# Rumen fluid sampling: a useful aid in the diagnosis of nutritional problems

Rumen fluid sampling can be a useful aid in the diagnosis of nutritional problems in dairy cows, most notably sub-acute rumen acidosis (SARA) at herd level. The correct selection of animals, and timing of sampling is critical in achieving an accurate diagnosis. It may also be of use in the individual animal suspected of having acute rumen acidosis, for example, secondary to cereal overeating.

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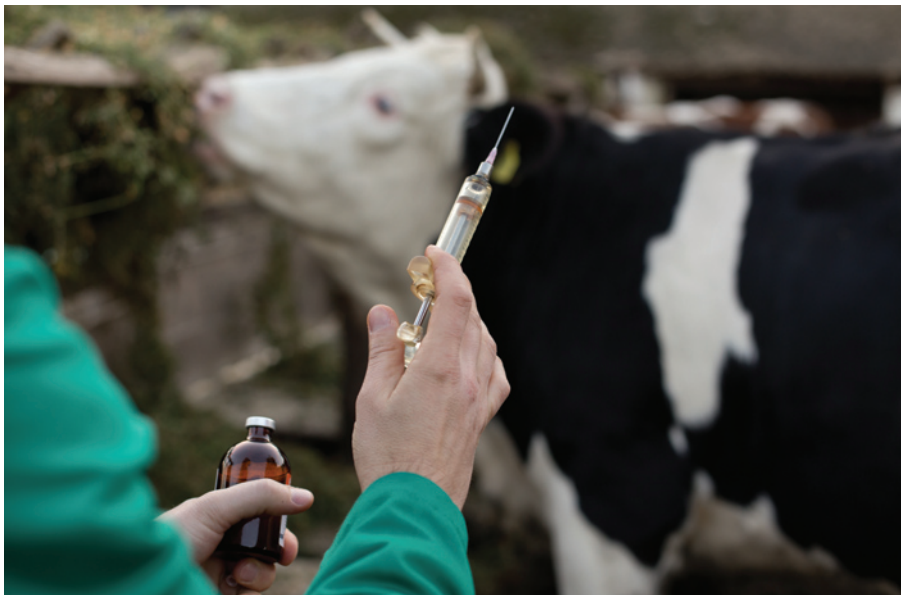

**Rumen fluid sampling can be a useful aid in the diagnosis of nutritional problems in dairy cows.**

Samples can be obtained by stomach tube but are most frequently collected by rumenocentesis. This procedure is a quick and straightforward means of assessing rumen fluid and measuring pH.

However, both orogastric sampling and rumenocentesis are invasive and cause a degree of pain for the animal, although a small study by Mialon et al (2012) concluded rumenocentesis was no more stressful for the animal than handling and restraint.

These authors also considered the technique to be ethically justified as a diagnostic procedure, but consideration would need to be given as to the ethics of the procedure when used as a routine monitoring tool.

Results should be evaluated in conjunction with other clinical signs and it should be noted that results can be difficult to interpret.

## Technical problems with rumen fluid sampling

Firstly, the correct animal selection is critical. Atkinson (2017) suggests sampling six animals more than three weeks calved, who should be adapted to the ration, and six cows 1-3 weeks calved who are still adapting to the milking cow diet.

The timing of the sample also needs to be planned carefully in relation to concentrate feeding in order to obtain the pH readings at their lowest.

Two hours post concentrate feed is suggested for non-Total Mixed Ration (TMR) herds, and four hours post fresh feed is offered in fully TMR herds. Herds utilising out of parlour feeders, etc, can pose further problems and should be assessed on an individual basis.

Another problem is that it only provides a 'snapshot' of information and hence must be interpreted with caution. There is also potential for haemorrhage and/or peritonitis at site of rumenocentesis.

Some alternative techniques may be considered but they will also have their limitations. For example, samples can be taken via orogastric tubing, with the use of a weighted rumen fluid collection kit.

This method is quicker and less invasive, however Shen et al (2012), showed statistically significant differences in fermentation parameters of collected rumen fluid, related to depth of insertion of tube.

Numerous authors have shown a higher pH in the craniodorsal rumen, which they attributed to saliva flow.

Saliva contamination of the sample will act as a buffer and may invalidate pH readings. There is also a potential for causing oesophageal trauma/rupture when passing through the stomach tube.

## What preparation is required?

In terms of time needed to prepare, 15-20 minutes will be needed to restrain the animal and aseptically prepare the site.

It is advised to insert local anaesthesia a minimum of five minutes before needle insertion, however Mialon et al (2012) concluded that local anaesthesia does not reduce the stress levels of animals subject to the procedure.

Allow five minutes to insert the needle and withdraw the sample. The air/collected sample may need to be used to flush the needle if it clogs with fibrous material during sampling.

In the decision-making process, the criteria for choosing this procedure will be for a herd suspected of suffering SARA, or for routine nutritional monitoring.

A risk assessment should be carried out and will likely present a couple of challenges. Firstly, there is the potential of injury to the operator by kicking, crushing against handling system or needlestick injuries. There is also the potential of rumen wall laceration by sampling needle, due to rumen movements or inadequate restraint;

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this can be mitigated by the use of a long needle.

Materials required will include:

- An adequate and well-maintained handling system, (for example crush with access to left flank), or head yoke and assistant to elevate tail.
- An 18g needle or similar and syringe for local anaesthetic. A 16g, four inch needle and 20ml syringe for collection, plus a 20ml container for storage of sample.
- 5ml of local anaesthetic solution, for example procaine.
- pH meter (electronic preferred, well calibrated), microscope, methylene blue.

Pre-medication should not be required. If the animal resists sampling, just select another animal.

To prepare the site, an area sufficient for needle insertion should be clipped and surgically prepared, noting the contact time for the preparation agent, for example, five minutes for hibiscrub.

Opinions in literature vary regarding the necessity to surgically prepare the area, but it is generally considered to be best practice.

## The procedure

To begin, a small area of skin, level with the stifle and 2cm behind the last rib should be clipped and scrubbed, before approximately 5ml of local anaesthetic is infused into the skin and deeper muscle layers. The site should then be surgically prepared.

To carry out the sample, the sampling needle should be inserted up to the hub through the bleb of local anaesthetic, and the sample withdrawn.

Any air and/or aspirate can be gently reinjected if the needle becomes blocked with fibrous material.

The sample can be stored for up to three

hours and exposure to air should be minimised as theoretically this can alter the carbon dioxide tension and hence raise the pH of the sample; however, Atkinson (2017) states this is unlikely to be significant in practice. To minimise the effects of exposure to air, containers should be filled to the brim or the rumen content obtained aspirated into a vacutainer.

The sample should ideally be examined as soon as possible.

## Sample analysis

Normal rumen fluid ranges in colour from green to brown, depending on the diet, but can appear milky or grey in cases of acidosis.

The normal pH is 6-7 and a pH of <5.5 is generally indicative of SARA, however, results should be interpreted with caution and in conjunction with other herd parameters. Atkinson (2017) suggests that SARA is better described as being when the pH is below 5.5 for three or more consecutive hours. Some 125ml of rumen fluid should decolourise 0.5ml of 0.03% methylene blue in under five minutes. This gives a broad assessment of the viability of the rumen bacteria. Protozoal activity can be subjectively assessed using low power microscopy at 37 degrees. Protozoa should be motile and plentiful, with a large:medium:small ratio of 1:1:1.

## Aftercare of the animal

The animal should be routinely monitored for inappetence, reduced yield or other signs of illness, but otherwise managed as normal.

There are potential complications to be aware of post-procedure. Haematomas, localised infection and generalised peritonitis have all been reported as potential complications although these are uncommon.

Tajik et al (2011) reported a 6% rate of inflammation at the puncture site with no further complications however, Strabel et al recorded 100% of 11 animals studied to be suffering haematomas at 10 days post procedure.

Tajik et al (2011) reported that small needle size, deep local anaesthesia, local disinfection and low sample volume removed, all had a positive effect on the post puncture complication rate. Aceto et al (2000) demonstrated a 16% reduction in milk yield in sampled cows.

In the long-term, medication is not required routinely unless unlikely complications arise. Generally, prognosis is excellent for the procedure itself, but long-term prognosis is dependent on results of sample analysis. ■

**References are available from www.vetstream.com/dairytopics**