

Clinical Trial Evaluating the Effects of a Mannan Oligosaccharide in Milk Replacer on Health and Performance of Commercially Raised Dairy Calves

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Introduction

Calves are faced with many health and performance challenges, and a common management strategy for minimizing animal welfare concerns and increasing performance is to add antibiotics such as neomycin and/or tetracycline to milk replacer. Some studies have suggested that calves prophylactically fed antibiotics have improved growth and decreased morbidity. However, use of antibiotics in cattle production is under increased public scrutiny due to concerns that such uses may promote the development of antimicrobial resistance. This is especially apparent in subtherapeutic feeding of antibiotics. Therefore, it is desirable to find alternatives to prophylactically fed antibiotics in calves. Some investigators have indicated that oligosaccharides may be able to replace antibiotics in milk replacer and achieve similar calf performance. Mannan oligosaccharides (MOS) contain yeast cell wall fragments that may competitively bind intestinal pathogens and stimulate antibody production. The goal of this study was to evaluate if commercially reared dairy replacement heifers receiving MOS had a difference in performance, morbidity and mortality, compared to those given antibiotics or no additive in their milk replacer.

Materials and Methods

Four commercial dairy farms raising replacements and two custom heifer growers participated in the trial from June to September 2005. Calves were randomly assigned to one of three treatment groups within each farm when placed in their pens. Each group was identified by a colored tag on the pen. All calves were fed a 22% all milk crude protein and 20% fat milk replacer (22/20 MR) (Land O'Lakes Animal Milk Products, Shoreview, MN) at a rate of 0.75 pound dry matter mixed into two quarts of 115°F (46.1°C) water twice daily. All calves were offered free-choice calf starter and water.

The treatment groups consisted of: 1) 22/20 MR with 7g MOS (Bio-Mos, Alltech, Nicholasville, KY) per feeding; 2) 22/20 MR with 200g/ton oxytetracycline and 400g/ton neomycin; or 3) 22/20 MR with no additives.

Blood samples were collected via jugular venipuncture 24 to 96 hours after birth, and serum total solids

were measured via refractometry after clotting.

Three times per week, health outcomes were measured. These included fecal score, dehydration assessment, attitude and anorexia. Therapeutic antibiotic treatments were also recorded. Once per week, heart girth and withers heights were measured. Date sold, died or weaned was recorded. These were outcome variables in the study. Covariates included total solids and farm as a random effect. Study technicians were blinded to treatment group and obtained all measurements. Calf feeders did not take measurements.

All health and treatment data were recorded and entered into a spreadsheet program (Excel, Microsoft Corp., Redmond, WA) and analyzed using a statistical software package (SAS version 9.1, Proc Univariate, Reg, Mixed, Freq, and Genmod; SAS Institute Inc., Cary, NC). Alpha was set at 0.05.

Results

A total of 293 calves were randomized to the three treatment groups in the course of the study. Of these calves, 107 (37%) were below a suggested cut-point of 5.0 g/dl total solids for failure of passive transfer. The average total solids of all farms was 4.85 g/dl (SD=0.67). Within farm, average total solids ranged from 4.6 to 5.2 g/dl.

A total of 23 calves died or were sold due to health reasons during the follow-up period. Of these losses, 10 (44%) were in the no-additive group, seven (30%) were in the antibiotic group and six (26%) were in the MOS group.

There was no difference in average daily gain as measured by heart girth and withers height ($p>0.05$) between treatment groups, nor was there a difference in fecal scores between the three groups ($p>0.05$).

Significance

Despite the unequivocal benefits of proper colostrum management leading to adequate passive transfer, this data set reaffirms our industry's need to better manage this crucial aspect of replacement rearing. MOS may prove to be an alternative to subtherapeutic antibiotics in milk replacer for commercial dairy heifer replacements.