

# Effect of feeding colostrum that was heat-treated with the Perfect Udder® System on passive transfer of immunoglobulin G in neonatal Jersey calves

A.A. Kryzer, BS<sup>1</sup>; S.M. Godden, DVM, DVSc<sup>1</sup>; R. Schell, DVM<sup>2</sup>

<sup>1</sup>College of Veterinary Medicine, University of Minnesota, St. Paul, MN 55108

<sup>2</sup>CalfStart, LLC., Altura, MN 55910

## Introduction

Heat-treating colostrum by the use of batch pasteurizers is an effective method to reduce bacterial contamination while protecting immunoglobulins and enhancing passive transfer and health in calves. The Perfect Udder® bag (Dairy Tech Inc., Windsor, CO) is designed to heat-treat 1 gallon (~4 L) of colostrum at a time prior to storage and feeding; however, this system has not been validated. The objective of this study was to compare passive transfer of IgG in neonatal calves that were fed colostrum that was heat-treated with the Perfect Udder® system, heat-treated with a batch pasteurizer (positive control), or fresh-refrigerated or fresh-frozen (negative controls).

## Materials and Methods

The study was conducted in the summer of 2012 on a large commercial Jersey farm in Minnesota. First-milking colostrum was pooled each day to create a unique batch. The batch was then separated into four 3.8 L aliquots, each of which was treated with 1 of 4 methods (heat-treated in the Perfect Udder® bag at 140°F (60°C) for 60 minutes [PU], heat-treated with a batch pasteurizer at 140°F (60°C) for 60 minutes and stored in the Perfect Udder® bag [BT; positive control], frozen fresh in the Perfect Udder® bag [FF]; negative control, or refrigerated fresh in the Perfect Udder® bag at 39.2°F (4°C) [FR; negative control]). For each batch, the IgG concentration for all treatments was determined immediately after assembly, after processing, and immediately prior to feeding. Newborn calves were removed from the maternity pen within 20 to 30 minutes after birth and before nursing from the dam. The calf was weighed and an 8-mL blood sample was collected from the calf's jugular vein prior to feeding. Singelton calves were then randomly assigned to be fed colostrum from 1 of the 4 treatment groups. A second 8-mL venous blood sample was collected from each calf at 24 hours of age. The IgG concentration was determined in serum samples by use of a radial immunodiffusion assay. For each treatment, the serum IgG concentrations were compared between samples collected before and after colostrum feeding, and the extent of passive transfer of IgG was compared among treatments with ANOVA.

## Results

Twenty-eight, 28, 29, and 27 calves were assigned to the PU, BT, FF, and FR treatments, respectively. Mean dystocia score, calf weight, and quality of colostrum fed (g of IgG/L) did not differ significantly among calves of the 4 treatments. The mean age at feeding was shorter for calves fed FR colostrum (69 min), compared with that for calves fed PU (79 min), BT (83 min), or FF (88 min) colostrum; however, age at feeding was not associated with IgG absorption in this study. Results of ANOVA indicated that the IgG concentration did not differ between the FF and FR treatments or between the PU and BT treatments; however, the IgG concentrations for the FF and FR treatments were significantly different from those of the PU and BT treatments. The mean apparent efficiency of absorption of IgG was 0.37, 0.37, 0.32, and 0.32 and the mean serum IgG concentration at 24 hours was 41.1 mg/mL, 40.0 mg/mL, 35.2 mg/mL, and 35.7 mg/mL for calves fed the PU, BT, FF, and FR treatments, respectively. Secondary analysis indicated that enhanced efficiency of absorption of IgG and higher serum IgG concentrations at 24 hours for calves fed the PU and BT treatments were likely attributed to the fact that the bacteria counts, particularly the coliform counts, in the heat-treated colostrum were lower, which enhanced IgG absorption. Pre-feeding total plate count (4.23 cfu/mL, 3.63 cfu/mL, 5.68 cfu/mL, and 6.53 cfu/mL for PU, BT, FF, and FR treatments, respectively) and total coliform count (0.45 cfu/mL, 1.08 cfu/mL, 3.82 cfu/mL, and 4.80 cfu/mL for PU, BT, FF, and FR treatments, respectively) differed significantly among the 4 treatments.

## Significance

Calves fed colostrum processed with the Perfect Udder® heat-treatment system had improved efficiency of IgG absorption and higher final serum IgG concentration, compared with those for calves fed fresh refrigerated or fresh frozen colostrum. Efficiency of IgG absorption and final serum IgG concentration did not differ between calves fed colostrum heat-treated and calves fed batch heat-treated colostrum. Thus, the Perfect Udder® colostrum heat-treatment system can be useful for dairies that desire to individually heat-treat 1-gallon aliquots of colostrum.