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# THE EFFECT OF LEVEL AND TYPE OF DIETARY FIBER ON HYDRATION STATUS FOLLOWING DEHYDRATION WITH FUROSEMIDE

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The loss of fluid and electrolytes in sweat during endurance exercise can be extensive, resulting in dehydration and poor performance if these losses are not replaced. Feeds high in fiber, especially those high in soluble fiber, possess a high water-holding capacity. Therefore, feeding strategies that optimize the level of dietary fiber and fiber type have the potential to benefit endurance horses by creating a reservoir of fluid and electrolytes in the hindgut that could be used to replace sweat losses.

To determine whether the level of dietary fiber and fiber type could affect plasma volume in response to dehydration, three diets were fed to six mature Thoroughbred horses in a 3 X 6 Latin rectangle experiment. Previous research has shown that fluid and electrolyte losses in response to a diuretic are similar to those lost in sweat during 2-3 h of moderate intensity exercise. Therefore, furosemide was used in the current study to simulate exercise-induced sweat loss. All diets contained similar dry matter (DM), energy, protein and electrolyte content, but differed in total dietary fiber (TDF), as well as soluble (SDF) and insoluble dietary fiber (IDF) components. The three diets were: 1) HIGH-HIGH (high TDF (65%), high SDF (12%)); 2) HIGH-LOW (high TDF (61%), low SDF (7%)); and 3) LOW-LOW (low TDF (48%), low SDF (7%)). In each 10 d period, diets were fed for 9 d. Water consumption and fecal moisture content were determined on d 6. On d 10, plasma volume (PV) was determined using a dye-dilution technique before and 4 h after the administration of furosemide (1 mg/kg BW IM). In addition, blood samples were obtained before and at hourly intervals for 6 h after the administration of furosemide for the determination of packed cell volume (PCV), plasma total protein (TP) and electrolyte ($Na^+$, $K^+$ and $Cl^-$) concentration. Body weight (BW) was recorded before and at 4 h and 6 h after furosemide administration (and corrected for fecal loss) to assess fluid loss in response to the diuretic.

Water consumption was greater (P<.01) when horses received diets high in TDF (HIGH-HIGH: 3.4±.2 L/kg DM; HIGH-LOW 3.3±.2 L/kg DM) compared to the diet low in TDF (LOW-LOW: 2.6±.2 L/kg DM). Diet affected (P<.01) fecal moisture content, with the HIGH-HIGH diet having the greatest fecal moisture, followed by HIGH-LOW and LOW-LOW. The decline in PV following dehydration with furosemide was similar for all diets, averaging 5.2±1.3 ml/kg BW (10.3%). While no differences in plasma TP were observed between diets following furosemide administration, TP concentration was higher (P<.05) prior to dehydration when horses received the LOW-LOW diet compared to the HIGH-HIGH diet. Horses receiving the LOW-LOW diet also had a higher (P<.05) PCV before dehydration and 1 h after furosemide administration compared to horses fed the HIGH-HIGH and HIGH-LOW diets. Before dehydration, BW was greater ($P<.05$) when horses received diets high in TDF (HIGH-HIGH and HIGH-LOW) compared to the diet low in TDF (LOW-LOW). However, loss of BW in response to furosemide was greater ($P<.05$) when horses received the HIGH-HIGH diet (4.8±.2%) compared to the HIGH-LOW (3.8±.3%) and LOW- LOW (3.8±.3%) diets.

The greater loss of BW in response to dehydration without a proportional loss of PV when horses received the HIGH-HIGH diet suggests that a diet high in SDF may provide the horse with a source of dispensable water in the hindgut during dehydration.