

The effect of pre, pro and symbiotic supplementation in milk to pre-weaned holstein heifers on body weight gain and health outcomes

P. Lucey, MVB, MPVM, DACVPM¹; **I. Lean**, BVSc, PhD, MACVSc, DVSc²; **H. Golder**, BAgSc, PhD²; **S. Aly**, BVSc, MPVM, PhD¹; **H. Rossow**, PhD¹

¹Veterinary Medicine Research and Teaching Center, University of California Davis, Tulare, CA 93274

²Scibus, Camdem NSW, Australia

Introduction

The objective of this clinical trial was to evaluate the effectiveness of pro, pre and symbiotic supplementation on average daily weight gain (ADG), diarrhea length, age at incidence of diarrhea, shedding of *Cryptosporidium* oocysts, enteric pathogens, and the odds of pneumonia in pre-weaned dairy heifer calves on a commercial dairy.

Materials and Methods

A total of 1,801 healthy Holstein heifer calves from a large California dairy were enrolled at 4 to 12 h of age until weaning at approximately 60 d of age. Calves were block-randomized to 1 of 4 treatments: 1) control, 2) yeast enriched with mannan-oligosaccharide (Prebiotic), 3) *Bacillus subtilis* (Probiotic), 4) combination of both products (Symbiotic), which were administered in milk twice daily from enrollment until weaning. Serum total protein at enrollment and body weight at 7, 42 and 56 d of age were measured. Fecal consistency was assessed daily on a scoring system of 1 to 3, for the entire pre-weaned period. A subgroup of 200 calves had fecal samples collected at 7, 14, 21, and 42 d for microbial culture and enumeration of *Cryptosporidium* oocysts by direct fluorescent antibody staining.

Results

Linear regression showed that symbiotic-treated calves had 20 g increased ADG compared to control calves for overall bodyweight gain (7 to 56 d) ($P = 0.042$). For late

bodyweight gain (42 to 56 d), prebiotic-treated calves had 84 g increased ADG ($P = 0.007$) and symbiotic-treated calves had 79 g increased ADG ($P = 0.012$) compared to control calves. Negative binomial regression showed no difference in the length of the first diarrhea episode per calf by treatment. Cox regression showed no difference in hazard of diarrhea compared to control calves. Logistic regression showed no difference in the odds of calves experiencing pneumonia. Negative binomial regression showed probiotic-treated calves shedding 100 times lower *Cryptosporidium* oocysts at 14 d than control calves.

Significance

Although no effects were seen on diarrhea length or pneumonia incidence, superior bodyweight gain in the late pre-weaned period may increase health outcomes of calves across the weaning process. Calves treated with the probiotic had lower numbers of *Cryptosporidium* oocysts present in their feces at 14 d, the point of highest shedding. Despite no change in the clinical presentation of diarrhea, decreased shedding of *Cryptosporidium* may impact the infectious pressure on calves entering the calf hutch and the environmental load and public health concern of *Cryptosporidium*.