

Research Summaries IV

Feeding heat-treated colostrum reduces morbidity in preweaned dairy calves

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Introduction

Previous studies have demonstrated that batch pasteurizers can be used on farms to heat-treat bovine colostrum at 140°F (60°C) for 60 minutes, resulting in a significant reduction in bacterial exposure to the calf while maintaining overall colostrum immunoglobulin G (IgG) concentrations. However, no studies have demonstrated that feeding heat-treated colostrum results in improved calf health.

A randomized controlled clinical trial was conducted using 1,071 newborn calves from six commercial dairy farms in Minnesota and Wisconsin, with the primary objective being to describe the effects of feeding heat-treated colostrum on serum immunoglobulin G concentration and health in the pre-weaning period. A secondary objective was to complete a path analysis to identify intermediate factors that may explain how feeding heat-treated colostrum reduced risk for illness.

Materials and Methods

On each of the six farms, colostrum was collected each day, pooled, divided into two aliquots, and then one aliquot was heat-treated in a commercial batch pasteurizer at 140°F (60°C) for 60 minutes. Samples of fresh and heat-treated colostrum were collected for standard microbial culture (total plate count, total coliform count [TCC], cfu/mL) and for measurement of immunoglobulin G concentrations (mg/mL). Newborn calves were removed from the dam, generally within 30-60 minutes of birth, and systematically assigned to be fed one gallon (3.8 L) of either fresh (FR; n = 518) or heat-treated colostrum (HT; 553) within two hours of birth. Venous blood samples were collected from calves

between one and seven days of age for measurement serum IgG concentrations (mg/mL). All treatment and mortality events were recorded by farm staff between birth and weaning.

Results

Linear regression revealed that serum IgG concentrations were significantly higher in calves fed HT colostrum (18.0 ± 1.5 mg/mL), compared with that of calves fed FR colostrum (15.4 ± 1.5 mg/mL; $P < 0.0001$). Survival analysis using Cox proportional hazards regression revealed a significant increase in the risk for a treatment event (any cause) in calves fed FR colostrum (36.5%; H.R._{Fresh}, 1.25; $P = 0.0022$), compared with that for calves fed HT colostrum (30.9%). There was also a significant increase in risk for treatment for scours in calves fed FR colostrum (20.7%; H.R._{Fresh}, 1.32; $P = 0.0003$), compared with that for calves fed HT colostrum (16.5%). Path analysis revealed that calves fed HT colostrum were at lower risk for illness because the heat-treatment process caused a significant reduction in colostrum TCC, which was associated with a reduced risk for illness as a function of improved serum IgG concentrations.

Significance

Implications from this research are that producers should adopt management strategies (heat-treatment being one option) to reduce the level of microbial contamination in colostrum and, thereby improving the number calves with adequate passive transfer of IgG and reducing morbidity during the preweaning period.