

# Breeding from ewe lambs



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## Key messages

- + Lambing ewe lambs can improve the financial viability of a sheep system.
- + Up to 55% of English lowland flock replacement females could give birth at one year of age.
- + Ewe lambs have lower fertility than mature ewes, but higher lifetime production if managed well.
- + Ewe lamb liveweight at mating should be 60% of mature bodyweight.
- + Select ewe lambs for lambing from well-grown twins.
- + Mate and manage ewe lambs separately from mature ewes.
- + Ideally ewe lambs should produce and rear one lamb.
- + Pregnancy scan to identify non-pregnant animals and litter size.
- + During early and mid-pregnancy, ewe lambs need 20% more feed than mature ewes to sustain continuing body growth.
- + Lambing ewe lambs is generally more successful when they are housed.
- + Ewe lambs may be more prone to udder injury and mastitis.
- + Lactating ewe lambs require 20% more feed than mature ewes. Their lambs should be creep fed and weaned at eight and nine weeks of age.
- + Ewe lambs have a Gross Margin of £74.24 compared to £25.90 for ewes that lamb first at two years of age. However the labour requirement is also much higher.
- + Lambing ewe lambs could reduce the amount of GHG generated per kg of carcase meat produced by about 9.4% over six years.

### Keywords:

Lambing ewe lambs, Lambing shearlings, Reducing GHG emissions in sheep flocks.

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## Introduction

English farming has been challenged to reduce its CO<sub>2</sub> (carbon dioxide) equivalent emissions by 11% (3 million tonnes) by 2020. Within the livestock sector, ruminants produce more GHG (Greenhouse Gas Emissions) per unit of meat than either pigs or poultry. The production of one tonne of beef, sheep, pig and poultry meat results in the production of 16, 17, 6 and 5 tonnes of CO<sub>2</sub> respectively.

The relatively high GHG emissions from sheep production could be reduced by keeping less 'unproductive' stock in the system. One way of doing this would be for more females to give birth for the first time at 12 months of age rather than at two years.

For a lowland spring lambing flock that breeds its own replacements or buys in ewe lambs, sheep lambing as ewe lambs would reduce the amount of GHG generated per kg of carcase meat by about 9.4% (see Appendix 1).

Under good management and in the right circumstances, lambing sheep as ewe lambs is also likely to improve the financial viability of sheep systems while at the same time reducing the number of breeding females kept.

## Current situation



Fifty-five per cent of English lowland flock replacement females could give birth at one year of age.

There are about 6.7 million breeding ewes in the English flock (Defra, June 2009 census), of which 57% (3.8 million) are in the lowlands and 43% (2.9 million) in the hills and uplands.

The mating of ewe lambs has most application in the lowlands. However, farmers on better quality hill farms have a role to play in managing female crossbred lambs (especially Mules) for earlier mating when sold to farmers in lowland situations. The animals should be able to mate one to two months after being sold at five to six months of age.

If the typical lowland flock replacement rate is assumed to be 22%, 836,000 female replacements are required by this sector of the industry each year.

According to census information for England (Defra, June 2009 census), about 332,000 ewe lambs were mated in autumn 2009. This equates to about 40% of the requirement for female replacements in lowland English flocks. However, in reality ADAS considers that the actual percentage of ewe lambs mated is more likely to be about 30% of ewe lambs retained.

It is thought that up to 55% of English lowland flock replacement females could give birth at one year of age. Limitations in ewe lamb size, liveweight and especially age are likely to restrict the extent to which ewe lambs are bred from.

A large proportion of producers already lambing their ewe lambs could improve the reproductive performance of these sheep, as performance is heavily influenced by husbandry and nutrition.

However, farm case studies carried out by ADAS in 2010, show that farmers may deliberately choose not to lamb ewe lambs because of insufficient resources. Reasons given include:

- + Limited housing space for ewes so cannot afford to occupy this space with low output pregnant ewe lambs
- + Cannot split sheep accommodation to feed ewe lambs separately
- + Extends lambing period too much
- + Much more attention needed at lambing for ewe lambs

## Practicalities of lambing ewe lambs

### Production potential

The fertility and prolificacy rates of ewe lambs are lower than those of adult ewes. This is because they have lower ovulation rates and higher embryo mortality. Progesterone concentration is lower in lambs than in ewes and consequently pregnancy rates, although similar to ewes at 15 days post mating, can be significantly lower by day 30.

Ewes bred as lambs have higher lifetime production rate than those bred as yearlings.

However, ewes bred as lambs have a higher lifetime production rate compared with those bred as yearlings. Also, ewe lambs that reach puberty during their first year have a higher lifetime reproduction potential, even if they are not bred from.

## Oestrus in ewe lambs

The time, onset and duration of the breeding season in sheep are affected by day length. It is also well established that puberty in ewe lambs is influenced by breed and cross, age, bodyweight and the time of year.

### Breed and cross

Trial work carried out in Wales, Ireland and the USA, showed the average age at puberty ranged from 189 days for Finn crosses, to 225 days for Hampshire crosses and 240 days for Suffolk crosses.

Since the time of onset of oestrus is linked to maturity, breeding from ewe lambs of certain large, late maturing lowland breeds such as Lincoln Longwool, Leicester Longwool and Romney, may not be viable.

The incidence of oestrus in ewe lambs is negatively linked to inbreeding, so crossbred animals are more likely to breed in their first season than purebreds.

### Bodyweight

Most ewe lambs reach puberty at a liveweight of between 36kg and 45kg. The liveweight threshold for puberty in Suffolk females is 40kg in early season and 33kg in late season, which respectively equates to 47% and 39% of a typical Suffolk ewe mature weight of 84kg. This analysis also demonstrates how the fertility of ewe lambs increases as day length gradually declines.

Ewe lamb liveweight at mating should be 60% of mature bodyweight.

In 2010, Scottish sheep specialist John Vipond stated that ewe lamb liveweight at mating should be 60% of mature bodyweight. He also outlined target weights for mating ewe lambs of certain popular breeds and crosses. (Table 1).

**Table 1: Target weights for mating ewe lambs**

Breed	Mature Bodyweight (kg)	Weight at mating as ewe lamb (kg)
Black Face / Hill Cheviot	55	33
Lleyn	60	36
Mule	75	45
Continental X	80	48

### Age

Ewe lambs begin cycling later than mature ewes of the same breed or cross and their mating season is shorter. Generally, lambs born relatively early in the season will cycle earlier in the year than later born lambs – partly due to their heavier bodyweight, partly due to their older age.

Conception rate in ewe lambs of less than seven or eight months is unlikely to be acceptable. This means that ewe lambs born in mid March will not be ready to be mated until late October; those born in early April should not be mated until mid November. Lambing for these two mating times is likely to begin in the third week of March and the second week of April.

## Selection of ewe Lambs

### Homebred ewe lambs

In systems that depend on home breeding it is advisable to keep 25% more ewe lambs than required for two main reasons:

- + It is likely that even in well-grown ewe lambs up to 20% exposed to the ram will not become pregnant due to low ovulation rates and high embryo mortality
- + It increases scope for selection. Lambs that are not pregnant can be sold. It may also be desirable to apply selection pressure for lambs that hold to first service, as these animals are likely to be naturally more fertile than those that become pregnant in subsequent cycles. Culling the latter after the first lambing can lead to a gradual improvement in fecundity within the flock

Replacement ewe lambs should not be selected solely on bodyweight. Saving only the heaviest lambs for replacements will favour early born lambs over later born animals. This has advantages but also favours singles over twins and triplets

Choose ewe lamb replacements from well-grown twins.

Choose ewe lamb replacements from well-grown twins, to put selection pressure on twinning, growth rate and milk yield. Avoid selecting from triplets as this may favour large litters. This should provide ewe lambs that are heavy enough to cycle on time in the autumn.

Female replacements from ewes that are persistently lame, need excessive dagging, have prolapsed, are poor mothers or produce weak lambs should not be kept. Effective record keeping and the quick retrieval of data is essential for matching up breeding ewes with their offspring.

### Purchased ewe lambs

Buying ewe lambs from one source, and if possible the same source every year, reduces the risk of introducing disease onto the farm.

If possible ewe lambs should have been sired by rams that have good Estimated Breeding Values (EBVs) for liveweight gain, muscle depth and fat depth.

Information on maternal ability (determined by lamb weight at eight weeks of age) and litter size (derived from lambing data), should also be scrutinized if available. The extent to which EBVs are used within the sheep industry is disappointing and closer links between pedigree breeders and commercial producers would help a great deal.

### Weight gain and nutritional flushing

In general ewe lambs should have a daily liveweight gain of about 250 grams per day from weaning until six weeks after mating. Very good quality grass should be enough, but offering up to 0.5kg/head/day of mineralised whole grain (oats or barley) if grass is in short supply will help.

Heavy feeding of very young female sheep (less than five months old) can reduce mammary gland development and subsequent milk yield, so is not advised.

Flushing female sheep to a rising level of food intake and weight gain as they go into the mating season increases litter size. The probability of multiple births also increases as ewe lambs gain more weight from weaning to mating.



### Effect of shearing on fertility

In research carried out at ADAS Drayton in 1995, North Country Mule ewe lambs shorn on 15th September and exposed to the ram for three oestrus cycles from 16th October, had a barren rate of 10%, compared to unshorn animals treated similarly which had a barren rate of 27%.

Shearing also increased the percentage of ewe lambs giving birth to twins from 19 to 30. This benefit in fecundity may be due to increased embryo survival as a result of alleviating mild heat stress.

### Desirable litter size



Lower milk yield and the need to keep growing means ewe lambs are better off rearing just one lamb.

It is usually desirable for ewe lambs to rear one lamb and multiple births are best avoided. This is especially the case where ewe lambs give birth later than the rest of the flock, as there are no newly lambbed mature ewes with single lambs available for fostering on to.

This means that ewe lambs, especially relatively heavy animals born early in the season, should not be overfed in the run up to, and during mating.

### Choice of ram

Mating ewe lambs to rams of breeds with a smaller mature size should reduce the incidence of difficult births. However, the table below illustrates that breeds that are traditionally seen as having smaller birth weights can have weights similar to continentals.

However, whatever the choice of ram, it is important to have some knowledge of the likelihood of lambing difficulties. Lambing records for lambs sired by the ram in previous seasons may be helpful.

EBVs for birth weight and lambing ease are available for Texel rams, and will be available for all breeds from 2012 onwards.

**Table 2: Birth weights in purebred sheep recorded with Signet Breeding Services**

Breed	Ram lambs		Ewe lambs	
	Single	Twin	Single	Twin
Beltex	4.6	3.7	4.3	3.5
Charollais	5.9	5.0	5.6	4.8
Hampshire Down	5.2	4.5	4.9	4.2
NCC Hill	5.0	4.4	4.7	4.2
NCC Park	5.6	4.8	5.2	4.5
Southdown	4.2	3.5	4.0	3.3
Suffolk	6.3	5.3	5.9	5.0
Texel	5.4	4.6	5.1	4.4
Welsh Mountain	4.3	3.3	4.1	3.2
Wiltshire Horn	5.0	4.6	4.8	4.3

Note:

Differences between breeds reported here reflect both genetic and environmental differences. Some breeds will be lambing earlier and fed more than others.

Differences observed between purebred lambs may be smaller when rams of these breeds are used on the same type of commercial ewe.

## Mating management

Ewe lambs should be mated separately from mature ewes as their oestrus behaviour is less aggressive. Mature ewes tend to monopolize the rams if they run together.

Vasectomised (teaser) rams running with ewe lambs for 15 or 30 days immediately before introducing fertile rams, can successfully synchronise their heat.

Mixing fertile rams with the ewe lambs for just three weeks should result in most the females being served at least once. Lambing is therefore also focused within this defined period and can be easier to manage. This technique could also be used to select for the most fertile sheep.

Ewe lambs have a shorter 'standing heat' period than ewes and this, coupled with their reluctance to seek out and court a ram, means that more ram power is required.

The need for extra rams is further increased if heat is synchronized. A ram to ewe lamb ratio of 1:25 and 1:35 is recommended respectively for synchronized and unsynchronised oestrus. Rams should be experienced but not so big they damage the ewe lambs.



Pregnancy scanning of ewe lambs is important for identifying barren animals and determining litter size.

The duration of heat depends on the sex drive of both ewe and ram and how closely they are confined together. Mating of ewe lambs should be done on relatively small areas of land.

## Pregnancy scanning

It is likely that there will be a higher percentage of empty ewes within a group of ewe lambs than within a group of mature ewes. Pregnancy scanning ewe lambs is therefore important for identifying non-pregnant animals and gives enough time to manage them differently, eg sell for slaughter, sell for breeding, or keep for breeding in a subsequent year.

Information on litter size is also vital for correct feeding management.

## Nutrition in pregnancy

During early and mid pregnancy, ewe lambs need about 20% more feed than mature ewes of similar weight to sustain their continuing body growth.

**During early and mid pregnancy, ewe lambs need 20% more feed than mature ewes to sustain continuing growth.**

They should be at optimum body condition score three (BCS 3), six weeks before lambing starts. The majority of foetal growth occurs at this time and feeding too much then can lead to oversized lambs and difficult births. It is best to feed only for maintenance and the growth of the lamb *in utero* during this time.

## Growth rates

Aim for 250g/day growth for the first two months after the rams are introduced. From then on and until six weeks before lambing, a growth rate of at least 150g/day is desirable.

## Feeding in pregnancy

Table 2 outlines example rations for pregnancy. A flat rate feeding regime involving only moderate amounts of concentrate feed is particularly important in late pregnancy.

**Table 3: Example rations for single and twin pregnancies in ewe lambs**

From two months gestation to six weeks before lambing		Last six weeks of pregnancy
Moderate quality silage or hay to appetite	Winter grass and moderate quality silage or hay (all to appetite)	Moderate quality silage or hay to appetite
Concentrate (16% CP, kg/head/day) –	Concentrate (16% CP, kg/head/day) –	Concentrate (18% CP, kg/head/day) –
Singles – 0.2	Singles – 0.2	Singles – 0.25
Twins – 0.3	Twins – 0.3	Twins – 0.5

Hay – ME 8.7 MJ/kg DM, CP 9%.

Silage – DM 25%, ME 10.6 MJ/kg DM, CP 11%.

Concentrate – ME 12.5 MJ/kg DM, CP 16% or 18%

## Time of lambing

Producers generally manage their ewe lambs so they start lambing just as their mature ewes are finishing. The main reasons for this are:

- + The need to allow more time for ewe lambs to grow and mature
- + The positive effect of reduced day length on ewe lamb fecundity
- + Availability of labour. Ewe lambs are likely to be more troublesome at lambing so labour can be concentrated on them

However, lambing ewe lambs when the rest of the flock has finished, means newly-lambed mature ewes with single lambs are not available for adopting lambs from ewe lambs that produced twins. Dovetailing the lambing of most of the ewe lambs into the last two weeks of lambing the main flock can be helpful.

Lambing ewe lambs is generally more successful if the animals are housed.

## Lambing problems

Lambing ewe lambs is generally more successful if the animals are housed.

The need for assistance is common and higher neonatal mortality often recorded. Difficult births due to large single lambs can also be a problem if the sheep are overfed and/or the sire has predisposed the lambs to heavy birth weights and large forequarters.

The mortality rate at lambing time is generally 1-2% higher for ewe lambs than for mature ewes. However, lambing sheep as ewe lambs is unlikely to have any harmful effect on future performance, provided they have not been damaged during the birthing process. Indeed, it has been shown that ewe lambs that are bred from successfully in their first year have higher lifetime performance.

## Mothering ability

It is generally reported by farmers that mothering ability in ewe lambs is better than for sheep lambing for the first time as two year olds. Sheep that lamb for the first time as ewe lambs also tend to be better mothers throughout their lives.



Ewe lambs should only rear one lamb to achieve satisfactory liveweight gain.

## Dealing with multiple births

Milk production of one-year-old ewes is generally lower than for ewes in later lactations. ADAS carried out a subjective assessment of milking ability by palpating the ewe lamb's udder and noting the gut fill of their newborn lambs. A score on the scale of 0 to 5 was given. About 80% of the sheep had low scores as ewe lambs, but the proportion fell to 34% when the same ewes were two years old.

The lower milk yield of ewe lambs, coupled with the need for continued growth in lactation, means that ewe lambs should only rear one lamb to achieve a satisfactory liveweight gain during their second grazing season, and to reach optimum body condition when mated again at 18 months of age.

Ewe lambs that suckle twins may tend to give birth to single lambs in their second breeding season. About 7 MJ/day of extra energy is needed by a ewe lamb rearing twins as opposed to just one lamb, roughly equating to the energy intake needed for an acceptable daily liveweight gain of 150 grams.

If ewe lambs and mature ewes lamb simultaneously, there is scope to foster excess lambs onto mature ewes. However, generally when the two groups are not lambing at the same time, one of the twins is taken from the dam within 24 hours of birth, and reared on reconstituted milk substitute.

It is hoped that by this time they will have received sufficient colostrum from their young dams. There may sometimes be opportunities to foster one of the twins onto ewe lambs that have lost their offspring.

## Health problems in ewe lambs and their offspring

Purchased ewe lambs are likely to be naïve to diseases on the farm to which they have been transferred. The lambs of ewe lambs can also be threatened, as their colostrum is unlikely to contain sufficient antibodies to the diseases present on the farm.

Ewe lambs may produce insufficient colostrum, and a supply of frozen colostrum taken from mature ewes on the farm should be available.

Lack of colostrum, coupled with the common practice of lambing ewe lambs after the main flock, demands high standards of hygiene as disease-causing organisms tend to build up in the environment as lambing progresses.

Quarantine treatment for internal and external parasites, following Sustainable Control of Parasites in Sheep (SCOPS) principles, and foot bathing to prevent transmission of foot-rot, are good practice when lambs arrive on farm.

A further month of quarantine is always advisable before mixing with other sheep on farm to monitor development of other diseases.

Ideally ewe lambs should be kept as a separate flock and only mixed with resident sheep after lambing. In order to avoid duplication of veterinary treatment, as much information as possible should be gathered from the farm of birth.

A flock health plan detailing all necessary vaccinations, eg for clostridial diseases and abortion, for ewe lambs should be discussed with the farm vet.

Vaccinations should be given in accordance with the data sheet. Vaccines should be spread out over a few weeks to allow full development of antibodies well before tugging.

**Ewe lambs are more prone to mastitis and their teats more easily damaged.**

Case studies carried out by ADAS in 2010, indicate that lambing replacements as ewe lambs can result in more cases of mastitis than lambing sheep for the first time at two years old. It seems that the udder of ewe lambs is relatively tender and teats are more easily damaged by the teeth of suckling lambs.

Lactating ewe lambs require 20% more feed than mature ewes of similar weight so they can continue to grow.

## Ewe lamb nutrition in lactation

As in pregnancy, lactating ewe lambs require about 20% more feed than mature ewes of similar weight to supply sufficient nutrients for body growth.

Lactating ewe lambs should be kept as a separate group at least until the time their lambs are weaned. A plentiful supply of good quality spring grass can suffice, but careful ration formulation is needed if the sheep are kept indoors or if grass is in short supply.

If grass is scarce, feed hay or silage to appetite, along with concentrate feed (ME 12.5 MJ/kg DM, CP 18%) at a daily rate per head of 0.5kg and 0.7kg for ewe lambs suckling singles and twins respectively.

## Creep feeding

Lambs born to ewe lambs should be fed creep pellets to appetite from one week of age. A high-energy product (ME 12.5 MJ/kg DM) with a crude protein content of 18% is needed until eight weeks of age. After this the protein content in the creep feed can be dropped to 15-16%.

The amount consumed to 14 weeks of age is likely to be about 50kg/lamb costing £11/lamb (at £230/tonne). The cost is likely to be justified for two reasons:

- + Lamb performance. With a feed conversion ratio of 3.5:1, each kg of liveweight gain would cost 80p against a market value of £1.60. The lambs would also finish sooner. Total cost of creep would be about £11.50 compared with a current lamb market value of £80
- + Dam performance. There would be less demand on the suckling ewe lamb as her lamb will partly satisfy its appetite from dry food. Ewe body condition is therefore likely to be maintained and she is more likely to be in optimum body condition when served again at 18 months old



Lambs born to ewe lambs will need creep feeding from one week of age.

## Weaning

The high nutrient demand for growth (6-7 MJ for a daily gain of 200g) in lactating ewe lambs, means their offspring should be weaned at a relatively young age, certainly before they are 14 weeks old.

Early weaning at eight to nine weeks of age, may be the best option if ewe lambs are in poor condition or are smaller than expected. However, good intakes of creep feed by their lamb would be essential.

A poor supply of grazing would be another reason for weaning early.

Weaning at eight to nine weeks should be done abruptly when at least 250g of creep is eaten/lamb/day over three to four days. After weaning continue feeding the creep feed (ME 12.5 MJ/kg DM, CP 16-17%), or dilute by adding 30-40% barley, or change to a home-mixed ration (ME 12.5 MJ/kg DM, CP 15-16%). Lamb growth rates of 300-360g/day and a feed conversion ratio of 3.5:1 should be expected.

Lamb weight at weaning, especially at six to eight weeks, is likely to give a good assessment of mothering ability of the dam. Young ewes should be culled if disappointing performance in their lambs is due to poor milk yield, or any other trait that is likely to affect lamb performance in future years.

## Economics of breeding from ewe lambs – with lambs weaned at 14 weeks of age

Table 4: Gross margins of North Country Mule sheep purchased at six months old and valued at 18 months old

	£/ewe lamb purchased	
	Bred as ewe lamb	Not bred as ewe lamb
Value of shearling (one year after purchase as ewe lamb)	130.00	120.00
*Lamb output (0.8 lambs reared per ewe lamb @ 18kg carcass weight @ £4.10/kg)	59.04	0.00
Wool	1.00	1.00
Total output	177.00	121.00
Less 1) Purchase Price	80.00	80.00
2) Mortality	3.0 (3%)	1.0 (1%)
Output	107.04	40.00
<b>Variable costs</b>		
Concentrates – ewe nuts @ £170/tonne	5.10 (30kg)	
Creep feed to sale at 14 weeks of age @ £215/tonne	11.00 (50kg)	
Forage	6.50	8.00
Vet and med	7.00	5.00
Bedding	0.70	0.00
Pregnancy scanning	0.60	0.00
Contract shearing	1.10	1.10
Lamb tags	0.80	
<b>TOTAL VARIABLE COSTS</b>	<b>32.8</b>	<b>14.10</b>
<b>GROSS MARGIN</b>	<b>74.24</b>	<b>25.90</b>

\* Has not considered financial margin from any twin lambs artificially reared.

Ewe lambs have a GM of £74.24 compared to £25.90 for ewes that lamb for the first time at two years of age. However, the labour requirement is also much higher.

The figures in Table 3 assume that ewe lambs were purchased for £80/head in the autumn. Two systems are compared:

- + Ewe lambs are mated in their first autumn
- + Ewe lambs are not mated in their first autumn

The estimated gross margins for animals that have given birth and those that have not lambed are £74.24 and £25.90 respectively – a difference of £48.34/sheep. It is assumed that lambing ewe lambs has increased their market value at 18 months of age by £10/head. The market value of the lamb (0.8 lambs per ewe lamb) is assumed to be £59.04.

However, the labour requirement of lambing ewe lambs can be substantial. For example, the allocation of one hour per sheep at a nominal charge of £10 would reduce the apparent financial advantage of lambing replacement females as ewe lambs from £48.34/head to £38.34/head.

One of the key benefits of lambing ewe lambs is the extra lamb that can be produced in the first year, which reduces the overall GHG emissions from the flock. Running ewe lambs empty only produces a fleece in the first year and slows genetic progress.

## Management calendar

Period of year	Management principle	Action
June/July	Selection of ewe lambs (purchased lambs)	<p>Liaise with the vendor to ensure the desired quality of sheep are delivered, ie well-grown lambs, free from dags, physically sound, born as a twin.</p> <p>Find out the ram's EBVs for liveweight gain, muscle depth and fat depth. Also the dam's performance – did she give birth easily, demonstrate good maternal care, have plenty of milk?</p>
July	Selection of ewe lambs (self-replacing flocks)	<p>The criteria outlined above for the ewe lambs parents are also relevant in self-replacing flocks.</p> <p>Decide on the number of ewe lambs needed in relation to the size of the flock. To start choose 25% more than actually required to allow further selection later.</p>
July/August	Choosing a ram to tup ewe lambs	<p>Refer to a ram's EBVs to obtain the right balance between growth rates, carcass conformation and easy lambing. It is important also to take maternal traits into account.</p> <p>Reduce the risk of lambing difficulties by mating to a breed with smaller mature size. If using large continental breeds choose one with a relatively small head and shoulders.</p> <p>Find out the ram's lambing history. A sire with a heavy birth weight relative to the rest of the breed may lead to possible lambing problems.</p>
July/August	<p>Size and target growth rates to mating</p> <p>Feeding for growth</p>	<p>Aim for at least 60% of mature bodyweight at mating. Actual weight will depend on breed and cross - medium sized breeds and crosses should weigh at least 36kg at mating.</p> <p>However, do not exceed a growth rate of 300 grams/day. Small lambs should not be 'forced' to reach a target mating weight as they may become over-fat.</p> <p>Feed good quality grass and offer a high energy supplement if necessary.</p>
September/ October	Nutrition	<p>Ewe lambs respond well to flushing. However to avoid excessive twinning, do not feed too generously from six weeks pre-tupping until the rams are withdrawn from the flock.</p> <p>Well-grown lambs born relatively early in the season are especially responsive to flushing.</p>
November/ December	Mating management	<p>Conception rates in ewe lambs are likely to improve as day-length lessens.</p> <p>Mate ewe lambs separately from mature ewes in a fairly small area so that lambs in oestrus can be easily spotted by the ram.</p> <p>Use at least one ram to 25 ewe lambs when oestrus has been synchronised with a vasectomised ram. Otherwise one ram to 35 ewe lambs should be adequate.</p> <p>Rams should be experienced but not so big they damage the young ewes.</p> <p>Using teaser rams for up to 17 days prior to mating can achieve a more compact mating period than by leaving rams in for just one oestrus cycle. This means lambing will take place within a three-week period.</p>

Period of year	Management principle	Action
January	Pregnancy scanning	<p>It is likely that 15-25% of ewe lambs exposed to the ram will not fall pregnant. Typically 30% of pregnancies will be twins.</p> <p>Pregnancy scanning is very important to identify barren ewes and determine litter size. Feeding management can be adjusted according to nutritional demand. Ideally, scan at 70 and 80 days of pregnancy.</p>
January	Dealing with barren stock	Non-pregnant animals should be separated. They can be either sold for slaughter, or kept and mated in the following autumn. Ewe lambs carrying twins should also be segregated.
January/February/March	Nutrition during early and mid pregnancy	<p>To allow for growth, a plane of nutrition 20% above that of mature ewes of similar weight is needed. Also, feed according to litter size.</p> <p>Moderate quality hay or silage fed to appetite should be supplemented with a high quality concentrate at a daily rate of 0.2kg and 0.3kg for ewe lambs carrying singles and twins respectively.</p>
March/April	Nutrition during late pregnancy	<p>Feed carefully feeding during the last six weeks of pregnancy to avoid lambing problems – especially in sheep carrying single lambs.</p> <p>Precise diet formulation is needed. A BCS of 2.5-3 at lambing is recommended.</p> <p>Moderate quality hay or silage fed to appetite should be supplemented with a high quality concentrate feed at a daily rate of 0.25kg and 0.5kg for ewe lambs carrying singles and twins respectively.</p>
March/April	Lambing Coping with twins	Lambing ewe lambs after the main flock is common practice. However, since ewe lambs should rear only one lamb, the absence of mature ewes for fostering means one of a set of twins will have to be reared on milk substitute.
April/May/June	Nutrition of ewe in lactation	<p>Good grass should provide adequate nutrition, but be ready to offer supplementary feed if grass is in short supply.</p> <p>Body condition should be constantly monitored and not allowed to fall below BCS 2.</p>
April/May/June	Nutrition of lamb	Creep feed should be offered to appetite from one week of age. The creep should have high energy content (ME 12.5 MJ/kg DM) and a crude protein content of 16-17%.
June/July	Weaning	Do not leave lambs suckling beyond 14 weeks of age. Wean lambs as early as six to eight weeks if their dams are in poor condition (BCS <2) or are smaller than expected.
July/August/September/October	Nutrition of the ewe before her second mating	<p>Continue to feed for growth as well as improve body condition. Close monitoring of body condition is vital.</p> <p>It will take at least eight weeks on a high level of feeding to lift body condition score by a single increment. This means that a lowland sheep with BCS 2 would have to be on a high plane of feeding for three months to achieve the target BCS 3.5 at mating.</p> <p>Supplementary feeding (0.5kg/head/day of a high energy concentrate) will be required if grass is in short supply.</p>

# Case studies



## Flock facts

### Flock size:

1154 mature ewes.  
116 ewe lambs (2010 lambing)

Breed of females:  
Suffolk cross Mules

Breed of rams:

Texel on ewes.  
Charollais on ewe lambs

Lambing % of main flock: 180%

Lambing date:  
Ewes from early February.  
Ewe lambs in April.

## Farm 1 - Purchased (Suffolk crosses)

### Advantages

- + Big enough to breed and expensive to run around empty
- + Bonus in year of production
- + Allows one extra lamb in a lifetime
- + Identifies non-breeders early – all those not raddled are culled
- + Temperament better as ewe lambs than unbred shearlings
- + Better colostrum as shearlings
- + Easier lambing than unbred shearlings

### Disadvantages

- + Possibly lose more ewe lambs with mastitis
- + What to do with spare lambs? Foster on to other ewes if possible or artificially rear at significant expense
- + Higher level of management required. Need comprehensive healthcare as naïve to most diseases eg abortion, worms etc
- + Feeding difficult to get exactly right. Not always to do with size of ewe lamb, as seem to get small ewe lambs in lamb as well. Large and fatter ones often have smaller lambs. This is because metabolism favours dam growth rather than lamb growth

### Source of stock

Source	Aim is from one farm only
Age at purchase	Five to six months
Selection criteria	Size to age ratio, health status, must be born as a twin
Criteria for culling ewes	Feet, mastitis, prolapse, poor mothering ability

### Use of EBVs to select ewe lambs

Not used, but like to know that good sires with good maternal abilities have been used. For example, the last farm ewe lambs were sourced from New Zealand Suffolks that have been bred for easier lambing.

### Management of ewe lambs

- + Grazing – kept separate and treated as a discrete flock
- + Ewe lambs have only 21 days with the tup. Aim to keep lambing compact
- + Supplementary feed before mating (some feed blocks if grass limiting)
- + Fed in pregnancy, but less than mature ewes - about 0.4kg for singles and 0.6kg for twins for last two weeks
- + Fed dry supplementary feed in early lactation if grass supply not adequate
- + Weaned at about 14 weeks of age. Rest of flock weaned at about the same time but these lambs are older (16 weeks maximum)
- + Only one lamb left on ewe lambs. Other lamb either reared artificially or fostered on to animals that have lost a lamb. About 10-12kg of milk powder is fed per lamb and they are weaned at eight weeks of age
- + Lambs are creep fed

## Lambing performance in 2009/2010

+ 116 ewe lambs tupped

+ 26 empty

+ 60 singles

+ 30 twins

+ 120 lambs born

Ewe lambs mated that gave birth **77%**

Lambs born from ewe lambs mated **103%**

Twinning rate **33%**

## Farmers comments

Scanning policy	Empty ewe lambs are taken out and two groups are run – singles and twins.
Selection of rams for ewe lambs	Choose those with history of easy lambing.
Problems with ewe lamb/baby lamb bonding	Generally not. More problems with unbred shearlings. Occasionally, one takes a couple of hours to realise what is happening, but most make good mothers. A few are very aggressive to other lambs and have to be separated.
Lamb deaths at birth from ewe lambs	No more than shearlings or older ewes, but colostrum quality can be an issue. Need to check colostrum quantity and make sure lambs have had enough early in life. May need to top up with artificial colostrum if concerned.
Lambs reared %	2009, 157% from whole flock (180% from ewes). 2012, all 90 ewe lambs in lamb reared a lamb. A few lost lambs but had new ones fostered across from doubles.
Returning ewe lambs to right body condition for tupping at 18 months old	Wean early and creep feed lambs. Lambs ate about 50kg/head of creep feed.
Happy to continue lambing ewe lambs	Yes.
What reason would prevent lambing ewe lambs in future?	If had to lamb outside.

## Summary

- + Breed only from ewe lambs born as twins
- + Feeding in pregnancy can be difficult to get right if ewe lambs vary in size and body condition
- + Use teaser rams to synchronise heat. This compacts the mating period and a satisfactory lambing percentage can be achieved by leaving the rams with the ewes for one oestrus cycle only
- + Use easy-lambing rams
- + Health problems can be an issue with bought-in ewe lambs as they are naïve to diseases on farm
- + Mastitis is more of an issue in ewe lambs
- + Poor colostrum quality can be a problem in purchased ewe lambs as it lacks antibodies to diseases on the farm
- + Rearing lambs artificially is very expensive but at current lamb prices is worthwhile
- + Good quality grass plays a vital role in early lactation hence lambing in April preferable
- + Lambing ewe lambs successfully is dependant on them giving birth inside where they can be watched over

## Farm 2 - Purchased (Welsh Mules)



### Flock facts

#### Flock size:

950 mature ewes.

250 ewe lambs.

Select 120 best ewe lambs for tupping

#### Breed of females:

Welsh Mules

#### Breed of rams:

Suffolk on ewes.

Charollais and Suffolk on ewe lambs

Lambing % of main flock: 190%

#### Lambs reared:

170% main flock.

90% for ewe lambs

#### Lambing date:

Ewes from late January to March.

Ewe lambs in April.

### Advantages

- + Having a lamb is a bonus
- + Lower financial loss if lose ewe lambs than yearlings.

### Disadvantages

- + More work.

### Source of stock

Source	Welshpool market
Age at purchase	Six months
Selection criteria	Health status, weight for age, good strong lambs
Criteria for culling ewes	Poor teeth, feet, udders, prolapse

### Use of EBVs to select ewe lambs

Not used as buy stock in the market.

### Management of ewe lambs

- + Graze all autumn and winter, grass then kale. Supplementary feed is not fed at this time
- + Late pregnancy, grass and fodder beet ad-lib
- + Early lactation (three weeks) 0.75kg 20% CP home-mix
- + All weaned at same time as main flock so lambs a couple of weeks younger – 12 to 14 weeks rather than 14 to 16 weeks
- + Ewe lambs treated separately for better management and disease control.

### Farmers comments

Scanning policy	Barren ones removed early and run on grass only. Pregnant ewe lambs kept together.
Selection of rams for ewe lambs	Have selected specific rams but consider success is more closely related to feeding than breeding.
Problems with ewe lamb/baby lamb bonding	No, very good mums.
Managing ewe lambs with twins	Take twins off and foster one onto other ewes.
Lamb deaths at birth from ewe lambs	A few more than for mature ewes, particularly small twins.
Lambs reared %	90% of those born to ewe lambs.
Returning ewe lambs to right body condition for tupping at 18 months old	Wean early and give good grazing.
Health issues with ewe lambs	No particular problems but need to make sure all ewe lambs are fully vaccinated.
Happy to continue lambing ewe lambs	Debatable – a lot of extra care and attention needed.
What reason would prevent lambing ewe lambs in future?	A disastrous lambing. Will go back to buying stronger lambs. Bought smaller lambs 2009 because of high price but prepared to pay more for bigger lambs so more will lamb as ewe lambs.

## Lambing performance in 2009/2010

+ 120 ewe lambs were tupped	
+ 17 empty	
+ 76 singles	
+ 27 twins	
+ 130 lambs born	
Ewes mated that gave birth	85%
Lambs born from ewes mated	108%
Twinning rate	26%

## Summary

- + Keep ewe lambs separate from established flock
- + Pregnancy scanning is very important to identify barren sheep and assess litter size
- + Pregnant ewe lambs, including those carrying twins, can be adequately nourished on grass and fodder beet
- + Lambing mature ewes and ewe lambs simultaneously can lead to ease of fostering when ewe lambs have twins. But, the special husbandry demands of ewe lambs giving birth can be difficult to cope with when labour is spread over the whole flock
- + A comprehensive vaccination programme can effectively overcome the naïve disease status of ewe lambs
- + Use easy-lambing rams
- + Good quality grass plays a vital role in early lactation hence lambing in April is preferable

## Farm 3 - Homebred (Pedigree Charollais)



### Flock facts

**Flock size:**

450 mature ewes.  
80-110 ewe lambs

**Breed of females:**  
Pedigree Charollais

**Breed of rams:**  
Charollais

**Lambing date:**  
Ewes from December/January.  
Ewe lambs in March.

### Lambing performance in 2009/2010

- + 94 ewe lambs tupped
- + 10 empty
- + 37 singles
- + 42 twins
- + 5 triplets
- + 136 lambs born

Ewes mated that gave birth **89%**

Lambs born from ewes mated **144%**

Twins and triplets **56%**

### Advantages

- + Big enough to breed from as born early and well nourished in their first year. Those born in December/January will be nine to ten months old when mated
- + Quicker genetic progress in pedigree flock
- + Lambing ewe lambs means that they are much quieter at two years of age

### Disadvantages

- + Ewe lambs are allowed to rear only one lamb. With twin births, one lamb has to be artificially reared as there are no recently delivered mature ewes available to adopt onto
- + Feeding can be difficult to get right. Flat rate feeding over the last six weeks of pregnancy is required to reduce the incidence of difficult births
- + Charollais sheep lambing as ewe lambs tend to take an extra six months to reach mature size, ie three years old as opposed to two and a half years old for those lambing for the first time

### Source of stock

All homebred.

### Use of EBVs to select ewe lambs

Used a little but not much. More concerned with looks and size. Since pedigree, a substantial amount of line breeding is used. However, prolificacy seems to have dipped recently.

### Management of ewe lambs

- + Grazing – kept separate
- + Small amount of concentrate fed on a daily basis from one month of age, until 18 months of age. May be overfeeding – 55% of ewes lambing produced either twins or triplets.
- + Flat rate feeding implemented in last six weeks of pregnancy to reduce risk of difficult births

### Summary

- + Faster genetic progress (especially important for pedigree flock) when lambing as ewe lambs
- + Sheep lambing as ewe lambs are much calmer when lambing as two year olds than those that lamb for the first time one year later
- + Overfeeding in two months leading up to mating can lead to an undesirable number of twins and triplet births
- + Flat rate feeding over the last six weeks of pregnancy is very important to reduce the risk of difficult births

## Farm 4 - Homebred (Lleyn)



### Flock facts

**Flock size:**  
600 mature ewes.  
250 ewe lambs (2010 lambing)

**Breed of females:**  
Lleyn

**Breed of rams:**  
Lleyn

**Lambing % of main flock:**  
190%

**Lambing date:**  
Ewes from late February.  
Ewe lambs in April.

### Advantages

- + Big enough to breed and expensive to run around empty
- + Bonus year of production
- + Allows at least one extra lamb in a lifetime
- + Lleyn ewe lambs can cope with suckling twins
- + Identifies non-breeders early
- + Easier lambing than unbred shearlings

### Disadvantages

- + More mastitis problems. Udder is relatively tender and suckling lambs cause more damage
- + Can get lambing problems. Need take care not to overfeed those carrying singles

### Source of stock

Source	All homebred
Age at purchase	All females kept. Those reaching a liveweight of 38kg by late September are mated. Hope to reach at least 41kg in five weeks to 10th November when rams are introduced.

### Use of EBVs to select ewe lambs

Yes – use EBVs for carcase traits and mothering ability. Some fairly close line breeding done. Selection pressure against triplets. Female and male progeny not retained for breeding if they are from a triplet family.

### Management of ewe lambs

- + Grazing – all kept separate and treated as a discrete flock
- + Teasers put in with ewe lambs for two oestrus cycles (five weeks)
- + Ewe lambs have only 25 days with the tup. Aim is to keep lambing period compact
- + All ewe lambs spend winter on high quality grazing grass. They return home in mid March
- + All lambs weaned in mid August

### Managing ewe lambs with twins

- + Offered feed blocks from scanning (80 days gestation) until housing in mid March
- + Fed good quality haylage to appetite and 450 grams/head/day (in two feeds each of 225g) of a high energy 18% CP concentrate - from housing in mid March until turned out with their lambs in April onto good quality grass
- + Grazed on clean pasture (first year leys)
- + Fed small amount of concentrate at grass (150g/day) until shearing time in mid June. This helps stockmanship – especially inspection of udders for mastitis etc

- + Twin lambs are fed creep feed up until early August (two weeks before weaning)
- + Ewes and twin lambs put onto summer grown forage crops in early August
- + Twin lambs weaned in mid August and stay on the forage crops

### Managing ewe lambs suckling singletons

- + Lamb outside
- + Offered feed blocks from mid March until they have all lambed
- + Concentrate feed is not offered in troughs as it would result in mis-mothering
- + Stocked very tightly on grass to reduce the risk of oversized lambs at birth

### Farmers comments

Scanning policy	Empty ewe lambs taken out and sent to slaughter.
Selection of rams for ewe lambs	Choose those with history of easy lambing.
Problems with ewe lamb/baby lamb bonding	None.
Lamb deaths at birth from ewe lambs	No more than with older ewes.
Lambs reared % of flock v ewe lambs	190% main flock. 111% for ewe lambs.
Returning ewe lambs to right body condition for tupping at 18 months old	Hard with twin bearing ones. They tend to have only one lamb the following year.
Happy to continue lambing ewe lambs	Yes.

### Lambing performance in 2009/2010

- + 250 ewe lambs tupped
- + 10 empty
- + 175 singles
- + 60 twins
- + 5 triplets
- + 310 lambs born

Ewes mated that gave birth	96%
Lambs born from ewes mated	124%
Twinning rate	25%
Lambs reared per ewe mated	111%

### Summary

- + With a naturally prolific breed (Lleyn) do not select for triplets. Do not retain any triplet females for breeding as ewe lambs
- + Feeding in pregnancy can be difficult to get right if ewe lambs vary in size and body condition
- + Use vasectomised rams for two oestrus cycles to synchronise heat. A mating period of just 25 days then gives very satisfactory lambing performance
- + Mastitis is more of an issue in ewe lambs. The udder is tender and the teats are very prone to damage from the teeth of suckling lambs
- + Lleyn ewe lambs can suckle twins successfully. However they demand very close shepherding. Their udders have to be looked at daily for any signs of mastitis. A small amount of concentrate fed daily up until shearing aids stockmanship
- + Sheep that have reared twins as ewe lambs are likely to be less prolific in the following year, tending to produce single lambs
- + Pregnant Lleyn ewe lambs on good quality lowland spring grass have a tendency to become fat and lambing problems can easily occur. High stocking rates can be necessary to restrict grass intake
- + Important to creep feed twin lambs until they are weaned

## Lambing ewe lambs – practiced in the past but now given up

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### Farm 5 – Homebred (purebred Lleyn ewes)

#### Summary

- + Inability to keep ewe lambs separate from main flock was hub of problem
- + Total mixed ration (TMR) fed to flock was not suited to ewe lambs. They were often too fat which led to many lambing problems
- + Poor summer grass growth on South Downs led to poor lactation performance in ewe lambs
- + Early weaning of lambs not successful – lambs became stunted

### Farm 6 – Purchased (North Country Mules)

#### Summary

- + Need very good nutrition for overwintering ewe lambs. They can compete for food with fattening lambs
- + Ewe lambs demand a disproportional amount of time at lambing
- + Lambing ewe lambs after the main flock caused a high disease occurrence in offspring from ewe lambs
- + With limited housing space it was not viable to occupy sheds with stock that were only half as productive as sheep lambing for the first time at two years old
- + Need for special ram such as a Charollais, was extra expense as using Texels and very large Suffolks on rest of flock

## References and further information

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- ADAS (2010). Breeding From Ewe Lambs – Report for EBLEX 21 June 2010.
- Baker, R.L; Stein T.A; Vabeno, A.W; Bekken, A; and Gjedrem, T. (1978). Effect of Mating Ewe Lambs on Lifetime Productive Performance. *Acta Agriculturae Scandinavica* 28:203-207.
- Beck, N.F.G; Davies, M.C.G; and Davies, B. (1996). A Comparison of Ovulation Rate and Embryonic Mortality in Ewe Lambs and Ewes and the Role of Late Embryo Loss in Ewe Lamb Sub-Fertility. *Animal Science*, 62, 79-83.
- Bichard, M; Younis, A.A; Forest, P.A; and Cumberland, P.H. (1974). Analysis of Production Records from a Lowland Sheep Flock. 4. Factors Influencing the Incidence of Successful Pregnancy in Young Females. *Animal Production*, 19:177-191.
- Bowstead, J.E. (1930). The Effect of Breeding Immature Ewes. *Sci Agr.* 10:429.
- Davies, C.G. (1988). Factors Affecting Embryo Mortality in Ewe Lambs. Ph.D thesis, University of Wales, Aberystwyth.
- Davies, M.C.G; and Beck, N.F.G. (1993). A Comparison of Plasma Prolactin, LH and Progesterone Concentrations During Oestrus and Early Pregnancy in Ewe Lambs and Ewes. *Animal Production* 57: 281-286.
- Diskin, M.G; and Sreenan, J.M. (1985). Progesterone and Embryo Survival in the Cow. In: M.G. Diskin and J.M. Sreenan, Editors, *Embryonic Mortality in Farm Animals*, Martinus Nijhoff, Publishers, Dordrecht, the Netherlands, pp. 142–158.
- Dyrmundsson, O.R. (1973). Puberty and Early Reproductive Performance in Sheep 1. Ewe Lambs, *Anim. Breed Abstr.* 41:273.
- Gaskins, C.T; Snowden, G.D; Westman, M.K; and Evans, M. (2005). Influence of Bodyweight, Age and Weight Gain on Fertility and Prolificacy in Four Breeds of Ewe Lambs. *Journal Animal Science* 2005 83:1680-1689.
- Hammond, J. Jr; Bowman, J.C; Robinson, T.J. (1983). *Hammond's Farm Animals*. Fifth Edition.
- Hohenboken, W; Cadillo, M; Vavra, M; Phillips, R.L. (1978). Factors Affecting Puberty and Reproduction. Report on Breeding Ewe Lambs. Special Report 502. Agricultural Experiment Station, Oregon State University, Corvallis.
- Hulet, C.V; Wiggins, E.L; and Ercanbrack, S.K. (1969). Estrus in Range Ewe Lambs and its Relationship to Lifetime Reproductive Performance. *Journal Animal Science* 28:246.
- Laster, D.B.H; Glimp, A; and Dickerson, G.E. (1972). Factors Affecting Reproduction in Ewe Lambs. *Journal Animal Science* 28:246.
- Lindsay, D.R. (1966). Mating Behaviour of Ewes and its Effect on Mating Efficiency. *Animal Behaviour* 14, 419.
- Longrigg, W. (1961). Sheep Management. *Prog. Rpt. Exp Husb. Fms. Exp Hort. Stas.* p 8-10.
- Pickard, N; and Johnson, P.N. (1992). The Effect of Pre-mating Shearing on Lambing Rate in Ewe Lambs and Subsequent Lamb Performance. *Animal Production* 54, 490.
- Ryle, M. (1961). Early Reproductive Failure of Ewes in a Hot Environment. 1. Ovulation Rate and Embryonic Mortality. *Journal of Agricultural Science, Cambridge* 57:1-9.
- SAC (2009). Scottish Agricultural College. Year-round Feeding the Ewe for Lifetime production.
- Sneath, R.W; Phillips, V.R; Demmers, T.G.M; Burgess, L.R; Short J.L; and Welch, S.K. (1997). Long-term Measurements of Greenhouse Gas Emissions from UK Livestock Buildings. Proceedings of the 5th International Livestock Environment Symposium, Minneapolis-St-Paul. Minnesota.
- Snowden, G.D; and Glimp, H.A. (1991). Influence of Breed, Number of Suckling Lambs and Stage of Lactation on Ewe Milk Production and Lamb Growth Under Range Conditions. *Journal Animal Science* 69:923-930.
- Southam, E.R; Hulet, C.V; and Botkin, M.P. (1971). Factors Influencing Reproduction in Ewe Lambs. *Journal Animal Science* 33:1282.
- Thomas, D.L. (2010). Breeding Ewe Lambs or Getting the Most out of Ewe Lambs. Department of Animal Sciences, University of Wisconsin-Madison.
- Thwaites, C.J. (1967). Embryo Mortality in the Heat Stressed Ewe. 1 The Influence of Breed. *Journal of Reproduction and Fertility* 114: 5-14.
- Tolman, B; and McKusisk, B.C. (2001). The Effect of Growth Rate on Mammary Gland Development in Ewe Lambs. A Review. In *Proc 7th Great Dairy Sheep Symposium*, Eau Claire, Wisconsin. Department of Animal Sciences, University of Wisconsin-Madison. pp 143-155.

Turner, H.N; Brown, G.H; and Ford, G.H. (1968). The Influence of Age Structure on Total Productivity in Breeding Flocks of Merino Sheep. 1. Flocks with a Fixed Number of Breeding Ewes, Producing Their Own Replacements. Australian Journal Agricultural Research 19:443-475.

Vavra, M; Hohenboken, W; Levine, J.M; Phillips, R.L; and Cadeillo, R.M. (1978). Report on Breeding Ewe Lambs. Special Report 502. Agricultural Experiment Station, Oregon State University, Corvallis.

Vipond, J. (2010). Scottish Agricultural College - Sheep and Beef News – June 2010 page 5.

Wiggins, E.L; Miller, W.W; and Barker, H.B. (1970). Age at Puberty in Fall-born Ewe Lambs. Journal Animal Science 30:974.

Yeates, N.T.M. (1949). The Breeding Season of the Sheep with Particular Reference to its Modification by Artificial Means Using Light. Journal Agricultural Science 39,1.

## Appendix 1

### Methane emission reduction benefits of lambing ewe lambs

Lowland ewes – culled at six years old

Scenario 1 – Lambed as ewe lambs

2010 (born), 2011 (lambd for first time) then lambd in each of following years - 2012, 2013, 2014, 2015, 2016. so total of six crops (1x 0.8 lambs and 5 x 1.5 lambs) which is 8.3 lambs to sell. Total weight of lamb carcase produced by the ewe is 157.7kg (19kg/carcase), which equates to 26.3kg of lamb carcase/annum over six years

Scenario 2 – Lambed at two years

2010 (born), 2011 (not lambd), then lambd in each of following years - 2012, 2013, 2014, 2015, 2016. So, total of five crops (1 x 1.4 and 4 x 1.5) which is 7.4 lambs to sell. Total weight of lamb carcase produced is 140.6kg lamb carcase (19kg/carcase) which equates to 23.43kg of lamb carcase /annum over six years

Scenario 1 compared to scenario 2 increases output by 12% (an additional total carcase output of 17.1kg or 2.85kg annum over six years).

Lambing ewe lambs could reduce the amount of GHG generated per kg of carcass meat produced by 9.4% over six years.

### Emissions

	N <sub>2</sub> O emission (kg N <sub>2</sub> O/yr CO <sub>2</sub> -e)	N <sub>2</sub> O emission (kg N <sub>2</sub> O/ha CO <sub>2</sub> -e)	Total N <sub>2</sub> O emission (kg N <sub>2</sub> O/ha CO <sub>2</sub> -e)	Storage -CH <sub>4</sub> emission (kg CH <sub>4</sub> /yr CO <sub>2</sub> -e)	Enteric - CH emission (kg CH <sub>4</sub> /yr CO <sub>2</sub> -e)	Average annual emissions associated with feed and fuel per ewe	Total emissions from feed and fuel over six years	Total kg CO <sub>2</sub> over six years	Total weight of meat produced	Emissions per kg meat (kg CO <sub>2</sub> e/kg DW)*
Scenario 1	19.9	335.0	38.8	41.4	1744	374	2244	4423	157.7	28.0
Scenario 2	19.7	331.6	38.4	39.7	1672	374	2244	4345	140.6	30.9

\* 9.4% reduction

### References

IPCC (2006). 2006 IPCC Guidelines for National Greenhouse Gas Inventories. H.S Eggleston, L Buendia, K Miwa, T Ngara, K Tanabe (Eds). Intergovernmental Panel on Climate Change (IPCC), IPCC/OECD/IEA/IGES, Hayama, Japan.

MacCarthy, J; Thomas, J; Choudrie, S; Passant, N; Thistlewaite, G; Murrells, T; Watterson, J; Cardenas I & Thomson, A; (2010). UK Greenhouse Gas Inventory, 1990-2008. Annual Report for submission under the Framework Convention on Climate Change. AEA Technology plc. Didcot, UK, April 2010.

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