



Supplementation of Sodium Bicarbonate as a Top-dress Can Reduce Lameness and Improve Performance in Feedlot Cattle

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Objectives: Lameness is the cause of significant losses in the feedlot industry. Because of feeding high amounts of highly rumen fermentable carbohydrate, occurrence of the acidosis is one of the most common nutritional related diseases in feedlot ruminants and can result in pH reduction and finally laminitis. Sodium bicarbonate is known as a pH modulator in cattle. Supplementation of the sodium bicarbonate in cattle may alleviate the acidosis and help to maintain rumen pH levels in optimal range, and higher salivation in ruminants. The purpose of this experiment was to investigate the effects of sodium bicarbonate on laminitis occurrence and performance.

Materials & Methods: One hundred Holstein bull calves (251.75±5.75) were used in a completely randomized design. Calves were group fed a similar basal diet during 42 days experimental period. Used treatments included: 1) Control treatment without feed additive, 2) Experimental diet that calves consumed 50 g/d sodium bicarbonate as a top-dress. Calves received fresh total mixed ration (13.65% DM CP and 37.44% DM NDF) and diets were fed twice daily at 0900 and 1300, orts were removed each day at 0800. Group dry matter intakes were measured daily and individual body weight changes were recorded monthly.

Results & Conclusion: Results showed that the effect of experimental diet on dry matter intake (7.02 vs. 7.36 kg/d, $P<0.001$), average weight gain (40.3 vs. 46.6 kg, $P<0.03$) and feed conversion ratio (7.36 vs. 6.53, $P<0.02$) were significant. A tendency was detected for average daily gain (0.96 vs. 1.11 kg/d, $P<0.07$). Compared with control group, occurrence of laminitis in experimental group was less (22% vs. 9%; odds ratio=2.6). Generally, results showed that feeding of sodium bicarbonate as a top-dress can have an efficient role in reducing laminitis occurrence and increasing profitability in feedlot farms. Regarding lower lame animals in SB compared with in BD group the most important factor in reduction of lameness probably has been rumen pH. Ruminal pH decreases following meals with the rate of pH decline increasing as meal size increases and as dietary NDF content decreases. Dietary supplementation of sodium bicarbonate attenuates the decline in ruminal pH that is observed post feeding. Because the most important reason for incidence of lameness is related to acidosis, and considering sodium bicarbonate as a strong buffer, the obtained result was expected.

Keywords: Feedlot cattle, Sodium Bicarbonate, Top-dress, Lameness

The effect of age on the chondrogenic differentiation potential of equine adipose-derived mesenchymal stem cells

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Objectives: Adipose-derived mesenchymal stem cells (AMSCs), as adult stem cells, have potential to differentiate into various lineages such as cartilage. In order to use equine AMSCs in treatment of diseases including musculoskeletal disorders, it is obligatory to understand the effect of donor age on the differentiation potential of these cells.

Materials & Methods: To isolate AMSCs, fat samples were collected from three mares aged 3, 6 and 10 years old and were transported to the laboratory. Immediately, cells were isolated by mechanical and enzymatic (Collagenase I) and were cultured in optimized conditions. The cultured cells were passaged until passage 3. To assess the chondrogenic potential of passage 3 cells, they were differentiated under the chondrogenic medium supplemented with TGF-beta3 and BMP-6 for 21 days. High-density cell culture system (micromass) was chosen. Chondrogenic differentiation was confirmed by toluidine blue staining and Pellet sizes were measured by microscope.

Results & Conclusion: All cultured cell pellets were differentiated to chondrocytes under chondrogenic differentiation condition when compared to control group. Differences in the chondrogenic differentiation capacity of equine AMSCs harvested from donor animals of different age were observed. Chondrogenic potential decreased with age. After 21 days, Cell micromasses from younger donors (3 and 6 years old horses) were larger than 9 years old horse. In conclusion, increasing age reduced chondrogenic differentiation potential of AMSCs.

Keywords: Equine, Adipose tissue, Mesenchymal stem cells, age, Chondrogenic differentiation