Feeding ewes during

This article outlines why feeding ewes in late pregnancy is a key factor in flock profitability

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Management during this critical period influences lamb weight and vigour at birth, and colostrum production by the ewe. These influence lamb viability; the number of lambs reared per ewe joined; and the labour requirement around lambing. Undernutrition during late pregnancy results in poor ewe body condition at lambing and lambs of low weight and poor vigour.

Over-nutrition results in lambs that require assistance at birth. Therefore, inadequate nutritional management increases labour requirement and lamb mortality. Each additional 0.1 lamb reared per ewe joined is worth approximately €10/ewe. My aim is to summarise results from the many studies at Athenry on the effects of the nutrition offered to ewes during late pregnancy on ewe and lamb performance.

Lamb birth weight

Why is lamb birth weight important? Research at Athenry has shown that each 0.5kg increase in lamb birth weight increases subsequent weaning weight by around 1.7kg. Each kilo that a lamb is heavier at weaning reduces its age at slaughter by approximately one week.

Birth weight is a major factor influencing lamb mortality at, or during the days which follow, birth. Regardless of litter size, as lamb weight increases mortality declines initially but levels out around the optimum birth weight. The optimum birth weight varies by litter size.

As birth weight increases above the optimum, lamb mortality increases again – probably reflecting difficulties immediately prior to, and during, delivery. The optimum birth weight, based on lamb mortality, for cross-bred lambs born as singles is 6kg, for twins 5.6kg, and for triplets 4.5kg.

Effect of grass silage feed value

Digestibility (DMD) is the most important indicator of the feed value of grass silage for ewes. The average DMD of silage produced in Ireland is 70% but can be anywhere from 52% to 82% on farm, so a key message is to have your silage analysed.

Studies undertaken at Teagasc Athenry have shown that increasing silage DMD increases ewe liveweight and body condition at lambing and increases lamb birth and weaning weights (Table 1). Each five percentage-point increase in silage DMD increases ewe weight post-lambing by 6.5kg and lamb birth weight by 0.25kg.

Another way to evaluate silage feed value is to determine how much concentrate is required to yield lambs of a similar birth weight. At Athenry (Table 2), ewes offered a high feed value (high DMD) grass silage and supplemented with 5kg concentrate (soya bean meal plus minerals and vitamins) during late pregnancy produced lambs that were heavier than lambs from equivalent ewes offered a medium feed value silage supplemented with 20kg concentrate.

The high feed-value grass silage enabled concentrate supplementation to be reduced by at least three quarters.

Silage feed value and concentrate requirement

For ewes offered silage with 70% DMD, increasing concentrate feed level allowance above 25kg yielded no real gain in lamb birth weight (Table 3) but the ewes were clearly fat-

Table 1: The effects of grass silage feed value in late pregnancy on ewe and subsequent lamb performance

	Silage feed value	
	Medium	High
DMD (%)	70*	77
Ewe weight post lambing (kg)	58.7	66.7
Lamb – birth weight (kg)	4.4	4.7
– weaning weight (kg)	30.5	31.7

*Average DMD of silages in Ireland is 70% DMD (Keady and Hanrahan 2009, 2010, 2012a).

late pregnancy

Tim Keady, Peter Connelly and Tom Kane at Teagasc Athenry.

Table 2: The effects of grass silage feed value and concentrate feed level in late pregnancy on ewe and subsequent lamb performance

	Silage feed value		
	Medium	High	
Concentrate (kg/ewe in late pregnancy)	20	5*	20
Silage DMD (%)	73	79	79
Ewe weight post lambing (kg)	61.4	70.4	73.6
Lamb - birth weight (kg)	4.6	4.9	5.1
- weaning weight (kg)	32.9	34.0	34.7
- gain – birth to weaning (g/d)	292	301	306

*5kg of soyabean plus minerals and vitamins (Keady and Hanrahan 2009).

Table 3: The effects of concentrate feed level in late pregnancy on lamb birth weight and ewe body condition score (BCS)

Concentrate offered in late pregnancy (kg/ewe)	Silage DMD (%)	
	70	75
5	-	4.8 (3.4)
15	4.7 (3.1)‡	5.0 (3.7)
25	5.2 (3.3)	5.1 (3.8)
35	5.4 (3.5)	-
45	5.3 (3.8)	-

‡BCS of the ewe (Keady and Hanrahan 2010)

Table 4: Effects of supplementing high feed-value silage quality with soya bean or concentrate in late pregnancy

Supplement type	Soya bean	Concentrate	
Supplement (kg/ewe in late pregnancy)	5*	15	25
Ewe weight post lambing (kg)	69.6	71.5	72.8
Lamb - birth weight (kg)	4.8	5.0	5.1
Lamb - weaning weight (kg)	32.4	33.2	33.3
Feed cost per ewe in late pregnancy (€)	2.60	4.05	6.75

*Ewes received mineral and vitamins daily (Keady and Hanrahan 2009, 2010).

ter (higher BCS). The same is true for ewes on 75% DMD silage – increasing concentrate allowances above 15kg yielded a minimal change in lamb birth weight. The increased energy intake from feeding excess concentrate to ewes during late pregnancy is converted to body fat.

Two studies have been undertaken at Teagasc Athenry to evaluate the effects of replacing concentrate with low levels of soya bean meal (5kg) during late pregnancy of ewes offered high feed-value grass silage.

In these studies, the DMD of the grass silages were 75% and 79%, respectively. In each study, the ewes were supplemented with either 5kg soya bean meal plus minerals and vitamins, or with 15kg or 25kg concentrate during late pregnancy (Table 4.).

Increasing concentrate feed level from 15kg to 25kg during late pregnancy had little effect on lamb birth or weaning weight. Reducing supplementation from 15kg concentrate to 5kg soya bean meal reduced lamb birth weight by 0.2kg, weaning weight by 0.8kg, and supplement cost by €1.45 but increased lamb age at slaughter by approximately one week, silage requirements by 9% and thus silage cost by approximately €0.80.

The difference between reduced concentrate cost and increased silage cost is small. So with high feed-value grass silage it may be more prudent to offer concentrate during late pregnancy rather than supplementing with lower levels of soya bean meal.

Level of concentrate to offer

The effects of silage feed value on the concentrate requirement of twin-bearing ewes in late pregnancy are presented in Table 5. It is assumed that the silage is being offered using good feeding management, i.e. ewes have access to fresh silage 24 hours daily and that any silage residue is removed twice a week.

Concentrate requirement is influenced by both silage DMD and harvest system (chop length). The main factor influencing concentrate requirement during late pregnancy is silage DMD. For example, for silages at 79% and 64% DMD an additional 3kg and 10kg concentrate, respectively, are required for long-chop silages, compared with precision-chop silages, respectively.

The concentrate requirements per ewe presented in Table 5 can be reduced by 5kg in the case of single-bearing ewes, while concentrate supplementation should be increased by eight kg for ewes carrying triplets.

Table 5: Effects of silage quality on total concentrate requirements (kg) of twin-bearing ewes during late pregnancy

	Silage DMD (%)		
	79	72	64
Precision chopped	10	17	25
Big bale/single chop	13	24	35

Concentrate protein

For prolific flocks the concentrate should be formulated to contain 19% crude protein (190g of crude protein per kilo as fed) as the grass silage on many sheep farms has a low protein concentration.

Some personnel within the industry suggest formulating low and high protein concentrates for feeding to ewes during weeks six to four prior to lambing and weeks three to lambing, respectively.

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Considering the size of most sheep flocks in Ireland and the fact that ewes require low levels of concentrate during the first two to three weeks of supplementation, together with the low protein concentration of grass silage on most sheep farms the savings from using two different concentrates is, at best, marginal.

For example, while relative to a 19% crude protein concentrate the cost of formulating a 14% crude protein concentrate is lower by approximately €25/t. This equates to only 0.5c and 1c per ewe daily when ewes are offered 0.2kg/day and 0.4kg/day during the first few weeks of supplementation.

For every 100 ewes in a flock, one tonne of concentrate will last for 50 and 25 days, respectively, when ewes receive a daily concentrate allowance of 0.2 and 0.4 kg/head.

For most farms there is no benefit to animal production, logistics or financial outcome from offering a low-protein concentrate during the first weeks of concentrate supplementation.

Where maize silage is offered as the forage during late pregnancy concentrate crude protein should be increased to 23% and mineral and vitamin supplementation should be increased by approximately 50%.

The effects of concentrate protein source offered during late pregnancy on the performance of ewes and their progeny were evaluated at Athenry and are presented in Table 6. Two concentrates were formulated to have the same metabolizable energy (12.4 MJ/kg DM) and protein concentrations (18% as offered). The protein sources in the concentrates were either soya bean meal or a mixture of by-products (rapeseed, maize distillers and maize gluten).

Lambs born to ewes that had been offered the soyabean-based concentrate were 0.3kg and 0.9kg heavier at birth and weaning, respectively, than lambs born to ewes offered concentrate that contained by-products as the protein source.

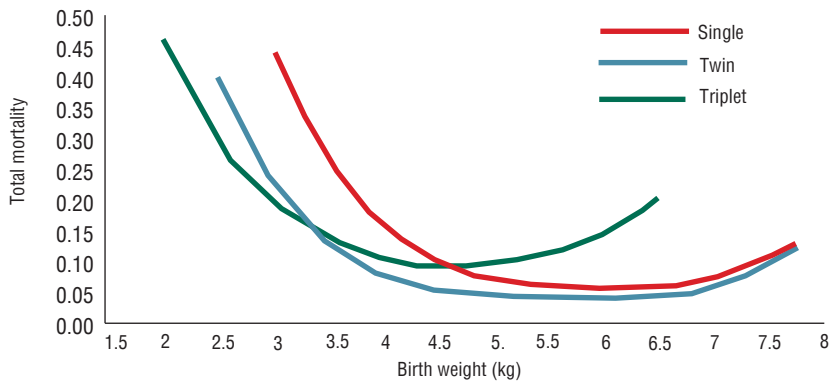
The increased weight of lambs of lambs at weaning from ewes offered the soyabean-based concentrate in late pregnancy (extra cost ~ €0.60/ewe) is similar to the response obtained from offering each lamb 6 kg of creep concentrate until weaning (cost ~ €3.50/ewe per set of twins).

It is more cost effective to offer concentrate formulated with good ingredients (e.g. soya, cereals, pulps) to ewes in late pregnancy than supplement lambs to increase lamb weaning weight.

The ingredient composition of the concentrate I formulated and offered to ewes during late pregnancy at Athenry is presented in Table 7. The concentrate was formulated to contain 19% protein using good protein (soya, rapeseed), energy (maize, barley) and fibre (beet pulp, soya hulls) sources.

Soya bean meal should form the main protein source for concentrates offered to ewes during late pregnancy. When offering similar levels of con-

Figure 1
Relationship between lamb birth weight and total mortality for lambs born as singles, twins and triplets



(Keady and Hanrahan, 2013)

Table 6: The effects of concentrate protein source on ewe and subsequent lamb performance

	Protein source	
	Soya bean meal	By-products
Ewe weight post lambing (kg)	53.2	51.4
Lamb – birth weight (kg)	4.0	3.7
Lamb - weaning weight (kg)	30.9	30.0

(Keady and Hanrahan 2012)

Table 7: Ingredient composition of the concentrate that will be offered to ewes at Athenry this year

Ingredient	kg/t
Soya bean meal	200
Maize meal	200
Barley	160
Soya hulls	145
Beet pulp	100
Rapeseed	80
Maize distillers	40
Molasses	50
Minerals and vitamins	25

Each five percentage-point increase in silage DMD increases ewe weight post-lambing by 6.5kg and lamb birth weight by 0.25kg.

IN SUMMARY

- Management during late pregnancy can have a major effect on labour requirement around lambing and on flock profitability.
- High feed-value silage reduces concentrate requirement and cost. Each five percentage-point increase in silage DMD increases ewe weight post-lambing by 6.5kg and increases lamb birth weight by 0.25kg.
- Optimum birth weight influences lamb vigour, viability and performance to slaughter. Each 0.5kg increase in birth weight increases weaning weight by 1.7kg.
- The level of supplementation offered to ewes in late pregnancy should be based on lambing date, forage quality and expected litter size.
- Minimise concentrate usage by penning ewes according to expected litter size and lambing date.
- As the demand for nutrients increases in late pregnancy supplementation should be stepped up weekly over the weeks immediately prior to lambing.
- Buy concentrate on the basis of ingredient composition, not solely on price.
- With high feed-value grass silage,it is more prudent to feed concentrate than low levels of soya bean meal (5kg).
- High-concentrate diets are an option but require good feeding management. Ensure that ewes are grouped by expected litter size and expected lambing date.

centrate to ewes during late pregnancy as is offered at Teagasc Athenry, a reduction in concentrate price of €20/t equates to a saving equivalent of only 44c per ewe.

Therefore, when purchasing concentrate it is very important to be aware of its ingredient composition rather than basing the decision on price alone.

Concentrate feeding management

To optimise the use of concentrate, ewes should be grouped according to predicted litter size (based on ultrasonic scanning) and expected lambing date (mating date – raddle colour). As lamb weight increases by 70% during the last six weeks of pregnancy the demand for nutrients increases substantially. Consequently, supplementation should be stepped up weekly over the period immediately prior to lambing. The objective is to produce lambs at the optimum birth weight (so will not require assistance during delivery), and ewes with adequate supplies of colostrum.

The feed schedules required to deliver different concentrate feed levels, varying from five to 45kg per ewe in late pregnancy, are given in Table 8. During the week prior to lambing ewes receive up to 1kg daily, clearly illustrating the benefits of penning ewes according to expected lambing date as well as expected litter size.

For example, for each extra week ewes are on the high level of concentrate supplementation they would consume ~7 kg concentrate – thus dramatically increasing concentrate usage and cost, and potential assistance (labour) required at lambing.

Table 8: Daily concentrate allowance (kg) per ewe required for different total concentrate inputs per ewe during late pregnancy

Week prior to lambing	Desired total concentrate input prior to lambing (kg)						
	5	10	15	20	25	35	45
8							0.4
7						0.4	0.6
6			0.2	0.3	0.4	0.5	0.6
5			0.2	0.3	0.4	0.6	0.8
4	0.1	0.2	0.2	0.4	0.6	0.7	0.9
3	0.1	0.2	0.3	0.5	0.6	0.8	1.0
2	0.2	0.4	0.5	0.6	0.7	1.0	1.0
1	0.3	0.6	0.75	0.8	0.9	1.0	1.1

High-concentrate feeding systems

Due to the poor weather conditions which prevailed in 2017 some producers who are short of forage, or have low feed-value forage, are considering high-concentrate systems for their ewes during late pregnancy.

A previous study at Athenry, which evaluated high concentrate and conventional silage-based diets during late pregnancy, concluded that both types of diet produced lambs which had similar levels of performance.

When feeding high concentrate diets the objective is to offer adequate quantities of concentrate to meet energy and protein requirements. Thus, as litter size increases and lambing approaches concentrate feed level must increase.

Proposed concentrate feed levels for ewes during the final eight weeks of pregnancy are presented in Table 9. The data presented in Table 9 show that ewes carrying singles, twins and triplets require 64kg, 74kg and 81kg concentrate, respectively, during the final eight weeks of pregnancy.

To ensure the success of high-concentrate systems during late pregnancy:

- Make sure that all ewes have adequate space to eat together.
- Build up concentrate feed level daily for the first week after housing and slowly reduce forage.
- Provide roughage and ensure that all ewes can access it at the same time.
- Feed the concentrate twice daily to reduce the risk of acidosis.
- Provide clean water.
- Group the ewes according to expected lambing date. If the ewes are offered the high levels of concentrate specified for the week prior to expected lambing date for a number of weeks, more assistance (labour) is likely to be required at lambing due to over-sized lambs, potentially increasing mortality.
- Group by expected litter size.

Table 9: Proposed concentrate supplementation level for high concentrate diets during late pregnancy (kg/day)

	Weeks prior to lambing			
Litter size	-8 to -7	-6 to -5	-4 to -3	-2 to -1
Single	1.0	1.1	1.2	1.4
Twins	1.1	1.2	1.4	1.6
Triplets	1.2	1.3	1.6	1.7