

Fibre could boost economic performance in a volatile market

The dairy industry is one of many affected by the Covid-19 pandemic. IDFA estimates supply of milk is exceeding demand in the US by more than 10% and the Royal Association of British Dairy Farmers (RABDF) estimates UK food service sector orders are down approximately 70-80%, resulting in one million litres of milk being wasted every day.

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Dairy producers across the globe are now faced with the challenge of producing a quality end product amidst these drastic fluctuations of prices and demand.

Here, we look at new innovations in fibre management that could help make all the difference. These innovative shifts can allow the previously untapped energy value to be extracted from the fibrous portion of the ration. Extracting as much energy as possible from fibre can lead to a more sustainable nutritional strategy for optimal dairy cow performance, minimising feed costs and maximising margins.

This represents a means of driving greater feed efficiency and animal performance as a result of improved rumen function and supporting better overall body condition.

Greater utilisation of fibre, therefore, presents a more economically viable method of improving management of underlying feed and farm costs, moving away from a reliance on milk price alone as a predictor of economic success.

Top priority for dairy producers

Fibre is an extremely important energy source in ruminant diets. It provides gut fill, causing stimulation of rumination which improves saliva production as well as providing a source of physically effective fibre helping to form an optimal rumen 'mat'. Inclusion of fibre in dairy rations helps maintain healthy rumen function, leading to optimised rumen fermentation.

Feeds high in fibre such as silage and moist feeds are some of the most cost-effective sources of energy available, so it makes sense to utilise them as efficiently as possible.

In dairy cow diets we typically target a NDF content of 28-32% of ration dry matter with ideally 75% of this coming from forage.

If fibre digestibility is not maximised, a good proportion of the best value energy in the diet can easily be lost, with knock-on effects for performance, feed costs and overall profitability.

Improving fibre digestion in the

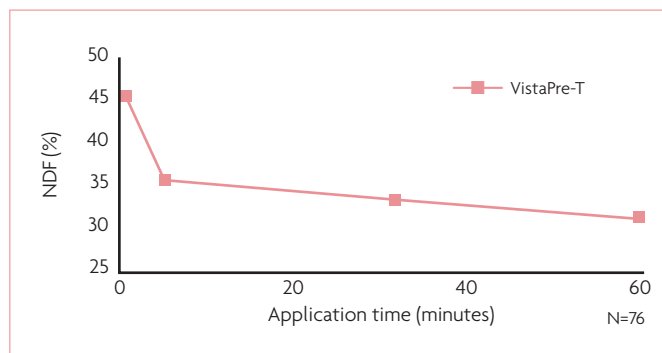


Fig. 2. The level of corn silage NDF versus application time. VistaPre-T begins to work in five minutes.

rumen should, therefore, be a top priority for all dairy farmers and nutritionists.

Rumen fibre digestibility

The rumen digestibility of plant cell walls – the main source of fibre in the diet – can be as high as 65% under optimal rumen conditions, but it can quickly drop to 35% with the addition of cereal grains if the rumen environment is not optimal.

The amount of fibre that is actually broken down and converted into energy by rumen microbes is determined by two key factors: the potential maximum digestibility of the fibre and how well the rumen is functioning.

Low rumen pH (acidosis) caused by

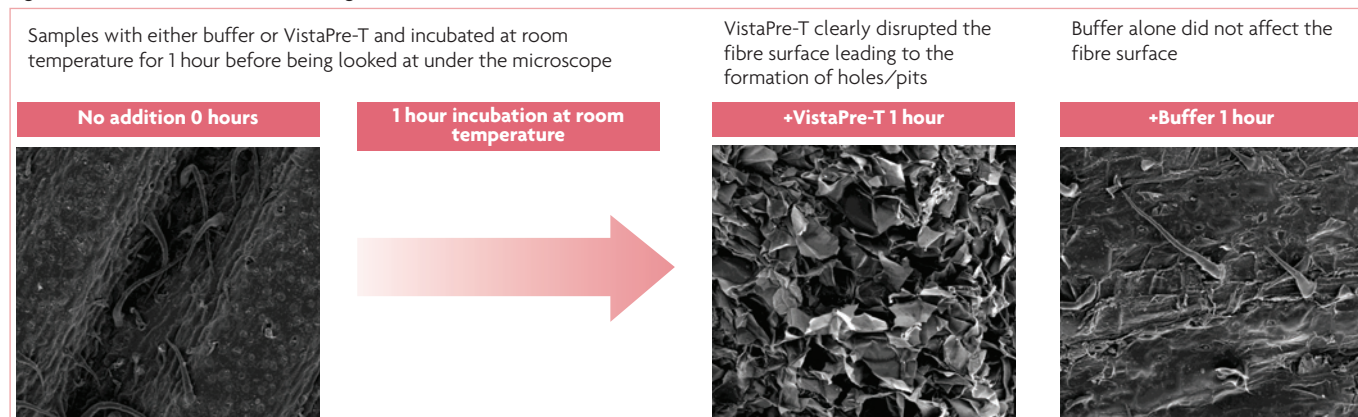
highly acidic silages or too much unbalanced starch in the ration will reduce the populations of fibre digesting microbes and slow the rate of fibre breakdown.

Increasing rumen outflow rates with the addition of sodium bicarbonate increases osmotic pressure in the rumen limiting the time available for digestion, whilst excess oil in the diet will coat the fibre, delaying microbial attachment and colonisation.

All are factors capable of reducing fibre digestibility, undermining overall feed efficiency and reducing profitability. It means that minimising or avoiding these factors needs to be a priority if you want to achieve performance as much as possible from forage and fibre.

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Fig. 1. Effect of VistaPre-T on corn silage.



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Improved fermentation efficiency

Advances in nutrition technology have yielded solutions aimed at pre-treating fibrous ingredients within the TMR prior to feeding. Trials using a *Trichoderma reesei*-derived fermentation extract (VistaPre-T) have demonstrated a roughening and pitting effect on the surface of fibre.

This physical effect works to increase the surface area for microbial attachment, resulting in substantial improvements in fibre digestibility, highlighting just how much additional potential there is to be gained when fibre digestion is optimised. As a result, dairy farmers and nutritionists should evaluate all aspects of the ration as part of an ongoing process, continually fine-tuning nutrient supply and the rumen environment to optimise fibre digestion.

Ensuring a balance between the rapid energy release from sugars and starch and the more slowly fermented digestible energy from fibre, and also considering the use of a slow-release rumen conditioner such as AcidBuf along with an effective live yeast such as Vistacell if silages are very acidic or low in NDF to reduce the acidosis risk. In addition, make sure you include

enough physically effective fibre to stimulate rumination and provide the optimal rumen conditions to help retain feed in the rumen until digested.

More energy from fibre

While feeding adequate fibre is critical to maintaining effective rumen fermentation, increasing energy availability through improved fibre utilisation can affect profitability by positively influencing the yield and quality of milk production (including milk fat yield) as well as wider herd management factors, such as body condition and fertility, all of which influence economic success.

Additionally, with feed typically accounting for more than 50% of the cost of producing milk, enhanced utilisation of fibre represents a means of driving efficiency while also supporting herd health.

Ruminant nutritionists have considered alternative approaches to improve the digestibility of forage fibre – including the addition of additives such as ionophores, probiotic live yeasts (Vistacell), bacterial direct-fed microbials and buffers – with the aim of altering intake and improving rumen fermentation.

Recent innovations include the use of crude fermentation extracts from *Trichoderma reesei* – as a means of pre-treating the fibrous portion of the ration, releasing previously unavailable energy reserves by improving fibre digestibility and leading to a reduction in the lag time to digestion.

Corn silage-based total mixed ration (TMR) samples treated with such products have shown a significant ($P<0.001$) increase in neutral detergent fibre digestibility at 240 hours (NDFD240) and a significant ($P<0.001$) decrease in undigestible neutral detergent fibre at 240 hours (uNDF240), reflecting improved digestibility. Innovations such as these also offer the opportunity to utilise alternative feeds – such as fibrous co-products – instead of cereal grains, as well as the ability to maximise the use of home-grown forage.

Responses in dairy cows

Responses to increased dietary energy will depend on a host of factors, including where the cow is in her lactation cycle and how she is coping with metabolic and other challenges. In a US study of 92 lactating cows fed a TMR pre-treated with a *Trichoderma reesei*-derived

fermentation extract (VistaPre-T) feed efficiency was significantly improved: 2.96 for the control and 3.39 for the pre-treatment group ($P<0.01$). In addition to improved feed efficiency, milk fat, protein and lactose percentages were also significantly improved in cows fed the pre-treated TMR.

Mid-lactation cows are able to partition nutrients towards body tissue replenishment rather than to milk production, which allows for compensation following the high metabolic stress of early lactation. In a US study, mid-lactation cows had greater weight gain when fed a pre-treated TMR with a *Trichoderma reesei*-derived fermentation extract (VistaPre-T).

An improvement in body condition score management throughout the lactation cycle mitigates the risk of metabolic disorders caused by a negative energy balance and can improve conception rates and management going into the dry period. For dairy cows fed silage or moist feed-based rations, extracting as much energy as possible from the fibre portion is the key to both minimising feed costs, improving quality and maximising margins. ■

References are available from the author on request