Objective measurement in the Australian Prime Lamb Industry

A report for

by Andrew Heinrich

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Forward

Measuring the genetic potential of individual animals in our sheep and beef industries has been with us for some time now. It has changed the way our seedstock producers are now breeding stock. With the seedstock breeders using mainly subjective methods and the show ring in the past when assessing potential new sires for breed type, length and structure, the addition of accurate objective assessment through Lambplan, Breedplan or Merinoselect, has brought us into a whole new era.

With the dairy, chicken and pork industries using measurement data to identify superior performing stock for a lot longer than our sheep and beef sectors, they have had huge production and marketing advantages for nearly 20 years. As we seem to be entering a whole new time zone with high grain prices, they are in a better position to handle this than if they had been using our mainly subjective selection methods over this period. However they are also experiencing some negative problems as a result of pushing measurement for particular traits too hard, thus we can and must learn from these mistakes to ensure we avoid this happening in our prime lamb industry.

Through further research and the development of Gene Markers, this should increase our genetic improvement at an even faster rate and enable us to question our current selection emphasis on traits such as fat! How lean should we go? Should we now be aiming to breed stock not as lean as we have been targeting, for even leaner animals may need grain or irrigation for finishing? We all know the direction grain costs are going and I must also question whether finishing stock under irrigation is the right thing to do in Australia's dry environment. It is now also possible to breed a flock of sheep which have a high genetic resistance against worms. With most of the high rainfall areas of Australia having worm resistance to most of our current drenches, we are now seeing graziers mixing costly cocktails to keep on top of worm burdens. It is certainly the right time to push ahead with this development and research. We now have choices as to where we want to aim the focus of our breeding programs in this fast changing industry.

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    - By supporting our son and me during the worst drought we have seen
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    - When I was in New Zealand with Kangaroo Island having its worst bushfires in the 25 years we have been on the Island
- Finally to all the wonderful people who helped me around the globe (refer appendix herewith ~ “A world of wonderful people”).

Abbreviations

BBB	Belgium Blue Beef
PETA	People for the Ethical Treatment of Animals
MLA	Meat & Livestock Australia
MLC	Meat & Livestock Commission
IMF	Intra Muscular Fat
PIC	Pig Improvement Company
SIL	Sheep Improvement Limited
HGPs	Hormone Growth Promotants
AWI	Australian Wool Innovation
EU	European Union
EBLEX	English Beef and Lamb Executive
ASBV	Australian Sheep Breeding Values
EBV	Estimated Breeding Values
WT	Weight
BWT	Birth Weight
PWT	Post Weaning Weight
EMD	Eye Muscle Depth
PWEMD	Post Weaning Eye Muscle Depth
PWFT	Post Weaning Fat
C+	Carcase Plus Index
WEC	Worm Egg Count

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Executive Summary

I must say that before my scholarship I had mixed feelings about the future of our sheep industry in Australia. I was confused in which direction we should be heading,

- Should we switch to a dual purpose flock
- Change to an easy care wool shedding flock requiring no shearing
- Continue breeding our self replacing merino and white Suffolk flocks using measurement through Lambplan and Merinoselect
- Maybe we should be doing what a lot of others have done in our high rainfall areas in Australia, this being selling out to Blue Gum plantations.

My questions were answered through my Nuffield Scholarship travels and I have come back with lots of passion and positive ideas to improve what we are already doing without chasing costly trends which we so often do in farming. I have no doubt now that we must continue to push the use of measurement whether it be for wool or meat, so we will remain viable against other livestock industries like dairy, chicken and pork who have been leaders for some time now in the use of measurement breeding programs.

But with measurement there can be downsides if we choose to go to extremes like the Belgium Blue Beef breed which I experienced in Belgium. With an end result being a high maintenance, costly breed with lean meat but lacking the eating experience (ie taste). Unlike the rare breeds which I saw in the UK where they were receiving high premium prices for their animals because these breeds were not genetically changed giving a very enjoyable eating experience. However we must realise that the downside of these rare breeds is their lack of production and if we were all using these the world would simply be starved of meat. In New Zealand the prime lamb industry was struggling to be viable mainly due to three main issues: 1- Their market is EU based therefore requiring a small carcase lamb; 2 - No emphasis on wool in their ewe flock giving little return (if any) at shearing; and 3 - No emphasis on skin quality meaning poor skin prices. This told me that even in our lamb industry we must still focus on wool and skin as it is a valuable part of our prime lamb enterprise.

So with measurement breeding programs like Lambplan and Merinoselect available we now have an exciting future ahead of us as we can raise the bar in our sheep industry as our opposition industries have done before us.

Introduction

There were three main areas that I wanted to look into through my Nuffield Scholarship:

1. Using measurement as a tool

To see what other livestock breeds and species were doing with measurement and what they thought the future direction should be. Through the use of Lambplan, we have seen how quickly improvement could be made in our own breeding program. With other species (eg diary, chicken, pork) having taken up measurement much sooner than the lamb & beef industries, they are more advanced and therefore are a model for us to learn from; not just the good outcomes, but also the negative outcomes from their programs; and importantly where they thought they may have erred.

2. Any difficulties & problems encountered as the result of using measurement

What difficulties and problems other meat breeds and species have found when using measurement. For example, could this lead to the development of high maintenance sheep, &/or negative outcomes on structure and fertility etc.

3. Eating quality of the product

Changing our eating qualities is a big concern to me as I believed, and still believe that other meat species, particularly pork and chicken, have negatively changed their eating qualities. This has happened despite all their good intentions, which concerns me more, as it seems to have occurred mainly through an over reliance on some measurements.

4. Other

There were also other aspects that I was keen to explore:

- The availability or development of any new breeds to this country; eg sheep with natural fibre shedding capabilities and dual purpose breeds
- The 'perfect' sheep
- Then there is the overriding question, "has the sheep industry any future at all?"

With farmers leaving the sheep industry in droves – would I be just be better off if I joined the exodus and sell out to investors in blue gums?

Background

I grew up on my family farm north of the small town of Bute in South Australia. This is located 145km north of Adelaide at the top of the Yorke Peninsula, in a predominately cropping area.

I had a limited education, leaving boarding school at the end of year 10, but with a strong desire to go farming. After spending three years working at home on the farm alongside my dad and brother in the cropping industry, with a few sheep and pigs on the side, we made the decision to expand and purchased a grazing property on Kangaroo Island; grazing being where my passion lay. It must be noted that in the year that I left school, my father purchased a Poll Dorset ram to put over his Suffolk ewes, aiming to breed White Suffolks. It was through this venture that some years later we were recognised as having formed the first and oldest White Suffolk stud by being given flock number 1 in the newly formed breed association.

In 1999 my dad passed the stud over to me, so the Ella Matta stud was moved to Kangaroo Island. It was then that I became convinced that the future of the stud's advancement was best achieved through the use of Lambplan as the major breeding selection tool.

The White Suffolk Association later received a grant to compare sires with extreme performance traits (these being for birth weight, growth, fat and muscle). This trial was carried out on our property through the use of Artificial Insemination of 300 ewes to 15 sires. It showed interesting results with all progeny being measured from birth right through to the boning room, including worm egg count (WEC). As a result of this, and with the prime lamb industry being so good to us, I decided to apply for a Nuffield Scholarship! I could have gone with wool selection, which is another of my passions, but as our White Suffolk stud was progressing so well, it was my decision to try to put something back into the industry.

Thus my Nuffield study was to see how far we could improve the dollar return in the lamb industry through measurement, plus also assessing that if we did this, how would it change the product.

My Analysis

In analysing the three main areas that I looked into during my Nuffield Scholarship, I put forward the following observations and information:

1. Using measurement as a tool

What is measurement in the sheep industry?

The wider use of measurement of sheep has been around for about 10 years now, with its use in the dairy, pork and chicken industries being adopted for much longer than that. In 'terminal' sheep breeds in Australia, we use Lambplan, with the key traits measured being growth, fat and muscle. There is also the 'maternal' breed selection, with their main measurement focus being the same as the 'terminal' but also including maternal traits of the ewe, the number of lambs weaned, plus wool selection. We also have Merinoselect which uses all of the above, with added wool measurement for fibre diameter and clean fleece weight in particular.

Views on different measured traits

Specifically relating to the Prime Lamb Industry, growth, muscle & fatness are the three main selection traits. Growth is probably the most important trait of all for obvious economic reasons. It is the main profit driver but it has its downfalls as there is a strong correlation between high growth and high birth weight (BWT) and there is very little growth from a lamb born dead! Eye Muscle Depth (EMD) is the best measurement for overall muscling and has a strong positive correlation with carcase yield. I had a meeting with Catapult Genetics and Lincoln University researchers to find out what they believed the future held in relation to gene markers. There are two gene markers that Catapult has identified that if present will result in an increase in carcass yield; these being the Loinmax and Moyomax which I will refer to in more depth on the next page.

Indices

Indices are used in all measurement systems that I saw around the world. Henry Gardner, from the Gardner Angus Ranch in Kansas, USA showed me his sale bulls. I asked him what he thought was his best bull. He indicated that it was Lot 1, as to his eye it was the best, plus it was also the bull with the highest index in the sale. It was good to see that he was ranked number 1 on index and Henry's best as well. How could I debate this as this bull also went on to top his sale at $140,000 USD.

In our prime lamb industry our most used and promoted index is Carcass Plus (C+). This is calculated from our three main selection traits being 60% PWT, 20% PWFT & 20% PWEMT. I do have great concerns that a lot of seedstock producers may be basing a vast majority of their selection decisions on the C+ index. This is already resulting in the production and sale of some high scoring rams on this index that are extremely lean and will most probably produce lambs that will need to be grain fed to 'finish'. With grain prices now high, and looking likely to remain that way for some years to come, we must be very careful how lean we go with our selections.

There are other indices such as the Trade $ index or the Export $ index. I don't mind the Trade $ index even though birth weight is not included in it. I do find it hard to see much difference in a ram of 110.20 index and one of 112.30 index. I believe that if we were to drop the first digit and put a dollar sign ($) in front of it, making it $10.20 compared with $12.30, you would then express it in a form that commercial producers would quickly relate to. The present form may be fine if they look at the ram's individual traits as well, but I feel that this does not always happen. While the objective of indices is to give breeders and prospective purchasers a quick summary overview of an animal's genetic potential, it does not necessarily differentiate animals for differing environmental and management factors. I believe the biggest fault of the C+ index is that it favours leaner sires. This is okay if you are targeting the heavy export lamb market, or using them over first or second cross ewes which usually carry more fat, but not for Merino ewes that are generally leaner. If the producer is targeting an earlier marketable lamb for the trade markets buying lean rams today is crazy!

Yes, we do need indices to sort progeny into some sort of order, but of more importance is the need to educate producers and some seedstock breeders on how to analyse the sheep's

individual traits. I have a belief that the problem with indices is that they can hide an animal's weaknesses.

Gene markers

This is the next big development in generating further improvement in our breeding programs. Although I believe we are not quite there yet, we will be in the near future. All of the gene markers at both Catapult Genetics and Lincoln University sound great, with gene markers found for parenting, eye muscle, increased carcase yield, worm resistance, footrot resistance and wool tensile strength. By the time you are reading this report, there are likely to be many more. It is common knowledge that in the near future we will be able to do one test which will find many gene markers and this should be very beneficial for breeders. In our own breeding program I fail to see any real advantage to be gained in using the current gene marker tests at this stage.

I found it was interesting that the Suffolk Breed Association in the UK have now opened their flock book, allowing their breeders to introduce outside breeds (non Suffolk) so that they can introduce certain new genes identified through gene marker technology. I believe Lambplan shows us that breeds or individual animals that carry some beneficial genes identified by markers (eg textile strength via Moyomax and worm resistance via Loinmax), lack growth advantages that other breeds, or individual sheep have demonstrated they have.

What is of some concern to me is that our clients may come to believe that we should test our sale rams for these gene markers per se. This is fine as long as we have the potential of achieving greater returns to offset the extra costs involved, but somehow I don't believe buyers will willingly pay more for this information, especially in the present economic climate.

The potential of gene markers is exciting, especially when a seedstock producer may use them in selecting future stud sires, but a lot of the relevant information you need at the moment we are able to attain through Lambplan.

Measurement systems in the UK & NZ

While in the UK I spent some time with Samual Boon, a 2005 Nuffield Scholar studying the breeding of composite sheep. Since finishing his scholarship he has had many employment promotions and is now in charge of SIGNET, which is the equivalent to Australia's Lambplan system and is run by the Meat & Livestock Commission (MLC). This breeding program is similar to Lambplan but does not contain 'across breed' linkages and this has frustrated Samual somewhat. We are very fortunate in Australia to have a composite breeding program and the White Suffolk breed, both allowing the use of other sheep breeds. This is a huge advantage as we can compare all of the breeds in one system. There also seems to be some frustration with the breed societies having strict and inflexible breed rules, which at times seem to be holding progress back. This has also, but thankfully not as much now, held back progress in Australia. Again led by the White Suffolk breed there is a focus on the aim of breeding the most "profitable sheep". Samual told me both countries could speed genetic progress even faster if it was much easier (than the system in place now) to move elite genetics from country to country.

New Zealand has Sheep Improvement Limited (SIL), again similar to our breeding programs but this also lacks linkages. New Zealand does have a central progeny test site which compared different breeds on the one site; a good system which we have used in Australia as well.

Marbling

Marbling in the prime lamb industry has of late been talked about. In the beef industry it is in big demand in certain countries. In Canada at our Contemporary Nuffield conference in Calgary all the new 2006-2007 scholars from around the world met together and I saw marbling in beef at the top end, at the Cargill killing and processing plant for the first time. I was amazed to see such even carcasses killed and all pushed hard with HGPs, grain finished and slaughtered before 15 months due to mad cow disease. The carcass had extreme back fat with centimetres cut off the backs with electric knives. They wanted the fat to get the

marbling. Later we went to a butcher where we viewed beef cuts for sale. The UK scholars commented that they would find it hard to purchase most of these cuts at home as they seemed way too fat.

Not long after leaving Calgary I had a day of meetings in Nashville USA at the Pig Improvement Company (PIC) set up by geneticist Scott Newman. At one of the meetings with Andrzej A Sosnicki he told me how the Australian pork industry had no focus on breeding pork genetics for different countries. This means that certain countries wanted different carcasses. This came together when I stopped over at Luxembourg, Europe on my way home. I saw the comparisons myself and it was obvious that different cultures demanded different carcasses. Europeans like their meat really lean whereas Northern American and Japanese prefer their meat fatter for marbling.

As for marbling in lamb, to me there are two main issues:

1. Will the consumer (eg housewife/mother who does most of the shopping) buy this?? I guess not as they are not ready for this. It would be fine for the restaurant industry as they will serve a popular eating experience with the customer not knowing any difference and purely buying on taste. But this is only a small percentage of sales of our lamb.

I strongly think we should try to produce a certain carcass for one country and a different carcass for another.

2. As for measurement for marbling in 'terminal' sires at this stage there is no accurate measurement and we don't even know which breeds are better. What I have seen in beef is that a good start would be to have sires that are not too lean.

A long conversation on the phone with a good friend of mine, who is one of the leaders in measurement of lamb, Richard Apps told me a good quote which I shall always remember "marbling and intramuscular fat are the same but are different!" What they both do is give a better eating experience. It seems that all well fed lambs (this being a lamb which has been raised on a good even plane) will have a good IMF%. I am told that IMF is not visual and has to be measured. The IMF in the lamb cut will give it better flavour and juiciness when eating lamb cuts.

I was also told that marbling in lamb is very rare and is more common in the later aged lamb which is most probably at an age when it is not a lamb, more likely a hogget! It is visual where IMF is not.

Breeding extreme genetics

By this I mean breeding an animal that is bred for the maximum result for an individual trait; for example growth, muscling or leanness. I saw this in Belgium with the Belgium Blue Beef (BBB) cattle. They had very impressive lean, extremely high yielding carcases and huge muscling; demonstrating that it is possible to achieve this when you place selection emphasis on these main traits only.

However with this comes a downside, as happens in all genetic breeding programs (whether in livestock or even plant breeding), you have to keep a balance. The downside in these cattle is also extreme, as the breeders seem to have forgotten about structure and the maternal side of the breed with important things such as calving ease.

I had a tour of an abattoir in Belgium that specialised in BBB and I was very impressed with the carcases visually. However, after the tour, the works manager told me of a nearby restaurant which specialised in BBB, so a long time friend of mine; Rob Axemann (a meat processor in Luxembourg) took me there. He told me he was not a fan of this meat as it did not have a pleasant smell and had poor flavouring. I now agree with him and was most thankful that he recommended it be served with a pepper sauce and a glass of red wine! I felt that it was dry and can only presume that the beef was just too lean. How different this eating experience was from the high marbling beef I ate while in North America.

2. Difficulties resulting through using measurement

After our meal Rob took me to meet a farmer who produces BBB. There were some impressive looking beasts in his barn. It did not take me long to start observing some huge issues in his herd. I was told how all cows had to be mated by Artificial Insemination as it was not physically possible for the bull to do this. I saw cows with scars and stitches on their left side; this was because all calves had to be delivered by Caesarean section by a vet. The cows were sold after their fifth calf as it was not really possible for cows to have any more calves than that, by that method. The calves then had to be bucket reared as the cows did not have enough milk for rearing their calves. There was a pen of calves on their own that the owner informed me all had structural problems and were being fed a much better diet so that he could sell them as soon as possible as light vealers.

This situation left me with the strong realisation of the importance of still keeping a safe balance in our breeding programs; not to only chase the dollar driven traits, but also keeping focus on structural, survival, reproductive, maternal and management traits as well. In the BBB, it was obvious the three main traits were growth, muscling and leanness and that calving ease, mothering ability and structure had been left behind. In my opinion the breed has gone far too lean, but going back to Nashville, where I had previously visited the PIC, they had a focus that certain countries and continents prefer different types of meat. In Europe there was definitely a preference for lean meat, so while I am critical, this seems to be what the Europeans want.

3. Eating quality of the product

Fat

It is clear that if you want to have flavour in your meat it must not be too lean. We should not produce lamb or beef that is high in fat either for obvious reasons but we must find the balance.

If the eating is not enjoyable for the consumer then they will move on to something else. We need to be careful as processors may try and force us to produce extremely lean meat as it will

have big cost savings to them, but taste would be sacrificed and the industry would suffer as a consequence.

I have received some criticism on this subject as I have questioned why we are still striving to breed sires that are even leaner than those we currently have. I will use the lambs we sold this year as a good example.

We lamb down late in the season, in August, just before the start of the spring. I will also add that we have a stocking rate of 15 DSE/Hectare, which is about 6 DSE above the average in our area. Maybe if we were running at a lighter stocking rate, we may have had a different result, but I doubt it. We weaned our lambs in early November 2007, in what was a below average spring and sent them to my brother's property north of Adelaide, to be finished on stubbles. The lambs were then sold in late February, giving us a relatively low cost lamb.

From the 638 lambs involved, the kill sheet told us we had:

- Only 2 lambs at fat score 5
- Only 17 lambs at fat score 4
- 207 lambs at fat score 3
- 279 lambs at fat score 2
- 25 lambs at fat score 1
- 28 lambs were not ready and therefore un-saleable.

The average ASBV for PWFT on the sire side was -0.6.
Thirty percent of the lambs' dams were Merino ewes, with the remainder being first cross ewes (Border Leicester x Merino). I believe the results support my point that fat is not a problem when using high growth genetics. However, it should be noted that when your lambs hit saleable target weights and specifications, it is important to sell them, for just like humans (including myself) when you stop growing, you run to fat!

Another issue is fatness on the dam side. In the beef industry, the Angus breed now gives an EBV as the more positive the better. Positive fat on the dam side gives huge advantages over leaner dams.

Mark Ferguson from Western Australia did his PhD on this subject; comparing two groups of ewes. Group 1 were Merino ewes that were positive for fat and were mated to positive fat Merino rams. Group 2 were Merino ewes that were negative for fat and were mated to negative fat Merino rams.

Both groups were selected using ASBVs for fat.
His conclusions were that from the group of positive fat ewes:

- Their lambs had better survival rates
- An increased birth weight
- An increase in milk production
- And most importantly of all, they had higher weaning weights.

These two groups were split into two other sub groups as well, to see what results he would get on low and high nutrition diets and not surprisingly, the positive fat ewes performed better than the leaner ewes in both dietary systems.

Another option to consider is the fat tail sheep from Africa; not that I went there, but stumbled onto some only 10kms away from our home. I took Charley Walker (UK Nuffield Scholar who I travelled with a few times during my scholarship year) who was studying 'shedding' sheep, to the property of William Marshall, owner of the Rare Breeds Farm on the north-coast of Kangaroo Island. It was here that I learnt how trials in Africa had shown that the fat stored in the tail of this sheep is equivalent to being fed 50kgs of grain. William called it the sheep's silo, and Mark calls it the sheep's hay stack. These sheep store fat during the good part of the season and draw on it when feed supplies are much lighter. One fat score above the score needed for ideal management or marketing (which is 2.5 to 3, when hand feeding would then be required) is equivalent to saving on 20 days of hand feeding. I often wonder why Merino seedstock producers have not been aiming for positive fat in their genetics. It must also be noted that there is a strong correlation with Merinos that are positive for fat to also have high tensile strength. When there is dietary stress, these sheep are able to draw on the fat they have stored during times of good nutrition, which prevents a weakening, or break in the wool, as occurs in sheep that are leaner.

The beef maternal breeds also know all about this. I visited Robert Parker, a UK Nuffield Scholar from Scotland, who studied suckler cow profitability using British Breeds. The UK seems to have had a big swing away from the British Breeds, to the much leaner European breeds, much like we did in Australia in the 1980s and early 1990s. He also found that the British Breeds had better fertility and were a much cheaper unit to run. This had a lot to do with the fact that British Breed cows are not as lean as their European counterparts.

Aging of a carcase for better eating and carcase stimulation

In the UK many processors hang their beef for 4 weeks and their lamb for 7 days; thereby resulting in excellent tenderness and taste. This comes at a high cost as chilling for that length of time is expensive and it also results in shorter shelf life in the shops, or for the consumer. Other processors claimed that they got the same result by putting their cuts in 'the bag'. This is when the cut is either sealed in a vacuum packed bag giving the cuts longer shelf life, either in the freezer or in the chiller.
'Cryvac' processing is a better version of this process and allows even longer shelf life of the meat.

There are also some processors using electrical stimulation to help improve the tenderness of the carcase. By doing this there is no need to age the carcase by hanging, as electrical stimulation has the same result; this being the stretching, loosening and separating of the meat fibres.

Rare Breeds

I did not specifically go looking for these, but stumbled across some a couple of times during my travels. A good friend, Tom Williams (whom I met at the Rural Leadership Course early on during my Nuffield Scholarship at the Duchy College in Cornwall) told me that they specialised in rare breeds of beef and sheep. Later in the year, I was able to visit his farm and he showed me his British Longhorn cattle. These animals were very impressive, especially with their long horns. I then had a look at their other cattle breeds and then their Aberdeen sheep that have four horns. Tom told me how they were getting paid a premium for marketing

their cattle as Rare Breed Beef and that all of their rare breeds gave a much better eating experience. They believe this was because these rare breeds had not been genetically changed at all, in comparison with the significant changes made to the modern breeds. Unfortunately I did not get to try any of their rare breeds' meat during my brief stay with the Williams family, as to our delight we were treated to a beautiful meal of pheasant instead!

Going back to the fat tailed sheep on the Rare Breeds Farm on Kangaroo Island, the owner, William Marshall makes the same claims and has promised me a tasting sometime soon, which will be of great interest, to see if the eating experience is as good as suggested.

Best Management for lamb producers for good eating practices

This really is pretty straightforward and can be put down in four simple points.

1. Try to keep lambs on an even plane of nutrition and if possible peak slaughter at approximately 3 weeks after their peak growth period.

2. Always sell when ready as delaying can cause negative changes (eg increased or decreased fat depending on seasonal conditions) and decrease eating qualities.

3. Try to avoid stress when both preparing for and during transport of lambs.

4. Avoid mixing animals that have not been together before, as this can also cause stress.

4. Other

Easy care sheep in the UK

In my time in the UK, it did not take long to find that the latest trend in sheep breeding was 'easy care sheep'. Where I got somewhat confused in this, was that 'easy care sheep' meant entirely different things to different sheep breeders.

On a visit to a farm in Northern Ireland, run by the very progressive Isaac Grilly, his breeding ewes were composites derived from an intensive crossbreeding programme involving many breeds including Texels, Charolais, Lleyn and Belclare. Rams were selected on performance EBVs with the emphasis placed on maternal traits including fertility, carcase quality and worm resistance.
His key objectives were:

- To breed durable ewes from within the flock, with the capacity to increase the number of lambs weaned and kgs produced per hectare
- To maintain lamb quality
- To have a less labour intensive and efficient 'Easier Care' working system.

I found this interesting as one of his aims in his 'easier care' breeding programme was lambing ease. In the UK there is a huge problem with lambing difficulties. The reason for this is because all lambing occurs in a barn, with the owners, and sometimes vets supervising lambing. This is fine for the short term well being of the animals, but where it has all gone wrong is that ewes having difficulty lambing are not only assisted, but also retained, along with their progeny in many cases. I have no problem with the initial assistance, as long as the lamb is not kept for breeding and the ewe is sold before next year's mating. Commercially this has not happened, and worst still is that generally, seedstock breeders have not been culling these types either. So over the past 100 years or so, there has been a breeding program which has actually fostered the development of lambing problems.

In comparison, here in Australia we have adopted the opposite approach. Lambing usually occurs unassisted in the paddock with a natural selection for lambing ease; as when lambing problems sometimes occur, the lamb usually dies and occasionally the dam as well. General

monitoring occurs for the purpose of humane animal treatment, or fox control (not a problem we have on Kangaroo Island fortunately), but identified problem lambers, or dry sheep at marking are usually culled.

Isaac's breeding program for 'easy care sheep' was based mainly on experiences he had witnessed from New Zealand Suffolk breeders, as their sheep lamb in much the same way as in Australia; just the use of good old common sense.

This reinforces my concern that while we are pushing high growth in our sires, we must also keep an eye on our birth weights. As I alluded to earlier in this report, high growth usually means high BWT.

I also experienced another 'easy care' breeding program in the UK, this being 'shedding' sheep (sheep that lose their natural covering and do not require shearing as a result). With difficulty in hiring shearers, there also seems to be a trend towards this in some areas of Australia.

I stayed with Charley & Andrea Walker at Duns, near Edinburgh in Scotland. Charley was a Nuffield Scholar in 2007 and his topic focus was on 'easy care' (shedding) sheep. They run a prime lamb operation, mainly based on a Romney flock with outdoor lambing. They were frustrated by extremely poor wool and skin prices, so they are aiming to produce a non-wool flock. They were achieving this by crossing their Romney sheep with the naturally shedding Wiltshire breed.

I found it hard to believe that there was such little value for wool and skins in the UK that warranted this approach, or that this was also the case in New Zealand. I have no problem with what they are trying to achieve, but it did make me question whether they would be better off heading in the other direction; that is to improve wool quality and also skin value as a result.

When visiting breeders in NZ, whether they were seedstock or commercial breeders, I heard the same statement time after time; that is "why bother with breeding for wool or skins when there is such little value for them?" This is fine in theory, until wool and skin prices go up, or you get poor prices for your lambs; a scenario that NZ breeders are going through right now. I

may be going against the trend, but in our prime lamb operation, wool and skins make up 30% to 40% of our profit, depending on prices. This is an important component that is worth paying attention to, even if there are some periods when the value is questionable.

So one of the big take home messages from my travels is - that we must continually aim for better wool returns and quality lamb skins for long term economic benefit.

The breeding of sheep for the show ring

I don't have a problem with stud breeders showing their prize sheep in general. It is a great way to put your stock before the public, compare how they measure up in a visual sense, to socialise and to get together and talk about issues in sheep breeding. However, in my opinion there has been too much emphasis on show results in claiming recognition for producing the 'best' animals. Do the chicken or pork industries use genetics directly from the show ring for their commercial breeding programs? I don't think so! They utilise high performing and rigorously measured and tested genetics.

I appreciate that both of these industries are struggling at the moment, but this is mainly due to high grain prices and they would be in far worse positions if they were relying on breeding stock selected for cosmetic appeal. Their decision to bypass the show winning genetics years ago is the only reason these intensive industries are still viable. They don't care if it does not have a pretty head, soft muzzle, or long ears etc, but they do care as to whether it is going to produce them a product that will make them more profitable.

I question the emphasis placed on results from showing animals from terminal sheep breeds when they are between 12 months and 18 months of age, even though our aim is to sell their progeny at six months of age. This will lead the industry into breeding late maturing sheep, which is exactly opposite to what our present market signals indicate we should be doing.

Showing is also a big issue for me with Merino sheep. The owner, if he is serious about showing his sheep to win prizes, will keep his show team in a shed and out of the weather, so they will look their best. This ultimately hides any problems these sheep would have through weather affecting their wool. By doing this, the animals have nice bright white wool and look

cosmetically appealing. Would they be like this if they were paddock reared, (which is how they are run) and have to perform in the commercial world?

I have never yet had one prime lamb buyer tell me he paid us a dollar more because our lambs had nice heads; or a wool buyer pay us more for our clip because our sheep have long ears, or a nice soft muzzle!

Breeding a flock of worm resistant sheep that does not need drenching
"The Perfect Sheep"

Soon after receiving my Nuffield Scholarship, I had to go to Western Australia, so I took advantage of the opportunity to look at a few things happening in the sheep industry over there. I went to see Johan Karlsson, who is in charge of the Rylington flock. Their sole aim is to breed a flock of sheep that do not need to be drenched. Their flock is run just out of Katanning, an area with approx. 550mm of annual rainfall (winter dominant). Over a period of time Johan has succeeded in breeding a Merino flock that does not need to be drenched at all.

Drench resistance is becoming one of the biggest management issues in the sheep industry, especially in the higher rainfall areas of Victoria and Western Australia in particular where it is well known that about 95% of the flocks have resistance to white and clear drenches. Our best available drench is an Ivamectin based drench, which was released about 20 years ago. This drench group is now showing up to 70% resistance in the higher rainfall districts, so we are now seeing some graziers actually mixing a combination of drenches, a cocktail, to kill worms. We must start testing more widely to identify sheep that will resist worm infestations. It may surprise some, but some of these sheep have been identified already and can be found through Merinoselect and Lambplan programs.

Conclusion

I am totally convinced that the sheep industry must continue to follow the breeding direction of other livestock industries and incorporate the widespread use of measurement for genetic gain in the selection process. The leaders in this direction have been the pork, chicken and dairy industries. We can learn so much from the pathways they have laid out for us, but despite our later start, we have the advantage of learning from the mistakes that they have made.

The breeding selection systems we use are highly regarded by top geneticists around the world. However our seedstock producers must aim to keep a balance in their flock figures. I feel that there are too many seedstock producers who are chasing extreme single trait selection and neglecting the importance of other vital survival and management traits. This may also be happening as a result of some producers chasing high performing stock by using indices only, and not a balance of EBVs.

I have concerns that in the future the processors may lead us into presenting extremely lean lamb. This would be good for the processor as it will give them a huge saving on trimming costs in the boning room, but we could end up with a very plain, dry meat which would not give the consumer a pleasant eating experience.

I believe we also must focus on breeding sheep for three specific purposes in Australia:

- Wool
- Meat
- A maternal breed.

There seems to be a trend for shedding sheep these days for short term easy care reasons. I question why some breeders would want to forgo wool income (over and above costs associated with wool harvesting) by breeding the wool off their flock so they can solely focus on meat. I appreciate some areas of Australia are having trouble finding shearers, but this problem has more than likely happened as a result of the way owners of the sheep have treated their shearers in the past, or they are breeding tough, tight woolled sheep. If these producers

think there is so little value in wool, maybe they should aim to improve it! We have had another non-wool, red meat option in Australia for years, this being beef cattle production; so maybe they could focus on this instead?

Another trend in sheep breeding in Australia is the breeding of dual purpose sheep. I also question the reasoning behind this! While it is admirable to attempt to spread market risk by producing a sheep that will allow some market penetration wherever the future market place leads us, these types have been tried throughout our history and continue to come up short. This is because they are generally high maintenance sheep and by focussing selection on such a wide range of dual purpose (terminal and maternal) traits, progress is very slow in any one area and economic opportunities are missed. These sheep tend to have a much higher feed intake to maintain progress in all of the selection areas, which then leads to less sheep being run to the hectare. It is just so much easier to focus on the main enterprises of 'wool', or 'meat', or 'a maternal sheep' and as a result your progress will be much faster, giving better overall returns.

We have seen this to some extent in our beef industry from the mid 1980s onwards, where there was a big swing into European breeds to increase growth and carcase yields in producers' herds. This worked well if you sold all of the progeny from the European breed bulls (ie using them as terminal sires only), but a lot of the breeders kept the heifers to use as future breeders. Many soon found out that their herd was then a higher maintenance herd. As a result we are now seeing a big swing back to breeding herds made up of the more traditional British breeds such as Hereford, Angus, Murray Grey and Shorthorn to name a few.

Our future in the Australian sheep industry, I believe is extremely bright. Wherever I travelled during my scholarship, I saw evidence of people leaving sheep production and switching to cropping, beef, or dairy. This was particularly evident in New Zealand, our main competitor for lamb export markets. I also observed the booming countries in Asia, with China in particular increasing its imports of lamb from Australia. With less competition and more demand, the future for sheep is bright in Australia; as long as we strive to be more productive by using better grazing systems; a safe balance in our breeding programs; and of course, through the identification and use of better genetics.

As for the current mulesing issue in our Merino sheep population, I feel very disturbed that there are so many mixed views on this. PETA (People for the Ethical Treatment of Animals) must love the fragmentation of views and that we are arguing on what we should be doing. I believe that the AWI (Australian Wool Innovation) has handled this issue very poorly right from the start, which to me is very disappointing. As we know, the decision was made for mulesing to end by 2010, so we now must support this decision totally. A possible scenario is that by 2010, those who resist the decision should have their wool sold as 'Australian mulesed wool' and everyone else should be marketed and sold as 'Australian mulesed free wool'; the market place will then take care of the issue.

On a less emotive note, I would again like to thank Nuffield Australia for selecting me to be a scholar and MLA for being my sponsor. It has been such a wonderful experience and I am looking forward to what the future has in store for me as a result of being a Nuffield Scholar. I also encourage other passionate farmers out there to take up the challenge and apply to become a Nuffield Scholar – it is well worth it!!

Recommendations

- After visiting the Gardiner Angus Ranch and the Pig Improvement Company I am now a firm believer that flocks that source large genetic pools will make much faster genetic gain than from smaller genetic pools.

- To achieve the above we need to have seedstock breeders with larger flocks; or for those with smaller flocks, I strongly recommend they pool their genetic resources to achieve a similar result.

- There needs to be a revision of the selection indices for terminal sheep breeds; if possible to include birth weight, plus placing less emphasis on leanness.

- Merino breeders must take on board measurement for carcase traits and fat particularly, in order to produce animals that are more productive maternally.

- There also need to change the percentile reports in Merinos as these also favour lean sheep, where I believe it instead needs to favour sheep with positive fat, just as the Angus beef cattle breed does.

- We need to change our trade and export indices to a much simpler and easier to understand form.

- We must still strive to improve wool & skin quality in our wool type sheep and to improve skin quality in our terminal breeds as well.

- We need to continuously educate commercial and seedstock livestock producers on how to interpret individual animal EBVs for relevant traits to best suit their environment and production system, and not rely just on indices.

- We need to focus our use of measurements to relevant economic and management traits. We do not need to progress down the track of measuring everything, just because we can, as it all comes at a cost for the seedstock producer. If their clientele were to demand extra measurement and showed a willingness to pay premiums for this information, it could be pursed, but this is not likely to be the case.

General Observations

- We, the agriculture sector, must try and bridge the communication and awareness gap that is happening between country and city people. We need to earn respect from our urbanised population and demonstrate the importance of our role in providing not only food for them, but also vital export income that enables governments to provide services we all take for granted.

- We as Australians need to work vigorously towards preventing a further loss of Australia's most productive land being taken over by urbanisation, carbon credits or 'taxation offset investment' industries such as blue gums. We need to protect our farming and food producing land to survive and feed the world.

Appendix

"A world of wonderful people"

These are the main people who helped me with my Nuffield travels, a lot who offered not only me but also Tracie and our son Jamie a bed as well. I was looked after so well (sometimes too well)! I will only be able to mention the main people as there are so many who helped in their small way but made the travelling so memorable and informative.

Cornwall ~ Rural Leadership Course, Duchy College November 2006
(www.cornwall.ac.uk/duchy)

- Richard Soffe who supervised the course and treated me so well
- Rob Williams and Steve Fisher the course teachers - great mates and both characters
- Jeffrey Beer who represented The Worshipful Company of Farmers – he was a nice warm guy who went out of his way to make me feel appreciated just for being there
- Fifteen fantastic people who participated along with me in the course – Paula Hichens, Angela McGregor, Catherine Davies, Fiona Kerr, Cathy Heath, Margaret Hiles, Tim Russ, Johnny Alvis, Tom Williams, Andrew Osmond, Andrew Freemantle, Alick Jones, Michael Hambly, Andrew Brown, Richard Griffiths and Johnny Alford. What a wonderful group of people who I have now made friends with and will look forward to staying in touch with for the rest of my life. Thanks to all who gave us a bed and shared with us their lifestyle when I was travelling for my independent scholarship studies section. Let's hope we can all meet up again one day.

Western Australia Independent Scholarship Study

- Johan Karlsson from Kattanning WA who gave me a day in December 2006 explaining how he was developing a worm resistance in his Rylington flock.

- Marilyn Sharp and Wally Doerksen – organised an excellent five days, well done!
- Dave and Cindy Judd of the Judd Ranch Kansas running Gelbvieh and Red Angus Cattle, where unfortunately I missed their Sale due to delays in flights meaning that I was unable to meet my connecting flight, and then to find out my bag did not travel with me – so eventually arrived at the ranch with no luggage. Not only did they clothe me and help me get back on track but showed me their farming practice and shared their life with me for a couple of days.
  (www.juddranchinc.com/)
- Henry Gardiner of the Gardiner Angus Stud, Kansas. Henry at the age of 75 showed me how he had developed the stud (what a forward thinking guy he is).
  (www.gardinerangus.com/home.html)
- Scott Newman, Nashville, organised meetings at the Pig Improvement Company and let me stay with him at his house – Scott was fantastic helping me get sorted buying all new luggage after losing my bag, which meant I could just get on with my travels.
  (www.pic.com/orgMain.asp?orgid=35)
- Bill and Lynne Duffield of Codan Stud in Ontario, Canada. It was my first time I had ever seen sheep housed in a barn and will always remember their great hospitality and especially Lynne's bread rolls.
  (www.codan-suffolks.com/)
- Pablo R Borrelli of Ovis21 Buenos Airies, Argentina. Pablo is an agronomist who thankfully organised my travels in Argentina and Uruguay. This was a really memorable part of my journey and Pablo set me up with some fantastic people and places.
- Miguelo and Susanna from Salto, Uruguay took me into their home when I was feeling very lost and alone – as I had had another bag stolen in the early hours of that morning, in a non English speaking country this is quite stressful. I will always remember all the big hugs and kisses I received on my arrival – thankyou so much.
- Mr Carlos Frick – an agronomist in Uruguay who showed me around this wonderful country for three days. What a character he is and how our friendship grew over those 3 fabulous days.
- David Fenton who showed me how his breeding program works on his ranch 'Monte Dinero' which is the most southern property in Argentina at the tip of the South

American continent facing the South Atlantic and the Strait of Magellan. His property also joins Chile – this was a totally different world, amazing. (www.estanciasdesantacruz.com/MonteDinero/montedinero_e.htm)

- Robert Axemann a meat processor in Luxembourg, Europe showed me the Belgium Blue Beef from the farmer, right through to the plate at the restaurant where we ate some. This included a visit to his impressive meat processing plant. Robert and wife Martine (life long friends of ours) looked after me and my family not only once but on several occasions with outstanding hospitality. Unbelievable memories!

Global Focus Tour 2007

Travelling with Sean Welsh, Jack Milbank, Camilla Philip, James Walker, Jamie Snell and Kiwi Steve Stern. What an interesting time this tour was and by the time I had finished this journey I had a totally different view of farming and life in general. Plus a group of people that I now share a special friendship that no one else will understand.

Philippines

- Duncan Macintosh, head of the International Rice Research Institute. Duncans father an Australian Nuffield organised our stay at IRRI. He was the first to tell me how important farmers are in feeding the world and how the world will become short of food.

China

- Angus Christian guided us through our trip in China. What a big job he had, a great aussie bloke and thanks for all the hard yards he did for us. Also others like Austrade and then there was Sarita who took us all to the village where her parents farm, a real eye opener.
- Lets not forget to mention the UK and other Australian Scholars who joined us on this leg of our trip, it was a great group. UK - Charley Walker, Cathal McCarron, Ellis Luckhurst, Christine Jackson, Dr Nicky Cannon, Australian's - Bruce Thompson, Damien Smart, Ronald Thompson and Helen Dalton.

Colorado / Nebraska

- Bart Ruth organised this leg of our trip – there were so many good visits but the one I will always remember was the BBQ tea at his house with some of the local people there as well and of course the fireworks.

Nova Scotia, Canada

- Eric Richie and his father Floyd who showed us what the Nova Scotia area was all about. His tour of McCain's where they make the French Fries for McDonalds has given me a whole new outlook when eating these.

Prince Edward Island

- Barry Cadmore was our tour guide for this leg of the journey and gave us an insight of what the island had to offer. An island not much bigger than Kangaroo Island but with 240,000 people and a seventeen km bridge to get there.

Washington DC

- This part of the trip we had to find our own way around and this was probably for me the highlight of our Global Focus Tour. With some tremendous meetings and that three hour traffic jam heading to Marylands.

Marylands

- Sarah Taylor Rogers, Russ Brinsfield and Ron Helinski were our organisers for this area of the USA. What a special part of the states it is and what about our last night at the crab restaurant – a top evening.

Ireland

- Thomas Horgan took us around Ireland for five days, what a huge commitment from him. His driving at times was extreme with his wife Michelle trying to keep him in line with little success. We also had John and Della Stone on this leg with us which was greatly appreciated and thank you John with all your help with my Nuffield.

France

- Phillipe Qignon, Romain Vacherot and Michel Caffin being our guides around France and what a tremendous few days. Firstly we went to the battlefields of the Somme which was a mind blowing experience. Then to south of Paris to Romain's family farm and then a day with Michel a person with a different view on farming but it was a good one.

Independent Scholarship Study

July/August 2007 (travelling with my wife Tracie)

UK, & Europe

- Johnny Alvis (Junior) who I was fortunate enough to have done the rural leadership course with, he and wife Jo allowed us to make a base at their lovely home and showed us their business and their lives, what great people. Soon after meeting Johnny he taught me how farming is done in the UK, how the EU works and most importantly how to drink scotch. They were also so kind as to give our son Jamie and his friend Ian Bolto a job in their Dairy's for three months allowing them to stay in their home as part of the family and treating them very well.
- Andrew Osmond, Angela McGregor, Mike Hambly, Tom Williams, Paula Hitchins, Andrew Brown and Fiona Kerr all from the rural leadership group and all let us stay a night or two with them and welcomed Tracie and I, and in some cases Jamie & Ian as well, into their lives. We met their families, shared their business

and lifestyle, heard their views and experiences and opened our eyes to another way of life – unforgettable!

- John Campbell (Nuffield Scholar) showed us extensively around his farm enterprises, supplied us with an amazing lunch and then also arranged for our son Jamie and his friend Ian to have a job for 5 weeks catching chooks setting them up in a nice little cottage.
- Long time friends Laren and Shona Moses who also allowed all 4 of us to set up base at their magnificent bed & breakfast home in Newton Stewart, Scotland. Treating and feeding us so well and showing us some of the agricultural and tourist sites in the area.
- The wonderful people who allowed us to stay in their homes, meet their friends and family, introduce us to some really interesting people in both the agricultural field and culture, and who we will never forget. Ellis Luckhurst & Gemima (Cornwall), Rhys Davies & Gwen (Wales), Cathal McCarron (Northern Ireland), Charley & Andrea Walker (Scotland), John Yeomann (Wales) and Ange Foley & Steve Congdon (Ireland).
- To those who gave up their time and knowledge: Samual Boon (SIGNET Breeding Services), Chris Lloyd (EBLEX), Donald McPherson (Well Hung and Tender, Scotland), Robert Parker (Stranraer, Scotland), Isaac Grilly (who is a very forward thinker and a leader in the prime lamb industry in Northern Ireland), Jonathon Birnie and David Brady (both from Dunbia, Northern Ireland - www.dunbia.com), Mark Needham (Meat Promotions, Wales - www.hybucigcymru.org), Dr Lutz Bunger, Professor Geoff Simm and Dr Joanne Conington (Scottish Agricultural College - www.sac.ac.uk/)

New Zealand – South Island

- Willie and Susie McDonald 'Middlehurst Station' Awatere Valley graze sheep and some beef on land up to 3,500 feet above sea level. What an eye opener it was! Another place in the world which is just so different to what I am use to. Great hospitality – amazing!
- Steve Sterne, Hawarden, NZ was with us for most of our global focus tour. He was such good value to have on our trip and is someone I will always look up to. He runs four thousand sows in an open air piggery with the view from the house being small

paddocks with sows in them and it didn't even smell. Great hosts, great place, great time!

- Mark Young NZ Meat and Wool who I met when I first arrived in Christchurch. He gave me some good contacts which was fantastic and also explained how NZ breeding systems worked.
- Jock Waller preg tests our sheep and cows on Kangaroo Island and on his last visit he insisted that when I was in NZ that I have at least two days with him. Now if Jock got his way my whole two weeks in NZ would have been with him. Jock drove me around and we visited his top and most interesting clients on his pre Christmas calendar run. This was a great way to see what was happening in the livestock Industry on the South Island – an enjoyable and very interesting couple of days!
- Les Keeper shared a room with me in Calgary at our International conference. Les gave me the ins and outs of the booming dairy industry on the NZ South Island and I will always remember us both 'Bungy Jumping' in Queenstown – Incredible!
- Charley Walker a Nuffield Scholar from Duns, Scotland was doing his study on the South Island at the same time as me. We travelled together for five days and what great company, another different view to the whole Nuffield experience.
- The following people helped me out whilst travelling in NZ: Hamish Bielski, Keri Lewis (both of Mount Linton Station), Sarah Adams (Catapults Genetics), Blair Davies (New Zealand Merino), Russell Welsh (Twin Farms) and Trevor Potter (Ohio Poll Dorset Stud).

So as you can see it has been amazing how far I have travelled, the things I have seen, the experiences I have had, the things I have done and most importantly all the wonderful people I have met and who have helped so generously along the way - we really do have a "world of wonderful people"

Plain English Compendium Summary

Project Title:	Objective measurement in the Australian Prime Lamb Industry
Nuffield Australia Project No.:	
Scholar:	Andrew Heinrich
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Objectives	Assess genetic measurement in the Australian Prime Lamb Industry. Aiming to improve profitability by comparing it with other systems used around the world. Whilst also maintaining the eating experience in which prime lamb is renowned for, along with ensuring that genetics do not go too extreme, which can lead to management issues.
Research	Travelled to 10 different countries during 2007, looking at different genetically measured breeding programs. This included UK, Ireland, France, Luxembourg, Belgium, Canada, USA, China, Philippines, Uruguay, Argentina, New Zealand and Australia.
Outcomes	Australia's Prime Lamb Industry must continue to strive for improvement with the use of measurement. Whilst keeping in mind the final eating quality of the product and the type of product, to ensure that it suits its specific market. Industries that have successfully adopted the use of measured breading programs have made more ground in the form of production than traditional breeding programs.
Implications	The Prime Lamb Industry will be left behind by other livestock industries if we do not strive for genetic improvement, whilst also aiming to maintain the eating experience in which lamb is renowned for. With recent high grain prices it would have been difficult for some industries, such as chicken and pork, to remain viable without the increased efficiency in which a measured genetic program has provided them.