

Effect of Feeding One or Two Doses of a Colostrum-Derived Commercial Colostrum Replacer on Passive Transfer of Immunoglobulin G in Newborn Dairy Calves

S. Godden¹, DVM, DVSc; D. Haines², DVM, PhD; R. Bey³, PhD

¹Department of Veterinary Population Medicine, University of Minnesota, St. Paul, Minnesota

²Department of Veterinary Microbiology, University of Saskatchewan, Saskatoon, Saskatchewan

³Department of Veterinary and Biological Sciences, University of Minnesota, St. Paul, Minnesota

Introduction

Colostrum is the single most important management factor determining calf health and survival. Calves experiencing successful passive transfer of colostrum immunoglobulins (serum IgG > 10.0 mg/ml) have improved preweaning health and survival, improved growth rate and feed efficiency, reduced age at onset of puberty, reduced age at first calving, and improved first and second lactation milk production. Unfortunately, many producers continue to suffer significant losses related to poor colostrum management. Factors affecting the success of a colostrum management program include 1) Quality of colostrum fed, 2) quantity of colostrum fed, 3) quickness of providing the first colostrum feeding and 4) cleanliness of colostrum (i.e. bacterial contamination). Use of commercial colostrum replacement products may offer multiple advantages, including consistent quality, convenience, and cleanliness. However, it is important to evaluate the ability of commercially available colostrum replacement (CR) products to achieve successful passive transfer of immunoglobulin G (IgG) in calves managed under field conditions. The objective of this study was to describe passive transfer of IgG in newborn calves fed one or two doses (100 gm IgG or 200 g IgG) of a commercial colostrum-derived colostrum replacement (CR: Land O'Lakes Colostrum Replacement®, Land O'Lakes Animal Milk Products, St. Paul, MN) or 4 quarts of maternal colostrum (MC).

Materials and Methods

This study was conducted at the Transition Management Facility (TMF, Emerald, WI) in summer, 2006. Newborn singleton heifer calves weighing \geq 70 lbs were removed from the dam within 30 minutes of birth, and before suckling. Calves were then randomly assigned to be fed one of three colostrum treatment groups (n=25/group), using an esophageal feeder tube, within 1-2 hours of birth: (1) Treatment Group 1: Feed one dose (100 gm IgG) of CR (2) Treatment Group 2: Feed two doses (200 gm IgG) of CR (3) Control Group: Feed 3.8 L of fresh MC collected from the dam. Blood samples were

collected from each calf at 0-1 hr of age (pre-colostrum feeding) and approximately 24 hrs of age for determination of serum immunoglobulin G (IgG, mg/ml) and total protein (TP, g/dl) concentrations. Colostrum samples were frozen and later tested for IgG concentration (mg/ml).

Results

Calves in the Control Group group were fed an average of 271 g IgG. Mean serum TP measures at 24 hours of age were 4.91, 5.47 and 5.74 g/dl for calves fed 1 dose of CR, 2 doses of CR, or 3.8 L of MC, respectively. Mean serum IgG measures at 24 hours of age were 9.6, 19.0 and 20.7 mg/ml in calves fed 1 dose of CR, 2 doses of CR, or 3.8 L of MC, respectively. There were no significant differences in serum TP or IgG measures between calves fed 2 doses of CR or 4 quarts of MC. There was no significant difference in apparent efficiency of absorption (AEA, %) of IgG for calves fed 1 dose of CR (35.5%), 2 doses of CR (36.5%) or 3.8 L of MC (31.8%).

Significance

In this study, feeding a single dose (100g IgG) of CR resulted in significantly lower serum IgG concentrations as compared to feeding two doses (200 g IgG) of CR or 3.8 L of MC. Because AEA% of IgG was not different among groups, the serum IgG differences observed are likely attributable to the different masses of IgG fed. Due to the small sample sizes studied, it could not be determined if there were health differences among treatment groups. Much larger studies will be needed to describe if there are health, performance, or economic differences among the three colostrum treatment groups studied. The results of this study suggest that producers could conceivably decide on a target IgG that meets the calf's needs for optimal health and productivity in their situation, and then design a colostrum feeding program that provides sufficient volume of either maternal colostrum or CR to deliver the necessary mass of IgG to achieve this target.