Feeding ewes during late pregnancy – key issues

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Introduction

Plane of nutrition offered to ewes during late pregnancy has a major influence on lamb birth weight, vigour and survival, colostrum production, and ewe body reserves; all of which impact labour requirement around lambing, lamb mortality, weaning rate and weaning weight. Consequently, appropriate nutrition and management during late pregnancy is one of the key factors influencing the productivity, and thus profitability of mid-season prime lamb production.

The aim of this article is to summarise results from recent studies at Athenry on the effects of late pregnancy feeding on lamb mortality, birth weight and subsequent growth rate.

Foetal development

At 8 weeks prior to lambing, whilst the placenta is fully developed, the foetus is only approximately 15% of its ultimate birth weight. The weight of the foetus increases by 70, 50 and 20 % during the last 6, 4 and 2 weeks prior to lambing, respectively. At the point of lambing the lamb(s) account for approximately 60% of the weight of the uterine contents. Consequently, a ewe that produces twin lambs, each weighing 5 kg, looses approximately 17 kg of live weight at lambing.

Nutrient requirements

Due to the rapidly growing foetuses and udder development (for colostrum production) the metabolizable energy (ME) requirement of ewes carrying singles, twins and triplets increases by 40, 60 and 70 %, respectively, over the final 6 weeks of pregnancy. Thus, for example, the ME requirement of a twin-bearing ewe weighing 75 kg increases from 12 to 19 MJ daily. Considering that each 1 kg of barley (14 %

moisture) contains only 11.5 MJ of ME, ewes need to be well supplemented in late pregnancy. Whilst ewes in good condition in late pregnancy can mobilize some body reserves those that are in poor condition must be fed to ensure that they maintain adequate body reserves for early lactation. Ewes that are in poor condition at lambing partition a greater proportion of food energy intake post lambing to replenishing body reserves, consequently, reducing milk energy production and consequently lamb growth rate.

Lamb birth weight

Birth weight is a major factor influencing lamb viability. The effect of lamb birth weight on lamb mortality is presented in Figure 1. Optimum lamb birth weight is influenced by litter size. Regardless of litter size, as lamb weight increases mortality declines initially but reaches a plateau at the optimum birth weight, which varies by litter size. Subsequently, as birth weight increases above the optimum lamb mortality increases again. The optimum birth weight, based on lamb mortality, for lambs born as singles, twins and triplets is 6.0, 5.6 and 4.7 kg respectively. Thus the optimum birth weight for lambs born as twins and triplets is 0.93 and 0.78 times that of singles.

The birth weight of lambs influences subsequent growth rate and consequently weaning weight. Previous studies at Athenry have shown that each 0.5 kg increase in lamb birth weight increases subsequent weaning weight by 1.7 kg. The increased weaning weight is due to a combination of the increase in birth weight per se and increased growth rate.

Lamb birth weight is influenced by many factors including ewe genotype, and, nutrition during mid and late pregnancy, and management. Studies at Athenry have shown that shearing ewes at housing (mid December) increased lamb birth weight by 0.6 kg.

Impact of silage feed value

The majority of ewes that are housed are offered grass silage as the sole forage whilst indoors. The major factors that affect the feed value of grass silage for sheep are digestibility and chop length.

Digestibility: Digestibility is the most important factor in grass silage affecting animal performance as it is positively correlated with energy concentration and intake characteristics. Previous studies clearly show that each 5 percentage-unit increase in digestibility increases milk yield of dairy cows by 1.65 kg/day, carcass gain of finishing beef cattle by 18 kg over a 150-day finishing period, and the carcass gain of finishing lambs by 2.3 kg over a 50-day finishing period .

Studies were undertaken at Athenry to evaluate the impact of silage digestibility on the performance of pregnant ewes, and of their progeny until weaning at 14 weeks. The results are presented in Table 1. Increasing silage digestibility, when offered at similar levels of concentrate, increased ewe live weight post lambing by 8 kg, lamb birth weight by 0.35 kg and lamb weaning weight by 1.2 kg. The increase in lamb weaning weight reduced age at slaughter, consequently the price received per kilogram of carcass was higher, since carcass price declines as the season progresses. In one of these studies in which silage feed value was increased (through increased digestibility and intake characteristics) lamb birth and weaning weights were increased by 0.55 kg and 1.8 kg respectively (Table 2).

An alternative way to evaluate silage feed value is to determine how much concentrate supplementation is required to yield lambs of a similar birth weight. A study was undertaken at Athenry (Table 2) to evaluate the effects of silage feed value and concentrate feed level on the performance of pregnant ewes and their progeny until weaning. Ewes that were offered the high feed value (high DMD) grass silage and supplemented with 5 kg concentrate (soya bean meal plus minerals and vitamins) produced lambs that were heavier than the lambs from ewes offered the medium feed value silage supplemented with 20 kg concentrate. Therefore the high feed value grass silage enabled concentrate supplementation to be reduced by at least 75 %.

Chop length: Unlike for beef and dairy cattle, chop length impacts on silage intake by sheep. In Ireland approximately 55 % of silage on sheep farms is ensiled in big bales. The effect of harvest system (precision chop or big bale) on ewe and subsequent lamb performance was evaluated at Athenry and the results are presented in Table 3. Ewes offered silage, during mid and late pregnancy, that was precision chopped produced lambs that were 1.8 kg heavier at weaning than lambs from ewes that were offered big bale silage.

Concentrate feed level

Silage feed value (as determined by digestibility, chop length and intake characteristics) and litter size are the major factors affecting the amount of concentrate supplementation required by ewes in late pregnancy. As the demands for nutrients increase in late pregnancy supplementation should be stepped up weekly over the weeks immediately prior to lambing. When supplementing ewes the objective is to produce heavy lambs (which will be delivered unassisted) and ewes with adequate supplies of colostrum.

The effects of level of concentrate supplementation on the birth weight of lambs from ewes that were offered either medium or high feed value silage was evaluated at Athenry and the results are presented in Table 4. Increasing concentrate feed level above 15 kg and 25 kg to ewes offered the high and medium feed value silages, respectively, did not increase lamb birth weight. However, feeding higher levels of concentrate resulted in higher ewe condition post lambing. The results of the studies presented in Tables 1 and 4 clearly show there is no benefit from feeding excess concentrate to ewes in late pregnancy.

The effects of silage feed value on concentrate requirements of twin-bearing ewes in late pregnancy are presented in Table 5. Concentrate requirements are influenced by both silage digestibility and harvest system (chop length). The rate of increase in the level of concentrate supplementation required increases as silage digestibility (DMD) decreases. Furthermore as silage chop length increases, the quantity of additional concentrate required increases because digestibility declines. For example, for silages at 79 and 65 % DMD an additional 4 and 10 kg concentrate are required for long chop length silages, relative to precision chop silages, respectively. For ewes carrying singles, concentrate supplementation can be reduced by 5 kg/ewe, whilst for ewes carrying triplets concentrate supplementation should be increased by 8 kg .

For prolific flocks the concentrate should be formulated to contain 190 g of crude protein per kilogram (i.e., 19% crude protein) as grass silages on many sheep farms have a low protein concentration. A study undertaken at Athenry evaluated the effect of concentrate protein source offered during late pregnancy on the performance of ewes and their progeny and the results 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 fed). The protein sources in the concentrates were either soyabean or a mixture of by-products (rapeseed, maize distillers and maize gluten). Lambs born to ewes that had been offered soyabean based concentrate produced lambs that were 0.3 kg and 0.9 kg heavier at birth and weaning, respectively, than lambs born to ewes offered concentrate that contained by-products as the protein source. The increase in lamb birth weight due to soyabean meal being offered as the protein source is similar to the effect of increasing silage digestibility (DMD) by 6.8 percentage units

As the quantity of concentrate offered to ewes in late pregnancy is modest (depending on silage quality) it should contain high quality digestible fibre, energy and protein sources.

Concentrate feeding management

To optimise the use of concentrate ewes should be penned according to predicted litter size (based on ultrasonic scanning) and expected lambing date ((mating date - raddle colour). The feed schedule required to offer ewes different concentrate feed levels varying from 10 to 45 kg per ewe in late pregnancy is shown in Table 7. During the week prior to lambing ewes receive up to 1 kg daily, clearly illustrating the benefits of penning ewes according to expected lambing date as well as expected litter size.

Conclusions

1. Correct nutrition during late pregnancy is a key issue impacting on flock productivity and profitability.
2. Grass silage feed value, as determined by digestibility and intake characteristics, is the major factor affecting ewe performance, and subsequently efficiency of production, during the housing period.
3. High feed-value grass silage can reduce concentrate requirement by at least 75 % whilst maintaining animal performance.
4. Level of supplementation offered to ewes in late pregnancy should be based on lambing date, forage quality and expected litter size.

5. Supplement with a concentrate containing 19% crude protein and ensure that soyabean meal accounts for a high proportion of the protein.
6. Pen ewes according to expected litter size and lambing date to minimise concentrate usage.

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

	Silage feed value	
	Medium	High
Dry matter (%)	23.0	25.9
DMD (%)	70.2	76.5
Animal performance		
Ewe weight post lambing (kg)	58.7	66.7
Lamb – birth weight (kg)	4.4	4.7
- weaning weight (kg)	30.5	31.7

(Keady and Hanrahan 2009, 2010, 2012a)

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

(Keady and Hanrahan 2009)

Table 3. The effects of silage system on ewe and subsequent lamb performance

	Silage harvest system			
	Precision chop		Big bale	
Concentrate (kg in last 6 weeks of pregnancy)	18	27	18	27
Ewe condition at lambing	4.1	4.1	4.0	4.1
Lamb - birth weight (kg)	4.7	4.9	4.5	4.9
- weaning weight (kg)	33.7	34.8	32.1	32.8

(Keady and Hanrahan 2008)

Table 4. The effects of concentrate feed level in late pregnancy on ewe and subsequent lamb performance

	Silage DMD	
Conc during late pregnancy (kg/ewe)	70	75
5	-	4.8
15	4.7	5.0
25	5.2	5.1
35	5.4	-
45	5.3	-

(Keady and Hanrahan 2010)

Table 5. Effects of silage quality on concentrate requirements of twin-bearing ewes in late pregnancy

	Silage DMD (%)		
	79	72	64
Precision chopped (kg/ewe)	8	17	25
Big bale/Single chop (kg/ewe)	12	24	35

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

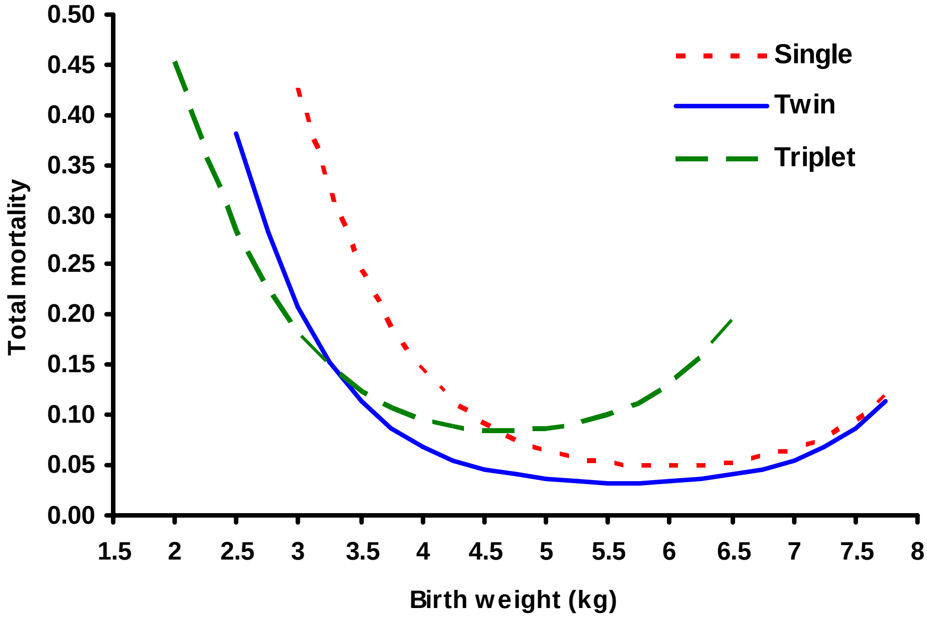
	Protein source	
	Soyabean	By-product
Dry matter (%)	23.0	25.9
DMD (%)	70.2	769.5
Animal performance		
Ewe weight post lambing (kg)	53.2	51.4
Lamb – birth weight (kg)	4.0	3.7
- weaning weight (kg)	30.9	30.0

(Keady and Hanrahan 2012)

Table 7. **Daily concentrate allowance (kg/ewe daily) required for different total concentrate inputs prior to lambing**

Week prior	Desired total concentrate input prior to lambing (kg/ewe)					
to lambing	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	0.2	0.2	0.4	0.6	0.7	0.9
3	0.2	0.3	0.5	0.6	0.8	1.0
2	0.4	0.5	0.6	0.7	1.0	1.0
1	0.6	0.75	0.8	0.9	1.0	1.1

Figure 1. Relationship between lamb birth weight and mortality



(Hanrahan and Keady, 2013)