final report

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Improving Lamb Survival

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Background

8 businesses in the group participated in the on-farm demonstration phase of the Lifetime Wool Project and discovered that they could increase their historically low conception rates in Merinos to acceptable levels (130%) using Lifetime Wool ewe management guidelines. However the lambing potential was not being realised due to very poor lamb survival rates and more than 20% of the lambs not being accounted for between scanning and lambing.

Case study examples found from more than 2000 fetuses only 1000 lambs were being marked. Preliminary investigations found approximately 500 lambs dead in the paddock, while the remaining 500 lambs were unaccounted for, despite vigilant fox management programs. This problem formed the basis for undertaking this PIRD on 'improving lamb survival'.

The aims of this PIRD application on 'Improving lamb survival' were;

- to improve producers understanding of the key factors affecting lamb survival,
- to identify the reason why on a number of properties in the group, 20% of the lambs couldn't be accounted for between scanning and lambing,
- to improve producers skill level in managing for improved lamb survival,
- to increase lamb survival rates and reduce ewe mortality rates, and
- to develop best management practice guidelines for improving lamb survival.

Methodology

There is a wide range of factors that contribute to lamb survival. The methodology outlined below reflects the main trials undertaken during the PIRD.

A) Coopers Guardian Campylobacter Vaccine- this investigation aimed to evaluate the effect of Coopers Guardian Campylobacter Vaccine on increasing lamb survivability between pregnancy scanning and lamb marking in both maiden and mixed age ewes. Four group members vaccinated their ewes twice (four weeks prior to joining and at joining time) treating half of their trial mob, while the remainder of the trial mob remained untreated.

Vaccine details- Coopers Guardian Campylobacter Vaccine for Sheep 2mL/dose administered subcutaneously, high up on the neck behind the ear.

Ewes were scanned for pregnancy (singles and multiples) at Day 80-90 of pregnancy. The total number of ewes and fetuses present in each treatment group was recorded. Empty ewes will be removed from the treatment groups at this time. The treated and untreated ewes continued to run together until two weeks prior to lambing. At that stage the ewes were drafted into their treatment

groups for lambing. In all cases the two mobs were lambed down side by side in similar paddocks in terms of shelter, size and feed-on-offer. At lamb marking the total numbers of lambs marked were recorded for each mob.

B) Impact of ewe mob size at lambing on lamb survival- Four group members conducted a trial comparing the impact of ewe mob size on lambing results. Prior to lambing scanned pregnant ewes, that were mobs of either singles or twins were split into mobs of varying size. The mobs were managed at similar stocking rates and feed-on-offer throughout lambing and lambed in similar paddocks in terms of shelter, so that the primary variable was mob size. The results were recorded at lamb marking and compared.

C) Impact of shelter at lambing on lambing survival- Three group members conducted a trial examining the impact of shelter on lamb survival. Prior to lambing scanned pregnant ewes, that were mobs of either singles or twins were split into 2 mobs and lambed in sheltered and unsheltered paddocks. The mobs were managed at similar stocking rates and feed-on-offer throughout lambing and lambed in similar mob sizes, so that the primary variable was the degree of shelter. The results were recorded at lamb marking and compared.

D) Impact of ewe condition at lambing on lambing survival- Three group members conducted a trial examining the impact of ewe condition score at lambing on lamb survival. Prior to lambing scanned pregnant ewes, that were mobs of either singles or twins were split into at least 2 mobs based on their condition score and lambed in separate paddocks. The mobs were managed at similar stocking rates and feed-on-offer throughout lambing, lambed in similar mob sizes and similar sheltered paddocks, so that the primary variable was ewe condition score. The results were recorded at lamb marking and compared.

Analysis of Results

A) Impact of Campylobacter Vaccine on lamb survival

The results of the trials investigating the impact on lamb survival of vaccination for Campylobacter are outlined in Table 1.

Table 1. The effect of Campylobacter vaccination on lamb survival

	No. of ewes Joined	No. of lambs Marked	Lamb marking Percentage
Vaccinated	495	294	59.4
	500	402	80.4
	263	247	93.9
	244	154	63.1
	246	196	79.7
	1748	**1293**	**74.0**

Control	476	230	48.3
	610	442	72.5
	268	229	85.4
	252	142	56.3
	253	203	80.2
	1859	**1246**	**67.0**

Overall the average increase in lambing percentage was 7% in the vaccinated ewes compared to the control. This outcome compared favourably with the expected increase in lamb marking percentage of 9% with the use of the Guardian Campylobacter Vaccine.

It should be noted that the one mob of adult ewes included in this trail had no improvement in lamb survival following vaccination. Consultant with veterinarian Dr David Rendell, revealed that this result is not surprising considering that the adult ewes should have built their own host immunity to Campylobacter. Similarly the majority of producers in New Zealand vaccinate maidens but rarely do they vaccinate adult ewes.

When this mob of adult ewes is removed from the trial data the increase in lambing percentage was 9% in the vaccinated ewes compared to the control. This outcome is in identical to the expected increase in lamb marking percentage of 9% with the use of the Guardian Campylobacter Vaccine.

B) Impact of ewe mob size at lambing on lamb survival

Lake Repose Case Study- Adult crossbred ewes joined to terminals that were part of one big mob (not pregnancy scanned) were lambed in the following mob sizes with the following results.

3 smaller mobs (101, 124, 131), average mob 119 ewes- 151% lambs marked

3 larger mobs (235, 298, 328), average mob 287 ewes- 129% lambs marked

The difference due to smaller mob size was 22% extra lambs marked.

Corea South Case Study- Examining the effect of mob size on twin lamb survival for crossbred ewes joined to terminals. The ewes ran together throughout joining and pregnancy and were separated just prior to lambing. The results are summarised in Table 2 below.

Table 2. The effect of mob size on twin lamb survival for crossbred ewes

No. of ewes in mob at lambing	No. of lambs scanned	No. of lambs marked	Lamb marking percentage to ewes scanned	Lamb survival %
186	372	333	179.0	89.5
198	396	353	178.3	89.1
404	808	646	159.9	80.0
441	882	688	156.0	78.0

Mob size at lambing appears to have had a marked effect on twin lamb survival. Mobs with more than 400 ewes at lambing had an average lamb survival % of 79%, whereas mob with less than 200 ewes at lambing had an average lamb survival % of 89.3%.

Burnside Case Study- Examined the effect of mob size on lamb survival for Merinos joined to terminals. The ewes were not pregnancy scanned so the data reported is for lambs marked to ewes joined. The ewes ran together through joining and pregnancy and were separated just prior to lambing.

The results are outlined in Figure 1. Again mob size at lambing appears to have had a marked effect on lambing percentage. In fact it appears to be a linear response in lamb survival to mob size at lambing (Figure 1). Mobs with more than 200 ewes at lambing had an average marking % of 79.8%, whereas mob with less than 200 ewes at lambing had an average marking % of 93.3%.

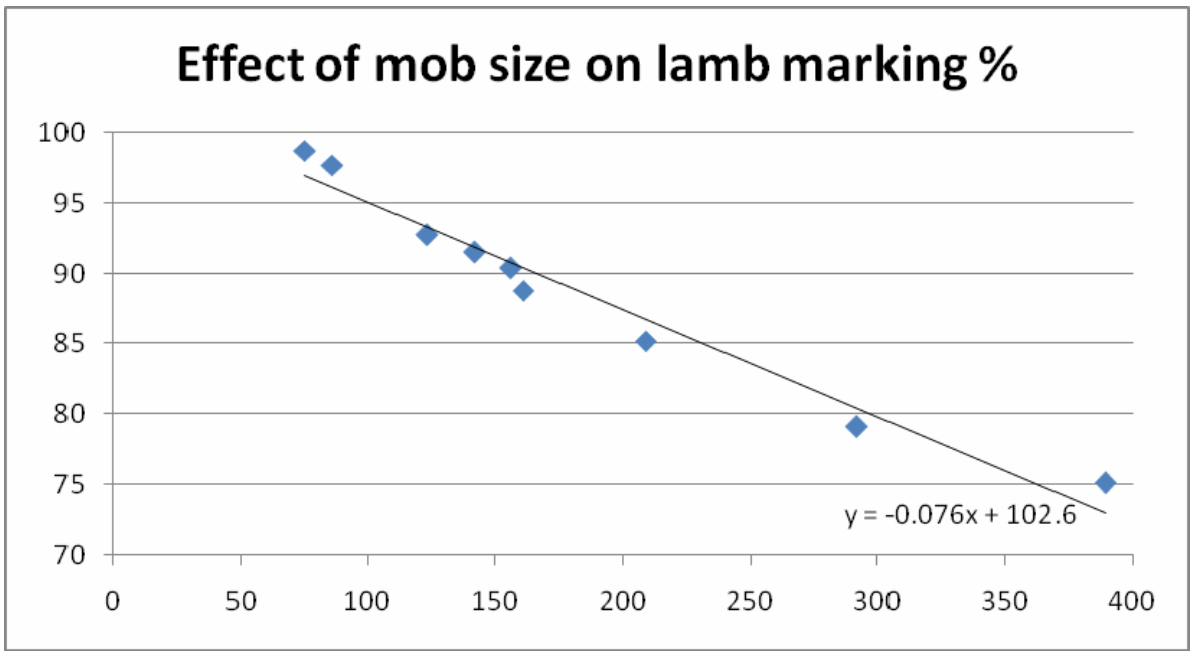

Figure 1. Effect of mob size at lambing on marking % for Merino ewes

Across all trials undertaken, regardless of ewe type, there was a significant response in lamb survival to mob size at lambing.

C) Impact of shelter at lambing on lambing survival

Corea South Case Study- Examined the effect of shelter on twin lamb survival in crossbred ewes, stocked at 10 ewes/ha in two 50 hectare paddocks. The results are outlined in Table 3 below.

Table 3. The effect of shelter on twin lamb survival for crossbred ewes

		No. of ewes scanned in lamb	No. of foetuses	No. of lambs marked	Lamb marking percentage	% Lamb survival
Sheltered						
	Twins	505	1010	915	181.2	90.6
Un-sheltered						
	Twins	503	1006	813	161.6	80.8

As a result of providing shelter the survival of twin lambs was increased by 10%.

R & F Mitchell Case Study- Examined the effect of shelter on lamb survival with 1600 Merino ewes scanned in lamb that were split between sheltered and unsheltered paddocks for lambing. The results are outlined in Table 4.

Table 4. Effect of shelter on single and twin lamb survival for Merino ewes

		No. of ewes scanned in lamb	No. of foetuses	No. of lambs marked	Lamb marking percentage	% Lamb survival
Sheltered						
	Twins	582	1164	821	141.1	70.5
	Singles	225	225	215	95.6	95.6
		807				
Un-sheltered						
	Twins	217	434	252	116.1	58.1
	Singles	573	573	502	87.6	87.6
		790				

As a result of providing shelter the survival of single born lambs was increased by 8% and the survival of twin born lambs was increased by 13%.

J Peddie Case Study- Examined the impact of varying degrees of shelter on twin lamb survival in composite ewes (Table 5).

Table 5. The effect of shelter on twin lamb survival for composite ewes

	No. of ewes scanned in lamb	No. of foetuses	No. of lambs marked	Lamb marking percentage	% Lamb survival
Sheltered	233	466	326	140	70.0
Limited shelter	220	440	345	157	78.4
Un-sheltered	261	522	440	169	84.3

As a result of providing shelter the survival of twin born lambs was increased by 14%.

In the trial undertaken the effects of shelter on lamb survival were consistent regardless of ewe type. Twin lamb survival was increased by 10-14% through the provision of shelter, where as single lamb survival increased by 8%.

Kookaburra Case Study- Examined the impact of lambing from mid September compared to early August on lamb survival. The result was 15% increase in the marking % to ewes joined and resulted in a whole farm shift in lambing date. The marking % achieved was the highest historically on the farm, but the later lambing does require the development of a finishing system such as summer crops or a feedlot.

D) Impact of ewe condition at lambing on lambing survival

E Connelly Case Study- Examined the effect of the condition score of twin bearing maiden crossbred ewes at the point of lambing on lamb survival rates. The ewes were pregnancy scanned and ran together until just prior to lambing when they were split three ways based on condition score (Table 6).

Table 6. Effect of ewe condition at lambing on twin lamb survival for maiden crossbred ewes

Lambing CS	Average Lambing CS	Ewes in mob	Lamb marking %	Lamb survival %
Low	2.6	188	118.1	59.0
Med	2.9	213	130.5	65.3
High	3.2	197	144.2	72.1

The condition score of maiden ewes at the point of lambing appears to have a significant effect on twin lamb survival. An increase of 0.6 CS at lambing resulted in a 13% in survival of twin lambs (an extra 26% of lambs marked).

Corea South Case Study- Examined the effect of the condition score of adult crossbred ewes at the point of lambing on lamb survival rates (Table 7).

Table 7. Effect of ewe condition at lambing on survival for crossbred ewes

Lambing CS	Ewes joined	Scanning %	Lamb marking %	Lamb survival %
2.5	6220	140.0	112.6	80.4
3	6180	149.0	135.4	90.9

The condition score of crossbred ewes at the point of lambing appears to have a significant effect on lamb survival. An increase of 0.5 CS at lambing resulted in a 10% in survival of lambs, which is a similar effect to that measured in maiden crossbred ewes.

Burnside Case Study- Examined the effect of managing ewes to achieve a higher condition at the point of lambing for Merino ewes joined to Merino rams, on lamb marking rates (Table 8).

Table 8. Effect of ewe condition at lambing on marking % for Merino ewes

Lambing CS	Ewes joined	Lambs marked	Lamb marking %
3	2302	1771	76.9
2.7	2505	2157	86.1

The condition score of Merino ewes at the point of lambing appears to have affected marking rates, with an increase of 0.3 CS at lambing resulting in a 9% in the number of lambs marked.

An additional observation in trials examining the effect of ewe condition score at lambing on lamb survival, was it is critical to at least maintain condition score of twin bearing ewes in late pregnancy. Loss of condition in late pregnancy led to many low birth weight lambs being born, which had very poor survival rates.

Best Practice Guidelines for Improving Lamb Survival

The practices that have been included in these guidelines all deliver significant increases in lamb survival (≥10% increase in lamb survival).

1. Vaccinate all maiden ewes prior to joining for Campylobacter- to minimise late pregnancy abortions and still births. This is especially important when mating ewe lambs because they have had very little opportunity to build their own auto immunity to Campylobacter. The protocol involves vaccinating the ewes twice, firstly four weeks prior to joining and then again at joining time.

2. Minimise mob sizes for lambing, especially twin bearers- to minimise the number of fresh lambs born in a paddock each day to reduce miss mothering.

Mob type	Maximum recommended number/mob
Twin bearing mature ewes	200
Single bearing mature ewes	400
Single bearing maiden ewes	300
Twin bearing maiden ewes	150

3. Provide adequate shelter during lambing- to minimise lamb deaths due to exposure. This is particularly important if lambing from June to September, which encapsulates many producers. The importance of shelter is even greater for twin bearing ewes because twin lambs have lower birth weights than single lambs, which increases their chances of perishing due to exposure.

4. Lamb twin bearing ewes in condition score 3 or higher- to ensure that twin bearing ewes have adequate energy reserves to successfully complete the birthing process and enhance the chances of successful bonding between the ewe and both the lambs.

5. Twin bearing ewes must at least maintain condition score from scanning to lambing- to ensure that the birth weight of twin lambs and subsequent survival is optimised.

6. Twin bearing ewes at least 0.3 CS higher than singles at point of lambing- which indicates that feed has been allocated appropriately in late pregnancy.

7. Minimise the occurrence of trail feeding during lambing- where possible plan to have adequate feed in lambing paddocks, even if only to get through the peak period of lambing, because trail feeding during lambing seriously compromises lamb survival.

Group members' skill development, practice change and impacts

All members of the group have been trained in condition scoring and ewe condition score management via feed budgeting. At the beginning of the PIRD none of the group members could calculate the energy balance of their ewes throughout the reproduction cycle, whereas by the end of the PIRD all group members could successfully complete this task, and most are now using it as part of their normal farm management.

At the beginning of the PIRD only 20% of the members were pregnancy scanning as part of their normal management, whereas by the end of the PIRD 80% were pregnancy scanning for multiples and separating ewes accordingly.

Another key practice change was the allocation of feed resources (pasture and/or supplements) to ewes, particularly in late pregnancy, with preferential treatment of twin bearing ewes becoming standard practice. Also the allocation of ewes to different lambing paddocks has changed, with much more consideration being given to shelter requirements and mob size, particularly with twin bearing ewes.

The group members' average lambing % at the beginning of the project was 75% for Merino to Merino lambings and 108% for crossbred ewes. By the completion of the PIRD this had increased to an average of 83% for Merino to Merino lambings and 118% for crossbred lambings. The increase in lambing % in Merino to Merino lambings is below the 10% target set at the beginning of the PIRD. A key reason for this was the extremely bad lambing conditions in western Victoria in July-September last year.

This PIRD has been a great experience for all involved. Participants have learnt that improving lamb survival requires paying a lot of attention to detail, which for the many wool orientated enterprises in particular has been very insightful. The support provided by MLA to undertake this PIRD has been greatly appreciated.