Diet formulation for a horse with chronic kidney disease (CKD): a case report

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Introduction

Dietary recommendations on CKD are nowadays routinely made in small animal practice. Fortunately, CKD is fairly uncommon in horses, with a prevalence reported to be around 0.12% (Schott, 2004). In contrast to small animals in which glomerular disease is a common cause of CKD, most horses suffer from chronic interstitial nephritis (Schott, 2013). Horses with CKD are often presented relatively late in the disease course, and are likely facing complaints of weight loss, mild ventral edema, polyuria, polydipsia, excessive dental tartar, halitosis and a dull hair coat with a "fishy" odor (as urea can be eliminated through sweat glands) (Schott et al., 1997). In most cases, the onset of this disease is insidious and often a precipitating event is not recognized (Shott, 2013). A diagnosis of CKD is generally made by detection of isosthenuria (specific gravity ranging from 1.008-1.014) and azotemia (once BUN exceeds 75-100mg/dl, equids generally show more clinical signs of uremia) (Schott, 2013). Hypercalcemia can also be found in horses with CKD (Leroy et al., 2011) and is considered a pathognomonic finding for CKD in equids in combination with the previous parameters. Although CKD is a progressive disorder by nature, early intervention may slow rate of progression and thereby prolong life.

Case history

A 23 year old thoroughbred stallion was presented at the veterinary clinic of Ghent University with complaints of polyuria, variable appetite and lethargy. Blood analysis revealed a severe azotemia with a BUN of 115 mg/dl (ref. range 20-41mg/dl) and creatinine levels of 5.4 mg/dl (ref. range 0.8-1.5mg/dl). A mild proteinuria (dipstick) was discovered concurrently. Based on blood, urinary and echographic analysis, a diagnosis of chronic kidney disease was made. The horse weighed 435 kg, had an optimal body condition score of 5/9 (Henneke et al., 1983) and was currently not performing any exercise. The current diet consisted of 5 kg of hay (estimation made by owner), 3kg Horsefood XP-EQ®, 400 gr Horsefood Herbal Structure blend® and 10 carrots per day.

Nutritional management

The main principles of nutritional management of CKD in horses include (1) improving or maintaining body condition and (2) minimizing excess protein intake that could result in higher BUN concentrations (Schott, 2013). In contrast to nutritional management of CKD in small animals, limiting phosphorus intake does not seem to be of much concern in equids. Horses with CKD often present in fact with serum phosphorus concentrations near or below the limit of the reference range (Schott et al., 1997). The magnitude of hypercalcemia in horses with CKD does seem to be directly related to the dietary calcium intake. However, clinical effects of hypercalcemia in horses have never been described (Schott, 2013). Nevertheless, the authors tried not to excessively exceed NRC requirements (2007) for calcium in the prescribed ration (26.95 versus 17.4gr).

In order to accommodate the primary goal of nutritional management of CKD in horses, adequate energy intake can be encouraged by offering multiple feedstuffs in frequent meals (Schott, 2013). The owners were advised to provide pasture access in order to stimulate appetite (good quality grass remains the most preferred feed for horses) and to give as many meals a day as possible. If necessary, the diet could be flavored with crushed ginger cookies (Jarvis, 2009) and supplemented with fenugreek in order to stimulate appetite (Sauvaire et al., 2000). Since uremia is known to suppress hunger, a small amount of daily exercise (hand-walking) was advised since this may increase the horse's appetite and in order to help preserve muscle mass. As anorexia and gastro-intestinal ulceration may be components of the uremic syndrome (Schott, 2013), 225 gr Boehringer Equitop Pronutrin ® (a pectin-lecithin complex) was added twice daily to the diet in order to prevent the development of equine gastric ulcer syndrome (Venner et al., 1999).

In horses with CKD, it is important to provide an adequate amount of dietary protein in order to meet requirements (a dietary protein intake of 1-1.5g/kg/day is considered a reasonable goal), but not to exceed these levels in order to maintain a neutral nitrogen balance (Schott, 2013). Therefore, a diet was

constituted incorporating 5.5kg of late cut grass hay (due to its higher protein and calcium content in regard to grass hay, legume hay is not preferred for horses with CKD – Schott, 2013). Forages that are harvested at a later stage are in fact known to have lower protein contents since the proportion of cell contents decreases as the plant matures (Beever et al., 2000). Fat supplementation is also considered beneficial as it will increase caloric intake without a concurrent increased protein intake. Furthermore, supplementation with omega-3 PUFA has been shown to slow progression of CKD in small animals (Fasset et al., 2010; Roudebush et al., 2010). Unfortunately, there are no studies up to date confirming the same benefits in horses. Despite the fact that similar data are lacking in horses, the authors chose to incorporate 120ml of linseed oil, a vegetable oil rich in omega-3 PUFA, into the diet nonetheless. Provision of a glucose source such as cereal starch can improve palatability and increase caloric intake without significantly increasing protein intake. The ration was therefore supplemented with 1.2 kg cornflakes, a cereal containing very high starch levels and a rather low protein content.

Although advocated in the past to increase voluntary water intake, supplementing salt above maintenance requirements to the diet of horses with CKD is no longer recommended since increased sodium intake may exacerbate symptoms (Schott, 2013). In this case, the horse was supplemented with 12 gr of table salt (NaCl) daily in order to meet NRC requirements, with concurrent removal of the salt lick in order to prevent further intake. Furthermore, 85 grams of Cavalor Nutri Plus®, a general vitamin and mineral supplement was added to meet NRC requirements (2007). Finally, because oxygen radical damage appears to contribute to the progression of CKD (Brown, 2008), the diet was supplemented with 13 gr (recommended dosage of 30mg/kg BW - Kolb et al., 1983) of the anti-oxidant vitamin C.

Follow-up

Unfortunately, the owners were not able to follow the feeding advice to such detail due to a declining appetite of the horse and had to resort to introducing new feedstuffs ever so often in order to encourage voluntary feed intake. Due to severe progression of the disease, the horse was euthanized 6 months after presentation at the clinic.

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