Ewe Management Handbook

Optimising Merino ewe nutrition to increase farm profit

for southern slopes NSW and north central Victoria

lifetimewool

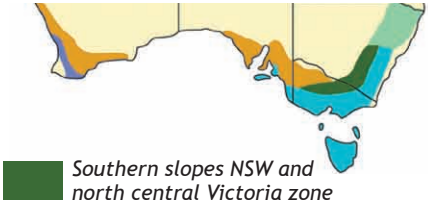
more lambs, better wool, healthy ewes

Ewe Management Handbook

Optimising Merino ewe nutrition to increase farm profit

southern slopes NSW and north central Victoria

The guidelines in this handbook have been designed specifically for Merino wool production systems of the southern slopes NSW and north central Victoria. This zone has a late winter-spring lambing. Typically, the zone has a winter growing season rainfall of 450-600 mm, and pastures are a mix of annual grasses, perennial grasses and sub clover.



Southern slopes NSW and north central Victoria zone

more lambs, better wool, healthy ewes

www.lifetimewool.com.au

Authors
Ralph Behrendt and Mandy Curnow

Contributing editors
James Whale and Chris Oldham

National Library of Australia Cataloguing-in-Publication entry

Title: Ewe management handbook: optimising merino ewe nutrition to increase farm profit / Mandy Curnow ... (et al.)

Edition: Southern Slopes NSW & North Central Victoria ed.

ISBN: 9780980344868 (pbk.)

Notes: Includes index.

Subjects: Merino sheep--Australia, Southern--Nutrition.

Merino sheep--Breeding--Australia, Southern.

Farm management--Australia, Southern.

Other Authors/Contributors: Curnow, Mandy (Catherine Amanda)

Western Australia. Dept. of Agriculture and Food.

Dewey Number: 636.31450994

Production Editor: Lucy Kealey, Kealey Clark Pty Ltd
Design & Layout: Victoria Griffin, Griffin Graphics
Printer: Adams Print

Contents

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 visit www.lifetimewool.com.au for further details including pasture and animal targets.

The lifetimewool project

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.

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 is derived from a large range of wool growing environments and a large range of Merino bloodlines.

Managing ewes to lifetimewool guidelines increases profits from Merino flocks. Breeding ewes play a pivotal role in the wool production enterprise and having them in the right condition at the right time will lead to:

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

These production benefits give substantial gains in profit, particularly for producers running moderate to high stocking rates. The increase in profit

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

David Robertson, Austral Park, Victoria

due to implementing the new knowledge gained during the lifetimewool project may be as high as 30% for some regions.

The interactions between pasture growth patterns, stocking rate, time of lambing and production are complex. The optimum strategy and levels of profitability described in this handbook are generated by the new information from lifetimewool and MIDAS modelling (Little River Catchment model). The full report on the southern slopes NSW and north central Victoria zone analysis can be found at www.lifetimewool.com.au/economics.aspx

lifetimewool research shows that there are substantial penalties for not having ewes in good condition by lambing. Ewes that are below optimal condition at lambing may have a significant cost on the sheep enterprise through decreased lamb survival and progeny production. At other times of the year, running fat ewes (over optimal condition at non-critical periods) can cost money through wasted feed resources. Alternatively, running thin ewes in non-critical periods and then trying to regain condition on supplementary feed is difficult and prohibitively expensive.

The guidelines outlined in this handbook give wool producers an optimum strategy for managing ewes 'year in, year out' to maximise production, ensure healthy ewes and deliver efficient feed allocation. This strategy offers the most profitable option which balances costs with production gains and takes into account the impact of stocking rate.

This handbook also describes the seven important phases in the reproductive cycle of Merino ewes for which the lifetimewool project has quantified the impact of nutrition on the production of ewes and lambs. Ewe nutrition can be managed by monitoring and meeting targets for ewe condition score and feed on offer (FOO). These concepts are defined below. A glossary of other terms can be found on page 28.

Condition score (CS) – is an assessment of the amount of soft tissue (fat and meat) over the short ribs and backbone on a scale of 1 to 5. This assessment is independent of body weight. For details on how to condition score and the relationship between condition score and fat score see pages 27 and 28.

Feed on offer (FOO) – is the amount of pasture available. It is the dry weight of all above ground plant material and is expressed in kilograms of dry matter per hectare (eg 1100 kg DM/ha). To convert **herbage mass (HM),** used in NSW, to FOO, add 300 kg DM/ha to the herbage mass value.

"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

Ewe condition and profitability

Ewe condition at lambing is very important as it sets up the likely progeny survival and lifetime performance. However, how the ewe gets to that condition is also very important as it affects profitability through the costs incurred to achieve that condition.

In the southern slopes NSW and north central Victoria regions, lambing in late winter–spring provides the best match of pasture availability to the energy needs of the ewe and lamb. This match allows more sheep to be run per hectare relative to lambing at other times of the year.

lifetimewool research has led to the development of an optimum condition score profile for breeding Merino ewes. For the southern slopes NSW and north central Victoria the optimum profile for late winter–spring lambing flocks is:

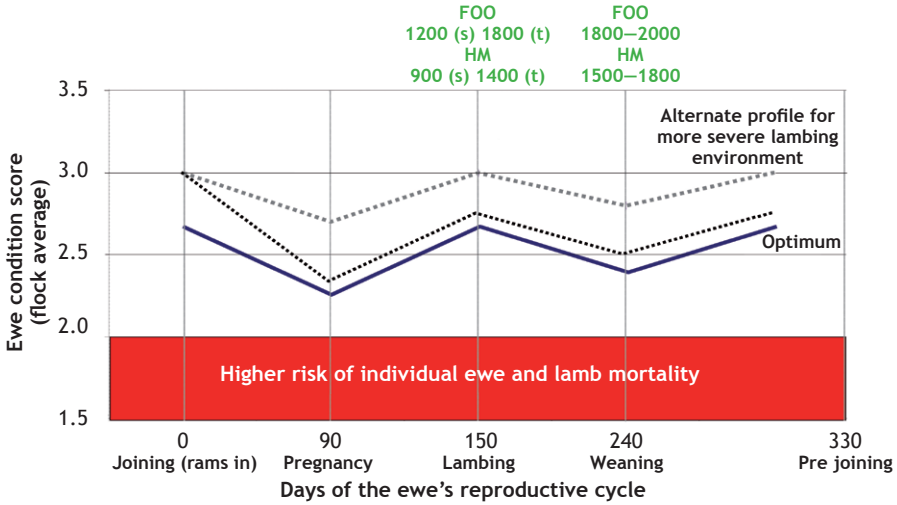
- allowing a moderate loss of condition from joining to 'break of season', provided condition can be regained prior to lambing on green feed
- a target condition score of 2.6–3.0 at joining.

There is a trade-off between saving on feed in early pregnancy (losing more condition) and loss of production (lamb survival and ewe wool production, particularly). Regaining lost condition on green feed before lambing gives optimum profitability. If green feed is unlikely, it is best to lose less condition or ensure that deferred pastures allow some condition gain prior to lambing.

Visit www.lifetimewool.com.au to download your copy of this profile.

Optimum condition score profile

(for Merino ewes, late winter-spring lambing)



The 7-step reproductive cycle

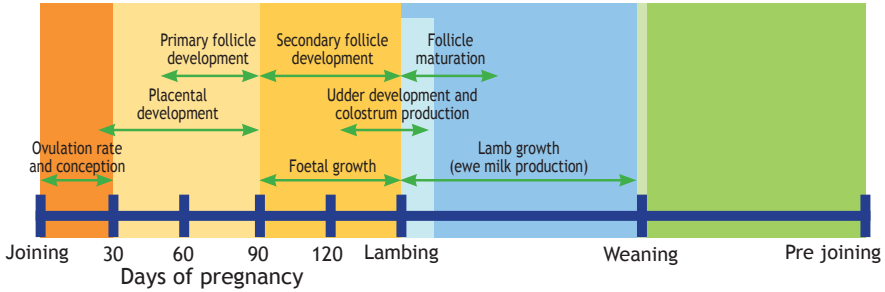
There are seven important phases in the reproductive cycle of Merino ewes. The lifetimewool project has quantified the impact of nutrition on the production of the ewe and lamb in each of these phases. The cycle starts at joining (day 0), proceeds through lambing (day 150) and weaning (day 240), and 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 6, and pasture targets, expressed as feed on offer (kg DM/ha FOO), defined on page 5. The impact of changes in the condition score profile on ewe and progeny production is detailed in the table on page 26.

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



1. Start of joining (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 2.6–3.0 over the joining period

Pasture target

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

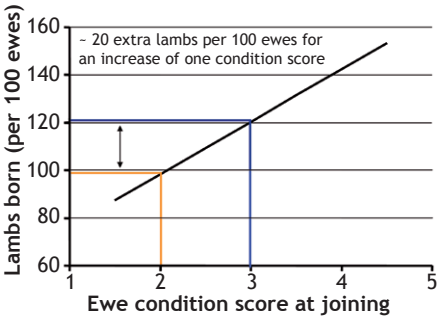
To convert FOO to herbage mass subtract 300 kg DM/ha

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 higher condition than recommended from weaning to the end of joining.

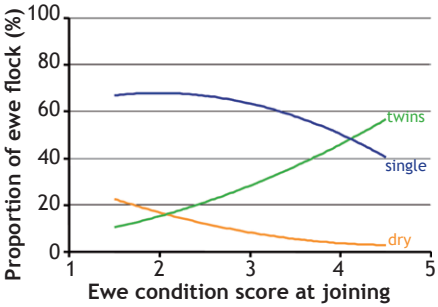
If reproductive rates are not responsive to increased condition at joining there will be little benefit in lifting feeding rates to achieve a higher condition.

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).

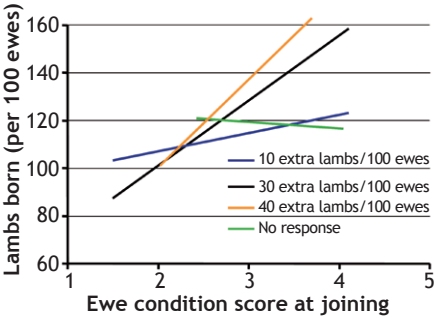
If ewes are in poor condition (less than CS 2.0) at joining, those that do conceive are unlikely to be able to gain enough condition prior to lambing to ensure good survival rates for both ewe and lamb (see pages 14 and 15). Production outcomes for these ewes may be improved by drafting them from the main mob and giving them the best emerging green feed.

Alternatively, consider not mating ewes that are in poor condition and run them as 'dries' for the season. A ewe of CS 2.0 at joining will need three months on good green feed (1000 FOO) to gain half a condition score by lambing.

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



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 2.6 - maintain 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 0.35 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.

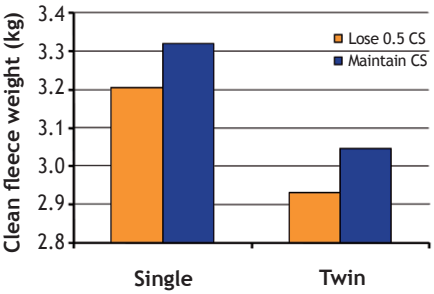
Twin lambs have significantly lower fleece weight and broader fibre diameter than single lambs, at high and low nutrition.

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

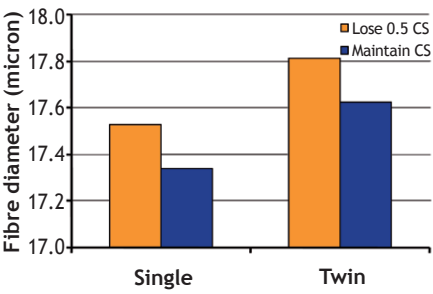
Due to the cost of supplementary feed required to maintain the condition of a ewe, a controlled loss of condition (maximum of 0.3 of a condition score) until the break of season is the most cost effective approach, so long as condition is able to be recovered in late pregnancy on green feed. This will often require tactics such as deferred grazing.

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 2.6 by lambing**
- **twinning ewes CS 2.6+ by lambing**

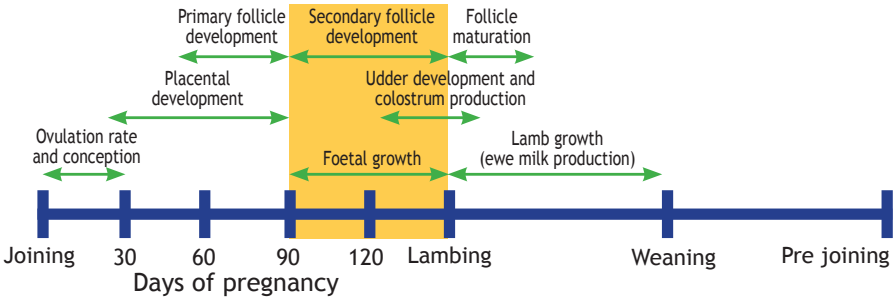
Pasture target

- **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 one condition score) 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.

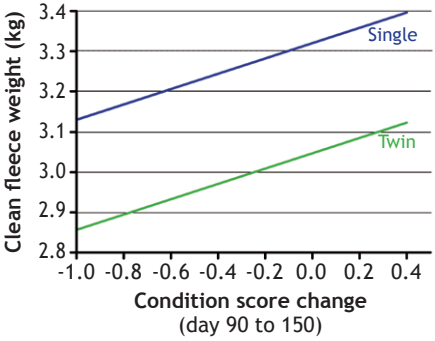
Secondary follicles are the most important part of the wool-producing skin, having a direct influence on the density and fineness of the fleece. The higher the follicle density the lower the fibre diameter.

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.

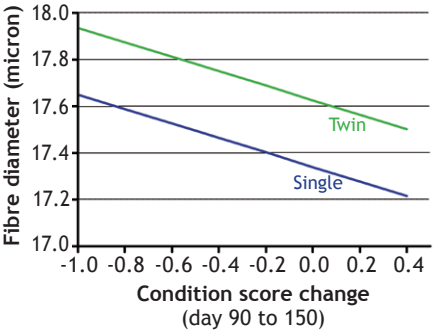
Single and twin bearing ewes can be managed to their specific feed requirements, if the flock is pregnancy scanned.

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 2.6**
- **twinning ewes CS 2.6+**

Pasture target

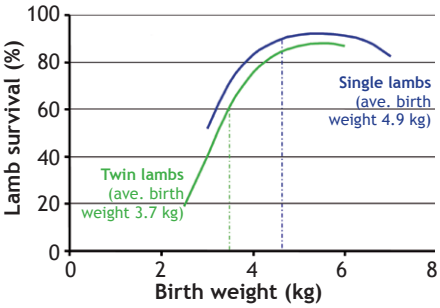
- **single ewes 1200 kg DM/ha green FOO**
- **twinning ewes 1800 kg DM/ha green FOO**

The first 48 hours of a lamb's life are critical – around 70% of lamb mortality from birth 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 the ewe's condition over pregnancy with late pregnancy being the most important phase.

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

The relationship between lamb birth weight and survival



Having ewes in condition score 2.6 at lambing ensures that survival and production are at high levels.

Ewe condition has its largest effect on birth weight in late pregnancy. Losing condition in early pregnancy and regaining ***all*** lost condition in late pregnancy can lead to higher birth weight and survival. It is however, only profitable to do this using green feed.

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 3.5 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 have 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.

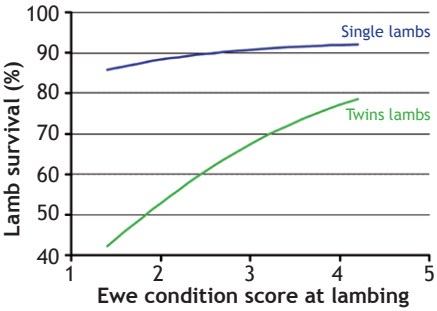
Ewe mortality can be a serious issue when condition score falls below 2.0 during late pregnancy or at lambing.

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.

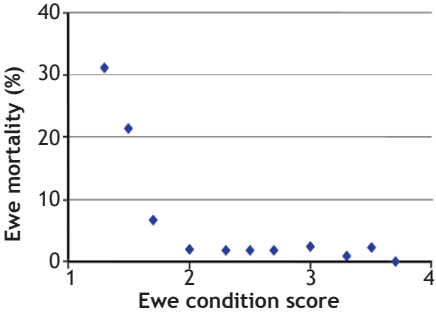
Any individual ewe whose condition score is less than 2.0 prior to lambing should be managed separately and have increased access to good feed. Twinning ewes are more likely to be in danger than single bearing ewes, with at least 2–3% higher mortalities for the same condition score.

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

The relationship between ewe condition at lambing and lamb survival



The effect of condition score at lambing on ewe mortality



5. Lactation (day 150-240)

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 2.4-2.6

Pasture target

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

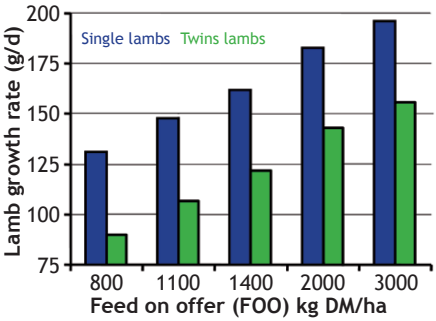
Feed on offer (FOO) during lactation is the main factor driving lamb growth rates.

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

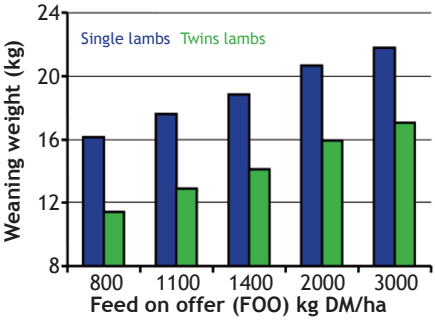
Ewes in good condition will use fat reserves and pasture to provide high lactation levels, and will tend to lose condition over lactation.

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 240)

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

Management recommendations

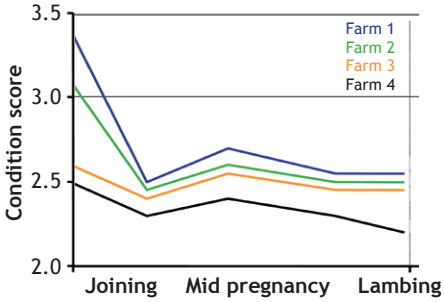
Condition score target
CS 2.4+ (ewes)

Pasture target
1100 kg DM/ha green FOO or more

Weaning liveweight target
45% of adult liveweight

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%



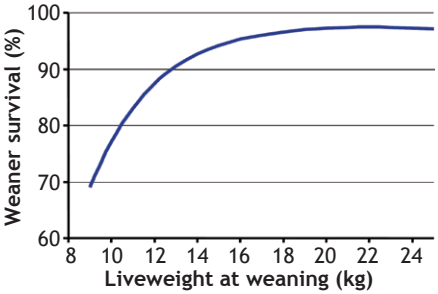
Lambs should be weaned at no later than 14 weeks from the start of lambing and 45% of adult liveweight for medium Merinos.

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.

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

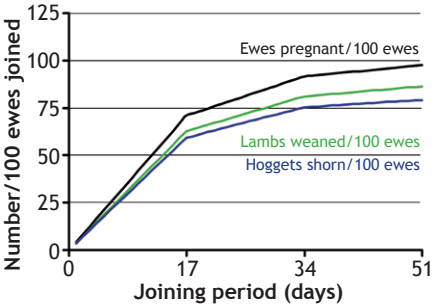
Condition score target

CS 2.6+

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 2.6 or higher at joining to achieve high reproductive rates (if they are a responsive flock) and to ensure that good condition can be achieved by the following lambing in the most cost effective way.

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 2.3.

Once the ewe is below CS 2.3 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.

Ewe wool production

Wool contributes about 70% (in a specialist wool system) and 30% (in a first cross lamb production system) to the gross income of a sheep production enterprise in the southern slopes NSW and north central Victoria, and breeding ewes make up more than 50% of the sheep flock. The level of wool production 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 predict the quantity and quality of the ewe wool clip with 80% accuracy. Together with ewe stocking rate, the condition score profile over the year can be used to estimate the value of the ewe wool clip in advance (see table below).

Ewes have particularly variable wool growth rates, compared with wethers, due to the added burden of pregnancy and lactation. This affects clean fleece weight, fibre diameter, staple length and staple strength.

The influence of FOO

Feed on offer above 2000 kg DM/ha usually maximises feed intake. At these levels of FOO wool growth is usually maximised irrespective of the stage of pregnancy or lactation. Liveweight growth and wool growth is reduced when FOO is less than 2000 kg DM/ha.

The influence of condition score

Condition score of the ewe during pregnancy and lactation affects clean fleece weight and mean fibre diameter (see table below). One condition score change over the whole of pregnancy equals a change of about 0.7 kg of clean fleece weight and 0.9 of a micron in mean fibre diameter. Ewes that lose 0.5 of a condition score during early pregnancy and regain that condition by lambing will produce a similar clean fleece weight and fibre diameter to ewes that maintained condition throughout pregnancy.

Effects on ewe wool production

Effect on ewe production	Effect of losing 0.5 of a condition score in a period of pregnancy		Cumulative effect of losing 0.5 of 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)	-0.35	-0.32	-0.03
Fibre diameter(µm)	-0.50	-0.40	-0.10

The effect of condition score change during early pregnancy is similar to late pregnancy effects on ewe clean fleece weight and the relationship is linear.

The key effects of change in condition score on fleece weight are:

- an increase of one condition score translates to a 0.7 kg increase in clean fleece weight
- losing 0.5 of a condition score and then gaining 0.5 of a condition score by lambing gives similar clean fleece weight to ewes that maintain condition through pregnancy
- a loss of 0.5 of a condition score in early to mid pregnancy reduces fibre diameter of both single and twin bearing ewes by half a micron.

The effect of condition score changes on staple strength

Staple strength is affected by nutrition due to the variation in fibre diameter along the wool staple (see graph to right). The key determinant of staple strength is the minimum fibre diameter. A one micron change in minimum fibre diameter is normally associated with a change in staple strength of about 4–5 N/ktex.

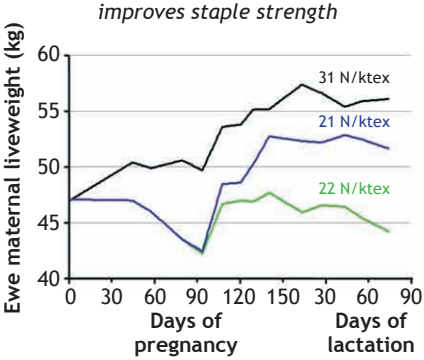
The impact of staple strength on price is very dependant on the position of the break along the fibre and the time of shearing. There is little impact if shearing occurs close to when the minimum fibre diameter occurs and a large impact if shearing occurs when the point of minimum strength is in the middle of the staple.

For late winter-spring lambing ewes that are shorn in spring/summer, a loss of one condition score during early and mid pregnancy can reduce staple strength by 5 N/ktex. Further, gaining one condition score in late pregnancy after losing one condition score in early pregnancy will reduce staple strength by another 2–3 N/ktex, so this wool can be 7–9 N/ktex weaker than that from ewes that maintained condition score throughout pregnancy.

A loss of 0.5 of a condition score in early to mid pregnancy reduces staple strength of both single and twin bearing ewes by 2.5 N/ktex (November shearing).

Lamb survival and rearing rank are also important in determining the staple strength of ewe wool. The more even the nutritional stress during pregnancy and lactation, the higher the staple strength is likely to be.

Better feeding of ewes improves staple strength



Profitability in Merino enterprises

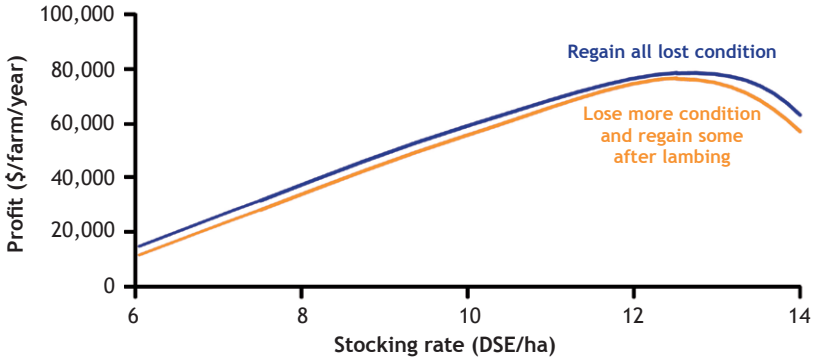
Profitability in Merino enterprises is driven by several key factors including stocking rate and the amount of pasture grown and utilised. Matching the time of lambing to maximum pasture availability allows higher stocking rates and pasture utilisation to be achieved, thereby increasing profit.

Late winter and spring is when feed is most plentiful in the southern slopes NSW and north central Victoria regions. It is therefore advisable to lamb in late winter to coincide with best pasture. Other factors such as weaner survival over the summer periods however may result in some producers preferring an autumn lambing time even though this time has a lower profitability.

Allowing ewes to lose a moderate level of condition (0.3 of a condition score) over autumn and regaining that lost condition after the break of the season ensures that lambing targets are met while achieving the most efficient use of grain and existing paddock feed. The relationship between stocking rate and whole farm profit is less important than the impact of the amount of grain fed or the cost of grain and for this reason producers should look at holding their current stocking rates and have their ewes in better condition for lambing. For a late winter-spring lambing system the majority of the grain will be fed in early and mid pregnancy. Ewes can then gain condition after weaning on green feed prior to the end of the season.

The graph below illustrates the impact of stocking rate on whole farm profit for late winter-spring lambing flocks and shows that the new guidelines from lifetimewool can further increase profitability in the order of 5–8% on whole farm profit, depending on stocking rate.

The effect of lifetimewool on profitability



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 lifetimewool defined 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 during pregnancy meant more money through savings in feed costs. We now know there are substantial penalties for not having ewes in good condition for lambing. These impacts must be included when evaluating the financial implications of different management strategies for ewe flocks.

Ewe condition during pregnancy affects the progeny's lifetime production.

Lamb birth weight, survival and progeny fleece value are closely related to ewe condition during pregnancy, and particularly her condition at lambing.

During pregnancy, the effects of ewe condition on progeny birth weight, survival and wool production are 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 large impact on profitability for that lambing. The effects on fleece value are permanent for the lifetime of the progeny. Use the table on page 23 to assess the impact on production of a range condition score profiles over pregnancy.

Impacts of condition score profile throughout pregnancy on ewe and progeny production

- The blue row shows ewe production and progeny production when the ewe is maintained at condition score 3.0 throughout pregnancy.
- All other figures show the **difference** in production when condition score throughout pregnancy differs from 3.0. These figures relate to the genotype of a medium Merino (50 kg SRW) ewe with 4 kg CFW and 20.5 µm wool.

Condition score profile			Ewe production				Progeny production					
joining	day 90	lambing	CFW (kg)	FD (µm)	Mortality (%)	Reprod. rate (%)	CFW singles (kg)	CFW twins (kg)	FD singles (µm)	FD twins (µm)	Survival singles (%)	Survival twins (%)
3.0	**3.0**	**3.0**	**4.1**	**20.5**	**3.2**	**120**	**3.4**	**3.1**	**17.6**	**18.1**	**91**	**71**
Condition score profile			Difference in ewe production compared to ewes maintained at CS 3.0				Difference in progeny production compared to ewes maintained at CS 3.0					
joining	day 90	lambing	CFW (kg)	FD (µm)	Mortality (%)	Reprod. rate (%)	CFW singles (kg)	CFW twins (kg)	FD singles (µm)	FD twins (µm)	Survival singles (%)	Survival twins (%)
2.5	2.0	2.0	-0.6	-0.6	3.2	-11	-0.1	-0.1	0.2	0.2	-13	-28
		2.5	-0.3	-0.2	0.8	-11	-0.1	-0.1	0.0	0.0	-3	-6
	2.5	2.0	-0.6	-0.6	3.2	-11	-0.1	-0.1	0.2	0.2	-17	-35
		2.5	-0.3	-0.2	0.8	-11	-0.1	-0.1	0.0	0.0	-5	-12
		3.0	0.1	0.3	0.0	-11	0.0	0.0	-0.2	-0.2	3	7
3.0	2.5	2.0	-0.7	-0.6	3.2	0	-0.2	-0.2	0.3	0.3	-19	-39
		2.5	-0.4	-0.2	0.8	0	-0.1	-0.1	0.2	0.2	-6	-15
		3.0	-0.0	0.2	0.0	0	0.0	0.0	0.0	0.0	2	5
	3.0	2.5	-0.3	-0.2	0.8	0	-0.1	-0.1	0.2	0.2	-9	-21
		3.0	0	0	0	0	0	0	0	0	0	0
		3.5	0.3	0.7	-0.1	0	0.1	0.1	0.0	0.0	5	16
3.5	3.0	2.5	-0.4	-0.2	0.8	11	-0.1	-0.1	0.3	0.3	-11	-24
		3.0	-0.1	0.2	0.0	11	0.0	0.0	0.2	0.2	-1	-2
		3.5	0.2	0.6	-0.1	11	0.0	0.0	0.0	0.0	5	14
	3.5	3.0	-0.1	0.3	0.0	11	0.1	0.1	0.2	0.2	-3	-8
		3.5	0.3	0.7	-0.1	11	0.0	0.0	0.0	0.0	4	10
		4.0	0.6	0.8	0.1	11	0.1	0.1	-0.2	-0.2	7	23

Source: Values based on lifetimewool experimental data. SRW = Standard Reference Weight, CFW = clean fleece weight, FD = fibre diameter.

Cost of missing targets

The optimum condition score profile for late winter–spring lambing flocks of the southern slopes NSW and north central Victoria is:

- allowing a moderate loss of condition (0.3 of a condition score) from joining to 'break of season', provided condition can be regained prior to lambing on green feed
- a target condition score of 2.6–3.0 at joining.

Following the optimum profile (profile 3 below) gives the highest profitability ($33.30/ewe) for this region and production system.

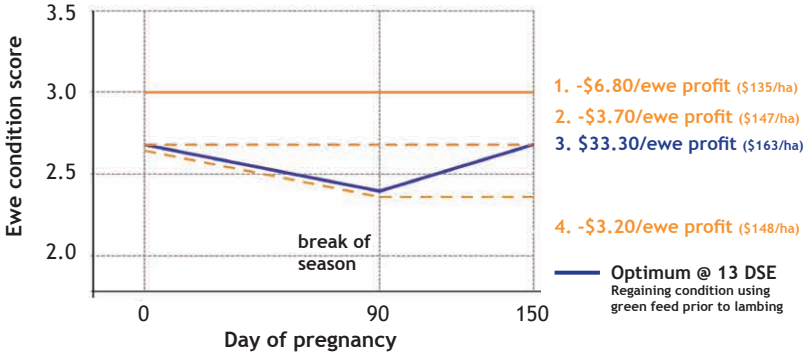
Maintaining ewes at their joining condition (CS 2.6) throughout the whole of pregnancy (profile 2) is expensive due to extra hand feeding over autumn and not taking advantage of the rapidly growing feed in spring.

This approach is $3.70/ewe less profitable compared to the optimal profile. Losing condition early and failing to regain any condition by lambing (profile 4) has a similar profitability to profile 2. Maintaining ewes at a higher condition score such as CS 3.0 throughout pregnancy (profile 1) is $6.80/ewe less profitable than the optimum profile.

Trade-offs of risk for profit

The optimum condition score profile takes into account both profitability and the health of the breeding flock. Poor ewe condition in late pregnancy reduces lamb birth weight and therefore lamb survival, and at lambing poor condition can increase ewe mortality.

Profitability of the optimum condition score profile (no. 3) compared with other condition profiles (for late winter-spring lambing)



Following a condition score profile that loses 0.6 of a condition score over autumn and only regains half of the lost condition by lambing has similar profitability to the optimum profile. However, there are large penalties in terms of flock health. Ewe mortality doubles and the survival of twin lambs is 5% lower than the optimum profile (72% compared to 77%). If the season fails to break and ewes don't regain a small amount of condition, lambing results could show further ewe losses and 14% lower twin survival.

Running stock to a similar profile to the optimum, but starting at CS 3.0 at joining, see page 6, has a slightly lower profitability (-$2.30/ewe) but if the climate is more severe or there are irregular seasons this may be the best option for improved lamb and ewe survival. However, there are small costs associated with having ewes in higher condition at joining.

The condition score profile is for the average of the flock. Usually in each flock there will be some individuals at least 0.5 of a condition score lower and an equal proportion that are 0.5 of a condition score higher. Individual ewes should not be below CS 2.0. Ewes at or below CS 2.0 during pregnancy should have preferential treatment to regain condition prior to lambing as ewe and lamb mortality increases dramatically when ewes are maintained at or below CS 2.0.

Running lower stocking rates

These profiles are also suitable for flocks run at stocking rates lower than the optimum (12–13 DSE/ha). However, by following the lifetimewool ewe profile stocking rates can be increased safely and profitability increased. In years when the peak condition of ewes prior to joining is above the optimum, it is worthwhile following a higher condition score profile for that season, such as joining in CS 3.0, losing condition to CS 2.7 and regaining lost condition by lambing (shown on page 6) because extra productivity will result.

Continuing to run ewes at this higher profile will give a slightly lower profitability to running ewes at the optimum profile, as the higher cost of supplementation offsets the higher production gains. Aiming to be on this profile every year or in an average year will be more expensive as it takes more supplement to grow maiden ewes to the higher starting condition score.

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

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.

*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).

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

Fat scoring

Fat scoring is used with liveweight to estimate the yield of saleable meat (%) of young sheep being sold for slaughter. Fat scores are related to 5 mm ranges in total tissue depth (fat and muscle) over the 12th rib (GR site). Fat score can also be used to estimate the nutritional well-being or 'reproductive fitness' of adult ewes and some advisors (visit www.dpi.nsw.gov.au/agriculture for more details) use fat score in their recommendations.

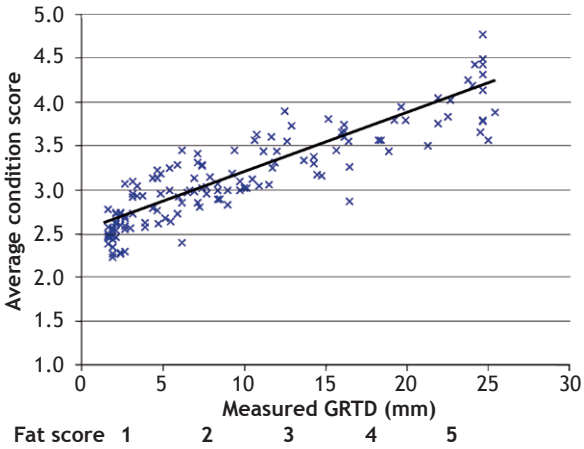
An experiment was conducted to establish the relationship between the two alternative methods of assessing condition. The results from four expert assessors of either condition score or fat score were compared to the measured tissue depth at the GR site on a large number of ewes. The assessment of both groups of experts was highly repeatable and the two measures of body condition were highly correlated.

The graph below shows the strong relationship between measured tissue depth at the GR site (GRTD) on the carcass and the average condition score (CS) for adult fine and medium Merino ewes and adult Merino x Border Leister ewes.

In ewes with at least 5 mm of tissue at the GR site, each increase of one fat score corresponded to a 0.3 increase in condition score.

For sheep in store condition, fat scoring is not a sufficiently sensitive measure. Using fat score in these flocks would mean that over half the sheep would be assessed as fat score one. However using condition scoring, they could be 2.0 to 2.5, representing healthy sheep, which is the commercial reality in many flocks in late summer or mid lactation. In flocks following the optimum condition score profile, around half the sheep will be below CS 2.5 during most of the year.

The relationship between fat score and condition score



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 to 5. 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). It is not considered a suitable method for assessing the condition of adult ewes.

Feed on offer (FOO) – Also known as pasture mass or herbage mass, this is the amount of all above ground pasture available for sheep consumption expressed in kilograms of dry matter per hectare (eg 1100 kg DM/ha). To convert to herbage mass (HM) add 300 kg DM/Ha.

Liveweight – The empty body weight of sheep weighed in kilograms and adjusted for weight of wool. In pregnant ewes adjust for conceptus.

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

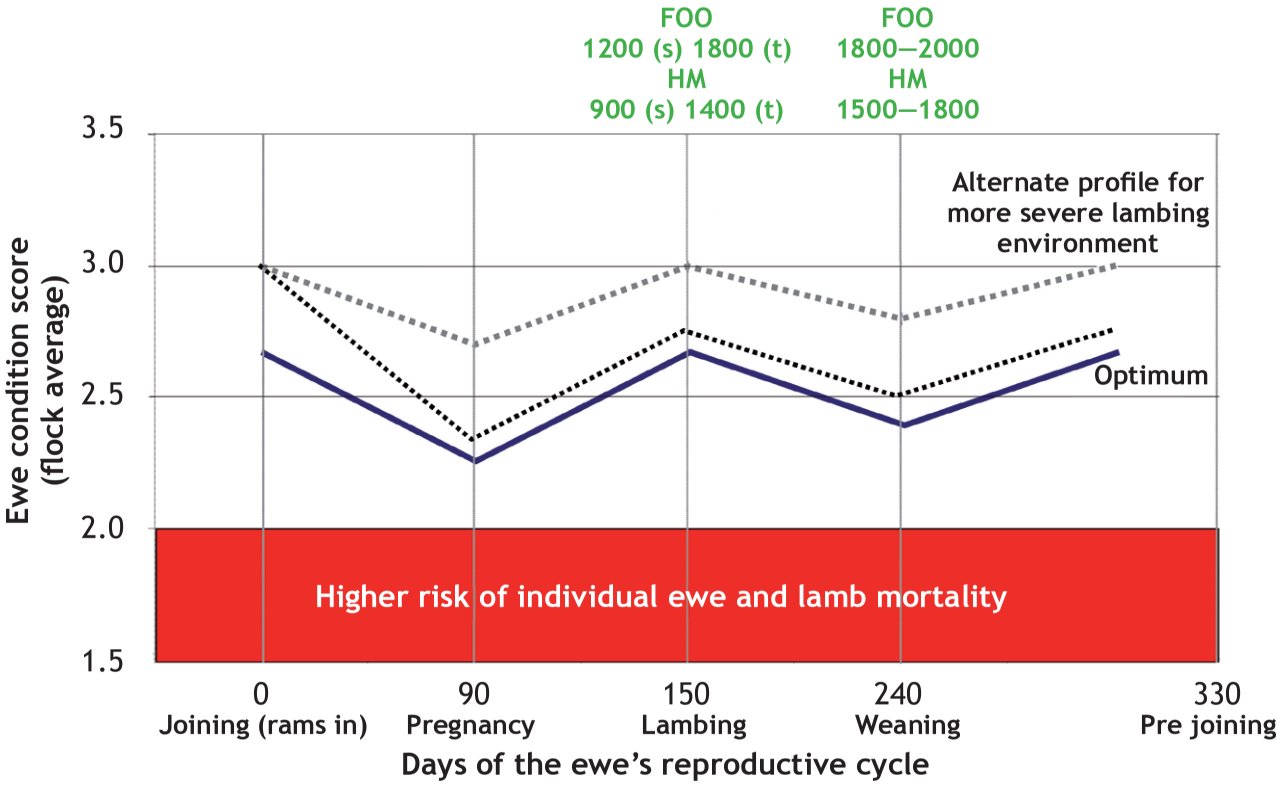
lifetimewool toolkit – available from www.lifetimewool.com.au or Dr Sue Hatcher, DPI NSW Orange, 02 6391 3861 or Sue.Hatcher@dpi.nsw.gov.au

Lambing Planner – Department of Agriculture & Food WA, available from Albany Office 08 9892 8444 or email mcurnow@agric.wa.gov.au

Making More From Sheep - available from AWI Helpline on 1800 070 099

Optimum condition score profile

(for Merino ewes, late winter-spring lambing)



Please visit www.lifetimewool.com.au to print out your own copy of the profile, and to access feed budgeting tools and pasture photos.

lifetimewool quick reference guide

Step	Phase	Day/s	CS target	Pasture target kg DM/ha green FOO*	Energy requirement MJ/head/day	Management guidelines
1	Joining	0	2.6	> 800 dry	8.0-9.5	Ewes CS 2.6 or above to maximise lambs conceived. Consider not mating ewes if below CS 2.0
2	Early to mid pregnancy	1-90	2.3	900 by day 90	9.0-11.0	Allow slow loss to CS 2.3 if late pregnancy pasture target can be met
3	Late pregnancy	90-150	2.6	1000 singles 1200 twins		Regain joining condition score by lambing
4	Lambing	150	2.6	1200 singles 1800 twins		Higher CS at lambing improves lamb survival. Ewe mortality doubles at CS 1.5
5	Lactation	150-240	2.4+	1200 singles 1800 twins		Increased ewe nutrition improves lamb growth rate and increases weaner survival
6	Weaning	240	2.4+	1100 ewes		Have weaners 45% of adult live weight by weaning. Draft off light weaners and supplement preferentially
7	Post weaning	240-290	2.6+	1000		Maximise weaner growth rates on green pasture. Maximise ewe live weight gain on green pastures prior to next joining
	Pre joining	290-365	2.6+	> 800 dry		Check ewe condition score to ensure ewes don't get below CS target for joining

*FOO = Herbage Mass + 300 kg