

Ewe Management Handbook

Optimising Merino ewe nutrition to increase farm profit
for the cereal-sheep zone



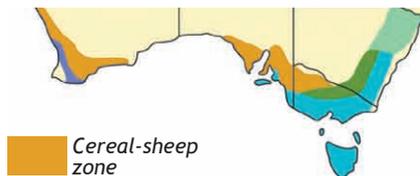
lifetimewool
more lambs, better wool, healthy ewes

Ewe Management Handbook

Optimising Merino ewe nutrition to increase farm profit

cereal-sheep zone edition

The guidelines in this handbook have been designed specifically for Merino wool production systems in the cereal-sheep zone, with a winter dominant rainfall of 280-420 mm per year and a May lambing. The feed base is typically crop stubbles and annual pastures.



more lambs, better wool, healthy ewes



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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%.

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 (cereal-sheep zone model). The full report on the cereal-sheep 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. See page 27 for details on how to assess condition score of a sheep.

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 (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 cereal-sheep zone, lambing in late July provides the best match of pasture availability to the energy needs of the ewe and lamb, allowing more sheep to be run relative to lambing at other times of the year. However, for many reasons, many producers choose a May (early or autumn) lambing, which is the focus of this handbook.

The optimum condition score profile for May lambing flocks is:

- maintaining condition from joining through to lambing
- a target of at least CS 2.7 at joining.

Following the shape of the profile is as important as the actual starting condition score of the ewes, so if ewes are in CS 3.5 pre-joining, the most profitable approach is to maintain their condition through to lambing. Similarly if the ewes are in CS 2.5 at joining, the most profitable approach is to maintain their condition.

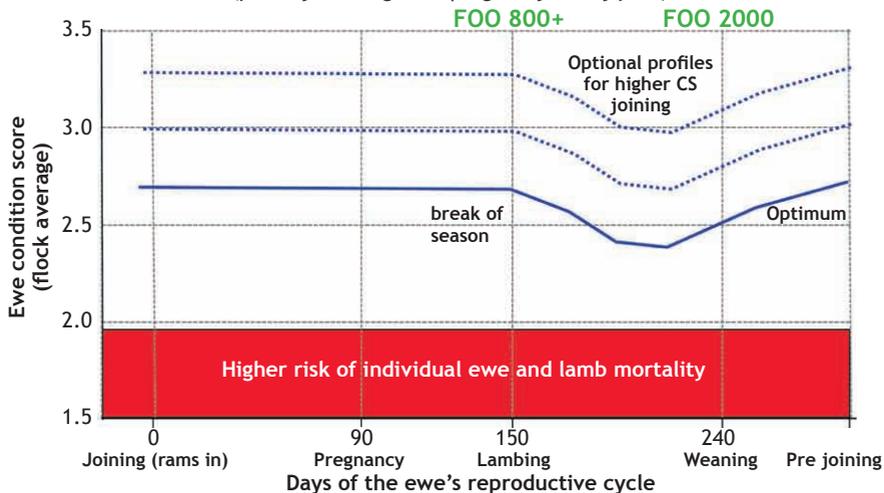
If lambing in late July, the optimum condition score profile is:

- moderate loss of condition from the end of joining to mid pregnancy (day 90) to CS 2.6
- regain any lost condition by lambing.

Visit www.lifetimewool.com.au to download your copy of an optimum condition score profile.

Optimum condition score profile

(for May lambing, late pregnancy on dry feed)



The 7-step reproductive cycle

There are seven important phases in the reproductive cycle of Merino ewes. The lifestimewool 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.



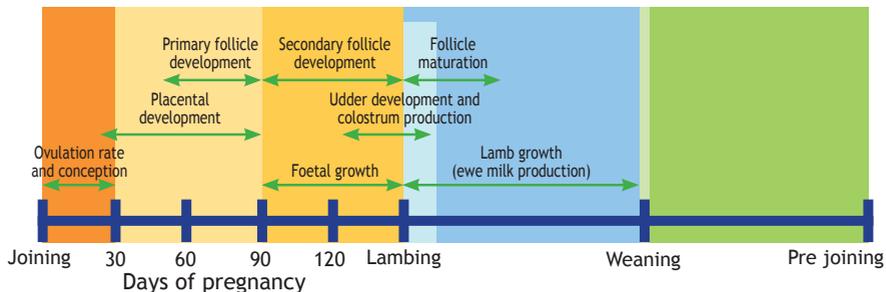
Management of ewe condition during each step of the cycle affects the following:

- 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, energy requirements for ewes on dry feed, and pasture targets, expressed as feed on offer (kg DM/ha FOO), defined on page 5. The energy requirements recommended are for medium Merinos (50 kg SRW) and large Merinos (60 kg SRW). 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 (May lambing)

Condition score target

CS 2.7+
over the joining period

Ewe energy requirements

medium Merino - 8.0 MJ/head/day
large Merino - 9.5 MJ/head/day

**use the lifetimewool feed budget tables to determine feeding rates required.*

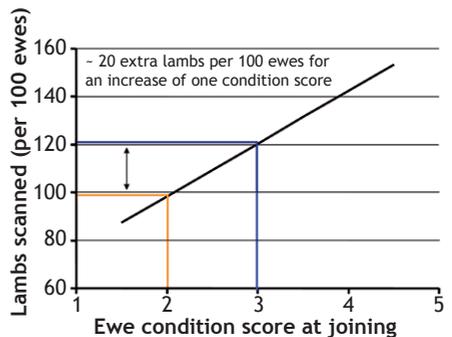
Ewes in better condition at joining conceive more lambs.

For each extra condition score at joining, on average, 20 more lambs are conceived per 100 ewes joined. Responses are greater in late lambing flocks than early lambing flocks but vary greatly (0-40) between Merino strains.

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.

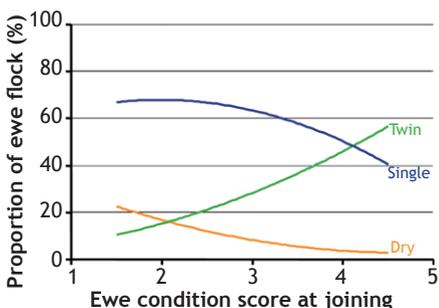
If reproductive rates are not responsive to increased condition at joining there will be little benefit in feeding to maintain a higher condition at joining.

Scanning ewes at day 90 for single and twin fetuses 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).

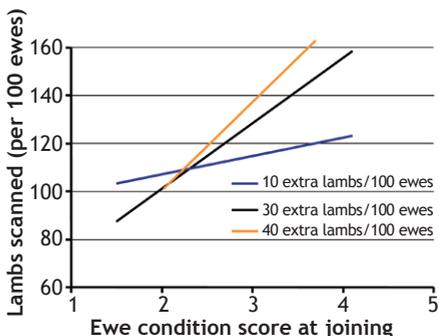
If ewes are in poor condition (less than CS 2.0) at joining, those that do conceive are unlikely to be able to gain enough condition prior to lambing to ensure good survival rates for both ewe and lamb (see pages 14 and 15). Production outcomes for these ewes may be improved by drafting them, after scanning, 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. The graph below shows the likely proportion of single or twin bearing ewes or dries in a flock for a given condition score. As condition at joining improves, the proportion of twin bearing ewes increases and the number of dries decreases.

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 three 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 future wool production are permanent.

Management recommendations (May lambing)

Condition score target

CS 2.7+

maintain condition from joining

Ewe energy requirements

By day 90:

medium Merino - 9 MJ/head/day

large Merino - 11 MJ/head/day



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

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 the first 48 hours after birth (see section 4 on page 14 for more details).

Ewe nutrition in early pregnancy will affect the ability of the ewe to reach lambing condition targets. Once pastures have senesced they rapidly decline in feed value until about New Year, reaching around 50% digestibility. At low digestibility ewes cannot eat enough to maintain condition - even when large amounts are available. See pages 25-26 for more details.

Stubbles can be a valuable feed and ewes will continue to gain weight while there is grain to eat.

It is very expensive (and unprofitable) to hand feed ewes to gain condition, so it is important to not let ewes get

lower than the lambing target. Low condition at lambing reduces 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.

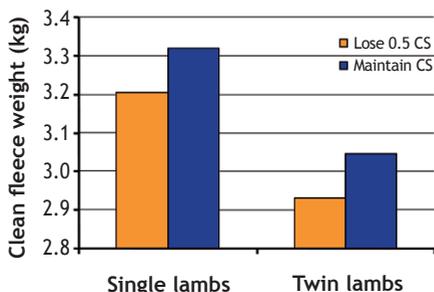
Small losses in condition score during early to mid pregnancy can be overcome by gains in ewe condition in late pregnancy.

However, the efficiencies of gaining condition compared to maintaining condition are very poor.

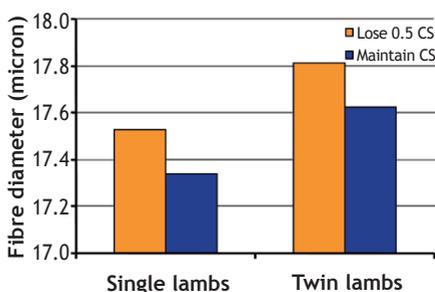
When feed supplies are short and supplementary feed is expensive, consider scanning ewes for singles or twins at day 90 to allow for separate management throughout late pregnancy and lactation. This ensures the most efficient allocation of feed resources over late pregnancy when energy requirements rapidly increase, particularly in twin bearing ewes.

The graphs below show the results from a fine wool flock, however, the response to changes in nutrition of the mother on progeny wool production were similar for flocks of larger Merinos measured in Western Australia and South Australia.

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 (May lambing)

Condition score target

- single ewes - maintain condition CS 2.7+
- twinning ewes - maintain condition CS 2.7+

Ewe energy requirements (MJ/head/day)

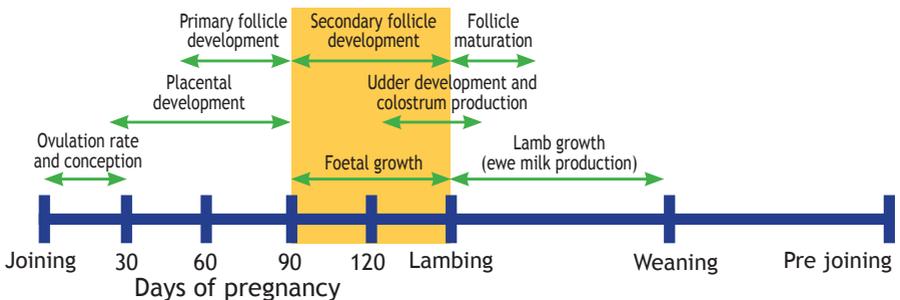
	After day 90	By lambing
Single ewes		
medium Merino	10.0	12.5
large Merino	11.5	14.5
Twinning ewes		
medium Merino	11.0	15.5
large Merino	13.0	18.0

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 (losing half a condition score) during late pregnancy has a greater impact on lamb birth weight (up to 0.25 kg), than nutrition in early pregnancy.

Maintaining condition in late pregnancy can lower the risk of pregnancy toxemia. Ewes experiencing loss of condition close to lambing, particularly twin bearers, are more susceptible to toxemia.



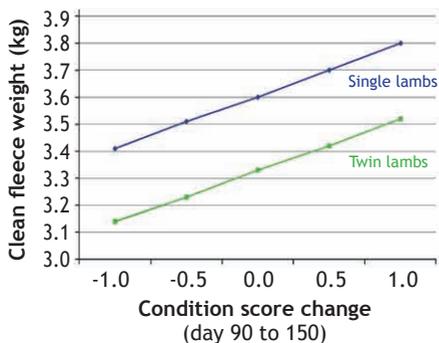
The ewe's energy requirement increases by 50% for single bearers and 80% for twin bearers by lambing. To increase her intake the ewe must have higher amounts of feed available available.

If ewes are still on dry feed and grain by the end of pregnancy it is important to ensure that both energy and protein levels are adequate.

If the break of season occurs in this period and pasture growth rates are high, continue to ensure that energy intake is high enough to maintain condition. Green pick will increase the protein available to the ewe. Consider locking up lambing paddocks to allow a 'feed wedge' to grow prior to lambing. This will ensure feed intake is adequate for good lambing, particularly if flock condition score is low (< CS 2.6).

Any gains in ewe condition in late pregnancy can lift progeny birth weight, fibre diameter and fleece weight.

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



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.

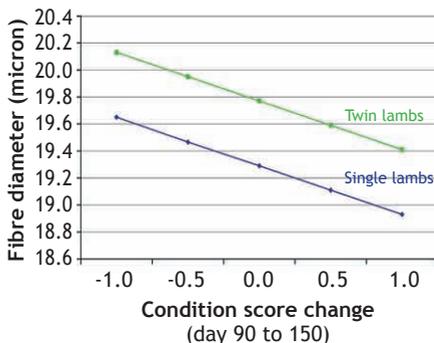
Secondary follicles are the most important part of the wool-producing skin, having a direct influence on the density and fineness of the fleece. The higher the follicle density the lower the fibre diameter.

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

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 fibre diameter



4. Lambing (day 150)



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

Management recommendations (May lambing)

Condition score target

- single ewes CS 2.7
- twinning ewes CS 2.7+

Pasture target

800 kg DM/ha if green feed is available

Ewe energy requirement

Single ewes

- medium Merino - 18 MJ/head/day
- large Merino - 21 MJ/head/day

Twinning ewes

- medium Merino - 23 MJ/head/day
- large Merino - 27 MJ/head/day

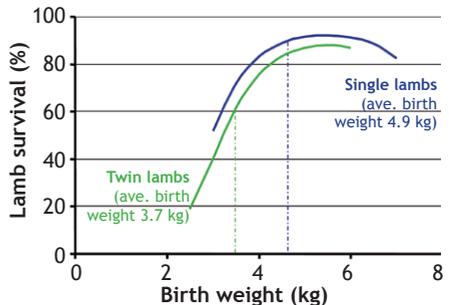


The first 48 hours of a lamb's life are critical - around 90% of lamb mortality from birth to weaning occurs within this period.

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. Losing condition over the last third of pregnancy should be avoided.

The optimum birth weight for lamb survival is between 4.5 and 6.0 kg. With lower birth weights expected in twins, good nutrition of the twinning ewe is especially important.

The relationship between lamb birth weight and survival



Having ewes in condition score of at least 2.7 at lambing ensures that survival and production are at reasonable levels.

Ewe condition has its largest effect on birth weight in late pregnancy. Having ewes in higher condition means birth weights closer to the optimum, especially for twins.

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 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.

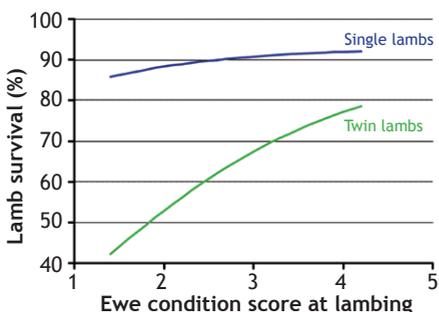
Ewe mortality can be a serious issue when condition score falls below 2.0 during late pregnancy or at lambing.

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.

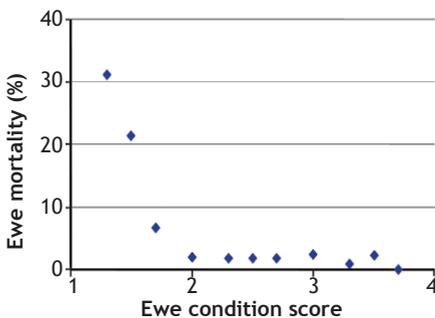
Any individual ewe whose condition score is less than 2.0 prior to lambing should be managed separately and have increased access to good feed. Twinning ewes are more likely to be in danger than single bearing ewes, with at least 2-3% higher mortalities for the same condition score.

Ewes in condition score over 4.0 (particularly single ewes in a good year) may be 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 (May lambing)

Condition score target

CS 2.7-3.0

Pasture target

- single ewes - increasing from 800 to 2000 kg DM/ha green FOO during lactation
- twinning ewes - increasing from 800 to 2500 kg DM/ha green FOO during lactation

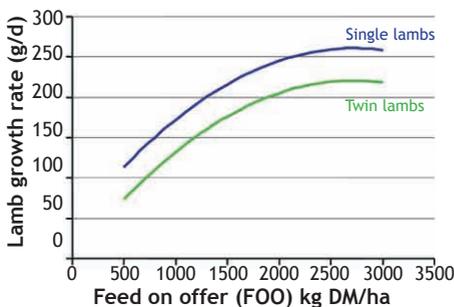
Feed on offer (FOO) during lactation is the main factor driving lamb growth rates.

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

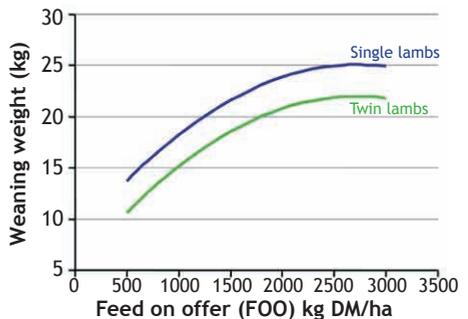
Ewes in good condition will use fat reserves and pasture to provide high lactation levels, and will tend to lose condition over lactation.

Ewes in poor condition will have poorer milk production 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 (May lambing)

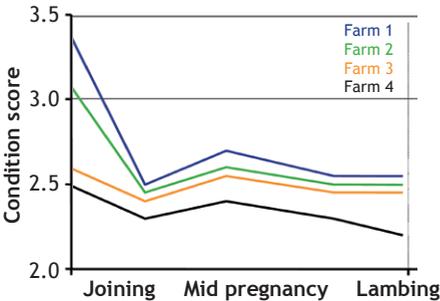
Condition score target
CS 2.5-2.7 (ewes)

Pasture target
2000 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%

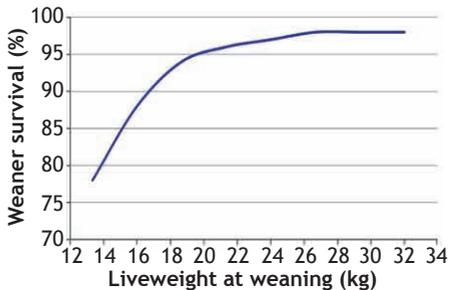


Lambs should be weaned at no later than 14 weeks from the start of lambing and 45% of adult liveweight.

Weaners need to keep growing through spring, summer and autumn to ensure high survival. There are no benefits to either ewe or lamb from delaying weaning past 14 weeks. Weaners on good green pasture (>2000 FOO) should grow at more than 200 g/head/day for large Merinos and crossbreds.

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

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 (May lambing)

Condition score target

CS 2.7+

Pasture target

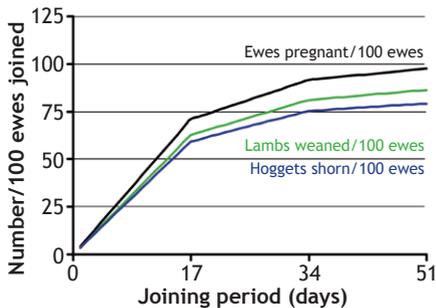
above 2000 kg DM/ha green FOO

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 CS 2.7 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.

Ewes being joined before February 1st should be teased to ensure that they are ready to conceive at the beginning of joining. Teasers also stimulate more ewes to come into oestrus. This produces a closer lambing period, and makes managing ewes and lambs easier. Teasing for 14 days followed by a 35 day joining is recommended. The Lambing Planner has more information on joining - to obtain a copy, see details on page 28.

Longer joining makes little difference to the number of lambs weaned but increases the proportion of small lambs at weaning



Ewe wool production

Wool contributes about 60% (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 cereal-sheep zone, and breeding ewes usually make up more than 50% of the flock. Wool production of ewes is closely related to their condition score profile during pregnancy and lactation with four assessments of condition score (joining, mid pregnancy, lambing and weaning) predicting the quantity and quality of the ewe wool clip with 80% accuracy.

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.

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.

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

Profitability in Merino enterprises

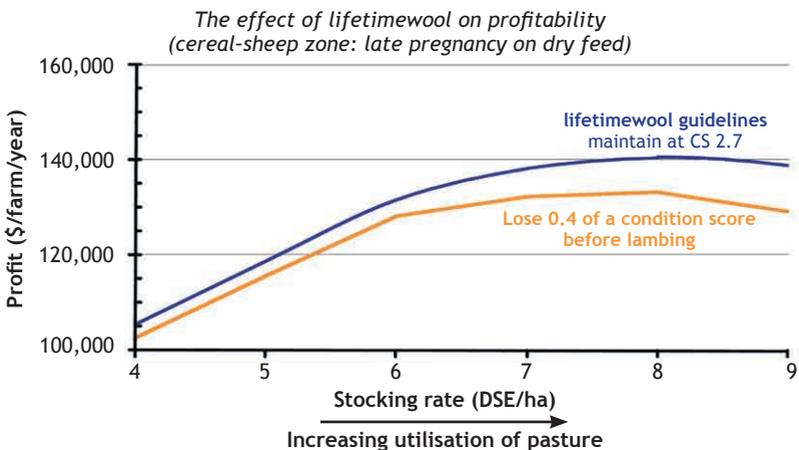
Profitability in Merino enterprises is driven by several key factors including stocking rate and the amount of pasture grown and utilised. Matching the time of lambing to maximum pasture availability allows higher stocking rates and pasture utilisation to be achieved, thereby increasing profit.

Late winter and spring is when feed is most plentiful. 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.

Maintaining condition throughout pregnancy for May lambing 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 May lambing system the majority of the grain will be fed prior to lambing. Because the ewes are in better condition after weaning there is less requirement to gain weight immediately after harvest and so a proportion of the high quality stubbles can be retained through till mid pregnancy.

The graph below illustrates the impact of stocking rate on whole farm profit for May 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.



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 26 to assess the impact on production of a range condition score profiles over pregnancy.



Cost of missing targets

May lambing

The optimum condition score profile for May lambing flocks is:

- maintaining condition from joining through to lambing
- a target of at least condition score 2.7 at joining.

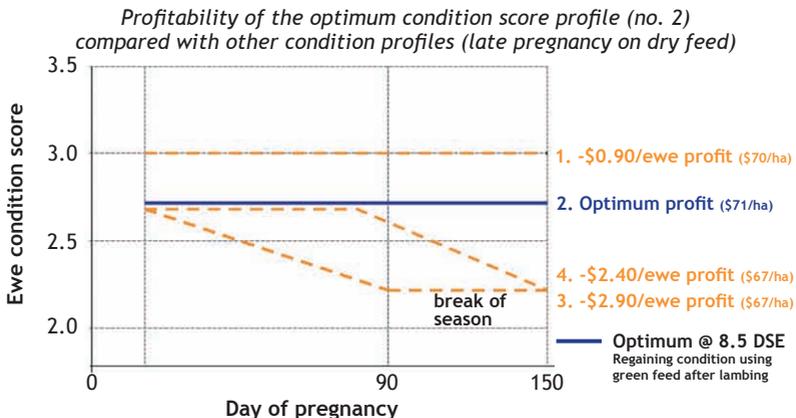
Following the shape of the profile is as important as the actual starting condition score of the ewes, so if ewes are in CS 3.5 pre-joining the most profitable approach is to maintain their condition through to lambing. Similarly if the ewes are in CS 2.5 at joining the most profitable approach is to maintain their condition.

The most important target for ewe flocks is to maintain condition through pregnancy. The economic modelling suggests that this option will

\$71/ha (profile 2 below). Missing the lambing target has a much larger impact than missing the joining target. In fact it is more important to maintain condition throughout pregnancy whatever the joining condition score, than to aim for a higher joining condition score and fail to maintain condition by lambing.

Allowing ewes to lose condition from CS 2.6 to CS 2.2 in the last third of pregnancy is \$2.40 less profitable (per ewe) than maintaining condition over pregnancy (profile 4). Similarly at higher starting condition score (CS 3.0), losing 0.4 of a condition score is \$1.60 less profitable per ewe.

Even less profitable is allowing ewes to lose 0.4 of a condition score over early pregnancy and maintaining them at this lower condition until lambing (profile 3).



Maintaining a higher overall condition throughout pregnancy is only \$0.90 less profitable than maintaining them at CS 2.6. This approach may be favoured if poor weather at lambing is likely, and consequently lower lamb survival is a possibility.

If ewes continue to lose condition throughout pregnancy to be around CS 2.0 at lambing, the risk of death of ewes and lambs is dramatically increased.

Running lower stocking rates

Many benchmarking studies confirm that stocking rate is the primary profit driver in the sheep enterprise. However, producers may choose to run flocks at stocking rates lower than recommended for maximum profitability for many legitimate reasons. Where lower stocking rates are preferred, it also pays to follow the same shaped profile as the optimum, but at a higher overall condition, ie joining in CS 3.0 and maintaining that condition through to lambing.

In seasons when the peak condition of ewes prior to joining is above CS 2.6, it is worthwhile following the same,

general trend of maintaining throughout pregnancy and gaining condition during lactation (see condition score profile on page 6). This is preferable to losing condition in an effort to follow the profile exactly. That is, profit is driven more by the shape of the condition score profile than by its starting point at joining.

However, continuing to run ewes at the higher flock condition score in an average or poor season will give lower profitability compared to running ewes at the optimum profile, as the higher production gains will be offset by the higher cost of feed supplementation.

July lambing

The optimum profile for late July lambing in the cereal-sheep zone is:

- moderate loss of condition from the end of joining to mid pregnancy (day 90) to CS 2.6
- regain any lost condition by lambing.

This lambing time gives optimum profitability for the Merino enterprise as it has the best match of pasture to the energy needs of the ewe and lamb, saving on grain feeding and lifting survival.

Feed quality throughout the year

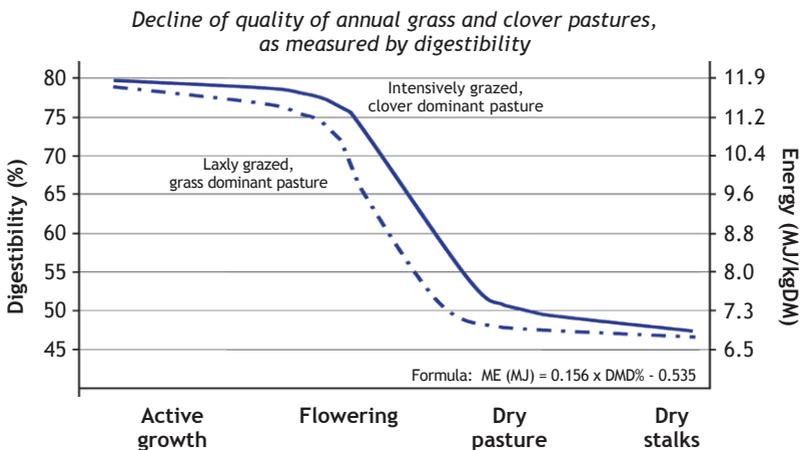
Annual pastures decline in both quality and quantity after senescence (see graph below). The nature of the decline is extremely variable and depends on daily temperature, time and pasture composition; and on factors such as grazing and conditions at the finish of the growing season. In May lambing flocks, the decline coincides with the peak energy demands of ewes in late pregnancy.

Recent work shows that decline in quality of annual pastures takes place after senescence and reaches a plateau after 30-60 days, depending on daily temperature. The **quality** then maintains around the 50% level, yielding about 7MJ of energy per kilogram of feed.

The amount an animal can eat (feed intake) is related to the digestibility of the feed. From the graph below it can

be seen that a non-lactating ewe can get only about 5MJ of energy per day from feed that has a digestibility of 50%. This means that the digestibility of dry pastures can fall rapidly to a level where ewes can not eat enough to maintain condition, regardless of the quantity available.

Depending on the level of efficiency of harvest equipment and prevalence of summer weeds, stubbles can have their highest feed value in early summer. However, the amount of grain left behind is the biggest determinant of feed value. Grazing decreases grain levels rapidly and stubbles may only provide adequate feed for as little as two weeks. The residual straw varies in quality due to conditions during crop senescence, with a short finish giving typically higher energy levels than a slow finish.



Implications for the ewe flock

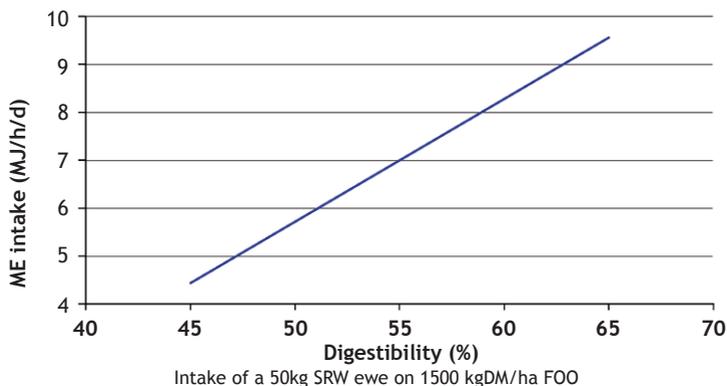
The enormous variation in the quality and quantity of dry feed, as well as sheep being selective grazers, means that managing pregnant ewes on dry feed is difficult. Condition scoring is the best tool to quickly identify loss of condition before a production penalty is incurred. Early action is more efficient and cost effective than waiting until large losses occur.

Supplementary feeding in late pregnancy may be required to maintain ewe condition due to the combination of increased energy demand combined with decreased feed value. For ewes grazing on dry pasture use the lifetimewool feed budget tables for dry conditions and at the break of season to estimate the levels of supplementation required. In stubbles, counting the number of grains on the ground may

provide an estimate of length of grazing time but condition scoring the ewes is the most accurate method of determining feed required.

With an autumn break in April or May, ewes will lamb onto rapidly growing green feed. This rapidly growing feed may take some time to provide enough feed on offer to meet requirements and deferring pastures to provide a feed wedge for lambing ewes can be very effective. The winter growth typically provides the lactating ewe and lamb at foot with high quality feed suitable for milk production and weight gain. Ewes may also be run on cereal crops planted for grazing rather than grain. It could be expected that a barley crop, for example, planted for grazing with average winter rainfall would produce at least 5 t DM/ha.

The relationship between digestibility and energy intake



Impacts of condition score profiles 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 (%)
2.0	2.0	2.0	-0.6	-0.6	3.2	-11	-0.1	-0.1	0.2	0.2	-13	-28
2.5	2.5	2.5	-0.3	-0.2	0.8	-11	-0.1	-0.1	0.0	0.0	-3	-6
2.0	2.0	2.0	-0.6	-0.6	3.2	-11	-0.1	-0.1	0.2	0.2	-17	-35
2.5	2.5	2.5	-0.3	-0.2	0.8	-11	-0.1	-0.1	0.0	0.0	-5	-12
3.0	3.0	3.0	0.1	0.3	0.0	-11	0.0	0.0	-0.2	-0.2	3	7
2.0	2.0	2.0	-0.7	-0.6	3.2	0	-0.2	-0.2	0.3	0.3	-19	-39
2.5	2.5	2.5	-0.4	-0.2	0.8	0	-0.1	-0.1	0.2	0.2	-6	-15
3.0	3.0	3.0	-0.0	0.2	0.0	0	0.0	0.0	0.0	0.0	2	5
2.5	2.5	2.5	-0.3	-0.2	0.8	0	-0.1	-0.1	0.2	0.2	-9	-21
3.0	3.0	3.0	0	0	0	0	0	0	0	0	0	0
3.5	3.5	3.5	0.3	0.7	-0.1	0	0.1	0.1	0.0	0.0	5	16
2.5	2.5	2.5	-0.4	-0.2	0.8	11	-0.1	-0.1	0.3	0.3	-11	-24
3.0	3.0	3.0	-0.1	0.2	0.0	11	0.0	0.0	0.2	0.2	-1	-2
3.5	3.5	3.5	0.2	0.6	-0.1	11	0.0	0.0	0.0	0.0	5	14
3.0	3.0	3.0	-0.1	0.3	0.0	11	0.1	0.1	0.2	0.2	-3	-8
3.5	3.5	3.5	0.3	0.7	-0.1	11	0.0	0.0	0.0	0.0	4	10
4.0	4.0	4.0	0.6	0.8	0.1	11	0.1	0.1	-0.2	-0.2	7	23

Source: Values based on lifetime wool experimental data. CFW = clean fleece weight, FD = fibre diameter.

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

*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).



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.

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

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).

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.

SRW (Standard reference weight) - The weight of a sheep when mature, not pregnant, bare shorn and with a condition score of 3.0.

Useful references

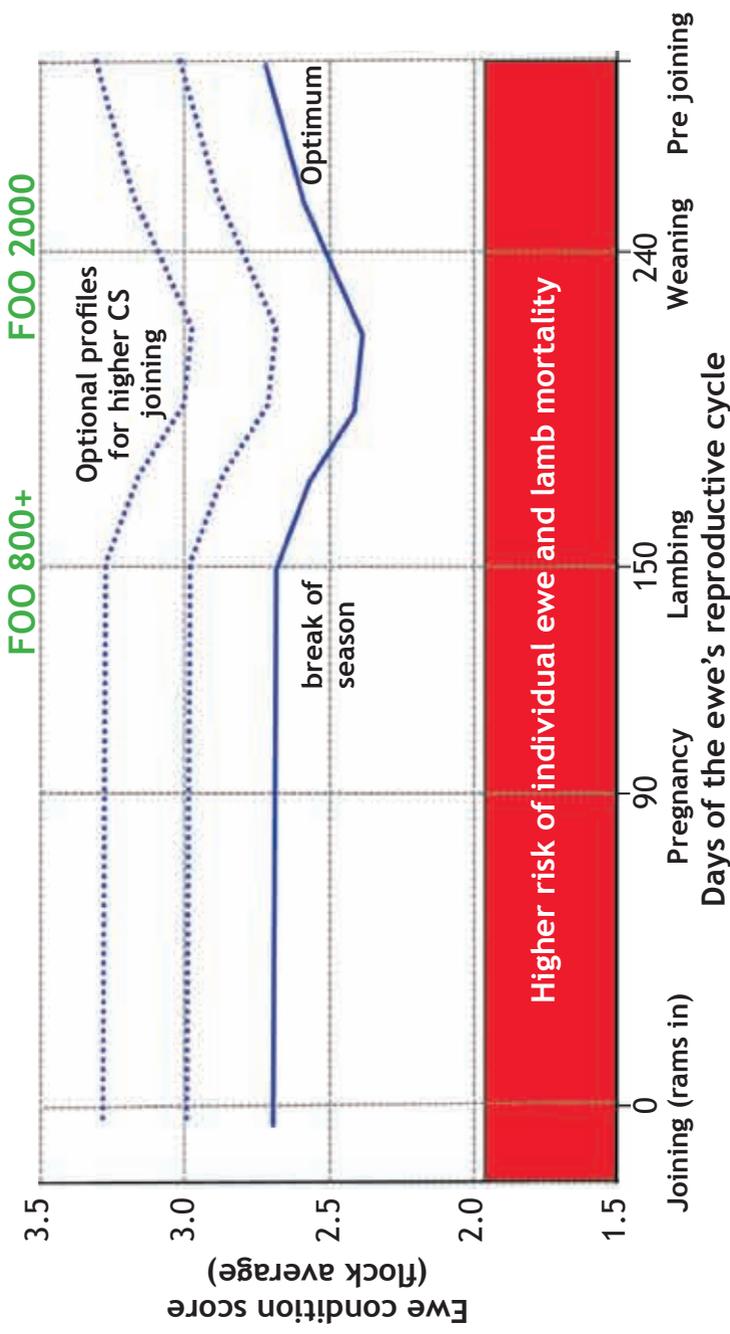
lifetimewool toolkit - available from www.lifetimewool.com.au or Mandy Curnow, Department of Agriculture & Food WA, 08 9892 8422

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 May lambing, late pregnancy on dry feed)



Please visit www.lifetimewool.com.au to print out your own copy of this profile or a late July lambing profile, and to access feed budgeting tools and pasture photos.

lifetimewool quick reference guide

(late pregnancy on dry feed)

Step	Phase	Day/s	CS target	Pasture target green FOO	Energy requirement MJ/head/day	Management guidelines
1	Joining	0	2.7		8.0-9.5	Ewes CS 2.7 or above to maximise lambs conceived Consider not mating ewes if below CS 2.0
2	Early to mid pregnancy	1-90	2.7		9.0-11.0	Maintain CS 2.7 to efficiently use energy reserves and supplements
3	Late pregnancy	90-150	2.7		single 10-14.5 twinning 11-18	Ensure ewes aren't losing weight at this time
4	Lambing	150	2.7	800+	single 18-21 twinning 23-27	Ewe mortality doubles at CS 1.5
5	Lactation	150-240	2.7+	800 - 2000		Increased ewe nutrition improves lamb growth rate and increases weaner survival
6	Weaning	240	2.5+	> 2000 for ewes		Have weaners 45% of adult liveweight by weaning Draft off light weaners and manage preferentially
7	Post weaning Pre joining	240 365	2.7 2.7	> 2000 for ewes		Maximise weaner growth rates on green pasture Maximise ewe liveweight gain on green pastures prior to next joining