

# BETTER STEERS OR MORE EFFICIENT COWS? CAN WE HAVE BOTH?

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For most commercial breeders, the ability of their cows to utilise pasture and breed efficiently in variable seasons has a far greater influence on profit than the finer points of carcase quality. They may well ask: why risk selecting for better steers if their sisters are less efficient as breeders?

A major project on maternal efficiency in CRC III is uncovering the important genetic connections between carcase quality, feed efficiency and breeding performance in southern (temperate) environments. It will answer the concerns of breeders who are cautious about using new EBVs to improve traits like carcase yield and marbling, in case there are negative effects on the breeding herd. It follows a similar study in CRC II that investigated these effects in tropically adapted genotypes in northern Australia.

## Maternal efficiency

In a breeding herd, about 70% of the feed is consumed by cows for their maintenance, so from the breeder's point of view, overall profit is much more closely connected to the feed efficiency in cows rather than in the steer progeny.

But first things first. Before worrying about new technologies, breeders already can choose from a wide range of options to make sure they are making the best use of their feed. There is often potential to make significant improvements by fine-tuning their management of three critical factors:

- Seasonal feed variation by choosing the best calving time, weaning early and using carefully targeted feeding of appropriate supplements
- Condition (fat score) of cows and heifers at key points during the year to maximise their fertility

- Breeding techniques, using well-proven methods such as crossbreeding, using breeds that offer the right traits, and using BREEDPLAN to select replacements.

With these in place, new EBVs resulting from the CRC's maternal efficiency projects will enable on-going improvement, keeping an economic balance between the carcase composition and feed efficiency of steers and the efficiency of the cow herd.

## Feed efficiency

EBVs for Net Feed Intake (NFI) have recently become available in some breeds. They are based on the fact that some animals require less feed to grow at the same rate as others. The difference between individuals is quite strongly controlled by genetics (i.e. is moderately heritable).

The foundation research with Angus cattle at Trangie demonstrated that if we identify and breed from the more efficient animals, we will gradually improve the ability of our cattle to convert grass into beef.

At Trangie in the 1990s, researchers created separate herds, selected for high and low efficiency. This demonstrated the rapid improvements in feed efficiency that can be made. (These cattle are now a resource for CRC III research, identifying the genes controlling feed efficiency).

In the research, it was noticed the more feed efficient cattle tended to be slightly leaner, although not different in growth or frame size. This raised the possibility that selection for feed efficiency could bring about changes in body composition, with possible effects on carcase value and cow productivity. This required further investigation and led to the new project in CRC III.

## Body composition

Since its inception in 1993, the Beef CRC's main focus has consistently been on improving steers and their ability to hit target market specifications. To achieve improvements in yield and quality for most markets this means reducing fat depth and increasing muscling.

In beef females throughout most of Australia, the ability to put on fat quickly when feed is plentiful is a very positive trait. The "haystack on their back" helps them retain their fertility through seasonal feed shortages and of course, drought (see box story, next page).

Does this mean aiming for higher carcase yield will mean less profitable cows? How does this connect with feed efficiency? Can we improve carcase yield and cow efficiency at the same time?

These are the questions being answered in CRC III by a series of experiments across southern Australia.

## Maternal efficiency project

Trangie-bred Angus females with known genetic profile for high or low NFI have been transferred to Struan (SA) and Vasse (WA) research stations for detailed studies into their growth, carcase composition and reproductive performance over a number of years.

The data will provide information on the genetic relationships underlying all these traits. It will be possible to answer important questions including:

- Can we improve NFI and carcase traits simultaneously?
- If we select for steers with improved carcase traits (marbling, fatness, yield), what effect will this have on female reproductive performance?

- If we select for steers with improved yield, will their sisters lose their ability to deposit fat?

The project will have strong links to industry with a number of Angus and Hereford BREEDPLAN herds tracking the same key traits under commercial conditions.

These breeders will record detailed conception and calving information for a number of years. Newly born females will be weighed and scanned regularly as they grow, develop and mature, to monitor body composition as they develop and rear calves of their own.

Ultimately, this data will allow BREEDPLAN to produce more balanced EBVs, calculated taking into account the positive and negative associations between the

carcase, fertility and feed efficiency traits. The new EBVs will give breeders the power to make positive progress in important traits at the same time, even if they are negatively correlated.

### **Future technologies**

While some practical answers are not far away, the foundation is being laid in these experiments for the new genetic technologies to play their part well into the future. DNA from these cattle is being stored for future validation of new gene marker tests and to identify the genes and gene combinations associated with differences in their performance.

Already, there is a change of focus from a few individual gene markers for important traits, to suites of markers,

indicating the technology to screen for thousands of genes will soon be delivered by the CRC's ambitious research programs.

Now that Australia is seriously working to deliver future DNA technologies through the BREEDPLAN system, we can be confident that cattle breeders will be given unprecedented power to find cattle with the genetics that not only meet market specifications, but will be profitable to breed and produce.

### ***Fat or muscle - which form of energy storage?***

The ability of a cow to put on extra body weight and then use it to get through times of feed shortage is a very useful feature in Australia's variable environment.

According to Dr Peter Parnell of NSW Department of Primary Industries, it makes a lot of difference whether a cow stores extra weight as muscle tissue or as fat. This is because the tissues have different concentration of stored energy, and have different maintenance costs.

A kilogram of stored body fat contains about 39 megajoules (MJ) of energy, more than 5 times that of a kilogram of muscle, which contains about 7 MJ. A cow can therefore store more energy in the same weight of fat compared to muscle.

Despite this difference, it only takes 25% more energy from feed to store a kilogram of fat compared to a kilogram of muscle.

And once fat is deposited in the body reserves, it takes less than half as much energy to maintain it there compared to the same weight of muscle. This is because muscle is a much more active tissue than fat and is constantly being turned over.

Dr Parnell says that in a typical cow herd, 70% of the energy used to maintain cows is used for maintaining muscle tissue, not fat.

At any given liveweight, mature cows that tend to store surplus energy as fat tissue should therefore be "cheaper to run" than those accumulating it as muscle. Any change towards leaner cows, whether by selecting for higher carcase yield or improved feed efficiency, could have serious consequences.

The Beef CRC's maternal efficiency project will spell out these consequences and present breeders with a balanced story. More importantly, the data will equip BREEDPLAN with the genetic correlations to produce more balanced EBVs that account for the trade-offs. The new EBVs will enable breeders to improve both carcase quality and female efficiency at the same time.