Beef Bulletin

December 2011

Strategies for marbling

Selection of cattle with high IMF EBVs leads to steers with higher carcass marbling

Southern Maternal Productivity Project

Heifer conception

Case studies:

John Fry, Bruce Creek, David Greenup

Dark cutting

Genetic and management factors influencing dark cutting

Beef CRC on target to deliver

Beef CRC to provide beefed-up breeding predictions

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Dr Fitzhardinge is a commercial cattle producer from NSW, a past member of the Boards of Meat Research Corporation and Meat and Livestock Australia.

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Dr Steele is a business advisor with beef R&D management experience, genomics knowledge and corporate governance and finance skills.

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Mr Backus brings northern beef sector and feedlot expertise and knowledge of the industry relevance of genomics to the Board.

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Mrs Robinson is a commercial beef producer in central Queensland and has extensive beef enterprise technology extension experience.

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Mrs Clubb has extensive financial, management and accounting experience as well as a strong rural background and operator of a beef cattle enterprise in southern NSW.

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Dr Robbins is General Manager of Animal Science for the Queensland Department of Primary Industries and Fisheries (QDPI&F) and former Director of the Queensland Beef Industry Institute.

Dr Heather Burrow, Chief Executive Officer

Dr Burrow has extensive research management experience and a quantitative genetics research background.

Mr Neil Scholes-Robertson, Company Secretary

Mr Scholes-Robertson holds a Bachelor of Business and is a qualified Chartered Accountant.

About the Beef CRC

The Co-operative Research Centre for Beef Genetic Technologies aims to add $179 million dollars to the value of the Australian and New Zealand Beef industries each year from 2012 through world-class gene discovery and gene expression research to improve profitability, productivity and animal welfare of beef enterprises.

Mission

To capture the benefits of the human and bovine genome projects and the "Livestock Revolution" by improving the profitability, productivity, animal welfare and responsible resource use of Australian and global beef businesses through worldclass gene discovery and gene expression research and accelerated adoption of beef industry technologies.

The Beef CRC research legacy

Dr. Heather Burrow

By June 2012, the Beef CRC will deliver all key outcomes from the CRC's four priority research areas for the beef industry.

I am pleased to advise the CRC is on track to achieve and, in some cases exceed, all our milestones in the Commonwealth Agreement.

The CRC will deliver genomic predictions for growth, carcase and beef quality, feed efficiency and male and female reproduction rate. The information will be integrated into BREEDPLAN, the beef industry's cattle records database.

The accuracy of these genomic predictions has been tested across breeds and the genomic data will be calibrated with the phenotypic and pedigree records and transferred to ABRI by April 2012 for subsequent inclusion in BREEDPLAN (see article in this edition for more details).

The CRC is on track to deliver genetic and management tools to increase reproduction rates of northern and southern beef herds and compliance with market specifications (the latter with benefits to weaner producers, grass- and feedlot finishers and processors).

We will exceed the milestones set for the tick vaccine project, but there is still several more years of research and registration trials before a commercial tick vaccine will be available.

The Beef CRC ceases operation in June 2012 and we have an integrated industry delivery and communication program underway to ensure our research outcomes over the life of this CRC, and previous CRCs, have been successfully disseminated to industry.

The integrated delivery program includes a new 'Train the Champion' initiative, where the CRC's senior scientists and experienced consultants and industry representatives mentor a southern and a northern network of State Department of Primary industry officers, researchers and scientists, industry representatives and private consultants.

The Train-the-Champion process aims to ensure peer-reviewed outcomes of Beef CRC research are accurately distilled into key messages of direct relevance to the Australian beef industry.

As part of the process, each Champion is asked to produce a peer-reviewed and Beef CRC-endorsed fact sheet and powerpoint presentation on his or her specialist topic. The fact sheets include case study information and economic data, where it is available.

All resource materials prepared by the Champions will be made freely available, along with other Beef CRC material, via an online legacy website, and as part of a presenter's kit.

In addition, the Beef CRC is supporting ongoing innovation amongst the Beef Profit Partnership (BPP) groups that are continuing to function through regional nodes as a way of driving improvements and innovations and technology adoption at a grassroots level.

Until recently, the cost of running these BPPs was shared between the Beef CRC and the BPP members themselves. However, knowing the CRC's term would end in June 2012, many BPPs have chartered their own course to ensure the network continues beyond 2012.

In New South Wales, for example, local producers were determined to keep the BPPs functioning and to retain Bill Hoffman as their facilitator. The NSW BPPs developed their own sponsorship model to fill the financial void left by the CRC's wind-up and that model is working well.

Finally, the Beef CRC remains proud of its legacy in training the future beef industry.

Over the last 20 years, the Beef CRC has supported the post-graduate research of nearly 100 PhD and Masters students.

The current Beef CRC has supported, or is currently supporting some 41 students.

More than 70% of Beef CRC post-graduate students continue to work within the beef industry. Post-graduates are employed in a range of roles – as academics within universities, or as research scientists within the state Departments of Primary Industries or CSIRO.

In this edition of the Beef Bulletin, we begin a series of profiles of Beef CRC post-graduates and their current role in the beef industry.

PUBLICATION DETAILS

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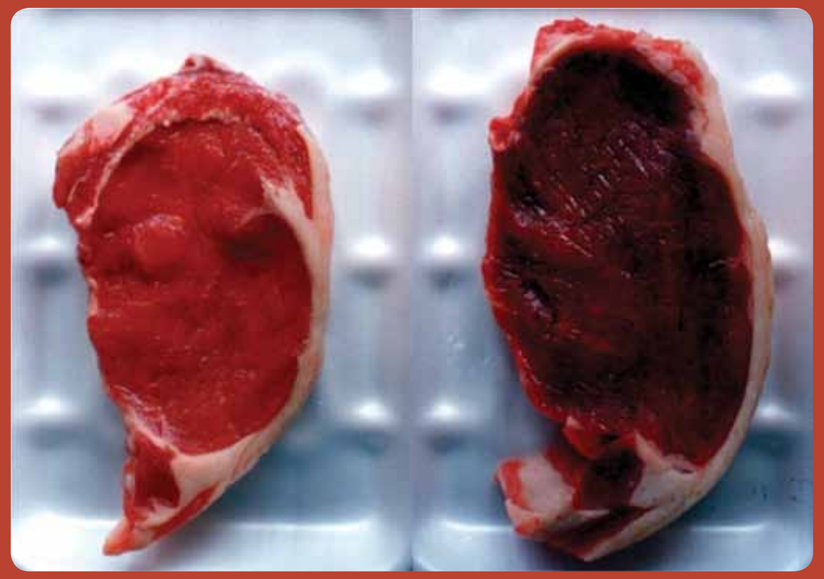
CORE PATICIPANTS

SUPPORTING PATICIPANTS

Dark Cutting

- New research finds increased muscling reduces dark cutting
- Genetic and management factors impacting on dark cutting



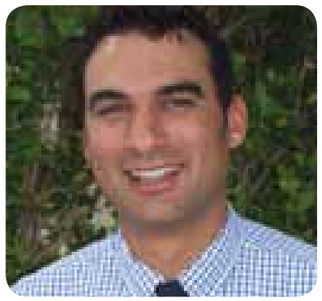
Ideal steak for pH compared with steak from a dark cutting carcass

FAST FACTS

- Animals with larger Eye Muscle Area (EMA) at a given carcass weight have a reduced incidence of dark cutting
- Aim to produce animals with an EMA greater than 70 cm^2 for 250kg carcass weight
- Producers can evaluate their current EMA position by viewing MSA feedback sheets which give EMA measurements, thus allowing appropriate breeding and management decisions to be made.

Increased muscling reduces dark cutting

More muscling reduces dark cutting and increases MSA compliance



Peter McGilchrist

New Beef CRC-funded research conducted by Murdoch University has shown that increased muscularity is a factor associated with lower ultimate carcass pH, leading to a reduced incidence of dark cutting.

In 2009, dark cutting cost the Australian beef industry around $35 million.

"Dark cutting meat is dry to taste, spoils very quickly, has variable tenderness and is very dark in colour," explains Peter McGilchrist, who conducted the research with his colleagues at Murdoch.

If there is low glycogen in the muscle, the pH remains elevated and the meat will be dark.

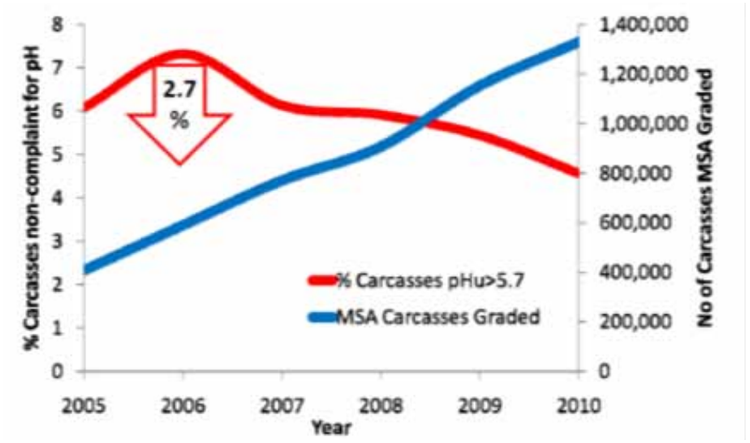
Based on Meat Standards Australia, when a carcass ultimate pH exceeds 5.7 dark cutting is triggered.

For a steak to be a desirable bright cherry-red colour, the pH of the meat must drop from a pH of 7 at slaughter down to an ultimate pH of less than 5.7 in the 24 hours after slaughter.

Meat from carcasses with an ultimate pH in the loin higher than 5.7 have darker meat colour, shorter shelf life, bland flavour, variable tenderness and resist cooking, which impacts on degree of doneness.

In 2009, Meat Standards Australia graded over one million cattle with 5.45% having a pH greater than 5.7 (see Figure 1). Due to its effect on quality, beef producers are commonly penalised up to $0.50 per kg carcass weight for carcasses with a pH greater than 5.7.

Figure 1: Percentage of carcasses non-compliant for pH (left hand side) and number of carcasses MSA graded across Australia (right hand side)



Relationship between muscling and dark cutting

The Murdoch research team found animals with higher muscle content, as defined by size of carcass eye muscle area (EMA) adjusted for hot standard carcass weight, is strongly associated with reduced incidence of dark cutting (Figure 2).

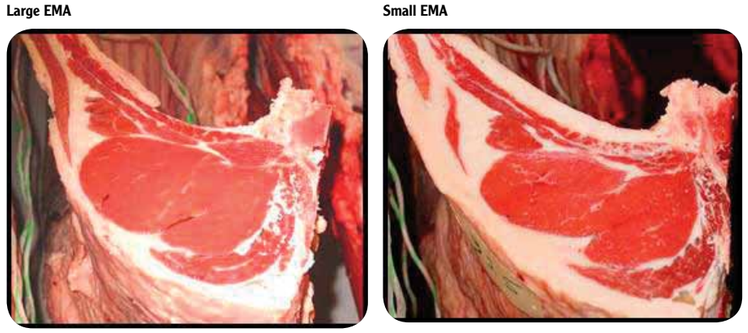


Figure 2: Higher muscle content is defined by the size of carcass eye muscle area (EMA). Increased muscularity is associated with lower ultimate carcass pH, leading to a reduced incidence of dark cutting.

What causes dark cutting?

Dark cutting is associated with insufficient muscle glycogen reserves in the muscle at the time of slaughter. The amount of glycogen present in the muscle before slaughter determines how much lactic acid the muscle is able to produce. If there is insufficient muscle glycogen at time of slaughter, the carcass pH decline will not be sufficient to reach an ultimate pH of below 5.7. If there is low glycogen in the muscle, the pH remains elevated and the meat is dark.

In carcasses less than 350kg, the effect of increased EMA from 40 to 80cm^2 reduced the proportion of noncompliant carcasses with an ultimate pH above 5.7 from around 22% to 6%.

In carcasses over 350kg the non-compliance level dropped from around 8% to 3% as EMA increased from 50 to 80cm^2.

The current average EMA from all MSA data across Australia is 64cm^2.

Producers should aim to produce animals that have an EMA greater than 70 cm^2 for a 250kg carcass.

"If muscling is increased to slightly above average, to around 70 or 75cm^2, this should greatly minimise the risk of dark cutting," says Mr McGilchrist.

To achieve this, producers should utilise sires with an Estimated Breeding Value (EBV) for EMA higher than the average. Producers can evaluate their current position by viewing MSA feedback sheets which give EMA measurements, thus allowing appropriate breeding and management decisions to be made.

Muscling and insulin and adrenaline sensitivity

Overall, muscle glycogen at slaughter is a function of initial muscle glycogen 'on-farm', minus the quantity of glycogen loss due to stressors during the pre-slaughter period.

Animals with low initial glycogen concentrations that undergo similar pre-slaughter stress are more susceptible to dark cutting.

In a separate study, Mr McGilchrist found that heavier muscled animals had increased insulin sensitivity and decreased adrenaline sensitivity.

This indicates that more muscular cattle have increased glycogen synthesis after eating and reduced glycogen breakdown during stress.

Both of these conditions result in increased muscle glycogen at slaughter, increasing the likelihood of having sufficient muscle glycogen for the carcass to reach an ultimate pH below 5.7.

Importance of muscling

A reduction in the incidence of dark cutting in high muscled cattle complements the other advantages of muscular cattle, such as increased retail beef yield and processing efficiency.

The relationship between increased muscling and reduced dark cutting is a very important finding for the beef industry, as it demonstrates that beef producers can actively select for more muscular cattle knowing it will help to reduce the incidence of dark cutting carcasses in their herd.

This article is based on a paper presented at the 57th International Congress of Meat Science and Technology, Ghent, Belgium.

Carcass weight, nutrition and feedlot finishing impact on dark cutting

Using data collected on 204,071 MSA graded carcasses at one WA processor from February 2002 till December 2008, Beef CRC researcher Peter McGilchrist and colleagues from Murdoch University investigated a range of animal and pre-slaughter factors that impact on the rate of dark cutting.

Data recorded for each carcass included weight, fat depth, marbling, eye muscle area and physiological age (ossification). In addition, lot size and finishing system (grain vs. grass) were recorded.

Overall, 8.75% of carcasses graded at the processing plant had an ultimate pH greater than 5.7, which tends to result in dark cutting.

From 2002 to 2008, the average carcass eye muscle area and marbling increased while physiological age (ossification) at slaughter decreased, indicating that animals were younger at slaughter.

Carcass rib fat depth averaged between 8 and 11 mm and reflected the differences in animal nutrition between years.

Carcass weight and rib fat depth

Increasing carcass weight and carcass rib fat depth were both associated with reduced rates of dark cutting. As carcass weight increased from 150kg to 220kg the predicted proportion of carcasses with a pH above 5.7 decreased from around 18% to 5%.

This indicates there is a very high incidence of dark cutting in very light vealer type cattle.

As carcass weight increased beyond 250kg, the proportion of carcasses with an ultimate pH higher than 5.7 continued to decrease, but at a slower rate.

As rib fat depth increased from 0 to 20 mm, the predicted proportion of non-compliant carcasses with an ultimate pH above 5.7 decreased from around 14% to 4%.

"The relationship between increasing carcass weight and rib fat depth are likely to be associated with better nutrition of heavier and fatter cattle," Mr McGilchrist said.

"Animals that are heavier and have higher rib fat can be assumed to have received better nutrition in the months leading up to slaughter, allowing for high muscle glycogen concentrations."

An interesting finding was that carcass marbling as assessed by MSA marbling was not associated with rate of dark cutting, even though carcass rib fat depth and carcass weight were.

Physiological age of carcass

Ossification is measured in increments of 10 from 100 to 590 and is an assessment of physiological age of a carcass. Physiologically older animals have higher ossification scores.

Overall, lower ossification scores in cattle at the same carcass weight indicate a more rapid growth rate throughout life.

FAST FACTS

Based on an analysis of over 200,000 MSA graded carcasses:

- An increase in carcass weight from 150kg to 220kg is predicted to reduce the incidence of dark cutting from 18% to 5%
- A large increase in carcass rib fat depth from 0mm to 20mm (reflecting improved nutrition) was predicted to reduce dark cutting from 14% to 4%
- In carcasses under 350kg, dark cutting increased from 6% to 20% as ossification score increased from 100 to 300 with the biggest increases occuring in animals with poor growth and an ossification score above 200
- As lot size increased from 10 to 80 head, dark cutting decreased from 10% to around 7%
- Feedlot finishing was associated with a 5.4% lower rate of dark cutting compared with pasture finishing

This article has been adapted from a journal article submitted to Meat Science titled 'Increased eye muscle area, lower ossification scores and improved nutrition have a lower incidence of dark cutting'

Generally, ossification score had a significant association with pH compliance of carcasses. However in carcasses with an ossification score less than 190, the effect was negligable.

In carcasses under 350kg, the rate of dark cutting increased from around 6% to 20% as ossification score increased from 100 to 300, with the biggest increases occuring at ossification scores above 200. In carcasses above 350kg, non-compliance increased from around 0% to 7% as ossification increased from 100 to 300.

Grain versus grass finishing

Season and finishing system (grass versus grain) also had a significant effect on the pH compliance of carcasses.

The highest incidence of dark cutting was in spring and summer even though the driest months are in autumn.

"During autumn, around 90% of MSA graded cattle in Western Australia are sourced from feedlots," Mr McGilchrist explained.

"The effect of higher rates of dark cutting in spring and summer is largely due to the reducing amount of metabolisable energy in the pasture in the weeks prior to slaughter.

"Even though the cattle may appear in good condition, low energy levels in the pasture mean there will be low glycogen levels in the muscle, resulting in a higher incidence of dark cutting."

Overall, grain finished cattle had 5.4% fewer carcasses classified as dark cutters based on pH, compared with cattle finished on pasture. Feedlot rations tend to have higher energy content, leading to higher muscle glycogen concentrations.

In addition, lot size was also associated with rate of dark cutting. As lot size increased from 10 to 80, the predicted proportion of carcasses with an ultimate pH above 5.7 decreased from 10% to around 7%. However there was little improvement in pH compliance beyond 80 head. Individuals in large mobs are thought to be more resilient to the stresses involved with the pre-slaughter period than individuals in small mobs.

Nutrition and dark cutting

Heavier cattle with increased fatness had lower rates of dark cutting. This underpins the importance of good nutrition and high muscle glycogen storage prior to mustering, transport and lairage to reduce rates of dark cutting.

Case Study:

Through careful selection and management, John Fry and his family have generated an efficient production system targeting young, high yielding, grain finished beef.

Based at Donnybrook, WA, in the Capel River valley, the Fry family has historically run 1100 Angus cows on approximately 1100 hectares but has recently reduced the scale of operation and turn off. This planned reduction has focused on increasing equity from 75% to 98% due to a downturn in WA beef prices from 2002-2010 and approaching retirement.

The Fry's innovative breeding and finishing operation have focussed on selection for increased meat yield which is an economically important trait.

Traditionally Mr Fry has bred Belgian Blue x Angus bulls for mating with cows while sourcing yearling Angus bulls for mating with heifers. The breeding program for the Belgian Blue x Angus composites focused on selecting 10 heavy muscled homebred bull calves, ranging from B+ to A+ muscle score at marking. The selected heavy muscled bull calves were then culled for growth, temperament and structure typically leaving 5 bulls available for first use at 15 months old. Yearling bulls are joined to 20 cows (5%) and 33 cows (3%) in subsequent years.

Each year, between 600-1100 animals at 10-13 months old are grain finished, using home grown grain and hay.

Mr Fry has target carcass weights of 230-300kg. During the 90 day finishing period average consumption is 730kg grain and 320kg hay. In addition to breeding his own progeny to finish, he leases Belgian Blue x Angus composite bulls to other producers.

"We buy back the progeny as weaners to supplement our feedlot," Mr Fry said.

This arrangement allows him to capture rewards from his system.

"We can supply genotypically similar yearlings to the high value grain-fed yearling grid autumn/winter market that appreciate high yielding MSA graded bodies," he said.

Last season, the finished yearling cattle dressed at an average of 56.6% with a range from 50.5% to 66.6%. By keeping weaner cattle on a fast growth path, the Fry's business captures the meat quality and production efficiency benefits associated with younger age at slaughter.

Mr Fry has not been afraid to push the boundaries and experiment with selection emphasis for yield. This has previously included extensive use of embryo transfer of purebred Belgian Blue into Angus cows that were delivered through caesarean section.

"We accepted the market was not ready to reward yield," Mr Fry said.

This sparked a decision to adapt the breeding program and mate all stud cows to Angus bulls with strict culling for any calving problems, resulting in calving assistance under 0.5% (1 in 200).

"By adopting commercial selection we are now able to use top Angus genetics for growth without calving problems," he said.

"As a result we no longer run any purebreds (Belgian Blue) but have a percentage of females that carry myostatin genes (high muscling) recessively but phenotypically look like Angus."

These cows are mated to the Belgian Blue x Angus composites to provide the heavy muscled bull replacements used in the herd today.

Mr Fry's EBV selection criteria for Angus bulls focus on having high carcass weight but moderate mature cow weight. This approach aims to capture the increased end-product value associated with carcass weight whilst maintaining a moderate mature cow weight.

"Our current Angus bulls average +59kg for Carcass Weight EBV where the Angus average is +48kg," he said. "We now source bulls in the top 10-15% for Carcass Weight EBV that still have an average Mature Cow Weight EBV (+80kg)."

Temperament is also an important aspect of the Fry's bull selection. Having had experience of bulls with very high overall genetic merit based on EBVs but poor temperament Mr Fry hopes to select for improved temperament along with other economically important traits.

"We have asked the Angus Society to include temperament selection to identify sires with poor temperament," he said. "The Limousin Society adopted it years ago and have achieved great results."

The Frys are great believers in benchmarking, which they use to examine production costs and to learn from peers what systems bring better returns on resources.

"We submit data to Red Sky which has had great results in the dairy industry in Australia and New Zealand, and has already spread to beef in Tasmania," Mr Fry said.

Mr Fry has long contributed to beef industry research and development, both in WA and at a national level. He is a member of the WA Beef Council and Chair of the Producer Round Table.

He has also served as a member of Beef CRC II advisory committee and maintains a keen interest in the Beef CRC Maternal Productivity Project.

Mr Fry is a regular at the Vasse Field Day and earlier this year following the Association for the Advancement of Animal Breeding and Genetics (AAABG) conference held in Perth, Mr Fry hosted visiting scientists at his property.

Overall, Mr Fry relishes the opportunity to interact with likeminded beef producers.

John Fry & family
Location: Donnybrook, Capel River valley, Western Australia
Property Size: 600 Ha grazing land with 75 Ha flood irrigated
Average annual rainfall: 950mm
Growing season: typically 5.5 months from mid May to end of October
Primary target market: high yielding Belgian Blue infused Angus steers and heifers finished with grain in on-property feedlot for 90 days
Primary calving month(s): April /May with heifers mated for 6 weeks and cows 8-9 weeks

FEATURE: HIGH QUALITY BEEF

FAST FACTS

- Achieving a high marble score is important for high value export markets, such as the Japanese B3
- Selection of cattle with high genetic merit for marbling as indicated by high IMF EBV leads to steers that exhibit higher carcass marbling at all stages of development post-weaning
- Longer time in the feedlot (days on feed) is associated with higher marbling
- Provision of high energy supplements in addition to high quality pasture immediately post-weaning does not increase the level of chiller assessed marbling

Strategies to achieve high marbling

Management and genetic options for increasing marbling

Marbling score is one of the main specifications for high value export markets such as the Japanese B3.

Marbling is the small flecks of fat visible to the human eye. Increased marbling is associated with improved eating quality through juiciness and flavour.

There are three main types of fat depots in beef cattle carcasses; these include subcutaneous fat, for example rib and rump fat, intra-muscular fat (marbling) and inter-muscular fat which is positioned between muscles.

Subcutaneous fat is sometimes referred to as "waste" fat and intramuscular fat as "taste" fat.

Producers are challenged with having adequate fat to allow animals to function normally and meet market specifications (e.g. minimum P8 of 6mm) whilst minimising waste fat.

At both the farm level and industry level excessive fat is undesirable. It is associated with an inefficient use of energy and costs processors in trimming.

High energy supplements post weaning

A recent Beef CRC project led by Dr Paul Greenwood, Principal Research Scientist at NSW Primary Industries, sought to determine if it was possible to increase marbling through the strategic use of high energy supplements immediately post-weaning.

The project also investigated MSA marbling score differences between steers bred from sires that were either high or low for genetic propensity to marble.

In total, there were 168 steers involved in the project. They were weaned at an average of six months. From weaning until 12 months old, half of the steers were fed pasture whilst the rest of the steers received pasture in conjunction with a high energy pellet supplement.

During the nutritional period, the pasture available to the cattle was managed so that cattle growth rates were the same for both nutrition treatments. Steers were then backgrounded until feedlot entry at 18 months of age where they were then either short or long feedlot fed for 100 and 250 days, respectively.

The use of a high energy supplement during the immediate post-weaning period did not enhance marbling in either the genetically high or low marbling steers.

Longer time in the feedlot (100 days vs. 250 days) was associated with increased marbling for all groups.

After 100 days on feed, the high marbling genotype steers had an average MSA marbling score more than 100 points higher than the low marbling genotype steers (Table 1). After 250 days on feed, the high marbling genotype steers had an average MSA marbling score of 618 compared with 422 for the low marbling genotype steers.

Carcasses in the chiller

An example of high marbling genotype steer

Table 1: Effect of marbling genotype, post weaning nutrition treatment and days on feed on carcass weight and MSA marbling score*

		Carcass weight** (kg)		MSA marbling score	
	Marbling genotype	Pasture Only	Pasture + supplement	Pasture Only	Pasture + supplement
Short-fed (100d)	Low	379	374	391	354
	High	383	386	512	483
Long-fed (250d)	Low	451	439	422	454
	High	468	460	618	575

*adjusted for initial live weight due to differences between genotypes. No significant differences between Pasture only and Pasture plus supplement groups. Significant effect of marbling genotype for MSA marbling score.
** only hygiene trim conducted, not a standard AUSMEAT carcass trim.

Project outcomes

If producers are trying to increase the amount of marbling within their beef carcasses as assessed by MSA marbling score, the results from this project demonstrate the importance of selecting cattle with a high genetic capacity to marble using intramuscular fat estimated breeding values (IMF EBVs).

Previous research has shown the best nutritional and/or management tool for increasing marbling is to finish cattle on a highly digestible, grain-based diet. This provides the highest level of net energy leading to high blood glucose levels and promotes fat deposition.

Breeding or buying steers with a high genetic capacity to marble and providing them high quality improved pastures post-weaning and during backgrounding is the most efficient way of ensuring feeder steers will reach maximum marbling potential. If post-weaning supplementation is required to meet market specifications, balance the diet for both protein and energy rather than energy alone.

Case Study:

Lock Rogers Jr:

"Outstanding marbling genetics are often hidden in a nondescript-looking bull that doesn't warrant a second glance."

Marbling was important to New England cattle producer Lock Rogers Jr when he was producing for the Japanese B3 market, but it became the key factor in his breeding strategy when he entered the Wagyu business.

On "Dyamberin", the Eastern Fall property he owns with wife Elizabeth, Mr Rogers has for several years been joining black Wagyu bulls to Angus cows to produce progeny for the Japanese long-fed market. The steer progeny are shipped live to Japan and finished overseas; the heifers are fed and slaughtered in Australia.

"Although Angus are the top-rated mainstream beef breed for marbling, they don't hold a candle to Wagyu, which have been selected for their marbling properties for generations," says Mr Rogers.

"On the Australian marbling scale of 1-9, Angus tend to reach around three when fed for long periods (e.g. >200 days) on grain," he said.

"With the right Wagyu genetics, F1 Angus-Wagyu animals average a marble score about 4-5 - still relatively modest by Japanese standards, where the marbling score goes up to 12, but adequate to fulfill the mainstream Japanese market for marbled beef cuts."

The Wagyu genetics make all the difference.

"If we were still a straight Angus herd, we could go and buy the highest marbling sires we could find and probably only slightly shift our marbling scores," Mr Rogers said.

"But if you put a Wagyu over them, you jump up a marble score or two immediately."

Not any Wagyu, though. Selecting Wagyu bulls with the same eye that selects for Angus or other mainstream cattle can be a mistake, in Mr Rogers' experience, because outstanding marbling genetics are often hidden in a nondescript-looking bull that doesn't warrant a second glance.

He has learned to buy bulls from certain genetic lines that are highly preferred by the Japanese.

At the moment, it is difficult to select Wagyu sires on EBVs because the Wagyu BREEDPLAN database is still in its infancy. That may be slow to change: supply and demand in the Wagyu trade with Japan is finely balanced, and the market can be easily crashed by a rush of new entrants, as happened in Australia a few years ago.

Selecting Wagyu sires on marbling alone makes it all the more important to select the other side of the F1 equation, the Angus females, on their ability to counter the Wagyu breed's production deficiencies.

In the New England's autumn turnoff period, Mr Rogers estimates his Wagyu F1 weaners are on average 30 kilograms lighter than their full Angus counterparts.

Mr Rogers enjoys a competitive advantage here: his father, Lock Rogers Senior, is the principal of the well-regarded Wattletop Angus stud at Guyra.

On "Dyamberin", Lock Jnr has been able to utilise Wattletop genetics to put together a herd of fast-growing cows that are the ideal genetic counterweight.

A selected portion of his cows are artificially inseminated with top-ranking, and expensive, Wagyu genetics. The F1 weaners from this process can fetch $900 a head for both steers and heifers.

The remainder of his cows are naturally mated to his own Wagyu bulls to deliver steers that can earn up to $900, but less for the heifers.

The other critical factor in determining marbling is ensuring a constant plane of nutrition, one of the rules enshrined in the Meat Standards Australia (MSA) directives for achieving optimum meat quality.

After producing three drops of F1 weaners on "Dyamberin" that year after year delivered an average marbling score close to five, Mr Rogers thought he had his production system under control.

"Then we sent a calf drop out west, where it got really dry. Those calves had a big check in their growth, and their marble scores were pretty disappointing - just above four."

"The next year we backgrounded the F1s at home again, and their marble scores came back at around five. A seasonal check can have a big effect."

Ultimately, it's all in the eating, whether that's here or Japan.

Mr Rogers said he was always conscious of marbling as a driver of value, but it wasn't until he began eating Wagyu-influenced beef that he fully appreciated the importance of marbling to meat taste and texture.

"Once you've eaten well-marbled beef, you get spoiled for everything else."

Trish Cowley of the Northern Territory Department of Resources is presenting to fellow champions, researchers and industry representatives at the Northern Train-the-Champion workshop held in Brisbane in November 2011. The workshop follows a similar process conducted among the Southern champions network in Melbourne in August.

Expert network to boost Beef CRC research legacy

By June 2012, the Beef CRC will deliver key outcomes from the CRC's four priority research areas for the beef industry.

To facilitate this, the CRC has developed a Northern and Southern network of champions consisting of State Department of Primary industry officers, researchers and scientists, industry representatives and private consultants.

The Train-the-Champion process aims to ensure peer-reviewed outcomes of Beef CRC research is accurately distilled into key messages directly relevant for the Australian beef industry.

The Champions select a topic and analyse the most recent Beef CRC research available on that topic. They are encouraged to engage directly with the project scientists about their research as well as to seek out new material relevant to their topic.

As part of the process, each Champion is asked to produce a peer-reviewed and Beef CRC-endorsed fact sheet on his or her specialist topic. The fact sheets include case study information and economic data, where it is available and appropriate.

The fact sheets prepared by the Champions network will be made freely available, along with other Beef CRC material, via an online legacy website, and as part of a presenter's kit.

Feedback: 'A champion initiative!'

By Jeisane Accioly, Research Officer, Department of Agriculture and Food, WA

"The Beef CRC's Train the Champions initiative has done wonders for collating past and present research material into a digestible format for industry and extension staff.

This was not a simple or small task but the output being produced will be very useful for all levels of industry.

In addition it has develop/stimulated communication among the various sectors (researchers, communication staff, MLA, consultants, service providers, etc.) and areas (northern and southern Australia).

It has also been paramount for the professional development of young communication staff who, while abundant in enthusiasm, lack training and experience. Another imperative is that a great proportion of the beef knowledge bank is quickly disappearing into retirement.

All participants in Train the Champion not only had the chance to expand their knowledge within their chosen themes but also learned a lot about other research areas, not to mention the network opportunity.

It would be fantastic if somehow this type of forum could become an ongoing exercise beyond the life of the CRC."

Genetically fatter heifers have higher conception rates

- **Beef CRC research finds high Rib Fat EBV Angus heifers had higher conception rates than low Rib Fat EBV Angus heifers**
- **CASE STUDY: Selecting for on-farm productivity and market flexibility at Hillcrest Pastoral Company**

Hillcrest autumn calving cow and steer calf

Higher pre-joining rib fat depth leads to increased heifer conception rate

Selecting for low rib fat as a way of boosting carcass meat yield may be linked to a reduction in maiden heifer conception, according to research conducted in the Beef CRC Maternal Productivity project led by Associate Professor Wayne Pitchford of the University of Adelaide.

The research found that selecting for low Rib Fat Estimated Breeding Values (EBVs) to boost carcass meat yield reduced maiden heifer conception rates by more than 8%.

This finding is important information for cow-calf producers because reproductive rate is critical for enterprise profitability and the efficiency with which beef is produced.

With the development of BREEDPLAN EBVs for a wide range of traits which impact on the profitability of the beef value chain, producers are faced with challenges to implement these tools in a balanced way, to ensure that selection is targeted at both pre- and post-farm gate profitability.

For traits such as the Rib Fat EBV, the challenge is to apply a breeding objective that is appropriate for both the target market and also the environment in which the cattle are raised.

About the research

As part of the Beef CRC Maternal Productivity project, 382 Angus heifers specifically selected to be divergent in rib fat EBV were monitored for reproductive performance at two research centres, Struan in the south east of South Australia, and Vasse in south west Western Australia.

The average Rib Fat EBV for the high Rib Fat EBV line of heifers was +0.84 mm, compared with the average for the low Rib Fat EBV line of -1.65 mm. Both lines were substantially different to the Angus breed average, which is -0.1 mm for 2009 born calves. The selected heifers represent approximately the highest 10% and lowest 5% of the Angus breed for Rib Fat EBV.

At both Struan and Vasse, the two heifer lines were managed together during mating and throughout the year to ensure they experienced the same nutritional and environmental conditions. Any differences in conception rates could therefore be attributed to genetic factors. Heifers were joined for 9 weeks with pre-joining weight of 360kg and 363kg for the high Rib Fat EBV and low Rib Fat EBV lines respectively (Table 1). Despite the lines being nearly identical in weight (360kg vs. 363kg), the high Rib Fat EBV heifers had 0.9mm more rib fat (4.5mm vs. 3.6mm) as measured by ultrasound scanning.

FAST FACTS

- Rib Fat EBVs are indicators of genetic differences in rib fat depth (mm) if measured on a standard 300kg carcass
- Heifers with high Rib Fat EBV had higher pre-joining rib fat depth
- High Rib Fat EBV Angus heifers had higher conception rates than low Rib Fat EBV Angus heifers
- On average, Angus heifers with 4mm of rib fat at joining achieved 89% conception rate
- Eye Muscle Area EBV was not associated with heifer conception rate
- Using an overall selection $index identifies animals that have high genetic value for a range of traits including fertility and carcass quality

Ultrasound scanning of rib fat depth

Table 1. Heifer age, weight, rib fat depth at joining

	Pre-mating age (days)	Pre-mating weight (kg)	Pre-joining rib fat depth (mm)
High Rib Fat EBV	475	360	4.5
Low Rib Fat EBV	461	363	3.6

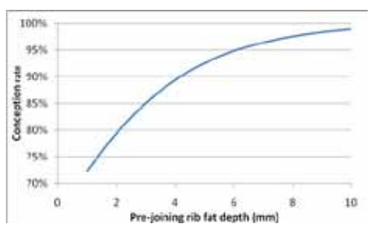
Heifers grazing at Straun Research Centre

Conception rate

The high Rib Fat EBV line had an average conception rate of 91.2% compared with 83.0% for the low Rib Fat EBV line when considered at an equivalent age. Importantly, the 0.9mm difference in pre-joining rib fat depth between the lines explained much of the difference in conception rate. Overall, when adjusted for rib fat depth, the difference in conception rate between the high vs. low Rib Fat EBV lines reduced from 8% to 5% and was no longer statistically significant.

A second key finding from the Beef CRC results is the very strong association between heifer rib fat depth at joining and conception rate (Figure 1). Heifers with higher pre-joining rib fat depth had higher conception rates. The greatest increases in conception rate were observed at low levels of pre-joining rib fat depth. For example, an increase in pre-joining rib fat depth from 2mm to 3mm was associated with an increase in conception of more than 5% (79% vs. 85%). In contrast, an increase in pre-joining rib fat depth from 8mm to 9mm was associated with a less than 1% increase in conception rate.

Figure 1. Conception rate at various levels of pre-joining rib fat depth



Implication for management and selection

For the first time, the Beef CRC studies clearly show that heifers with a very negative Rib Fat EBV (that is bottom 5% of the breed) have a greater likelihood of reduced conception rate at their first joining.

Ensuring maiden heifers have sufficient energy reserves prior to their first joining leads to higher conception rates. Cattle breeders therefore need to carefully think about the importance of fat in their cattle, particularly for heifers, and develop strategies to ensure that body energy reserves are adequate to achieve high conception rates.

Importantly, an animal's genetic merit for Eye Muscle Area (EMA) as assessed using EMA EBVs was not related to heifer conception rate. In terms of breeding, a practical strategy would be to seek bulls with high $index values for a selection index that suits their current production system and the target market. Producers still need to focus on carcass traits, including retail beef yield, and not just adopt selection strategies that focus on Rib Fat EBV in isolation.

For seedstock producers the message is to continue to use an overall selection index that incorporates weaning rate. This strategy allows for animals with the best combination of all traits to be identified, including animals that can sustain heifer calving under tight feed conditions even though they may be leaner.

This research has demonstrated that genetically fatter heifers have higher conception rates. However, data on overall reproductive rate, group feed intake and progeny performance is still being analysed to determine whether this higher initial conception rate translates into higher long-term on-farm productivity or supply chain profitability.

Case Study: Black coats and hybrid vigour

Selecting for on-farm productivity and market flexibility

For Bruce and Libby Creek, managers of Hillcrest Pastoral Company, marketing flexibility and achieving high on-farm productivity is the major focus

Hillcrest is primarily a beef breeding operation in the Lucindale district of South Australia owned by Hugh and Clare Bainger. The operation is run on 5200Ha across five properties and produces around 2500 calves annually. In addition to the cattle, a Merino ewe/cross bred lamb enterprise is also run.

The majority of steers are finished off grass to MSA markets, sold to feedlots, or carried through to EU markets.

By growing steers out to heavier weights they are able to better utilise spring pasture compared with traditionally selling the majority of stock into weaner markets. For example, in 2009 steers at 15-16 months and 430-435kg had an average daily gain of 2.2kg on spring pasture over a 53 day grazing trial.

Bruce targets selling steers at approximately 18 months old into grass finished markets rather than carrying them through for an extra summer and autumn. In 2011 85% of steers will be successfully finished off grass compared with 25% in 2007.

Breeding and selection

The cow herd is self-replacing and has an Angus/Poll Hereford/Shorthorn female base.

"Currently we mainly use Angus bulls as we are aiming to get a black coat, and once we achieve that we will look to use Poll Hereford and Shorthorn bulls for hybrid vigour," Bruce said.

In addition, Charolais and Simmental sires are also strategically used as terminal sires.

Bruce and Libby have set themselves the target of reaching an "even, black coated cow herd, with positive fat EBVs, capacity and structural soundness." They perceive that the full black coat allows market flexibility with live weight premiums up to 20c/kg and access to premium end markets. Overall, the breeding program is designed to generate an easy doing herd that can handle tougher conditions and remain fertile.

Bruce and Libby come from a seedstock background, and so are well versed in running breeding programs.

"Selection of suitable bulls has been critical in progress to the Hillcrest herd," Bruce said. "We place a lot of emphasis on structural correctness, temperament, muscling and softness."

BREEDPLAN information is also an important part of bull selection at Hillcrest.

Only Angus sires with positive fat (Rump and Rib EBV), above average EMA and at least breed average IMF EBV are selected.

In addition, bulls are also selected to be at least breed average birth weight, above average growth, and only moderate Milk EBV.

Performance on the farm

Steers are now turned off earlier at the desired weights and are consistently hitting market specifications for fat and muscling.

"The selection program has been very encouraging, we reach premium prices with a larger portion of steers produced," Bruce said.

Bruce and Libby say they have maximum flexibility in marketing options.

"By selecting larger birth weight bulls to use over the heifers, we have increased the capacity of these calves and are now retaining heifer progeny as replacements to enhance genetic gain," Bruce said.

"We have also seen improvement in the pregnancy rates in the younger lines of females where continual selection for positive fat and moderate milk has ensured that they can return to oestrus quickly even during difficult feed periods."

Hillcrest aims to breed an even black coated cow herd

Hillcrest Pastoral Company, Bruce and Libby Creek
Location: Lucindale, South Australia
Property Size: 5200 Ha clay over limestone
Average annual rainfall: 500mm
Growing season: typically 4.5 months July to mid November
Primary target market: 500-600kg steers sold to MSA and EU markets or feedlots
Primary calving month(s): April /May

Hillcrest joins heifers at 300kg plus and has an average heifer calving rate of 85% with cow calving rate ranging from 92-96%. "Any heifer or cow that fails to calve is culled, there are no second chances," Bruce said.

Living near the Struan Research Centre has allowed Bruce and Libby to follow results from the Beef CRC's Maternal Productivity Project.

"The results of the CRC maternal productivity trial proved exactly what we believed in practice," Bruce said. "While we were chasing better muscling along with positive fat, we had been told these two traits could be antagonistic. This trial proved that not to be the case. It also proved that positive fat does help ensure females return to oestrus easier during tough periods."

Hillcrest Pastoral Company has supported and followed southern beef research and development for many years. Bruce and Libby are MLA More Beef from Pastures Producer Advocates.

Alf Collins Jr.

Case Study: Brahman reproduction at Gundaroo

Reproduction comes first for ALC Brahmans run by Alf and Louise Collins of 'Gundaroo', Nebo, in Central Queensland.

Alf Collins Jr is the third generation of the Collins family to breed Brahmans in northern Australia.

Recent research outcomes from the Beef CRC's northern Australian program have validated the value of the Collins' strong selection pressure on fertility.

The Collins' run 500 stud females on 'Gundaroo' and 2000 commercial females on 'Tondara' near Collinsville. All bulls are bred on 'Gundaroo' and used in the stud and commercial herds. The stud herd has been closed for 20 years and has recently been divided for family reasons. Mr Collins said the herd does no need to be closed, but finding other genetics that have had the same selection pressure applied so they can make genetic progress in their herd is difficult.

The Collins' expect all females to deliver a weaner every year off grass with low inputs and no supplementary nutrition. The stud herd has the same management as the commercial herd. Mr Collins says the only selection criterion on a female is she has to conceive a calf, wean that calf and reconceive within 12 months.

Calving starts around August and all the calves are born before the middle of December.

"We don't falter on culling non-producing heifers or cows," Mr Collins said. "There are no exceptions, regardless of season. The reason being is that's reality. From a seedstock point of view we live in this northern environment, so we need to create cattle that work under these conditions. It works well as a genetic selection tool as well as a management tool."

The commercial heifers are mated for the first time as two-year-olds at around 280kg.

However this year the Collins' are mating their stud heifers at 'Gundaroo' as yearlings, averaging 230-240kg, because of the better quality nutrition on the brigalow country.

Heifers are joined for 90 days and the cows are joined for 105 days with the first mating groups being joined in October.

The Collins aim to apply selection pressure on the females to breed early in the season. Generally speaking the wet season begins in December, so mating often occurs before the rain when females are lactating, consuming dry grass and losing weight. "We're really interested in the cows that conceive in that period," Mr Collins said. "We prioritise that information from the dams when we're selecting our bulls."

All heifers are mated and herd records on all stud females are submitted to BREEDPLAN to generate days to calving and mature cow weight EBVs. Calves are weaned at 5+ months of age depending on cow body condition and are grown out on grass with no supplements.

The Collins' focus on sire selection to make genetic gain in their herds though use of extensive herd records and BREEDPLAN EBVs.

"We want sires from the females with the most number of calves, the shortest calving interval and calving early in the breeding season," Mr Collins said.

The Collins' identify cows with negative (i.e. favourable) days to calving, and then look at the bull's performance for age of puberty, growth, temperament, muscling and structural soundness.

"We look at four generations of females when selecting bulls," Mr Collins said. "If there's four generations of females that have consistently high fertility, there's a fair chance that's no longer luck, that's reliability, and we want that bull to pass it on to the next generations. For us, reproduction has got to be first. If that's not there we don't have to look any further."

He says that once fertility is sorted, then traits such as muscling and growth can be more easily bred into the herd.

EBVs are generated for scrotal circumference and 200-, 400- and 600-day weights. All bulls generated in the stud herd are kept until 600 days of age so there is a complete dataset for decision making. The Collins' place as much importance on identifying poor genetics as they do on identifying exceptional genetics.

The Collins' also identify bulls that reach sexual maturity early in the season. Scrotal circumference is measured every 30 days from 400 days of age. The serial scrotal measurements are used to determine age of puberty, which is defined by the age at which a bull has a scrotal circumference of 27cm.

"We start off in the dry season, so we're looking for cattle on the worst of our nutrition but are sexually active. There are cattle that will reach puberty regardless of what nutrition is in front of them. Those sires get priority in our bull selection."

Bulls are joined with same age heifers at 18 months to two-years of age in one large mating group. All progeny from these matings are DNA parentage tested. Aside from the ease of managing the first joining in one large group, multiple-sire mating also provides a way to find the most active bulls.

The Collins' keep about 60% of their males as bulls and sell 100-120 bulls a year. The majority of their bulls are sold into the north and west including the Northern Territory and Western Australia

"When you sell bulls into the north they've got to compete with mickey bulls and other bulls that commercial breeders haven't got control of, so it is of interest to buyers to know which bulls are more dominant."

The Collins' keep three generations of female information on each sale bull (including number of calves, calving interval, days to calving EBV), plus the bulls scrotal circumference, weight, age of puberty, weight at puberty, month in which puberty was reached, 200-, 400-, 600-day growth EBVs, and days to calving EBV on the bull (if available).

Case Study: Driving fertility in the north

Achieving higher fertility performance in Santas

By applying selection pressure from every angle, David Greenup is pushing his stud and commercial Santa Gertrudis herds towards ever-higher fertility performance.

In decades past, the Santa's otherwise excellent reputation for performance was somewhat marred by a matching reputation for low fertility.

David recalls that pregnancy rates in his family's herd 20-plus years ago could be back to 70% at times. Today, they are consistently up between 88-92% on his properties at Jandowae, Queensland, where he and wife Sonya, along with their three sons and David's parents Grahame and Peggy,run commercial and stud herds, of about 700 females each across 12,000 hectares.

Getting to this position has meant a single-minded focus on the decisions needed to drive fertility.

In David's Rosevale Santa Gertrudis Stud, which turns off about 300 bulls a year to buyers across the Australian rangelands, all working sires are semen morphology tested annually to ensure semen viability, and scrotal size is assessed in all yearling bulls.

Yearling scrotal size is an indicator of how quickly a bull and his sisters will reach puberty, an important factor in fertility. But size is also dependent on the environment, and can change according to seasons – and big is not necessarily best, David notes.

A too-large scrotum in a mature bull can be a liability, as it is more prone to injury.

To get another angle on likely outcomes for this trait, Rosevale also balances its physical scrotal measurements against estimated breeding values. It looks for genetics on target to produce yearling scrotal sizes in the top 20-30 per cent of the breed, without being overly-large at maturity.

Females come under their own form of stringent selection pressure.

Seasons permitting, all yearling heifers over 290 kilograms are mated, to bring them into the breeding cycle as early as possible.

"Last year, with a bit better season, we mated about 80% of our yearling heifers; this year we'd be down down to 60%."

"It puts more pressure on them to conceive early. Anything that has calving problems, we cull."

Rosevale has collected "days to calving" records on its stud females for almost a decade. The resulting BREEDPLAN estimated breeding value (EBV) on each female is a measure of the time from when the bull is introduced to the herd to when the cow drops her calf.

"We're finding that those cows with good days to calving EBVs are those that continually calve in the first month of the calving season.

Not many tropical herds are recording the trait, David said, which he thinks is a lost opportunity.

"If we can buy bulls out of cows with strong EBVs for this trait, it's another thing we can use to drive fertility."

Over the past couple of decades, aided by "religious pregnancy testing", David has progressively culled out cows with the thrifty Bos indicus tendency to only have two calves every three years, and selected for those that calve every year.

"Rigid culling on a preg test has not only removed those females of inherent low fertility but also those that lack a strong constitution and find it hard to conceive in a poor season while rearing a calf," David says.

Joining periods have been brought down to three months, compared to five months 20 years ago. David thinks three months is the optimum for his conditions.

"It's long enough to give us some flexibility, whether or not the season is with us. We're not prepared to feed cows to tighten up the joining. It means that every year we can put bulls in and pull them out on the same dates and still know we've got optimum coverage."

David Greenup

Rosevale's zero-tolerance approach to culling extends through to branding. The Greenup's properties, which border the dingo barrier fence, have the added pressure of wild dogs. "We ran into seven dogs in one pack just the other day," David said.

Although Santa cows are extremely protective mothers, this inevitably means some extra mortalities at times, which add to other commonly experienced reasons for calf losses.

"We're looking at losing 7-8 per cent of calves between preg testing and weaning. At branding time we will have a few cows that have slipped or lost their calf for whatever reason, and we'll cull them then."

"We want to make a return on every female, every year, and that's either by selling her calf, or herself."

Beef CRC on track to provide beefed-up breeding predictions

The Beef CRC will deliver genomic predictions that identify animals genetically superior for carcase and beef quality, feed efficiency and female fertility traits to BREEDPLAN by May 2012.

"This is one of the main outcomes of this CRC and we are on track to deliver these predictions, which have been validated in independent cattle populations," said Beef CRC CEO Dr Heather Burrow.

"The research undertaken by the Beef CRC and its partners will deliver more detailed DNA information on Australian cattle breeds than has ever been achieved."

The genomic predictions will allow seedstock cattle breeders to more accurately identify animals that are genetically superior for carcase and beef quality, feed efficiency and female fertility traits such as age at puberty, first-calf re-breeding and lifetime reproductive performance in tropically adapted cattle breeds.

The predictions will be incorporated into BREEDPLAN to improve the accuracy of the current estimated breeding values (EBVs) which are based on extensive phenotypic records and pedigree information.

Dr Burrow said the Beef CRC had recently completed genotyping more than 10,000 research animals and 1300 industry sires using the latest DNA super chips.

The new genomic predictions were developed using Illumina's new 700K chips and their accuracy will be improved over coming months before they are delivered to BREEDPLAN and genomics companies operating in Australia.

Beef CRC Chief Scientist Professor Mike Goddard said the new 700K chips measured more than 700,000 unique genetic variations (SNPs) within an individual animal's genome, and across the genomes of multiple animals, to identify the unique genetic attributes linked to the most important production traits.

The Beef CRC has recently completed calibrating the genomic predictions within breeds, based on DNA samples provided from 1300 high-accuracy sires from several breeds.

Dr Burrow said the greatest value for adding genotype information to BREEDPLAN will be for young animals that do not yet have any measurements on them or their progeny or for the very hard or expensive to measure traits that are generally not recorded by industry.

"That is where you have greatest ability to improve the accuracy of predicting that animal's performance," she said.

"Producers will then be able to select for these hard to measure traits in young animals, something they have not been able to do up until now."

Industry scenario

How the new "beefed-up" breeding predictions will work in the future

A cattle breeder has a young weaner that does not yet have any ultrasound scanning data. The breeder wants to predict the weaner's genetic merit for high marbling or beef tenderness, to know whether to put the animal into a breeding program.

The breeder takes a hair sample from the animal and sends it off to his breed society, or directly to a genotyping laboratory. The laboratory genotypes the animal and sends the results to BREEDPLAN, where the genotypes are combined with other information such as pedigree and recorded measurements on the animal and its relatives. Using a calibrated mathematical formula, a genomic prediction is made on the animal's genetic merit for all the BREEDPLAN traits.

The breeder will receive EBVs in exactly the same way as currently occurs, except the EBVs will have an improved accuracy due to the inclusion of the additional validated genomic information.

For more information:

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Industry comment

Terence Farrell, GM, Charolais Society of Australia

"For the Charolais Society, providing sire samples for the CRC's industry sire genotyping project which helped calibrate these new genomic predictions within breeds, means Charolais breeders will be able to closely map genotypes back to our EBVs for traits such as tenderness, meat flavour, fat type and fat colour.

Currently, the predictions for some of those meat science traits are not as accurate as we would like. The CRC's genotyping project has also worked in well with our other Beef Information Nucleus research projects, where we are collecting birth, growth and meat quality data on sires and their progeny. This data will greatly enhance our predictions for these traits.

Many breeders are wondering where genomics research is heading because the technology is advancing all the time. I find a lot of people are still struggling with the concept of what an EBV is, let alone a genomic EBV. But all they need to know is that genomics will be integrated into BREEDPLAN to produce a more accurate EBV.

It is critical for the Charolais breed to be part of this research and we believe the genotypes for each of the breeds should be made available to cattle researchers. If we can confidently identify the best animals within Charolais and across other breeds, we will be able to make greater genetic progress than we have done in the past.

The Beef CRC research will also provide us the tools to access the large Charolais datasets held overseas, so we can start predicting traits by family lines. This will save us a lot of money in the future and will allow us to better meet the requirements of our domestic and international beef markets."

Dr Terence Farrell
GM, Charolais Society of Australia
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New genomic EBVs for Australian beef cattle

DISCOVERY POPULATION
10,000 animals across eight breeds

Genotype and phenotype records for difficult and expensive to measure traits including:

- 3,695 for growth and carcase traits
- 2538 for Net Feed Intake
- 4,832 for female reproductive performance
- 1,124 for male reproductive traits

50K chip

700K chip

Industry sire project:

Predictions validated across breed for improved accuracy in identifying genetically superior carcass and beef quality, feed efficiency and female fertility traits in tropically adapted cattle.

Breeder supplies hair sample to laboratory for testing

EBV which includes genomic prediction to identify carcass quality, NFI and fertility values is supplied to the breeder.

Skilling the beef industry

Post graduate study forms an integral component of the Beef CRC.

Over the last 20 years, the Beef CRC has supported the post-graduate research of nearly 100 PhD and Masters students.

The current Beef CRC has supported, or is currently supporting some 41 students.

More than 70% of Beef CRC post-graduate students continue to work within the beef industry. Post-graduates are employed in a range of roles – as academics within universities, or as research scientists within the state Departments of Primary Industries or CSIRO.

In this edition we look at the work of one of our post-graduates, Michael Laurence.

"Best decision I have made"

Michael Laurence is a lecturer in Production Animal Health and Management at Murdoch University.

Dr Laurence graduated as a vet from the School of Veterinary Science at Murdoch University in 1997. He subsequently worked in mixed practice in Western Australia before moving to the United Kingdom and working as a locum in large animal practices across England.

Some of Dr Laurence's more challenging work whilst in England focused on being a Veterinary Inspector for the Ministry of Agriculture Fisheries and Food during the 2001 Foot-and-Mouth outbreak. He recalls this as "one of the most traumatic, challenging and interesting periods of my professional career".

Dr Michael Laurence, Lecturer in Production Animal Health and Management at Murdoch University

After nearly a decade in predominantly large animal practice, Dr Laurence opted to undertake a PhD in 2006.

"I made the decision because it was either become a rural practice owner, or explore the broader field of production animal science," Dr Laurence said.

"It was a hard decision but the science won out in the end and it is one of the best decisions I have made."

Dr Laurence's PhD with the Beef CRC focused on the Maternal Productivity Project and how associations between selection for feed efficiency (Net Feed Intake) and fatness as measured by an animal's Rib EBV impact on beef herd productivity.

His research interests are broad – in addition to his on-going involvement with the Beef CRC Maternal Productivity Project, Dr Laurence is also involved in research focused on live-export and welfare.

In his current role as a lecturer, Dr Laurence is both a teacher of vet students as well as a researcher. "For me, this is ideal because throughout my PhD I always missed 'applying my trade' and now I have the chance to do both," he says.

Dr Laurence spends his time teaching, running a large animal practice and undertaking research.

"It is a perfect mix," he says. "I couldn't be in this position without the science training that I got from my PhD."

Beef Bulletin