

## What is heaves?

Heaves is a chronic, non-infectious lung disease that primarily affects mature horses and can have a significant effect on a horse's well-being and performance ability. Heaves is also referred to as recurrent airway obstruction (RAO) and is often compared to human asthma. The primary pathologic mechanisms leading to clinical signs in affected horses are bronchospasm, inflammation and thickening of the lower airways (small bronchi), and accumulation of mucus and inflammatory exudates in the airway lumen. The term RAO indicates that the disease is chronic and recurrent, although "remission" from clinical signs can be achieved through treatment and proper management of affected horses.

Heaves is considered an allergic condition that is set off by inhalation of "respirable" particles. Mould spores, bacterial endotoxin and dust particles are the most commonly recognized inciting allergens. The primary sources of these allergens are feed (especially hay) and bedding materials.

## Clinical signs of heaves

The typical clinical signs a horse owner will notice are an increased respiratory effort and coughing. Nasal discharge can also be seen in some horses but horses do not appear sick and do not have a fever. Signs can vary considerably depending on the severity of disease; in mild or early cases, coughing at the beginning of exercise may be the only noticeable sign. Horses with advanced disease typically show an obvious "abdominal lift" when breathing (especially at the end of exhalation) and may develop a "heave line". A heave line indicates hypertrophy of the abdominal muscles due to continued increased breathing effort. Severely affected horses may also lose weight and will generally have significantly reduced performance ability.

Additional signs that can be noticed on veterinary examination are an increased respiratory rate, a tracheal rattle due to accumulation of fluid in the trachea, abnormal lung sounds on auscultation (especially wheezes) and intolerance to a rebreathing examination.

Due to its nature as a chronic recurrent disease, clinical signs of heaves typically occur in a seasonal pattern. Many horses will have exacerbation of disease in the winter months when they are stalled and will improve when they are turned out to pasture. A syndrome of a “summer pasture associated obstructive pulmonary disease” occurs in the Southern United States and may be very similar to heaves although the inciting causes appear to differ. Based on my personal experience, some horses in Western Canada appear to have exacerbations of heaves in late winter/early spring as well.

## **Diagnosis**

Heaves is diagnosed based on historical information (especially the recurrent pattern and seasonality of disease), clinical examination findings, and laboratory diagnostics. Laboratory tests typically include the analysis of one or more lung lavage samples, which may include a tracheal aspirate and/or a bronchoalveolar lavage (BAL) sample. A BAL sample is generally preferred as it is more indicative of changes in the deeper tissues of the lung. Blood work and chest radiographs or ultrasound may also be used, primarily to rule out other possible disease conditions such as pneumonia.

Tests of lung function are also useful in the diagnosis of heaves. In practice, a simple response test to an injectable bronchodilator such as atropine may be done to demonstrate the presence

of bronchospasm. More advanced lung function testing requires specialized equipment and is therefore usually reserved for advanced diagnostic testing or research studies concerning heaves. Challenge tests are also common in research studies and may be done with natural substances such as mouldy hay, or with individual stimulants such as histamine or endotoxin.

## Treatment

Environmental management to reduce exposure to inciting allergens is the only true treatment for heaves. The goal of management is allergen reduction in the horse's "breathing zone" and, ideally, in the entire living space of the horse. Most horses with heaves do better in pasture than when stalled, and many research studies have shown that remission from heaves can be achieved by environmental changes alone. As hay has been implicated as the main trigger of heaves, alternatives to hay feeding should be considered for affected horses. These may include cubes, complete pelleted rations, or silage or haylage (caution must be used when feeding these!). Hay treatments to reduce dust, spores and moulds are also offered by several companies. If hay feeding cannot be avoided, hay quality should be optimized. Soaking hay to reduce dust can be helpful in the short term but is not recommended as a long-term management option. Feeding of round bales should be strictly avoided.

In addition to feeding considerations, management should aim to optimize air quality and ventilation, and reduce overall dust exposure. Some options include the use of alternative bedding materials, re-organization of barns to move horses away from storage sites for hay and bedding, removal of horses during barn cleaning, and spraying of barn isles. Heaves is inherently a chronic progressive disease but optimal management in the early stages may delay the onset or reduce the severity of disease long term.

Medical therapy of heaves is necessary with acute exacerbations and to provide relief until environmental changes can be implemented and take effect. Anti-inflammatory corticosteroids and bronchodilators are the mainstay of medical treatment and these medications may be administered systemically (i.e. by injection or orally) or locally by inhalation therapy. Medical

treatment should only be regarded as a short-term solution and should not be considered an alternative to environmental management.

### **Risk factors for the development of heaves**

There is now convincing evidence that heaves has a genetic basis which makes certain horses susceptible to development of the disease once they are exposed to the inciting allergens. Several studies have investigated the genetics of heaves and have found a strong predisposition in certain horse families. One study found genetic predisposition only to severe forms of heaves and it is quite possible that the different clinical severities represent different forms (rather than different stages) of the disease. There does not appear to be one gene that determines susceptibility to heaves but, rather, the genetics are very complex and different genes may be implicated in different families of horses. The inheritance pattern may also vary among equine families. In general terms, studies to date suggest that presence of heaves in one or both parents significantly increases the risk that an individual horse will develop heaves. There is currently no genetic test for heaves and the complexity of the genetic predisposition makes it necessary that more research is done.

Age is a risk factor for heaves and the disease generally develops in middle-aged to older horses. It appears reasonable to assume that optimal management in susceptible horses may delay the onset of clinical signs; however, evidence to this effect is lacking to date. Similarly, the potential relationship between inflammatory airway disease, a condition primarily of young racehorses, and heaves is not understood.

Hay feeding is the strongest environmental risk factor for heaves. As hay varies greatly in dust content, hay source and quality are important and feeding of round bales poses the highest risk. In addition to the frequently lower hygienic quality of round bales, horses tend to bury their heads in the bales when eating, thereby increasing the number of respirable particles they inhale.

Indoor housing is often named as a risk factor for heaves and many studies have shown that remission of heaves can be achieved by keeping horses in pasture full time. Hay feeding may be the component of indoor housing that most significantly increases the risk for heaves and one study showed that horses kept indoors in a well-ventilated barn and on a hay-free diet fared as well as horses in pasture. Similarly, the evidence for the relative risk associated with different bedding materials is not consistent.

In partial contradiction to the protective effect of pasture housing, outdoor housing in the winter was found to increase evidence of airway inflammation in one study. Exercise in cold, dry weather may also increase the risk of heaves exacerbation as it leads to inflammation associated with airway cooling.

The potential for heaves development or exacerbation subsequent to respiratory infections (such as viral infections) requires further investigation. Viral respiratory infections can increase airway hyperresponsiveness, and sufficient rest periods following viral infection are necessary to allow for complete airway healing. There is interesting evidence concerning the relationship between the airway microbial flora and chronic airway diseases in humans but research in this direction has not been undertaken in horses to date.

## Conclusions

Heaves is an important and common chronic respiratory disease of horses. Susceptible horses develop clinical signs in response to environmental allergen challenge, and environmental management is the only true treatment for heaves. Further research is needed to understand the genetic basis of heaves, investigate the potential for different forms and triggers of the disease and to elucidate the potential relationship between heaves and other conditions such as respiratory infections.

## References

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