

Ewe Management Handbook

Optimising Merino ewe nutrition to increase farm profit



lifetimewool
more lambs, better wool, healthy ewes

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high rainfall zone edition

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www.lifetimewool.com.au

Authors

Mark Ferguson, Andrew Thompson and Darren Gordon

Contributing editors

Ralph Behrendt, James Whale and Mandy Curnow

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Ewe Management Handbook - Optimising Merino ewe nutrition to increase farm profit

High rainfall zone edition

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Further information

lifetimewool
M Curnow
Dept Agriculture & Food WA
444 Albany Highway Albany WA 6330
and
J Whale
Department of Primary Industries
402-406 Mair Street Ballarat Vic 3350

Contents

The lifetimewool project	4
Why is lifetimewool important?	5
Profitability in Merino enterprises	6
Managing ewe profitability	9
Measure to manage	10
The 7-step reproductive cycle	11
1. Joining and conception	12
2. Early to mid pregnancy	14
3. Late pregnancy	16
4. Lambing	18
5. Lactation	20
6. Weaning	21
7. Post-weaning/pre-joining	22
Key effects of condition score	23
Glossary of terms and definitions	24
lifetimewool quick reference	back cover

This handbook is designed to be read in conjunction with the lifetimewool 'toolkit' which includes feed budgeting tables, condition score information and pasture photo standards for assessing pasture on offer.

Please contact James Whale, Ballarat Office, DPI Victoria on 03 53366633 or james.whale@dpi.vic.gov.au for copies of the toolkit or visit www.lifetimewool.com.au

Further details, including pasture and animal targets, can be found at www.lifetimewool.com.au or seek advice from your local Primary Industries or Agriculture office.

The lifetimewool project

“lifetimewool has had a tremendous impact on our business and how we manage our ewes.”

David Robertson, Austral Park, Victoria

“By following the data and recommendations we have in one season been able to lift our performance by an average of 25% or 4000 lambs.”

Gordon Dickinson, Nareen Station, Victoria

lifetimewool is a national project funded by Australian wool producers through Australian Wool Innovation Limited and state government departments of Victoria, Western Australia, New South Wales, South Australia and Tasmania.

The project has developed management guidelines for allocating feed resources to Merino ewes to optimise their production and the lifetime performance of their progeny. By following the lifetimewool guidelines, wool producers can improve management to increase profit sustainably.

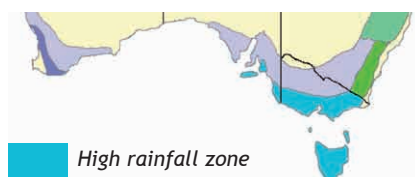
Research from 2001 to 2004 at *Austral Park*, Coleraine, Victoria and *Billandri*, Kendenup, Western Australia formed the basis for the information in this handbook. In addition, the lifetimewool guidelines have been tested across five states at 18 paddock-scale research sites and more than 200 producer demonstration sites from 2003 to 2007. Hence, the information presented has been tested across a large range of wool growing environments and a large range of Merino bloodlines.

High rainfall zone edition

The guidelines in this handbook have been designed specifically for Merino wool production systems in the high rainfall zone of southern Australia with late winter-spring lambing. The principles in this book are relevant to other wool production areas and systems, such as summer rainfall regions, autumn lambing enterprises or the pastoral zone, however the pasture and animal benchmarks quoted may not be appropriate for these production systems and further advice should be sought.

Other editions of this handbook will include:

- Cereal-sheep zone (WA, SA, Vic & NSW)
- Medium rainfall zone (WA)
- Central & southern sheep zone (NSW)
- Northern tablelands (NSW)



Why is lifetimewool important?

Managing to lifetimewool guidelines will help wool producers increase profits from their Merino flock.

The breeding ewe plays a pivotal role in the wool production system - she is the engine room of a wool production business. It makes good sense to have her in the right condition at the right time. The benefits of the lifetimewool management system include:

- improved ewe health and survival
- increased wool production and tensile strength of wool
- improved ewe reproduction
- increased lamb survival
- increased progeny fleece weight and lower fibre diameter
- more effective use of pasture.

These production benefits give substantial gains in profit particularly for producers already running ewes at moderate to high stocking rates compared with average district practice. The increase in profit due to implementing new knowledge gained during the lifetimewool project may be as high as 50%.

Recent research has shown that there are substantial penalties for not having ewes in good condition by lambing. Ewes that are below optimal condition at lambing can cost an enterprise \$9 per ewe through loss of progeny fleece value and lamb survival.

At other times of the year, having ewes fat (over optimal condition at non-critical periods) can cost money through wasting feed resources. Running ewes thin in non-critical periods and then trying to regain lost weight on dry feed can be difficult, and prohibitively expensive if supplementary feed is required.

There are seven important phases in the reproductive cycle of Merino ewes. The lifetimewool project has quantified the impact of nutrition on the production of the ewe and lamb in each of these phases. The lifetimewool guidelines give wool producers an optimum strategy for managing ewes 'year in, year out' to deliver efficient feed allocation, limit production losses and ensure happy healthy ewes.

*lifetimewool leads to more lambs and weaners,
and more wool of lower fibre diameter*

Profitability in Merino enterprises

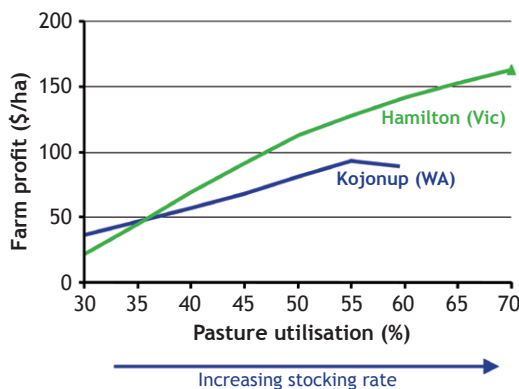
The quantity and quality of what sheep eat (nutrition or energy intake) controls their fatness (body condition), which in turn directly affects a number of production factors including lamb survival and the wool production of both the ewe and her progeny.

Pasture availability (largely driven by rainfall) and the nutritional needs of the breeding ewe due to advancing pregnancy both change throughout the year. The demand for energy by the ewe peaks in early lactation, hence matching the time of lambing to a time of high pasture availability, allowing the increased energy needs of the ewe to be met at a lower cost.

Late winter-spring lambing in the high rainfall zone provides the best match of pasture availability to the energy needs of the ewe and lamb. This match

lifts pasture utilisation and allows stocking rate to be increased relative to lambing at other times of the year. Higher stocking rates will increase the production per hectare and profit per hectare, although 'optimum' stocking rate will vary season to season and farm to farm within and between regions. Profitability at Hamilton in Victoria is optimised when pasture utilisation is around 70%, due to the long growing season of the region and the prevalence of perennial pasture species. At Kojonup in Western Australia farm profit is optimal at 55% pasture utilisation, due to the increasing level of supplementary feeding needed to maintain the stocking rate over the dry season.

Pasture utilisation and its relationship to farm profit



Ewe condition has a significant effect on profitability at any stocking rate.

Increasing stocking rate without adequate nutrition for ewes may reduce lamb survival and wool production, which in turn may limit profitability. Inadequate nutrition can limit profitability at any stocking rate.

Before fully understanding the effects of ewe condition on fleece production and lamb mortality, it was assumed that running ewes thinner and losing more weight over the autumn and during pregnancy meant more money through savings in feed costs. Extensive experiments and economic analysis have shown this belief to be false economy as there are substantial penalties for not having ewes in good condition by lambing, and smaller but significant penalties for not having ewes in good condition for joining. These impacts must be recognised

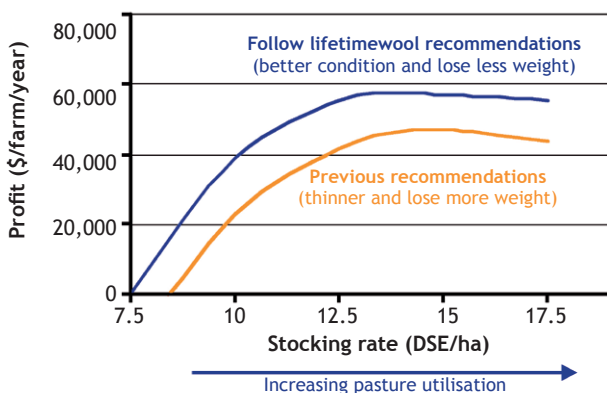
when evaluating the financial implications of different management strategies for ewe flocks.

Condition during pregnancy affects the progeny's lifetime production.

Ewe condition affects the lifetime performance of her progeny. Lamb birth weight and progeny fleece value are closely related to ewe condition, particularly at lambing. Lamb birth weight is a strong predictor of lamb survival and fleece value of the progeny.

During pregnancy, the effects of ewe condition on progeny wool production and birth weight (and survival) are generally additive. That is, the impacts of nutrition in early to mid pregnancy can be added to the impacts of nutrition in late pregnancy. Even though the impacts appear small at each phase, they can add up to a

The effect of lifetimewool on profitability



large impact on profitability for that lambing. The effects on fleece value are permanent for the lifetime of the lamb.

The table below shows the impacts of changes in condition score over a pregnancy. For example, the progeny of ewes maintained at CS 3.0 throughout pregnancy might cut 3.5 kg CFW (clean fleece weight) of 17 micron wool. If the same ewes were to lose condition so that they lambed in CS 2.0, their progeny would only cut 3.1 kg CFW of 17.4 micron wool (ie less wool that was broader).

Importantly, losing condition during early to mid pregnancy and then regaining that lost condition by lambing time gives the same net result as maintaining the ewe's nutrition over the whole of the pregnancy. For example, the progeny of ewes maintained at CS 3.0 over pregnancy

might cut 3.5 kg CFW of 17 micron wool but if the same ewes lost condition by day 90 and then regained it to be CS 3.0 at lambing, the progeny would cut similar quantity and quality of wool.

It is important to note that the impact on progeny birth weight is greater in late pregnancy than in early to mid pregnancy. Lamb birth weight is strongly related to lamb survival, particularly in twins (due to their generally lower birth weight). Optimum birth weights are 4.5-6.0 kg and survival decreases rapidly if lambs are below 4.0 kg. Increasing lamb birth weight by 0.5 kg from 3.5 kg to 4.0 kg in twin lambs can mean an increased survival of 15%. The impacts of ewe condition on lambing success are discussed further in sections 3-6 of this handbook.

Effects on progeny production

Effect on progeny production	Effect of losing one condition score in a period of pregnancy		Cumulative effect of losing half a condition score by day 90 then regaining that condition by lambing
	Early to mid (Day 0 to 90)	Mid to late (Day 90 to 150)	
Clean fleece weight (kg)	-0.19	-0.19	0.00
Fibre diameter(µm)	+0.31	+0.35	-0.04
Birth weight (kg)	-0.33	-0.45	+0.12

Managing ewe profitability

The ewe's condition at lambing is very important in terms of production outcomes, however **how she gets to that condition** is also very important as it affects profitability through the costs incurred to achieve that condition. It is more energy efficient to maintain weight throughout pregnancy rather than lose weight after joining and regain it before lambing, but that doesn't necessarily mean that the ewe has to be 'fat' all year round.

The lifestimewool project has developed a condition score profile (below) which indicates the optimal condition scores for late winter-spring lambing ewes throughout the reproductive cycle of the ewe. If lambing is unlikely to be on good green

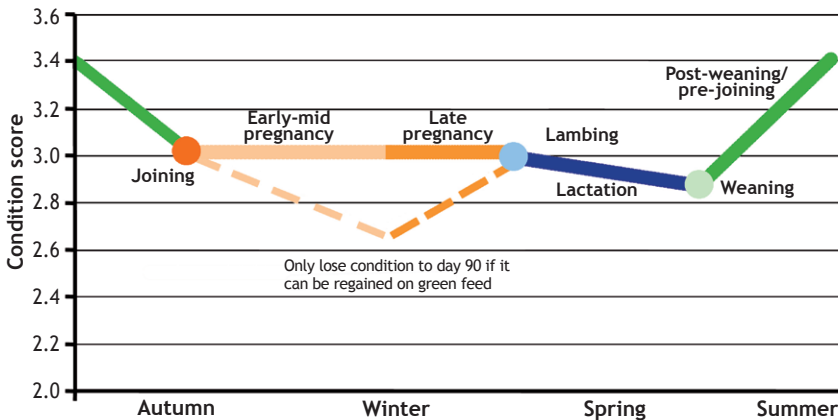
feed such as with autumn or early winter lambing, it is important that ewes be maintained in condition score 3.0 or above throughout pregnancy.

The lifestimewool condition score profile, takes into account the costs and benefits of achieving the condition score targets for specific times of lambing and specific regions. Achieving the condition score targets at each stage of the ewe's reproductive year will result in optimal management of the ewe flock 'year in, year out'.

The lifestimewool guidelines track the management of ewes through each phase of the production cycle of the Merino enterprise.

Optimum condition score profile

(for Merino ewes, late winter-spring lambing)



Measure to manage

Managing ewes to meet production targets or to achieve acceptable welfare targets relies on knowing the condition of the ewe. It is very difficult to visually estimate ewe condition or a mob's condition in the paddock - only large changes can be noticed and by the time changes are noticed it may be too late to change management or feeding regimes. Liveweight measurement or condition scoring can be used to assess condition. Condition scoring is recommended because liveweight measurement can be misleading during pregnancy (due to the weight of the foetus) and it doesn't account for frame size of the animal. The ewe's condition score is independent of her frame size*.

Condition scoring is a simple yet effective tool that gives an accurate measure of the ewe's nutritional status. Only a small proportion of the mob needs to be assessed (25 random animals). Condition scoring uses estimates of the flesh cover on the spine and over the ends of the short ribs and the fullness of the eye muscle between the two. Full details on this method can be found in the toolkit or at www.lifetimewool.com.au

*The effect of frame size is accounted for in feed budget tables by defining the Standard Reference Weight (SRW) of the sheep; that is, the liveweight of the sheep, fleece and conceptus free in CS 3 (forward store condition).



Knowing the condition of the ewe flock allows decisions to be made on feeding regimes, pasture budgeting and predictions of production from the ewe and progeny. For example if the lambing target condition score was missed by a condition score of one then predictions can be made on the subsequent wool production of the progeny; or if joining targets weren't achieved, the proportion of twinning ewes in the flock can be estimated.

Ewes in condition score 2 are lean but have reasonable eye muscle and rounded short ribs and spine. This is often called 'store' condition.



Condition score 2

Ewes in condition score 3 have full eye muscle and no excess fat but the short ribs and spine are well covered.



Condition score 3

Condition scoring ewes at key times enables good feeding decisions

The 7-step reproductive cycle

There are seven important phases in the reproductive cycle of Merino ewes. The lifetimewool project has quantified the impact of nutrition on the production of the ewe and lamb in each of these phases. The cycle starts at joining (day 0), proceeds through lambing (day 150) and weaning (day 225), and finishes with the pre-joining management of ewes.

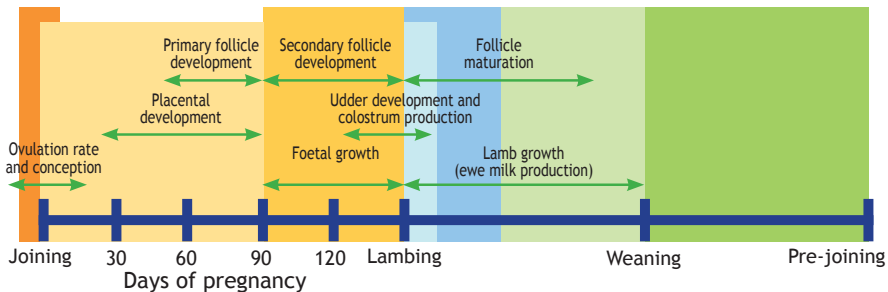
Management of ewe condition during each step of the cycle affects the following:

- conception success, reproductive rate, placental development, udder development and colostrum production of the ewe
- foetal growth of the lamb, including wool follicle development which influences wool production in the progeny
- ewe milk production, which influences lamb growth after birth.



For each of the seven steps of the reproductive cycle, the following sections of this handbook give recommendations for condition score targets, based on the condition score profile on page 9, and pasture targets, defined as *feed on offer* (FOO) and measured as kg DM/ha.

The stages of pregnancy and lamb development in relation to the reproductive cycle of the breeding Merino ewe



1. Joining and conception (day 0)



The condition score on the day of conception is the major predictor of reproductive rate and it is more important than changes in condition prior to joining.

Management recommendations

Condition score target
CS 3.0-3.5 by joining

Pasture target
800 kg DM/ha dry FOO minimum,
supplement ewes as required

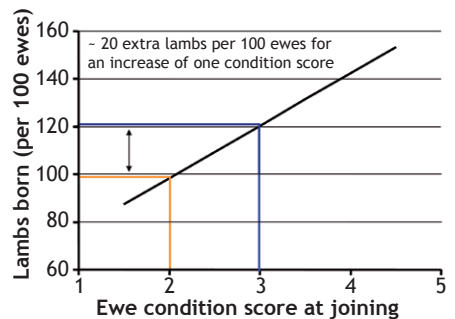


Ewes in better condition at joining conceive more lambs.

For each extra condition score at joining, between 0 and 40 more lambs are conceived per 100 ewes joined. Responses are greater for spring lambing flocks than autumn lambing flocks.

On poor pasture, ewes can lose one condition score over 35 days, therefore it is important to maintain ewe condition over the joining period to ensure maximum conception rates.

The relationship between ewe condition score and the number of lambs conceived



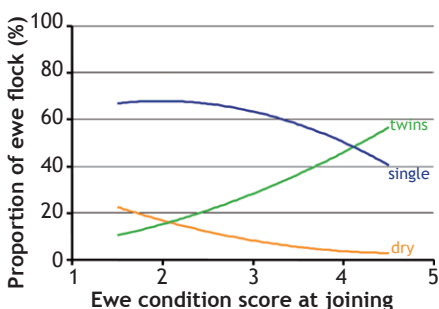
Knowledge of the relationship between condition score at joining and conception rates for an individual flock enables tailored management.

Where a flock's reproductive rate is very responsive to increased condition and more lambs will contribute to profitability, it may be worthwhile maintaining high condition from weaning to the end of joining.

If reproductive rates are not responsive to increased condition at joining there will be little benefit in lifting feeding rates to increase condition.

Scanning ewes at day 90 for single and twin foetuses and comparing this with the condition score of the ewes at joining will enable assessment of the potential to increase reproductive rates in the flock (see www.lifetimewool.com.au for a worksheet on predicting reproductive rate response).

The effect of ewe condition at joining on the proportion of dry, single and twin bearers

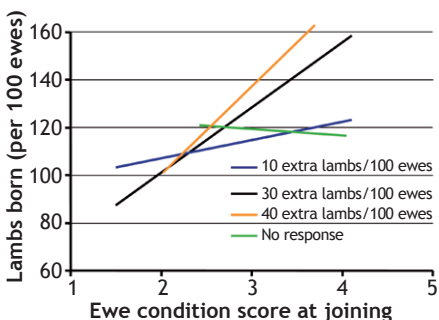


Ewe wool production

The fleece value of ewes is closely related to their condition score profile during pregnancy and lactation. In fact, four assessments of condition score (joining, mid pregnancy, lambing and weaning) can be used to predict the value of the ewe wool clip with 80% accuracy.

Changes in ewe condition score during pregnancy have an effect on ewe clean fleece weight (CFW) and fibre diameter (FD). One condition score change equals a change of about 0.75 kg CFW and 1 µm FD. Ewes that lose 0.5 CS during early pregnancy and regain that condition by lambing will produce a similar CFW and FD to ewes that maintained condition throughout pregnancy.

The effect of ewe condition at joining on the reproductive rate for four flocks



2. Early to mid pregnancy (day 1-90)



The condition score during the early to mid pregnancy phase affects lamb birth weight, fleece weight and fibre diameter, and these effects on the developing lamb are permanent.

Management recommendations

Condition score target

CS 3.0 - maintain at this score or allow maximum loss of 0.3 of a condition score if pre-lambing pasture targets (and therefore condition score targets) can be achieved

Pasture target

- at break of season: 500 kg DM/ha green FOO minimum - restrict grazing until at least this level is achieved to allow good pasture establishment. Supplementary feed will be required.
- by day 90: 900 kg DM/ha green FOO

Poor ewe nutrition during early to mid pregnancy reduces placenta size and lamb birth weight.

Poor ewe nutrition during early to mid pregnancy may result in a smaller placenta.

Poor ewe nutrition (loss of one condition score) during early to mid pregnancy will reduce lamb birth weight by up to 0.30 kg - smaller lambs are less likely to survive to weaning.

Ewe nutrition in early pregnancy will affect the ability of the ewe to reach late pregnancy condition targets. Starting from a very low condition in early pregnancy will not give the ewe enough time to gain condition in time for lambing, potentially reducing the chances of lamb and ewe survival.

The lamb's future wool production is affected by ewe nutrition during early to mid pregnancy and the effects on the developing lamb are permanent.

Poor ewe nutrition during early to mid pregnancy increases the fibre diameter and decreases fleece weight of the progeny reducing fleece value for the lifetime of the progeny.

Lambs from ewes fed to maintain condition to mid pregnancy produce 0.1 kg per head more wool and up to 0.2 micron finer wool than lambs from ewes allowed to lose 0.5 of a condition score.

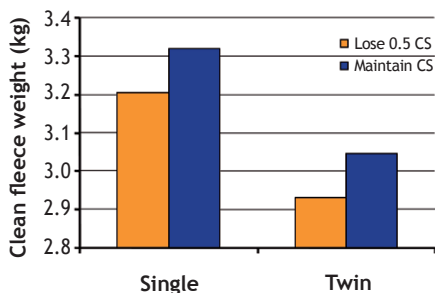
Twin lambs have significantly lower fleece weight and broader fibre diameter than single lambs, at high and low nutrition.

Small losses in condition score during early to mid pregnancy can be overcome by gains in ewe condition in late pregnancy.

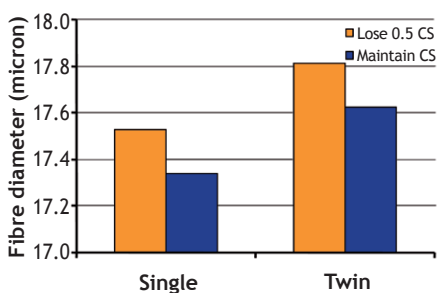
Due to the cost of supplementary feed required to maintain the condition of a ewe, a controlled loss of condition (maximum CS 0.3) over the first 90 days is the most cost effective approach, so long as condition is able to be recovered in late pregnancy on green feed.

Consider scanning ewes for singles or twins at day 90 to allow for separate management throughout late pregnancy and lactation.

The effect of maintaining and losing condition score during early to mid pregnancy on progeny clean fleece weight



The effect of maintaining and losing condition score during early to mid pregnancy on progeny fibre diameter



3. Late pregnancy (day 90-150)



The condition score in late pregnancy can influence the growth of the foetus as well as secondary wool follicles, which directly influence the density and fineness of the fleece.

Management recommendations

Condition score target

- single ewes CS 3.0 by lambing
- twinning ewes CS 3.0+ by lambing

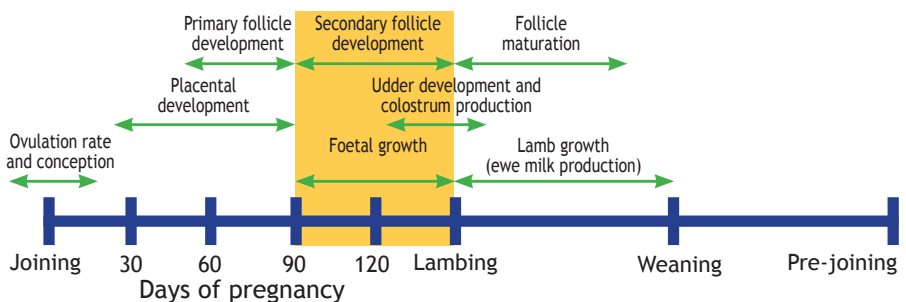
Pasture target

- single ewes a minimum of 1000 kg DM/ha green FOO
- twinning ewes a minimum of 1200 kg DM/ha green FOO

Good nutrition in the late pregnancy phase ensures that optimal birth weights and other pregnancy targets can be achieved.

Most of the growth of the developing lamb occurs in the last 50 days before birth.

Ewe nutrition (gaining CS 1.0) during late pregnancy has a greater impact on lamb birth weight (up to 0.45 kg), than early pregnancy nutrition (up to 0.33 kg).



The amount of FOO during late pregnancy and lactation affects the nutrition of the ewe and the fleece characteristics of her progeny.

The ewe's energy requirement increases by 50% for single bearers and 80% for twin bearers by lambing. To increase her intake the ewe must have higher amounts of FOO available.

The effects of loss of ewe condition on progeny birth weight, fibre diameter and fleece weight, prior to day 90, can be overcome by returning the ewe to target condition by lambing.

Good nutrition in late pregnancy is required to achieve high secondary wool follicle density, which leads to lower fibre diameter and higher fleece weight - these effects are for the life of the progeny.

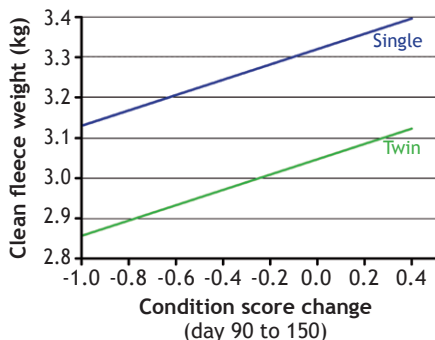
Secondary follicles are the most important part of the wool-producing skin, having a direct influence on the density and fineness of the fleece. The higher the follicle density the lower the fibre diameter.

Good nutrition in late pregnancy can achieve up to a 0.2 micron reduction in fibre diameter and a 0.1 kg increase in clean fleece weight for each gain of 0.5 of a condition score.

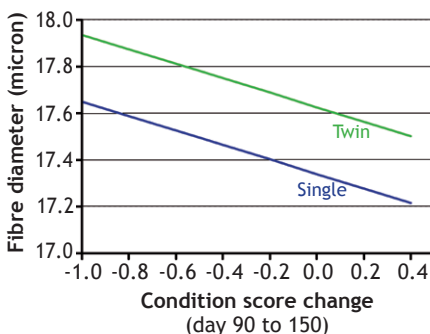
Single and twin bearing ewes can be managed to their specific feed requirements, if the flock is pregnancy scanned.

Single and twin lambs are equally affected by nutrition of the ewe during pregnancy, however twins will always have lower production than singles due to extra nutritional competition.

The effect of changes in condition score in late pregnancy on progeny clean fleece weight



The effect of changes in condition score in late pregnancy on progeny fibre diameter



4. Lambing (day 150)



The condition score of the ewe at lambing influences birth weight and survival of the lamb.

Management recommendations

Condition score target

- single ewes CS 3.0
- twinning ewes CS 3.0+

Pasture target

- single ewes 1200 kg DM/ha green FOO
- twinning ewes 1800 kg DM/ha green FOO



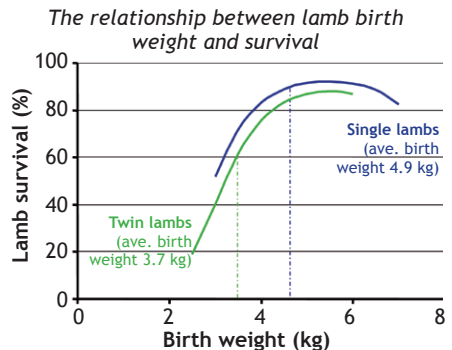
The first 48 hours of a lamb's life are critical - around 70% of lamb mortality to weaning occurs within this period.

The survival of single and twin born lambs is mostly affected by birth weight, which in turn is influenced by ewe condition score at lambing.

The optimum birth weight for lamb survival is between 4.5 and 6.0 kg.

Average birth weight of single lambs from well-fed Merino ewes (50 kg mature weight) is about 5.0 kg.

Average birth weight of twin lambs is often less than 4.0 kg and mortality rates can exceed 40-50% for Merinos.



The optimum condition for lambing ewes is CS 3.0.

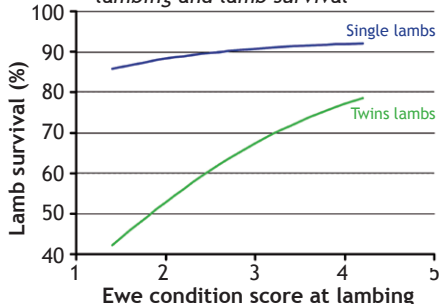
Having ewes in CS 3.0 for lambing is the economic optimum for the high rainfall region. This accounts for the cost of achieving that condition, its effect on stocking rate and most importantly the effect on production and survival of the ewe and her lambs.

Twin lambs are much more sensitive to changes in ewe condition score and twinning ewes should be given higher priority when feed supply is limiting. Higher condition score of the twinning ewe at lambing (CS 4.0 compared to CS 3.0) can mean an increase in lamb survival of more than 10%.

On-farm case studies of lamb survival in Victoria show that 15-20% more lambs survive when born to ewes of CS 3.0-3.5, compared with ewes of CS 2.0-2.5.

Poor nutrition and low condition score has detrimental effects on ewe and lamb behaviour, contributing to increased lamb mortality. Ideally the ewe and lambs should remain at the birth site for at least six hours.

The relationship between ewe condition at lambing and lamb survival



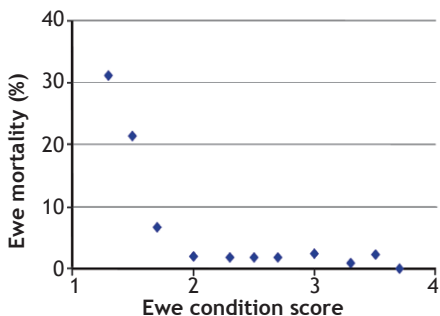
Ewe mortality can be an important issue when condition score falls below 2.0 during late pregnancy or at lambing.

Maintaining adequate ewe condition to avoid mortality is especially important where there is likely to be poor weather conditions and/or low pasture feed availability.

Any individual ewe whose condition score is less than 2.0 prior to lambing should be managed separately and have increased access to good feed. Twinning ewes are more likely to be in danger than single bearing ewes, with at least 2-3% higher mortalities for the same condition score.

Ewes in condition score over 4.0 (particularly single ewes in a good year) maybe at increased risk of having lambing difficulties (dystocia).

The effect of condition score at lambing on ewe mortality



5. Lactation (day 150-220)



Ewes in good condition during lactation produce more milk, which means larger lambs with higher survival and growth rates.

Management recommendations

Condition score target
CS 2.7-3.0

Pasture target

- single ewes 1200 kg DM/ha green FOO
- twinning ewes 1800 kg DM/ha green FOO

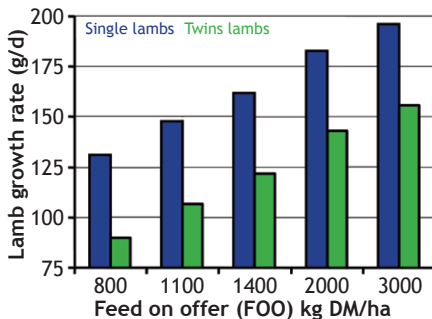
Feed on offer (FOO) during lactation is the main factor driving lamb growth rates.

Improved ewe nutrition through lactation means bigger weaners and better weaner survival.

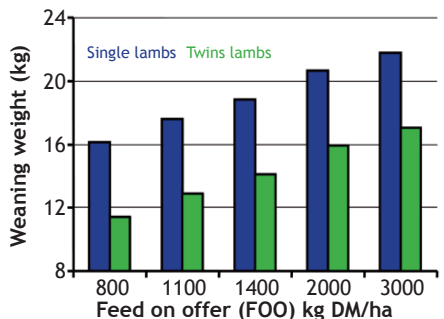
Ewes in good condition will use fat reserves and pasture to provide high lactation levels, and will tend to lose condition over lactation.

Ewes in poor condition will have poorer milk production and tend to wean lambs earlier resulting in lower lamb growth rates.

The effect of FOO during lactation on lamb growth rate prior to weaning



The effect of FOO during lactation on lamb liveweight at weaning



6. Weaning (day 220-240)



Lamb liveweight at weaning is a very important factor for weaner survival.

Management recommendations

Condition score target
CS 2.5-2.7 (ewes)

Pasture target
1100 kg DM/ha green FOO or more

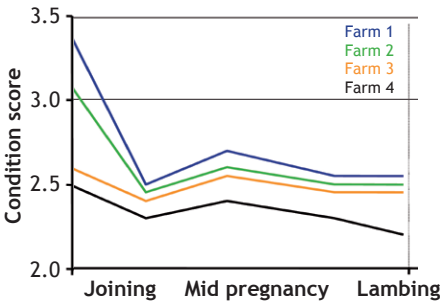
Weaning liveweight target
45% of adult liveweight

Lambs should be weaned at no later than 14 weeks old and 45% of adult liveweight for medium Merinos.

Weaners need to achieve positive growth rates through summer, autumn and into winter to ensure high survival. There are no benefits to either ewe or lamb from delaying weaning past 14 weeks.

Preferential treatment (including supplementary feeding) of light weaners less than about 45% of adult liveweight should be standard practice.

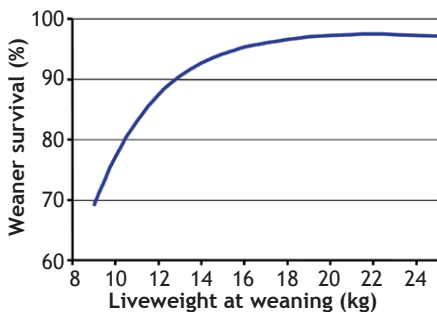
Ewe condition score profile throughout pregnancy for four farms



Farm	Ewe mortality	Weaning rate
1	1.1%	85%
2	2.3%	84%
3	1.7%	64%
4	12.0%	52%

Case studies have shown that low condition score at joining and lambing significantly reduces weaning percentages.

Liveweight at weaning and survival of Merino weaners (45 kg SRW) to 12 months



7. Post-weaning/pre-joining (day 240-365)



The period from weaning to joining is important to get ewes in the right condition for mating.

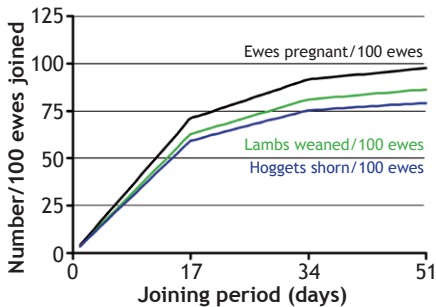
Management recommendations

Condition score target
CS 3.5 or higher

Pasture target

- above 1000 kg DM/ha green FOO
- above 800 kg DM/ha dry FOO to preserve ground cover, supplement dry ewes as required

The effect of length of joining period on the numbers of ewes pregnant, lambs weaned and lambs surviving to 12 months



The more time on high quality green feed post-weaning, the lower the cost of achieving condition targets prior to joining.

Ewes need to be in CS 3.0-3.5 at joining to achieve high reproductive rates (if they are a responsive flock).

Monitor ewes for condition at least twice during this period.

Make the best use of pasture to put weight back onto ewes immediately after weaning. Ewes can then be allowed to lose weight gradually in summer and autumn to CS 3.0.

Once the ewe is below CS 3.0 it is difficult and expensive to lift condition of stock when pasture has dried off and pasture quality has decreased.

Feed budget and plan to start supplementing ewes to maintain condition before they slip below target condition scores.

Key effects of condition score

1. Joining

- Ewes in better condition score at joining have more lambs
- For each extra condition score at joining, between 0 and 40 extra lambs are conceived per 100 ewes joined
- A change in condition score from CS 2.0 to CS 3.0 is equivalent to an increase of 7 to 10 kg in liveweight of the ewe, depending on the frame size

2. Early to mid pregnancy

- Lamb birth weights can increase or decrease by 0.5 kg in response to ewe nutrition
- Low lamb birth weight results in reduced lamb survival, particularly in twins
- Ewes should be maintained at CS 3.0 to avoid reducing lamb birth weights
- Fibre diameter and clean fleece weight of progeny is affected by poor nutrition during both mid and late pregnancy and these effects add up

3. Late pregnancy

- Ewes should reach CS 3.0 by lambing to avoid reducing lamb birth weights
- Fibre diameter and clean fleece weight of progeny is affected by poor nutrition during both mid and late pregnancy and these effects add up
- Effects on progeny birth weight, fibre diameter and fleece weight due to poor nutrition prior to day 90 can be overcome by improving nutrition in late pregnancy

4. Lambing

- Lamb survival is heavily influenced by birth weight and ewe condition score, especially when poor weather conditions are likely
- Ewe mortality at CS 1.5 is double that at CS 3.0 and above - twinning ewes must be above CS 2.0 by lambing, whatever the season
- Optimum birth weight is 4.5-6.0 kg. Survival decreases rapidly if lambs are below 4.0 kg

5. Lactation

- Better lactation through increased ewe nutrition improves lamb growth rates and weaner survival

6. Weaning

- Weaner liveweight explains most of weaner mortality - lambs should be 45% of adult liveweight going into summer
- Weaners need to achieve positive growth rates through summer and autumn

7. Post-weaning/pre-joining

- The more weight that ewes gain on green feed in the post-weaning phase, the less it will cost to achieve target condition scores by the next joining

Glossary of terms and definitions

Condition score (CS) - is a manual assessment of the amount of soft tissue (fat and meat) over the short ribs and backbone on a scale of 1.0 to 5.0. This assessment is independent of body weight.

Dry sheep equivalent (DSE) - Equivalent to one dry ewe or wether maintaining weight at approximately condition score 3.0.

Fat score - Fat scores are based on actual soft tissue depth at the GR site, which is situated 110 mm from the midline over the 12th rib. Scores vary from fat score 1 (leanest) to fat score 5 (fattest).

Feed on offer (FOO) - Also known as pasture mass or herbage mass, this is the amount of pasture available for sheep consumption expressed in kilograms of dry matter per hectare (eg 1100 kg DM/ha).

Liveweight - The empty body weight of sheep weighed in kilograms and adjusted for weight of wool. In pregnant ewes, it is important to use the conceptus-free liveweight.

Maintenance feeding - The level of feeding required to maintain liveweight of a dry ewe or wether.

Metabolisable energy (ME) - This is the energy available for use by the animal from a feed after taking into account the digestibility of the feed. It is expressed in megajoules per kilogram (MJ/kg).

Pregnancy - The period of embryo and foetal development from conception to lambing, characterised by three phases during which ewe nutrition can have significant effects on lamb survival and performance:

- **early** - from joining to approximately day 50
- **mid** - from day 50 to day 90
- **late** - from day 90 to lambing (day 150).

Primary follicles - These are the first wool follicles that begin development in the foetus at about day 60 of pregnancy.

Secondary follicles - These are the second type of wool follicles that form in the foetal skin from about day 90 of pregnancy.

Useful references

lifetimewool toolkit - available from www.lifetimewool.com.au or James Whale DPI Victoria Ballarat 03 53366633

Lambing Planner - Department of Agriculture & Food WA, available from Albany Office 08 98928444 or email mcurnow@agric.wa.gov.au

lifetimewool quick reference guide

Step	Phase	Day/s	CS target	Pasture target kg DM/ha green FOO	Management guidelines
1	Joining	0	3.0+	> 800 dry	Ewes CS 3.0 or above to maximise lambs conceived Consider flushing ewes with lupins, if below CS 2.0
2	Early to mid pregnancy	1-90	2.7	900 by day 90	Allow slow loss to CS 2.7 if late pregnancy pasture target can be met
			3.0	if target can't be met	Maintain CS 3.0 to efficiently use energy reserves and supplements
3	Late pregnancy	90-150	3.0	1000 singles 1200 twins	Reach CS 3.0 to optimise fleece weight and fibre diameter from progeny and increase lamb survival
4	Lambing	150	3.0	1200 singles 1800 twins	Lamb and ewe survival is maximised in ewes of CS 3.0-3.5
5	Lactation	150-220	2.7+	1200 singles 1800 twins	Increased ewe nutrition improves lamb growth rate and increases weaner survival
6	Weaning	220-240	2.5+	1100 for ewes	Have weaners 45% of adult liveweight by weaning Draft off light weaners and supplement preferentially
7	Post-weaning	240-290	3.5+	1000	Maximise weaner growth rates on green pastures Maximise ewe liveweight gain on green pastures
	Pre-joining	290-365	3.5+	> 800 dry	Check ewe condition score and supplement, if required to achieve target CS 3.0 at next joining