

How Cold Air Affects Equine Airways

Cold, dry winter air can potentially leave horses susceptible to irritation, respiratory pathogens, and bronchoconstriction.

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Cold, dry air can increase risk of bronchoconstriction in horses. | Photo: iStock

Winter can bring you and your horse a much-needed break from heat and humidity. During this period of colder temperatures, however, you might notice your horse coughing more frequently or having a harder time breathing. You might also question whether your horse, like you, experiences the winter cold and flu season. Cold weather alone will not give your horse a respiratory infection. However, cold air and winter management choices might influence the health and function of your horse's respiratory tract, increasing his risk of

exposure to infectious agents or exacerbating chronic problems such as **equine asthma**.

Horses breathe in a tremendous amount of air entirely through their noses. While at rest this might correspond to only about 10 breaths per minute, it can increase more than tenfold during exercise. This corresponds to more than 1,000 liters of air inhaled per minute. Air that enters through the nasal passages progresses down the trachea ("wind pipe") and ends in very small and specialized airways within the lung (the bronchioles and alveoli). Here, oxygen in the inhaled air diffuses into the blood for transport to other parts of the body.

The **respiratory system** has several important features to help condition the air for delivery to the lungs, as well as defense mechanisms to protect the airways from exposure to dust, irritants, and pathogens (such as viruses).

Warming and humidification of air in the nasal passages prevent the sensitive airways within the lung from getting irritated. The nasal passages are also an important first line of defense against larger irritants (dust, mold) and in respiratory tract immunity. Air that passes through the trachea encounters a second defense barrier called the mucociliary apparatus, consisting of special hairlike projections called cilia and a layer of mucus lining the trachea. Together these trap and remove irritants and pathogens before they reach the lungs. Finally, in the bronchioles and alveoli, specialized immune cells protect the respiratory tract. In addition to these features, reflexes such as coughing and sneezing remove irritants and fluid lining the respiratory tract to keep the tissues healthy. Cold, dry air and exposure to allergens or irritants and respiratory infections can all interfere with these defenses.

Cold air can dry the tissues lining the respiratory tract, resulting in impaired local defenses (e.g., the mucociliary apparatus) and potentially increasing their susceptibility to irritation and respiratory pathogens. Additionally, because the bronchioles and alveoli are sensitive to temperature extremes, cold, dry air increases the risk of bronchoconstriction (airway-narrowing).

With respect to respiratory infections, we know people tend to get a cold or the flu more commonly during winter. However, while cold temperatures make you feel cold, they will not make you sick. Rather, cold temperatures might be associated with an increased risk of exposure (some viruses survive better in cooler conditions). Probably one of the biggest risk factors is that during the winter we spend more time indoors, where ventilation might not be ideal, and in contact with other people.

What does this mean for your horse? While we know less about cold air's impact on the equine respiratory tract, we can apply some of what we see in humans to horses. In healthy horses there is some evidence that breathing cold air during exercise might cause bronchoconstriction and airway inflammation. Currently, we do not know if this happens in horses with asthma. If you have a horse with asthma, you might notice that controlling things that exacerbate his clinical signs becomes more challenging during the winter and, in fact, owners do report episodes of asthma in their horses more frequently during colder seasons. The most important reason for this is that horses are often housed indoors in winter, where ventilation might not be adequate and exposure to allergens and irritants such as dust or molds found in feed or bedding is greater. Similarly, exposure to aerosolized infectious agents (from horses sneezing and coughing) might be greater under these conditions.

What can you do during the winter to improve your horse's respiratory health? For horses that must spend a significant amount of time indoors, make sure your barn and stalls provide adequate

ventilation. Weather permitting, turnout is ideal. Minimize exposure to allergens and other irritants, taking into account high-exposure activities such as stall-cleaning or exercising horses indoors. Finally, reduce the risk of infectious disease exposure by using good biosecurity protocols and appropriate preventive health practices.