

Deer Industry New Zealand
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Science Report: Lindsay Fung

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Today's presentation is titled "Positive Science – Research and Development for the NZ Deer Industry", I will spend the next 15 minutes giving you an overview of the work currently underway and how it is benefiting industry or will provide benefits over years to come.

The talk will cover DEEResearch first, starting with our 'flagship' programme VSS, then introduce the other projects and round off with some case studies of positive science. For VARNZ there will be an update of the wound healing work, the animal welfare considerations for NaturO rings and a new pilot study on country of origin verification.

At the last FGM DEEResearch was awaiting the outcome of a government fund application round that included our Venison Supply Systems programme. The good news is that the application was *largely* successful and DEEResearch industry funds of \$408,000 per annum have secured over \$1.3 million *p.a.* FRST funds for six years. This programme also includes a sizeable amount of Landcorp funding and looks likely to secure additional SFF funds for projects related to the programme. Partnering with Landcorp also brings additional benefits to the table: as a significant farming enterprise and owner of deer, it has a range of expertise and in-kind resources to assist the researchers and focus farms and it will move rapidly to take up positive outcomes from the research, thus leading by example to other parts of the industry.

The programme itself consists of three main areas of research: Venison Market Supply Systems (overcoming seasonality issues) covers early breeding and optimising feed requirements. Enhanced On-Farm Productivity covers parasitology and focus farm support. Environmentally Responsible Systems covers maintaining water quality and benefits of extensive systems.

The programme as proposed to FRST was presented last year as follows, with the inclusion of a fourth objective that was essentially venison quality and optimising value of the carcass.

Unfortunately while the rest of the programme was funded, this was specifically excluded by FRST, so DEEResearch as a result has reallocated some of its funds for venison quality and processing R&D. I'd just like to slip in here that DEEResearch views this co-funded programme as industry-led, the Board and key stakeholders all provide input into the research direction and annually review the programme. That said there is still a balance to strike between the more

applied science (that quickly leads to technology and tools) that industry would like to have more of and basic science that generates leads that develop into applied science. For that reason DEEResearch chooses to fund specific components of the programme and leaves other parts to be picked up by FRST funds. Landcorp is also funding a specific part of the programme but it views the programme as entirely industry-good and is fully supportive of all technology transfer activities to spread uptake.

Looking at all the DEEResearch funded work over the next few years, you'll see that there is a high degree of committed funding in the following areas. The ratios shown refer to the amount of leverage we get for each of the areas. Processing R&D requires matching funds from other sources – principally a processing or exporting company to undertake some applied research or problem-solving project. And we expect results to be fed back to the stakeholders.

Of course it goes without saying that ultimately the benefits and outcomes from all of this should be realised back at the farm.

The one area of funding not shown is the small amount of funds DEEResearch has retained for discretionary or contingency use. In the current year this is being used to support the Massey Deer Research Unit and a SFF project to improve the parasite diagnostic tool faecal egg counts.

I thought I'd now touch on a few highlights from the DEEResearch projects both historical and current that demonstrate how research has benefited the deer industry and will continue to positively influence it in the future. While some research can struggle to be picked up or converted in practical outcomes, others such as these can quietly work their way into general farming practices.

- *PGgRC, methane emissions:* This includes both the direct contributions to the PGgRC and additional work funded to look at deer-specific methane emissions in relation to age of deer and type of feed. It is important to note that were it not for the consortium, agriculture would be under more pressure than at present for it to be accounting for the cost of greenhouse gas emissions. As a measure that has helped delay this imposition, it has more than paid for the investment. However as a science solution its true value will lie in the ability to find a suite of technologies that will result in more efficient conversion of plant matter to meat (or velvet) and less wastage in the form of methane or nitrous oxide. If this is realised the payback will be enormous both in terms of direct benefit to the industry as well as potential revenue from licensing to less efficient livestock producers overseas and international kudos at government level.
- *Johne's disease:* Another big spend reflecting the real impact and concern it has to the industry. This is quite a hard area to effectively quantify in terms of benefit but there are

some good estimates of the cost of Jd at both the herd level and the national level which ranges from \$16 to \$33 million *per annum*. The cost includes deaths from the disease and losses in productivity (subclinical infection), losses in carcass value due to suspect Tb, and testing costs. How much these costs can be reduced depends very much on how committed individual farms are to controlling or even eliminating Jd from the herd. As an example an 8% infection level in a herd is not uncommon – and the number of breeding hinds in an average size herd of about 450 would be what? 300 to 350? This would then mean that if about 70 herds (or 2%) out of the approximately 3,500 herds in the country were controlled to less than 1% infection level, the cost savings would pay for the research to date.

- *Breeding values:* This is an interesting one in that it was not initiated by DEEResearch, but rather came about due to researchers with “no strings attached” FRST funding partnering with some of the industry stud breeders. The result of this was the development of DeerSelect and in reality most of the subsequent genetic research (some funded by DEEResearch) has fed into this tool. The outcome of all of this is not some fancy tool (well it is), but the ability for farmers to choose what sort of trait to include in the herd.

This graph illustrates how measured liveweight at 12 months has improved over time as expressed by breeding value. It is an average for the herds measured and the genetic gain of the top venison-focused herds is almost certainly higher than the average, so by selecting the right herds the industry can make more genetic progress than the average would indicate.

As an example however, if the herd average liveweight at 12 months was 80 kg in 1992, and the environment/management practices had remained constant over the intervening time, then the average weight in 2006 would be about 86 kg or an increase of 7.5%.

Additional breeding values will be added to DeerSelect as the VSS productivity work progresses. Already there is strong evidence that genetics plays an important role in conception and calving dates, so if a suite of genes or specific genotypes can be identified, the industry and individual farms will have huge flexibility to match feed supply with conception, calving, weaning and slaughter.

- *Parasites:* This topic has been of some concern to all of the livestock industries for a while now. There are some interesting initiatives that have been developed for sheep and beef, but for deer we are really starting from almost scratch. We know very little about the types of parasites we are dealing with, the current diagnostic tools FEC and FLC are

very crude or not even useful and we only have one drench available and there are anecdotal accounts of parasite resistance to the drench. It's a bit of guessing game as to how much this costs the industry, but strategically it would be hard not to justify some work in this area, and for that reason it features prominently in the VSS for the 6 years of the programme. As the programme progresses we should be able to get a better idea of how much productivity and reproductive capacity is affected by parasite burden.

Moving onto VARNZ I have to report that there is both positive action in progress but also significant challenges. While last year we were successful in obtaining FRST funding for our on-farm programme, the AgResearch velvet programme was unable to secure FRST funds, which will mean that at 1 July the industry will have limited access the wealth of historical knowledge that resides in the minds of our velvet researchers at AgResearch. For the industry this knowledge is irreplaceable so we and AgResearch are actively looking for other funding opportunities to retain these services.

However returning to the positive: the wound healing project that has been ongoing since 2002 is now at a very interesting stage. Last year I outlined the progress to date and identified the next few key steps that were needed to reach a go/no-go decision, these were:

- Complete the *in vivo* animal trials that will either confirm or refute 'proof-of-concept'. These were the pig and rat trials carried out overseas.
- Consult with other external experts on the ability to scale-up the extraction process to commercial levels.
- And from this develop a business plan that identifies the appropriate commercial option.

I am pleased to report that these steps have been completed and the no-go option has not been taken up!

The animal trials were mostly completed by 30 September and final analyses were reported back to the VARNZ Board by the end of December 2007. The pig trial produced some good results in not only wound healing quality, but also showed encouraging results in rate of wound healing. The rat trial was less conclusive and although there was an indication that the velvet extract was as good if not better than the current gold standard, there was no statistical significance in the results.

However in our discussions with the research organisations that carried out the work, it became apparent that the pig data was probably the most appropriate and of most interest to pharmaceutical companies for commercialisation consideration and moving into human patients. VARNZ is satisfied that sufficient information has been compiled to approach companies and has prepared a three-page "teaser" flyer. Eleven pharmaceutical companies with

an interest in wound healing have been contacted and have been sent the flyer within the last week. If there is interest from the companies there will be follow-up comprehensive presentations. The work is progressing on track and is very encouraging, but that the path to market still contains significant risks, which is usual for this type of development, but underlying all of this is the VARNZ board's goal to maximise the benefit and opportunity for New Zealand deer farmers.

In other areas of VARNZ research. Last year two independent studies by Massey and Lincoln Universities provided strong evidence that NaturO rings produced a good level of analgesia comparable to that of lignocaine. The level was achieved well under the NVSB recommended wait time of 1 hour. This year the work is determining if the use of NaturO rings are of minimal or insignificant noxiousness to the stag. At this time we have one preliminary report from Lincoln that places the use of the rings well below the ballpark level of noxiousness for such events as ear tagging and neck clipping for Tb testing. We are awaiting the final report from Massey and we also have an additional independent bioethical evaluation in relation to other husbandry practices which has concluded that the impact of velveting using NaturO rings is comparable to tail docking and ear tagging, but less than that of weaning, castration, disbudding and dehorning.

This work will be presented to NAWAC on 30 June 2008 and we are very hopeful that this will result in full approval for the use of NaturO rings to be given without the need to have the practice provisionally reviewed every year. If this is the case, then that can truly be considered as positive science.

Other work due to start this year is the use of velvet as a supplement for companion animals. Last year we were in discussion with Canadian researchers who had already shown benefits of using velvet to relieve symptoms of osteoarthritis in dogs. In the end we could not enter into a collaborative study and also their sponsor was unable to secure Canadian funding. However VARNZ has approved a small study to examine if velvet as a supplement for dogs enhances their general immune system which will be carried out by Massey researchers who have good connections with the pet food industries in New Zealand. The rationale behind this work is that an enhanced immune system will provide improved quality of life for dogs and could reduce the need for expensive veterinarian treatment for a number of common ailments. This work will commence in July and results will be available by September 2008.

And finally, the use of isotopic signatures in deer velvet is being examined to determine if this will be an effective method of verifying the country of origin – that is that NZ-grown velvet is just that and not turning up as Korean velvet or velvet from any other country. Although this pilot trial is still at an early stage for proof-of-concept, cost effectiveness and reliability, stage

one has shown clear differences between three NZ sites and a Chinese velvet sample. Stage 2 will look at additional NZ sites, Russian and Korean samples and examine one NZ site in more detail.

So, as concluding remarks, I hope you now have a brief understanding of the positive role science has played in supporting the industry and will continue to play in creating or underpinning further developments and gains for the industry. Some of the science will in itself not lead to any direct application but may lay the basis for completely unrelated applications. Science despite adopting a rational and methodical approach to any given problem is essentially a hypothesis driven discovery process, so there are no guarantees that it will deliver every time. What I hope is clear to you is that there are two research Boards – DEEResearch and VARNZ whose directors have a clear vision of the needs of the industry, understand the value that science can add to the industry as well as the limitations of that science, and are working to guide the research programmes in line with those needs.

Thank you.