# Turning reproductive potential into reality

By Jason Trompf (J.Trompf@latrobe.edu.au, 0408 211 864)

## 1 Target lamb survival rates, factors contributing to and ultimate causes of lamb loss

Given the majority (75%) of sheep producers don't pregnancy scan for multiples (twins, singles and dries) it is difficult to get an accurate estimate of lamb survival on an industry wide basis. However, comparing common pregnancy scanning rates to marking rates, highlights that lamb survival could be improved significantly, with;

- merinos regularly scan 120-140 lambs/100 ewes joined, yet mark only 70-100 lambs/100 ewes joined,
- non-merino ewes regularly scan 140-170/100 ewes joined, yet mark only 100-130 lambs/100 ewes joined,
- consistently at least ¼ lambs (range from 15-50%) do not survive from mid pregnancy to lamb marking.

The first 48 hours of a lamb's life are critical, with around 80% of lamb mortality occurring within this period. Table 1 has the factors that contribute to and ultimate cause of lamb loss, and potential mitigation strategies.

**Table 1. Lamb loss- contributing factors and ultimate causes of loss, and potential strategies**

| Factors contributing to loss | Ultimate causes | Strategies to reduce lamb loss |
|---|---|---|
| Low birth weight | Starvation<br>Exposure<br>Predation | Nutrition in pregnancy (particularly twins)<br>Sheltered lambing paddocks<br>Predator control programs- dogs, pigs, foxes |
| Dystocia due to large lambs | Birth trauma | Nutrition in pregnancy (particularly singles)<br>Genetics - avoid high birth weight terminals |
| Ewes lacking energy to complete birth process | Birth trauma<br>Starvation | Nutrition in pregnancy<br>Feed-on-offer in lambing paddocks |
| Abandonment/ mismothering | Starvation<br>Exposure | Ewe condition at the point of lambing<br>Feed-on-offer in lambing paddocks<br>Mob size and stocking rate at lambing |
| Poor ewe milk supply | Starvation | Ewe condition at the point of lambing<br>Feed-on-offer or supplement for lambing |
| Predators | Predation | Coordinated control programs (trapping, baiting, shooting. Exclusion fences. |
| Adverse weather conditions | Exposure | Sheltered lambing paddocks |

The loss of lambs around the time of lambing is expensive, due to;

- ewes having been managed for reproduction, yet don't produce any return via lambs,
- a 20% reduction in ewe productivity (primarily reduced fleece weight) associated with lambing and lactation, about half of which is due to pregnancy and the other half is due to lactation, and
- the opportunity cost with wasting feed on ewes that could have been utilised by more productive ewes.

Target lamb survival rates that have been found to be achievable on-farm under best practice, are;

- 92% for merino single lambs (92 lambs marked/100 Merino ewes scanned 'single'),
- 75% for merino twin lambs (150 lambs marked/100 Merino ewes scanned 'twin'), and
- 95% for crossbred single lambs and 85% for crossbred twin lambs.

The 'Lamb Survival Indicator' below can be used to calculate your own lamb survival rates, by comparing overall scanning rates (foetuses or lambs scanned/100 ewes) to marking rates (lambs marked/100 ewes).

**Lamb Survival Indicator**

| | | |
|---|---|---|
| Number of ewes joined…… | | **A** |
| Number of lambs scanned…… | | **B** |
| **Scanning percentage (B ÷ A x 100)** =…… | | |
| Number of lambs marked…… | | **C** |
| **Marking percentage (C ÷ A x 100) =**…… | | |
| **Survival % scanning to marking (C ÷ B x 100) =** | | |

## 2 Summary of the critical success factors for lamb survival

The following provides a summary of the critical success factors for lamb survival;

### 1) Proactive management of ewe condition score:

**Ewe nutrition during pregnancy and at the point of lambing is without doubt the most important issue affecting lamb survival**. This is because the rate of survival for single and twin born lambs is mostly explained by difference in birth-weight and ewe condition score (CS) at lambing. Ewe nutrition directly affects birth weight, milk supply, the process of ewe/lamb bonding, lamb growth after birth and ewe mortality. It is much more efficient and effective to manage a ewe to preserve condition than it is to let her loose condition and have to feed it back on - proactive management of ewe condition score is critical.

There are three key aspects to this;

- you must assess the ewe's condition score by feeling how much tissue and fat is covering her loin area, backbone and short ribs (see demonstration on youtube - https://youtu.be/1F5V-GcG1Qk),
- you must assess the paddock feed for quantity and quality, plus know the quantity and quality of any supplement being provided, and
- you need to do an energy balance on the ewe and prepare a ewe condition score budget, that aims to maintain ewe condition in late pregnancy, particularly in twin-bearing ewes.

### 2) Tight and effective joining lengths of six weeks or less:

If the ewes lamb over a longer period it's very difficult to tailor nutrition to the entire mob. There are also flow-on effects, particularly when producers delay weaning to grow out the smaller lambs, as it compromises the ewes' opportunity to recover for their next reproduction cycle. This typically leads to a lower peak condition score, which adversely affects conception rates and means there is less scope for ewes to lose condition in the ensuing pregnancy/lactation.

The aim at joining is for;

- both ewes and rams in condition score 3-3.5, by targeted management between weaning and joining,
- imprint feed and wean lambs by 14 weeks of age (from the start of lambing) to drive ewe recovery because on average one condition score increase is worth 20 lambs conceived/100 ewes joined,
- it takes 8 weeks for sperm production so within 8 weeks of joining rams should not be shorn and prior to joining must be regularly inspected and treated for any flystrike and/or lameness, follow the 'managing rams for joining - the five T's checklist' www.leadingsheep.com.au/.../leading-sheep-managing-**rams**-for-**joining**, and
- with fit ewes and rams, and adequate ewe-ram contact (at least 2 rams/100 ewes) then 70% of lambs will be conceived in the first cycle, meaning there is no need to join for more than 2 cycles (5 weeks).

### 3) Pregnancy scanning for multiples:

Scan to determine single or multiple pregnancies then separate ewes into their categories – dry, single and twin-bearing and allocate nutrition accordingly. Ewe nutrition in the last 60 days of pregnancy relates directly to lamb birth weight, with low birth weight and too high birth weights accounting for about 60 per cent of lamb losses. **Participants in Lifetime Ewe Management that have adopted scanning for multiples and differential management of single and twin bearing ewes have increased whole flock marking rates by 14%.**

The key messages on the impact of ewe condition at lambing on lamb survival are;

- lamb survival increases with improved ewe condition at the point of lambing,
- ewe CS at lambing is more important than CS changes during pregnancy,
- single and twin bearing ewes should be in CS 2.8 to 3.0 and 3.0 to 3.3 (respectively) at lambing to maximize lamb survival,
- poor ewe nutrition and low CS at lambing has detrimental effects on maternal behavior and lamb behavior that contribute to increased mortality, ideally they should remain at the birth site for at least 6 hours,
- by pregnancy scanning for multiples (0, 1 and 2) and reallocating feed (paddock feed or supplement) away from singles towards twins, overall survival can be increased significantly, and
- to prepare for scanning watch the following youtube - https://www.youtube.com/watch?v=fPITK8uN3WM

**4) Paddock allocation and mob size for lambing:**

Both these strategies can be used to address two significant causes of lamb loss, particularly twins, being exposure and mismothering. Allocate twin-bearing ewes to the most sheltered paddocks, because the lower the lamb's birth weight, the greater the risk of death due to exposure. Lamb twin bearing ewes in smaller mob sizes to preserve privacy at lambing. The number of lambs born in a paddock each day governs the opportunity a ewe has for privacy to bond with her lamb at the birth site, which enhances the ewe's maternal behaviour. Other ways of dispersing the concentration of a lambing mob in a paddock is providing multiple water points and feed points, if supplement is being used.

Hence selecting and preparing lambing paddocks is a critical element of optimising lamb survival. The aim is to provide adequate feed and water, shelter and privacy. The impacts of each of these approaches are;

(i) Higher levels of feed on offer at the time of lambing remove the temptation of the ewe to move away from the birth site. Ideally the ewe and lamb should remain at the birth site for at least 6 hours because it can take this long before a ewe commits her lamb(s) to memory.

(ii) New-born lambs are susceptible to cold stress, which increases their risk of death. Lambs born during poor weather conditions maintain their body temperature by metabolising brown fat (energy reserves), shivering and drinking milk. However, these energy reserves can be quickly depleted and the risk of heat loss and cold stress depends on temperature, wind and rain.

(iii) A recent study has been undertaken to investigate the relationship between ewe mob size at lambing and marking percentage. The impact of mob size at lambing on twin born lambs was significant and there was 0.6% decrease in lamb survival per extra lamb born in a paddock on a given day. So for every 100 extra twin bearing ewes in the lambing paddock, marking rates drop by 11% (see Table 2 below).

**Table 2. Impact of decreasing the mob size of twin bearing ewes by 100 ewes for lambing**

| **Mob size** | **200** | **100** |
|---|---|---|
| Number of foetuses | 400 | 200 |
| Lambs born per day (assume 75% born over 17 days) | 17.7 | 8.8 |
| Difference in lambs born per day | +8.9 | |
| Difference in lamb mortality (%) | +5.3 | |
| Difference in marking rate per 100 twin-bearing ewes (%) | **+10.7%** | |

**5) Lamb marking day is a sheep producers 'yield mapping day':**

It is critical to plan ahead for lamb marking, in particular so that you have adequate labour on hand. Good lamb marking data linked back to mobs and paddocks takes some attention to detail. Do not box mobs up on the way to lamb marking, as this will just lead to an averaging of results, making it much harder to identify corrective action for next year based on mob and paddock information. During lamb marking, wet and dry ewes to identify those ewes that failed to rear lambs, as per the youtube video 'how to check ewes for wet and dry udders'- https://www.youtube.com/watch?v=ceL3i5IdOxo.

Ewes that fail to rear lambs have 60-70% lower lambs survival the next year than ewes that actually reared at least one lamb. Identify dry ewes and cull them from the breeding flock if they ever reoffend by lambing and loosing again. Be wary of culling ewes that don't rear a lamb in years when overall lamb survival rates are low as there may have been extenuating circumstance beyond the ewes' control (eg. nutrition levels or predation).

## 3 Economics of lamb survival

The value of an extra lamb is very sensitive to meat prices, even in merino systems. Recent economic analysis (Young *et al*. 2014) showed that in a self-replacing merino system turning the wether portion off at 17 months **the net value of an extra merino lamb doubled when meat price rose from $3 to $5/kg carcass**. Hence at an industry level the cost of lamb loss is profound and the analysis showed that the net value of an extra lamb surviving birth in a pure Merino system to be worth $62, and $85 in a meat system (Young *et al*. 2014). The loss of lambs equates to over $700m in potential revenue lost per year for the sheep industry.

**Increasing conception is less valuable than increasing survival** because improving conception leads to a higher proportion of twins and twin lambs have a lower survival rate. At current twin survival rates a 10% increase in scanning may only lead to as little as 2.5% increase in weaning rate. As a result the value of an extra lamb through improved conception in a Merino system, at twin survival rates of 50% is just $22 (Young 2011- Sheep Reproduction RD&E Plan). It is not until twin survival rates are increased to 60% and beyond that increasing conception becomes viable and leads to notable increases in whole-farm profit (Figure 1).

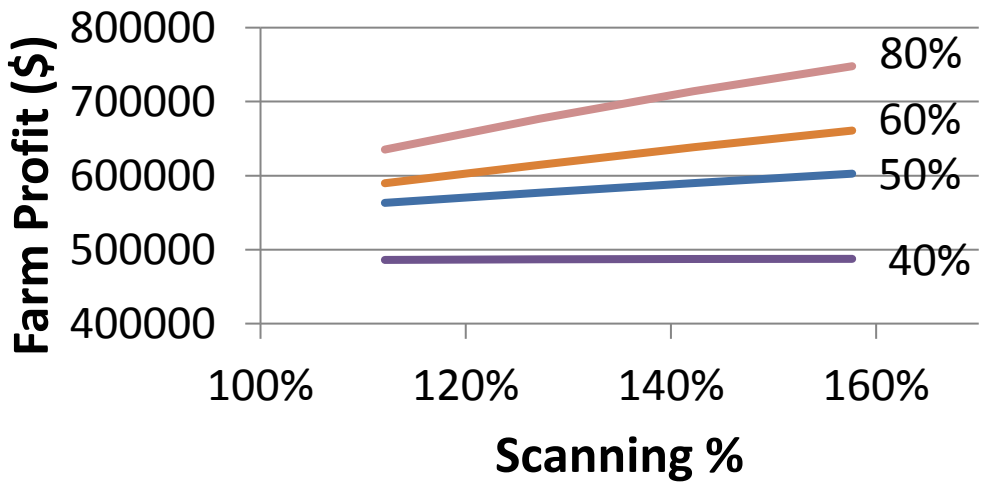


**Figure 1. Change in profit (10,000 ewe flock) with scanning % at varying twin lamb survival rates**

The value of increasing weaning rate depends on the sheep system operating. In self-replacing Merino systems the earlier the turn-off of wethers the greater the increase in profit from lifting weaning rate (Figure 2).

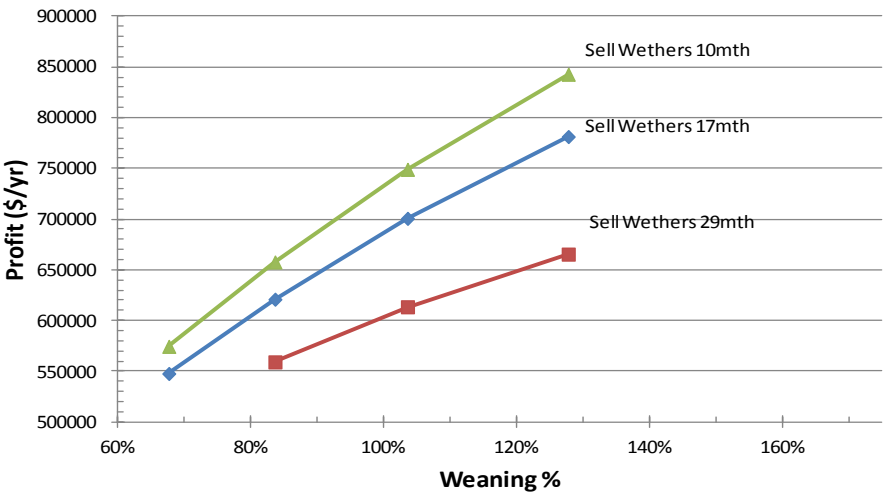


**Figure 2. Change in profit (10,000 ewe flock) with weaning % for different Merino systems**

## 4 Sheep industry update on reproduction rates and contributing factors

Key points in relation to marking rates (lambs marked to ewes joined) in the Australian sheep flock;

- In the 15 years from 1990 to 2005 Australia's lamb marking rates had remained stable at around 80%,
- In the 10 years since 2005 the marking rate has increased significantly by about 1% per annum, from 81% in 2006 to 92% in 2014/15 , which is the highest ever recorded,
- The Sheep Industry Strategic Plan (SISP 2015) is targeting a 5% improvement by 2020 in order to ensure consistency of lamb, mutton and wool supply and simultaneously sustain the national flock,
- Improving lamb survival is the primary avenue to lift marking rates, where at an industry level the cost of lamb loss is estimated to be about $700m in potential revenue lost per year (Young et al. 2014).

To better examine the gains in marking rates and remove the fluctuations that occur in individual seasons, in Table 3, the average marking rate for the five years from 2002/03 to 2006/07 is compared to the marking rate achieved in the last five years, 2010/11-2014/15. Table 1 shows;

- national marking rates have increased by 9% between these two periods examined,
- the states have varied in their marking rate gains from 10% in NSW to 4% in QLD,
- most states had a consistent trend in marking rates in the years studied, with the exception of QLD where the lift in the recent 5-year average was driven by the marking result in 2010/11 alone .

**Table 3. Changes in national marking rates from 2002/03-06/07 to 2010/11-14/15 and by state**

| | Australia | NSW | SA | VIC | WA | QLD |
|---|---|---|---|---|---|---|
| Average marking rate 02/03-06/07 | 81% | 80% | 86% | 86% | 80% | 63% |
| Average marking rate 10/11-14/15 | 90% | 90% | 95% | 94% | 86% | 67% |
| Increase in marking rate | 9% | 10% | 9% | 8% | 6% | 4% |

(Based on ABS, ABARES and MLA/AWI data, analysis by Kimbal Curtis, Livestock Dynamics, 2016)

The key factors contributing to the national gains in marking rate of 1% per annum since 2005 are;

- A doubling in the number of non-merino ewes in the national flock from 15% to 30% of the flock, which consistently mark at least 20% more lambs than is achieved in merino to merino matings,
- With the exception of WA and QLD, where the number of non-merino ewes has increased to 20% of the WA and QLD flocks however there was no advantage in marking rate derived from that, with non-merino ewes in those states not marking any more than merino ewes on average,
- Significantly higher rainfall and better growing seasons in the last 5 years examined compared to between 2002 and 2007, where almost all of NSW, SA and VIC went from receiving decile1-3 rainfall between 2002 and 2007 to at least average rainfall or above between 2010 and 2015,
- Whereas rainfall in WA didn't improve over the periods examined and QLD experienced slight improvements but was variable across the state,
- Lifetime Ewe Management (LTEM) that has reached over 3,000 producers representing almost 25% of the national ewe flock, lifting their marking rates by 8% on average, as well as reducing ewe mortality by 30%, whilst increasing stocking rates by 10%, and a satisfaction score of 8.5 out of 10.