

the merino 100% club

improving reproductive performance

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introduction

This report summarises the conclusions of the Merino 100% Club project, completed in March 1998, and provides an update on more recent research. However, since the end of the 100% Club there has been little done on the limitations to merino reproductive performance. The exceptions are ongoing work by Peter Anderson and a group of Marlborough farmers, looking at hogget growth rates, scanning percentage, disease and trace elements, and by Dr Rachel Forrest on cold tolerance.

Farms in the 100% Club project individually made substantial gains in reproductive performance and in condition score of their stock during the three years of the project through a formal monitoring programme to identify factors that were limiting reproductive performance and then making improvements through management changes. The key limitations are discussed in this summary together with management targets and recommended monitoring.

While wool production remains the key to financial profitability on many merino properties, lamb production is increasingly becoming important due to the value of merino meat. Good lambing performance is also vital for making genetic gain. On properties with low lambing performance few inferior stock can be culled, resulting in little stock improvement, even although the rams used may be superior. For many farmers, the cost of improving merino lambing performance can be relatively low, while the benefits are great.

background

The Merino 100% Club concept was developed from discussions that I had with Robert Jopp in 1994. The project was funded jointly by FoRST and Wools of New Zealand (with the strong support of Dave Quinlivan from Merino New Zealand Inc) and ran from February 1995 to February 1998. Chris Mulvaney was appointed as science manager and I worked as project manager. Together we formed the management team and developed clear objectives and protocols for the participating farmers. Richard Green was appointed as project manager after I joined Merino New Zealand Inc in 1997.

The purpose of the project was to better understand and improve merino lambing performance by putting in place a comprehensive monitoring system on a number of merino properties. The project objectives were to:

- Define key benchmarks for the reproductive performance of the NZ Merino
- Identify and define the limitations to the reproductive performance
- Implement management changes to improve reproductive performance.

Thirty-five merino farmers, farming 8% of the merino ewes in New Zealand, participated in the project. This project was the first to use scanning information to identify lamb losses. Over the three years, the 35 properties were able to increase their overall performance by:

- Increasing lambing percentage from 76.5% to 87.9%
- Reducing death rate to 4.1% (mating to tailing)
- Increasing condition score by 0.3 throughout Year 3

key findings

The full report from the 100% Club project provides a detailed description of the project methodology and the results. This summary provides key information from the project for merino farmers who are not familiar with the project or the results. For those who require more detail, the full report is available on request from Merino NZ Inc.

The topics that are covered here include:

- Monitoring, including scanning, live weights, condition scores, animal health
- Ewe management
- Ram management
- Lambing Management
- Relationships between body weights at mating and both scanning and lambing percentages

MONITORING

One of the major conclusions from the project was that there is no single recipe to lift reproductive performance. Each property is different but the key to improving lambing performance is to:

- Monitor your present situation
- Set clear goals
- Implement management changes to improve performance
- Maintain an ongoing monitoring programme

When looking to improve lambing performance it is vital that base monitoring information (including scanning, live weights, condition scores and faecal egg counts) is available so that the present limitations to lambing performance can be identified. Appendices 1 & 2 provide further detail on stock weighing and condition scores.

The disciplined approach to monitoring and identifying limitations to reproductive performance before making changes was a significant strength of the 100% Club.

RAM MANAGEMENT

Overall, the Merino 100% Club found little effect on conception rates due to ram management. The exception was where young rams were used with young ewes. This does not mean that ram management is unimportant, but it does demonstrate the difficulty in identifying the effect that poor ram management has on conception rates in ewes.

1. Feeding systems: Rams should be inspected approximately 12 weeks prior to mating. This should include checking their feet, breeding soundness and condition. Those that are unsound should be removed and the remaining rams should be placed on an improving plan of nutrition. A high protein diet that includes lucerne or grain will improve sperm production.

2. Two tooth rams: The Merino 100% Club found that inexperienced 2 tooth rams mated with young ewes (single sire mated) had lower conception rates (around 20% to 40%). Young rams should be placed with a few ewes 2 to 4 weeks before mating. This will significantly improve ram servicing.

3. Ram teams: Research has found that in a ram team of three, the top ram will mate around 50% to 70% of the ewes, the second ram 20% to 30% of ewes and the third ram 10% to 20%. This means that putting excess rams out will have little impact on increasing conception rate. Ram/ewe ratios of 1:60 to 1:120 are the norm, and will vary depending on the size of the blocks and ewe age.

4. Exercise: Exercise of rams prior to mating has been shown to both improve conception rates and reduce weight loss of rams during mating. This should take place up to 12 weeks prior to mating.

EWES MATING WEIGHTS AND CONDITION

The management of ewes prior to mating starts at weaning. The aim should be to present ewes at mating in condition that optimises conception rate for your property. The management of the bottom 20% of your flock in many cases will have a larger effect on lambing percentage than lifting the average. In most cases some ewes are mated in poor condition. These ewes will have a much reduced conception rate and much higher death rates over winter.

1. Mating bodyweight: Traditionally after weaning merino ewes are moved to semi improved or native pastures. Those ewes that are in light condition or body weight are unlikely to gain sufficient weight prior to mating. These ewes should be drafted off and managed separately. A minimum target weight by mating for any ewe should be 39 kg for maiden ewes or 43 kg for mixed age ewes. These figures can be moved up or down depending on frame size. Often condition scoring will give a much better handle on where you are, than actual bodyweight. The 100% Club data showed that an increase of 7.5% in conception rate was achieved with an increase of 1 condition score. Because of the inherent frame size difference between bloodlines, condition scoring seems to give more accurate predictions than body weights.

2. Merino fertility: The merino is relatively fertile and lower lambing performance experienced by merino farmers is generally due to a combination of lower bodyweight, higher ewe losses over winter and lower lamb survival. The Merino 100% Club showed that on average conception rates were about 2.4 times bodyweight at mating which is similar to crossbreeds. This Scanning Index however ranged from 1.9 to 3 between properties indicating that factors such as the range of bodyweights within a flock, the change in body weight prior to tupping, and ram management as well as genetics and disease have an influence.

3. Pre-mating management: Ewe management 3 weeks prior to mating is very important and disruption at this time can effect the cycling of ewes. This can lead to late lambing or lower conception rates. Those who class sheep up for mating should plan to do it at least a month before mating. Any vaccination etc. should also be done six weeks prior to mating.

4. Minimum liveweights: Ewes not reaching minimum target liveweights that are also in poor condition should be run dry as the economics of mating these ewes is very marginal.

5. The 100% Club: In the 100% Club project the average mating weight for mixed age ewes was 48 kg and for two toothed it was 43 kg.

6. The first 90 days of pregnancy are important in placental growth. This has a major effect on birth weight of the lamb.

SCANNING

The 100% Club was the first research project to use scanning on a commercial basis (1995). It is therefore somewhat surprising that the uptake of this technology has been relatively slow in the merino industry. The reason often given is that either there are not enough twins to worry about or that they are all feed as well as possible. Scanning is not only a valuable management tool in identifying dries and twins but gives useful information on conception rates and lamb deaths. This will often point to problem areas if used correctly.

1. The 100% Club data showed an average scan rate of 111.5%, with a range from 84% to 137% The twinning rate ranged from 0 to 51% among the farmers in the project and the dry rate averaged 7.1% with a range from 1% to 18%

2. After scanning ewes were split up into 5 mobs. Dries, twins and single mobs for maiden ewes and twin and single mobs for mixed aged ewes.

POST SCANNING MANAGEMENT

Separation of ewes into dries, singles and twins at scanning (for two toothed and mixed aged ewes) will mean that twin bearing ewes can be managed separately. While preferential feeding of twin bearing ewes is needed (up to 40% increase in energy intake) single bearing ewes should not be neglected. If the tailing percentage from the single bearing ewes falls below 80% then one of the factors could be ewe management. Even where farmers feel that scanning is unlikely to improve their lambing percentage, the management information that they can obtain from scanning could well justify its use.

VACCINATION OF EWES

1. Toxoplasmosis: In the 100% Club all properties autopsied 20 lambs per year. On 15 of these properties toxoplasmosis was identified. Considering a number of properties were vaccinating and only two properties considered that they had had abortion on their properties, it seem common sense that all properties vaccinate for toxo unless there is a compelling reason not to. Work done by Peter Anderson backs up this recommendation and he has estimated that a 3% improvement in tailing % for the whole flock can be expected annually when vaccinating. Only maiden ewes need be vaccinated.

2. Campylobacter: There were no lambs submitted to the 100% Club project that were identified with campylobacter. Work since done by Peter Anderson has suggested that improvements in both tailing percentage and scanning percentage of up to 10% can be achieved with vaccinating but this tends to be a property to property issue rather than the widespread issue that toxo is. This requires 2 injections in the first year for maiden ewes. There is some discussion that there is only minimal benefit in re-vaccinating adult sheep if they have been done as maiden ewes.

3. The cost: The overall cost of vaccinating maiden ewes is around \$2.20 plus labour for both toxoplasmosis and campylobacter. In a ewe flock of 2000 mixed age ewes and 500 two toothed this would cost \$1,100 plus labour. With lambs worth around \$45 / head, this is equal to an increase of about 1% in lambing.

TRACE ELEMENTS

The main trace elements looked at in the 100% Club were iodine, cobalt, selenium and copper. No deficiencies were diagnosed for either copper or selenium on any properties in the project. It should however be noted all properties were supplementing with selenium. 45% of autopsied lambs from the project had thyroid/birth weight ratio of greater than 0.4g/kg indicating that iodine maybe a significant cause of lamb wastage. Iodine is critical in heat generation. Given that lamb deaths at birth is often the major limitation to lambing performance in merinos, iodine supplementation is recommended.

1. Iodine: Iodine supplementation can be done a number of ways. The recommendation is for two drenches. The first one at scanning and the second one 2 to 4 weeks prior to lambing. From the 100% Club data, iodine deficiency seems to be wide spread and as lamb survival is a major issue in merinos, drenching with iodine would seem a prudent risk management option for all merino farmers.

2. Salt: Salt supplementation has been researched and as yet there is no conclusive evidence to show improved lambing percentage due to feeding salt. However stock fed with salt seem more settled which should improve bonding between the ewe and lamb. Trials done on three Marlborough properties showed a trend towards improved lamb survival in mobs with access to salt over lambing. This was believed to be due to less mismothering and lamb snatching. Ewes craving salt seem attracted to the foetal fluids of any newborn lamb. There is some good anecdotal evidence to suggest that where ewes have access to salt mismothering and cross-mothering is less of a problem.

3. Vitamin A: Vitamin A has also been implicated in improved lambing performance but this has yet to be proven conclusively. Some iodine drenches include vitamin A, and these drenches should used in preference, given the possible benefit.

EWE LOSSES

The ewe losses from mating to tailing averaged 5.5% with a range from 0.5% to 14%. Ewe losses are a major contributor to low lambing performance in merinos. If we assume that on average each ewe that is lost is carrying one lamb and \$40 worth of wool then for a 5,000 ewe flock this loss is worth \$23,000. This does not take into consideration the cost of feeding through the winter and the cost of having to retain an extra hogget to replace the lost ewe. A 1% drop in death rates is worth more than \$4,000.

This highlights the need to only winter those animals that are likely to survive the winter. Culling, at both weaning and mating, of poor condition stock is one of the main ways to reduce death rates. This should be coupled with management of light stock and twin bearing ewes during the winter.

UDDER AND TEAT DAMAGE

The prevalence of udder and teat damage was low in the project but individual properties did have up to 3% damage which would have affected the ability of the ewe to rear a lamb. Culling of affected ewes at shearing and weaning is recommended.

LAMBING MANAGEMENT

The average lamb loss for the 100% Club project was 27% from a scanning percentage of 111.5%. The percentage of lambs lost from single bearing ewes was 15% and it was 34.5% from twin bearing ewes. This gave an average lambing percentage of 82.5%. On 25 properties lambs were autopsied to identify cause of death. Over 80% had breathed but only 13% had suckled.

1. Lamb loss: The 100% project showed that most lambs survived from scanning to birth, and that most of those that died had been born alive, but failed to suckle.

2. Birth weight: Birth weight is a major factor in lamb survival. Research has shown that an increase of 1 kg in birth weight will increase lamb survival by 28%. Once birth weight falls under 3 kg lamb survival decreases.

3. Survival: The merino is less able to tolerate cold conditions at birth due to the high body surface area to body weight ratio and has less ability to maintain core body temperature at birth in adverse conditions.

4. Genetics: There was a strong suggestion that there is a genetic component to lamb survival. In a progeny test program the variation in lamb survival between sires groups was 17% to 36%. Recent work by Rachel Forrest at Lincoln University has identified a gene marker responsible for variation in heat generation in sheep. This is being followed up in a research project with a number of merino stud breeders.

SUMMARY OF MANAGEMENT ACTIONS TO OVERCOME LIMITATIONS

The following list summarises key management actions used by the 100% Club participants to improve lambing performance. The full report includes case studies from 4 properties showing how each one developed a management plan to work on the particular limitations identified. Hogget growth was also included in the project.

WEANING TO MATING

- Condition score at weaning and preferentially feed light ewes
- Set minimum and target mating weights etc and manage ewes accordingly
- Focus autumn management on improving the quality of feed over winter
- Buy rams on both subjective appraisal and objective records
- Actively manage rams prior to mating
- Flush ewes for 3 weeks pre-mating and during mating to improve conception rates

- Avoid stress to breeding ewes immediately before and during mating
- Monitor faecal egg counts over autumn, especially in low condition ewes
- Monitor and manage trace elements (e.g. cobalt, selenium)
- Continue monitoring lamb growth rates. Aim to have lambs at the start of winter at 60% of their mature weight.

MATING TO PRE-LAMB

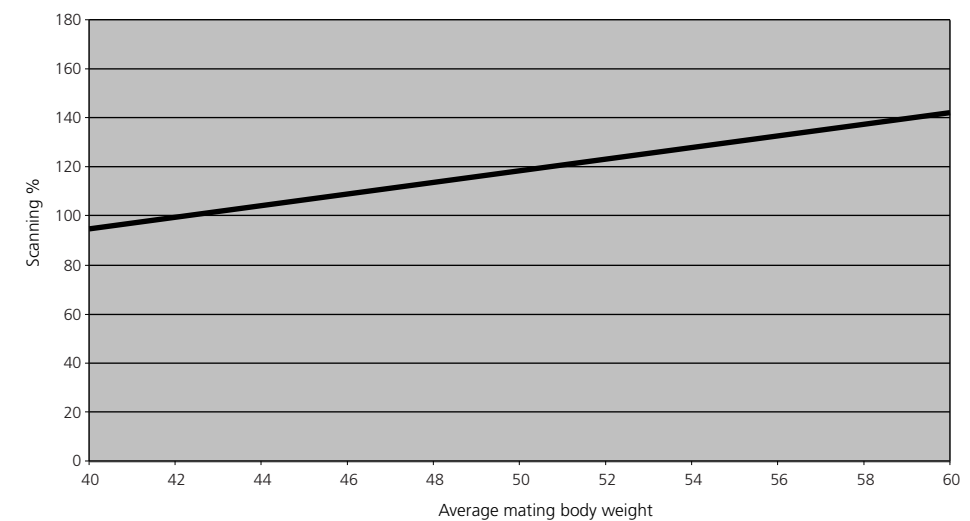
- Leave the rams out for 2 cycles (34 days)
- Prevent weight loss and aim to maintain ewe condition at 2.5 condition score
- Scan then preferentially feed multiples, and run dry ewes separately
- Use winter feed and supplements if required to ensure that condition is maintained in first 90 days of pregnancy to maximize placental growth and, therefore, lamb birth weight
- Ensure high quality feed for last 60 days of pregnancy
- Shear ewes at least 6 weeks pre-lamb to reduce stress and potential condition loss
- Monitor worm levels throughout the winter and adjust management to reduce worm contamination
- Clostridial vaccination programme for ewes
- Provide iodine supplementation.

PRE-LAMB TO WEANING

- Preferentially feed multiples and low condition single bearing ewes
- Monitor and analyse lamb survival on each block
- At tailing, monitor condition score of ewes.

RELATIONSHIP BETWEEN SCANNING PERCENTAGE & BODY WEIGHT AT MATING

Figure 1: Scanning potential vs average mating body weight



The data in Figure 1 is based on monitoring information from the 100% Club project and represents the average of that group during the 1995/96 season. There was, however, a significant variation between properties reflecting the management and genetic variation within the merino industry.

This graph shows that while lambing performance in merinos remains well below the national average, the fertility (conception to scanning) on a mating bodyweight basis remains at the mid to low end of the crossbred industry. It can, therefore, be assumed that for the average merino property conception rates relative to mating bodyweight are not the major limitation to lambing performance.

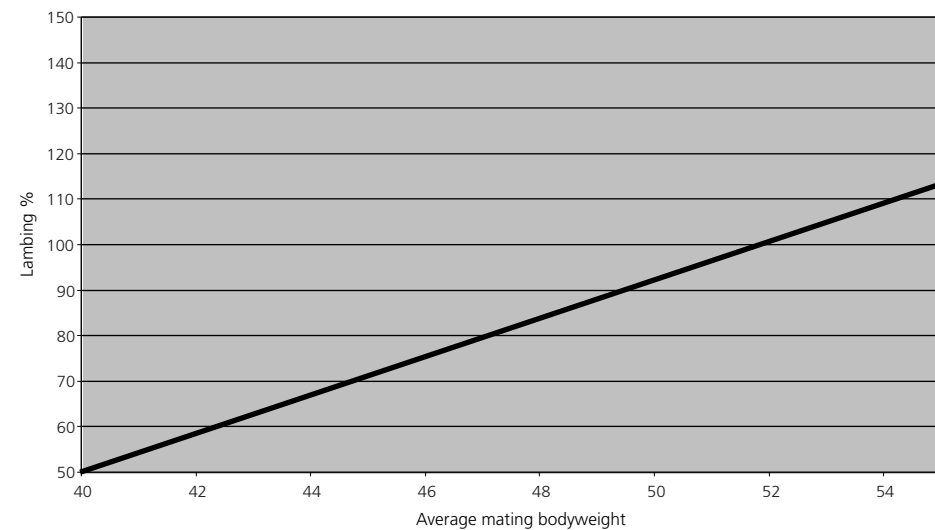
HOW TO USE THIS INFORMATION (figure 1)

When looking to improve lambing performance it is vital that base monitoring information is available so that the present limitations to lambing performance can be identified.

As a first step you should map your own performance against the graph to identify where you are presently placed. You need to remember that this only gives an indication of how you are presently performing.

RELATIONSHIP BETWEEN LAMBING PERCENTAGE & BODY WEIGHT AT MATING

Figure 2: Average mating bodyweight vs lambing %



The graph in Figure 2 is derived from monitoring information from the 100% Club project and represents the average of that group during the 1995/96 season. There is a significant variation between properties reflecting the management and genetic variation (lamb survival is significantly affected by genetic factors).

The most interesting point to note here is that, while lambing % increases with increased mating bodyweight, more importantly survival increases markedly with increased mating bodyweight, even though the number of twins has also increased. At 40 kg average bodyweight at mating nearly 50% of the lambs born died while at 50 kg average bodyweight at mating 25% of lambs died.

HOW TO USE THIS INFORMATION (figure 2)

As with Figure 1 you should map your own performance on this graph. When this information is combined it can be used to identify where potential increases in lambing performance can be obtained.

appendix 1: stock weighing

Weigh at least 50 animals from each mob
Record body weights on recording sheet (see next page)

Management: Stock should be emptied out for 2 hours only, or at the gut fill each time.

- Always check scales before using them and at least once during their use. The simplest system is to check against a known weight such as a salt block.
- The amounts of gut fill affects the live weight, therefore weighing the animals at the same time off feed every time is important. Recommended time is 2 hours off feed.
- The ewes should be a random sample from the flock. Drafting every 5th ewe and weighing them until you have weighed 50 is the ideal system.

SUGGESTED WEIGHING PROGRAMME

To get baseline information for a programme to improve lambing performance the following weighing programme is recommended:

EWES / TWO TOOTHS

Weigh ewes / two toothes at:

- mating
- mid winter (this can be done at scanning and should be done for both singles and twins)
- shearing
- weaning
- pre mating (6 weeks before mating).

LAMBS / HOGGETS

Lambs and hoggets should be weighed whenever they are in the yards.

