



# BEEF NEW ENGLAND & NORTH WEST SLOPES news

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NSW Department of Primary Industries, [www.dpi.nsw.gov.au/beefnews](http://www.dpi.nsw.gov.au/beefnews)

A quarterly newsletter for beef producers of the New England and North West Slopes areas of NSW.

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## Managing cows & calves this spring

*Alastair Rayner, Livestock Officer (Beef Products) Glen Innes*

With calving almost completed for many herds in northern NSW, producers should now be focussing on the challenges of keeping their calves growing and ensuring their breeding cows will be capable of going back into calf during the joining period.

Successfully meeting these challenges will depend on how well producers can match feed supplies from available pastures with cow conditions. Many producers who have yet to receive significant rainfall may be faced with continuation of supplementary feeding programs to correct any shortfalls from their pastures.

### ENERGY REQUIREMENTS OF LACTATING COWS

Once a cow calves, her daily energy requirements effectively double. This demand for energy is caused by the requirements for milk production as well as to meet changes within her body. Often the demand from energy cannot be met from feed intake alone, and cows will utilise fat reserves to make up any energy shortfalls.

If energy intake is still limited, the cow's milk production levels fall dramatically, impacting upon calf growth.

### FAT SCORE AND SUCCESSFUL JOINING

Cow fat score plays a fairly significant role in ensuring cows can be successfully rejoined in a minimum time frame. Cows in an average fat score at calving (eg fat score 3) generally take 55 days from calving to start cycling again. Cows in a lower condition at calving, such as fat score 2 may take another 20 days, and quite often up to 40 days longer to recommence cycling.

Significant weight loss during the early stages of lactation will also lengthen the time period taken for cows to recommence cycling. Therefore cows which lose significant weight not only produce lighter calves, through lower milk production, but are often harder to get back into calf; increasing the impact of production losses for the producer.



NSW DEPARTMENT OF  
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***Cows in this condition require supplementary feeding and early weaning if they are to go back into calf***

### **WHAT OPTIONS EXIST FOR PRODUCERS?**

There are several options which are open to producers trying to minimise weight loss and ensure cows will go back into calf successfully. These options include:

#### **Supplementary Feeding**

- While many people would like to finish feeding supplements when pastures start to grow, many times this is not an option. The short green pick seen across most areas now still fails to provide sufficient amounts of feed for cattle, particularly lactating cows.
- Any supplement in this situation should aim to provide energy. In most cases feeding grain will be the most cost effective form of energy supplementation. Care should be taken introducing grain to any ration and producers should seek advice from a livestock officer when preparing rations. If cows are on reasonable standing

feed, a supplement which has both energy and protein will be useful. Such feeds include white cottonseed or a fortified molasses mix.

#### **Early weaning**

- Weaning calves early is another effective method of reducing weight loss from lactating cows. Weaning a calf reduces the demand for energy to produce milk and helps conserve the cow's fat reserves.

- Early weaning requires calves to be well cared for and may require the use of a supplement which is high in protein and can allow the calves growth to continue unhindered. Advice on weaning calves can be obtained from the NSW DPI website <http://www.agric.nsw.gov.au/reader/beefmanage/a257.htm>

### **CONCLUSION**

Managing cows through the early phases of lactation is essential to ensure high joining and calving rates in the following season. Producers need to be alert to cow condition and be prepared to draft cows into groups of similar condition scores and manage those groups according to their needs.

This could well mean groups which may be managed by a combination of feeding a supplement alone, supplementary feeding and early weaning, or even moving to early weaning and full ration feeding.

This strategic management will result in producers avoiding long term productivity losses due to poor reproductive performance and smaller calves at sale time.

## **International Research to Value Add to the Australian Cattle Industry**

*Warwick Fraser, CRC for Beef Genetics, Armidale*

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Australia's cattle industry is set to reap significant economic benefits from the recent completion of the bovine DNA sequence, according to one of Australia's leading cattle geneticists.

Dr Bill Barendse from CSIRO Livestock Industries and a research leader for the Beef Cooperative Research Centre (Beef CRC), Australia's largest integrated beef research program, predicts the complete DNA sequence from the international bovine genome project will form the backbone of livestock research for the next half century. (CSIRO contributed US\$1m to the US\$54m sequencing project.)

"Using the bovine sequence will eliminate much of the guesswork of cattle genetics in future and will help improve the health and disease management of cattle whilst also improving the nutritional value of beef products," said Dr Barendse.

"In turn, this precision cattle breeding will significantly improve the profitability of Australian beef herds," Dr Barendse added.

"Scientists in the sequencing project have been looking for genetic markers known as single nucleotide polymorphisms or SNPs. SNPs can help identify specific genetic traits such as meat tenderness, marbling, reproductive performance or resistance to parasites such as ticks," said Dr Barendse.

According to Dr Barendse SNPs can also be used to work out how

genetic traits can be switched on or off to control economically important traits like feed efficiency.

To value add the multi-million dollar sequencing project for Australia's cattle industry, the Beef CRC collaborated with EMBRAPA in Brazil and the International Livestock Research Institute (IRLA) in Kenya. The three organisations each contributed additional cash to specifically develop a new genotyping tool for use in *Bos indicus* cattle such as the Brahman, Droughtmaster and Santa Gertrudis breeds.

7,000 new SNPs unique to *Bos indicus* cattle have been identified using the funds and will now be used to assist in the discovery of genes associated with tropically adapted cattle.

"The international sequencing project, coordinated in the United States, originally only looked at European breeds of cattle," said Dr Heather Burrow, Beef CRC Chief Executive. "But more than half of the Australian cattle herd is derived from Indian or African breeds from tropical areas. It was therefore essential that genomic tools be developed for use specifically in tropically adapted cattle," she said.

"Gene discovery and gene expression for traits important to beef production will take the cattle industry through the 21<sup>st</sup> century," Dr Burrow said, "and will create precision breeding and management strategies that will value add the Australian industry by millions of dollars each year."



## Editorial

*Alastair Rayner, Livestock Officer (Beef Products) GLEN INNES*

Welcome to the Spring edition of the Northern Tablelands & North West Slopes Beef News. As I am writing this it's a blustery and cold September day. While in Glen Innes and parts of the Tablelands we have received good falls of rain, I know many areas have missed out on decent rainfall.

With this in mind and with so many producers struggling to manage lactating cows I have chosen to focus on some ideas to help deal with this part of your beef enterprise. As with any part of your beef operation, feel free to contact me if you would like some advice or to bounce a few ideas and options around.

In this edition you will also find a paper presented by Dr David Pethick from Murdoch University at the recent Beef Improvement Association conference in Tamworth. David has some good points in his paper to combine theory with practical tips for producers. Carol Harris has also submitted some information on the new Grain and Graze program in the North West.

## Coming Events

### PROGRAZE

Planning is underway for a couple of Prograze groups to be formed across the district. At this stage a course will be held in the Tenterfield area, and we are hopefully starting before the end of the year. If you are interested in doing a Prograze course, please contact me or your local DPI office.

### Beef-n-omics

Beef-n-omics has been very popular with producers. Since its release earlier this year two tablelands groups have participated in the program. The next course will be held around Tamworth. Anyone interested in registering should let me know at the Glen Innes office.

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## Grain and Graze in North West New South Wales

*Carol Harris, Research Agronomist DPI Glen Innes*

The Primary Industries Innovation Centre (PIIC, a partnership between NSW Department of Primary Industries and the University of New England) has joined forces with Grain & Graze and the Border Rivers Gwydir Catchment Management Authority. This partnership will provide producers in the Border Rivers area with the tools to effectively incorporate pastures into cropping systems and improve on-farm productivity. It will also enhance the natural resource base and economic performance of whole-farm enterprises.

Grain & Graze is a national research, development and extension program working with farmer and community groups in 9 catchments in Australia's mixed farming zone. It aims to improve on-farm profitability and productivity as well as to achieve local catchment management targets. The national Grain & Graze program is jointly sponsored by Land & Water Australia, MLA, AWI and GRDC.

The Border Rivers region embraces a wide range of farming enterprises from almost exclusively cropping in the west, grazing with sheep and cattle in the east and a large proportion of the region with potential for both cropping and livestock production. In contrast with other catchment areas in Australia's mixed farming zone, there is a lower proportion of farms able to successfully integrate crops and pastures. Locally, Grain & Graze activities in the NSW Border Rivers area are being funded by the Border Rivers Gwydir Catchment Management Authority and conducted through the PIIC.

The focal point of the PIIC research activities will be on the University of New England property Douglas McMaster Research Station at Warialda. This research station is ideally situated in the Border Rivers catchment and is typical of farms in the area.

At McMaster the influence of pastures in cropping systems on production, natural resources and profitability will be assessed on a series of farmlets to represent a whole-farm scenario. Each farmlet will be approximately 50 ha and will be distributed equally over the 3 main soil types and land-uses found throughout the region. The farmlets will be designed in collaboration with a local producer group; one farmlet will represent a typical mixed farm, as well as farmlets involving separation of livestock from cropping and/or integration and low input pastures versus improved perennial and annual pastures. These treatments will be measured using innovative precision techniques as well as traditional methods. An additional trial will look at the foraging behaviour of livestock and their impact on soil structural and fertility parameters, pasture composition and pasture recovery. This will be monitored using GPS tracking devices on the cattle, EM surveys and Crop Circle assessment of plant growth and vigour.

Pasture trials at McMaster will underpin the whole-farm scale study. These trials will investigate appropriate pasture species for the catchment including perennial grass/legume pastures in conjunction with CSIRO, alternative pasture legumes and new lucerne and tall fescue varieties. Additional pasture trials in the wider catchment area will also investigate appropriate pasture species and conduct research on pasture establishment and management.

The long-standing crop rotation trial at Glen Innes established in 1921 will be used in the Grain & Graze program as a valuable resource to study long-term impacts of legume pastures on production and soil health. It also provides an unique opportunity to monitor the impact of livestock on production and soil health after a long period (40 years) where the pasture phase has not been grazed. It is expected that the reintroduction of grazing will have a positive

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benefit to both crop productivity and soil health.

In addition to research activities PIIC will be developing and delivering a range of regionally specific courses, workshops and field days between August 2006 and June

2008. A number of NSW DPI PROfarm short courses will be available through the Grain & Graze program including Prograze, Landscan, Property Planning, Paddock Plants, Beef-n-omics and Wean More Lambs.

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# Meeting Market Specifications in a changing world

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## Introduction

The market for slaughter beef cattle is always changing. In the lighter, domestic type markets, carcass weight, fatness and age (defined by dentition) have always been the target and indeed they are still critical. The heavier markets are of course very focused on marbling specifications but also strongly value carcass weight and fatness attributes. Meat quality signals from the market historically were poor and inconsistent but the MSA beef grading system has changed this. So the goal posts were shifted – MSA has added ultimate pH, meat colour, marbling score, ossification, sale yards, hormonal growth promotants and slaughter pathways to predict eating quality x cut x cook. Overlay this with increasing pressure on traceability and we now have a potentially complex market place.

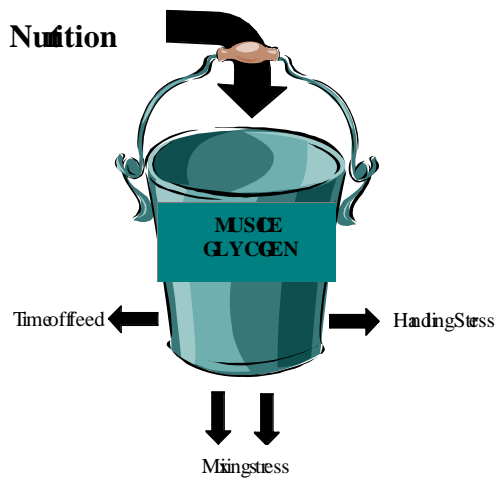
The more recent additions to the marketing pathways have been taken up either directly as product underpinned by MSA or indirectly by product that uses much of the MSA technologies, such as the major Australian supermarkets. Additional elements to the market place include the role of lean meat yield within supplychains. This paper gives an overview of the key components associated with meeting specifications in modern markets.

## Meeting Colour and pH specifications

The key message is to recognise the impact of pre-consignment nutrition on this quality attribute. Meat colour and pH is driven by the need for adequate muscle glycogen (or sugar) at the point of slaughter. Muscle glycogen is now widely described as the 'glycogen bucket' (Figure 1; [www.msagrading.com.au](http://www.msagrading.com.au)), with good nutrition 'filling' the bucket and managing stress to stop the leaks.

It came as a surprise to researchers to realise just how important nutrition is as a factor to achieving an adequate bucket of glycogen. Our conclusion was that a pre-consignment growth rate of 0.8-1kg/day was required to secure a full bucket. So this means nutrition right through to the end is critical and clearly partly underpins the huge popularity of feedlotting. In a pasture finishing scenario, we are looking at high quality pasture with about 10.5MJ of metabolisable energy per kg of DM or more and at least 100mm in pasture length to secure enough growth to underpin muscle glycogen levels. If dark cutting is costing you as a grass finisher, then consider shifting turnoff time to better match pasture quality/availability or closely evaluate a supplementary feeding strategy to maintain growth rates. Supplementary feeding need only occur long enough to get the cattle onto feed and have them eating the full ration for at least a week (about a 3 week exercise in total) before slaughter.

**Figure 1.** The Glycogen Bucket model



Of course managing stress is of great importance. This has proved frustrating to understand from a research point of view since often cattle need to be severely stressed to cause muscle glycogen loss. The best way to think of stress is as a 'risk factor' and the known important stress factors are:

- Heavy exercise during mustering
- Cycling heifers
- Hormonal growth promotants, especially re-implanted animals
- Mixing of mobs
- Unseasonal weather changes (i.e. first hot days in spring)
- Animal temperament
- Time off feed

Recently some new 'animal' factors have been associated with the glycogen bucket. Work in both sheep and beef cattle suggests that animals with an increased propensity for muscle (high EBV for eye muscle area) are (i) more responsive to nutrition in filling the glycogen bucket and (ii) lose less glycogen from the bucket in response to stress hormones. So more heavily muscled animals may have a lower susceptibility to cutting – all else being equal.

#### **Meeting Ossification targets**

Ossification represents bone maturity and is largely driven by animal age. Growth path does effect ossification BUT through effects on animal age (i.e. if a growth check effects age to slaughter). Other factors do influence ossification, such as gender and hormonal growth promotants (HGP). Thus heifers and HGP treated cattle will show an increased ossification score at a given age ([www.msagrading.com.au](http://www.msagrading.com.au))

Currently the MSA beef grading scheme allows an ossification score of up to 300 and this target should be easily met by supplychains that slaughter within 30 months of age. Perhaps the real challenge is can the economic value of reduced ossification score (as a component for improving eating quality) be captured by supplychains ?

#### **Hormonal growth promotants**

The issue of hormonal growth promotants (HGP's) and their use can become very emotive. However the clear facts are that HGP's do increase the rate of liveweight gain (often by about 15%) and are a useful tool to manage carcass fatness (some heifer genotypes). The effect of HGP's to increase carcass muscle and hold fatness usually translates into a lower marbling score which is an issue in markets seeking increased marbling (see below). HGP use also reduces the MSA eating quality score particularly for the higher eating quality cuts (i.e. cube roll and striploin). The common approach is to use HGP's if the market allows their use. Feedlotter's argue the financial losses associated with the increased risk of dark cutting is offset by the increased liveweight gain.

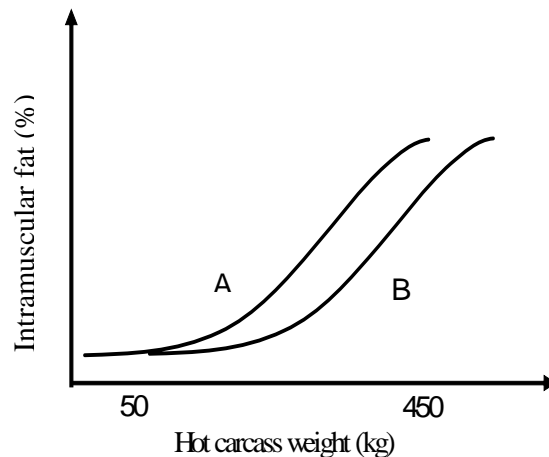
#### **Meeting marbling specifications**

Intramuscular fat content (% fat) or marbling score is clearly late maturing and typically requires the feeding of high energy diets for 150-300 days. However fat development within muscle (driven by high energy diets) is not late maturing and the expression of marbling is due to maintained fat synthesis in combination with declining muscle growth as animals get older. Hence high rates of 'all of life' growth promote marbling.

Marbling is a complex trait that is driven by genetics, growth path and maturity pattern. The mega drivers of the marbling phenotype are:

- Total carcass fatness – more total carcass fatness increases the trait (Rump fat EBV)
- Total carcass muscle – more muscle decreases the trait (Eye muscle area EBV)
- Growth potential– higher growth potential achieved via an increased mature body size, delays maturity and so decreases marbling at a given carcass weight (600 day weight EBV) – see Figure 2.

**Figure 2.** Graph showing the development of intramuscular fat in cattle of different mature body size and/or muscle development (B > A).



The holy grail of course is to change fat distribution i.e. from subcutaneous to intramuscular fat and this is achieved with a focus on the intramuscular fat EBV. However simultaneous pressure on less carcass fatness, more muscle and increased 600 day weight and likely to blur the progress until we understand how these factors quantitatively interact.

The Beef CRC is currently working to discover new gene markers that influence fat distribution with the goal of

understanding at least 50% of the genetic variance. However it is important to realise that for a complex trait, like marbling, that several markers are likely to be required. Moreover, these markers will still be influenced by the mega drivers of total fat, muscle and growth.

### Lean meat yield

Lean meat yield (LMY) like marbling, is not a single trait but composed of:

- Carcass fatness (more fat reduces yield)
- Carcass muscle (more muscle increases yield)
- Carcass bone (changes in bone generally have a small impact on yield)
- Carcass weight (ore weight = more meat)

For most 'British' type cattle, gains for LMY have come from increasing mature body size (i.e. selection for growth) meaning that at a given carcass weight the slaughter livestock is less mature, leaner and so yield more muscle. An alternative is to limit mature size and select for more muscle at a given fatness.

As a general principle, lighter weight markets (240-270kg HCW) with a P8 fat depth around the 10mm, would need to pursue an increased muscling approach to influence LMY because the animals are already relatively lean (i.e. carcass weight fixed and fat is optimally low). For heavier carcass weight markets, where P8 fat depth blows out to 20mm or more, both reductions in P8 as well as increases in muscle would both deliver substantial gains in LMY.

Supply chains have always been interested in lean meat yield and boning room performance (saleable meat produced) is closely monitored. To date simple slaughter grids focus on weight and fatness as an approximation of yield at the carcass level. However interest, at the individual carcass level, to include estimates of muscle and fatness is now emerging. Evidence for this is clear at a number of levels:

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- Muscle score is now a widely accepted rating system for muscularity in cattle (<http://www.agric.nsw.gov.au/reader/beefappraisal>) and analyses of the National Livestock Reporting Services data undertaken by the NSW Department of Primary Industries shows a considerable price premium for high muscle score cattle (steers, heifers and cows) compared to average cattle of the same fatness (about 10 cents/kg live weight/muscle score). If you like the saleyard system pays for lean meat yield on both fatness and muscularity.
  - The supermarket majors are now measuring LMY (muscle and fatness) and at the moment have chosen to stay with weight and fat grids for payment. However, as discussed above, improvements in LMY for this market sector will come not from reducing fatness, but from increasing muscularity. One future scenario might be to underpin improvements of muscularity and LMY with a minimum marble score so as the beef does not become too dry and difficult to cook.
  - The Beef CRC supplychain program has formed a collaborative relationship with 5 Australian processors and their supplychains to underpin research into the new carcass and meat quality genetic technologies. In order to prove that new genetic technologies deliver the promised phenotypic outcome the Beef CRC needs measurements of LMY (muscle and fatness) plus full MSA grading to as LMY and eating quality can be optimised for different markets. In essence another 5 supplychains will become interested in LMY.

The point here is not to panic or worry – simply keep an eye on the market place you are targeting. Importantly if you are not producing cattle for supplychains where marbling is important (i.e. B3 Japanese market) then consider increasing the muscle genetics within your slaughter livestock, especially if your market destination pays for it. However for the ‘marbling’ markets we are still not fully confident of the extent to which increases in muscle and/or mature size interact with the final marble score, even when there is positive selection for intramuscular fat.