EFFECT OF DEXTROSE SUPPLEMENTATION ON ELECTROLYTE AND WATER ABSORPTION IN RESTING THOROUGHBREDS

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Electrolytes are a critical component of a performance horse's feeding program since they play an important role in maintaining osmotic pressure, fluid balance, and nerve and muscle activity. During exercise, sodium (Na^+), potassium (K^+), and chloride (Cl^-) are lost in large quantities through sweating. Loss of these electrolytes causes fatigue and muscle weakness and decreases the thirst response to dehydration. Unfortified hay and grain rations tend to be deficient in sodium and contain variable quantities of chloride. If forage intake is restricted (less than 1% BW on a dry matter basis) and/or high sweat losses occur then additional potassium supplementation may also be necessary.

Commercial electrolyte products often contain sugar (dextrose), which is purported to improve electrolyte uptake in horses. Two studies were conducted by KER to evaluate if sugar inclusion affects electrolyte and water uptake and retention in idle horses. In study 1, four Thoroughbreds (Age 6.25 yrs ± 2.25 yrs; Weight 574.4 kg ± 82.4 kg) were used in a 4 X 4 Latin square design trial. The horses were dosed with 92 grams of electrolyte (72 g NaCl, 20 g KCl) either alone (elect), with 10 g of dextrose or 100 g dextrose. The electrolyte mixes were dissolved in 1 liter of water and administered via nasogastric tube. A fourth treatment of 1 liter water with no added electrolytes or dextrose served as a control. Plasma samples were taken before and for 4 hrs post dosing and Na^+, K^+, Cl-, BUN, and glucose were measured. The horses were offered water free choice and hourly water intake was measured for 4 hrs dost dosing. Plasma Na^+ and osmolality were significantly elevated post-dosing in all three electrolyte treatments compared to the control ($p<.05$), but dextrose did not affect the rate or duration of increase. All electrolyte treatments increased voluntary water intake for the first 4 hr post dosing compared to the control ($p<.05$). Water intake equaled 0.3 ± .4 l, 5.3± 3.6 l, 5.4 ± 2.3 l, and 4.7 ± 2.5 l in the control, elect, 10 g dex and 100 g dex treatments, respectively.

A second 4X4 Latin square trial was conducted with 4 Thoroughbreds (Age 6.25 yrs ± 2.25 yrs; Weight 546.6 kg ± 35.2 kg). The horses were administered 1mL distilled H_2O/100g BW + 0.15g/Kg BW D_2O via nasogastric tube either 1) alone (control), 2) with 70 g NaCl + 30 g KCl (elect), 3) electrolyte + 10 g dextrose (dex) or 4) electrolyte + 10 g starch (starch). Blood samples were taken immediately before and .5, 1, 2, 3 and 4 hrs post dosing and D_2O, Na^+, K^+, Cl^-, BUN, and glucose were measured. Plasma D_2O at 2 hrs post dosing was used to calculate total body water. Total urine and faecal excretion was measured for 24 hrs before dosing and at 12 hr intervals for 72 hrs post dosing. Plasma Na^+ and osmolality were significantly elevated post-dosing in all three electrolyte treatments compared to the control ($p<.05$), but neither dextrose nor starch affected the rate or duration of increase. Plasma D_2O was elevated to a greater extent ($p<.05$) in the control compared to the 3 electrolyte treatments at 30 and 60 min post dosing suggesting that isotonic electrolyte solutions delay water uptake compared to pure water. Total body water was unaffected by treatment and equaled 59.1 ± 6.3, 60.3 ± 5.3, 62.6 ± 7.7 and 58.4 ± 4.7 ml/kg BW for the control, ELECT, dex and starch treatments, respectively. Urinary and faecal electrolyte excretion was not different between the 3 electrolyte treatments. These studies suggest that adding dextrose or starch to electrolyte mixes does not increase rate of absorption or retention of electrolytes. Dextrose may still have some value in improving palatability of electrolyte mixes, but the higher the dextrose content, the lower the electrolyte content of a product. This means high dextrose products supply lower amounts of electrolytes per kg, and may be less effective as a result.