

Comparison of Oro-ruminal Probe and Rumenocentesis for Prediction of Rumen pH in Dairy Cattle

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Chronic subacute rumen acidosis is a significant concern in the dairy industry. The syndrome results from a variety of causes including insufficient transition time from dry cow to high production diets, too high a level of fermentable feedstuff in the diet (or conversely too low a level of effective fibre) or inadequate feedbunk management which allows boluses of highly fermentable feed to reach the rumen. Nordlund *et al* have published a detailed review of the etiology and clinical signs.¹ Although the disease generally does not cause overt clinical signs, it can have serious implications on herd health and production. Herd level problems attributed to the syndrome include chronic laminitis, poor appetite or cyclical feed intake, poor body condition in spite of adequate energy intake, hemoptysis, unexplained abscesses, intermittent diarrhea, and high herd cull rates for poorly defined health problems.² The absence of obvious clinical signs makes diagnosis of subacute rumen acidosis difficult. By the time the animal shows symptoms of the syndrome, several weeks may have passed, making diagnostic tests inconclusive or misleading. As a result, in dairy herds at high risk, because of feeding management practices, a subsample of the herd, consisting of cows in transition and cows at peak production should have their rumen pH monitored.

Testing rumen fluid pH requires acquisition of uncontaminated rumen fluid samples. Several techniques have been described for obtaining rumen fluid samples from non-fistulated cows. In North America, the current method of choice is rumenocentesis. Nordlund first described its use as a herd nutrition monitoring tool.³ This technique involves aspiration of a sample of rumen fluid from the ventral rumen sac via a 16 g, 5 inch stainless steel needle. The technique requires surgical preparation of the centesis site and because of its invasive nature there is a risk of peritonitis. A second technique of rumen sampling has been described by Geishauser from Germany.⁴ The Geishauser technique employs an oro-ruminal probe and suction pump for extraction of rumen fluid. The

device contains a fenestrated brass probe at the end of a flexible metal stomach tube. When it is introduced orally it falls into the ventral sac of the rumen and rumen fluid is siphoned off using the suction pump. The technique requires less preparation time and is less invasive, however, there is a risk that the sample may become contaminated with saliva, thus raising the pH and giving invalid results.

The current study compared pH readings from the techniques of Geishauser and Nordlund. Five cows were tested with each method 4 times at 5 d intervals to assess the ability of the oro-ruminal probe to predict pH as obtained by the rumenocentesis technique. Cows began the study on a diet of mixed hay *ad libitum*. In an attempt to get a range of rumen pH levels, every 5 d approximately 15% of dry matter intake was replaced with crushed barley until the cows were consuming 45% of their diet as concentrate. Samples were collected 2-3 hours after the morning feeding at which $\frac{2}{3}$ of the concentrate was fed. Sampling procedures were rotated (centesis first or probe first) so that an equal distribution was attained for each animal and concentrate level.

For samples collected with the Geishauser probe, the collection apparatus was passed orally to a length of approximately 2 m or until resistance was encountered. The device was connected to the suction pump and rumen fluid was aspirated. The first 200 ml of fluid obtained was discarded and the next 100 ml was used for pH determination. No difficulties in obtaining this volume of rumen fluid were noted. For samples collected with the Nordlund technique, a sedative of 0.04 mg/kg Xylazine was administered intravenously and the site of needle insertion was clipped and prepared using the standard three scrub surgical preparation. A 16 g 5 inch stainless steel needle was inserted approximately 15 to 20 cm caudoventral to the costochondral junction of the last rib while an assistant tailjacked the cow.³ A 20 ml eccentric tip syringe was attached and 10 ml of rumen fluid was aspirated. No complications were noted and samples were obtained from all study animals. Samples

collected with each technique were analysed immediately using a Cardy Twin pH meter.³

Results ranged from pH values of 5.12 to 7.09 (mean 6.16, std. dev 0.53) for rumenocentesis and 5.63 to 7.15 (mean 6.58, std. dev. .39) for the oral probe. Individual values were compared using linear regression (Figure 1). The results generated with the probe were predictive of the centesis ($p < .001$) with the regression equation $\text{centesis} = -0.6116 + 1.0300 * \text{probe}$. The Pearson correlation coefficient was $r^2 = .58$. On average, values obtained using the probe were 0.42 pH units higher than those obtained with rumenocentesis. Results at the various levels of concentrate feeding are summarized in Figure 2.

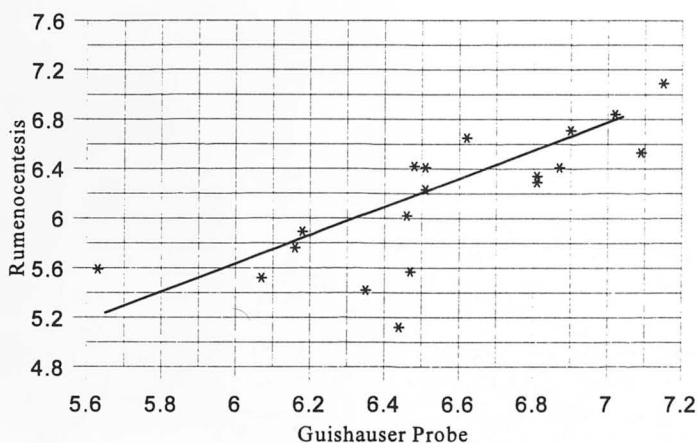


Figure 1. Simple Regression Plot

Results of this study indicate that the Geishauser probe may be a useful tool to procure rumen samples for pH analysis. Despite attempts in the study design to generate a wide range of values, pH levels were generally above those found in herds with subacute rumen acidosis problems. In addition, comparison of each technique to an accepted gold standard would be preferred

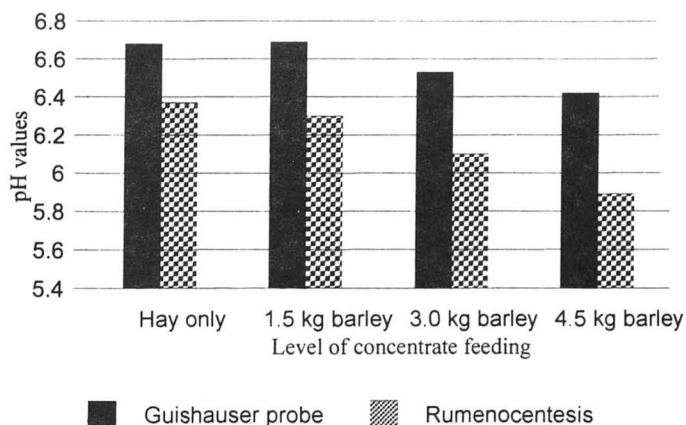


Figure 2. Average pH values for each technique

to the current design. Garrett *et al* compared pH values from rumenocentesis to those from a rumen canula and found that rumenocentesis values were on average 0.35 pH units below the canula values ($r^2 = 0.53$).⁵ Further research, to both compare the Geishauser method to an accepted gold standard and to assess the utility of the procedure in the field is necessary.

References

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