

Optimising cow longevity, reproductive performance and milk yield

There is no magic bullet that will keep cows healthy and optimise cow longevity, reproductive performance and milk yield. It comes down to the basics, starting with cow comfort and encompassing the quality of forages used, milking procedures, nutrition and more. These components are all important to keeping cows healthy, which is a key factor in dairy herd profitability.

by **Maria Agovino,**
Ruminant Manager, Europe, Alltech.
www.alltech.com

Healthy cows provide high-quality milk and have superior reproductive performance, but high-production cows are particularly susceptible to disease. Mastitis, lameness, ketosis, calving problems and other disorders can reduce production and increase the need for costly veterinary treatment. Improvements in overall health and feed efficiency can result in cost savings in production, veterinary fees, medical treatment and breeding. High pressure for increased milk production per lactation has led to increased health problems and decreased fertility, both of which compromise a cow's longevity.

Focus on peripartum

Health problems can appear at any time during lactation; however, pre and postpartum (the transition period) is the most important period affecting cows' longevity and herd profitability. In the last decade, the topic of dairy cows' transition period has been extensively reviewed and knowledge has improved significantly, but culling incidence due to transition period-related health problems still remains high.

During this phase, the complex interaction between the postpartum dry matter intake (DMI) depression, negative energy balance (NEB) and loss of body condition is associated with metabolic disorders and poor reproductive performance. To avoid NEB and loss of body condition, and to achieve dairy cows' milk yield potential, dairymen provide diets that are high in



concentrates and low in roughage. Feeding such diets, however, can lead to impaired rumen fermentation and rumen acidosis, whereas low ruminal pH (less than 5.6) can further depress DMI and decrease milk yield. Feeding strategies that stimulate dry matter and energy intake, while stabilising rumen fermentation, are therefore vital for transition cows.

Numerous feed additives have been tested to improve postpartum DMI, stabilise rumen fermentation and decrease the incidence of postpartum metabolic problems. Dietary buffer supplementation (for example bicarbonate) could attenuate the decline in ruminal pH; however, results have not been consistent.

Several trials have been carried out to evaluate the effect of feeding live yeast cultures. Yeast is purported to stabilise the rumen environment, with effects including higher rumen pH, increased numbers of cellulolytic bacteria and reduced lactate concentration.

A study in dairy heifers by Lascano and Heinrichs (2009) also showed reductions in rumen ammonia concentration. In this experiment, dairy heifers supplemented with a live yeast culture exhibited increased volatile fatty acids production and a

possible stimulation of N uptake by rumen bacteria.

Similarly, Al Ibrahim et al. (2010a) also noted a reduction in ammonia N concentration but with little effect on other rumen parameters. The lack of effect in the Al Ibrahim et al. (2010) study is likely to be related to the performance of the control group, making it more difficult to find a difference between supplemented and unsupplemented animals.

Increase in rumen pH

In contrast, Bach et al. (2007) noted an increase in average rumen pH over time in dairy cows when yeast was added to the diet. In a recent meta-analysis of the effects of live yeasts in ruminants, Desnoyers et al. (2009) noted that across 157 experiments, yeast inclusion increased ruminal pH, VFA production and organic matter digestibility (OMD), while reducing lactate concentration.

It was highlighted that dietary composition played an important role in the magnitude of the effects. This is in agreement with Robinson and Erasmus

Continued on page 8

Continued from page 7

(2009), who noted that higher dietary neutral detergent fibre (NDF) and acid detergent fibre (ADF) resulted in a lesser response to yeast supplementation.

Commercially, there are numerous yeast products, such as Yea-Sacc (Alltech), available for use in ruminant livestock and other species. All are based on different strains.

Research has consistently shown that live yeast culture supplementation resulted in more stable rumen pH, increased DMI and milk production, and better feed efficiency, and more recent trial results have also shown decreased blood non-esterified fatty acids (NEFA) and better reproductive performance (Kaske, 2007).

Feeding the rumen

A basic understanding of animal nutrition as it applies to dairy cattle is essential to good herd management. The quality of the feed (levels of nutrients, palatability and digestibility) affects the rate of digestion in the rumen, uptake of nutrients and their utilisation by the animal.

Correct rumen development and maintenance is the key to promoting digestion. A suitable microbial flora must be established to ensure that forage is degraded at an optimum rate, releasing nutrients for the promotion of beneficial micro-organisms as well as supplying nutrients to the host cow.

Proper feeding of the dairy cow is complicated and requires a combination of scientific knowledge, creativity and good management skills to balance the needs of the rumen micro-organisms and the needs of the animal.

There are several elements that contribute to increased feed efficiency, but one of the most important is enabling the rumen of the dairy cow to reach its full potential, supporting the activity and growth of the rumen microflora and enabling dietary nutrients to be extracted from the diet as efficiently as possible.

Nutrients need to be provided to the

rumen microflora that are well-balanced in terms of fermentable energy and protein supply. Fermentable protein nutrition has to be specifically adapted to maximise rumen microbial population activity and growth, as the different populations have different requirements in terms of how nitrogen is supplied.

For instance, cellulolytic bacteria achieve optimal activity and growth when nitrogen is supplied as non-protein nitrogen or ammonia, while amylolytic bacteria require short peptides and amino acids to reach maximal growth and activity.

However, milk production is not simply connected to rumen degradable protein supply, as it is primarily a function of digestible protein supply in the intestine. Not only the quantity, but also the quality, of these digestible proteins is of tremendous importance.

In particular, amino acid profile and quantity have a direct impact on how efficiently they are used for milk production.

Poor efficiency

For years, dairy nutritionists have overfed crude protein in an attempt to meet the amino acid requirements for the desired milk yield. Beside the significant increase in input costs, this also results in poor nitrogen efficiency and, subsequently, higher nitrogen excretion, which is obviously detrimental to the environment.

The dairy cow inherently suffers from this poor nitrogen efficiency. Excessive nitrogen is converted first into ammonia and then into urea, which is partially recycled, but the vast majority is excreted. There is ultimately an energy loss associated with this process due to the detoxification of ammonia into urea.

This energy cost comes at the expense of milk production and other biological functions, such as reproductive performance. The energy required to excrete excess nitrogen is equivalent to up to 2kg of milk and can lead to body condition loss, increased blood and milk

urea levels, and, subsequently, issues with reproductive performance.

The solution

The Alltech Protein Management programme provides a high-quality source of protein for your animals, giving them the nutrients they need to produce at their peak. This programme makes your feed work harder, so your animals do not have to. The Alltech Protein Management programme provides a source of consistent, high-quality protein for your animals, getting them off to the right start and keeping production on track to optimise performance.

It helps to meet the requirement of the rumen microbes for optimal growth and activity, while increasing the production of microbial proteins in the rumen and allowing maximal diet digestibility. Based on Alltech solutions that are included in the diet (Optigen, Optisync, Rumagen or DEMP), we can increase the fermentation rate in the rumen liquid phase.

Its bypass fraction contains a unique mix of essential amino acids that have a very similar profile to microbial protein, which is beneficial for efficient milk synthesis.

With the Alltech Protein Management programme, we are able to combine a slow-release nitrogen source with a high-nutritional-value protein source. The slow-release source ensures a steady supply to the rumen cellulolytic microflora, while the high-nutritional-value source is designed to provide protein for amylolytic bacteria. It also supplies the ideal protein to the liquid phase of the rumen.

There are clear opportunities to improve diet performance by adopting innovative programmes. The uniqueness of this programme has provided nutritionists and dairy producers with a new arsenal when formulating dairy diets.

“We feed the bugs before we feed the cow” has always been a rule of thumb when feeding dairy cows. By using innovative technologies, the dairy industry can maximise profitability and maintain production costs. ■