Anhidrosis - Non Sweaters
By: Jenna Bayne, DVM

Anhidrosis in the horse, more commonly known as a dry horse or a non-sweater, is a medical condition typically seen in horses residing in hot and humid environments. The inability of affected horses to properly regulate their body temperatures through sweating can have dire consequences and is of major importance from an animal welfare perspective.

The mechanisms involved in the development of anhidrosis are not completely understood. A probable etiology is a combination of environmental factors and multiple pathophysiological responses in the sweat gland of the horse (McEwan Jenkinson et al., European Society of Veterinary Dermatology, 2006 and 2007). High climatic temperatures and humidity can lead to a continuous release of adrenaline into the horse's bloodstream. A state of adrenaline-driven hyperactivity occurs, which leads to changes in the secretory cells that make up the sweat glands. Adrenaline normally binds to the β_2-adrenergic receptors of horse sweat gland cells, which sets up a cascade of intracellular events, culminating in the release of sweat onto the body's surface. Continuous stimulation of these adrenergic receptors eventually leads to their desensitization – higher concentrations of adrenaline are needed to produce a normal response. Eventually the response cannot be elicited despite the high concentration of adrenaline delivered to the sweat gland cells. As well, over stimulation leads to changes within the sweat gland cells themselves, including down-regulation and a decreased rate of adrenergic receptor production by the cell. The sweat gland cells have fewer receptors which are less responsive than normal. Irreversible glandular degeneration can be seen in extreme cases. Overall, desensitization and down-regulation is seen clinically as the inability to produce normal amounts of sweat in horses with anhidrosis.

A recent study on the epidemiology of anhidrosis in horses residing in Florida was carried out by Johnson and colleagues (JAVMA, 2010, 236(10): 1091-1097). It was shown that at the farm level, horses located in central and southern Florida were 2.13 and 4.40 times more likely respectively, to develop the condition compared to their counterparts in northern Florida. As well, the type of horse operation was significant in the occurrence of the disease – horses used in riding instruction and showing were 15.40 and 5.26 times more likely to develop anhidrosis, respectively, compared to ranch operations. Animal factors, which include breed, use, place of foaling, as well as a family history of anhidrosis were found to be significant. Horses originating from more temperate climates are at a greater risk of developing anhidrosis when transported to hot, humid climates for racing or exercise compared to horses native to Florida. Thoroughbreds and Warmbloods develop the condition more often than Quarter horses and other breeds, and a strong association between family history of anhidrosis and risk of this condition exists.

There are variable ways in which anhidrosis can present (Hubert et al., Vet Clin Equine, 2002, 18: 355-369). The onset of the inability to sweat can be sudden, which usually occurs following a period of profuse sweating, or it can be insidious and progressively worsen over time. The most common clinical sign seen in horses is a compensatory increase in respiration rate – in the range of 60 – 120 breaths per minute. Other variable signs may be an increase in body temperature and heart rate. The demonstration of an inability to sweat can be variable in its degree and course of onset. Though complete anhidrosis can be seen, partial anhidrosis may limit the areas of the horse that retain their

ability to sweat to include the mane, the saddle and halter areas, and the axillary, perineal and inguinal regions. Clinical signs of long standing anhidrosis may include dry, flaky skin, hair loss, a reduced appetite and a decreased water intake. A tentative diagnosis of anhidrosis may be made on history and clinical signs. A semiquantitative test, involving the intradermal injection of β_2 agonists (salbutamol sulphate, adrenaline bitartrate and terbutaline sulphate), may be used to identify partial and complete anhidrosis.

Many medical treatments available for anhidrosis are largely based on anecdotal reports and impressions rather than scientific evidence. It should be stressed that sound environmental management continues to be a very important aspect of treatment for anhidrosis. Reported medical therapies include nutritional supplementation of L-tyrosine, ascorbic acid, niacin and cobalt (commercial preparation available); use of drugs that decrease sympathetic drive (ie. methyl dopa), have been used by some practitioners with reported success, though no control studies support these claims of efficacy. Use of acupuncture and a homeopathic combination of sulphur and lycopodium have been reported. Other claims of treatment include: vitamin E therapy, adrenocorticotropic hormone injection, antidiuretics, electrolyte supplementation and antihistamine preparations. Results at best are equivocal for the above medical therapies.

The most reliable treatment for anhidrosis is removal of the severe climatic stress. The ability to sweat can be restored in early stages of anhidrosis if the horse is removed to a cooler, drier environment, though longstanding cases may fail to respond to such changes. Maintenance of horses with air conditioning may be a means of treating as well as preventing the onset of the condition, by minimizing exposure to extreme environmental conditions. Short of having the ability to move horses, or keep them in climate-controlled stalls, a reduction in aggravating factors may provide practical ways to reduce the development or progression of anhidrosis in susceptible or afflicted animals. Factors that increase the basal metabolic rate, such as high protein feed, disease, exercise or those that increase water loss or influence heat loss should be avoided. Management changes may include feeding less grain to reduce metabolism and therefore heat production, exercising the horse during the coolest part of the day, and the use of misting fans and cooling the roof of the barn by running water on it will help maintain a cooler environment. Sound environmental practices at this time remain the most effective ways in which to address anhidrosis in horses.

Contact Brandon Equine Medical Center at 813-643-7177 or email info@brandonequine.com with any questions regarding this topic.