Cobalt supplementation in pre-weaned beef calves affects humoral immune response, feedlot health, and final carcass characteristics

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Introduction

Economic losses from bovine respiratory disease (BRD) in beef cattle are $2 billion annually. Mineral supplementation during pre-weaning has potential to reduce sickness and improve health. Mineral cobalt (Co) is used by rumen-inhabiting microbes for the synthesis of vitamin B_{12}, which is a cofactor for vital metabolic pathways in tissue carbohydrate and lipid metabolism required for maintenance and growth. Vitamin B_{12} is also vital for B cell proliferation to form plasma cells that secrete antibodies. Recent studies have shown that Co supplementation levels above NRC-recommended levels enhanced antibody response in weaned beef calves. The objective of this study was to evaluate if an oral Co (30 g Co O_4) sustained-release bolus dosed pre-weaning affects humoral immune response during the post-weaning feeding period, reduces the incidence of BRD, and improves carcass characteristics.

Materials and Methods

Five different ranches with similar genetics, forage, mineral, water aquifer bases, and preconditioning health programs were utilized. Two hundred, 6 to 8 month old beef calves were randomly selected from 2,000 head (BW 485 ± 53 lb; 220 ± 24 kg). All calves were vaccinated against *Mannheimia haemolytica* 3 weeks before weaning. At vaccination, 100 calves were randomly selected to receive an oral Co bolus and another 100 calves served as controls. Both treatment and control calves were bled at vaccination to analyze initial *M. haemolytica* leukotoxin antibody titers and again at days 70 in the feedlot. All calves were weaned and transported the same day, and were fed the same ration during the feeding period.

Results

There was a 42% increase ($P = 0.06$) in *M. haemolytica* leukotoxin antibody titer in calves supplemented with Co. Co treatment decreased ($P = 0.02$) BRD incidence during the feeding period. Final carcass characteristics (HCW, yield grade, and marbling) were not measured at the time this abstract was submitted.

Significance

This study is relevant to the U.S. Beef Cattle Industry and bovine veterinarians in that these results indicate that increased NRC Co may decrease the incidence of BRD, improve health in weaned beef calves, improve feedlot health and growth, and will lead to expected improved carcass characteristics. Each of these impacts would increase the profitability in beef calf production. Previous NRC Co recommendations were derived from studies during the 1950s when beef cattle production goals were much different than today. Results from this study indicate that current NRC Co levels should be increased to improve post weaned health and performance in beef calves.