

Can preserving forage with a silage inoculant give higher milk yields?

The short answer to this question is yes. Here at Volac, we have results of 15 dairy trials showing an average milk yield increase of 1.2kg per cow per day from feeding silages treated with the MTD/1 strain of *Lactobacillus plantarum* – which is the specially-selected bacterial strain in Ecosyl silage inoculants.

by Derek Nelson,
Global Product Manager,
Volac International Ltd, UK.
volac.com

These trials were conducted around the world, including in the UK, Ireland, the USA, Japan, Holland and Germany, and on grass, maize and lucerne.

With a strong business case for maximising the value of home-grown forages on dairy farms, as often the cheapest feed available, this is a highly significant result.

Against that, however, other research that we had conducted among UK farmers suggests that many may be missing out on the potential benefits of using a silage inoculant, simply because they do not fully understand the science.

Although farmers recognise the value of producing higher quality (and quantity) forage for their business, to reduce bought-in feeds, and have a clear understanding of the silage-making process and the need to avoid aerobic spoilage at feedout, there

seemed to be a poorer knowledge about the working of silage additives. Accordingly, we believe there is a need to improve understanding of the gains that adding lactic acid bacteria with a quality silage additive can bring.

This article sets out to unravel some of this 'mystery' by explaining the key steps by which a proven inoculant brings about its beneficial effects.



The science of ensiling

Fundamentally, the fermentation process that takes place during ensiling is a natural one, whereby the crop's own sugars are converted to acid to pickle the forage.

However, making good silage is not all down to the weather. The speed and efficiency of the fermentation, and of the corresponding pH reduction, are of vital importance – both to maximise feed value and to minimise dry matter losses.

Even in a well-managed system, dry matter losses in a clamp can be over 25%. On top of that, the forage's own enzymes will continue to break down protein, eroding feed quality.

The key issue at ensiling, however, is that although there will be naturally-occurring lactic acid bacteria present, they will not necessarily be in sufficient numbers, or indeed the right ones since not all lactic acid bacteria are equal. In addition, there will also be populations of undesirable micro-organisms present – for example

enterobacteria, clostridia, yeasts and moulds – which waste valuable nutrients.

As a result, in an untreated fermentation, sugars may be broken down to lactic acid, but also to other compounds such as acetic acid, ethanol and carbon dioxide. This results in a slower pH fall, while the carbon dioxide produced is effectively lost dry matter. This type of fermentation is called hetero-fermentative.

By comparison, in an efficient *Lactobacillus plantarum* fermentation, sugars are converted solely into lactic acid, producing a rapid pH fall with no dry matter loss. This is termed homo-fermentative.

A particularly poor fermentation is brought about by clostridia bacteria whereby sugars and lactic acid are converted to butyric acid and carbon dioxide, and protein is converted to carboxylic acids, amines, carbon dioxide and ammonia. This results in a high pH, unpalatable silage with a low nutritive value

Continued on page 13

Fig. 1. Ecosyl (*Lactobacillus plantarum* strain MTD/1) brings about a much faster pH fall (Buckle, 1991).

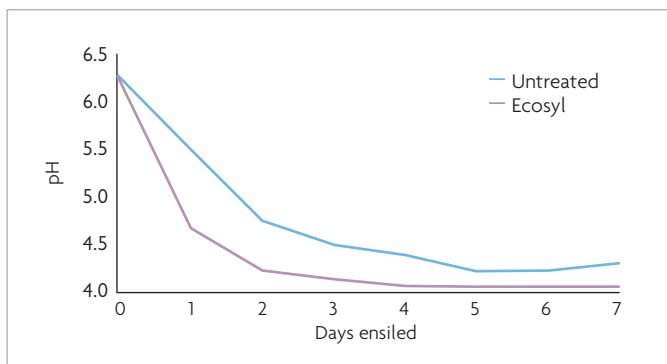
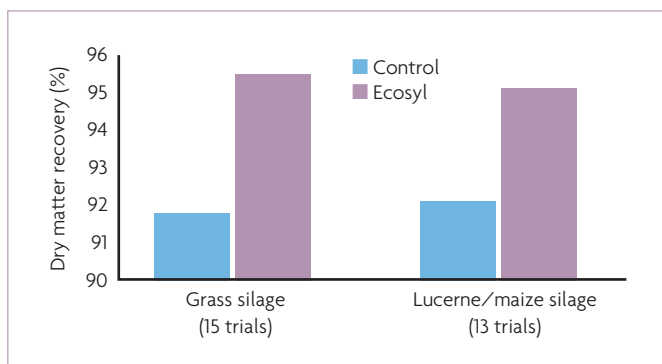


Fig. 2. Improved dry matter recovery for grass and lucerne/maize silage.



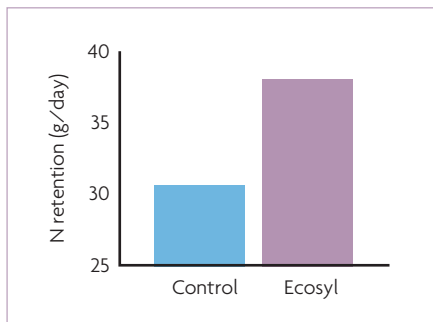


Fig. 3. Increased efficiency of nitrogen utilisation (mean of 19 trials).

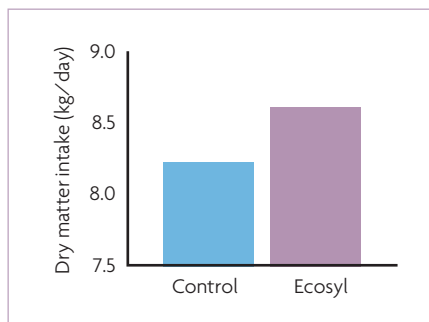


Fig. 4. Increased dry matter intake (mean of 34 trials).

Continued from page 11
and high DM losses. So, a desirable fermentation is one where you want to dominate the natural microbial population with good bacteria to achieve a rapid pH fall, minimise dry matter losses and preserve as many nutrients as possible for the cow.

But how do you do this?

The Ecosyl MTD/1 strain of *Lactobacillus plantarum* has been extensively studied, so the effects that it delivers are extremely well understood and provide an excellent model. As well as the 15 dairy performance trials, it has also been evaluated in over 200 fermentation trials with many crops, for example grass, maize, lucerne, wholecrop cereals and sorghum, and using clamps, bales, bags, upright silos and heap silos. It has also been subjected to 40 intake/digestibility/ME feeding trials.

Faster fermentation

Looking at preservation first, results with Ecosyl have shown clear improvements in fermentation, with a much faster pH drop in the critical first 24 hours after ensiling compared with untreated forage (Fig. 1). Moreover, higher dry matter recovery levels

were achieved – of around 95% in grass, lucerne and maize silages (Fig. 2). This effectively means that more of what was ensiled in the first place was available later to be fed.

Better nitrogen utilisation

The efficiency of rumen microbial N synthesis is greater with intact protein than with partially degraded protein so it is important to minimise the breakdown of true protein that is normally found during ensiling. Ecosyl has been shown to preserve 9% more true protein, leading to a 22% increase in the efficiency of N utilisation (Fig. 3).

Improved dry matter intake

Turning to animal studies, improved dry matter intake has also clearly been shown with Ecosyl-treated silage – with intake increased by an average of 5% across 34 trials (Fig. 4).

Increased digestibility

Digestibility is the single most important factor affecting animal performance as it influences both intake and the potential

nutritional value of the feed. In feeding trials, Ecosyl-treated silage has been clearly shown to have a higher digestibility (Fig. 5) with MTD/1 giving an average of 3 D units more than untreated silage. It also produced its biggest effect at higher silage dry matters – underlining the claim that it is not just for use in poorer weather conditions when grass dry matter is lower.

Furthermore, metabolisable energy (ME) values of silages have also been assessed. Across 11 animal feeding studies, average ME was increased by 0.6 MJ/kgDM with Ecosyl treatment.

Improved milk yield

Overall, the many improvements seen in key areas such as DM intake, digestibility and ME offer a scientific basis for explaining the large improvements in animal production seen with Ecosyl-treated silage – including the average improvement across the 15 international dairy trials of 1.2kg more milk produced per cow per day (Fig. 6).

Conclusions

In conclusion, as part of the drive to improve business efficiency by making the best use of home-grown forage, farmers must concentrate on producing the best quality silage. Good clamp management is the basis for this but the use of a well proven inoculant will help ensure a good fermentation with reduced DM losses and potential animal performance benefits.

Scientific studies have confirmed that treating forage with the specially-selected MTD/1 strain of *Lactobacillus plantarum* in Ecosyl has delivered multiple benefits – including more DM conserved, better preservation of feed quality, and improved animal performance.

We believe that a proven silage inoculant should therefore be considered an integral part of best silage-making practice, particularly if there is a desire to improve milk yield. ■

Fig. 5. Regression analysis of the 26 in vivo grass digestibility trials across a range of dry matter contents shows an average of three 'D' units higher with Ecosyl treatment, the effect being even bigger at higher DM.

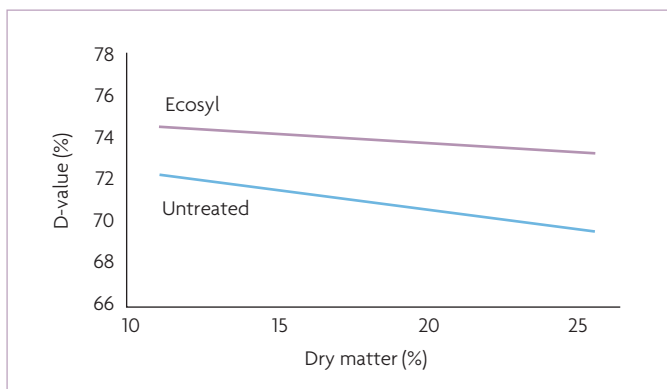


Fig. 6. Regression analysis of 15 independent dairy trials shows MTD/1 consistently produces more milk over a wide range of crop types and DMs.

