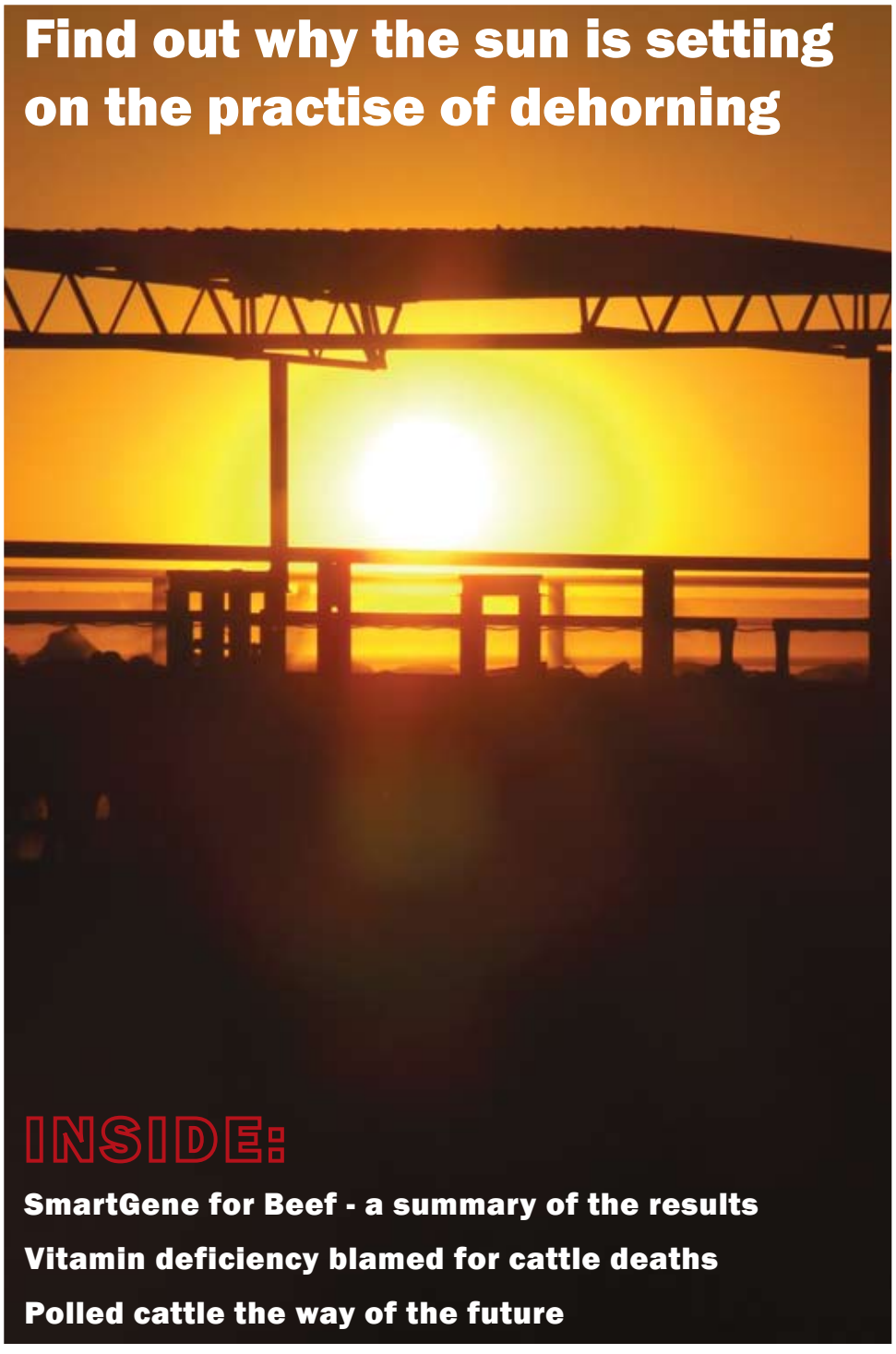
CRC BEEF

Beef Bulletin

Find out why the sun is setting on the practise of dehorning



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Australia's largest
integrated beef research program

Spring 2008

Scientific young gun
ticks all the right boxes

A young Queensland scientist working on a clean, green way of controlling cattle ticks (Rhipicephalus microplus) has received a prestigious Early Career Scientist award. Presented at the Cooperative Research Centre Association's (CRCA's) Annual conference in Sydney in May, the Early Career Scientist Award recognizes the work of some of the brightest PhD students in the country.

Emily Piper's work has the potential to save the northern Australian cattle industry millions of dollars in lost productivity and chemical control.

Her research is investigating whether Australia's northern cattle industry can harness the natural resistance that some breeds of cattle have to the cattle tick, which costs Australian cattle producers more than $175 million per year in control costs and lost production.

To her delight and astonishment, Emily's work was in May honoured with the Early Career Scientist award. The award was presented in front of a crowded audience that included Senator Kim Carr, the Federal Minister for Innovation, Industry, Science and Research and the Chief Executive of CSIRO, Geoff Garrett.

A PhD student from the University of Queensland, Emily was one of eight students nominated for the accolade.

Emily is trying to discover which types of immune cells, and the products they produce, are responsible for the high levels of tick resistance observed in Brahman animals and some cross-bred cattle.

"Currently producers use synthetic insecticides to control the cattle ticks but they are costly and can possibly leave residues in food products and the environment," she said.

"Some breeds of cattle such as the Brahman are naturally more resistant to the cattle tick and ticks will die rather than feed on them," Emily said.

"On the other hand, European breeds such as the Holstein-Friesian and Hereford become heavily infested when there are many ticks in the field."

Controlling ticks by using resistant breeds is not new; however, it is difficult to identify highly resistant animals, especially in composite breeds, where there can be wide ranges of resistance and susceptibility.

The secret may lie in the profile of immune cells. When a tick feeds on an animal, small molecules are passed from the tick to the host. The molecules are then processed by three main types of immune cells in the host – T cells, B cells and macrophages.

"So far, I've shown that Brahman animals have a different profile of immune cells to that of the susceptible Holstein-Friesian animals," Emily said. "The Brahman cattle had more B cells and helper-T cells in their blood, while the Holstein-Friesian cattle had more macrophage type cells."

She said once it's established what kind of immune response is important for high levels of tick resistance, researchers will be a step closer to developing an immune assay to predict tick resistance or susceptibility.

"Producers in tick-endemic areas of Australia will then be able to make breeding decisions based on resistance. Additionally, by understanding how tick resistant cattle reject ticks, we can develop an improved tick vaccine for the cattle industry therefore reducing the dependency on chemical control."

Michael Hartmann, CEO of the CRC Association, said Emily's work is a great example of what can be achieved through collaborative research.

"While the CRCs are recognized as the engine room for collaborative innovation, they are also the breeding ground for Australia's next generation of innovators. A key outcome of the CRC program is the development of highly skilled and industry ready graduates across a myriad of industry sectors", said Mr Hartmann.

"The finalists in this year's CRC Association's Early Career Scientists Awards have made practical discoveries with application in industry, agriculture and the environment."

Emily Piper, University of Queensland PhD student, accepts the Early Career Scientist Award from Master of Ceremonies Bernie Hobbs, ABC Science and Dr Geoff Garrett, Chief Executive, CSIRO

SmartGene for Beef:
A Summary of the Results

The "SmartGene for Beef" project is providing valuable information to further develop genetic evaluation in the Australian beef industry, provide new EBVs and increase the accuracy of some existing BREEDPLAN EBVs.

By integrating DNA marker information with BREEDPLAN phenotypic data and pedigree information to calculate marker-assisted Estimated Breeding Values "SmartGene for Beef" aims to help producers select more efficiently for economically important traits.

Major Project Outcome

Tenderness was the key trait targeted by "SmartGene for Beef" because no EBV is available yet, and the trait cannot be directly measured on live animals.

Tenderness is the most significant characteristic in consumer taste panel tests. Research has shown that it is a major limitation particularly for tropical adapted beef breeds consistently meeting eating quality standards.

The SmartGene results for tenderness are very consistent. Of the four GeneSTAR tenderness markers examined, T1 and T2 consistently showed significant effects in British breeds and T1, T2 and T3 showed effects in tropically-adapted breeds of cattle. These markers will be the major components of BREEDPLAN trial Tenderness EBVs to be released in October 2008.

Marker-assisted EBVs will allow producers to identify animals that are genetically pre-disposed to producing more tender meat. This will not only provide significant benefits to the Queensland (and the Australian) beef industry but also to our global customers.

The project was undertaken in three distinct stages:

Stage 1 - Genotyping was performed by Catapult Genetics using ~12,000 DNA samples from Beef CRCI and II animals plus two industry projects. All animals were tested for the 12 commercially available GeneSTAR DNA tests (4 markers each for tenderness, marbling and feed efficiency). Results from the testing were transferred to the Beef CRC's database.

Stage 2 - The Animal Genetics and Breeding Unit (AGBU) then undertook analyses. DNA test results and performance measures (phenotypic measures of tenderness, intramuscular fat or IMF, marbling and feed efficiency in fully pedigreed animals) were analysed to estimate the full range of parameters required to calculate marker-assisted EBVs. Specifically this research estimated gene frequencies and evaluated the effects of each marker individually as well as sets of markers (T1-T4, M1-M4 and FE1-FE4) on each trait. The amount of variation accounted for by each DNA marker in each cattle population was estimated using these gene frequencies and gene effects.

Stage 3 – Software development is now being done by AGBU (funded by MLA) to calculate trial BREEDPLAN marker-assisted EBVs. They will combine the DNA test results from Stage 1, the DNA test results from seedstock animals already reported with BREEDPLAN, the genetic parameters from Stage 2 and the phenotypic records collected in CRC-I and II to deliver the marker-assisted EBV methodology to BREEDPLAN.

Animals tested in "SmartGene for Beef" project came from two Beef CRC projects conducted over the past 15 years and two field experiments conducted by breed associations. These projects are summarised in Table 1.

GeneSTAR DNA test results

Catapult Genetics supplied the DNA tests. Results were reported as 0, 1 or 2 'stars' for each marker. A result of 0, 1 or 2 'stars' means the animal carries zero, one or two copies (alleles) of the 'favourable' form of each gene or marker.

Comparing the allele frequencies of different experiments for the same breed showed only small differences. Where extreme frequencies exist (i.e. where fewer than 5% of animals have two copies of a particular allele

Table 1. Summary of animals tested in the "SmartGene for beef" project

BEEF CRCI	These data comprise seven purebred breeds, 4 temperate breeds (Angus, Hereford, Murray Grey and Shorthorn) (n=3,229) and 3 tropically adapted breeds (Brahman, Santa Gertrudis and Belmont Red) (n=3,615)
BEEF CRCII	These data are from the CRCII northern breeding project focussed on tropically adapted cattle- including purebred Brahman (n=2,039) as one breed and Tropical Composites (from various pastoral companies) as another (n=2,400).
Angus Progeny Test	Angus Australia progeny test program conducted using the NSW DPI Trangie Angus herd as dams (n=415).
Durham Progeny Test	The Shorthorn Beef progeny test program conducted in Durham herd (n=347), Orange, NSW.

or where >95% of animals have the same combination of genes for the marker of interest), a larger number of tested animals with phenotypes are required to establish the marker effects with confidence. Even when the effects can be established, they may have little utility as the markers with extreme frequency explain only a small amount of the genetic variation in that population, particularly if the favourable marker is at very high frequency.

Statistical analyses

Extensive analyses were done within each trait (tenderness, marbling and NFI). The performance measures (phenotype) and DNA test results were analysed extensively to determine the effects of each individual marker, as well as collectively as the total effect of all of the markers applicable to the trait. Each trait had a panel of 4 markers with the total number of favourable "stars" for each trait potentially ranging from 0 to 8 "stars". A brief outline of the key results are presented here. More detailed results will be available from the websites of the SmartGene partners.

Tenderness Results

Figure 1 shows the average effect of increasing numbers of "stars" on beef tenderness when measured as *longissimus dorsi* (LD; loin muscle) shear force.

Shear force is a mechanical measure that can be likened to how much force a person needs to chew a piece of steak. **The lower the shear force value, the more tender the beef.**

The effect of increasing numbers of "stars" was statistically significant ($P<0.05$) in each of the populations tested. Key points in the tenderness results include:

- Of the four GeneSTAR tenderness markers examined, T1 and T2 consistently showed significant effects in British breeds and T1, T2 and T3 showed effects in tropically-adapted breeds of cattle. These markers will contribute significantly to BREEDPLAN trial Tenderness EBVs by October 2008.
- While the CRCI temperate population contained animals used in marker discovery; the results were also statistically significant in the independent CRCII populations.
- The markers identified variation in both normally-hung and tenderstretched carcases. However, as the tenderstretched carcases were more tender and had less variation for tenderness than normally-hung carcases, the effects of the tenderness markers were reduced under tenderstretch hanging.
- Although statistically significant, the total amount of phenotypic variation in tenderness accounted for by the GeneSTAR tenderness markers was only around 4% in temperate breeds and 6% in tropical breeds. While encouraging, it means many more markers are required in both breeds to account for a sizeable percentage of variation.
- For CRCI temperate breeds, results showed estimates were not accurate for Shorthorn due to the extreme gene frequencies and low numbers of animals. For Angus and Murray Grey, the T1 and T2 markers were significant, had modest effects on tenderness and acted additively, but T3 and T4 were not significant. For Herefords, only T1 was significant.
- For tropically adapted breeds, results for T1, T2 and T3 fitted jointly showed significant and additive effects, except for T2 in CRCII Brahmans. However when T4 was added to the model, it had inconsistent effects, ranging from negative in CRC1 Brahman (that

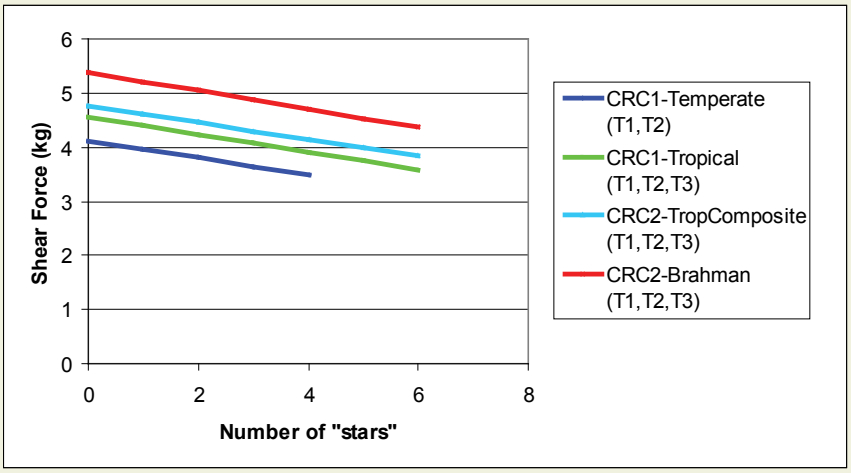


Figure 1. The average effect of increasing "stars" on LD shear force.

includes the discovery animals), to no observed effect in CRCII breeds, to positive in CRCI Santa Gertrudis and Belmont Red.

- T1, T2 and T3 in tropically adapted breeds were significant for tenderness in normally-hung carcases and had consistent effects on Meat Standards Australia (MSA) consumer taste panel scores. The marker effects appear to be additive in their effects on tenderness.
- The effect of T3 was not consistent in British breeds and T4 does not appear to be a useful marker for tenderness in these breeds.

Marbling Results

The marker effect as either individual markers or as increasing 'stars' was neither statistically significant (P>0.05) or consistent for IMF, MSA marble score or AUS-MEAT marble score in any of the populations tested, including the Angus progeny test animals. Points to note with respect to the IMF and marbling results include:

- None of the four marbling markers had a consistent effect either individually or collectively on IMF or marble score.
- The extreme gene frequencies of these markers made it difficult to assess the difference between 0 and 2 star or 1 and 2-star genotypes in most breeds.
- Animals tested for these markers were grain-fed for up to 180 days but there were no very long-fed animals in these datasets.
- IMF and marble scores were relatively low reflecting the days-on-feed; nevertheless, they are representative of Australian grain-finished cattle for most markets.
- To increase the statistical power of estimating significant effects, the information was pooled for CRCI Angus and Murray Grey and the Angus progeny test datasets and was used to examine MSA marbling score in these higher marbling breeds. This combined dataset comprised 1123 animals with MSA marble scores and a mean MSA marble score of 1.55 (± 0.80). In this dataset, none of the markers was individually significant and no statistical trends were observed. Similar results were observed when considering the markers together.

Feed Efficiency Results

Net feed intake (NFI) is a measure of how much an animal eats relative to an expected amount for its weight and growth rate. The lower the NFI value, the less the animal eats for its weight and growth rate and the greater the animal's feed efficiency.

The effect of increasing number of 'stars' was statistically significant for NFI (P<0.05) in the CRC1 temperate breed population, but not statistically significant in any other population. The effects of the markers on other traits associated with feed efficiency (e.g. daily feed intake and feed conversion ratio) were very similar to the effects on NFI.

Because the feed efficiency (FE) markers were discovered from research on some of the CRCI temperate and tropically adapted animals it was expected the effect of the markers would be statistically significant in that population. However, the marker effects were not statistically significant in any other population, showing that when tested in totally independent populations, the estimated marker effects were not consistent or informative. Points to note with respect to the NFI results include:

- The variance explained by the four FE markers in CRCI temperate breeds (i.e. comprising the discovery animals) was about 1.8% of the phenotypic variance for the trait.
- Gene frequencies for FE markers in Brahman were extreme for three of the four markers.
- For CRCI and CRCII tropical breeds, the markers explained none of the sire or phenotypic variance. Similar results were obtained for the two progeny test datasets, except the direction of the effect was in the unfavourable direction (but not significant).
- Markers FE3 and FE4 were significant in the CRCI temperate breed populations (that also included the discovery animals) for net feed intake and daily feed intake, but they did not validate in any other set of information. The direction of effects for NFI was not consistent across populations. The high gene frequencies of the 2-star form of the gene, especially in the tropical breeds, also limit their usefulness for breeding purposes.
- The effects of the markers on other traits associated with feed efficiency (e.g. daily feed intake and feed conversion ratio) were very similar to the effects on NFI.

Glossary of technical terms

DNA marker - A unique DNA sequence genetically associated with a particular trait and used to identify an individual or cell carrying that marker.

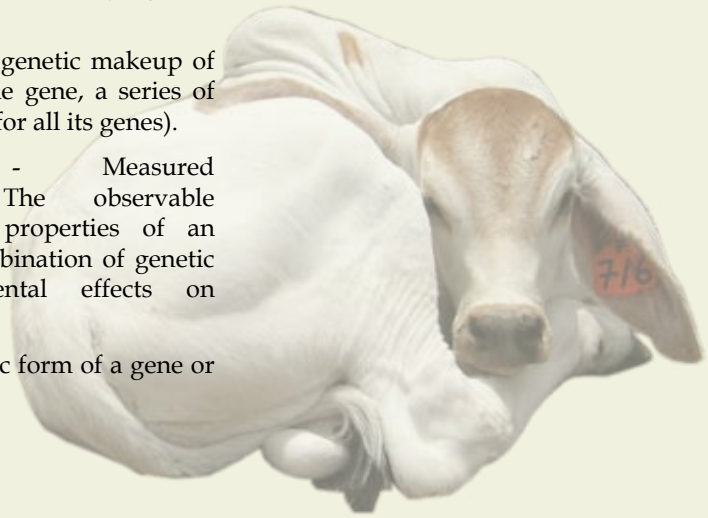
Genotype - The genetic makeup of an animal (at one gene, a series of gene markers or for all its genes).

Phenotype - Measured performance. The observable or measurable properties of an animal. The combination of genetic and environmental effects on performance.

Allele - A specific form of a gene or gene marker.

Gene - The functional sequence of DNA that codes for a specific protein.

Tender-stretch - A method of hanging a carcase employed at the processing level. It involves hanging carcases by the pelvis as opposed to the traditional Achilles tendon and is known to improve beef tenderness.



Acknowledgements

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Will investment in marker panels ever pay off?

Professor Michael Goddard, Chief Scientist of the Beef CRC believes the discovery of large panels of DNA markers are the biggest revolution the beef industry has seen since the development of Estimated Breeding Values (EBV's) in the 1980's. But what implications does this technology pose for industry?

Imagine being able to conduct a single genetic test on your cattle and immediately be able to tell which stock to breed from, which to divert into a feedlot and which ones will ultimately produce a tender, juicy steak.

If research being conducted by the Beef CRC pays off, this sort of scenario will be common place in the Australian beef industry.

Once dismissed as a 'pipe dream', recent advances in technology have allowed Australian and international scientists to use large panels of DNA markers, or Single Nucleotide Polymorphisms (SNP - pron 'snip') to genotype cattle.

"We've just scaled up from a 10,000 SNP chip to a 50,000 SNP chip," said Professor Goddard from the Department of Primary Industries, Victoria and the University of Melbourne. "This has allowed us to discover large numbers of markers which are associated with economically important traits in beef cattle."

The Beef CRC aims to add $179-million to the value of the Australian beef industry each year from 2012 by improving carcass and meat quality traits, reproductive and adaptive traits.

Prof Goddard said the dairy industry has already begun adopting new genetic technology.

"There are a number of dairy studs genetically testing their cattle because they know they won't be able to compete against others if they don't," said Professor Goddard.

He said the main aim of industry is to produce the most efficient cattle. One way to do this is through enhanced genetics.

"In dairy we've already shown a large number of markers used together can predict the breeding value of a young bull with no offspring with a 70 per cent accuracy for traits such as milk protein yield," he said. "The accuracy isn't as high in beef cattle, which is why we need to do larger experiments using a larger population of cattle to discover, confirm and validate the markers."

That's why the CRC has entered into the international collaboration he said.

The collaboration involves the United States Department of Agriculture (USDA), the US National Beef Cattle Evaluation Consortium (NBCEC), the US National Beef Cattleman's Association (NBCA), the Beef Improvement Federation (BIF), the University of Guelph (Canada) the University of Alberta (Canada) and the Beef CRC.

The international collaboration allows for marker discovery in 3,000 animals, confirmation in another 3,000 animals which are totally independent, and then validation in up to 15,000 animals before the markers are released to industry.

"The collaboration is a very useful thing. It gives us the opportunity to increase the scale of the experiments we're doing without having to invest large amounts of money."

Professor Goddard said if scientists can discover the genes which affect the traits, genetic gain will occur at a rapid pace.

He said ultimately producers want to know which bulls or cows will produce the best offspring.

"Whether you use an eyeball view of the animal or an EBV based on the recorded performance of the animals' progeny or DNA markers, what you really want is to be able to tell early on how that animal will perform," said Professor Goddard. "DNA markers offer the possibility of determining this from the day calves are born."

He believes the development of DNA markers will not only affect stud breeders but commercial producers as well.

He said DNA profiles could be used by the producer to determine everything from which animal to mate from or which to purchase. He said there may even be implications for the feedlots which may buy cattle or allocate them to a feeding system on the basis of their DNA profile.

"Feedlots for example might put the ones which have good genes for marbling into a long feeding program and those that haven't got those genes for marbling into a short feeding program. Consumers may even buy their meat on the basis of a DNA profile. We've already begun talking about including markers for tenderness into the MSA model.

But Professor Goddard doesn't have a crystal ball and urges caution against believing DNA markers are the be all and end all.

"I've painted a picture of how good they'll be in the future. But I don't want to give the impression that they're that good now. People need to be cautious when investing their money. They need to ensure the product which is available justifies the price."

Vitamin deficiency blamed for cattle deaths

The loss of more than 100 CRC calves during calving in 2004 initially baffled staff at Toorak Research Station, 50 km south-west of Julia Creek in north-west Queensland. What they eventually discovered could ensure that other beef producers don't wear such a disastrous loss.

"It was an economic disaster," said Station manager Peggy Olsen, Queensland Department of Primary Industries and Fisheries (QDPI&F). "We ended up losing about 40 per cent of the entire calf crop. Everyone wanted answers."

Of the 406 calves born in 2004, 168 of them died–most within the first 24 to 48 hours of birth.

The cattle at Toorak are part of a resource population put together by the Beef CRC as part of a research project looking at ways to improve the carcass and meat quality, adaptation and fertility traits of cattle in northern Australia.

The herd contains two breeds, Brahman and a Belmont Red/ tropically adapted composite. The cattle are owned by the Australian Agricultural Company (AACo), the North Australian Pastoral Company (NAPCO), Consolidated Pastoral Company (CPC), McDonald Holdings, 'Mandalay', 'Tartrus' and 'Cona Creek'.

Mrs Olsen said there were numerous theories as to what was causing the deaths, but initial post mortems by station staff failed to find any obvious cause. "We'd weigh the new-born calves, tag them and then release them back to their mums, but by the next day they were dead. We had no idea what was going on."

"Some people put it down to heat stress, others thought it was more sinister. Some believed we were stressing them when we tagged them."

"We were pushing up dirt around the troughs so they had access to water as well as milk. We were offering them shade. We tried everything to prevent the losses."

"You have to realise just how much contact we have with these cattle. Whether we're weighing them, scanning their ovaries, measuring their rib fat, we're dealing with them all the time. Even during pregnancy we checked them every day."

Several QDPI&F vets, including Dick Holroyd from Rockhampton and pathologist Bruce Hill of the Animal Research Institute (ARI) spent time at Toorak investigating the deaths.

Dr Holroyd said post-mortems were carried out and samples tested for unusual viruses, bacteria or other signs of disease, but infection was ruled out.

During November they watched a number of calves just prior to their deaths. The calves were then placed in three broad clinical categories.

"In the first group, calves could follow their mother but had difficulty finding and sucking on a teat; the second group exhibited mild to moderate nervous system dysfunction, blindness and appeared mentally depressed and weak with prominent drooping of the head," said Dr Holroyd. "These calves could not follow their mothers, showed very infrequent and ineffective sucking and usually died about 24 hours after birth."

"The third group showed depression and blindness. Some had severe nervous system dysfunction and their heads would shake. These calves could not suck, they spent periods lying on their side and usually died quickly."

After extensive analysis, Dr Hill and his team at ARI found problems in the brain, the nervous system, the optical system and internal organs.

"Eventually it boiled down to a vitamin A deficiency which can prevent the skull from growing," said Mrs Olsen. "The brain was growing but the skull wasn't. So as the brain got larger it put immense pressure on the calf's brain stem."

Mrs Olsen said a premature end to the pevious wet season is believed to have contributed to the deficiency.

"We didn't have any rain for 10 months and as a result the Mitchell grass hayed off earlier than usual. The cows were putting on weight and had good body condition but they had little access to green foliage which can provide vitamin A," she said.

Désirée Jackson, a beef scientist and extension officer with QDPI&F, Longreach said vitamin A deficiency can be mistaken for other diseases.

"Some of the symptoms can look very similar to other diseases. Cattle can get a rough coat or decrease their feed intake, and many producers will think their cattle have worms," Ms Jackson said.

"But the one sign that is most unique to a vitamin A deficiency is 'night blindness'. Because people don't usually work with their stock at night they don't generally pick up on it."

Ms Jackson said a calf receives all the vitamin A it needs from the colostrum of its mother's milk. The cow stores vitamin A in its liver, but when the animals are grazing on dry pastures for extended periods, their vitamin A storage becomes depleted.

"They only need about an ounce of green feed per day, or if they can get a big dose of green feed the carotenoids will be converted and stored as vitamin A in the liver," Ms Jackson said.

"Alternatively, when the season starts to dry off and if producers are feeding licks, it might be useful to include a pre-mix containing vitamin A. Vitamin A is very susceptible to oxidation via contact with sunlight; so there will be some deterioration and not all of the vitamin will be available for absorption. Along with other nutrients, there is a higher demand for vitamin A at calving and during lactation so building up liver storage reserves of vitamin A to ensure there is plenty of vitamin A going into the colostrum for those calves makes good economic sense."

Back at Toorak, all cows are nowinjected to increase body reserves of vitamin A.

"We usually inject them with vitamin A once a year, but with another early end to the wet this year we'll do it twice, once in the first trimester and then again in the last trimester," said Peggy Olsen.

She understands it won't be feasible for every producer to inject their cows.

"If you have some green pick or trees you can just move a fence or two. The cattle don't need much."

Dr Holroyd said that since the reported deaths at Toorak, several other properties have also reported similar issues.

"Although these reports could not be investigated, it would suggest that in dry years, vitamin A deficiency is possibly a significant cause of neonatal mortalities in northern beef herds"

Polled cattle *the way of the future*

Dehorning is time-consuming and can adversely affect animal productivity and welfare. A new genetic test is being developed which, if successful, will give producers the ability to choose the breeding stock they need to produce a polled herd.

Anecdotal evidence suggests that about 90 per cent of bos indicus cattle in northern Australia are horned, ensuring that dehorning is a common practice across the region.

Dr Kishore Prayaga, CSIRO Livestock Industries, argues there's a growing need to develop a non-invasive genetic tool which will enable the practice to be phased out.

"There is increased awareness of animal welfare issues among the general public," Dr Prayaga said. "It would be much better if we could identify genetically polled animals which don't pass horns on to the next generation of calves."

Horns are detrimental from a welfare and production perspective, and pose a safety risk to cattle handlers.

Horned cattle can injure each other, are often more aggressive towards other cattle, and make the herd more prone to injuries or bruising.

They also cause more damage to gates, yards, fences and troughs and are generally not accepted into feedlots or for live export.

Tipping (removing the insensitive sharp end of the horn) does little to reduce the disadvantages of having horned cattle.

Dr Prayaga's work, supported by the Beef CRC and Meat & Livestock Australia, is focused on finding the genes that indicate whether an animal will grow horns.

"We believe there is more than one gene contributing to whether a bos indicus animal develops horns or not. We're currently targeting the African horn gene and the scur gene," Dr Prayaga said.

"If we can find the genetic markers for these genes we can then develop a DNA test which will assess whether an animal will produce calves with horns or not, and what proportion will be horned or polled."

Finding the genes responsible for horns in bos indicus cattle won't be as straightforward as it is in British breed cattle, which have a higher incidence of natural polling.

Dr Prayaga's work is based on two approaches, "gene discovery" and "gene expression".

Results of the first gene discovery scans are being collated, with promising results becoming available.

More genetic material is being generated through a breeding program at a research property, Hillgrove Station, near Charters Towers. "We're using polled bulls and polled, horned and scurred cows as a resource population to generate calves for further gene discovery studies."

Dr Prayaga and his team will record the horn status of calves, which will identify the combination of parents which are more likely to produce calves with horns.

"We also believe there is some sort of genetic 'switch' shortly after or just before birth which determines whether a calf will develop horns or not. We've identified 700 differentially expressed genes between horned, polled and scurred animals. We now need to further analyse the inter-linkages to determine which genes are responsible for horn growth."

Dr Prayaga said a genetic test could put more money in the pockets of stud breeders.

"People are looking for bulls which have a combination of good performance genetics and are polled. For the past four of five years, buyers of polled bulls have paid a premium over horned bulls."

Discovering the genes responsible for producing polled cattle is a long-term process, so Beef CRC researchers are looking at other ways to address the animal welfare and productivity issues associated with dehorning beef cattle.

CRC PhD student Stephanie Sinclair, CSIRO, is investigating whether there is a simple and effective pain relief program that producers can administer at the time of dehorning.

Dr Carol Petherick Principal Scientist, Animal Behaviour and Welfare, from Queensland DPI&F said the challenge is to address the setback that cattle apparently undergo from the stress and pain of dehorning.

"Dehorning can be unproductive," said Dr Petherick. "You want animals to be going ahead, putting weight on. You take their horns off and that stops happening."

"It's realistic to think the cost of administering a drug post-operatively could off-set the costs of mortality and weight setbacks, but it has to be practical or producers won't consider it."

While available information suggests older bos indicus suffer a setback from being dehorned, Dr Petherick said there has been very little research into the subject.

"Most of the work has been done on Bos taurus animals at a relatively young age, a few days or a few weeks old.

Future studies will monitor the behaviour, physiology, wound healing and weight changes of the cattle after they've been dehorned. Researchers will measure inflammation and cortisol response, which is an indicator of stress and pain.

An on-farm perspective

Charters Towers cattleman Tom Mann can't wait for the day he can genetically test his herd to determine which cattle will and won't produce horns.

Dehorning adds an extra job to the station calendar. Breeding cattle that don't produce horns could save the industry time and money, Mr Mann believes.

There are two main reasons why Mr Mann, who owns Hillgrove Station, likes polled cattle

"You can fit an extra two beasts on each truck deck; that equates to a considerable saving in freight costs," he said.

"It's also much safer for people handling the cattle. You might get a few bruises from a polled bullock, but you won't get gored."

Hillgrove Station, north of Charters Towers, is around 42,500 hectares and carries between 5000 and 8000 head of cattle, depending on the season.

Mr Mann said he has previously selected polled heifers and bulls in preference to cattle with horns. But that has meant he has had a smaller pool of cattle to choose from, he said.

"This could be why some people think breeding polled cattle negatively affects productivity. But you have to remember that Rome wasn't built in a day. If you try and eliminate horns overnight by selecting only polled animals you could well be losing productivity in other areas."

Mr Mann said he hopes one day to be able to test a hair follicle or a blood sample and be told straight away whether a beast is going to produce a calf with horns or not.

"That would allow us to make our selections much earlier when we have bigger mobs of cattle to choose from."

Mr Mann is confident producers would be prepared to pay for a genetic test for horn status. But doesn't know how much they'd pay.

"Like all these things, it depends on how much it is used as to how much it'll cost. So until they find the gene marker, it's all a matter of guesswork."

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