How a stable rumen environment improves feed conversion efficiency

Feed efficiency can be defined as the fraction of feed energy captured in saleable products and allows producers to utilise their resources more effectively, subsequently increasing the economic profitability of their business in a more sustainable and environmentally friendly manner.

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For many years, the Feed Conversion Ratio (FCR) has been used in the pig, poultry and beef industries as a measure of efficiency.

Within these sectors, the FCR of an animal was used as a key performance indicator (KPI) of their business and was closely associated to the profitability of that production system. However, the dairy industry has been slow to incorporate feed efficiency measurements when analysing the success of their production systems.

The interest in feed efficiency amongst dairy producers will no doubt increase in the future, as a growing human population increasingly competes with the dairy industry for grain and feed input supplies to feed dairy cows. Also the manure excreted by cows has become a growing concern for environmentalists.

Milk production efficiency or dairy efficiency is the kgs of energy or fat corrected milk produced per kg of dry matter intake (DMI) consumed by the animal.

Influencing factors

There are many factors that influence feed conversion efficiency in dairy cows, for example, genetics, stage of lactation and health status of the animal.

Another area of huge relevance to feed conversion efficiency in dairy cows is rumen digestion of feedstuffs. The rumen and its inhabitants (microbial population) have a large influence on how nutrients are extracted from a particular feedstuff and converted into metabolic fuels for the dairy cow.

Traditionally, dairy nutritionists have emphasised maximising DMI in dairy cows as a way of increasing milk production. However, increasing DMI may not always result in favourable productive outcomes as the law of diminishing returns kicks in and digestibility decreases as DMI increases.

As DMI increases, the feedstuffs spend less time in the rumen being digested by the rumen microbial population and harvest less nutrients from the feed so more nutrients pass through to the lower digestive tract and out of the animal's body.

Changes in the rumen microbial population also have a big impact on the efficiency of rumen digestion.

A stable environment

Maintaining a stable environment for the rumen microbial populations by minimising changes in rumen pH allows starch, sugar and fibre digesting bacteria to live in harmony, digesting the range of carbohydrates consumed by the dairy cow.

Most rumen microbes are pH dependent so a fluctuating daily rumen pH will lead to the death of certain bacteria and the rumen will be unable to cater for the range of carbohydrates ingested by the cow.

High rumen pH levels can also induce methane producing bacteria, which can have a high energy cost to the cow and can also have a negative effect on the environment.

To combat these changes in rumen pH and fluctuating rumen microbial profiles, dairy cow nutritionists should ensure diets contain sufficient effective fibre and limit the amount of starch and sugars that are included in the dairy cow diet.

One product that can help to maintain this stable rumen environment and prevent negative changes in rumen microbial profiles is Acid Buf produced by Celtic Sea Minerals.

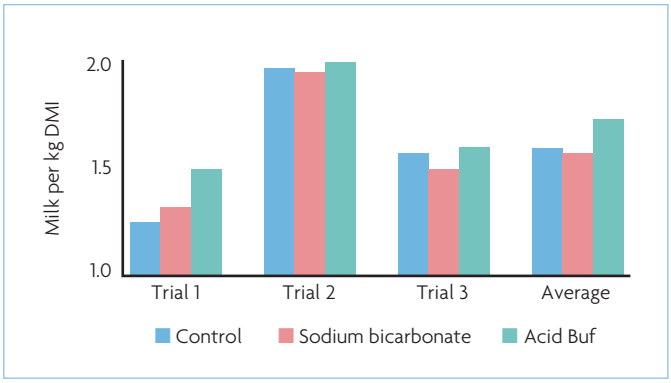

Fig. 1. Trial results showing more energy corrected milk per kg DMI is achieved when dairy cows are supplemented with Acid Buf.

In a recently published paper in the Journal of Dairy Science, researchers at Stellenbosch University discovered that including 90g/cow per day of Acid Buf in the dairy cow diet resulted in 0.24kg of 4% fat-corrected milk (FCM) more per kg of DMI compared to cows that were not supplemented with any feed additive and 0.17kg of 4% FCM per kg DMI more compared to cows receiving 180g/cow per day of sodium bicarbonate (Cruywagen et al., 2015).

Similar research at the University of Georgia, US reported similar trends when Acid Buf was supplemented to dairy cows in a trial carried out on lactating dairy cows consuming a high NDF diet.

According to the authors, supplementing 90g/cow per day of Acid Buf increased the production of energy-corrected milk (ECM) per kg of DMI by 0.1kg/cow per day compared to cows not supplemented with Acid Buf (Bernard et al., 2014).

Acid Buf has consistently shown its beneficial effect on improving the efficiency of dairy production in a number of trials. Despite being evaluated in Europe, the USA, and Africa on different diets and in different production systems, Acid Buf produced consistent results in terms of metabolic factors and dairy performance.

Increasing milk production efficiency can lead to increased margin over feed costs and subsequently more money made from milk production. For example, a difference of 0.1kg ECM/kg DMI per day in a dairy cow yielding 35kg/day can lead to an increase of $0.50/cow per day in margin over feed costs.

Conclusion

To conclude, feed efficiency measurements will need to be embraced by dairy producers in the future and success can be achieved with the right approach.

When balancing diets for dairy cows, it will be important to understand the conflicting nature of DMI and rumen digestion so we can promote optimum DMI as opposed to maximum DMI for high producing dairy cows.

The focus on the rumen microbiome will need to be centred on creating an optimum environment for different species of microbes to leave the rumen in a position to extract nutrients from all types of carbohydrates.

Maintaining an optimum environment for these microbes can start with the reduction of rumen pH changes.

Acid Buf is a tool that can be used to increase feed efficiency on dairy farms through promoting an optimum rumen environment for the digestion of feedstuffs. ■

References are available from the author on request