



GENETICS

INAUGURAL SHEEP BREEDERS FORUM

Last month's inaugural Beef + Lamb New Zealand (B+LNZ) Genetics sheep breeders forum in Dunedin attracted about 100 ram breeders, scientists and industry professionals from across New Zealand.

The two days (14-15 October) included discussion on the future direction of B+LNZ Genetics, as well as recaps on science results achieved in recent years and research currently underway. This post-conference newsletter is a summary of speakers and topics covered. Many of the speakers were also videoed and those presentations are available on the forum web page at www.blnzgenetics.com. During the forum, attendees submitted questions to be addressed. Those questions and answers will be available as a pdf on the forum web page, together with pdf copies of the 21 research posters displayed over the two days.

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B+LNZ Genetics general manager Graham Alder addresses the audience of about 100 sheep breeding professionals, who gathered in Dunedin last month.

Breeder feedback sought

It has only been six months since B+LNZ Genetics kicked off its initial five-year programme of activity. The government-backed subsidiary of B+LNZ brings together existing sheep and beef genetics research and innovation by consolidating Sheep Improvement Limited (SIL), the B+LNZ Central Progeny Test and Ovita.

B+LNZ Genetics general manager Graham Alder opened the forum and explained that its aim was to engage and involve sheep breeders with the B+LNZ Genetics programme as early as possible. "This forum is an opportunity for sheep breeders – who are integral to the advancement of genetics in New Zealand – to talk to us directly about where they see the organisation heading and to help guide its future direction."

Graham said the organisation's vision was to facilitate profitable genetic gain for the sheep and beef industry and this was underpinned by three main objectives. "Those objectives are developing better breeding objectives, developing more accurate genetic evaluations and matching genetics to end user needs.

“In a nutshell, B+LNZ Genetics wants to work with sheep breeders to make sure that commercial farmers have access to the ‘right’ genetics for the future – and, critically, that these genetics are easy for them to select.”

B+LNZ Genetics chairman Chris Kelly said he believed addressing the hurdle of technology transfer was as significant to the success of the genetics programme as the genetics themselves. “None of the PGPs (primary growth partnerships) will succeed until we solve the technology transfer problem.”

▶ See www.blnzgenetics.com forum web page for full video of the presentation.

SIL engine upgrade

The news that excited breeders the most over the forum's two days was the announcement that the SIL engine was being seriously upgraded.

B+LNZ Genetics senior geneticist Dr Mark Young explained that the new SIL engine would allow for “bigger, faster, better genetic evaluations”.

The upgrade will see pedigree, performance and DNA information combined in a single, weekly national genetic evaluation, therefore removing the need for many smaller evaluations.

Mark said the key benefits were:

- One evaluation, so no variation between different sets of BVs;
- Most accurate BVs estimated;
- Leading to faster genetic gain.

While the full upgrade and delivery of improved tools will take up to five years, Mark expected to be testing large-scale evaluations within one year and to roll out larger scale evaluations commercially soon after, assuming testing goes well.

There was also discussion about the need to review the base year reference point and drop older data from the system, to help speed up evaluation.

Senior scientist Benoit Auvray is leading the upgrade of the core genetic evaluation software in the SIL engine rebuild.

He says a successful year one result would see the new engine built, with year two spent fine-tuning the models fitted and improving accuracies.

- ▶ See www.blnzgenetics.com forum web page for videos of Mark and Benoit's presentations.
- ▶ Also research posters:
 - SIL genetic engine
 - Supercharging SIL genetic evaluation

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RESEARCH UPDATES

Each research presentation was videoed and can be viewed on the forum web page at blnzgenetics.com

NZ Inc must take lead

When it comes to progressing sheep genomics technology, New Zealand Inc has to lead the charge. No other country will do it, according to AgResearch scientist John McEwan.

John predicted further development of chip technology would be the basis of much of B+LNZ Genetics' work going forward.

With change being inevitable, it was critical to build for new technology, not the old. "We need to make the right technology choices at the right time, because there is a two-to-five-year lead in time."

John said the cost of technology dropped dramatically – by five orders of magnitude in some instances – over the 12 years of Ovita and, while he did not believe breeders would see a \$3 DNA test, he did predict greater value from future tests.

He flagged that the quality of DNA was critical going forward. "All new technologies need better DNA. That means high quality DNA, suitable for any task. Historically, older methods could use lower quality DNA and lower amounts of it, as well. While new techniques can use vanishingly small quantities of DNA, in practice automated systems need sufficient quantity of high quality DNA – not degraded and clean of contaminants."

From a breeder perspective, that means using new TSU samplers and making sure samples are handled appropriately after collection.

Where the sheep science programme is going

The primary focus of the B+LNZ Genetics sheep science programme is ewe profitability, recognising the national flock's move into hill country.

Animal productivity scientist Dr Michael Lee outlined the programme's five main research areas:

- 1) Genomics;
- 2) New evaluation system, via the improved SIL genetic engine;
- 3) Phenotyping – including feed efficiency, stayability and body condition scoring; and investigating the use of electronic devices;
- 4) Fit to environment;
- 5) Socioeconomic research.

With regard to the new genetic evaluation system, Michael was looking forward to the ability to use information as optimally as possible, including the better integration of DNA information. "This will give more accurate eBVs, through better use of data. This is a necessary upgrade for SIL."

Genotype-by-environment interactions were also a high priority and addressing the question: "Do we need to breed ewes specifically for hill country? Or can we get away with 'all rounders'? We now have two hill country central progeny test sites, but it's going to take a long time to generate data."

AbacusBio managing director Dr Neville Jopson also presented to the forum, updating attendees on the sheep central progeny test. He highlighted the key role it plays in maintaining the genetic connections between flocks needed for accurate across-flock evaluations.

For more info, see www.blnzgenetics.com forum web page research posters:
- Genotype by environment interaction
- Sheep central progeny test

The economics of indexes

AbacusBio's Drs Tim Byrne and Peter Amer are investigating development of breeding objectives and selection indexes that better describe farm profit in harder country.

Peter described the review of SIL indexes in relation to: relevance to hill country; accounting for breed shifts; updating input price assumptions; and adding new traits.

"The inclusion into SIL of some new traits linked to ewe efficiency, such as ewe body condition score and ewe longevity, is a research priority. The work involves pulling together results of research undertaken with SIL breeder records, and working out how to implement the findings in SIL in a practical and robust way. This will provide additional criteria for farmers to identify sheep better adapted to harder farming conditions."

For more info, see www.blnzgenetics.com forum web page research posters:
- Economic analysis – indexes
- Maternal ewe traits
- Who benefits?

Working towards higher accuracy

Animal productivity scientist Dr Shannon Clarke is looking at how to generate genetic data that feeds into future genomic selection and gene discovery studies.

Shannon said this work would use whole genome sequencing, existing 5k and 50k SNP technology and the new high-density SNP chip, recently developed by the International Sheep Genomics Consortium and FarmIQ.

"We're hoping to have a better understanding of the biology of the trait, higher accuracy of prediction – that is more accurate gBVs – and better persistency of accuracy across generations."

For more info, see www.blnzgenetics.com forum web page research poster:
- Sheep genomics



Activity and proximity loggers

Technologies from the human field have potential in the animal sciences, albeit with different end uses.

Senior scientist Dr Tricia Johnson outlined her pilot study work using activity and proximity loggers. Activity loggers – like an iWatch – measure heart rate, operate as a GPS and collect a wealth of other data. Proximity loggers allow scientists to collect data in hill country environments that they would not otherwise be able to collect. For example, if an animal has another animal within its vicinity, the logger records that. Applications include hogget mating where the teaser's vicinity can provide an oestrus date to predict onset of puberty.

“While the technology exists and pilot studies are progressing, it is not ready for widespread use in animal science. We’re working to get the costs down to a realistic level for widespread use.”

Feed efficiency pilot trial underway

Dr Tricia Johnson also updated attendees on the pilot trial work underway around feed efficiency.

There has been considerable work in this field in cattle, but there is very limited data for sheep.

“The long-term plan is to set up an automated feed intake facility near Invermay, using 200 hoggets per year from the central progeny test.”

In the meantime, the pilot trial involves 40 hoggets and is aiming to gather as much information as possible, to begin to build trait profiles.

With the interest in feed efficiency increasingly relevant to industry – given it has the potential to increase productivity and profitability – there is a need to know if there are negative genetic correlations.

For more info, see www.blznzgenetics.com forum web page research poster: - Feed efficiency in sheep

Stamp of approval

Animal health company Zoetis is developing a quality mark for sheep breeders who use its breeding tools.

Zoetis regional manager Sharl Liebergreen said some breeders invest in technology that delivers better rams to commercial farmers, but commercial farmers do not necessarily understand the significance of that investment. “Our clients said ‘we want to be able to spell out to the marketplace that we are using this technology and doing as much as we can in this space’.

“It’s similar to the Registered Master Builders’ quality mark. You can use them with confidence and know you’ll get a good product.

“B+LNZ has put millions into these products, via Ovita. Now we need commercial farmers to understand and benefit from that investment.”

Sharl said the company had already started moving in that direction, with its “Best technology. Best breeder. Best rams” advertising campaign, where it publicly supports breeders who are using its technology – specifically Shepherd Plus and Sheep 5k – across their flock.

For more info, see www.blznzgenetics.com forum web page research poster: Why do I need to use Sheep 5k?

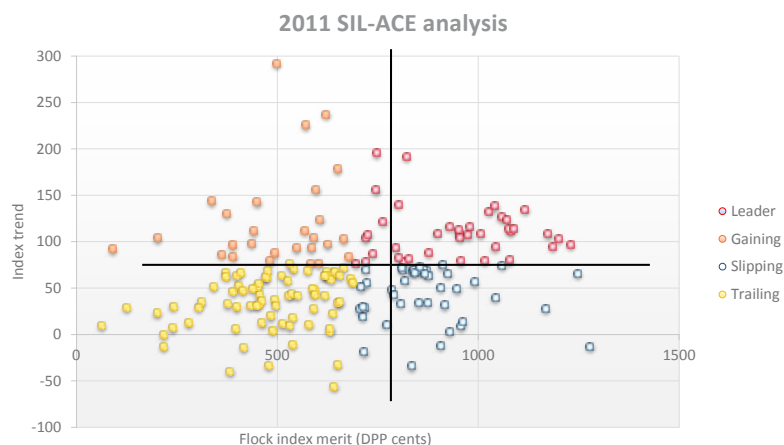


Figure shows average genetic merit (x axis) and rate of genetic gain (y axis).

The ram buying accountant

Based on an accountant’s actual experience, AbacusBio consultant Jude Sise demonstrated the monetary difference between buying good rams and home-bred rams in a commercial farm setting.

Assuming a dual purpose ram is used for four years over 100 ewes, lambing at 1.25 lambs/ewe, and 60 per cent of the ewe lambs were retained for use as breeding stock in a commercial flock, Jude worked through a series of calculations. Under this scenario, with each index merit point valued at 1 cent, the potential return on each index point was \$3.

The return was so dramatic, because the effect was cumulative, compounding year on year, as greater genetic merit animals bred and fed replacements into the flock.

Extrapolated out to 15 years, the total financial benefits between using good rams and home-bred rams could be up to \$100,000 for a flock running 1000 commercial ewes.

The graph pictured above drew much interest from the forum attendees (as everyone hoped they were in the top right quadrant). Jude explained the figure and showed where commercial farmers would make the greatest cumulative gains – by buying from breeders with high merit rams and who were achieving high rates of genetic gain (top right quadrant).



What about beef genetics?

Specialist beef geneticist Dr Steve Miller said that many of the questions facing sheep breeders were the same as those facing beef breeders, such as maternal issues related to hill country environments.

The “beef genetics plan” will deliver genetic tools to improve material performance on hill country, while also producing carcasses that meet market specifications.

Steve said the plan would involve:

- 1) Beef genomics;
- 2) Economics and indices;
- 3) Extension and adoption;
- 4) Maternal genetics.

“We need to collaborate with overseas, but at same time we need information on New Zealand animals.”

He was specifically interested in genomics related to fat composition, as it was especially relevant to New Zealand’s grass-fed beef difference.

Steve also talked about the 1000 Bull Genome project and New Zealand’s contribution of 29 bulls, which meant New Zealand then had access to all 1000-plus sequences.

Dr Jason Archer spoke about the beef progeny testing work underway at several properties, including Whangara, a large Maori corporate property near Gisborne. At Whangara, they want to lift the number of animals achieving BeefEQ specs to 75 per cent and measure the impact of their investment – thereby quantifying the investment in genetics in a commercial context.

▶ For more info, see www.blznzgenetics.com forum web page for videos of Steve and Jason’s presentations.

▶ Also research posters:
- Beef genetics plan
- Beef progeny testing



SMARTPHONE APP LAUNCHED

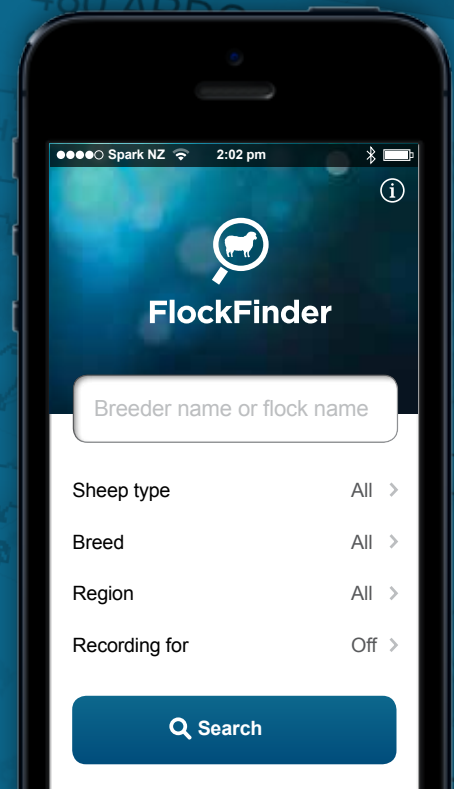
B+LNZ Genetics has developed a convenient smartphone app – called FlockFinder* – which allows easy access to information on leading New Zealand ram breeders recording animal performance and conducting genetic evaluations using SIL.

Users can search for ram breeding flocks on the basis of breed, exact geographical location, flock name, owner name or on traits being recorded.

One of B+LNZ Genetics’ goals is to make it easy for farmers to find and select the right genetics for their individual property. The FlockFinder app is the first of many developments working towards achieving this goal.

B+LNZ Genetics expects the app to be a key tool for farmers and rural professionals that support the New Zealand sheep industry.

**The app can be downloaded at either the Apple App Store or Google Play.*



ONSITE AT INVERMAY

The forum included a session at AgResearch Invermay, where attendees also had the option of touring the research farm and visiting the lab facilities. Invermay and Woodlands farm manager Kevin Knowler (pictured) spoke about the challenges being faced on the Invermay property.

New Zealand sheep breeders in unique position

Zoetis R&D Genetics executive director Dr Sue DeNise says New Zealand sheep breeders are in a unique position, as a result of the Ovita partnership's work over recent years.

US-based Dr DeNise said three key factors have come together to make genomics technology more accessible than ever for New Zealand sheep breeders. Those factors were genomic prediction, genotyping platforms and decision support tools.

Alongside estimated and molecular breeding values (eBVs and mBVs), breeders also now had access to genomic breeding values (gBV), which generated very accurate predictions on how a young ram will perform.

Through Ovita, Zoetis had worked closely with Beef + Lamb New Zealand and AgResearch scientists over the past six years and Dr DeNise said sheep breeders had benefited through tangible outcomes – most notably Sheep 50k and Sheep 5k, which provide mBVs for selection purposes, and Shepherd Plus, which determines parentage via DNA.

Dr DeNise said the value of the Sheep 5k tool was in its accuracy. "If we think about it in terms of a mature ram with an eBV. He has progeny in production and that raises his accuracy. With an mBV, there are no progeny to date but how many progeny would it take as a mature ram to match the accuracy of the mBV? For a trait like 'number



US-based Zoetis R&D Genetics executive director Dr Sue DeNise addresses forum attendees via video conferencing.

of lambs born', up to 18 progeny are needed to reach the accuracy you will get on an mBV. That saves you a substantial amount of time and you do not selection mistakes early."

However, the Sheep 5k report back to breeders was relatively complex. Dr DeNise said the key was that the smaller the percentage rank number reported back against a particular trait, the closer the animal is to the greatest genetic merit for that trait.

As for future genomics development, this was likely to focus on new traits, new genotyping platforms and better decision support tools, so breeders could maximise the use of their

genomic information.

Dr DeNise spoke about "Enlight™", a management tool for US Holstein dairy farmers. It allows farmers to optimise their investment in genomics by giving them access to all their genetic information in one programme, which is highly visual and includes analytical tools to help with decision making.

Breeders at the forum asked if a programme like Enlight™ could be developed for the New Zealand sheep industry over time. The answer was "yes", but it would require the significant upgrade currently being undertaken on the country's sheep breeding database, SIL.



Sheep breeders (from left) Peter Moore of Moutere Downs stud (Nelson), Gordon Levet of Kikitango stud (North Auckland) and Allan Richardson of Avalon stud (Heriot) catch up on day two of the forum.



Pictured (from left) are Andrew Tripp of Nithdale Stud, B+LNZ Genetics general manager Graham Alder and David Colhoun of Colhoun Genetics.