In the last BREEDPLAN News we reported on the first results from a field test of Insulin-like Growth factor I (known as PrimeGRO™ IGF-I) in BREEDPLAN herds. Blood samples from more than 7,000 calves were collected at or around weaning, with some older animals also included. We have now analysed all our data, which included the ultrasound scan data on these animals. Unfortunately we did not get all animals scanned as planned due to the severe drought conditions on many farms. However, by combining the information from other relatives recorded in previous years we could complete the analysis and can now report the results.

IGF-I in calves at weaning is moderately heritable, our estimate was 0.39 ± 0.05. In yearling the heritability was greatly reduced (0.11 ± 0.06). We therefore recommend taking IGF-I blood samples at or before weaning to give the best genetic responses. Our analysis also showed that selection against blood serum IGF-I concentration will reduce all measurements of fat (including marbling) and increase growth rate slightly. However, as these genetic correlations are not particularly strong, we found plenty of animals which went against the overall trend.

The most encouraging result of all was the high genetic correlation between IGF-I and Net Feed Intake (NFI). This correlation was estimated as 0.63, but still with a large standard error of ±0.27. Selection against blood serum IGF-I at weaning will result in progeny, which for the same weight and gain on a feedlot ration, will eat less than expected. ie: they are more efficient.

From the estimates of the relationships between IGF-I and NFI we predict that selecting the bottom 35% of young bulls on IGF-I to become sires will result in progeny which eat about 0.07 kg per day less in a feedlot trial (10 MJ per kg feed) compared to the average bull’s progeny. This benefit is a little more than half of what you get if you actually did a feed intake test on all these young bulls for NFI, but at a fraction of the cost. Using information on all relatives, as common in BREEDPLAN, will increase the benefits further. Of course, we don’t advocate single trait selection, however, our results are a clear indication that IGF-I is a good indicator trait for NFI and is much cheaper to record than NFI directly. AGU will now process the accumulated data and transfer it to the BREEDPLAN database. We will also undertake the necessary work to have IGF-I and NFI records included in the multi-trait BREEDPLAN genetic evaluation system by mid 2004. With additional data we will then be able to investigate the links between IGF-I and the female reproduction trait ‘days to calving’ and from additional CRC data the genetic link with carcase and meat quality traits.

As there is an indication that NFI is slightly negatively correlated with meat tenderness this might be true for IGF-I too. It is important to know this. Data currently collected in the Beef CRC-II will soon provide us with the genetic parameters for tropically adapted breeds.

Hans Graser
Director
Animal Genetics and Breeding Unit

Acknowledgments: The collection of samples was funded by MLA and undertaken by NSW Ag technical staff. Primegro Ltd, which has an exclusive licence to market the patented PrimeGRO™ IGF-I test, funded the analysis of the samples. Mr Mark McKenzie from Primegro can be contacted for collection kits and details on cost of test on 08 8354 7791.

IGF-1 blood test improves NFI EBVs

BIA fellowship for David Johnston

In Sept 2003, the Beef Improvement Association of Aust. awarded David Johnston a fellowship recognising his outstanding contributions to genetic improvement in the beef industry. These awards are nominated by BIA branches, in this case Albury Wodonga. David completed a Ph D at the University of Georgia in 1992 and has since been based at AGBU as beef genetics project leader. During this time he has had major involvement in the R&D for most new features in BREEDPLAN. Some of these he writes about on the adjacent page. Others which come to mind include: the fertility traits; mature cow wt; combining scan and abattoir data for carcase EBVs and multibreed EBVs .He has also been a project leader in key CRC genetics programs, helping integrate these into BREEDPLAN. Somehow he finds time to accept many speaking engagements. These are always well presented with great slides - a career in the dramatic or graphic arts would also have been a possibility!

Well done David - it’s a privilege to work with such a professional!

Brian Sundstrom

http://breedplan.une.edu.au
Interest in BreedObject $Indexes has continued to grow through 2003, with a number of significant developments:

- The Australian Brahman Breeders’ Association (ABBA) published its first $Index in May. The $Index targets a self-replacing herd producing Jap Ox grass-finished by 32 months of age. A pleasing genetic trend for the breed is evident, based on results from the June 2003 Brahman Group BREEDPLAN analysis (Figure 1). The ABBA technical committee, Christian Duff & AGBU have recently been working towards further refining the $Index.

- The Charolais Society launched two new $Indexes.

- Two large northern Aust. pastoral companies, Stanbroke and Australian Agricultural Co. developed $Indexes customised for their operations. The AACo $Index is for their Gulf Composite herd. Their animal and EBV search options through BREEDPLAN, are similar to those now used by many of the Breed associations.

- 17 $Indexes, in widespread use in the Angus, Hereford, Limousin, Murray Grey, Poll Hereford, Shorthorn and Simmental breeds, were also updated.

Steve Barwick

With version 4.1, BREEDPLAN began including genetic information (EBVs and EPDs) on immigrant sires, dams and embryos, from overseas sources. Initially this was confined to weight traits only. However, expansion of systems overseas has increased the number of traits on which EBVs are available. Unlike BREEDPLAN which analyses all traits (except calving ease) in a single multiple-trait analysis, EBVs from foreign sources are generally derived from a number of separate evaluations. BREEDPLAN was designed to use this information as a ‘starting value’ until sufficient data were collected to adequately reflect the immigrant individual’s performance locally.

Recently, however, feedback from breeders has suggested that BREEDPLAN was over emphasising the foreign information at the expense of local information. Research at AGBU revealed that because of the conflicting methods of evaluating multiple traits as either one joint analysis, or a number of single and multiple traits, has exacerbated this problem. A modified method for incorporating this information may be included for the next GROUP BREEDPLAN analyses. Breeders will be notified when this is implemented. Less emphasis will be given to foreign information, particularly that of extreme overseas EBVs.

New StockTake software is undergoing trials before release to BREEDPLAN users on a regular basis. StockTake identifies key performance indicators (KPI) at breed and individual herd levels within a breed. At this stage KPIs have been established as those that predict differences in genetic progress between herds in a breed standard $Index for a given time period (e.g. 1995-2000). The KPI identified from our research to date, have usually been variables closely in line with the genetic theory (e.g. genetic superiority of sires used). In addition to the KPIs identified for a breed/$Index combination, StockTake also computes statistics for other variables of use to breeders (e.g. average inbreeding level, age at first calving, AI and ET usage).

The delivery of StockTake reports is now being developed (e.g. web graphics, confidential herd reports). These will be able to be produced at the completion of the each BREEDPLAN run. Reports will allow breeders to benchmark their genetic progress against other herds in their breed and use the KPIs to identify focus areas for future breeding programs. StockTake software was developed by AGBU in our MLA BGEN.100 project.

David Johnston

AGBU news continues Page 14
Kay Payne has one of Australia's longest histories of performance recording, and a very highly regarded herd. She began recording her "Elite" Poll Hereford herd in 1967, was a trial BREEDPLAN herd in 1983/4 then a full BREEDPLAN participant since its commercialisation in 1985. The herd of 300+ cows, is run near Scone NSW. Commercial and registered cattle are run and recorded together - no favouritism! Bulls and replacements are kept from either on merit. In the 1990's most of the commercial steers were sent through an alliance to feedlots to obtain feedback for the heavy domestic market. In recent years, apart from last year's drought, grass finish at home for the EU market has been more profitable. Steers achieve this by 12 to 20 months, depending on seasons. 15 months is the target to average 250kg dressed weight. I recently attended Kay's annual bull sale (conducted by the buyer friendly Helmsman system), and pass on some replies to questions I asked as we walked through her excellent '02 bull drop:

The cattle are at the top end of British breed muscling. Average Eye Muscle EBVs for the '02 bulls was 2.7 which is in the top 10% of the Poll Hereford breed. How did you achieve this, visually or through EMA EBVs and scanning? "Mainly the latter" said Kay "Visual assessment is less reliable, even with very experienced assessors. The carcase EBVs are more certain, and are now much better to use since they have been expressed on a steer weight basis."

Does calving ease worry you when you select for higher muscling? "I keep a close eye on birth weight and calving ease EBVs of course, and find the calving ease EBVs very good once accuracy reaches reasonable levels. Of the visual features affecting calving, I feel skeletal structure of the calf is more important than muscling", commented Kay. "The NSW Agriculture Angus muscling selection lines at Camden have shown no increase in calving difficulty despite being 1.5 muscle scores apart. The top line cattle averaging C+ are still very functional and free calving. The steers have made an extra 15 -20c/kg live wt compared to the Lowline (D-) at the same weight and fat cover".

How about non genetic influences on calving, particularly first calf heifers? "I think nutrition during the first three months of pregnancy has a big influence. If nutrition is poor then, the heifers compensate by setting up a bigger blood supply to preserve nutrition of the foetus. Then if they are on good feed for the last three months they can produce very big calves. This leads to increased calving difficulty from bigger calves and less well grown heifers . Given our erratic seasons, it is hard to control heifer nutrition at times, but at least if you are aware of this concept, management can aim at minimising problems".

A testimony for the muscling and carcase quality of the "Elite" steers, was a second placed pen of two, hoof and hook, in the recent Scone carcase competition. This includes mostly specialist crossbreeders, ensuring a tough competition.

Brian Sundstrom

Muscling and calving ease in British breeds

Kath Donoghue has joined AGBU as a Beef Geneticist. Kath comes from Coolah, NSW, where she had close association with her family's Toolangatta Hereford stud and has a small registered Hereford herd of her own. Kath received a Junior Research Fellowship from MLA to the University of Georgia in the USA. There she completed her Masters on the feasibility of an international genetic evaluation for Charolais across Australia, N Z, Canada and the USA. Her PhD was on combining AI and natural service data for fertility EBVs (see page 6). At AGBU, Kath will investigate an international evaluation for Limousin and Charolais across Australia, New Zealand, Europe, and USA. She will also conduct research for international BREEDPLAN clients including US Salers and Hereford Associations in USA and Canada.

http://breedplan.une.edu.au
Stud cattle breeders have long dreamed of predetermining the gender of some matings. Where AI is being used, sex sorted sperm would be the way to do this - how far has this technology advanced?

The most promising technology at present is developed by the US company XY Inc. They support research in this field in many countries including projects at Sydney University Vet School. Fiona Hollinshead, who has just completed a PhD in Sydney, provided some of the following information. Other parts I have summarised from a phone discussion with Dr Mervyn Jacobson of XY Inc.

- The current XY Inc system uses a modified flow cytometer (originally for blood separation - see pic) to ‘draft’ or separate the male and female sperm. Female sperm have slightly higher DNA content, which allows separation of sperm as they flow ‘in single file’ past UV laser and fluorescence detectors. They ultimately flow into two separate collection tubes. While this is done at an impressive 4,000/sec, it can still take approx. 15-20 minutes to produce a 2 million sperm straw (depends on factors such as quality of the sample/ejaculate). Most Australian frozen semen straws have 25 million sperm, aiming to ‘deliver’ 15 m. active sperm on thawing. XY Inc have added technology developments which allow successful low dose insemination from straws as low as 2 million sorted sperm.

- The sorting equipment is currently very big and immobile ie best where bulls are on site and fresh semen can be collected, sorted and then frozen. The most common beef cattle use at present is therefore in big AI centres. US engineers hope more portable equipment will be available within a few years.

- Fiona has also experimented with sex-separation of frozen-thawed and liquid stored ram and bull semen. In one case, liquid stored semen came from Rockhampton. Both techniques showed promise, but require more semen to start with, as they contain a lower % of viable sperm than fresh semen.

- XY Inc works with many domestic species including cattle, sheep, pigs, horses and dogs. Captive animal programs include elephants and dolphins and some endangered species where female numbers need rapid boosting. Some 150,000 ‘totally normal’ sex selected progeny have now been born. The first cattle from sex sorted fresh semen and AI, were in 1995, some of these have since contributed to further generations.

- While the current technology sounds slow and expensive, the potential is enormous with for example juvenile IVF programs. Very young heifers, preselected on BREEDPLAN EBVs, could produce 50 or more eggs each and a straw of sexed sperm can fertilise up to 400 eggs! One of the large northern Australian pastoral companies has recently tried this with 40 heifers, to multiply some valuable new composite lines. I hope to be able to report on this next issue.

The XY Inc system is now commercially available in the UK and Argentina with the US, Mexico, Brazil, Canada, China and Japan to follow shortly. Negotiations in Australia and NZ are in progress, with commercialisation planned within 1 to 2 years. It is hard to predict when sex sorted sperm will be more widely used in the average stud. Such technologies can improve rapidly, but are also at times frustratingly slow. I sense things are moving quite quickly, so watch this space or http://www.xyinc.com

Brian Sundstrom