Practical Approach to Coughing Horses
Amanda House, DVM, DACVIM
University of Florida
Gainesville, FL

Cough and poor performance are common complaints among pleasure and sport horses in equine practice. This lecture will discuss a practical diagnostic approach to the horse with a cough, and treatment of non-infectious lower respiratory disease.

History and examination
A complete history and physical examination are critical for evaluating the patient with cough. Duration, severity, nasal discharge, presence or absence of fever, and inciting causes can all be helpful in determining the underlying etiology. A rebreathing examination should be performed as part of a complete respiratory examination. Horses with inflammatory, non-infectious lower airway disease may have a prolonged recovery and the presence of crackles and/or wheezes on examination. Horses with infectious pneumonia may have abnormal adventitial sounds as well, and as such, this examination will not point to a specific etiology. A complete blood cell count may be beneficial to determine whether evidence of infection is present, but can be normal in horses with pneumonia. Changes in the white blood cell count or fibrinogen concentration should prompt further diagnostic consideration.

Horses with a history of fever and changes on the CBC should be suspected of having infectious lower airway disease/pneumonia. Definitive determination of a bacterial etiology is best accomplished with a percutaneous trans-tracheal aspiration sample submitted for cytology and culture/sensitivity. Pneumonia is often characterized cytologically with degenerative neutrophils (with or without the presence of intracellular bacteria). Broad spectrum antibiotics should be initiated if cytology is suggestive of pneumonia, while culture results are pending. Tracheal aspiration cytology can also be suggestive of inflammatory lower airway disease, when non-degenerative neutrophils are the predominant cellular population. Thoracic ultrasound examination and radiographs can be helpful in the evaluation of the horse with lower airway disease. Practically speaking in a field setting, ultrasound examination of the thorax can be accomplished with a trans-rectal probe. This technique is most useful to determine if pleural fluid or pulmonary infiltrates are present.

RAO (heaves, equine asthma)
Recurrent airway obstruction (also known as heaves, equine asthma, broken wind, and chronic airway reactivity) is a common respiratory disease of horses characterized by periods of reversible airway obstruction caused by neutrophil accumulation, mucus production, and bronchospasm. The classic clinical syndrome includes chronic cough, nasal discharge and respiratory difficulty. The term COPD is no longer used to describe this condition in horses, because the pathophysiologic and morphologic aspects of the disease are different from human chronic obstructive pulmonary disease.

Most evidence suggests that RAO is the result of pulmonary hypersensitivity to inhaled antigens, although multiple theories exist regarding the exact pathophysiology. The most common antigens are mold, organic dust, and endotoxin present in hay and straw. Periods of reversible small airway obstruction are caused by bronchoconstriction and accumulation of mucus and neutrophils. RAO occurs worldwide, with the highest prevalence in stable horses fed hay in the northeastern and midwestern United States. A similar condition that can occur in horses in the southeastern United States is termed summer pasture associated obstructive disease (SPAOD). However, horses with SPAOD typically improve when stabled. RAO is a common respiratory disease of mature horses (typically >7 years old). The average age of onset in RAO affected horses is 9-12 years, and both genders are commonly affected. Winter and spring appear to be the most common seasons for exacerbation of RAO. There does appear to be a heritable component to the etiology of this condition. The incidence of RAO in horses with healthy parents is approximately 10%, which increases to 44% if two parents are affected.

Clinical signs
Clinical signs of RAO typically include a chronic cough, nasal discharge and a prolonged labored phase of expiration. The classic “heave line” is due to hypertrophy of the abdominal muscles which are assisting in respiration. Flared nostrils and tachypnea are frequently observed. On thoracic auscultation, wheezes, tracheal rumbles, and over-expanded lung fields may be present. Crackles may also be heard secondary to excessive mucus production in the lower airways. Severe cases may also exhibit weight loss, cachexia, and exercise intolerance. Horses are typically afebrile with normal complete blood cell count and serum biochemical profile, unless a secondary bacterial pneumonia has occurred.

Diagnostic evaluation
Diagnosis of RAO can be done on the basis of history and characteristic clinical examination findings in the majority of horses. Additional diagnostics to confirm and characterize the pulmonary inflammation include transtracheal aspiration (TTA), bronchoalveolar lavage (BAL), thoracic radiographs and ultrasound examination.
Maintaining horses on pasture full-time is generally recommended. Horses that must be stalled should be kept in a clean, well-

abnormalities will often include high resistance and poor compliance of the lungs, with increased dead space ventilation. Lung
to inspire rather than expire may have interstitial pneumonia or pulmonary fibrosis, and radiographs are indicated to better
characterize lung disease in these cases. Ultrasound may be utilized if primary or secondary infectious pulmonary disease is
suspected.

Lung function tests in horses with RAO typically demonstrate hypoxemia without hypercarbia, due to V/Q mismatch. Function
abnormalities will often include high resistance and poor compliance of the lungs, with increased dead space ventilation. Lung
function testing is not widely available, but can be performed at The University of Florida. It is beneficial in more subtle cases of poor
performance and inflammatory airway disease (IAD).

Treatment

The most important treatment for RAO is environmental management to reduce exposure to organic dusts and mold. As previously
mentioned, the most common antigens are organic dusts, mold, and endotoxin present in hay and straw. Round bale hay is high in
to inhalation, and the presence of round bale hay is a potential cause of treatment failure in horses on pasture. Maintaining horses on pasture full-time is generally recommended. Horses that must be stalled should be kept in a clean, well-ventilated environment and ideally be transitioned to a complete pelleted feed. Straw is not recommended as bedding for RAO affected horses. Soaking hay (for at least 2 hours) and feed may alleviate the signs in mildly affected individuals, however, soaked hay may still exacerbate RAO in more severely affected cases. It is important to remember that although medications will alleviate the clinical signs of disease, respiratory disease will return if the horse remains in a mold/dust-filled environment once the medications are discontinued.

Systemic corticosteroids and aerosolized bronchodilators are the most immediately helpful therapy for a horse in respiratory
distress. Intravenous administration of Dexamethasone (1 mg/kg) should improve lung function within 2 hours of administration. Dexamethasone has an oral bioavailability of about 60%, and will improve pulmonary function within 6 hours if given by this route. Dexamethasone may be continued for one to several weeks at a tapering dose (usually quarter the dose every 3-5 days) for severe cases. Isoflupredone acetate (0.03 mg/kg IM every 24h for 14 days) and a single dose of triamcinolone acetonide (0.05-0.09 mg/kg IM) have also been utilized in horses with significant respiratory difficulty and acute airway obstruction. For management of less severely affected cases of RAO, prednisolone is generally considered to be less potent and less toxic than the previously mentioned drugs. Prednisolone should be administered at 1-2.2 mg/kg orally once daily for a week and then gradually tapered. Oral prednisone is poorly bioavailable, and not recommended for treatment of RAO in horses.

Corticosteroids will not provide immediate relief of acute, severe airway obstruction, and rapidly acting β2-adrenergic bronchodilators (such as albuterol sulfate) are indicated for treatment of those cases. Aerosolized albuterol sulfate (8-2 µg/kg in MDI, metered-dose inhaler; typically 5-10 puffs/500kg of 100 µg/puff MDI every 4-6h) improves pulmonary function by 70% within 5 minutes of administration; however, the beneficial effects last only 1-3 hours. Administration of albuterol will improve the pulmonary distribution of other aerosolized medications, such as aerosolized corticosteroids, and speed mucociliary clearance. Salmeterol (210 µg dose, 1-3 times daily) may also be used as an inhaled bronchodilator. Ipratropium bromide (20 µg/puff, 5-10 puffs/500 kg every 6-8 hours) has also been utilized for inhaled bronchodilator therapy.

Clenbuterol (0.8-3.2 mcg/kg PO every 12 h), a β2-adrenergic agonist, provides long-acting bronchodilation in horses with moderate
to severe RAO. Side effects include tachycardia and sweating, which are more common at higher doses and with intravenous
administration. The clinical efficacy of clenbuterol is inconsistent at lower dosages if exposure to a dusty environment is maintained. However, it does appear to improve the objective parameters of pulmonary function. Down-regulation of β2-receptors has been documented in horses after administration of clenbuterol for 12 days (8 µg/kg IV, every 12h). Administration of corticosteroids prevents clenbuterol-induced desensitization when administered concurrently. Since β2-agonists have minimal to no anti-inflammatory activity, they should not generally be used alone for the treatment of RAO.

Systemic anti-cholinergic drugs are not recommended for long-term management of RAO due to their potentially severe side
effects (CNS toxicity, ileus, mydriasis, tachycardia, etc). Atropine (5-7 mg IV/450 kg) can be administered as a rescue medication.
during a severe airway obstruction episode. Ipratroprium bromide is a synthetic anti-cholinergic drug that is administered via inhalation and produces bronchodilation, inhibits cough, and protects against bronchoconstrictive stimuli. Its duration of effect is 4-6 hours and it is administered at 90-180 µg/horse in an MDI (AeroHippus and the Equine Haler).

Aerosolized corticosteroids are effective in horses with mild-moderate RAO, and can be used in conjunction with systemic therapy in severe cases. The two aerosolized preparations for administration to horses via the Equine Haler™ are beclomethasone dipropionate (3500 µg/horse every 12h via MDI) and fluticasone propionate (2000 µg/horse every 12 hours via MDI; typically 8-10 puffs/500 kg of a 220 µg/puff MDI twice daily). Fluticasone is the most potent and most expensive inhaled corticosteroid, and due to its low oral bioavailability, it has the least potential for adrenal suppression. In affected horses, fluticasone propionate reduces pulmonary neutrophilia, improves parameters of pulmonary function, reduces responsiveness to histamine challenge, and speeds clinical recovery. Although the therapeutic effect is not immediate, pulmonary function typically begins to improve within 24 hours after administration of aerosolized corticosteroids. Additionally, horses in apparent “remission” from RAO may benefit from low dose, long term, aerosolized corticosteroid treatment.

References