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# Paromomycin Sulfate as a Metaphylactic Treatment for Cryptosporidiosis Control in Newborn Dairy Calves

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The objective of the field trials was to mitigate cryptosporidiosis in newborn female Holstein calves before its clinical presentation during the second week of life, aiming to reduce weight loss consequences under various raising systems. The study involved 120 newborn female calves from three different dairy facilities in Mexico: Study 1 (S1) in northern Mexico, Study 2 (S2) in central Mexico, and Study 3 (S3) in western Mexico. The calves were raised in individual crates and randomly assigned to one of the following treatments: Control (antibiotic treatment for scours), and commercial prophylactic treatments against Cryptosporidium spp. encompassed Halofuginone lactate (HL), Nitazoxanide (N), and Paromomycin Sulfate (PS).

S1 included 20 calves in elevated crates with Control and 20 with PS. S2 included 21 calves in Control, 14 with N, and 23 with N. S3 included 30 calves with HL and 28 with PS. Treatment HL was administered from day 2 of life for seven days, while N was given on days 2 and 5 as per the label. Personnel involved in the trials were trained to detect early signs of loss of appetite, indicating the need for paromomycin sulfate treatment.

Passive immunity was determined using Brix refractometers at 48h of age. A daily scoring system was used to record diarrhea for the first 60 days of life. Fecals were collected at 7 and 14 days of age and analyzed morphologically with acid-fast staining. Fecal samples from S2 were quantified for *Cryptosporidium* oocysts using a discontinuous flotation test observed in a Nomarski chamber. Calves were weighed at birth, 60 (S2/S3), 90 (S1/S3), and 120 days (S2). All calves received pasteurized colostrum and pasteurized milk until 55 days of age. Feeding schemes varied: S1 calves were fed five times daily at 20% of their body weight (BW), S2 calves twice daily at 20% of their BW, and S3 calves twice daily at 18% of their BW.

Statistical analysis was conducted using mixed procedures with JMP 17.2 and JASP 0.18.1, considering statistical significance at $P<0.05$. Fixed effects included treatments, site, and housing, while random effects were scours and appetite, with weight as a covariate within the treatment.

Results indicated no significant differences in passive immunity (Brix) among study groups at all sites. Morphological analysis of fecal stains showed a seven-day threshold for the clinical appearance of cryptosporidiosis. At the end of treatment, the prevalence of cryptosporidiosis and oocyst shedding on day 14 of age showed that PS decreased prevalence in S3 (14%), N reduced prevalence in S2 (28.1%), while HL increased prevalence in S3 (33%).

During the second week of age, quantification of *Cryptosporidium* oocysts post-treatment showed a significantly lower oocyst count in the PS group compared to the Control and N groups in the S2 cohort ($P<0.05$). In the first week of treatment with PS showed a decrease in scours across all three sites, and this effect continued into the consecutive week in S1 ($P<0.05$) and S2 ($P<0.0001$), though no follow-up was recorded for S3 ($P<0.05$). S2 showed significantly less pneumonia cases with PS ($P<0.05$).

There were consistent increments in weight and height for S1 and S2 when treated with PS. Regarding S2, calves treated timely for diarrhea showed no significant difference compared to PS treated calves, while calves treated with N prophylactically did not prevent weight loss and had less height at 120 days of age ($P<0.05$).

In the comparison of different milk feeding schemes and treatments, S1 calves fed a higher milk plane supplemented with PS showed a 13.6 kg weight difference with the control group. In S2, the weight difference was 16.8 kg when comparing the control and PS groups to the N treatment. The smallest weight difference was in S3 at 6.9 kg. Passive immunity was also a probable contributing factor to the weight increment, with S1 and S2 registering Brix values of 9.9 and 9.5 respectively, while S3 had a lower Brix value of 7.3.

In conclusion, paromomycin sulfate (PS) was effective during the peak of cryptosporidiosis, resulting in 34-50% less oocyst shedding, thereby allowing for local immunity with fewer clinical signs, no appetite loss, and fewer pneumonia cases. Weight gain was consistently higher in the PS study group at 60, 90, and 120 days of age, compared to other prophylactic treatments for controlling Cryptosporidium spp. The combination of good passive immunity, higher milk

feeding planes, and close clinical follow-up, along with biosecurity measures and timely treatment, collectively contributed to the effective control of cryptosporidiosis in newborn calves.

**References**


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