Methods of Evaluating Ruminal pH in Dairy Cattle

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Progress in understanding ruminal acidosis in dairy cattle has been limited by the methods available for determining ruminal pH. We evaluated three different methods of measuring ruminal pH in 8 ruminally-cannulated Holstein cows in early lactation as part of a 28-day nutritional study. Cows received the same mixed diet throughout the study, but dry matter intake and feeding frequency were varied. Average composition of the diet was 52.9% forage DM, 7.3% coarse particles, 21.8% crude protein, 28.9% NDF, and 36.9% NFC. Treatments were arranged as two replicates of 4 x 4 Latin squares, with each cow spending one week on each treatment. Ruminal pH was evaluated with the three different methods on the last day of each treatment period at 3 to 4 hours after the first meal of the day. The standard method of determining ruminal pH was with an indwelling pH electrode placed through the ruminal cannula into the ventral rumen. The pH electrode was weighted and surrounded by a wire basket to prevent the electrode from coming into contact with the ruminal wall. Ruminal pH determined by the indwelling pH electrode was compared to the ruminal pH of fluid manually removed through the ruminal cannula and to the ruminal pH of fluid collected orally via an oro-ruminal probe (Geishauser technique). Results are presented in Table 1.

Table 1. Comparison of methods of determining ruminal pH.

				Regression of method vs. electrode:		
Collection Method:	N	Mean ruminal pH for method	Mean ruminal pH for indwelling electrode	R^2	Slope (95% CI)	Intercept (95% CI)
Ruminal cannula	31	6.42	6.32	.86	1.10 (.93 to 1.27)	-.51 (-1.59 to .58)
Oro-ruminal probe	31	6.63	6.26	.51	.60 (.38 to .82)	2.89 (1.50 to 4.28)

Mean ruminal pH was higher for both the cannula and tube-collected samples compared to the indwelling pH electrode. Samples collected via the oro-ruminal tube had a higher pH value and were not as well correlated to the indwelling electrode as were samples collected through the ruminal cannula.