Factors affecting grass silage digestibility

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Introduction

Digestibility (DMD) is the most important factor influencing silage feed value and consequently the performance of beef cattle, lactating dairy cows, pregnant ewes and finishing lambs offered grass silage based diets. Silage DMD is the percentage of silage dry matter consumed that is actually digested by the animal and is thus utilised by the animal. A summary of research studies shows that each 5 unit increase in silage DMD increases milk yield of lactating dairy cows, carcass gain of finishing beef cattle, carcass gain of finishing lambs and birth weight by 1.65 kg/day, 0.11 kg/day, 47 g/day and 0.26 kg respectively.

My objective in this article is to summarise the factors which influence silage DMD.

Harvest Date

Harvest date is the **most** important factor affecting silage DMD; it also affects herbage yield. Silage DMD declines as harvest is delayed whilst herbage yield increases. Silage DMD declines by 3.3 units, on average, for each 1 week delay in the date of harvest. The rate of decline in the digestibility of herbage from the second cut (primary regrowth) is similar to that for the first cut (primary growth). Therefore each 1 week delay in harvesting of grass for ensilage means that extra concentrate will need to be fed to achieve target animal performance levels. To sustain milk yield of lactating dairy cows, carcass gain of finishing beef cattle, carcass gain of finishing lambs and lamb birth weight from pregnant ewes an additional 1.8 kg/day, 0.9 to 1.8 kg/day, 0.25 kg/day and 13 kg during late pregnancy, respectively, of concentrate is required to compensate for the decline in DMD.

When deciding on when to harvest a sward base your decision on an inspection of the sward canopy, and not on heading date alone, as there may be an accumulation of decaying material at the base of the sward which negatively impacts on DMD. In broken weather do not delay harvest date for a protracted period of time with the hope of getting a wilt – it may not happen.

Crop Lodging

Lodging, or flattening, of the grass crop prior to harvest accelerates the rate of decline in herbage DMD as harvest date is delayed. This accelerated decline in DMD is due to the accumulation of dead leaf and stem at the base of the sward. In severely lodged crops DMD may decline by as much as 9 units per week whilst in a standing crop DMD declines by 3.3 units.

Sward type

Normally it is assumed that silage produced from old permanent pasture has a lower DMD than silage produced from a perennial ryegrass sward. However the negative impact of old permanent pasture on silage DMD is dependent on its botanical composition. A 3 year study undertaken at Grange concluded that, when harvested at the same time, silages produced form old permanent pastures had a lower DMD of 2.8 units relative to silage produced form perennial ryegrass swards. If old permanent pastures are harvested at the correct stage of growth silage with a high feed value can consistently be produced.

Sward heading date

Perennial ryegrass varieties are classified according to heading date. The effect of intermediate and late heading varieties of perennial ryegrass on silage DMD have been examined. It was concluded that to produce silage with the same DMD herbage from late heading varieties (heading date 12 June) had to be ensiled 8 days later than herbage from intermediate-heading (heading date 19 May) varieties even though there was a difference in heading date of 24 days. Some commentators make a general recommendation to harvest swards at approximately 50% ear emergence. Had the herbage from the intermediate and late heading varieties been harvested at 50% ear

emergence the DMD of silage produced from the late heading varieties would have been 7 units lower in DMD.

Silage fermentation

Relative to well-preserved silage, poorly preserved untreated silage normally has a lower DMD.

Wilting

Wilting reduces silage DMD. The rate of decline in DMD due to wilting depends on the duration from mowing to ensiling the herbage and on potential soil contamination due to mechanical treatment. Each day of wilting will reduce DMD by between 0.5 and 2.2 units. Therefore when wilting the objective should be to obtain a rapid wilt and ensile the herbage within 24 to 36 hours after mowing.

Conclusions

1) Harvest date is the key factor that affects silage DMD. Silage DMD declines by 3.3 units for every week delay in harvest date.
2) Decide on harvest following inspection of the sward canopy for presence of seed heads and decaying material at the base.
3) For each 1 week delay in harvest additional concentrate must be offered to maintain animal performance as follows:
    a) 1.8 kg per lactating cow daily
    b) Between 0.9 and 1.8 kg per finishing beef animal daily
    c) 13 kg per ewe during late pregnancy
    d) 0.25 kg per finishing lamb daily
4) Ensile herbage from late varieties within 8 days of that from intermediate varieties to maintain silage DMD
5) If wilting ensile within 36 hours and avoid soil contamination.