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Comparison of feeding lacteal- and plasma- derived commercial colostrum replacers on fecal scores and pathogen shedding in heifer dairy calves

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Introduction

Failure of passive transfer (FPT), defined as serum IgG <10 mg/ml at 24-48 hrs of age, is an important problem on dairy farms. If an adequate supply of high quality colostrum is not available, producers may feed a colostrum replacer (CR) product. However, studies are lacking to compare the effects of different CR products on passive transfer and calf health during the preweaning period. The objectives of this study were to describe the effect of feeding two different commercially available CR products, one lacteal-derived (LD CR) and one plasma-derived (PD CR) on i) serum IgG levels during the first 9 weeks, ii) the risk for development of scours and iii) the risk for fecal shedding of common enteric pathogens in the first 14 days of age.

Methods and materials

The study was conducted between June and August, 2009, at a commercial transition cow facility (TMF, Emerald, WI). Newborn heifer calves meeting study eligibility criteria were randomly assigned to be fed either a LD CR containing 150 g IgG (n=36 calves, Land O' Lakes Colostrum Replacement, Land O' Lakes, Inc., St. Paul, MN) or a PD CR, 130 g Ig, (n=38 calves, Colostrx® 130 Colostrum Replacer, AgriLabs, Inc. St. Joseph, MO) via an esophageal feeding tube within two hours of birth. After the first colostrum feeding, calves were fed 1.9 L of a commercial milk replacer formula twice daily until 24 hrs of age, then 2.8 L of pasteurized milk twice daily until weaning at 9 wks of age. Venous blood samples were collected from the calves at birth, 24 hours, and at 3, 6, and 9 wks of age for determination of serum IgG levels. Subjective fecal scores ranging from 0-4 were assigned to the calves' fecal pats daily from 1 to 14 days of age, with scours defined as FS ≥ 2. Fecal samples were collected and analyzed using a lateral immunochromatography test kit for *C. parvum*, *E. coli* F5 (K99) attachment factor, rotavirus and coronavirus at 7 days of age (BioX Diagnostics, Jemelle, Belgium). A two-way BioX fecal antigen test was also performed at day 14 for *Cryptosporidium parvum* and rotavirus.

Linear regression (Proc MIXED, SAS version 9.2) was used to evaluate the effect of treatment on IgG measures at 3, 6 and 9 weeks and on the number of scour days. Logistic regression and (Proc GENMOD, SAS version 9.2) was used to evaluate the effect of treatment on risk for a positive FS and the risk for shedding fecal pathogens of interest in the first 14 days. Critical P values were set at $P < 0.05$.

Results

Serum IgG levels (mg/mL) were significantly higher in calves fed LD CR at 24 hrs (14.7 +/- 2.9), wk 3 (8.3 +/- 2.2), and wk 6 (11.0 +/- 5.0), as compared to calves fed PD CR (24 hrs = 9.6 +/- 1.8; wk 3 = 6.9 +/- 2.7; wk 6 = 8.4 +/- 4.0). There was no effect of treatment on IgG levels at week 9. A high proportion of calves exhibited $FS \geq 2$ (LD = 97%; PD = 95%) during the first 14 days. There was no effect of treatment on risk or duration of scours between 1 and 14 days. There was no effect of treatment on risk for shedding of one or more of the fecal pathogens investigated at either 7 days (LD = 19% positive; PD = 13% positive) or 14 days of age (LD = 56% positive; PD = 63% positive).

Discussion

The very high rate of scours experienced in this study was abnormal for this farm and may be attributed, at least in part, to a cooler, wetter summer than normal, making the calf hutch environment wetter than usual. Calves fed a LD CR had significantly higher concentrations of serum IgG at 24 hrs, 3 wks and 6 wks, as compared to calves fed a PD CR. We would expect these differences to provide calves in the PD CR group with increased protection against enteric pathogens, but this was not demonstrated in this study.

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