

The hidden threat of sub-acute rumen acidosis

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A healthy rumen is one of the most important factors for maximising animal performance as this is where the true value of any feed is determined.

Around 70-80% of a cow's energy is supplied from absorption of volatile fatty acids produced by rumen fermentation and microbial protein is her main nitrogen source.

Ideally, a rumen pH of 6.0-6.5 is most favourable for the mixed population of rumen micro-organisms. If it falls much below this acidosis results (Table 1).

To get the most out of a ruminant diet the

fibrous fraction needs to be broken down as fully as possible, a job carried out by the rumen micro-organisms, a mixture of bacteria, fungi and protozoa, with bacteria dominating (up to 10^{11} cfu/ml).

This microbial population is finely balanced and very sensitive to changes in its environment and although it can adapt to new conditions it needs time to do so. If the change is too fast or extreme, the balance will be altered so much that fibre digestion will decrease significantly.

The fibre digesting micro-organisms are particularly sensitive to pH, their numbers starting to decrease below pH 6.0. Feed digestion results in the formation of volatile fatty acids which would cause the pH to fall

Rumen pH	Effect
>7	Alkalosis
6-7	Normal
<5.7	Sub-acute or chronic acidosis
<5.2	Acute acidosis
<4	Usually fatal

Table 1. The effect of pH on the rumen.

significantly if they were not being absorbed from the rumen and buffered by saliva produced during rumination. Even so the pH will always fall immediately after feeding – the aim is to minimise the size and duration of this as fibre digestion will be impaired.

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Acute acidosis occurs when there is a rapid fall in rumen pH to below 5.2 and results in easily recognisable symptoms such as a severe reduction in intake initially followed by a lack of coordination and a reluctance to move around due to abdominal discomfort.

Sub-acute rumen acidosis (SARA) occurs when the pH falls below pH 5.7 and leads to low or variable intake and reduced performance as well as a number of other symptoms (Table 2). Because of this it is highly likely that SARA is much more prevalent than is realised – it is thought to affect more than 50% of all UK dairy cows (DairyCo).

The type of feed and way it is fed both have a big impact on the rate it is broken

down in the rumen and the ability of the rumen to maintain a normal pH (Table 3).

Diets containing high levels of highly fermentable carbohydrates (sugars and starch), especially if the particle size is small too, result in large amounts of acid being formed very fast. This accumulates faster than it can be absorbed or buffered and the pH falls rapidly to a low level. Below pH 5.2 acute acidosis will occur.

If the rumen pH continues to fall excess acids absorbed into the blood lower the blood pH, leading to metabolic acidosis. This can lead to other issues such as laminitis or even death.

High lactic acid silages are often blamed for acidosis but it is not the silage per se that is

- Low or variable intake
- Low milk fat
- Reduced cudging
- Spitting out cud balls
- Increased water intake
- Diarrhoea
- Foamy faeces with casts
- More undigested fibre particles in dung
- Lameness, especially front legs
- Liver ulcers
- Panting
- Displaced abomasum

Table 2. Sub-acute rumen acidosis signs.

the problem, rather the overall ration not being balanced properly. The potential acid loading of any feed on the rumen is a combination of the total acid content and buffering capacity of the feed, the acids produced in the rumen during its digestion and the effective fibre content of the feed as this affects how much buffering saliva will be produced.

Low pH, high lactic silages often result from extended fermentations caused by ensiling low dry matter crops with high sugar levels, less of an issue these days with the improvements in harvesting machinery and technique. High residual fertiliser nitrogen is another cause. It is better that lactic acid is produced rather than volatile fatty acids as the latter result in higher fermentation losses and have no energy value in the rumen.

Reduced fibre digestion means less acetate is produced. This is the precursor for milk fat so a reduced milk fat is a good indicator of acidosis, especially if you also see diarrhoea as acid accumulation causes an influx of water from the tissues into the gut.

Prevention

It is far better to prevent acidosis occurring than to have to deal with the consequences so ensure the ration being fed is properly balanced to maintain a normal pH with minimum fluctuation and that there is enough effective fibre to stimulate saliva production.

Feed high quality forage so there are no palatability issues that might reduce intake. Feeding little and often, as with a TMR (don't over process), will help avoid excess fluctuations. A buffer or yeast product can be included to help maintain the rumen pH. ■

Table 3. Factors leading to acidosis.

- Diets with high levels of rapidly fermentable carbohydrates
- Low fibre diets
- A high concentrate:forage ratio
- Switching from high forage to high concentrate diets to quickly
- Poor quality silage with low intake
- Very low DM diets
- Very fine chopped forages
- Over-mixed TMRs (fine particle sizes)
- Mycotoxins