

Ruminal pH in Holstein dairy bull calves from pre-weaning to post-weaning.

J. Kohler, M. Middeldorp, Z. He and M. A. Steele

Department of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton, T6G 2P5, Canada.

The goal of this research was to characterize the ruminal pH changes that occur during weaning in calves fed an elevated plane of nutrition pre-weaning. Six Holstein bull calves were fed milk replacer at 15% of body weight in two equal volumes per day. Milk volumes were adjusted weekly according to body weight. Milk replacer was decreased to 50% at the end of week 5 and calves were weaned at the end of week 6. Calf starter, straw and water were offered ad libitum and recorded daily while bodyweight was recorded weekly. Calves were ruminally cannulated between d 6 and 12 of age. Ruminal pH was measured continuously every 5 minutes from week 5 to 12 with a ruminal pH bolus.

Body weight increased from birth (45 ± 1.5 kg) to week 12 (109 ± 3.0 kg). However, during transition (week 6) and the week after weaning (week 7) body weight was maintained at 79 ± 1.5 kg and 77 ± 2.7 kg respectively. As expected, starter intake increased ($P < 0.01$) during transition from 130 ± 26.7 g per day (week 5) to 385 ± 41.8 g per day (week 6) and kept increasing as the animals aged (2824 ± 66.9 g; week 12). Pre-weaning (week 5) ruminal pH was already low with a mean pH of 5.6 ± 0.09 , indicative of ruminal acidosis. The mean ruminal pH was lowest (5.5 ± 0.11) the week after weaning (week 7) and remained low until week 10. The pH increased significantly in week 11 and 12 ($P \leq 0.01$), with a mean pH of 6.1 ± 0.12 . During weeks 7 and 8 ruminal pH was below 5.5 and 5.2 daily for approximately 745 ± 187 and 220 ± 78 min, respectively.

Implications: These results show that the ruminal pH is depressed even prior to a step-down weaning in calves with low starter intake. It is also showing that it takes the calf several weeks to adapt their rumen to not be in a state that would be classified as ruminal acidosis post-weaning. Further research into the adaptation of the structure, function and microbiota of the rumen is warranted to determine if the depression in ruminal pH during weaning compromises gut health or is a natural part of ruminal development.