Making the Most of Genetic Technology

As a Murray Grey beef producer, whether it be at a seedstock or commercial level, you now have access to a greater range of genetic technologies than ever before. These genetic technologies provide you with the tools to significantly improve the genetic merit of your animals and ultimately, improve the profitability of your beef enterprise. So are you making the most effective use of the genetic technologies that are available?

What Genetic Technologies are Available?

1. BREEDPLAN

BREEDPLAN is a modern genetic evaluation system for beef cattle which uses the world’s most advanced genetic evaluation system (based on Best Linear Unbiased Prediction (BLUP) technology) to produce Estimated Breeding Values (EBVs) of recorded cattle for a range of important production traits. BREEDPLAN EBVs take the guesswork out of selection decisions by providing beef producers with an objective assessment of an animal’s genetic potential.

BREEDPLAN has been available in Australia since 1984 and is now utilised by members of approximately 27 Australian Breed Societies. Use of the BREEDPLAN technology has also increased internationally with uptake in New Zealand, Namibia, Thailand, the Philippines, the United States, Canada, United Kingdom, Hungary, South America and South Africa.

A BREEDPLAN genetic evaluation is currently performed for the Murray Grey breed and includes animals from Australia, New Zealand, United States, Canada and the United Kingdom. Within the Murray Grey evaluation, EBVs are published on individual Murray Grey animals for up to 17 different traits. These traits include:

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<td>Calving Ease Direct</td>
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<td>600 Day Weight</td>
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<td>Mature Cow Weight</td>
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Further expansion and development of the EBVs that are available on Murray Grey animals is likely to continue in the future. Other breeds are now producing EBVs for Docility, Net Feed Intake (x2), Flight Time & Tenderness, and EBVs for Structural Soundness (x6) are anticipated shortly.

2. Selection Indexes

Selection Indexes combine the BREEDPLAN EBVs for an animal with an economic weighting (based on costs of production and returns on outputs) to produce a single value of an animal’s overall genetic merit for profitability in a particular production scenario and market. Selection Indexes are calculated using sophisticated software known as BreedObject.

Selection Indexes enable cattle producers to make “balanced” selection decisions, taking into account the relevant growth, carcase & fertility attributes of each animal to identify the animal that is most profitable for their particular commercial enterprise. Selection Indexes reflect both the short term profit
generated by a sire through the sale of his progeny, and the longer term profit generated by his daughters in a self replacing cow herd.

Three different Selection Indexes are now calculated for the Murray Grey breed. These are the Supermarket, Long Fed and Heavy Grass Fed Selection Indexes. These three Selection Indexes have been designed to cater for the main commercial production systems of relevance to Murray Grey producers in Australia and are intended for use by both seedstock & commercial producers.

3. Internet Solutions

“Internet Solutions” is the title given to an extensive range of internet based services that are available to both seedstock and commercial beef producers. Internet Solutions enables beef producers to access and utilise the BREEDPLAN and Selection Index information that is available on an animal in the most effective and efficient manner possible.

Services available to Murray Grey producers under the banner of Internet Solutions include:

- **Member/Animal/EBV Enquiry**: This facility enables producers to access member, animal & EBV information as it is recorded on the Murray Grey Beef Cattle Society database. A powerful search engine allows producers to undertake a wide range of functions that aid in quick & easy access to information.

- **Sale Catalogues**: Online sale catalogues can be accessed for single-vendor auction, multi-vendor auction & private treaty sales. As with the member/animal/EBV enquiry facilities, a powerful search engine allows producers to quickly source superior genetics for use within their breeding program by searching both within a particular catalogue and across different catalogues.

- **Semen Catalogues**: Online semen catalogues can be accessed providing a valuable service to the AI industry. This service has similar functionality to the sale catalogue facility.

- **Mating Predictor**: A simple EBV calculator provides producers with ability to predict the outcome of a specific mating or range of matings by calculating the expected EBVs of the progeny.

Internet Solutions also includes extra facilities that can be utilised by the seedstock sector such as the ability to submit pedigree and performance information, and access the updated BREEDPLAN information of their animals from a secure file download area.

The Internet Solutions services that are available for the Murray Grey breed can be accessed via the Murray Grey Beef Cattle Society website (www.murraygrey.com.au).

4. TakeStock

TakeStock is a powerful benchmarking tool that was made available to Murray Grey producers in 2008. TakeStock is only applicable to seedstock producers and collates all the available BREEDPLAN and Selection Index information to provide beef cattle breeders with a tool that enables them to assess and improve the rate of genetic progress in their herd.

TakeStock uses the pedigree and performance information that has been recorded with the Murray Grey Beef Cattle Society to:
Provide a range of statistics relating to the genetic structure of the Murray Grey breed and the individual herds within it.

Evaluate the rate of genetic progress that has been made by the Murray Grey breed and the individual herds within it. To do this, TakeStock assesses the genetic progress that a herd has made for each Selection Index and benchmarks the individual herd’s progress with the genetic progress that has been made by the breed as a whole.

Determine the key factors that explain significant differences in the rate of genetic progress between herds within the Murray Grey breed across a given period of years. These factors are known as Key Performance Indicators (KPIs). The KPIs help breeders identify the type of factors that had the greatest impact on the rate of genetic progress made by herds within the breed. Herds are rated for their performance against each KPI to benchmark the performance of their breeding program.

5. Total Genetics Resource Management (TGRM)

Total Genetics Resource Management (TGRM) is a mate allocation tool available to seedstock producers. TGRM enables seedstock breeders to nominate the sires and dams that are available for use within their breeding program and the software program will allocate the animal matings that will produce the greatest gain towards the herd’s breeding objective, while minimising inbreeding.

Widespread adoption of TGRM is currently limited, however increasing the utilisation of TGRM offers an opportunity for seedstock producers to significantly increase the rate of genetic improvement being achieved in their herd.

What Genetic Technologies Are Under Development?

In addition to the genetic technologies that are available, there are also a number of technologies that are under development and will more than likely be available to Murray Grey producers shortly.

1. Data Audit

The quality of the pedigree and performance information that is recorded for an animal has a considerable influence on the quality of the BREEDPLAN EBV and Selection Index information that is calculated for that animal. “Data Audit” is a tool currently under development that evaluates the quality of the pedigree and performance information that has been submitted to BREEDPLAN by each seedstock herd.

It is anticipated that Data Audit will:

- enable seedstock producers to assess their performance recording practices and ensure the quality of the performance information that they record is maximised.
- enable commercial producers to assess the likely quality of the performance information that has been submitted by a particular seedstock herd.

Data Audit is likely to evaluate the quality of a seedstock herd’s pedigree and performance data for such things as completeness of recording, quality of phenotypes and effectiveness of recording (eg. contemporary group structure).
2. Genomics & Marker Assisted EBVs

The next generation of genetic technology undoubtedly relates to the field of genomics. A significant advantage of the genomic technology is the ability to identify the genetic merit of animals for hard to measure traits and the ability to evaluate the genetic merit of animals at an early age. However, while having several advantages, the genomic technology does come with some significant challenges.

At the time of writing, producers could test their animals for 12 different gene markers (4 x marbling, 4 x feed efficiency, 4 x tenderness) that are commercially available from Catapult Genetics. Gene Markers are sequences of DNA that are closely linked to an individual gene that influences a particular trait, and are tested using either a hair, semen, blood or tissue sample that has been collected from an individual animal. Over the coming months, it is anticipated that both the number of gene markers available and the number of companies offering gene marker tests will increase significantly. It is also likely that the way in which gene marker results are displayed will change considerably.

While individual gene marker tests are currently available, the most effective application of genomic technology to the beef industry is likely to be through combination with the traditional genetic technologies such as BREEDPLAN. Methodology has recently been developed whereby the gene marker information can be incorporated with the performance information available when calculating EBVs for an animal. These EBVs are commonly called “Marker Assisted EBVs”. The first Marker Assisted EBVs for Tenderness have been recently released for the Brahman breed.

3. Multibreed EBVs

Currently, all Australian Breed Societies conduct a separate BREEDPLAN analysis and so the BREEDPLAN EBVs available on an animal can only be directly compared with other animals of the same breed. Feedback has been received from commercial producers that it would be beneficial if animals of different breeds could be included in the same BREEDPLAN analysis so that the EBVs of animals can be compared across breeds. While researchers are investigating this capability, the success of developing an across breed genetic evaluation is ultimately dependent on the availability of suitable data.

As the first step in developing multibreed EBVs, a conversion table has been developed that enables producers to adjust the within breed EBVs of their animals with the within breed EBVs of another breed. The conversion table enables adjustment of the Gestation Length, Birth Weight, 200 Day Growth, 400 Day Weight, 600 Day Weight and Carcass Weight EBVs for Angus, Hereford, Limousin and Simmental animals.

The Challenge for Beef Producers

There is clearly a comprehensive range of genetic technologies currently available to beef producers. In addition, the range of technologies available is now increasing in terms of both number and complexity at a greater speed than ever before. The challenge to both seedstock and commercial beef producers is to keep up with this technology and ensure that they are most effectively applying the genetic technology within their breeding program.

A recent analysis of the Murray Grey Long Fed Selection Index illustrated that there was $10.29 per cow mated difference in the rate of genetic improvement being made per year between the top and bottom seedstock herd for this production scenario. Furthermore, there was a $5.19 per cow mated difference in the rate of genetic improvement being made per year between the top herd and the average of the breed. This difference clearly identifies that there is a huge potential for Murray Grey
producers to increase their rate of genetic improvement through better adoption of the genetic technologies that are available.

For further information about any of the above genetic technologies, please contact Andrew Byrne at SBTS on (02) 6773 3357 or by email andrew@sbts.une.edu.au. Comprehensive information is also available from the SBTS website (http://sbts.une.edu.au).

*Article compiled by Andrew Byrne for inclusion in Murray Grey Annual, 2008.*