Section Editor:
Suzanne Holbery
SARDI, Minnipa Agricultural Centre

Livestock

Management strategies to improve lamb weaning percentages

Jessica Crettenden and Suzanne Holbery
SARDI, Minnipa Agricultural Centre

RESEARCH

Location: Minnipa Ag Centre
Rainfall
Av Annual: 324 mm
Av GSR: 241 mm
2013 Total: 334 mm
2013 GSR: 237 mm
Livestock
Enterprise type: Mixed farming
Type of stock/breed: Merino

Key messages

- **Lamb survival increased by 10% from 2012 to 2013 by following a management system developed from Lifetime Ewe Management (LTEM)[1] principles.**
- **Pregnancy scanning is essential to understand flock potential and assists with managing ewe nutrition which is critical to lamb survival.**
- **An on-farm autopsy can provide valuable information to address lamb survival issues.**

Why do the trial?

Benchmarking is a tool used to identify and measure areas that can be improved and should be considered an essential component of a mixed farming business. An opportunity exists in many livestock enterprises to improve reproduction. In this study this opportunity was addressed by identifying, and understanding, the timing and causes of lamb losses from pregnancy scanning through to weaning. Lamb survival issues that have been recognised can then be reduced by implementing management, genetic and/or feed and forage strategies whereby a significant economic benefit accrues to the industry.

Research into identifying the causes of lamb deaths conducted in 2012 (EPFS Summary 2012, p 120) was partly inconclusive because 49% of deaths were un-diagnosed or the lambs were not found. The recommendations from the 2012 study were used as the basis for this project in 2013, which employed various flock management strategies to improve weaning percentages and closely measure and monitor flock performance.

How was it done?

A management system from joining to weaning was developed using guidelines outlined in the Lifetime Ewe Management (LTEM)[1] program in addition to recommendations from the 2012 study.

On 6 February 2013 the 350 flock ewes, which included 130 maiden ewes, were weighed, condition scored and drafted into six randomly selected single-sire mating groups of approximately 48 ewes, ensuring each had equal amount of ewe ages. Another group for artificial insemination (AI) consisted of 64 ewes that had successfully reared one or more lambs to weaning in the past two years. A February joining was chosen being close to the time of peak fertility in this environment and in attempt to match the ewe and lamb nutrition requirements with feed availability (whilst also reducing the need to supplement feed). Rams were allocated and released into their selected groups on 7 February. The AI group was laproscopically inseminated on the same day, apart from two ewes that did not meet the health requirements and five ewes which were inseminated the previous day for demonstration purposes. A back-up ram went out with the AI mob ten days after insemination. Rams were removed on 21 March for a six week joining. At this time ewes were weighed, condition scored and re-established as one mob.

Ewes were pregnancy scanned on 13 May, 13 weeks after the start of joining. Pregnancy scanning identified dry, single and multiple bearing ewes to ensure nutritional requirements could be better managed mid to late pregnancy and throughout lambing. Ewe health was monitored, and maintained through vaccination against common livestock diseases and fly, lice and worm protection.

The vaccine also contained Selenium for improved immune system performance and the vitamin B12 to assist with the ewe's ability to cope with stress.

Monitoring for predator activity via trail cameras with day and night-time capability began in March and continued until the end of lambing. Predator monitoring also included recording of visual observations on the property. Fox lights (devices designed to randomly flash in alternating sequences to simulate the headlights of a vehicle or flashlight typical of hunting procedure with firearms) were put out at beginning of lambing in strategic locations in each paddock in an attempt to frighten foxes away from the lambing ewes. Poison baits were put out on 15 July in response to a wild cat and fox population influx, presumably as a response to lambing, until a rain event three weeks later. A trap was also put out at this time after multiple sightings of cats in a particular paddock. As a demonstration of another predator control option, two wether alpacas were run with the AI mob throughout lambing.

Six paddocks ranging from 3.4 to 6.2 ha in size were chosen for lambing based on feed availability, shelter and optimal space for individual ewes to bond with their lambs after birth. Paddocks consisted of mallee scrub, saltbush, olive trees, annual grasses, medic and broadleaf weeds. Prior to lambing, paddocks were monitored and biomass cuts were taken and tested to ensure that ewes would receive their nutritional requirements. Biomass was also measured on 11 and 23 July to estimate feed on offer. Ewes in paddocks with high stocking rates were allowed access to neighbouring broad-acre pasture once feed reserves became low. Supplements in the form of licks and blocks were provided ad lib from the start of lambing until weaning. Oaten hay was tested for nutritional quality and provided ad lib towards the end of lambing as fresh pastures began to deteriorate.

Ewes were side-branded (for identification) and drafted into lambing groups on 27 June based on their pregnancy scan result. There were four mobs of approximately 45 ewes bearing multiple lambs, one group of 69 single-bearing ewes, the AI mob of 64 ewes and a mob of dry ewes. The AI ewes remained as one mob throughout lambing and were not drafted according to pregnancy scan result.

Lambing commenced on 4 July and the last lamb was born on 17 August. Lamb birth dates were recorded daily, lambs were individually identified (to both sire and dam) and tagged. Birth weight, birth type, rectal temperature, lamb vigour and ewe maternal temperament was also recorded, along with any other observations about ewe or lamb behaviour. In the case of lamb death prior to weaning a basic autopsy was conducted to establish the most likely cause of death. If the cause of death could not be determined laboratory analysis was used to make a diagnosis.

Lamb marking was undertaken on 22 August and included tail docking, castrating, EID ear tagging and vaccination. At weaning on 18 October lamb and ewe weights were recorded and ewes were condition scored to measure the impact of lambing and to understand their requirements for recovery.

What happened?

From the 350 ewes joined, 534 lambs were scanned, equating to 153%. One sire group had a below average result with 29 out of 45 (56%) ewes scanning dry. After establishing that the ram had no physical injury or abnormality, it was concluded he had an unknown fertility issue.

The result for the 350 ewes included 46 dry, 89 singles, 202 twins, 11 triplets and 2 quadruplets. At birth 531 lambs were tagged, equating to152%, including lambs that were found deceased at the birth site. The number of lambs weaned was 448, equating to 128%. In the AI group, 45 out of the 62 ewes inseminated became pregnant with 69 lambs weaned, equating to 111%.

Birth weight (measured at 2-24 hours after birth) ranged from 2.5 to 8.2 kg, averaging 5.4 kg for singles, 6.1 kg for twins, 5.3 kg for triplets and 4.8 kg for quadruplets. Rectal temperature measured on live lambs ranged from 34.5 to 40.5°C with an average of 39°C. The ewe maternal temperament and lamb vigour was measured as an objective score of 1 to 5 (with 1 being poor and 5 being excellent). Interestingly, the maternal temperament score increased with the higher number of lambs born per ewe with a score of 3.5, 3.6 and 4 for the singles, twins and triplets/quadruplets respectively. However, this can possibly be explained by the greater number of maiden and younger ewes that gave birth to single lambs as opposed to multiples (indicative of better maternal instinct in older ewes).

Between scanning and weaning, five ewes died from reproductive-related causes including pregnancy toxaemia, dystocia (labour difficulty) and mastitis. Between tagging at birth and weaning 83 lambs died, with 24% of carcases 'not found' and autopsies unable to be conducted on 10% of the deceased lambs due to secondary predation. These were labelled 'undiagnosed'. The majority of lambs died when they were less than a week old (70%), with 32% of these dead within the first day. Of the deceased lambs, 29 were born to maiden ewes. There were more deceased multiples (83%) than singles (13%), with 4% recorded as unknown birth type. The autopsy results are displayed in Figure 1, which also shows the results from the 2012 study.

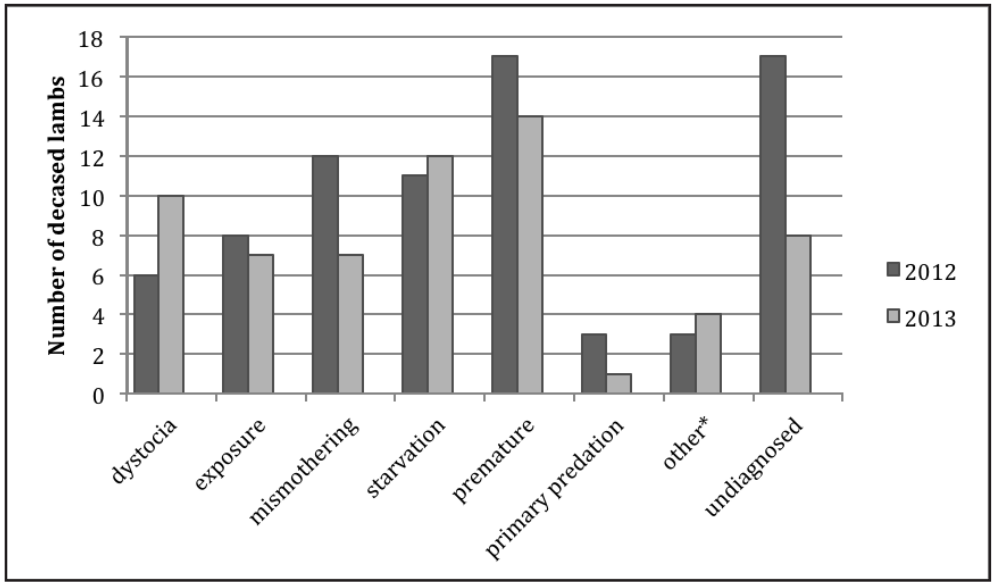

Figure 1 Autopsy results for the deceased lambs in the Minnipa Agricultural Centre flock 2012 and 2013 drop from birth until weaning

**other includes injury, infection and misadventure*

Note: the 43 (2012) and 20 (2013) 'not found' deceased lambs are not displayed on the graph

Table 1 The reproductive performance of the Minnipa flock in 2012 and 2013

Year	Ewes joined	Pregnancy scanning	Lambing	Weaning	Lamb deaths*	Foetuses**
2012	374	557 (149%)	563 (150%)	443 (118%)	120	30%
2013	350	534 (153%)	531 (152%)	448 (128%)	83	25%

**lambs deceased during or after birth*

***per cent mortality from scanning through to weaning, including foetuses aborted*

Monitoring pre-lambing suggested that predator populations were low. However, one week into lambing it became clear from autopsy data that predators had moved into the area. From March until the end of August there were thirteen sightings of cats, eight of foxes, two of dogs and two of eagles. A baiting program was implemented with baits placed at strategic locations in close proximity to the lambing ewes and water points. Over the baiting program only two out of ten baits were taken suggesting there was enough afterbirth and carcases to scavenge during this time. Fox lights may have worked as a deterrent for a short time after they were initially installed in the paddocks but any effect was short lived as predators became accustomed to their presence.

What does this mean?

Using a 'best practice' management system assisted the Minnipa flock to increase lamb survival percentage by 10% (Table 1).

Each individual cause of lamb death from conception to weaning was analysed separately to identify the sequence of events that occurred to both the ewe and lamb during this time. With this information, targeted responses could be implemented immediately and/or into the future.

Lamb survival is an important factor determining success in a flock and this is driven by ewe performance. The importance of understanding ewe nutrition requirements during pregnancy and throughout lambing was the major catalyst for the success. Pregnancy scanning was the initial process by which nutritional decisions needed to be made, as the use of this information and subsequent changes in management practices reduced the chance of potential losses. In particular, the information obtained from scanning for single and multiple bearing ewes increased flock productivity considerably, as multiple bearing ewes required different amounts of nutrition to single bearing ewes and dry ewes, given that a foetus can grow two thirds of its actual size in the third trimester.

In 2013, fewer deaths were associated with starvation, mismothering and exposure (referred to as the SME complex) collectively when compared to 2012. This is most likely attributed to better managed, multiple bearing ewes and a subsequent increase in lamb birth weight combined with reduced stocking rates to alleviate the likelihood of mismothering. By managing ewe nutrition according to pregnancy status, maintenance of body condition in single and twin bearing ewes could be maintained. This result is highlighted by an increase in lamb birth weight of 0.4 kg and 0.6 kg in twins and triplets/ quadruplets respectively from 2012 to 2013. Associated benefits included the ewe spending more time at the birth site (allowing lambs to obtain their first essential drink containing colostrum to build their immune system), better ewe milk supply, more energy for labour and healthier lambs that were able to follow their mother during grazing and were not as susceptible to predation.

More dystocia diagnoses were given in 2013 than in the 2012 study due to the implementation of a more advanced autopsy procedure that explored the complexity of the birthing process and the role that difficulties during labour can have on lamb development post-birth. Dystocia is an issue generally associated with large lambs, which can be caused by excess feeding of predominantly single-bearing ewes, particularly in the last trimester. Problematic labour can be common in maiden ewes or is caused by incorrect presentation of the lamb/s during birth. Dystocia may be more of an issue than originally believed, and can easily be misdiagnosed. Information suggests that haemorrhaging of cerebral tissue and the spinal cord can occur in lambs which have a difficult, or unusually long birth, this can damage the innate response to suckle. Basic post-mortem examination would label these lambs as death due to the SME complex, however further investigation may detect partial haemorrhaging of the brain, confirming cause of death to be a result of dystocia. Cause of death by dystocia can be minimised by correct ewe nutrition, which will better manage lamb size and will also provide ewes with sufficient energy to cope with their labour. However, poor presentation i.e. a lamb that is not correctly positioned during birth, is unavoidable.

The second year of the study found that shelter and paddock allocation go hand-in-hand with managing ewes according to their pregnancy status. Plenty of dense shelter and good quality feed needs to be provided to the multiple-bearing ewes. Single lambs tend to be larger and stronger when first born and have access to more colostrum therefore they are not as susceptible to hypothermia. Paddock design also needs to be considered to allow for bonding between the ewe and lambs.

Unfortunately, some deaths to some extent are inevitable, for example prematurity, misadventure, infection and injury. Some cases of premature deaths are caused by poor nutrition and stress, which can be rectified to prevent death in utero. At lambing time, mobs should be checked regularly (every 1-3 days) but should have minimal disturbance. Losses due to ewe physical abnormalities can be avoided by regular monitoring and treatment where appropriate. Checking udders at weaning time is important (if individuals have not been identified during lambing) in order to determine if the ewe has reared a lamb, lambed and lost, or is dry. Ewes should be culled if they have not reared a lamb for two consecutive years.

The study has found that primary predation was generally not an issue. Observations concluded that efforts should be concentrated more to minimise predator numbers to reduce secondary predation of lambs that are weak or have been mismothered. Autopsies concluded that the majority of predated carcases were scavenged; hence predation was not the primary cause of death. However, it is essential that pest numbers are controlled in order to reduce the incidence of scavenging which builds up predator condition and can result in population increase around lambing time, and possible 'gang' attacks.

Determining your ewe's reproductive potential is the first step to increase weaning percentages – you don't know what you have lost unless you know what you started with. The most efficient way to acquire this information and subsequently better manage your ewes is through pregnancy scanning. The next step is to identify areas that can be improved to reduce the gap between the potential number of lambs and the actual number of lambs weaned.

[1]Lifetime Ewe Management (LTEM)[1] is a nationally accredited course developed from the LTW2 project, which developed management guidelines for improved understanding of the impact of ewe nutrition on the performance of the ewe and her progeny over their lifetime.

[2]Lifetimewool (LTW) was funded and supported by Australian wool producers through Australian Wool Innovation Limited, state government agencies and farm businesses. LTW has a series of ewe and pasture targets that increase productivity and profitability of the Merino sheep enterprise. There are also management guidelines for ewe flocks at all times of the year.

Acknowledgements

We gratefully acknowledge the funding by the South Australia Sheep Advisory Group (SASAG) through the Sheep Industry Fund (SIF) in addition to in-kind support from the South Australian Research and Development Institute (SARDI), Eyre Peninsula Grain and Graze 2 and an Australian Wool Innovation (AWI) project conducted in conjunction with this project. We would also like to thank Minnipa Agricultural Centre staff Mark Klante, Trent Brace and Brett McEvoy for their livestock management support and Emily Litzow (Primary Industries and Regions South Australia) for her technical expertise.