ABSTRACT

Niacin derived coenzymes, NAD+ and NADP+, are crucial for fat and its components are essential for a variety of energy pathways. Derived warming mechanisms such as those associated with niacin on the response to cold stress in beef calves. Rumen-protected niacin on the response to cold stress in beef calves. Rumen-protected niacin supplemented calves displayed an average of 38.9°C < 0.7. NiaShure calves displayed an average of 38.9°C < 1.3. No significant differences were seen between NiaShure and control groups when examining rectal temperature.

METHODS

Heifers were sorted based on whether or not their expected calving dates were compatible within the timeframe of the project. The selected heifers were then bled and randomly assigned into treatment groups using a 2x2 factorial; for a 21 d period prior to parturition, heifers were fed 12 g NiaShure supplement in 0.91 kg barley or control feed (barley alone). After 14 d of receiving their feeding treatment, the heifers were bled a second time.

Heifers were regularly assessed for health issues. At calving, newborns wereuzzled while colostrum was milked from their dams. Each calf was then bottle fed 30 mL/kg colostrum, based on BW. Finally, calves were allowed to bond with their dams for 3.5 hours before the experiment commenced. At 3.5 hours the calf was separated from its dam and an IV catheter was inserted into the jugular vein, heart rate monitor was placed and rectal temperature probe was inserted. Once this was accomplished, calves were placed in a -2°C modified environment or a 15°C control environment. Environment treatment was assigned by random selection using a 2x2 factorial.

RESULTS AND DISCUSSION

Data were analyzed by using SAS (v 9.2) and classified as significant if p<0.05. If p=0.10, then it can be assumed that trends toward positive results were achieved.

Temperature

The average rectal temperature for the control calves was 38.4°C < 0.7. NiaShure calves displayed an average of 38.9°C < 1.3. No significant differences were seen between NiaShure and control groups when examining rectal temperature.

Heart Rate

When HR was compared between NiaShure and control calves, a p-value of 0.6306 was noted. However, when the software analyzed the average of each treatment group's HR measurements, calves from heifers who received NiaShure supplement had an average HR of 91.24 beats/min, in contrast to control calves, which average HR values of 78.94 beats/min.

Niacin Levels in Serum

Our initial results analysis consists of samples before feeding (BF) and after feeding (AC) for the heifers, as well as an initial sample (IS) and final sample (FS) for each of the cow-calf pairs. As expected, the data reflected the outlined parameters. Results illustrate a trend of the initial samples containing a higher level of niacin than the final samples. The heifers also portrayed this trend when comparing samples from before feeding and after calving. We hypothesize that the reduction in niacin concentration is due to the fact that niacin, namely NAD+ and NADP+, are shunted into energy pathways as the calves and heifers require energy to exhibit shivering behaviors and parturition, respectively. While niacin levels are more variable in the control group of cow-calf pairs, the average level of niacin is significantly greater in calves whose dams received NiaShure supplement. When comparing niacin content between initial samples and final samples in control calves, the averages were determined to be 241.9-ug/L < 0.63 vs. 158.5-ug/L < 0.54. NiaShure calf averages for the same samples were 294.2-ug/L < 0.93 vs. 204.4-ug/L < 0.63. The disparity in data from the additional samples revealed compelling trends, the results were inconclusive. Results were inconclusive, in part, because of the unexpectedly small sample sizes (NiaShure n= 4, control n= 7). This study cannot state that supplementing NiaShure will definitely reduce cold stress in calves. Further research must be conducted to derive solid conclusions and recommendation. It would also be advisable to obtain more accurate AI records for reliable calving data. Longitudinal setbacks such as delays in processing blood may have also led to inconsistencies within our results; the niacin microbiological assay is very sensitive to traces of hemolysis in serum samples. Future plans for this study will analyze calf weaning weights, which may yield further compelling evidence in favor of NiaShure supplementation. The majority of cow-calf operations are dependent on accurately assessing weight gains with respect to weaning weights, disease and illness incidence is another category of data that should be compiled. If weaning weights are statistically higher and rate of illness and disease is statistically lower for the NiaShure supplemented cow-calf pairs, the long-term financial value of NiaShure supplementation would be validated.

IMPLICATIONS

This study suggests that rumen-protected niacin (NiaShure) may provide economic benefits to cow-calf operations. Economic benefits will stem from the fact that calves will theoretically show an increased resistance to stress generated from exposure to a cold environment, e.g. typical calving weather in Montana. In this case, the use for feeding NiaShure supplement is to promote resistance to cold stress; in theory, the result would be to obtain minimal morbidity and mortality rates, as well as higher weaning weights, the main source of profit. With these ideals realized, optimally healthy calves will enhance their performance and minimize labor and medical costs. With these results in mind, producers will benefit financially by incorporating niacin supplements into their feeding plan. The cost for the producer to feed NiaShure supplement, incorporated into mineral salt, would be approximately $70/ton (4.5 lb NiaShure per ton) retail cost - $41.50. This would provide 12 g of NiaShure for 6 cow-calf pairs for one month. In total, combining NiaShure supplement with mineral salt gives rise to an additional cost to the producer of $1660/month; therefore, an additional $705.50/100 head/month. If this supplementation regimen saves the producer one calf, it will yield a profit of over $800/animal, based on a steer price of roughly $1000/head. Given the overall economics of the cattle industry, NiaShure supplementation merits further investigation and research.

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