Managing breeding ewes

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Contents

The information in this booklet was compiled by Grace Whitlow (AHDB) and Dr Nerys Wright (Independent Sheep Consultant).

Introduction

Good ewe management throughout the year is vital for ewe performance and productivity. There are many elements to ewe performance, from proactive health planning to adequate nutrition.

Ewe fertility is one of the main drivers determining the output of a sheep flock. Optimising fertility, e.g. the number of lambs scanned and subsequently born, will ultimately form the basis for the rest of the year. The maximum number of lambs expected will be known from pregnancy scanning. The key is to keep as many lambs alive as possible through to weaning, then to sale or retention into the breeding flock.

Ewe body condition score (BCS) is a useful management tool for assessing the adequacy of the flock's diet at key stages in the production cycle. It should be carried out regularly and changes made to flock management based on the results. This allows animals that are not at target condition to be managed according to their specific needs.

Keeping good records to compare data year-on-year will be time well spent. The ewe breed, flock age profile, date of lambing, land and labour availability will all affect an individual farm's priorities and targets. Each flock's targets will be different. Analysing historic data and setting goals and working with a vet and/or adviser will help keep the goals attainable and cost-effective. The advances in electronic identification (EID) can enable the required data to be collected. However, only collect what you can analyse. Analysing the figures is crucial to monitor performance and see whether goals are being achieved.

Whether replacements are homebred or bought in, the performance, health and welfare of the female breeding stock must be optimised.

Dr Nerys Wright
Independent Sheep Consultant

Reviewing your flock's breeding performance

Collecting and, more importantly, reviewing and acting on ewe performance records can help improve flock output by highlighting the strongest and weakest areas of an enterprise. There are many ways to record the data required to assess your flock's performance. This can be done using EID software programmes or more traditional recording on paper.

AHDB provides a levy-funded Flock notebook which can be used to record data such as scanning results, lambing records and lamb weight data. This is available to order as a hard copy or to download at **ahdb.org.uk/knowledge-library/flock-notebook**

To review your flock's breeding performance, it is important to record and calculate your performance at mating, scanning, lambing and at eight weeks post-lambing and weaning.

Mating records

Record the following:

- Number of females (ewes/ewe lambs) put to the ram
- Number of rams used
- Average ewe weight (kg) at mating (weigh approx. 10–20% of the group)
- Body condition score (BCS) at mating
- Date rams in
- Date rams out

Calculate performance

Number of females put to the ram ÷ Number of rams used = Ewe to ram ratio

The ratio that is right for your farm will depend on several factors, but one ram to shearlings and older could be an average figure to use as a baseline to work from. Factors to consider when deciding on the number of ewes per ram are ewe age, ram age and experience, use of teasers and terrain.

For ewe lambs, a ratio of 1:25 or 1:35 is recommended for synchronised or unsynchronised oestrus, respectively.

Average ewe weight (kg) at mating

Ewe weight is particularly important in younger ewes. Aim for 60% of mature body weight for ewe lambs and 80% for shearlings. Weigh the ewes in your flock to get a good idea of their mature weight.

Date rams out - Date rams in = Mating period (days)

The recommended mating period is for two to three oestrus cycles, which equates to 34–51 days. This will keep lambing time compact, ensure lambs are close in age and provide a longer period of time for ewes to recover after weaning.

Scanning records

The scanning percentage of a flock may be affected by many factors. It will depend on the time of year ewes are mated, the age of the ewes mated, ewe breed and farming system. Your flock's scanning result will also be dependent on ewe condition at weaning of the previous production year, as well as ewe condition at mating time itself and their condition through to scanning.

It is difficult to quote a target that will be appropriate for all farming systems. However, scanning greater than 120% for hill or upland flocks and greater than 160% for lowland flocks would be a good base to start from.

Calculate performance

- [A] Number of females put to the ram
- [B] Number of empty ewes
- [C] Number of ewes with singles
- [D] Number of ewes with twins
- [E] Number of ewes with triplets
- [F] Number of ewes with quads

((C x 1) + (D x 2) + (E x 3) + (F x 4)) = Total number of lambs [G]

(G ÷ A) x 100 = Scanning %

The key elements to analyse when you have scanned your ewes are:

- How do these figures compare with previous years on your farm?
- How do they compare to others with similar farming systems to yours?
- What is the proportion of ewes carrying singles, twins and multiples (triplets, quads and more)?
- If your scanning is lower than previous years, what is causing this – is it a higher proportion of ewes not in-lamb or is it fewer multiples and/or more singles?
- Number of empty ewes – determine why ewes are not in-lamb – how old are they? Do they have a raddle mark indicating whether they have been mated, and if so, was this early or later in the mating cycle? Are they in good condition? Have they been empty at scanning before?

You may consider culling empty ewes. More information on making that decision can be found on page 28.

While scanning results will determine the maximum number of lambs born, it is not the only milestone that will determine the rearing percentage of the flock. Higher scanning results (greater than 200%) are associated with many triplet lambs, which typically means lamb losses are often greater than when more ewes are carrying twins or singles. Reduced lamb losses from scanning to lambing and through to weaning can have a better impact on the flock's overall performance.

Table 1. 400-ewe flock scanning, lamb losses and subsequent rearing percentage

Number of ewes	Scanning %	Lamb losses	Rearing %
400	180% 400 x 1.8 = 720 lambs scanned	15% 720 x 0.15 = 108 lambs lost	720 - 108 = 612 612÷400 x 100 = 153%
400	170% 400 x 1.7 = 680 lambs scanned	10% 680 x 0.10 = 68 lambs lost	680 - 68 = 612 612÷400 x 100 = 153%

Empty ewes at scanning = (Number of females put to the ram ÷ Number of empty ewes) x 100

Ideally, fewer than 2% of ewes (shearlings and older) should be empty at scanning time. For ewe lambs, ideally less than 10% empty at scanning time.

If the number of empty ewes exceeds these figures, consider contacting your vet or adviser for a discussion on why this may be the case. Questions they may ask could include:

- Replacement policy – do you buy in or retain your replacements?
- Flock vaccination status – particularly for toxoplasma and enzootic abortion
- Flock health history – did any ewes abort last lambing, is there any evidence of early embryonic loss this year, have they been mated (raddle colour) and what condition are they in?

- Rams – what was your ewe–ram ratio, did you do a ram MOT and did all rams appear to be working?

For ewe lambs, what weight were they when they were mated? Consider analysing the scanning results relative to weight at mating – is it the lighter ewes at mating that are not in-lamb?

Lambing records

Record lamb losses to calculate the rearing percentage of your flock. The rearing percentage is an important measure of a system's performance. Recording when lambs have been lost between scanning and sale or retention for future breeding can help identify areas of concern. This information can be used to calculate some key performance indicators (KPIs) to identify the strengths and weaknesses of your flock.

Calculate performance

- [A] Number of females to ram
- [B] Number of singles born alive
- [C] Number of twins born alive
- [D] Number of triplets born alive
- [E] Number of quads born alive

Total number of lambs born alive

(B x 1) + (C x 2) + (D x 3) + (E x 4) = Total number of lambs born alive [F]

The number of lambs scanned versus number of lambs born alive indicates the number of lambs lost during pregnancy through absorption, abortion or born dead. This can point to underlying diseases or inadequate nutrition.

Lambing percentage

(F ÷ A) x 100 = Lambs born alive per 100 females to ram (lambing percentage)

Born alive to turnout or tailed percentages

[G] Number of lambs turned out or tailed

(G ÷ A) x 100) = Number of lambs turned out per 100 females to ram

((F - G) ÷ F)) x 100 = Number of lambs lost from born alive to turnout or tailed per 100 females to ram

The number of lambs born alive versus number of lambs turned out indicates how many lambs are lost in the first few days of life. This may highlight underlying issues related to health, hygiene or colostrum intake.

For more information, see **Improving lamb survival** and **Flock notebook**.

Planning a breeding strategy for your flock

Establish your flock's breeding objectives by identifying which traits are required to boost your flock's performance. The performance of an animal is a result of both environmental and genetic factors. However, only the genetic factors can be passed to the next generation through breeding. The degree to which one trait is passed from one generation to the next is termed 'heritability'. Traits with the highest heritability tend to be those related to growth and carcase conformation, while traits associated with health and fertility tend to have comparatively low heritability. However, genetic improvement of all these traits still has a strong positive economic benefit.

Animals in a performance-recorded population can be ranked within the breed for each trait measured. This means the trait can be given a value known as an estimated breeding value (EBV). A group of economically significant EBVs can be grouped and weighted according to relative importance to provide an 'Index'. This gives buyers a simple mechanism to compare the relative overall genetic merit.

For further information on EBVs and breeding strategies, see AHDB and Signet manuals, which include: **Buying a recorded ram** and **How to performance record your flock with Signet**. Also, find further information at **signet.com**

Breed or purchase female replacements

Deciding whether to retain your homebred female replacements or purchase them from another farm depends on several factors. Retaining your own replacement females should not be a reaction to either high breeding stock prices or low ewe lamb values. Aim for a planned approach to enhance flock performance by keeping or buying females of known breeding potential and health status.

A simple costings exercise can compare the differences between replacements. Consider your enterprise and calculate the costs you incur if purchasing or breeding your own replacements.

If you are considering breeding your own replacements, develop a plan which:

- Assesses financial implications of keeping homebred females
- Establishes performance-based breeding goals
- Considers selection of stock rams based on EBV's to improve economically important traits
- Establishes a simple recording system to identify which females to keep as replacements

Breeding your own replacements

Selecting your replacements from lambs born and reared on your own farm will mean they are already exposed to the challenges on your farm – health, nutrition, etc. This will mean there is less of a challenge to become accustomed to the farm's environment on their arrival.

Flocks retaining their own replacements also have complete control over which ewe lambs to retain and the criteria for their selection. However, to maximise that opportunity, records will need to be kept to identify those animals.

Selecting homebred replacements for future breeding has two phases:

1. At birth, identify lambs:

- That are born easily, without assistance
- That suckle without assistance
- Whose mothers demonstrate high levels of maternal care

(For many lowland flocks, multiples will be marked as potential replacements.)

2. At weaning, or as first lambs approach slaughter weight, select from the group those that are:

- Well-grown
- Structurally sound

Purchasing female replacements

If replacements are required, purchasing them at least 10 weeks before mating will allow sufficient time for implementing an adequate quarantine period and ensuring vaccinations are up to date. Keep incoming sheep separate from the main flock for a minimum of 21 days.

On arrival, inspect all sheep for signs of disease and treat any problems immediately.

For more information on sheep diseases, see the **Sheep diseases directory**.

Another consideration would be parasites, such as roundworms, sheep scab and liver fluke. For detailed information, visit the **SCOPS guidelines** on quarantine for parasites and discuss with your vet, SQP/RAMA.

If the vaccination history of the sheep is unknown, assume they are unvaccinated and begin the primary course.

Assessing ewe body condition

A ewe's condition refers to the amount of body fat she has. Excluding disease, the most common cause for ewes being in poor condition is a diet that does not meet their nutritional requirements. Regularly assessing ewe condition will provide useful information on the adequacy of their diet and the health status of your flock.

The amount a ewe weighs is reflective of body fat. However, there are many other factors that can affect the weight of a ewe at any given point in time. These include skeleton size, ewe breed, ewe age, the weight and size of the fleece, gut fill and the stage of production, from the weight of foetus through to udder development and milk production during late pregnancy and into lactation. These variables need to be taken into consideration if using liveweight to assess ewe condition.

It is also possible to scan and measure the amount of body fat a ewe has through backfat scanning.

It is common practice in pedigree flocks for lambs, but this requires specialist equipment and a trained scanner, both adding time and cost.

It is difficult to detect minor changes in BCS when ewe condition is assessed visually (by looking at the ewe from a distance). It will be easier to identify thinner ewes in newly shorn ewes, but six to eight weeks' regrowth will provide good cover and may hide poor condition. It is also harder to see each ewe individually when assessing them visually.

While there are developments in the relationship between ewe liveweight and condition, the most practical and reliable tool available to all sheep farmers to assess the condition of all your ewes, efficiently, is by placing your hand on their back. This is the best location, in adult ewes, because it is the last place body fat is deposited and the first place fat is mobilised.

How to record BCS

Place one hand on the loin region to assess for the sharpness or roundness of the transverse (A) and spinous processes (B); this will reflect the amount of fat cover and muscle mass.

After placing your hand on the ewe and assessing their condition, it is possible to assign a 'score' to reflect the amount of fat and muscle cover on the processes. It might be sufficient to assign a 'thin, fit, fat' score. There is also a validated number scale available from 1 to 5, with 1 being very thin and 5 being very fat. Page 12 describes how each unit would feel. Experienced scorers may use half or quarter scores because of the large difference between each whole score.

There are several ways to record ewe BCS, from a simple paper record, individually marking or spraying ewes, through to utilising EID and the associated software programmes.

Top tips

When assessing condition using BCS:

- Ewes must be standing on four legs
- Ewes must not be compressed, e.g. in a squeeze crush
- Use the same hand, to reduce variability which can occur when using both hands
- Repeat at regular intervals to get a feel for the change throughout the year in your flock

The important element is determining whether ewes are at the correct score for that current production stage. Manage ewes that are not at target (either below or over target condition) and monitor the change over time to ensure interventions are having a positive effect on ewe condition.

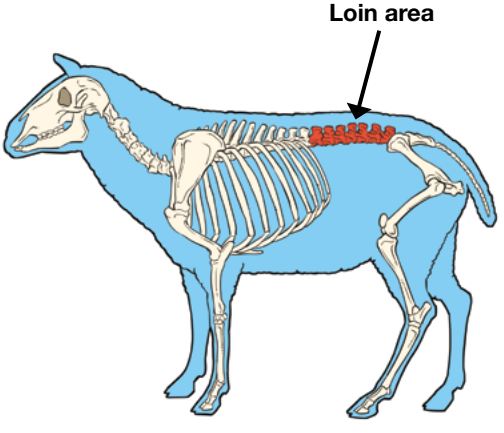


Figure 1. Image illustrating where ewes are handled to assess condition using BCS

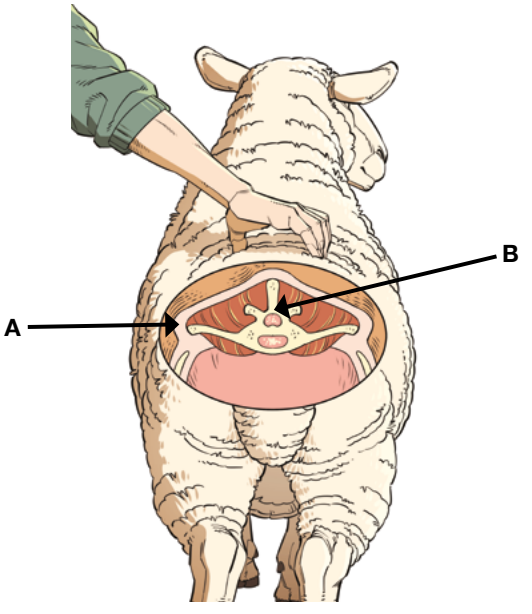


Figure 2. Assess the (A) transverse and (B) spinous processes of the loin

Score 1

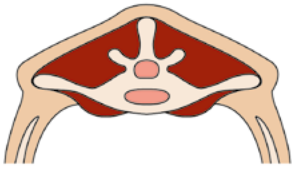
The spinous and transverse processes are prominent and sharp. The fingers can be pushed easily below the transverse bone and each process can be felt. The loin is thin with no fat cover.

Score 2

The spinous processes are prominent but smooth, individual processes being felt only as corrugations. The transverse processes are smooth and rounded, but it is still possible to press fingers underneath. The loin muscle is a moderate depth but with little fat cover.

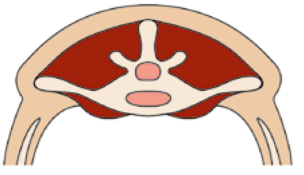
Score 3

The spinous processes are smooth and rounded; the bone is only felt with pressure. The transverse processes are also smooth and well-covered; hard pressure is required with the fingers to find the ends. The loin muscle is full and with moderate fat cover.



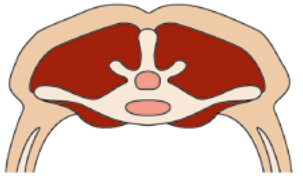
Score 4

The spinous processes are only detectable as a line. The ends of the transverse processes cannot be felt. The loin muscles are full and rounded and have a thick covering of fat.



Score 5

The spinous and transverse processes cannot be detected even with pressure; there is a dimple in the fat layers where the processes should be. The loin muscles are very full and covered with very thick fat.



BCS at key production points

Findings from the AHDB Beef & Lamb-funded Sheep key performance indicators (KPI) project have shown that regular assessment of ewe BCS and liveweight throughout the year, particularly at key production points such as mating, scanning, lambing, eight weeks post-lambing and weaning, can help quickly identify thin ewes, enabling management to be adjusted accordingly.

Achieving target BCS at these key stages of the production cycle can improve ewe productivity and lamb growth rates through to weaning. The target BCS of a flock will vary depending on the time of year and the level of production; for example, the number of lambs scanned and reared. For lowland ewes expecting to scan and rear two lambs, the targets are illustrated below in Figure 3.

The Sheep KPI project has highlighted that ewe BCS has a longer-term impact on flock production than previously thought. A ewe's historic BCS will impact her future performance for at least one year. It becomes difficult to manipulate ewe condition once ewes are pregnant, without potentially detrimental effects on the unborn lambs. We also need to consider the cost, in terms of time needed to regain lost condition but also the feed costs associated with that.

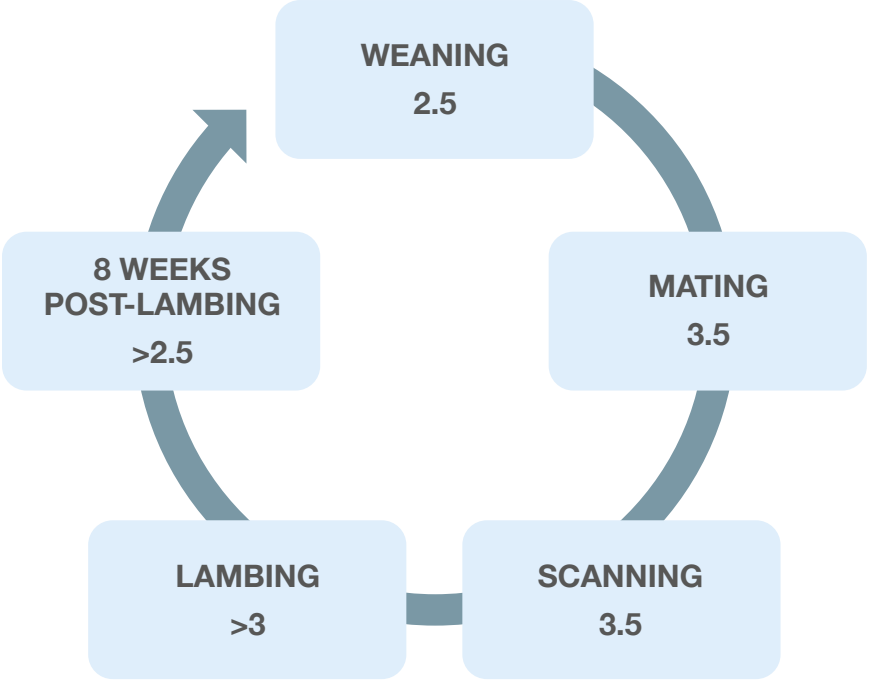


Figure 3. Target BCS cycle for lowland ewes and ewes expected to scan and rear two lambs

Getting ewes ready: Weaning to mating

The period after weaning takes place and leading up to the next mating is known as the 'dry period'. This provides ewes with time to regain condition lost during lactation, ready for the next production cycle. We have previously seen weaning as a time to draw a line under a difficult scanning, lambing or summer and start again. However, data from the Sheep KPI project has highlighted that the condition of ewes at weaning can have an impact on scanning percentages (more likely to scan with single lambs), lambing percentage and lamb weight gain through to weaning (have lighter lambs) in the subsequent production year. The impact of BCS on a production cycle begins sooner than many may think.

One reason for this longer-term impact is the time available to regain condition between one production year and the next. A survey found that 66% of farmers were weaning their lambs at 14 weeks and older. Assuming the mating date remains unchanged, this provides ewes with less time to gain the condition lost during lactation. Weaning at 12 weeks post-lambing provides ewes with 10–12 weeks' recovery time.

Another reason for longer-term impact is the amount of condition ewes are required to gain. Ewes that are thinner at weaning have more condition to regain.

One BCS is equivalent to around 10% of a mature ewe's liveweight. A 70 kg ewe weaned at BCS 2 will be required to gain 1.5 units of BCS to achieve the target of 3.5 at mating. In terms of liveweight, this means ewes would need to gain around 10 kg of weight (see Table 2).

Table 2. Examples of daily liveweight gain (DLWG) needed to gain condition based on time and wean BCS

BCS gain (units)	Liveweight equivalent* (kg)	Time (days)	DLWG (g/day)
1.5	10.5	56	187
1	7	56	125
1.5	10.5	90	116
1	7	90	78

*Assuming 70 kg mature liveweight and 10% liveweight needed to gain one unit of condition.

Body condition score at weaning

Weaning lambs from thin ewes sooner allows them more time to recover condition, without affecting lamb performance. It is well documented that it can take six to eight weeks to gain one unit of BCS on good-quality grass. This will be longer if grass quality is poor or the amount of grass available is limited. It is possible to add supplementation to gain condition faster; however, this does add cost to the business.

Top tips

- Wean lambs from their mothers at approximately 12 weeks to provide time for ewes to recover
- Identify thin ewes at weaning, separate and provide with priority feeding
- Investigate ewes that are not gaining condition after four weeks

Table 3. Intervention summary for ewes at weaning

	Target		
	Hill 2.0	Upland 2.0	Lowland 2.5
Above target	Separate. Allow fat ewes (BCS >4) to lose a small amount of condition, or, at the very least, not to gain any further condition by grazing ewes tightly or on poorer-quality grass.		
At target	Separate. Ewes that are at target BCS at weaning (BCS 2.5) are still thinner than they need to be at mating, therefore they will need to be separated and provided with good grass for six to eight weeks to regain one unit of BCS.		
Below target	Separate. Thin ewes (BCS <2.5) will need excellent grazing, both quality and quantity, and possibly further supplementation to gain more than one unit of BCS in sufficient time for mating. If the reason for their low BCS is unknown, or they're not gaining sufficient condition after four weeks, ask a vet to investigate.		

*Assuming 70 kg mature liveweight and 10% liveweight needed to gain one unit of condition.

The mating period and early pregnancy

Nutrition and body fat reserves are closely related to ovulation rate. Ovulation rate is influenced by ewe age, breed and nutrition (reflected as BCS). Low body weight and poor BCS delay cycling and onset of the breeding season, particularly in immature ewes, e.g. ewe lambs.

Increasing the plane of nutrition with better grazing or small amounts of concentrates for at least one cycle (two to three weeks) before mating is known as flushing. It is believed to increase ovulation rate and therefore improve scanning results. However, the impact of flushing ewes is limited by the ewe's BCS at the time of flushing. Research has found that flushing ewes at BCS 4 or above, or ewes at BCS 2 and below, had no effect on scanning results. Flushing had the biggest impact on ewes between BCS 2 and 4. A word of caution: flushing ewes that are too thin (below BCS 3) could result in below-target ewes having multiple births. This increases the risk of metabolic disease and death. It is not advised to intentionally hold ewe condition back with the intention of flushing them in the latter stages before mating.

Implantation of a fertilised egg does not take place until 15 days post-fertilisation. Embryos are particularly vulnerable to stress at this stage. Abrupt changes in ewe diet, change in BCS or stress for the first three weeks post-fertilisation can impair implantation and reduce conception rate. Maintain a level plane of nutrition after removing the rams. Keep handling and working ewes with new or unfamiliar dogs to a minimum during this time. On average, 15–30% of eggs shed at ovulation fail to develop. While some are not fertilised, many more fail to implant.

During the development of the embryo and foetus, important physiological parameters can be affected by environmental events; this is known as epigenetics. This can have an impact into adulthood and affect the following generation. The genetic code is not altered, but the switching on/off of certain genes is why the changes are seen. Nutrition in early pregnancy is thought to be one of the factors that affects gene expression in the foetus and can impact future performance.

Mating on red clover

Previous research from the southern hemisphere resulted in the recommendation that ewes should not be grazing pastures containing high levels of red clover for 45 days either side of mating. This was thought to be due to the presence of phyto-oestrogens that affect ovulation rates. More recent research had cast doubt over this advice, but further research is needed before we can confidently alter the recommendation.

Body condition score at mating

Ensure at least 90% of the flock is at target BCS at mating time to optimise flock performance. Thin ewes ovulate fewer eggs and are likely to have fewer lambs at scanning and, subsequently, at lambing. Over-condition ewes will ovulate more eggs than thinner ewes. However, oestrus activity may be reduced and higher embryonic death due to circulating fatty acids in the blood may result in lower scanning in over-conditioned ewes.

Top tips

- Ensure ewes are at target BCS prior to mating to reduce the number of thin ewes mated
- Maintain feed levels throughout the mating period; minimise any stress

Table 4. Intervention summary for ewes at mating

	Target		
	Hill 3.0	Upland 3.0	Lowland 3.5
Above target	Maintain BCS during the mating period and for three to four weeks after. It is not advised for ewes to be mobilising body fat during this critical time. However, gaining further condition could also be detrimental.		
At target	Maintain BCS during the mating period and for three to four weeks after.		
Below target	Consider culling ewes that are below target (BCS 2.5 or less) before mating as they may cause problems later in the year. Flushing may result in thin ewes bearing multiple lambs. Aim for a mild increase in plane of nutrition throughout mating and for three to four weeks after.		

Mid-pregnancy: Months two and three

By months two and three post-mating, the fertilised eggs are implanted in the uterine wall and placental development begins. Scanning at around 70 days from mating can improve pregnancy management. It identifies barren ewes with high accuracy; culling these animals will reduce feed requirements and costs. The number of lambs a ewe is scanned with can be identified with 90–95% accuracy, enabling ewes to be grouped and fed according to litter size and BCS.

Historically, it has been suggested that a ewe can lose up to half a unit of condition during mid-pregnancy, once the higher-risk period of the first three to four weeks has passed. However, much of this research was conducted looking at the relatively short-term impact on condition loss, such as lamb birth weight and survival, linked to placenta and cotyledon development. Much of the research was also caveated with the requirement to regain that condition at a later stage in production.

Results from the Sheep KPI project suggest there is some benefit of ewes maintaining or even gaining condition between mating and scanning, in terms of litter size at scanning and lamb daily liveweight gain through to weaning. While this could be a challenging time of year for significant pasture to be available for condition score gain, maintenance would at least allow the condition to be made available to the ewe later, possibly during lactation, to aid lamb performance.

Top tips

- Ewes need to maintain or gain BCS during this period
- Use body condition and scanning results to group ewes for feeding
- Analyse scanning results. Investigate empty ewes if above 2%

Table 5. Intervention summary for ewes during mid-pregnancy

	Target		
	Hill 2.5	Upland 3.0	Lowland 3.5
Above target	Maintain or allow them to lose no more than half a unit of BCS gradually during mid-pregnancy.		
At target	Maintain condition throughout mid-pregnancy.		
Below target	Allow ewes to gain up to half a unit of BCS, very slowly, by providing additional forage. If grazing quality and quantity is reducing due to the time of year, consider supplementation in the form of concentrate feed (no more than 0.5 kg per ewe) or alternatives.		

Late pregnancy: Months four and five

Managing ewe nutrition and therefore ewe BCS through appropriate feeding in the last six weeks of pregnancy is critical for both the ewe and her unborn lamb(s). During the last six weeks, energy and protein requirements increase to meet the requirements of lamb growth (70% of growth occurs during this time), udder development in preparation for lactation and colostrum production.

Nutrition to meet the ewe's increasing demands in the last six weeks is critical for lamb birth weight, vigour and survival. With energy and protein requirements increasing week-on-week, increasing the nutrient density of the diet, both energy and protein, is crucial. Despite lamb growth resulting in pressure on the rumen, ewes become more efficient at digestion, with an increase in rumen turnover rate.

Diets low in energy result in ewes mobilising their body fat to meet their requirements; this leaves them vulnerable to metabolic disease.

It also means that body fat won't be available to the ewe in early lactation to meet the greater energy requirement of milk production. Diets low in protein are thought to impact colostrum and subsequently milk production, which leads to an increased risk of mastitis during lactation.

Under-feeding ewes in late pregnancy is also known to have an impact on the ewe and lamb bond after birth. Ewes underfed in the last six weeks lick their lambs less and bleat less. As a result, lambs are more prone to mis-mothering, leading to starvation due to a lack of colostrum.

For further information and examples of late pregnancy rations, including interpreting your forage analysis and how to calculate your own supplementation, see the **Feeding the ewe** guide and **Improving ewe nutrition** manual.

Table 6. Intervention summary for ewes in late pregnancy

	Target		
	Hill 2.5	Upland 3.0	Lowland >3
Above target	Feeding in late pregnancy determines the birth weight of the lambs. Do not be tempted to be hard on fit ewes that are carrying multiple lambs because this may lead to metabolic disorders. Feed to meet energy and protein requirements, to not depend on mobilisation of body fat in over-condition ewes.		
At target	Feed to meet energy and protein requirements – this is based on ewe mature weight and the number of lambs scanned.		
Below target	Thin ewes are also at risk of metabolic disease during late pregnancy. However, overfeeding thin ewes in the last six weeks will impact lamb growth. Overfeeding thin ewes may result in large lambs from thin ewes – this may lead to dystocia (lambing difficulties).		

Top tips

Monitor BCS regularly and maintain ewe condition in the last six weeks of pregnancy (BCS >3 for lowland-type ewes).

Feed scanned ewes according to litter size and BCS. Group according to nutrient needs, e.g. lambing date and age.

Take blood samples to check for nutritional status in the last three to four weeks of pregnancy. Test for:

- Beta-hydroxybutyrate (BHB) – a by-product of fat mobilisation, a higher value suggests body fat is being mobilised to meet energy requirements
- Urea – a reflection of the short-term protein status of the ewe
- Albumin (serum/plasma) – a reflection of the longer-term protein status of the ewe

Refer to the **Feeding the ewe** guide for more information on addressing deficiencies or consult a nutritionist.

Lambing time

Ewe BCS at lambing can affect colostrum, milk production and, subsequently, lamb growth rates during the early lactation period. Avoid extreme BCS losses during lactation to reduce the amount of condition a ewe will need to put on prior to mating. Ewes in poor condition (BCS 2.5 or below) will not be able to mobilise body fat to meet energy demands for lactation. Research has shown that feeding ewes that are at a lower-than-target BCS can reduce the impact significantly.

After lambing, compare scanning results with the number of lambs born. Large differences need a management review of feeding, health planning and handling.

Top tips

- Assess ewe condition at lambing and determine the management group for lactation
- Feeding during the first three to four weeks of lactation will impact the amount of ewe BCS loss and peak milk yield
- Record lamb losses (number and cause of death) to review prior to next year

Table 7. Intervention summary for ewes at lambing time

	Target		
	Hill 2.0	Upland 2.5	Lowland 3.0
Above target	Ewes in good condition will have better reserves and should not need additional supplementary feed unless grass growth is below 4 cm height or if ewes are housed for a significant period post-lambing. They are able to mobilise body fat to meet increased energy demands for lactation.		
At target	Ensure ewes are fed to meet requirements to ensure not too much body fat (and BCS) is mobilised. Ewe ME requirements double after lambing, therefore access to good food is essential to optimise milk production.		
Below target	Separate into a thin group and provide additional supplementary feed if grass is below 6 cm in height. Monitor BCS to ensure no further loss. Ensure all ewes have sufficient access to feed if housed.		

Eight weeks post-lambing

Flock assessments at eight weeks post-lambing have been undertaken on pedigree flocks for a number of years. As part of the Sheep KPI project, ewe and lamb data was collected at eight weeks to assess its relevance in a commercial flock.

Ewes

Ewe BCS and lamb liveweight at eight weeks was identified as an important KPI in determining the need to wean ewes to provide sufficient time to recover for the subsequent production cycle. It was determined that eight weeks is a good time to check ewe BCS, as weaning dates can be altered based on the results. For example, if ewes are below target BCS (greater than 2.5) at eight weeks, you may wish to provide additional grazing to ensure further condition is not lost that may have a detrimental effect on next year's flock performance. Consider when to wean the lambs, with 12 weeks as the optimal time, but 10 to 11 weeks could be considered if ewes and lambs are competing for the same feed.

Avoiding extreme BCS losses during lactation (greater than one unit of BCS) will reduce the amount of condition a ewe will need to gain prior to mating. Ewes at higher BCS during lactation are able to mobilise their body fat reserves to meet the increased energy demands of lactation. Ewes at lower BCS will either have insufficient reserves to mobilise or will result in being too thin ahead of mating.

Lambs

In early lactation, lamb growth rate is largely dependent on the ewe's milk supply. After four weeks of age, lambs will be inquisitive and start to graze grass or creep, depending on what is available to them. This coincides with a ewe peak milk yield at three to four weeks pre-lambing, thereafter milk production will slowly decline. From six weeks onwards, lambs will increasingly rely on pasture and other sources of nutrition, such as creep feed, for their feed intake.

The results from the Sheep KPI project highlighted that lamb weight at eight weeks was an important KPI in determining lamb weaning weight. Research by Jones et al. (2011) also highlighted that lamb weaning weight highly influences lamb finishing weight and conformation. Combined, recent research is highlighting that the performance of lambs is determined by eight weeks.

Target lamb weight at eight weeks

Many farmers who are weighing lambs at eight weeks for the first time may wonder what a target lamb weight at eight weeks could be, or what 'good' looks like. The target will be farm-dependent and may even be increased over time. For the Sheep KPI project, the following calculation was assumed – see Table 8.

A target of 20 kg was calculated for the lambs. This was a target for all individual lambs to achieve. Knowing the percentage of lambs achieving the 20 kg target would be a beneficial outcome. A flock average would be an alternative calculation to undertake. However, this may hide the heavier and lighter lambs.

Top tips

- Assess ewe BCS around eight weeks post-lambing. Utilise this to determine grazing priorities through to weaning and when to wean the lambs
- Weigh lambs around eight weeks of age
- Determine the grazing needed for ewes to regain BCS and for lambs to thrive post-weaning

Table 8. Example calculation to determine lamb weight target at eight weeks

Lamb birth weight (kg)	Number of days	Growth rate (g/day)	Weight (kg)
5	56	280 (0.280 kg/day)	5 + (56 x 0.280) = 20.68

Table 9. Intervention summary for ewes eight weeks post-lambing

	Target		
	Hill >2.0	Upland >2.5	Lowland >2.5
Above target	Assess lamb condition and feed availability and aim to wean lambs at 12 weeks of age.		
At target	Assess feed availability to ensure there is sufficient feed for ewes and lambs and aim to wean lambs at 12 weeks of age.		
Below target	Ewes could be offered better grazing, additional forage or supplementary feed to avoid further BCS loss to weaning. Assess the performance of lambs to determine the age at weaning. Weaning later than 12 weeks will leave less time to regain condition for the next mating season.		

Weaning: Cycle continues

Deciding when to wean your lambs is one of the most important management decisions of the year. The following factors should be taken into consideration:

- Ewe body condition score
- Lamb performance
- Feed quality and quantity

These conditions change every year, so a flexible weaning date would be beneficial rather than a set date in the calendar.

Ewe BCS

Aim to wean ewes at BCS 2.5. Allowing ewes to be below BCS 2 will have an adverse effect on the next production year, even if they are able to gain some of that condition back. They are likely to scan with singles next time around and will have lighter lambs at the subsequent weaning.

If ewes are thin despite access to good grazing, it is worth talking to a vet about testing ewes to eliminate disease as the underlying cause for poor ewe condition.

Lamb performance

By 12 weeks of age (around 90 days), lambs can withstand the pressure of weaning. In some cases, leaving lambs on the ewes too long can be detrimental to both ewes and lambs. It is possible that ewes are competing with their lambs for grass.

A target lamb weight by weaning is demonstrated in Table 10. This can be altered for your own farm. It is also dependent on lamb eight-week weight target. In this example, if the lambs achieve 20 kg at eight weeks and continue to grow at 280 g/day through to weaning, you would expect them to weigh 30 kg by weaning at 12 weeks of age.

Top tips

- Wean lambs at 12 weeks of age to allow time to regain condition for subsequent mating season
- Plan the grazing for your ewes and weaned lambs

Table 10. Example calculation to determine lamb weight target at eight weeks

Lamb weight at eight weeks (56 days)	Number of days	Growth rate (g/day)	Weight (kg)
20	90 - 56 = 34	280 (0.280 kg/day)	20 + (34 x 0.280) = 29.52 kg

Management of young sheep

The rearing phase of replacement ewes is thought to affect their long-term productivity and longevity. Sheep that are lighter as ewe lambs are less likely to lamb as ewe lambs. However, they will also need to grow more to achieve their target weights as shearlings. If they do not, scanning and lambing percentages, lamb growth rates and ewe longevity could be compromised.

Achieving weight targets when mating ewe lambs and shearlings is advised to optimise their production and lifetime performance (see Figure 4). It is interesting to visualise the changes in weight and condition over time. Measuring weight, as well as BCS, is crucial in young sheep until they approach their mature size. Mature body weight is defined as the weight of a ewe around BCS 3 at three years of age or older. This means that neither ewe lambs or shearlings have reached their mature weight yet and will still be growing (frame, muscle and laying down adipose tissue), as well as rearing lambs.

Example for a 70 kg ewe

See below an example of a ewe with an expected mature weight of 70 kg.

Mating as ewe lamb:
60% of 70 kg = 42 kg

Mating as a shearling:
80% of 70 kg = 56 kg

Difference of 14 kg

A young ewe will need to gain 14 kg of liveweight over a 12-month period. If a ewe lamb is rearing a lamb during that first year, she will continue to grow frame and weight, amounting to 14 kg. This is a huge undertaking and requires careful management and good nutrition.

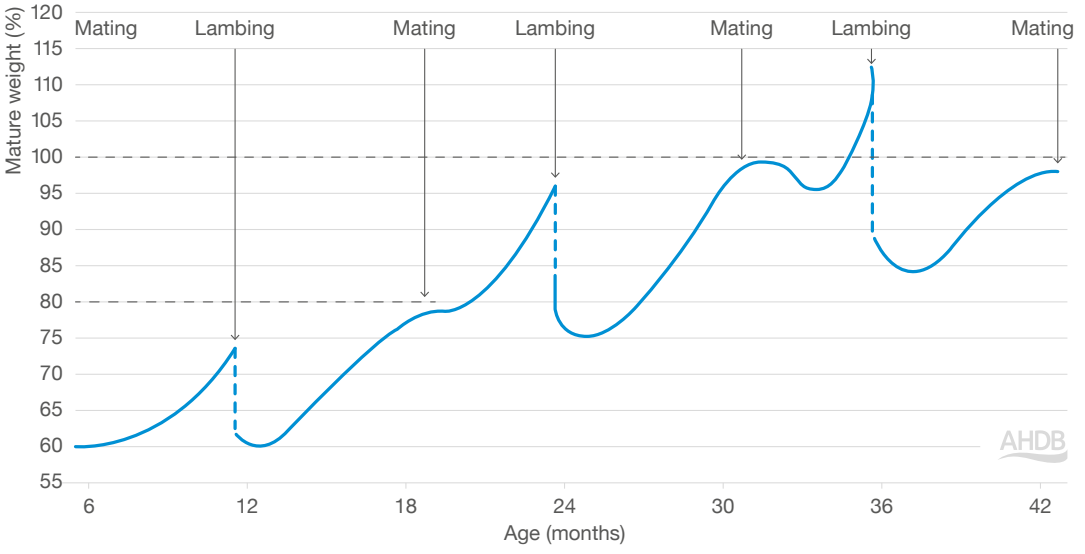


Figure 4. Weight targets (as a percentage of mature body weight) for young sheep.
Source: SAC Consulting

Managing ewe lambs and shearlings

Ewe lambs

Ewe lambs will scan and lamb at lower percentages than mature ewes. However, well-managed, mating from ewe lambs can increase a ewe's lifetime production.

Some top tips:

- Ewe lamb liveweight at mating should be 60% of mature body weight
  - For a 70 kg mature ewe: 70 x 0.60 = 42 kg
- Mate and manage ewe lambs separately from mature ewes
- Use mature rams with ewe lambs
- Pregnancy scan to identify non-pregnant animals and litter size. Aim for over 90% in-lamb
- Prioritise ewe lamb feed allocation. During early, mid-pregnancy and lactation, ewe lambs need 20% more energy than mature ewes to sustain continuing body growth
- Avoid overfeeding in late pregnancy as this could lead to lambing problems
- Ideally, ewe lambs should produce and rear one lamb
- Consider creep feeding lambs from ewe lambs to reduce the pressure on the ewe lamb during lactation
- If ewe lambs are lambing later than the main flock, consider weaning around 10 weeks to allow sufficient time to recover prior to mating with the main flock the following season

For more information on breeding from ewe lambs, visit **ahdb.org.uk/knowledge-library/breeding-from-ewe-lambs**

Shearlings

The age of the ewe at her first lambing is not necessarily the main point to consider when determining the management of your replacements. Mammary tissue only develops when sheep are pregnant for the first time, irrespective of age. Therefore, breeding ewes for the first time as shearlings poses similar risks in terms of milk production and yield, leading to mastitis risk as ewe lambs.

Ensure sufficient quality and quantity of feed availability, especially to young ewes post-lambing who will require up to 20% more feed than mature ewes. While this may prove difficult in practice, mating and managing shearling ewes separately from mature ewes would have benefits to their performance.

If it is not possible to manage the shearlings as a separate management group, separating thin shearlings that are rearing two lambs and providing preferential feeding, such as better grazing, supplementation or creep feeding their lambs, would be beneficial.

Lambs born to shearling ewes contribute a higher proportion of lambs that are light at eight weeks of age. Light is defined as being 17 kg or below, when the flock average is 20 kg. The reasons behind this require further research.

Challenge sheep project

The Challenge Sheep project is a seven-year project which began in 2017. The project involves 11 farms from across the country recording and sharing data to generate new knowledge and highlight existing information on managing ewe replacements. Covering both sheep bred for the first time as ewe lambs and as shearlings, the project tracked 7,000 replacement ewes from a range of English sheep farms.

The Challenge Sheep farmers collected weight and BCS data at five key production points during the sheep breeding cycle: mating, scanning, lambing, eight weeks post-lambing and weaning. The project aims to utilise this data to develop understanding of how management decisions at these key points can affect lifetime performance.

Using EID, the Challenge Sheep ewes are being assessed for traits relevant to their economic performance, and an important aspect of this is their longevity.

The reasons for ewes leaving the flock, either through culling (Figure 5) or ewe mortality (Figure 6), are summarised below. The allocation for the cause of death is only attributed when farmers are confident of the main contributing factor to their death. On many farms, the reasons are unknown.

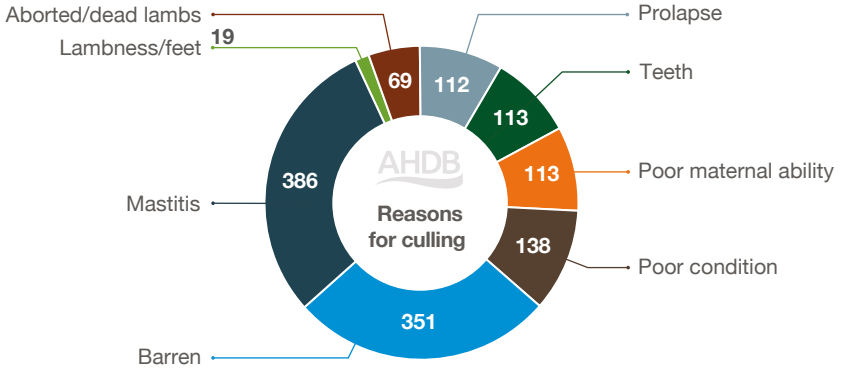


Figure 5. Reasons for culling in the Challenge Sheep project

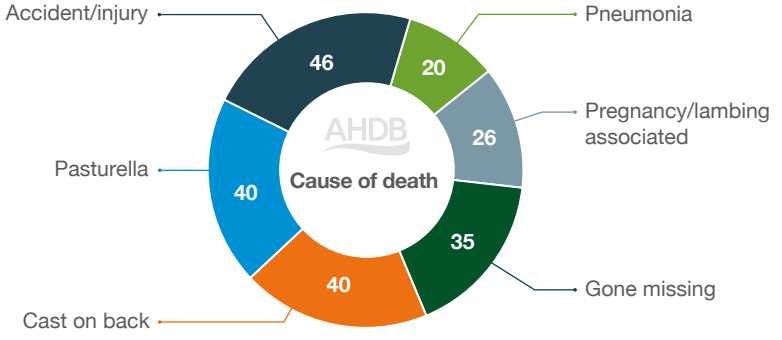


Figure 6. Reasons for deaths in the Challenge Sheep project

Mortality and culling

Ewe mortality

Average ewe mortality in the UK is 3–8% annually. This varies hugely between farms and during different production years, with weather having an impact on feed quality and quantity. Weather also plays a significant role in the prevalence of certain diseases, such as liver fluke.

The cause of death is a critical piece of information that would inform you of future steps to take to avoid further losses. However, the reason for a huge proportion of ewe deaths is unknown. Post-mortems are valuable tools and are offered by most vet practices, the Animal and Plant Health Agency (APHA) and some fallen stock collection centres. Post-mortems are costly but are important if a flock is experiencing a particularly high number of deaths or they are occurring at an unusual time of year.

The majority of ewe deaths occur in late pregnancy and during the lambing period. Ewe BCS is a key risk factor for ewe mortality, with mortality greatest in ewes below BCS 2.

Ewe culling

Rigorous culling ensures only ewes fit for breeding are retained. If a ewe is retained and her performance is suboptimal, it is likely to have a negative impact on overall flock performance and may increase input costs, e.g. feed and medicine costs. Income for a cull ewe is more beneficial than incurring fallen stock disposal costs, should the ewe die during the year.
A proactive culling policy may also reduce ewe mortality and replacement costs.

The most prevalent reasons for culling younger ewes have been mastitis and empty ewes. These continue to be some of the most prevalent reasons for all ages.

As expected, the number of culls for teeth condition was low for younger ewes but rose increasingly for the older ewes.

Records and identification are key to a successful culling policy. Throughout the year, permanently mark or tag ewes if they have a problem that renders them unsuitable for further breeding, e.g. prolapse, mastitis. This allows for ease of identification when it comes to selling your culls. The introduction of individual ewe EID has made the process of collecting management data throughout the year, such as cull ewes, easier.

Most common reasons for culling

Body condition score: Lean ewes are more prone to disease, are less able to mount an immune response to vaccines and have less body fat reserves for milk production. Ewes at BCS less than 2 should be culled, especially if they are not regaining condition after priority feeding and weaning.

Teeth and/or ewe age: Teeth problems (such as broken-mouthed or overshot jaws) may mean ewes are unable to graze and maintain sufficient body condition. This may lead to thin ewes, poor milk production and/or increased susceptibility to disease. Some flocks cull on ewe age, to pre-empt teeth problems and condition loss.This is common on hill and upland farms.

Udders: Ewes with lumpy or hard udders are likely to yield less milk and are a potential source of infection to other ewes in the flock. Poor udder conformation, such as low or slack udders, is also known to predispose to mastitis. For more information, see the **Sheep diseases directory.**

Reproductive problems: Unproductive means ewes that are empty at scanning or scan as pregnant but don't rear a lamb, including aborting. Mature ewes that are unproductive either at scanning or lambing

will be costing money to keep. Up to 20% of mated ewe lambs can be empty at scanning, but shearlings and older would be expected to be productive. Other reproductive reasons for culling include ringwomb, prolapse and even dystocia (difficult lambing), which may result in future fertility problems.

Other factors affecting ewe condition

If ewes have access to adequate nutrition but are struggling to keep condition, disease may be the cause. Below is a list of publications produced by AHDB that cover the major health issues of sheep.

- Worm control in sheep
- Liver fluke in grazing livestock
- Sheep diseases
- Lameness in sheep

Ewe production calendar

Table 11. Ewe production calendar

When	Activity/task
Post-weaning	Ewe MOT – teeth, udders, feet, BCS Split ewes into groups according to BCS Identify pasture that will enable them to regain condition Investigate if reason for poor BCS is unknown
Four weeks after weaning	Assess ewe BCS to ensure thin ewes are gaining condition Investigate ewes that have not gained BCS since weaning
Replacement ewes	Vaccinate replacement ewes against abortion Weigh and BCS replacements
Mating	Turn your rams out with ewes at target BCS Calculate how much winter feed you have conserved, plan to fill any gaps
Early pregnancy	Prevent ewes losing condition or any abrupt changes in nutrition Minimise stress for up to three weeks after rams are removed Analyse your winter forage and plan supplementation, if required
Scanning (mid-pregnancy)	Scan your ewes at 70–90 days post-mating BCS ewes Separate ewes into groups based on number of lambs, lambing date and BCS
Late pregnancy (last six weeks of pregnancy)	Analyse forage for energy and protein content, assess supplementation required to meet flock energy and protein requirements Booster ewes with clostridial vaccine Feed plan for lactating ewes
Lambing	Record numbers of lambs born and causes of lamb mortality Record details of lambing ease, mothering ability and lamb vigour Identify ewes for culling
Lactation	Check feed availability in meeting demand Supplementation may be required if grass growth is slow Monitor lamb and ewe losses
Eight weeks post-lambing	Weigh lambs at eight weeks, identify light lambs Weigh and BCS ewes to determine when to wean the lambs
Weaning ~90 days (12 weeks)	Dry ewes off quickly, either putting them indoors on straw and water or onto a bare pasture for a few days. Check carefully for signs of mastitis

Throughout the year, record the number of ewe deaths, cause of death (if known), cull ewes and the reason for their exit from the flock.

Table 12. Summary of key sheep records throughout the production year

Sheep records			
		Example flock	Your flock
Mating	Number of ewes and ewe lambs put to the ram [A]	1,250	
	Number of rams used [B]	20	
Scanning	Number of barren ewes [C]	23	
	Number of lambs scanned [D]	1,715	
	Scanning percentage (%) [D÷A*100 = E]	137	
	Number of ewes scanned with singles	760	
	Number of ewes scanned with twins	446	
	Number of ewes scanned with three or more lambs	21	
Lambing	Number of lambs born alive [F] (up to 12 hours old)	1,623	
	Number of lambs turned out or tailed [G]	1,576	
Eight weeks post-lambing	Number of lambs eight weeks post-lambing [H]	1,579	
	Average age at eight weeks (days)	59	
	Average lamb eight-week weight (kg) [I]	19.5	
Weaning	Number of lambs weaned [J] (include lambs sold before weaning)	1,556	
	Average age at weaning (days)	98	
	Average lamb weaning weight (kg) [K]	30	
Ewes	Number of lambs reared [L] (store, finished and retained replacements)	1,550	
	Number of cull ewes [M]	125	
	Ewe mortality [N]		

Further information

Other publications from AHDB

- Flock notebook
- Feeding the ewe
- Improving ewe nutrition
- Liver fluke in livestock
- Reducing lamb losses

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Produced for you by:

AHDB Beef & Lamb
Middlemarch Business Park
Siskin Parkway East
Coventry
CV3 4PE

T 024 7647 8834
E comms@ahdb.org.uk
W ahdb.org.uk

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