

# **Silage digestibility – its effects on animal performance**

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## **Introduction**

The largest harvest that occurs annually in Ireland will commence within the next week or so: silage making. Grass silage forms the basal diet of the majority of beef cattle, dairy cows and sheep during the winter indoor feeding period. Digestibility (DMD) is the main factor that determines the metabolisable energy (ME) concentration of silage and also is a key factor influencing intake. As DMD increases, silage ME concentration and silage intake increase; increasing ME intake results in an improvement in animal performance. Therefore, digestibility is the main factor influencing silage feed value.

Whilst the mean DMD of the grass silage produced in Ireland last year was 69%, the DMD of silages produced on individual farms varied from as low as 52% to a high of 82%. Because of the generally low DMD of the silage on farms cattle and sheep are normally supplemented with concentrate and the level of supplementation depends on the feed value of the silage and the level of performance required.

My objective of this article, which is based on a recent review of research on silage feeding, is to summarise results on the effects of silage DMD on the performance of pregnant ewes, finishing lambs, finishing beef cattle and lactating dairy cows.

## **Dairy cows**

There is a substantial body of evidence to indicate that increasing silage DMD increases silage intake and performance of lactating dairy cows. From the mean of 23 comparisons in which silages differing in digestibility were offered to lactating dairy cows the mean milk yield response per 5 unit increase in silage DMD was 1.65 kg per cow per day.

The response to increasing silage DMD when offered to dairy cows offered different levels of concentrate supplementation [indicated by forage:concentrate ratio (F:C ratio)] are presented in Table 1. As daily concentrate feed level increased the daily milk yield response per 5 units increase in DMD declined from 2.9 to 0.8 kg/cow. The data in Table 1 show that even at high levels of concentrate supplementation offering a silage with a higher DMD increases milk yield.

### **Beef cattle**

From the mean of 34 studies in which silages differing in DMD were offered to beef cattle the mean response, from each increase of 5 units in silage DMD, was an increase in daily live weight gain and carcass gain of 0.15 kg and 0.12 kg, respectively. However the response in beef cattle performance to increasing silage DMD depends on the level of concentrate (F:C ratio) in the diet (Table 2). The data presented in Table 2 demonstrate that the response to increasing silage DMD declines as the level of concentrate in the diet increases. For diets with F:C ratios of 60:40 and 40:60 each 5 unit increase in silage DMD increases carcass gain of finishing beef cattle by 13 kg and 6 kg, respectively, during a 150-day finishing period. At the current beef price an increase in carcass weight of 13 and 6 kg is valued at approximately €52 and €24, respectively.

### **Pregnant ewes**

The effects of silage digestibility on the performance of ewes during mid and late pregnancy are presented in Table 3. Each increase of 5 units in DMD of silage offered to ewes during mid and late pregnancy increases ewe weight immediately post lambing by 6.5 kg (with a consequent improvement in ewe body condition) and lamb birth weight by 0.26 kg. Lamb birth weight has a positive impact on weaning weight. Previous studies at Athenry have shown that an increase of 1 kg in lamb birth weight results in an increase of 3.2 kg in weaning weight. Thus an increase in lamb birth weight of 0.26 kg consequent on offering a silage with 5 units higher DMD is an expected increase in lamb weaning weight of around 0.8 kg.

### **Finishing lambs**

From the mean of 10 comparisons in which grass silages differing in digestibility were offered to finishing lambs the mean response to an increase of 5 units in silage DMD was an increase in daily live weight gain and daily carcass gain of 72 g and 47 g, respectively. The effects of silage DMD on lamb performance decline as the level of concentrate in the diet increases (Table 3). Even at high levels of concentrate supplementation, an increase of 5 units in silage DMD increases carcass gain by 1.5 kg during a 50-day finishing period which would have been worth approximately €8/lamb last winter

## **Conclusions**

- 1) Digestibility is the most important factor influencing the feed values of silage and consequently the performance of beef cattle, lactating dairy cows, pregnant ewes and finishing lambs offered grass-silage based diets.
- 2) On average, each increase of 5 units in silage DMD increases:
  - a) Milk yield of dairy cows by 1.65 kg/day
  - b) Carcass gain of finishing beef cattle by 0.12 kg/day
  - c) Carcass gain of finishing lambs by 47 g/day
  - d) Pregnant ewe weight post lambing by 6.5 kg
  - e) Lamb birth weight by 0.26 kg
- 3) While the response to increased silage DMD declines as the level of concentrate in the diet increases, it is still evident at high levels of concentrate feeding.
- 4) Aim to produce silage with a DMD of 75% when ensiling forage that will be offered to finishing beef cattle, lactating dairy cows, pregnant ewes and finishing lambs

**Table 1. Response in dairy cow performance to a change of 5 percentage units in silage DMD at various forage:concentrate ratios**

	Forage:concentrate ratio		
	80:20	60:40	40:60
Silage intake (kg DM/day)	1.6	1.0	0.4
Milk yield (kg/day)	2.9	1.9	0.8
Yield of fat plus protein (kg)	0.19	0.13	0.08

Keady et al (2013)

**Table 2. Response in beef performance to a change of 5 percentage units in silage DMD at various forage:concentrate ratios**

	Forage:concentrate ratio			
	100:0	80:20	60:40	40:60
Silage intake (kg DM/day)	0.6	0.5	0.3	0.2
Carcass gain (kg/day)	0.18	0.13	0.09	0.04
Total carcass gain over 150-day finishing period (kg)	26	20	13	6

Keady et al (2013)

**Table 3. Response in performance of finishing lambs to a change of 5 percentage units in silage DMD at various F:C ratios**

	Forage:concentrate ratio		
	80:20	60:40	40:60
Silage intake (kg DM/day)	1.6	1.0	0.4
Carcass gain (g/day)	65	45	30
Total carcass gain (kg) over 50-day finishing period	3.3	2.3	1.5

Keady et al (2013)