finalreport

Animal Health and Welfare

Project code: **AHW.131**

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Australian Livestock Scanning

Date published: **January 2007**

ISBN: **9781741911589**

PUBLISHED BY
Meat & Livestock Australia Limited
Locked Bag 991
NORTH SYDNEY NSW 2059

Lamb marking performance for ultrasound scanned ewes in Australian sheep flocks

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Abstract

Ewes (98,272) from commercial operations in the Riverina, Monaro, Southern and Northern Tablelands of NSW and representing Merino and first and second cross lamb production enterprises, were scanned with ultrasound in 2006. Scanning results for regions and enterprise types are provided. Overall scanning results were; empty 13.7%, singles 62.6% and twins 23.7%.

There were 13,463 empty ewes and 6,439 ewes that were scanned as pregnant but which, for a variety of reasons, were not present at lambing. There remained a total of 78,370 pregnant ewes from which the number of lambs marked and additional ancillary data, was recorded. The results for regions and enterprise types are provided. Overall survival rates from pregnant ewes were; all maiden ewes, 0.774, mature single bearing ewes, 0.835 and mature twin-bearing ewes 0.685, (i.e., 137 lambs/100 pregnant, twin lambing ewes). Thirty two commercial producers have marked 81.5% of lambs from 91,833 ewes joined and 95.5% of lambs from ewes scanned in lamb, in a drought year after a string of drought years. All co-operators remarked that joining and lambing performances were down by an estimated 20% plus compared to previous years, due to drought. Some co-operators reported percentages down by well in excess of 20%.

Ultrasound scanning is presently used by a minority of producers. This project has provided extensive information not previously available and a very strong foundation for decisions regarding adoption of scanning technology.

Executive Summary

Project Objectives

The objectives of this project were to collect scanning data (empty, single or twin) and lambing data for between 60,000 and 80,000 ewes from sheep owned by co-operating commercial producers. The ewes involved in the project were selected from the ALS client list in order to have the desired range of breeds, "enterprise types" and sheep and wool production regions represented in the data collected. These data were collected to provide baseline information on sheep reproductive performance and lamb survival for a range of enterprise types and geographical regions.

What was achieved?

Large numbers of ewes from four major regions in NSW, representing all major enterprise type's and involving all the major breeds of ewes and rams involved in sheep and wool production in NSW, have provided joining and lamb survival data. All the objectives of this project have been accomplished.

Scanning data was collected on 98,272 ewes. The search for co-operators for involvement in this project was conducted under the conditions of drought. With the likelihood of high and unknown numbers of empty ewes and given the need to have 60,000 to 80,000 pregnant ewes from which lambing data could be collected, it was essential that many more than 80,000 ewes be involved in the project at scanning stage.

The main sheep breeds, Merino and Border Leicester x Merino ewes, and Merino, Border Leicester and Dorset rams were represented in this project. Other breeds of ewes and rams were represented and these included Corriedale ewes and White Suffolk and Texel rams.

Sheep from the Monaro (13,075), Riverina (6,593), Southern (40,165) and Northern Tablelands (38,439) were represented in the project, with the emphasis being on the regions where grazing enterprises are the mainstay of production.

Scanning data was collected from 98,272 ewes. The numbers from the various enterprise types were; Merino self replacing enterprises (54,955), first cross lamb production (22,090) and second cross lamb production (21,227).

Lambing data was collected on 78,370 ewes. The numbers from the various regions and enterprise types were; Monaro (11,022), Riverina (5,716), Southern Tablelands (29,964), Northern Tablelands (31,668), Merino self replacing enterprises (45,927), first cross lamb production (16,273) and second cross lamb production (16,170).

Significant Results

Thirty two commercial producers have marked 81.5% of lambs from 91,833 ewes joined and 95.5% of lambs from ewes scanned in lamb, in a drought year after a string of drought years. All co-operators remarked that joining and lambing performances were down by an estimated 20% plus, due to drought. Some cooperators reported percentages down by well in excess of 20%. Assuming that the reduction in performances was half that reported by co-operators it suggested that in "normal years", the producers who have scanned their ewes would have the opportunity to achieve 90 to 95% of lambs marked from ewes joined and 105 to 110% of lambs are marked from pregnant ewes.

Solid benchmarks have been set with regard to joining and lambing performances in flocks where scanning is practiced, across a range of geographic areas and enterprise types. The project has thus provided information not previously available and a very strong foundation for decisions regarding adoption/examination of scanning technology. The work can thus be expected to stimulate the uptake/examination of scanning technology by producers who have, to date, expressed a degree of scepticism with regard to the technology.

Commercial producers are often slow to adopt findings generated within "research institutions" and the usual comment is that they will wait until such time as results can be demonstrated under "practical conditions". No such attitude can be applied to the results of this project. Even the most cautious of producers could not deny what this group of 32 co-operators were able to achieve under difficult seasonal conditions.

When and how can the industry benefit from the work? Who can benefit from the work?

This project provides important baseline information on sheep reproductive performance and lamb survival in flocks that undertake routine scanning of pregnant ewes for litter size. The performance of these flocks is above industry averages, even in a period of severe drought, highlighting the significant benefits that can be obtained from this technology if properly applied and utilised to improve management of pregnant ewes. The industry as a whole will benefit from the findings of this project as additional producers adopt scanning technology and make appropriate changes to management of pregnant ewes to improve reproductive performance in their operations. Those producers that decide to adopt the technology will now also have access to important benchmarks against which to compare the success or otherwise of their efforts. The project is thus likely to further stimulate uptake/examination of scanning technology.

Reliable data comparable to that collected in this project, on lambing performances from un-scanned flocks are not readily available. This is a deficiency that will not be easily rectified. However, it can be confidently stated, that if all producers in the sheep and wool industry were achieving performances similar to those achieved by the co-operators in this project in 2006, a very significant advance would have been already realised, which has the potential to increase profitability of the sheep and wool industry.

Recommendations for further action

The uptake of scanning technology has been slow but steady over the last 20 years and whatever efforts are taken to encourage producers to adopt/examine the technology will be likely to maintain and possibly increase the rate of uptake. This would happen because sheep and wool producers are placing more emphasis on improving the lamb production component of their enterprises in response to diminishing returns from wool production.

Currently, many producers regard twin lambs as little more than a nuisance. If reproductive rates in general and lamb survival in particular are to be improved, producers need to be provided with the tools to firstly improve the survivability of twin lambs and secondly to ensure that surviving twin lambs achieve satisfactory growth rates and target weights. Scanning technology provides one of these tools, by allowing for identification of twin-bearing ewes for preferential feeding and management during pregnancy and lambing.

Contents

1 Background

Ultrasound scanning of ewes has been in commercial usage in the sheep and wool industry in Australia for about 20 years. There are about 20 commercial contractors scanning an estimated 3 to 4 million ewes annually. By any measure, it is clear that a minority of ewes in the sheep and wool industry are involved in the technology and that the uptake of the technology has been slow. The several reasons for this situation have been discussed in this report. The lack of objective information from commercial properties regarding lamb survival rates that might be realised from the correct management of ewes identified as single and twin bearing is a possible reason for limited and slow rates of uptake of scanning technology.

2 Project Objectives

The objectives of this project were to collect scanning data (empty, single or twin) and lambing data for between 60,000 and 80,000 ewes from sheep owned by co-operating commercial producers. The ewes involved in the project were to be selected from the ALS client list in order to ensure a range of breeds, "enterprise types" and sheep and wool production regions represented in the data collected.

3 Methodology

3.1 Collection of scanning data

The scanning data were gathered by two teams, each consisting of two men operating throughout the Monaro, Riverina, Southern and Northern Tablelands of New South Wales. During the period January to late August 2006, a total of 80 days were required to collect scanning data on 98,272 ewes. Co-operators were chosen so as to represent the major breed types and enterprise types that exist in the sheep and wool industry in eastern New South Wales. The sheep were scanned with the aid of sheep handling systems built by Dr Doug Fowler and used in association with a fully commercial sheep scanning and consulting operation. Each team traveled an average of 1000 kilometers per week and all costs including wages, sustenance, accommodation and vehicle usage, were met by ALS.

Each flock was examined at a time that did not exceed 105 days after the start of joining and was, at the same time, at least 45 days after the end of joining. For each flock that was scanned, the number of dry ewes, single-bearing ewes and twin-bearing ewes was identified and recorded for subsequent reporting purposes.

3.2 Collection of lambing data

Each cooperator allocated the pregnant ewes into lambing mobs based on litter size and/or age and allocated the mobs into lambing paddocks prior to the commencement of lambing. A questionnaire prepared by Dr Fowler was provided to each cooperator. Details of additional data collected are provided in Appendix 1 of this report. The questionnaire enabled the collection of all data needed to describe the lambing performance of each and every one of the 331 lambing mobs involved in this project.

MLA requested that additional data be collected as part of this project. These data related to predation, supplementary feeding, adverse weather events and other information that might be expected to impact on the lambing results. These data were collected as a part of the questionnaire provided to each co-operator.

In compiling this report ALS has completed the following tasks:

- Identification of suitable clients and contact to determine their willingness to participate.
- Prepare a written protocol of the exercise and provide each of the willing participants with a written copy of that protocol
- Preparation and distribution of the questionnaire provided to each co-operator.
- Collate the scanning and lambing data in such a way as to facilitate subsequent analysis.
- Arrange payment of rebates to co-operators on receipt of completed questionnaires.
- Prepare a final report for MLA.

3.3 Data files and explanatory notes

3.3.1 Summary Analyses

Summary analyses of the data by enterprise type and region were undertaken, with the results presented in this report. The original data for this project was also collated into a series of spreadsheet files, as described in Appendix 2, and supplied to MLA electronically for further analysis.

3.3.2 Explanatory notes

Lamb survival data is presented for mature single bearing ewes, mature twin bearing ewes and all maiden ewes (single and twin bearing). This was done for the obvious reason that mobs consisting of very few, twin bearing maiden ewes, are quite impractical. Under commercial conditions, maidens are regularly lambed down as maiden ewe mobs consisting of 98% plus single bearing maidens. There were 6 lambing mobs among the 331 mobs lambed down, which consisted of maiden, twin lambing ewes only. These mobs are identified in the relevant files.

There are fewer ewes for the lambing data than are identified as pregnant in the scanning data. This happened because not all ewes scanned as pregnant were kept to be lambed down. Among the pregnant ewes put into lambing groups and then into lambing paddocks, not all of the ewes were acceptable for inclusion in the lambing data. One reason for this was that in some situations, singles and twins were lambed in the one mob and the data was not used. Additionally some mobs were found to be running together when the mobs were brought in for lamb marking. In these situations, data that was acceptable was used and data that was unacceptable was not used. Yet another reason was that inconsistencies in the lambing data were such as to render the data as unacceptable (1,023 pregnant ewes from 1 cooperator were in this category). In total, there were 1,590 pregnant ewes that were put into lambing mobs and then into lambing paddocks but the lambing data was not used. As a result of these decisions there was a total of 78,370 pregnant ewes in 331 lambing mobs.

4 Results and Discussion

4.1 Results

4.1.1 Scanning

The scanning results for 98272 ewes are shown in tables 1 and 2.

Table 1 Scanning Results for ewes in four different regions of NSW

REGIONS OF NSW	Number ewes scanned	Percent Ewes empty	Percent Ewes with singles	Percent Ewes with Twins
Overall Monaro	13,075	15.2	69.4	15.4
Overall Riverina	6,593	13.0	45.2	41.8
Overall Southern Tablelands	40,165	18.5	60.1	21.3
Overall Northern Tablelands	38,439	8.3	65.6	26.1

Table 2 Scanning results for ewes in three different enterprise types and over all regions and enterprise types

ENTERPRISE TYPES	Number ewes scanned	Percent Ewes empty	Percent Ewes with singles	Percent Ewes with Twins
Overall Merino x Merino	54,955	14.9	70.8	14.3
Overall First Cross Lamb Production	22,090	16.0	59.2	24.8
Overall Second Cross Lamb Production	21,227	8.3	44.7	47.0
OVER ALL REGIONS AND ENTERPRISE TYPES	98,272	13.7	62.6	23.7

4.1.2 Lambing

The lambing results for 78370 pregnant ewes are shown in tables 3 and 4.

Table 3 Lambing results for ewes in four different regions of NSW

REGIONS OF NSW	Total number of ewes in all lambing mobs	Percent lambs marked from all pregnant ewes	Percent lambs marked from all pregnant maiden ewes	Percent lambs marked from all mature single lambing ewes	Percent lambs marked from all mature twin lambing ewes
Overall Monaro	11,022	90.8	73.8	84.4	128.5
Overall Riverina	5,716	102.4	73.1	85.7	132.7
Overall Southern Tablelands	29,964	92.8	76.9	84.4	131.3
Overall Northern Tablelands	31,668	98.3	79.8	82.0	144.1

Table 4 Lambing results for ewes in three different enterprise types and over all regions and enterprise types

ENTERPRISE TYPES	Total number of ewes in all lambing mobs	Percent lambs marked from all pregnant ewes	Percent lambs marked from all pregnant maiden ewes	Percent lambs marked from all mature single lambing ewes	Percent lambs marked from all mature twin lambing ewes
Overall Merino x Merino	45,927	88.0	74.6	84.2	123.7
Overall First Cross Lamb Production	16,273	97.3	82.5	82.0	132.3
Overall Second Cross Lamb Production	16,170	114.9	85.9	83.4	152.0
OVER ALL REGIONS AND ENTERPRISE TYPES	78,370	95.4	77.4	83.5	137.0

More detailed summary analyses are presented in Appendix 3.

4.2 Discussion

Over all regions and enterprise types in a year of severe drought and in a year following on from a "string" of drought years, some 1100 lambs were born from every 1000 pregnant ewes. Co-operators commented that scanning performances were well down (empty ewe rates up and twinning rates down) by comparison to previous years. When questioned as to the magnitude of the drop, the general comment was 20 percent plus (varying from 10 percent to 40 percent).

If it is assumed that the reduction in performances was half that reported by co-operators, it leads to the conclusion that in "normal years" the producers who have scanned their ewes will achieve 1200 plus lambs born from every 1000 pregnant ewes, 90 to 95% of lambs marked from ewes joined and 105 to 110% of lambs marked from pregnant ewes.

The impact of drought on performances is shown clearly in the results. Of the three major regions involved in this project, Monaro, Southern and Northern Tablelands, the highest performances were found in the least drought affected region i.e. Northern Tablelands. In addition, almost all co-operators were involved in two or three enterprise types on the one property.

Additional data relating to predation, supplementary feeding, adverse weather events and other information that might be expected to impact on the lambing results was also collected at the request of MLA. For 30 farms where lambing data was recorded, 28 fed some or all of their lambing mobs pre-lambing and13 fed during lambing. Eleven producers reported problems with predators, with eight of these listing foxes as the main predator. Dogs, crows and eagles were also listed as predators by two producers each, in some cases in combination with foxes. Only one producer (from Northern Tablelands region) listed adverse weather events, other than drought, as a problem during lambing. This producer averaged 56% lamb marking percentage for 5 mobs of merino ewes (56% for 1 mob of twins and 42% to 80% for four mobs of singles) and 28% for one mob of 1st cross ewes (singles).

5 Success in Achieving Objectives

The objectives of this project were to collect scanning data (empty, single or twin) and lambing data for between 60,000 and 80,000 ewes, from sheep owned by co-operating commercial producers. The ewes involved in the project were to be selected from the ALS client list in order to ensure a range of breeds, "enterprise types" and sheep and wool production regions represented in the data collected.

Large numbers of ewes from four major regions in NSW and representing all major enterprise type's and involving all the major breeds of ewes and rams involved in sheep and wool production in NSW have provided joining and lamb survival data.

The data has been collected, collated and analysed to the extent that was requested in order to report on the project. All the objectives of this project have been accomplished

6 Impact on Meat and Livestock Industry – now & in five years time

The impact of this project on the sheep and wool industry right now will depend upon the extent to which producers continue to take up scanning and other practices to improve sheep reproductive management.

Currently, many producers regard twin lambs as little more than a nuisance. If reproductive rates in general and lamb survival in particular are to be improved, producers need to be provided with the tools to firstly improve the survivability of twin lambs and secondly to ensure that surviving twin lambs achieve satisfactory growth rates and target weights. Scanning technology provides one of these tools, by allowing for identification of twin-bearing ewes for preferential feeding and management during pregnancy and lambing.

There are known to be 20 commercial scanning contractors operating at the present time and the number of ewes scanned approximates 175,000 for each scanning contractor. Based on these numbers, it is estimated that there are about 3.5 million ewes scanned each year in eastern Australia. Scanning of ewes as a commercial reality was not in existence in 1987 and a growth rate of 175,000 ewes scanned per annum would be needed to arrive at the estimate of 3.5 million ewes scanned each year. It is also known that at least half of the scanning operators have been in the scanning business for a mean of about seven years. This of course means that the annual increase in the numbers of ewes being scanned would be over 200,000 per annum over the last seven years. Whatever initiatives are forthcoming as a result of this project might result in an increased uptake of scanning technology to the point where possibly 300,000 additional ewes per annum were being scanned.

If there was no impact of this project on the meat and livestock industry and the number of ewes scanned each year continued to increase at the rate suggested above, there would be at least 5 million ewes being scanned each year from 2012 onwards. However, if this project and initiatives that may follow do have an impact and result in more ewes being scanned each year, then it follows that a more rapid increase in the numbers of ewes being scanned annually would be achieved.

7 Conclusions and Recommendations

The major advance now in place as a result of this project is that solid benchmarks have been set with regard to joining and lambing performances in flocks in NSW where scanning is practiced. The project has a very strong foundation for decisions regarding adoption/consideration of scanning technology. The work may stimulate the uptake or at least the consideration of scanning technology by producer's who have, to date, expressed a degree of scepticism with regard to the technology.

All sheep and wool producers should be made aware of the results of this project.

Commercial producers are often slow to adopt findings generated within "research institutions". The usual comment is that they will wait until such time as results can be demonstrated under "practical conditions". This study conducted in commercial conditions can help to demonstrate this practical application and therefore has the potential to overcome some of these concerns.

The reluctance on the part of sheep and wool producers to adopt scanning technology is not different to their reluctance to adopt many new technologies and is the fear that they will not be able

to implement the technology in such a way as to allow them to recoup the costs and show a positive return on the investment. However, even the most cautious of producers could not deny what 32 cooperators were able to achieve, in a drought year and following a string of drought years.

Whatever information exists with regard to scanning and lambing performances in commercial flocks that have been scanned and in which the pregnant and lambing ewes have **NOT** been managed with regard to their pregnancy status, should be collected. Such information would be valuable for comparative purposes with the results of this project. In fact such data could well exist within the whole of life wool project. Whatever data was forthcoming from that source would be from Merino x Merino enterprises. Within this project there is scanning and lambing data for almost 50000 ewes that would be comparable to whatever is collected and is suitable from the whole of life wool project.

8 Appendices

8.1 Appendix 1

Additional data was collected from each co-operator at lambing and supplied for additional analyses as required. Data was collected on the following items for each lambing mob:

- Shearing date
- Joining date
- Start lambing date
- Rainfall in 3rd month pre Joining
- Rainfall in 2nd month pre Joining
- Rainfall in 1st month pre Joining
- Breed of ewe
- Age of ewe
- Breed of ram
- Litter size
- Ewes (pregnant) put into lambing paddock
- Ewes at lamb marking
- Number of lambs marked
- Percent lambs marked
- Number ewes died
- Percent ewes died
- Are of lambing paddock
- Topography of lambing paddock
- Aspect of lambing paddock
- Shelter in lambing paddock
- Did co-operator bait for foxes ?
- Did neighbour bait for foxes
- Was predation a problem
- If predation was a problem, which predator?
- Any adverse weather events?
- Details of adverse weather events
- Did co-operator feed ewes prior to lambing
- Did co-operator feed ewes during lambing
- Feeding Details
- Feeding Duration

8.2 Appendix 2 – Data files

The data from this project was collected and supplied to MLA in a series of Excel spreadsheet files, as listed below.

File name	Description
H1 FinRep, N Tab, ScanDat Sh 1,2,3.xls	Scanning data for Northern Tablelands
H2 FinRep, N Tab, LambDat Sh 1,2,3.xls	Lambing data for Northern Tablelands
H3 FinRep, S Tab, ScanDat Sh 1,2,3.xls	Scanning data for Southern Tablelands
H4 FinRep, S Tab, LambDat Sh 1,2,3.xls	Lambing data for Southern Tablelands
H5 FinRep,Monaro, ScanDat Sh 1,2,3.xls	Scanning data for Monaro
H6 FinRep,Monaro, LambDat Sh 1,2,3.xls	Lambing data for Monaro
H7 FinRep, Riverina, ScanDat Sh 1,2,3.xls	Scanning data for Riverina
H8 FinRep, Riverina, LambDat, Sh 1,2,3.xls	Lambing data for Riverina
H9 FinRep, All Region, ScanDat Sh1 only.xls	Summary Scanning data for all Regions
H10 FinRep, All Region, LambDat Sh 1 only.xls	Summary Lambing data for all Regions
H11 FinRep Tables Sh 1 only.xls	Summary Tables
H12 FinRep Financial Report.xls	Project Financial summary
H 13 lambing Data Codes.xls	Codes for lambing data questionnaire

There is one file for each region and three pages in each file, with each page in each file being for one enterprise type. Thus, there are 4 files each consisting of 3 sheets which contain all of the scanning data. There are another 4 files which also contain 3 sheets per file which contain all of the lambing data. There are an additional 4 files in excel format. One file (H9) collates the overall scanning data and another (H10) collates the overall lambing data (both emailed to ES). One more file (H11) in excel format contains the tables used in the body of this report. Excel file (H12) contains all of the financial details associated with this project and has been forwarded to MLA as part of the Administrative Details Report.

8.3 Appendix 3 – Additional analyses of lambing data

8.3.1 Demographics of lambing data

A total of 329 lambing mobs from 30 properties were included in the lambing data analysis, distributed among regions and enterprises as shown in Table A1.

Table A1. Distribution of flocks and lambing mobs by region and enterprise type

		Monaro	Northern Tablelands	Riverina	Southern Tablelands	Total
Overall	Mobs	65	139	19	106	329
	Flocks	4	14	2	10	30
Merino	Mobs	40	67	12	60	179
	Flocks	5	10	3	8	23
1st X	Mobs	23	28	4	21	76
	Flocks	5	10	2	5	19
2nd X	Mobs	2	44	3	25	74
	Flocks	2	7	2	5	13

220 mobs comprised single-bearing ewes, while 109 mobs were twin-bearing and 56 were maidens while 273 were adults. Less than one quarter of merino mobs were twin-bearing, compared to 39% and 51% for 1st and 2nd cross, respectively (Table A2).

Table A2. Distribution of single and twin-bearing mobs by enterprise type

	Single	Twin	% of Twins in Total	Total
Merino	138	41	23	179
1st X	46	30	39	76
2nd X	36	38	51	74
Total	220	109	33	329

8.3.2 Lamb marking percentages

Lamb marking percentages were lowest for Merinos and highest for 2nd cross ewes and tended to be lower in the Monaro and higher in the Riverina (see Table A3).

Table A3. Mean lamb marking percentages by region and enterprise type

Region	Mer	1st X	2nd X	Total
Monaro	97.4	101.1	82.6	98.5
Northern Tablelands	94.3	105.0	127.2	106.8
Riverina	105.4	112.8	124.3	111.1
Southern Tablelands	95.8	103.8	129.6	105.0
Total	96.2	103.9	127.1	104.7

8.3.3 Lamb mortality rates

Lamb mortality rates for adult ewes are summarised in Table A4 and for maidens in Table A5. Mean mortality rates for adult singles varied from about 13% to 20%, depending on region and enterprise type, but were as high as 30% to 39% in some flocks and up to 72% in one flood-affected flock.

Mean mortality rates for adult twin-bearing ewes ranged from 20% to 40%, with losses as high as 40% to 50% in some mobs and 72% in one flood-affected mob.

Table A4. Lamb mortality rates for adult ewes by region and enterprise type

		Singles			Twins		
		1st X	2nd X	Mer	Mer	1st X	2nd X
Monaro	Maximum	30	17	36	48	42	-
	Mean	18	17	13	33	33	-
	Minimum	7	17	0	23	17	-
Northern Tablelands	Maximum	72	26	57	72	42	45
	Mean	17	13	17	36	30	21
	Minimum	0	0	0	15	15	8
Riverina	Maximum	17	18	17	44	37	29
	Mean	13	18	15	37	31	27
	Minimum	9	18	11	33	25	26
Southern Tablelands	Maximum	39	23	33	52	42	43
	Mean	21	16	14	38	34	25
	Minimum	12	9	2	21	27	7

Mean lamb mortality rates for maiden single-bearing ewes ranged from about 14% to 30%, with rates in individual mobs as high as 51%. There were only 7 twin-bearing mobs reported, with lamb mortality rates up to 57% recorded.

Table A5. Lamb mortality rates for adult ewes by region and enterprise type

		Singles			Twins	
		Mer	1st X	2nd X	Mer	2nd X
Monaro	Maximum	21	14	32		
	Mean	21	14	26		
	Minimum	21	14	20		
Northern Tablelands	Maximum	21	41	51		28
	Mean	17	24	22		23
	Minimum	13	9	3		18
Riverina	Maximum			39	51	
	Mean			30	45	
	Minimum			20	38	
Southern Tablelands	Maximum		35	33	57	48
	Mean		27	27	57	40
	Minimum		18	19	57	33

8.3.4 Month of lambing

Five flocks (34 lambing mobs) lambed from March to June, while the remaining 25 flocks (295 lambing mobs) lambed during July to September (see Table A6).

Table A6. Distribution of month of lambing by numbers of flocks and lambing mobs

Month	March	May	June	July	August	September	Total
Flocks	1	3	1	8	12	7	30
Mobs	7	22	5	74	148	73	329

Lambing percentages were highest for 2nd cross mobs lambing in July (23 mobs from 3 flocks, averaging 137%) and lowest for merino mobs lambing in all months (Table A7).

Table A7. Mean lamb marking percentages by month and enterprise type

Month	Mer	1st X	2nd X	Overall
03		113	124	118
05	100		96	98
06	79			79
07	95	106	137	112
08	92	99	114	99
09	92	103	105	93
Overall	92	103	119	101