MESSAGE FROM THE GRAYSON-JOCKEY CLUB RESEARCH FOUNDATION

BREATHING EASY

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Horses are tremendous athletes with vast cardiovascular and respiratory capacity. Unlike people's, horses' athletic ability is limited by lung rather than heart function.

The equine respiratory system begins at the nose and continues to the tips of the lungs. Air is carried to the lungs through the nose, upper airways, and trachea (or windpipe), driven by contraction of a large muscle called the diaphragm. The lungs are composed of small tubes and sacs that permit exchange of gases between the lung and the bloodstream. Carbon dioxide produced in the body, especially skeletal muscles during exercise, is exchanged for oxygen, needed to power all organs and tissues in the body, including the muscles.

Horses at rest, standing quietly in a stall or grazing at pasture, use only a fraction of their lung volume. They breathe slowly, about 8–12 times per minute, inhaling only about 10 gallons of air per minute. During intense exercise such as racing, horses' respiratory rates might exceed 120 breaths per minute, and they might inhale in excess of 500 gallons of air per minute. If the lungs are not functioning perfectly due to inflammation or infection, the exchange of oxygen and carbon dioxide is compromised, and horses cannot race at top performance. Maintaining a healthy respiratory system is essential.

Multiple studies funded by the Grayson-Jockey Club Research Foundation have showed that environmental air quality impacts horses' lung function and is associated with successful and poorly performing racehorses.

Poor environmental air quality has been linked to the development of mild to moderate equine asthma or inflammatory airway disease in horses, characterized by inflammation of the trachea and bronchi, with excessive accumulation of mucus and inflammatory cells in the airways. The airway inflammation leads to mild increased resistance to airway flow, limiting gas exchange within the lung. Airway inflammation is not trivial. Mild equine asthma is common and decreases racing performance in Thoroughbred racehorses. Mild to moderate equine asthma was diagnosed in 80% of racehorses sampled by Dr. Laurent Couetil and colleagues in a recent GJCRF funded study. The researchers identified that increases in certain cell types, mast cells, and neutrophils, isolated from fluid within the lungs, were associated with reduced speed figures. Additionally, these researchers found a connection between poor air quality and mild equine asthma.

Research by N. Edward Robinson and colleagues also found associations among poor environmental airway quality, development of mild to moderate equine asthma, and poor racing performance. This research emphasizes not only the importance of airway health to optimum performance in equine athletes but also the value of collaborative research among scientists, equine veterinarians at the racetrack, horse owners, and trainers.

What to do? Many racetracks are in urban areas where air quality is impacted by industrial pollutants and heavy metals. Barns contain airborne and respirable particulates, including dust, molds, endotoxin, and other organic and inorganic antigenic triggers for airway inflammation.

Steps can be taken to improve the quality of air horses breathe, diminishing their risk of mild to moderate equine asthma and associated poor racing performance. Good ventilation is key. Keep windows and doors open to maximize air exchange in the barn. Move horses out of the barn during cleaning, an event associated with spikes in poor airway quality. Spray the barn aisles with water prior to raking and sweeping to limit dust. Feed horses on the ground, allowing contaminants to drain from the airways. If possible, do not store hay, straw, and bedding above the horse stalls where dusts will float into the stalls through the floor boards. Investing in a hay steamer might be worth it; results by Meriel Moore-Colyer and colleagues showed a 99% reduction in respirable particulates in hay after steaming with limited changes in the nutrition value.

In summary, improving horses' respiratory hygiene and airway quality is paramount to achieving and maintaining optimum racehorse performance and welfare. When horses develop signs of mild to moderate equine asthma, work with your veterinarian to develop a treatment and prevention plan. Continued partnership among researchers, racetrack veterinarians, horse owners, and trainers and support by the GJCRF will continue to unravel connections among the air they breathe, lung function, and performance. BH

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