EverGraze
More livestock from perennials

More perennials
Better livestock
Healthier catchments

Exchange

Improving survival of lambs

EverGraze has developed profitable farming systems that integrate the use of perennial pastures, high performing livestock enterprises and best management practices with a whole farm approach.

An integral driver of these productive sheep systems is achieving a high lamb survival rate with high lamb marking percentages flowing through to high weaning rates. The national reproductive performance (lambs marked per ewe joined) of the Australian sheep industry has seen little change over the last two decades. To ensure the long term sustainability of the industry and to improve the profitability of lamb production systems, lamb survival and marking percentages need to be improved.

EverGraze research has demonstrated that perennial pastures and shrubs can improve lamb survival through provision of high quality forage and shelter. This EverGraze Exchange draws together the science behind lamb survival (both from EverGraze and previous research) and provides recommendations for practices which can be considered to address lamb survival issues on farm.

Exchange summary

- Increasing weaning percentages by 10 percent can increase the average gross margin /hectare by 10 percent in a prime lamb operation or by $5-$6 per ewe.
- Lamb birth weight has the biggest influence on lamb survival in the first 48 hours. The optimum birth weight range in Merinos is 4.5 to 6.0kg. Heavier genotypes may be able to carry larger lambs.
- To increase lamb survival, focus needs to be on improving the survival of twins or triplets (multiples) as they are more susceptible than single lambs.
- In the high rainfall zone sheep production environments, the key strategies which producers can implement to improve lamb survival and marking percentage are:
  1. Manage feed on offer and ewe nutrition during pregnancy and at lambing to achieve condition score targets.
  2. Provide shelter to reduce wind speed and chill effects on lambs, particularly for multiples in an environment where high chill during lambing is a problem.
  3. Lamb down in mob sizes that reduce the incidence of mis-mothering.
  4. Minimise the impact of dystocia through ewe nutritional management and sire selection for low to moderate birth weight ASBVs.
  5. Minimise the impact of animal health issues on ewes and lambs by addressing nutrition, worms and disease.

Shelter aids twin lamb survival

FUTURE FARM INDUSTRIES CRC
awi Australian Wool Innovation Limited
mla MEAT & LIVESTOCK AUSTRALIA

Grass hedgerows at Hamilton EverGraze Proof Site increased weaning percentage by 30 percent

The cost of lamb mortality

Lamb mortality in the high rainfall zone of southern Australia has not improved in the last 20 years and represents a reduced income of around $100m per annum to the sheep industry.

The failure of a ewe to rear a lamb contributes to a number of inefficiencies across the range of sheep production systems.

Over 90 percent of income generated in a specialist prime lamb system and over 50 percent in a Merino terminal system is generated from the sale of livestock. The survival of lambs to marking is therefore a significant driver of profit in both these systems.

Although livestock sales contribute less to income in self-replacing Merino systems, lamb survival is still an important driver of profit in these systems.

Higher marking percentages allow increased selection pressure, greater flexibility in flock structures (e.g. supporting a younger ewe flock) and potentially faster genetic gain.

Marking percentages of only 70-80 percent reduce the efficiency and profitability of Merino enterprises.

Modeling was been undertaken as part of Lifetime Wool found that flocks which were below optimum condition score targets were $3.00-$5.00 per ewe less profitable than those managed to recommended targets, largely due to higher lamb and ewe mortality.

Furthermore, in a prime lamb operation, increasing weaning percentage by 10 percent can increase average gross margin per hectare by 10 percent. That is about $5-$6 per ewe.

The causes of lamb mortality

Seventy percent of lamb mortality between birth and marking occurs within the first 48 hours after birth. Lamb birth weight has the biggest influence on the survival of lambs during that period, particularly in colder environments.

Most lamb deaths occur at the extremes of birth weights. Heavier lambs die more often due to birthing difficulties and lighter lambs die due to reduced vigour, mis-mothering, exposure and starvation.

Losses in twin lambs are generally 2 to 2.5 times greater than singles in the same flock, mostly due to their small body weights and lower energy reserves, as well as competition for milk supply. This reduces their overall vigour during the first 48 hours making them more susceptible to death from starvation - mis-mothering-exposure (SME).

Large single lambs, especially males, have higher mortality due to trauma from birth difficulties (dystocia).

Lamb mortality does differ between breeds and breed crosses and there is also considerable variation in the extent of loss within regions and between years due to climate.

Industry targets are 90 percent and 70 percent survival for single and twin born Merino lambs respectively and 90 percent and 80 percent for single and twin born cross bred lambs.

The ability of flocks to meet these targets relies heavily on the management of ewe nutrition and shelter which will be discussed later.

Lamb survival is calculated on lambs marked as a percentage of lambs conceived (or born).

When thorough autopsy procedures are followed, the majority (greater than 80 percent) of lamb deaths are attributed to either the starvation - mis-mothering - exposure (SME) complex or dystocia.

In contrast to industry perceptions, while predation is common on dead lambs, it is not often diagnosed as the primary (first) cause of death and primary predation usually accounts for less than 10 percent of lamb deaths. Autopsy is an important tool for identifying the specific cause(s) of high mortality levels and these can often be property specific (eg: predation, cold exposure and infection).

Ensure ewes meet condition score 3 at lambing

The primary causes

1. Starvation - mis-mothering - exposure (SME) complex

Starvation, cold exposure and poor mothering ability are often interrelated factors that contribute to lamb death and is therefore known as the 'SME complex'.

Often in practice (unless thorough autopsies are conducted) it is difficult to separate exposure and starvation deaths because the two often occur together and compound. For instance; lambs that don't feed will suffer reduced heat production and are likely to become hypothermic, while lambs verging on hypothermia stop feeding.

The highest incidence is found in lambs with low birth weights. The reasons for starvation, mis-mothering and exposure include:

- Weak low birth weight lambs that don't have the energy reserves to find their first drink of colostrum and die from starvation and/or exposure.
- Failure of the ewe-lamb bond to establish. It takes up to six hours for a ewe to bond with her lamb and twice as long for a lamb to recognise its mother.
- Delayed milk production as a result of poor nutrition in late pregnancy, mastitis, breed or first lambing related deficiencies.
- Low quantity and quality of pasture in lambing paddocks.
- Poor ewe nutrition during late pregnancy.
- Ewe condition at the point of lambing.
- Lack of shelter in lambing paddock particularly for twins and triplets that are less resilient.
- Competition with other lambs.

Starvation

As well as poor maternal behaviour and hypothermia, starvation can also be the result of lack of available colostrum soon after birth and this can be a result of udder defects due to shearing injury, mastitis or to delayed lactation. The latter is usually a result of poor nutrition in later pregnancy. However, in Merinos, the let-down of colostrum is not always synchronised precisely with birth.

Mis-mothering

Mis-mothering occurs because the ewe has not developed a sufficient bond with her lamb.

Ewe age, breed, metabolic disease and management decisions relating to ewe condition, nutrition and shelter, will all impact on the ability of ewes to develop this bond.

Bonding occurs at the birth site and can take as little as 30 minutes, but can take up to six hours before a ewe commits her lamb(s) to memory.

It takes lambs twice as long to recognise their mothers. If a ewe is slow to learn, or leaves the birth site before she has had time to learn, then the memory will be weak and the maternal bond may fail.

These last two aspects are an issue for Merino ewes because: a) they are slower to learn than most other breeds, so the ewe-lamb bond can be weak, especially for the second lamb of twins; and b) they tend to be more "fearful" and are therefore more inclined to move away from the birth site, if disturbed.

Maiden ewes can also have difficulty establishing a bond with their lambs due to a lack of maternal experience and/or the increased likelihood of the young ewe experiencing birthing difficulty and trauma.

Exposure

Lambs born into a cold environment are often subjected to a massive drop in temperature. Wind, rain and evaporation of birth fluid increase the risk of hypothermia.

Metabolism of brown fat (energy reserve), shivering and drinking milk are mechanisms that lambs utilise to stay warm.

Meet food on offer targets of 1200 kg/ha for single bearing ewes and 1800 kg/ha for twin bearing ewes

Brown fat makes up to two percent of the lamb's body weight and provides rapid heat that dries the lamb at birth. These energy reserves are small in new born lambs. In cold conditions, starving lambs will exhaust their reserves in less than 24 hours, and within three days in warm conditions. Lower birth weight lambs die earlier because of lower energy reserves.

Lambs exposed to cold conditions that have utilised all their brown fat reserves and have been unable to get an adequate drink, lose body heat until core temperature is reduced enough to bring on a subconscious state. This is then followed by a period of inactivity in which the lamb appears to be sleeping, or standing with a humped back "feebly" bleating. Ewes lose interest in chilled lambs resulting in starvation.

Colostrum provides energy, so the lamb can overcome the sudden drop in environmental temperature. It also provides disease resistance because it contains the antibodies of the mother. A single drink can extend the survival of a lamb by 24 hours.

2. Dystocia (birth difficulties)

The birth process can be traumatic for the lamb. During birth the lamb is subjected to a variety of pressures that can result in haemorrhage and brain damage. Delays in birth can lead to suffocation and death. Birth difficulties most commonly account for around 15 to 25 percent of losses but can increase up to 50 to 80 percent of deaths where predisposing factors such as high birth weight, especially of single born male lambs, exist.

Dystocia can also lead to secondary causes of death, such as exposure, starvation and mis-mothering. Lambs that are not born dead but are damaged or suffer from lack of oxygen during the birthing process, can have subsequent low vigour, may not feed and may die within six days of birth.

Some other considerations

1. Predation

Predation is diagnosed where otherwise normal lambs show signs of fatal injury due to a predator.

In contrast to industry perceptions, while predation itself is common on already dead and dying lambs, it is not often diagnosed as the primary (first) cause of death.

Primary predation usually accounts for less than 10 percent of lamb deaths.

2. Diseases and infections

In some flocks, other factors such as disease, bacterial infections and trace element deficiencies may be important in contributing to lamb losses after lambing and prior to weaning.

However, it should be noted that these problems are less common as a cause of lamb loss and require veterinary diagnosis to confirm the cause, treatment and prevention.

Diseases such as vibriosis, brucellosis, toxoplasmosis, listeria and leptospirosis can cause abortions pre-partum and lamb deaths in affected flocks.

Vaccines are available for Vibriosis (*Camphylobacter fetus* and *jejuni)* and for Leptospirosis (*Leptospira hardjo* and *pomona*) and have provided responses in lamb marking percentage for some flocks.

A veterinarian should be consulted if these diseases are suspected in the flock. Professional diagnosis is warranted for diagnosing the cause of the infection, effective treatment and the development of preventative strategies.

Bacterial arthritis may also be a source of lamb lameness and lamb loss prior to weaning.

A high standard of hygiene at lamb marking will also reduce the risk of bacterial contamination of wounds.

Test for animal disease risks such as campylobacter and vaccinate accordingly

3.Trace elements

In some areas soils and subsequently pastures may be deficient in trace elements such as selenium and copper.

Selenium deficiency can cause “white muscle disease” in young lambs, while copper deficiency during pregnancy can cause “swayback” .

Deficiencies in both these trace elements have the potential to cause lamb losses prior to weaning.

However, it is important to seek veterinary diagnosis for any suspected deficiency and for the development of an effective preventative strategy.

Autopsy: a tool to identify the causes of lamb mortality

The causes of lamb mortality can be determined by autopsying and studying dead lambs found during lambing.
The procedures can be done quickly in the paddock and gives the producer information about the primary (first) and secondary (second) causes of lamb death.
Table 1 summarises a number of the key causes of lamb death at lambing.

Improving lamb survival

To improve lamb survival, producers must first identify the primary causes of lamb death.

The previous section has detailed how producers can identify different causes of death.

There are a number of ways a producer can improve lamb survival depending on the principal causes of death on their property.

The key methods by which producers can reduce death due to SME and dystocia are to;

- ensure good ewe nutrition,
- promote good maternal behaviour,
- create a suitable lambing environment and
- select rams with low to moderate birth weight ASBVs that are appropriate for the type and size of the ewe.

Table 1. Causes and evidence of lamb losses and some example strategies to address the issue.

Cause	Evidence	Strategy to address cause
Dystocia (Birthing difficulties)	Oedema (swelling due to fluid accumulation) around the head and neck of the lamb. Cranial and central nervous system (CNS) spinal chord haemorrhage. Small red dark spots caused by bleeding, possibly as a result of lack of oxygen (petechiation) on lungs or heart. Possible damage to internal organs such as the liver. Lamb may not have walked (shows no signs of wear on feet)	Pregnancy scan to enable single bearing ewes to be nutritionally managed separately from twin bearing ewes. Maintain ewes to achieve target condition score 3 at lambing. Source rams with breeding values (ASBVs) for low birth weight and improved lambing ease.

Table 1. CONTINUED. on next page

Source rams with low birthweight and improved lambing ease breeding values

Table 1. CONTINUED. Causes and evidence of lamb losses and some example strategies to address the issue.

Cause	Evidence	Strategy to address cause
Mis-mothering	Lamb has walked, breathed, has no cranial or CNS haemorrhage No milk in gut. Lamb may or may not have been cleaned by the ewe. Fat has been mobilised from the lambs heart and kidneys.	Ensure ewes are condition score 3 at lambing and have adequate high quality feed on offer (1200kg DM/ha for singles and 1800kg DM/ha for twinners) this will encourage the ewe to stay at the birth site for longer. Ensure the lambing environment is free from disturbances and that paddock sizes and mob sizes are smaller rather than larger. Recommended maximum mob sizes for lambing of twin bearing mature ewes is 100–250. For single bearing mature ewes mob size is 400–500.
Mis-mothering combined with secondary exposure	Lamb has walked, breathed, no cranial or CNS haemorrhage No milk in gut, yellowing and oedema (fluid swelling) on knee joints. Fat has been mobilised from the lambs heart and kidneys.	Ensure ewes are condition score 3 at lambing and have adequate high quality feed on offer (1200kg DM/ha for singles and 1800kg DM/ha for twinners). If lambs in this category also have low birth weights then managing ewes to achieve optimum condition during pregnancy will assist in improving birth weight. Shearing ewes mid pregnancy may also increase birth weights. Ensure paddocks are sheltered particularly for multiple bearing ewes.
Primary Exposure	Lamb has fed, walked, yellowing and oedema on knee joints, no cranial or CNS haemorrhage. Fat not metaboilised.	Provision of wind-reducing shelter through use of trees, shrubs, hedgerows will reduce chill and subsequent deaths from exposure. Shelter may also encourage ewes to stay with new born lambs for longer. Shelter should be close to high quality feed.
Dead in utero	Lamb did not breath and no head/neck oedema or cranial/CNS damage. Has not walked. There will be signs of in utero decomposition.	Test for animal disease risks, such as campylobacter. Vaccinate accordingly.
Primary Predation	Lamb has none of the above symptoms and is otherwise normal except for signs of a fatal injury from predator.	Implement predator control prior to lambing. Programs in conjunction with neighbours are more effective.
Secondary Predation	Lambs are diagnosed with symptoms of another death category (above) but also shows signs of predation.	Consider the primary causes first.

Pasture digestibility should be above 70 percent and clover percentage around 30 percent at lambing

1. Ensure good ewe nutrition

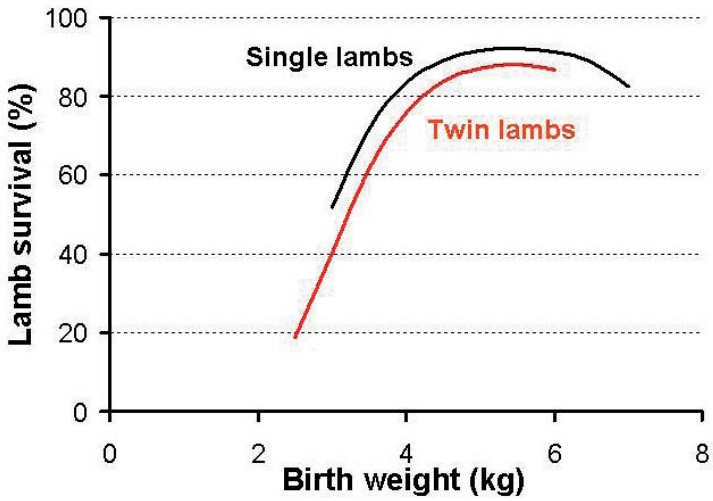
Improve nutrition, improve lamb birth weight, and improve survival

Ewe nutrition during pregnancy affects birth weight, milk supply (colostrum production), the process of ewe/lamb bonding, lamb growth after birth and ewe mortality.

Lamb birth weight has the biggest influence on the survival of lambs during the first 48 hours particularly in more hostile environments.

The optimum birth weight for maximum survival in Merinos is between 4.5 and 6.0kg.

Figure 1. Lamb birthweight and impact on lamb survival (www.lifetimewool.com.au)



A 0.5 kilogram decrease in birth weight from the average has little effect on the survival of singles, but decreases survival of twin lambs by about 20 percent (Figure 1).

Lamb birth weight is influenced by ewe nutrition in early pregnancy (prior to Day 90) and its affect on placental development.

However, it is the nutrition of the ewe in late pregnancy (last 50 days of gestation) that has a much greater impact on birth weight as this is the period when the foetus grows fastest.

Single lambs are at greater risk of dystocia from over-feeding in late pregnancy while multiple bearing ewes are at greater risk of birthing low birth weight lambs if they experience poor nutrition particularly in late pregnancy.

Food on offer targets for lambing ewes (www.lifetimewool.com.au)

Single bearing ewes - 1200kg DM/ha

Twin bearing ewes- 1800kg DM/ha

Adequate feed availability will remove the temptation of the ewe to move away from the birth site too soon

Improve nutrition and enhance the ewe-lamb bond

Colostrum production occurs mainly in the last week of pregnancy and ewe nutrition will greatly impact the quantity and quality of this colostrum.

Adequate feed must be available to the ewe at the time of lambing to remove the temptation of the ewe to move away from the birth site too soon and damage the maternal bond.

This is a bigger problem if the ewe is light in condition or where there is limited feed available near the birth site.

Set targets and allocate feed

a. Match feed supply to animal demand – get the grazing right first

Ewe requirements for energy increase by 50 percent in late pregnancy and by more than 100 percent during lactation. The cheapest form of energy is pasture, so overall stocking rate and time of lambing should be managed to ensure that these requirements can be met from pasture in most years.

Ideally lambing should be planned for when feed demand for lactation matches the peak of pasture production. Choice of lambing time is a major management decision and needs to also consider meeting a specific target market for lamb turnoff.

To ensure enough feed is available for the ewe at lambing there are a number of different strategies that can be adopted.

Options for producers may include use of perennials that grow vigorously early in the autumn, stock containment areas or sacrifice paddocks early in the season, rotational grazing to maximise pasture growth or, nitrogen or giberrelic acid to boost winter dry matter production after a late autumn break.

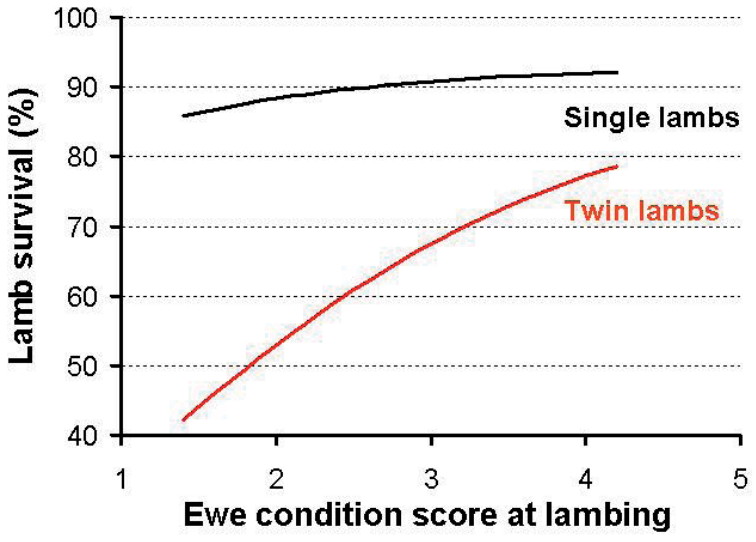
It is important to consider the selection of the right range of species/cultivars across the farm and manage them correctly to maximise productivity and meet nutritional targets.

Consider not only the amount of green feed available but also the expected pasture growth rate and quality of pasture produced.

Target pasture 'food on offer' (FOO) to 1200kg green dry matter per hectare for single ewes and 1800kg green dry matter per hectare for ewes bearing multiples at lambing. This reflects the increased energy requirements of a ewe with twin lambs (three times greater than that of a dry ewe and nearly 30 percent greater than a single bearing ewe).

Having more feed on offer means there is more feed to consume and it is easier to harvest. Digestibility should be above 70 percent and legume content should be around 30 percent.

Figure 2. Ewe condition score at lambing and lamb survival (www.lifetimewool.com.au)



Scan ewes for multiple or single lambs and feed accordingly

A ewe rearing twins can consume in excess of 2kg of pasture per day. It may not be possible to provide sufficient green feed for autumn-winter lambing flocks unless a paddock is spared for this purpose and/or ewes are supplementary fed in late pregnancy and through lambing.

The latter is not preferable as it may interfere with the ewe-lamb bond. This matching pasture growth curves and your animal demands needs to be considered carefully.

b. Scan for multiple and singles

Pregnancy scanning is a key tool for understanding, managing and improving lamb survival and marking percentages.

Without pregnancy scanning it becomes difficult to determine the overall potential lambing rate of the flock after joining.

Scanning and determining the number of lambs born allows producers to determine discrepancies due to losses pre-partum.

By identifying dry ewes and ewes carrying twins, pasture available during pregnancy can be allocated according to ewe nutritional requirements.

Twin bearing ewes can also be treated preferentially at lambing.

Most operators prefer to scan ewes 80-90 days after the rams first went in with the ewes.

Other operators prefer to scan 45 days after the rams are removed from the flock. Check with the technician to determine the appropriate time.

Also refer to guidelines at www.sheepcrc.org.au.

c. Set Condition Score targets

Condition score at lambing is strongly related to lamb survival as shown in Figure 2.

Ewes managed to target condition scores have improved lamb survival due to lambs being in the optimum birth weight range and ewes having sufficient milk immediately after birth.

Table 2: General recommendations for condition score for single and twin bearing ewes during pregnancy

Stage of pregnancy	Ewe Condition Score	Pasture Targets Kg DM/ha green FOO
Early to mid pregnancy (1-90 days)	2.7-3.0	900
Late pregnancy (90-150 days)	3.0 Singles >3.0 Twins	1000 Singles 1200 Twins
Lambing	3.0 Singles 3.3-3.5 Twins	1200 Singles 1800 Twins

Table 3. Combinations of temperature, wind and rain leading to a chill index of 1000 units (calculated for Nixon-Smith 1972).

Temp (^{0}C)	Wind (km/hour)	Rain (mm/day)
-4.4	0	0
7.7	7.2	0
9.7	7.2	2
24.1	7.2	25

Table 4. Recommended mob sizes at lambing (Wean More Lambs)

Mob type	Maximum mob size
Twin bearing mature ewes	100-250
Single bearing mature ewes	400-500
Single bearing maiden ewes	250-400

Most losses from exposure are most likely to occur in lambs up to four days old

Target condition scores vary depending on pregnancy status (single, twin), lambing time (autumn, spring) and location (annual pastures, high rainfall regions, wheat sheep zone).

The Lifetime Wool project has defined the ideal condition score and nutritional targets for ewes. Guidelines for various regions and lambing times are provided at www.lifetimewool.com.au.

Generally, the recommendations are for ewes to be close to, or above condition score 3.0 at mating.

The pregnancy scanning results from ewes will then dictate management during pregnancy.

Dry ewes can be treated like wethers, but pregnant ewes should be managed according to the general condition score targets.

Condition scores for twin and single bearing ewes along with pasture targets to achieve these can be found in Table 2.

More information about condition score and lamb survival can be found at http://www.lifetimewool.com.au/Ewe%20Management/lambsurv.aspx

2. Use shelter to improve the lambing environment

Shelter reduces wind chill and increases survival

Unfavourable weather during lambing is common and in some environments hard to avoid if lambing occurs through winter and spring.

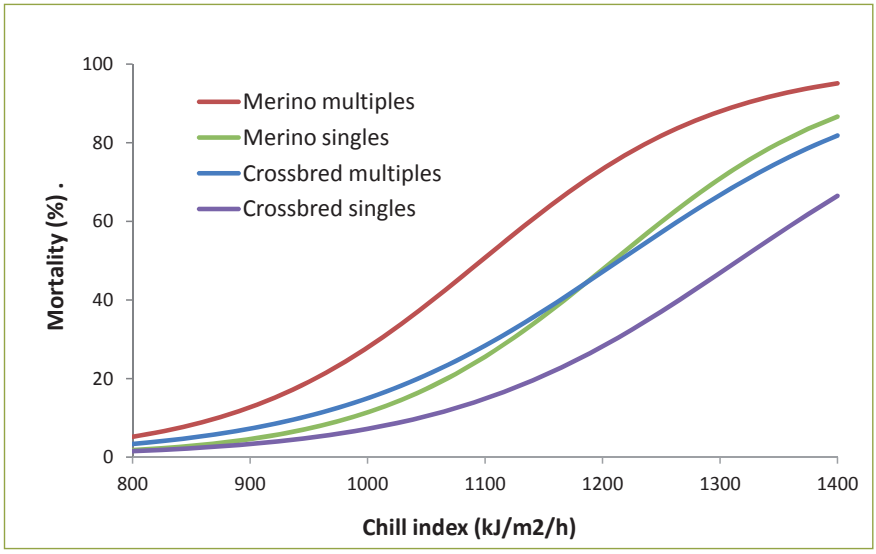
Studies have found that provision of shelter can reduce lamb mortality by up to 50 percent.

An increase in lamb survival from 88 to 94 percent in single lambs means an extra six lambs per 100 ewes. In twin lambing flocks, if lamb survival increases from 75 to 86 percent, an additional 22 lambs survive per 100 ewes. Losses can occur in lambs up to four days old.

The risk of cold stress in new-born lambs depends on temperature, wind and rain.
A formula that combines these factors is used by the Bureau of Meteorology for their sheep weather alerts.

Lamb mortality is closely related to this estimate of cold stress, which is called the “Chill Index”. Once this index of heat loss exceeds 1000 kJ/m^2/h it is assumed a bad chill day and the risk of lamb mortality increases significantly (Figure 3).

Figure 3. Relationship between the chill index (kJ/m^2/h) and the mortality of single and twin lambs born to purebred Merino ewes, and crossbred ewes (Merino x Border Leicester) (after Donnelly 1984).

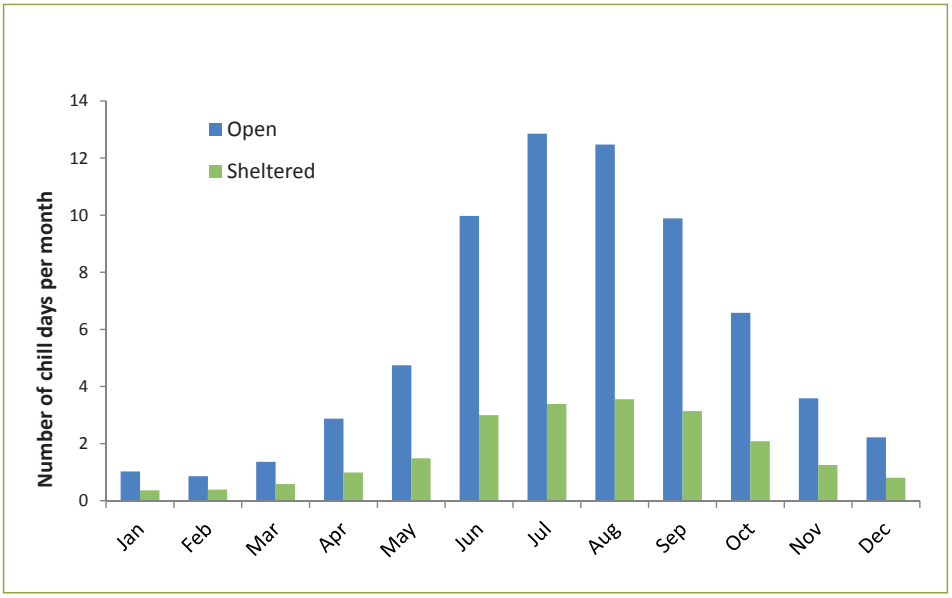


A chilling potential of 1000 units can be reached by the following combinations of temperature (Table 3), wind speed and rain.

Using long term weather data from the Hamilton DPI, Figure 4 demonstrates how many chill days on average occur across the year and in the key lambing months for the Hamilton region (June to September).

Acacia shrubs provided shelter at Wagga Proof Site, increasing lamb survival by 10 percent

Figure 4. Number of chill days per month (heat loss exceeding 1000 kJ/m²/h), calculated from long term daily records for the Hamilton DPI weather station in hedgerow sheltered areas versus open areas.



DPI Hamilton EverGraze trial found that wind speeds adjacent to perennial grass hedges was reduced by up to 99 percent relative to the unsheltered areas. These hedges would be expected to reduce the average number of chill days per month from nearly 10-13 days per month down to three or four days (Figure 4).

At Hamilton, this reduction in wind speed, created by tall perennial grass hedges at 10 metre spacings, was found to have a significant effect on the survival of average birthweight lambs born from Merino and Coopworth composite ewes, increasing it by 30 percent

Survival of lambs of average birth weight increased from 69 percent in the un-sheltered areas to 90 percent in the paddocks with the hedges.

At another EverGraze Proof Site at Wagga, twin lamb survival was increased by 10 percent in a mild winter by using *Acacia sp.* shrub rows planted at 50 metre intervals.

In both trials, twin and triplets gained the most benefit from shelter. This is because they tend to have lower birth weights and higher surface area to body mass ratios which makes them less resilient to cold exposure.

Full details of the shelter and lamb survival results from the EverGraze Proof Sites, as well as information on establishment and management of grass and shrub hedges can be found in separate EverGraze Actions at www.evergraze.com.au

High chill index is more likely to result from wind and rain combined with a low ambient temperature rather than from low temperature alone (Table 3). For example, with rainfall and a wind speed of zero the temperature would need to be – 4.4°C to result in a chill index of 1000 units. In contrast 25mm of rainfall and a wind speed of 7.2km/hr can result in high chill with a temperature of 24.1°C.

Hedges, shrubs and tree shelter primarily operate by reducing wind speed.

The amount of shelter needed will depend on the topography, climate during lambing, mob size and the proportion of singles and multiples.

'Maternity ward' at Hamilton Proof Site gives the ewes no choice but to lamb in a sheltered environment.

Paddocks vary in effectiveness of shelter provided for lambing ewes.

Key considerations are:

- The wind speed at ground level (lamb height). It can be reduced using strategic windbreaks of trees, shrubs and perennial grasses such as non-palatable phalaris slashed into rows or tussocks
- How frequent or well dispersed the shelter is across the paddock and the value of that shelter. The value of the shelter, and how well it is used depends on its permeability, height and how accessible high quality feed is to the shelter.
- A northerly aspect which protects stock from cold southerly or westerly winds will have higher soil temperatures and increased pasture growth compared to southern aspects
- Paddock aspect, drainage and the way it is fenced – temporary fencing of exposed ridges or poorly drained areas

Shearing late pregnant ewes can increase use of shelter but with variable results

Shearing ewes a few weeks before lambing is used by some producers to increase shelter seeking behaviour by ewes. However, the effect on lamb survival is variable.

For most flocks shearing within four weeks of lambing does have complications and the benefit in lamb survival needs to be weighed up against other factors such as;

- Shorn ewes may desert their lambs to seek shelter in cold weather and provide less bulk for lambs to shelter beside than woolly ewes
- Shorn ewes also have higher nutritive requirements (up to 40 percent greater) than woolly ewes in cold conditions increasing feed demand at a time of year when nutrition may be limiting.
- Being removed from feed during shearing may induce metabolic disorde rs such as pregnancy toxaemia and hypocalcaemia.
- Shearing may be delayed, causing issues with ewes lambing at shearing time.
- Shearing pre-lambing could coincide with wet weather during winter which could result in increased mortality of the ewe

Work in New Zealand has shown that mid-pregnancy shearing of ewes between days 54 and 80 of pregnancy (8-10 weeks prior to lambing) can increase lamb birth weight and lamb survival.

The birth weight response occurs during mid-pregnancy mainly in ewes whose lambs were more likely to be lightweight and ewes must be of suitable body condition or have adequate pasture available to respond.

The concept of a "maternity ward"

The term "maternity ward" refers to an area of concentrated shelter, where ewes are held during lambing.

Research has demonstrated that the use of shelter by ewes and lambs can vary depending on whether they are shorn or woolly, the type of shelter (e.g. artificial or natural shrub or grass hedgerows) and the design of the shelter (e.g. distance between shelter rows).

To avoid the possibility of ewes not lambing near shelter, EverGraze has developed the concept of the "maternity ward" using closely spaced (about 10m) grass or shrub hedges placed at right angles to the prevailing wind direction to give the ewe no choice but to lamb in a sheltered environment. Provision of high quality pasture between the hedge rows in the maternity ward ensures the ewe does not need to leave her lamb to find feed, and the shelter provides isolation and privacy from the flock which reduces lamb stealing.

Acacia shrub 'maternity ward' at Wagga Proof Site

Prioritise the feed and shelter (twins, maidens and then singles)

It is often not possible to lamb all ewes down in sheltered paddocks so it is a matter of matching mobs that will have the most vulnerable lambs (ie: low birth weight lambs or lambs from maiden ewes) to most protected paddocks.

In reality this is often the twinning mobs, mobs where ewes are at low condition score at lambing, or maidens. Where ewes are scanned and drafted into twins and singles, paddock allocation is important.

The diagram below indicates how pasture and shelter could be allocated according to ewe type, ewe pregnancy status and condition score.

Twin lambing / low condition score and maidens	best pasture / best shelter
Twin lambing / high condition score	↓
Single lambing / low condition score	↓
Single lambing / high condition score	least pasture / most exposed

Consider stocking density and mob size at lambing

Ewes close to lambing often take an interest in other lambs and can be inclined to "poach" lambs from other ewes. This has been found to be a major cause of permanent separation between a Merino ewe and its newborn lamb.

Also, young lambs will approach any nearby ewe and this can also lead to mis-mothering.

It has been shown that the separation of Merino ewes from their lambs can increase at higher stocking densities (e.g. over 18 ewes/hectare) but there has been limited published data demonstrating the effect of stocking density on actual lamb survival.

Recent work from EverGraze at Wagga, however, has shown a 24 percent higher mortality of twin lambs at a high stocking density of 30 ewes/hectare compared to 16 ewes/hectare (where pasture was not limiting), indicating the potential for stocking density to have an impact on lamb survival.

Since ewes do not necessarily seek isolation to lamb and mob together irrespective of paddock size, the size of the lambing flock could also have an impact on lamb survival.

A large South Australian study indicated flock sizes of 414 for single bearing ewes and 386 for twin bearing ewes respectively in extensive lambing systems are optimum for lamb survival.

The Wean More Lambs module also recommends mob sizes (Table 4).

The effect of stocking density and mob size at lambing could be related to the actual number of ewes lambing at any one time.

Smaller mobs and lower stocking densities will reduce this, and therefore potentially the incidence of mis-mothering. More research is required to identify the effects of mob size, stocking densities and length of lambing window on survival, particularly in twin bearing flocks.

3. Ram and ewe Selection

Selecting rams with high birth weight ASBV's can increase the risk of dystocia particularly in young ewes. Sires can also influence the number of lambs weaned and selecting for this trait will result in commensurate gains in weaning percentage through effects on fertility and survival.

Stock density effects lamb survival. Lamb mortality at Wagga EverGraze Proof Site was 24 percent higher at 30 ewes/ha compared to 16 ewes/ha

The incidence of dystocia can also be reduced by selecting for improved lambing ease.

In future traits currently under investigation in the Sheep CRC and or genomic breeding values may become available to further improve ram selection for survival.

Ewe breed type can have a large affect on lamb survival with Merino ewes generally having poorer lamb survival compared to other breeds and crossbreds.

Research has shown that ewe temperament and maternal behaviour scores have a low genetic correlation with lamb survival, meaning it is harder to improve lamb survival through genetic selection of ewes.

However, with a ewe flock it is possible to cull ewes that repeatebly fail to rear lambs.

4. Minimise the impact of animal health issues on ewes and lambs

It is important that ewes do not expend energy unnecessarily on coping with internal and external parasites or nutritional deficiencies.

A suitable health management program should be implemented to minimise the impact of health issues on ewe performance and lamb survival.

This will include;

- An effective worm management program with worm egg count monitoring and drenching as required.
- A vaccination program for ewes and lambs to guard against common diseases.
- A high standard of hygiene and care at lamb marking to minimise losses between lamb marking and weaning due to infections.
- Monitoring of lamb and ewe losses with veterinary diagnosis of causal agents where required.

Veterinary diagnosis of the cause of ewe and lamb losses is important in identifying less common specific disease or trace element issues in flocks and in designing cost effective preventative strategies.

Attention to detail in the subsequent nutritional and health management of weaners is also important to make the most from additional lambs produced to weaning.

Benchmarking and planning to improve survival

It is possible to improve lamb survival.

Because lamb survival is a complex problem with multiple factors affecting the performance of ewes and lambs in any single year, it is important to systematically address key survival issues on your farm and plan for success.

A first step in this process is to benchmark current levels of survival and determine what the key issues are for your sheep enterprise.

Once these issues are determined, a number of management options as explained above can be put in place to address the issue.

However, it should be noted that there are no silver bullet options for improving lamb survival and many of the strategies mentioned above require attention to detail, planning and implementation throughout the year.

Further information on lamb survival is available from;

www.makingmorefromsheep.com.au

www.lifetimewool.com.au

www.sheepcrc.org.au

Losses in twin lambs are generally 2 to 2.5 times greater than singles in the same flock

How good is lamb survival in your Merino ewe flock?

The worksheet below gives you an opportunity to compare lamb survival in your Merino flock to the best practice targets for single and twin lambing ewes of 90 percent and 70 percent respectively as proposed in the Lifetime Ewe Management project.

The biggest area of reproductive wastage between mid pregnancy and lamb marking is survival of lambs within two to three days of birth. Therefore, comparing the potential number of foetuses at pregnancy scanning and the number of lambs marked will give you an estimate of overall lamb survival.

To use the worksheet you enter your ultrasound scanning data, work out the potential number of lambs you should have at marking based on the best practice survival targets and then compare that to the number of lambs you actually have at marking. This will give you an estimate of how your flock survival compares to what could be achieved.

To help establish whether problems with survival are associated with large single lambs (eg due to dystocia) or small twin lambs, it may be useful to collect dead lambs for a few days and determine causes of death. Notes on lamb autopsy can be found at http://www.dpi.nsw.gov.au/agriculture/livestock/sheep/health/other/lamb-autopsy, or enlist the help of your district veterinarian.

The numbers entered in the boxes below are purely an example for a Merino flock.

	Ewes scanned:			Potential number of lambs	Target survival	Potential lambs at marking		Actual number of lambs marked	
Dry	10		X 0	0					
Singles	100	A	X 1	100	X 90%	90			
Twins	100	B	X 2	200	X 70%	140			
Totals	210	C		300	D	230	E	200	F

ewes % scanned in lamb	200/210 =95%	Number of foetuses per 100 ewes	300/210x100 =143%	Target lamb survival %	230/300x100 =77%	Actual lamb survival %	200/300x100 = 67%
	(A+B) ÷ Cx100		D ÷ Cx100		E ÷ Dx100		F ÷ Dx100

Increase profitability by maximising lamb survival

Further information

EverGraze Action – *Perennial grass hedges provide shelter at lambing* www.evergraze.com.au

EverGraze Action – *Shrub belt hedges for shelter and recharge control* www.evergraze.com.au

J C Pollard - Shelter for lambing in New Zealand, http://www.dpi.vic.gov.au/agriculture/beef-and-sheep/sheep/handling-and-management/sheep-guidelines-for-the-provision-of-shelter

McCaskill, M. 2007 EverGraze 5. Tall Wheatgrass hedges cut wind speeds. Proceedings of Grassland Society of Southern Australia 48th Annual Conference. P104

Wean More Lambs Module of Making more from sheep http://www.makingmorefromsheep.com.au/wean-more-lambs/index.htm

Lamb Planner http://www.makingmorefromsheep.com.au/wean-more-lambs/tool_10.2.htm

Holst, P.J. Lamb Autopsy - Notes on a procedure for determining cause of death NSW Agriculture (2004) ISBN 0 7347 1599 4 http://www.dpi.nsw.gov.au/agriculture/livestock/sheep/health/other/lamb-autopsy

Dutra, F. Quintans,G. Banchero, G. Lesions in the central nervous system associated with perinatal lamb mortality. Australian Veterinary Journal Volume 85, No 10, October 2007

www.lifetimewool.com.au

www.sheepcrc.org.au

Authors

Dr. Belinda King
School of Animal and Veterinary Sciences
Charles Sturt University
Wagga Wagga NSW
P: 02 6933 2427
M: 0429 331 210
E: bking@csu.edu.au

Dr. Michael Friend
Program Leader - New Livestock Systems
Future Farm Industries CRC
Charles Sturt University
Wagga Wagga NSW
P: 02 6933 2285
E: mfriend@csu.edu.au

Dr. Ralph Behrendt
Senior Research Scientist - Livestock Systems
Department of Primary Industries
Hamilton Victoria
P: 03 5573 0979
M: 0407 506 519
E: Ralph.Behrendt@dpi.vic.gov.au

Anita Morant
Sheep Industry Development Officer
Department of Primary Industries
Hamilton Victoria
P: 03 5573 0732
M: 0427 329 541
E: Anita.Morant@dpi.vic.gov.au

EverGraze on line: www.evergraze.com.au

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