TREATMENT WITH HYPERTONIC SALINE SOLUTION ENHANCES RENAL EXCRETION OF ACIDS IN CATTLE WITH RUMEN ACIDOSIS

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Introduction: Acute rumen lactic acidosis (ARLA) is quite common in feedlot beef cattle receiving large amount of concentrates. The treatment consists of removal of the rumen contents, correction of dehydration and systemic acidosis. Hypertonic saline solution (HSS) has been used to correct rapidly hypovolemic shock and to increase the excretion of urine. No study has been carried out so far for its treatment of ARLA.

Objective: To evaluate the use of HSS in the subsidiary treatment of ARLA in cattle, mainly on the excretion of metabolites in the urine.

Material and methods: ARLA was experimentally induced in twelve rumen cannulated steers. Twenty hours later the steers were divided into 2 groups for the treatments: A) HSS group was rapidly infused with 5 mL/kg BW of HSS (NaCl 7.2%) and 20 mL/BW of isotonic saline solution (ISS) for the next 3 hours; the control group received same protocol, but instead of the treatment with HSS they received ISS. Five liters of rumen fluid were removed and replaced with the same amount of water in both groups. Blood and urine samples were collected throughout the experiment to determine pH, total lactic acid (TLA) and creatinine in blood, and pH, creatinine, TLA and phosphorus (P) in the urine. The total volume of urine excreted was also recorded. The glomerular filtration rate (GFR) and the total amount of H⁺, P and LA excreted in the urine were calculated. Data from each period were sum to obtain the results from the entire period of treatment. A Mann-Whitney test was performed to compare the groups.

Results and discussion: The use of HSS did not cause any side effects. Steers treated with HSS increased by 50% its GFR (1.61 mL/min) compared to ISS group (1.06) (P < 0.03). The overall volume of urine excreted by HSS group was higher than ISS group (1.6 vs 0.7 L) (P < 0.02). This increase in total volume of urine provided by HSS, favored a greater excretion of H⁺ ions in urine, which was 3.39-fold higher in HSS group (64.3*10⁻⁷ vs 18.9*10⁻⁷ Mol) as well as lactate (241.7 vs 181.8 mMol) and P urinary excretion (3.8 vs 1.1 mMol) that reduced the urine pH (5.3 vs 5.7). Only the HSS group decreased significantly blood TLA concentration (20.3 %) throughout the treatment.

Conclusion: The therapy with HSS provided a substantial increase of renal excretion of acids, mainly lactic acid and somehow favors the decrease of this acid in the bloodstream.

Keywords: Hypertonic saline solution, lactic acidosis, urinary excretion, pH