Effect of Orally Administered Electrolyte Solution Formulation on Abomasal Luminal pH in Dairy Calves

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Abstract:

Objective: To determine the effects of 3 commercially available, orally administered electrolyte solutions (OAEs) on abomasal luminal pH and emptying rate in dairy calves, compared with the effect of orally administered milk replacer. Design: Randomized crossover study. Animals: 6 male dairy calves (age, 12 to 31 days). Procedures: Calves were surgically instrumented with an abomasal cannula and were administered 4 treatments in randomized order: all-milk protein milk replacer, high-glucose high-bicarbonate OAE, high-glucose high-bicarbonate OAE containing glycine, and low-glucose OAE containing acetate and propionate. Abomasal luminal pH was measured with a miniature glass pH electrode prior to treatment administration and every second afterward for 24 hours. Results: Feeding of orally administered milk replacer resulted in a rapid increase in mean abomasal luminal pH from 1.3 to 5.8, followed by a gradual decrease to preprandial values by 8 hours afterward (mean 24-hour pH, 3.2). High-glucose high-bicarbonate OAEs caused a large and sustained increase from 1.3 to 7.5 (mean 24-hour pH, 4.1 for the solution without glycine and 3.5 for the solution with glycine). In contrast, feeding of the acetate-containing OAE was followed by only a mild and transient increase (mean 24-hour pH, 2.1); luminal pH returned to preprandial values by 3 hours after ingestion. Conclusions and Clinical Relevance: Ingestion of a bicarbonate-containing OAE resulted in sustained abomasal alkalinization in dairy calves. Because persistently high abomasal luminal pH may facilitate growth of enteropathogenic bacteria, administration of OAEs containing a high bicarbonate concentration (>70mM) is not recommended for calves with diarrhea. (J Am Vet Med Assoc 2012;241:1075-1082)

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