PERFORMANCE PRO-BIOTICS
DIRECT-FED MICROBIALS

# DFM REPLACES OTHER ADDITIVES (SUMMARY)

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**The addition of Direct Fed Microbials to dairy cow rations necessitates the removal of some additives, and allows for the exclusion of others. The two groups of additives of most interest are ionophores, such as monensin, and buffers. Both of these groups of additives have become standard additions to dairy cow diets, therefore the suggestion to exclude both ionophores and buffers can be quite confronting for farmers. Some of the microbes within Performance DFM, however, act specifically against bloat and ruminal acidosis.**

Performance DFM is made up of 5 bacteria (Lactobacillus acidophilus, Bifidobacterium thermophilum, Bifidobacterium longum, Streptococcus faecium, Bacillus subtilis), 3 enzymes (alpha-Amylase, Hemicellulase, beta-Glucanase) and yeast (Saccharomyces cerevisiae).

## BLOAT

The primary cause of bloat is now commonly accepted as being due to high levels of soluble proteins, particularly seen in legumes, but also occurring in grasses. Another contributing factor are slimes produced (mucopolysaccharides) during microbial fermentation of plant cell walls, which further increase the viscosity of the rumen contents and increase the stability of the foam bubbles characteristic of bloat. Salivary proteins, saponins and protozoal cellular proteins, and certain plant lipids may also play a role in the persistence of the protein based foams.

High levels of soluble proteins result in plants when nitrate and nitrite are not converted to true plant proteins. The process of converting nitrates to true proteins is called 'nitrate reduction'. One of the bacteria included in Performance DFM, Bacillus subtilis, is proven to be effective in facilitating the reduction of nitrate, thus reducing the risk of bloat.

Performance DFM also contains the enzyme beta-Glucanase. This enzyme is involved in the breakdown of glucans, which are carbohydrates within the plant cell walls. The inclusion of beta-Glucanase decreases the viscosity of the feed within the rumen, and decreases the levels of non-starch polysaccharides, including mucopolysaccharides responsible for slime and foam bubble stability associated with Bloat.

### In addition to the inclusion of DFM, there are a number of other management practices which can be effectively employed to reduce the incidence of Bloat at high risk times:

> Graze higher risk pastures and legumes later in the day, when sugars are higher and soluble proteins lower. (Sugars are required for nitrate reduction.)
> Add sugar to the diet. Molasses can also be used, but is less effective.
> Increase starch levels through more grain or higher starch pellets.
> Add salt to the diet and offer ad lib. Salt helps burst foam bubbles, as well as transports potassium out of the cows system (which can be responsible for metabolic issues other than bloat).
> Bloat Oil, terric and surfactants can be employed, at a cost.
> Bloat Guard and Bloat Shield also provide effective but more expensive protection.

Ionophores, such as monensin, work by inhibiting the growth and reproduction of all gram positive bacteria, some of which are responsible for the production of the gas involved in bloat. Unfortunately the actions of monensin are non-specific, and populations

of useful gram positive bacteria are also wiped out. This may include all of the bacteria in Performance DFM, hence the reason that monensin must be excluded from the diet when DFM is introduced. While farmers perceive an increased risk of bloat with such actions, it needs to be noted that the level at which monensin is included in feed additives, is insufficient for registration for bloat control. Monensin in feed additives is registered as improving feed efficiency, and other monensin products are used to control bloat. Additionally, the actions of DFM, in its own right, in preventing bloat should now be better understood.

### RUMINAL ACIDOSIS

Ruminal acidosis occurs when the pH of the rumen drops to levels at which bacterial populations and the ratio of volatile fatty acids (VFAs, or products of fermentation) change significantly. Most often this is associated with slug feeding, higher levels of concentrates and lower levels of forages. The result is a build up of lactic acid within the rumen, which further drops rumen pH, further effecting microbial populations and further effecting fermentation patterns. A cascade of issues then follows, ultimately resulting in damage to the rumen wall, compromised rumen function and very sick cows.

The drop in rumen pH has the greatest impact on the fibre fermenters, also called cellulolytic bacteria. Interestingly, the most recognised action of Performance DFM in general is the increase in populations of cellulolytic bacteria. More specifically, DFM includes the bacteria Lactobacillus acidophilus. The introduction of Lactobacillus to the rumen directly reduces the activity of Streptococcus bovis, the bacteria most responsible for lactic acid production. Additionally, Saccharomyces cerevisiae (the yeast included in DFM) will compete with Streptococcus bovis for nutrients and stimulate the Lactobacillus bacteria. The result is lower lactic acid levels and higher total Volatile Fatty Acid concentrations, therefore a much better balanced rumen.

### As with bloat, there are many sound management practices that can easily be employed by farmers to further reduce the risk of ruminal acidosis:

> Make any dietary changes a gradual process to ensure that microbial populations are able to adjust gradually.
> Allow cows to make their way to the paddock immediately as they exit the dairy, as pasture will balance grain from the dairy extremely well.
> When it is not practical to have cows walking straight to the paddock ensure that there is other feed on offer while the herd is waiting.
> Simple buffers such as sodium bicarbonate and Acidbuff can be included in diets as an added precaution.

Both bloat and ruminal acidosis are real risks when feeding cows, particularly when we are targeting increased productivity. While there are a number of options and additives available for reducing these metabolic issues, Performance DFM provides a single solution. The microbes in DFM make the exclusion of monensin necessary, while still reducing the risk of bloat through the specific actions of one of the bacteria and one of the enzymes included. Similarly, another bacteria species and the yeast included in DFM significantly reduce the risk of ruminal acidosis and therefore reduce the need for additional buffers. When accompanied by sound management practices, we can virtually eliminate such problems, thus resulting in more productive and profitable dairy businesses.