Multi-cut system for grass silage

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Multi-cut system for grass silage

The multi-cut approach of silage making involves taking more frequent cuts of younger grass (at around four-week intervals) throughout the season and is becoming increasingly popular. There are many potential benefits of using such an approach. Younger grass is more digestible since it contains more leaf material and less stem. The higher digestibility means the silage won't spend as long in the rumen, so cows can eat more of it. Younger grass will likely have higher metabolisable energy (ME), whilst protein content is also likely to be higher. There can also be practical benefits to this approach; a delay of 1 week due to poor weather at 4 weeks growth will still leave you with a relatively high quality crop at 5 weeks, compared with a similar situation after 6 and 7 weeks respectively.

However, there are also potential challenges associated with a multi-cut system. The shorter cutting window can result in higher residual nitrogen levels from fertiliser which, when combined with the potentially higher protein levels (as outlined above), can increase the buffering capacity of the crop. A higher buffering capacity will slow down acidification during the ensiling process, resulting in a higher silage pH. A shorter cutting window can also result in slurry contamination, introducing undesirable bacteria to the silage. When combined with the higher pH, this can result in high DM losses.

In this booklet, we aim to put some scientific research data behind some of the assumed benefits and challenges outlined above.

Trial work

We monitored grass harvested as part of a multi-cut system from a farm in Pembrokeshire, West Wales, throughout the 2018 growing season. The crop was a four-year-old perennial ryegrass ley, which received 45 units of nitrogen/acre and 3000 gallons of slurry/acre six weeks prior to 1st cut. The crop also received 35 Units nitrogen/acre and 1500 gallons slurry/acre after each cut. Slurry was applied using a trailing shoe to minimise contamination of the grass crop.

Given the potential challenges of ensiling a multi-cut crop (outlined above), we aimed to test the benefits of using Ecosyl silage inoculant, which applies *Lactobacillus plantarum* MTD/1 at 1 million cfu/g forage, as part of a multi-cut system for making grass silage. We ensiled untreated grass and grass treated with Ecosyl from the first four cuts taken approximately every four weeks during May, June, July and August and monitored the progress of the ensilage process. We also assessed several indicators of crop quality throughout the growing season.

Quality of the standing crop

We regularly tested the quality of the standing crop from late April though to early October 2018. We found that the crop was consistently of high nutritional value, being highly digestible (average D-value of 75), high in energy (average ME of 12), and high in protein (average crude protein of 19.2%) as expected of young grass harvested as part of a multi-cut system. However, we also identified some challenging features of the crop.

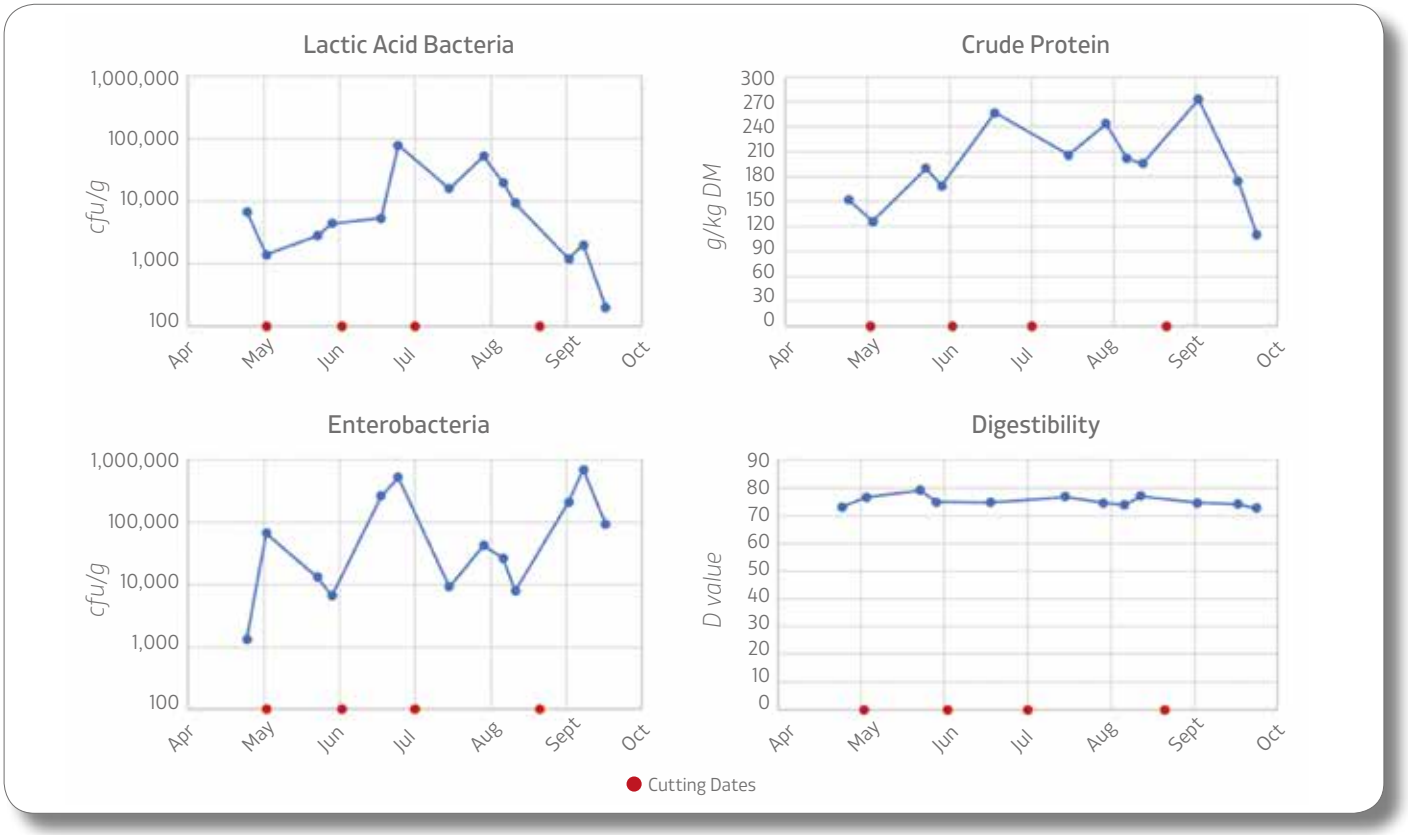
Lactic acid bacteria numbers were relatively low in the fresh crop, averaging 15,600 cfu/g fresh forage throughout the season. A low level of naturally occurring lactic acid bacteria may not be sufficient to ensure the rapid fermentation and low pH required to stabilise the silage (for comparison, the Ecosyl silage inoculant applies *Lactobacillus plantarum* MTD/1 at 1,000,000 cfu/g fresh forage).

Despite the use of a trailing shoe for slurry application, there was evidence of enterobacteria (commonly associated with slurry) contaminating the crop, with counts consistently almost ten times the level of the natural population of lactic acid bacteria present (the average enterobacteria count throughout the season was 152,410 cfu/g). Enterobacteria can cause inefficient fermentations to take place in silage, resulting in significant dry matter losses.

Conclusions: Standing Crop

As expected the nutritional value of the crop was consistently high however the low lactic acid bacteria population present, combined with high crude protein and enterobacteria counts, could potentially lead to problems during ensilage.

Quality characteristics of standing grass throughout the season

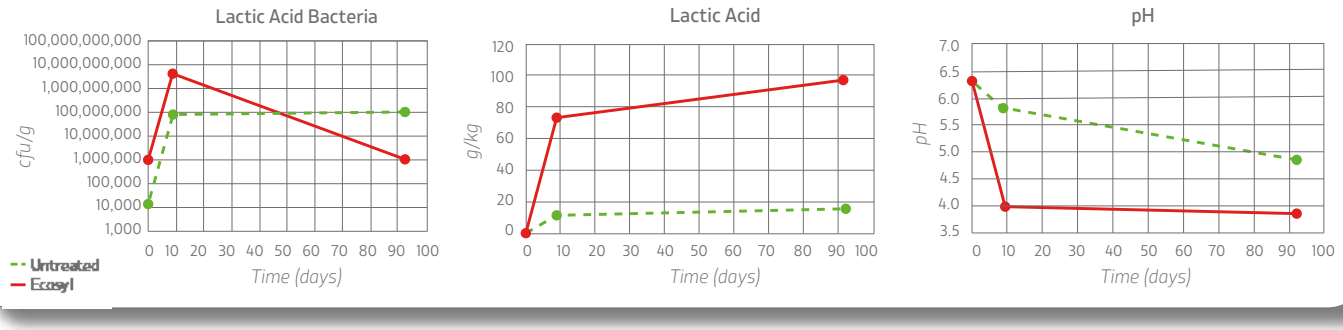


Details of forage as ensiled

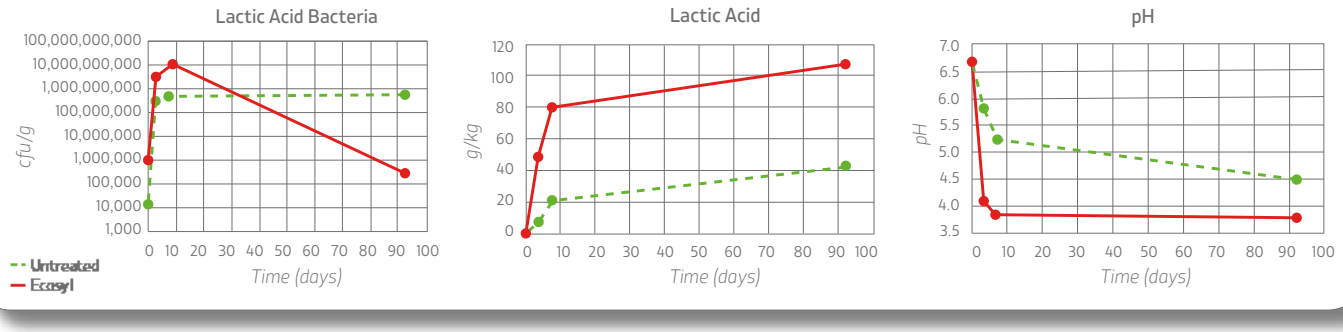
	Date	DM (%)
Cut 1	6th May 2018	37
Cut 2	4th June 2018	32
Cut 3	4th July 2018	50
Cut 4	25th August 2018	28

Additive treatment improved the fermentation of all cuts

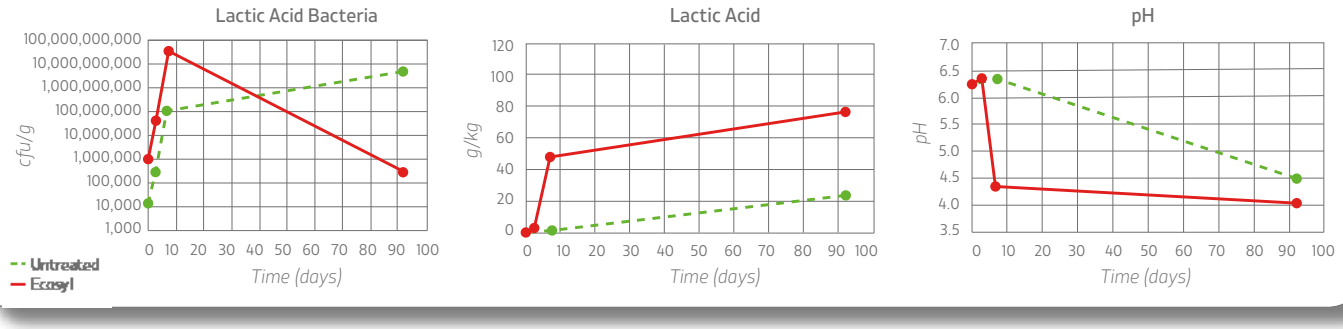
Cut 1 - 37% DM



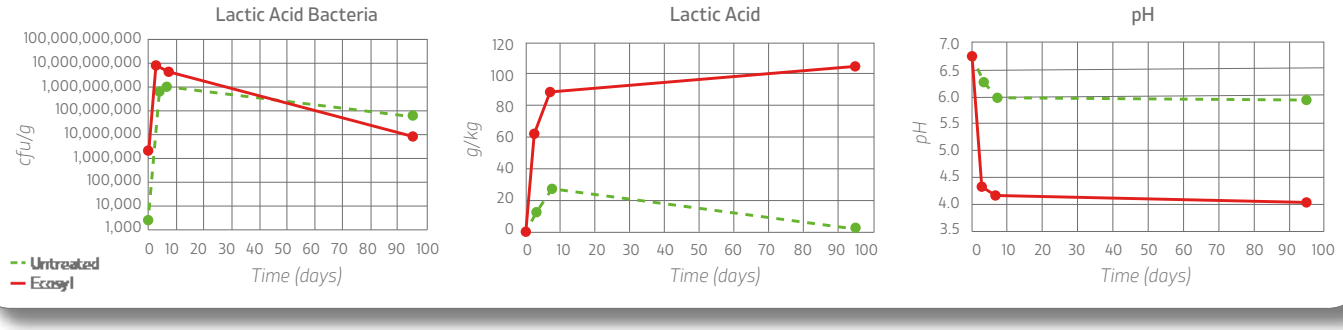
Cut 2 - 32% DM



Cut 3 - 50% DM



Cut 4 - 28% DM

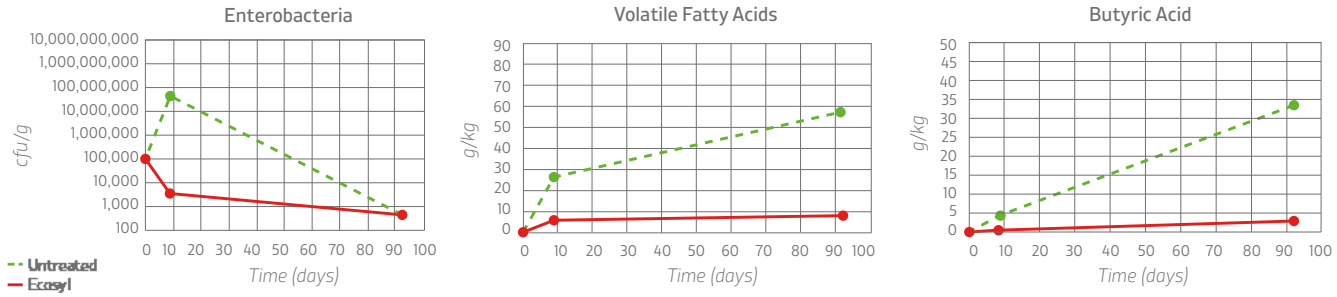


An efficient fermentation will rapidly generate lactic acid, the most important fermentation acid, in order to lower the silage pH.

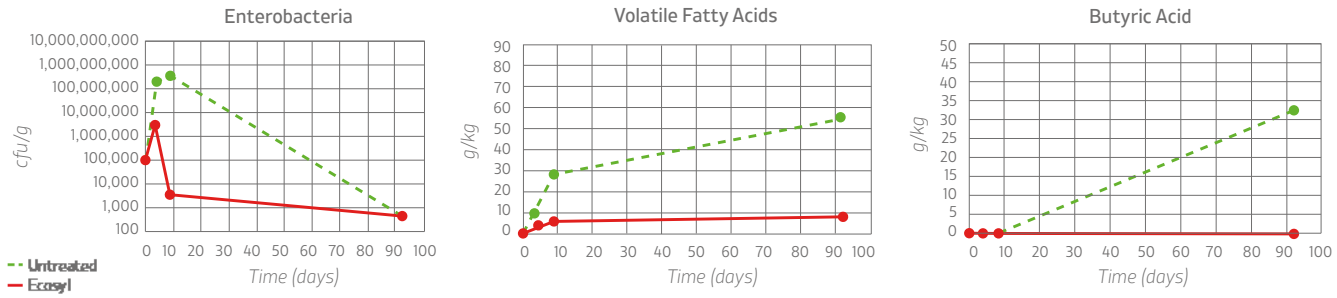
In all four cuts (including the challenging 3rd cut which reached 50 % DM during the hottest part of the 2018 summer), the beneficial MTD/1 bacteria from Ecosyl were able to generate more lactic acid than in the untreated silage, bringing the pH down rapidly. The pH in the untreated silage fell much more slowly and never reached the same level as the Ecosyl silage, leaving it vulnerable to high DM losses.

Additive treatment consistently controlled bad bacteria

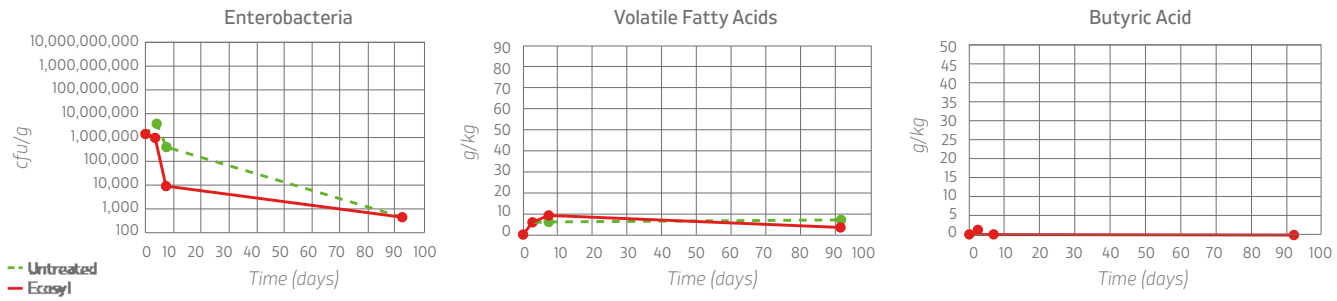
Cut 1 - 37% DM



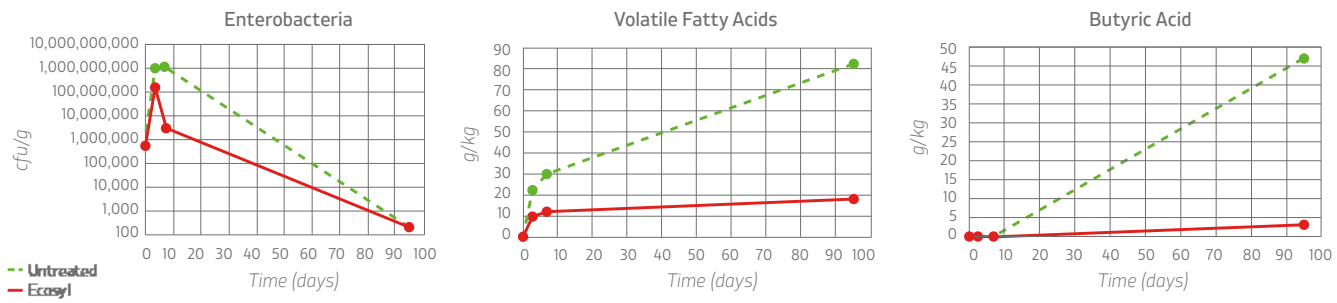
Cut 2 - 32% DM



Cut 3 - 50% DM



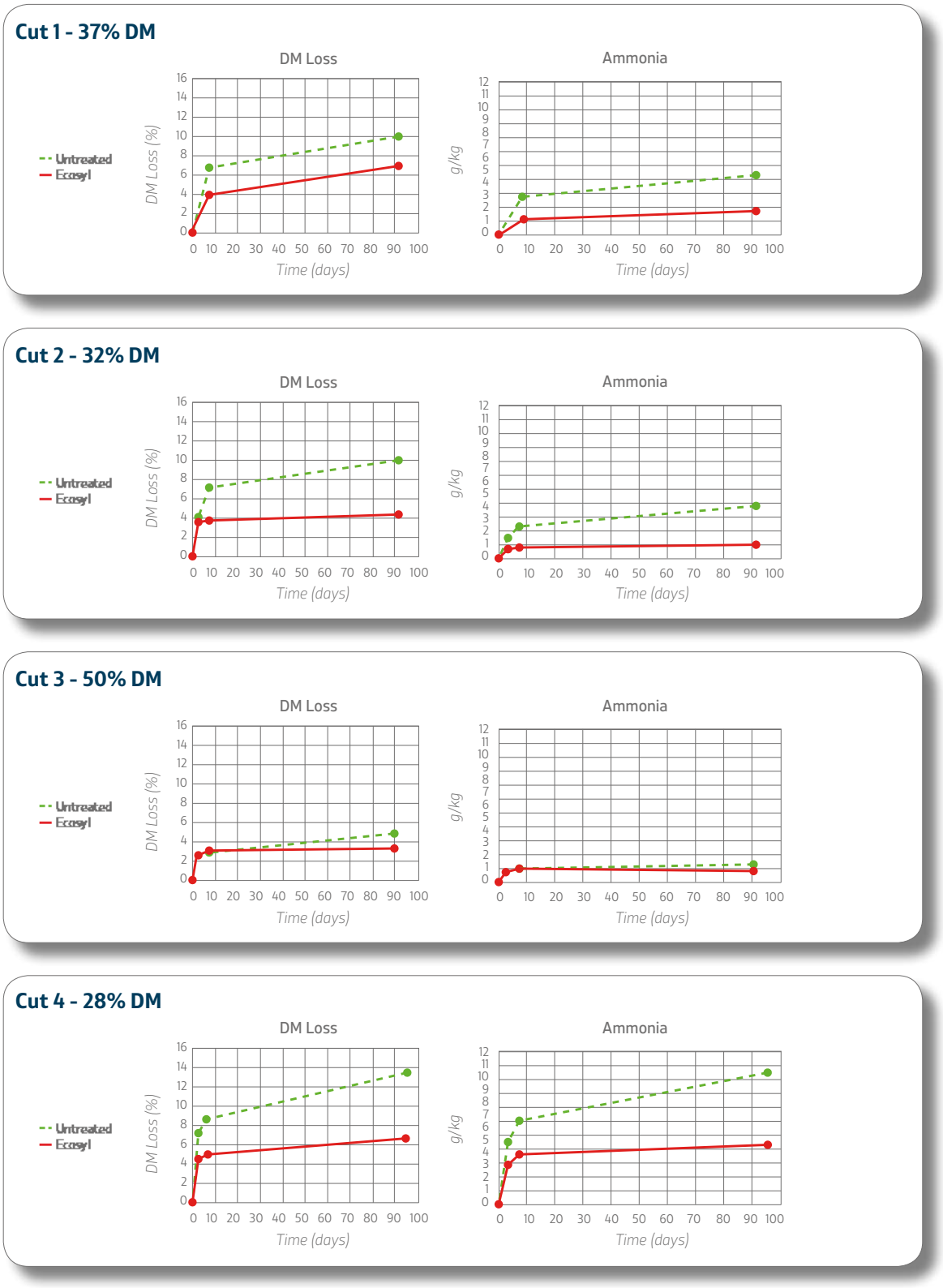
Cut 4 - 28% DM



Rapidly lowering the pH is vital for stabilising silage as it prevents the growth of bad bacteria, including enterobacteria and clostridia, which may be present on the crop.

Bad bacteria generate undesirable fermentation acids, known as volatile fatty acids or VFAs. These are the result of inefficient fermentations which lead to high DM losses. As well as high DM losses the presence of butyric acid in silage, generally resulting from clostridial activity, can lead to health problems and reduced silage intakes. Ecosyl treated silage controlled the growth of enterobacteria and restricted the production of volatile fatty acids, including butyric acid. In untreated silage, where the pH remained high for at least 7 days in all four cuts, enterobacteria counts were consistently higher for longer – relative to the Ecosyl silage. Untreated silage was also higher in volatile fatty acids, including butyric acid.

Additive treatment reduced silage losses



Controlling the levels of undesirable bacteria, such as clostridia and enterobacteria, is essential to minimise DM losses and prevent protein breakdown.

Having successfully controlled undesirable bacteria within the fermentation, Ecosyl treated silage showed minimal DM losses which ranged from 3 – 7 % over the four cuts. The fermentation in the untreated silage failed to adequately control undesirable bacteria, resulting in considerably higher DM losses, ranging from 5 – 14%.

As well as preserving more of the silage DM, Ecosyl treated silage consistently gave lower ammonia levels, indicating better preservation of the available protein than in the untreated silage (ammonia levels are used as an indicator of protein breakdown as ammonia is released when plant proteins are broken down during ensilage).

Conclusions:

This study showed that:

- The use of a multi-cut system with a four-week cutting window consistently produced a crop which proved very challenging to ensile if left untreated (slow acidification, leading to high levels of enterobacteria and DM losses).
- The use of Ecosyl, containing 1 million cfu/g *Lactobacillus plantarum* MTD/1, significantly improved the fermentation of all four cuts, maximising DM recovery and nutritional value.
- Treating with Ecosyl resulted in more of a higher quality silage to feed, when compared to untreated silage.

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