Nutrition of ewes during late pregnancy

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Introduction

Prime lamb production is seasonal and grass-based with the majority of ewes lambing in March. Management of ewes during late pregnancy influences lamb birth weight and vigor, and colostrum production by the ewe; all of which impact on lamb mortality and on labour requirements around lambing. Consequently, appropriate nutrition and management during late pregnancy is one of the key factors influencing flock productivity (lambs weaned per ewe joined), and thus profitability. Each additional 0.1 lamb reared per ewe joined is worth approximately €9.5/ewe

My objective in this article, the eight in the current series, is to summarise results from studies at Athenry on the effects of the plane of nutrition offered to ewes during late pregnancy on ewe and lamb performance.

Lamb birth weight

Previous studies at Athenry have shown that each 0.5 kg increase in lamb birth weight increases subsequent weaning weight by around 1.7 kg.

The effect of lamb birth weight on lamb mortality is shown in Figure 1. Regardless of litter size, as lamb weight increases mortality declines initially but levels out around the optimum birth weight, which varies by litter size. Subsequently, 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 crossbred lambs born as singles, twins and triplets is 6.0, 5.6 and 4.5 kg, respectively. Thus the optimum birth weight for lambs born as twins is 0.93 that of singles; the corresponding proportion for triplets is 0.78.

Lamb mortality is also influenced by litter size.

Variability in the feed value of grass silage

Digestibility (DMD) is the most important characteristic of grass silage from the viewpoint of animal performance because it is positively correlated with energy concentration and intake. As silage DMD varies from 52 to 82 % on Irish farms it is essential to know the feed value of the silage (forage) (as determined by laboratory analysis) that will be offered to ewes when developing a nutritional plan for housed ewes in late pregnancy.

Impact of grass silage feed value

The results from studies undertaken at Athenry on the impact of silage digestibility on the performance of pregnant ewes, and that of their progeny are summarized in Table 1. Increasing silage DMD increased ewe live weight immediately after lambing and increased lamb birth and weaning weights by 0.3 and 1.2 kg, respectively. Each 5 percentage-point increase in silage DMD increases ewe weight post lambing by 6.5 kg and increases lamb birth weight by 0.25 kg.

An alternative 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 5 kg concentrate (soya bean meal plus minerals and vitamins) during late pregnancy produced lambs that were heavier than the lambs from equivalent ewes offered a 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 %.

Silage feed value and concentrate requirement

The effects of concentrate feed level and silage feed value on lamb birth weight and ewe body condition score (BCS) at lambing are presented in Table 3. Note for ewes offered silage with 70 DMD increasing concentrate feed level allowance above 25 kg yield no real gain in lamb birth weight but the ewes were clearly fatter (higher BCS); the same is true for ewes on 75% DMD silage – concentrate allowances of 15 and 25 kg yielded an increase in BCS but a minimum change in lamb birth weight. Therefore

the increased energy intake from feeding excess concentrate to ewes during late pregnancy is converted to body fat.

The effects of silage feed value on the concentrate requirement of twin-bearing ewes in late pregnancy are presented in Table 4. It is assumed that the silage is been offered using good feeding management, i.e., ewes have access to fresh silage 24 hours per day and that any silage residue is removed twice weekly. 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 4 and 10 kg concentrate, respectively, are required for long chop silages, compared to precision chop silages, respectively. The concentrate requirements per ewe presented in Table 4 can be reduced by 5 kg in the case of single-bearing ewes, whilst concentrate supplementation should be increased by 8 kg for ewes carrying triplets.

Concentrate protein

For prolific flocks the concentrate should be formulated to contain 19% crude protein (i.e., 190 g of crude protein per kilogram 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 6 to 4 prior to lambing and weeks 3 to lambing, respectively. However, considering the size of most sheep flocks in Ireland and the fact that ewes require low levels of concentrate during the first 2 to 3 weeks of supplementation, together with the low protein concentration of grass silage on most sheep farms the savings from using 2 different concentrates is, at best, marginal. For example, whilst relative to a 19% crude protein concentrate the cost of formulating a 14% crude protein concentrate is lower by approximately €30/t, this equates to only 1 cent per ewe daily during the first few weeks of supplementation, when ewes are offered between 0.2 and 0.4 kg/ewe daily. For every 100 ewes in a flock 1 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. Therefore, 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 then concentrate crude protein concentration 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 was evaluated at Athenry. 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 soyabean 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 0.3 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 the weaning weight of lambs from ewes offered the soyabean-based concentrate in late pregnancy (extra cost ~ €0.50/ewe) is similar to the response obtained from offering each lamb 6 kg of creep concentrate until weaning (cost ~ €3/ewe per set of twins).

The ingredient composition of the concentrate being offered to ewes during late pregnancy at Athenry is presented in Table 5. The concentrate was formulated to contain 19% protein using good protein (soya, rapeseed), energy (maize, barley) and fibre (beet pulp, soya hulls) sources. When offering similar levels of concentrate to ewes during late pregnancy as is offered at Athenry, a reduction in concentrate price of €20/t equates to a saving equivalent of only 45 cents per ewe. Therefore when purchasing concentrate it is important to be aware of its ingredient composition rather than basing the decision on which concentrate to purchase solely 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 6 weeks of pregnancy the demand for nutrients increases substantially during late pregnancy. Consequently, supplementation should be stepped up weekly over the weeks immediately prior to lambing. The objective is to produce lambs at the optimum birth

weight (that 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 10 to 45 kg per ewe in late pregnancy, are given in Table 6. 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. 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.

Conclusions

1. Each 5 percentage point increase in silage DMD increases ewe weight post lambing by 6.5 kg and increases lamb birth weight by 0.25 kg.
2. Each 0.5 kg increase in birth weight increases weaning weight by 1.7 kg.
3. The level of supplementation offered to ewes in late pregnancy should be based on lambing date, forage quality and expected litter size.
4. Minimise concentrate usage by penning ewes according to expected litter size and lambing date.
5. As the demand for nutrients increases in late pregnancy supplementation should be stepped up weekly over the weeks immediately prior to lambing.
6. When purchasing concentrate select on ingredient composition and not solely on price.

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

	Silage feed value	
	Medium	High
DMD (%)	70.2	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 concentrate feed level in late pregnancy on lamb birth weight and ewe body condition score (BCS)

Concentrate offered during 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 silage quality on total concentrate requirements (kg) of twin-bearing ewes during late pregnancy

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

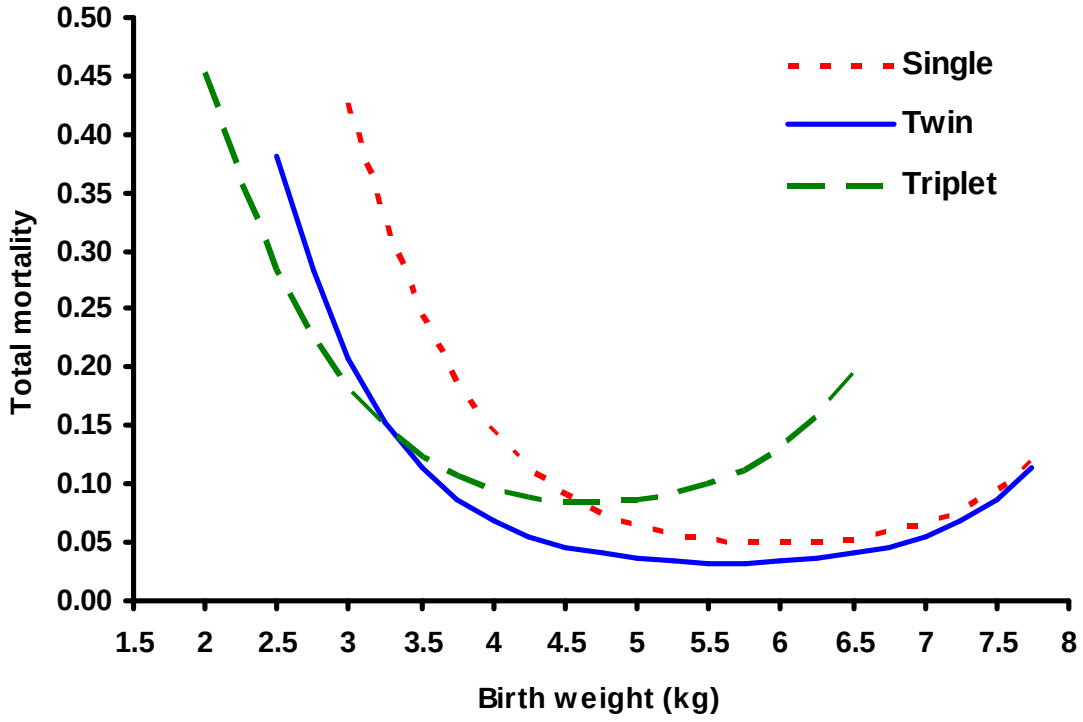
Table 5. Ingredient composition of the concentrate that will be offered to ewes at Athenry this year.

Ingedient	kg/t
Soyabean meal	200
Maize meal	190
Barley	170
Soya hulls	145
Beet pulp	100
Rapeseed	80
Maize distillers	40
Molasses	50
Minerals and vitamins	25

Table 6. 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)					
	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 total mortality for lambs born as singles, twins and triplets



(Hanrahan and Keady, 2013)