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Abstract:

This presentation is covering two topics focusing on airflow problems up from the nose and going down into the lungs: 1- A new wireless endoscopy technology available in veterinary medicine and at the University of Calgary to diagnose “wind” or throats problems in horses. 2- An update on the latest diagnostic techniques and treatments available for non-infectious lung diseases in horses.

1- The Dynamic Respiratory Scope, also called Wireless Endoscopy or “over-the-ground” endoscopy:

Alberta has the greatest population of horses among the Provinces of Canada, and has a lot of performance horses (western competitions, show jumping, race horses, etc...). Diagnostic of “dynamic throat obstructions”, which decrease the airflow through the throat during exercise and put your horse “out of wind” are often made empirically in Alberta because of the lack of equipment, which has consequences on the outcome of the treatments. The dynamic Respiratory Scope (DRS) is a new technology in equine medicine that allows diagnosing throat problems that happen in horses during exercise. This revolutionary portable and telemetric endoscopy system allows performing upper airway endoscopies in horses in the field while the horse is working. The results are far better than those obtained with a high speed treadmill to diagnose dynamic upper airway obstructions in horses. Thanks to a generous donation from the Equine Foundation of Canada, the Faculty of Veterinary Medicine, University of Calgary, has been able to purchase this DRS equipment to fulfill this important need in equine medicine in Alberta. The DRS is also used at the UCVM for teaching the veterinary students, as well as for continuing education of veterinarians.

Some horses will be “out of wind” during exercise, intermittently or systematically. They will

sometimes make an abnormal respiratory noise heard from the nostrils. In these cases, the first step to diagnose the origin of the condition is to perform an endoscopy at rest. The regular endoscopes used in this case are a flexible tube with a camera at the tip that allows examining inside the throat of the horse. The problem veterinarians are facing is that the throat looks normal at rest in many of these horses presented for noise or “lack of wind” during exercise. Basically all the anatomical structures into the throat are in place and seem to work normally at rest, but they do not work normally during exercise. Since the throat is really a bottleneck in the path of the air down to the lungs, any alteration in the diameter of the air passage in the throat will have a huge impact on the breathing and performance of the horse. And that is exactly what happens in these horses: Some structures in the throat collapse and create a partial obstruction to airflow! Like if you were forced to run and breathe from the nose with one blocked nostril. To make it even more complicated, there are many different structures that can create different types of obstructions in the throat: So guessing is not an option to figure out what is going on. Establishing the right diagnosis is crucial to choose the right treatment and obtain a prognosis. Indeed, most of the treatments are surgical, but there are many different options available: To perform the right treatment you need to obtain the right diagnostic and understand what is going wrong in the throat of the horse. So how do we obtain the right diagnostic if we cannot see anything wrong at rest and problems only happen during exercise?

The only option we had in the past was a high speed treadmill (going above 60 km/h). However, first of all, there is no high speed treadmill available in Alberta. Second, high speed treadmills have many disadvantages: 1- they are an expensive and unpractical for horse owners because the horse has to be trailered and kept on site for a day of training before the examination can be performed at high speed, 2- They are quite dangerous for the horse and the personnel working around 3- The conditions are very artificial and are not representing the effort or the stress level that happens in the field or during competitions,. Consequently, false negative/ inconclusive results are frequent.

The answer to diagnose the problems in horses with “wind problems” today is the DRS. Instead of bringing the horses to a treadmill, the DRS is small and light and is brought on-site where the horses are working. The DRS system is a 3kg portable endoscope system that can be carried by a rider in a backpack or installed on a sulky or on a harness. A small endoscope with a camera at the tip is installed on the horse and plugged to the backpack unit. The endoscope goes into the nose to visualize the throat, and is attached to a bridle. The endoscopic images are both recorded on a small video card in the back pack and sent to a portable receiver screen by wireless telemetry. The veterinarian holds the receiver with the screen on the side of the arena or the track while the horse is exercising. The telemetry device allows visualizing the endoscopic images in real time from a distance of up to 500 meters. The images on the digital card can also be reviewed in slow motion on a laptop for further analysis.

The DRS is used in real-life conditions: During the endoscopy, the horses can work in the exact same conditions and environment as when the problem is noticed by the owners. The test can be done during mild exercise or in race-like conditions if necessary. The position of the head and tension on the reins are exactly the same as when the problem occurs.

This equipment is very versatile and can be used in many disciplines: With a rider carrying the backpack, it allows diagnosing throat problems in all sort of horses (from draft horses to ponies) used in all sorts of disciplines: Western as well as English riding, flat or jumping, thoroughbred racing, polo horses, pleasure riders etc... When attaching the backpack to a harness we can test horses in harness racing, chuckwagon racing, draft horses, pleasure carriage etc... We can also put the equipment on the saddle of horses lunged without a rider if necessary. Many cases with videos will be presented of different conditions diagnosed with the DRS in horses used in various disciplines.

2- The latest development in diagnostic and treatment of non-infectious lung diseases:

Respiratory diseases represent a common reason for veterinary consultation in horses in North America. Horses lung diseases that are not due to an infection by a virus or bacteria (like in pneumonia) are called inflammatory lung diseases and can be compared to asthma in people. Equine inflammatory respiratory diseases that are most commonly seen in North America and Europe are mainly two diseases: 1)- Recurrent Airway Obstruction (RAO) (also known as "heaves") and 2)- Inflammatory Airway Disease (IAD), which has been described more recently.

1)- Recurrent Airway Obstruction has been known for centuries in horses: it resembles human asthma and is characterized by chronic inflammation of the lungs (in the deep airways) and episodes of bronchoconstriction. The bronchoconstriction is a narrowing of the tubes (bronchi) conducting air deep into the lungs: If the tubes narrow down, it is very difficult for air to flow in and out of the lungs and the horse is in labored breathing, even at rest. This is easily noticed by the horse owners. The bronchoconstriction is probably secondary to the inflammation in the lungs. The inflammation is mostly due to allergic-like reaction to dust and molds. This means, in short, that horses with heaves can be considered as being allergic to dust and molds. Unfortunately, dust and molds are everywhere in the environment of horses, mostly in the hay, bedding and barns.

We will present a short questionnaire that allows horse owners to see if their horses show clinical signs and a history indicating that they are at risk of having heaves or not.

2)- Inflammatory Airway Disease has only been well defined by experts since 2007. It was first described in young racehorses but can occur in any horse of any age. Inflammatory Airway Disease is more difficult to detect for horse owners than RAO because it is more subtle. Horses with IAD will NOT show labored breathing at rest. The predominant clinical sign indicative of IAD is a cough, very often at the beginning of exercise, sometimes during exercise. Often IAD is also associated with some sort of exercise intolerance, but this is noticed in horses that are pushed to maximal or sub-maximal exercise capacity. Another sign of IAD can be increased secretions at the nostrils at the end of exercise. These signs are not specific of IAD, which thus needs to be diagnosed with special testing, namely a bronchoalveolar lavage (BAL) fluid analysis (see below).

Take-home message: A horse coughing at the beginning of exercise may have IAD.

The gold standard test to diagnose and differentiate RAO from IAD is based on clinical signs and identifying the type of inflammation in the lungs. To measure the degree of inflammation deep into the lung, and to identify the type of inflammatory cells involved, the test we use is the bronchoalveolar lavage (BAL) fluid analysis. Basically, to obtain a sample of cells from the deep lung section, the less invasive and most efficient way is to perform a wash of a small portion of the lung; this will wash out the cells into the airway when we aspirate the fluid back. The cells obtained in the fluid are then processed and counted under a microscope. The more inflammation is present deep in the lungs, the higher the count of inflammatory cells. In addition, the type of inflammatory cells is identified (with a microscopic examination), which also helps understand the problems going into the lungs of the patient and find the most appropriate treatment. A video of the BAL technique will be shown.

We performed a large scale study using BAL analysis in 167 horses in the Calgary area. The summary of the results of the study will be presented. Basically, we found that the large majority of the horses had an abnormal BAL, showing some evidence of lung inflammation. Based on the BAL cytology, 28 (17%) horses were Normal and 139 (83%) were Abnormal, with 110 (66%) showing a Mild to Moderate and 29 (17%) a Severe Lower Airway Inflammation. We found that Thoroughbred had more often moderate lung inflammation while Quarter Horses had more often Severe lung Inflammation.

We performed a risk factors analysis: The highest risk factor for horses to develop lung inflammation was to be kept outside. That was surprising considering that usually we think horses are in a better environment outside than inside! However another major risk factor for horses to develop Severe lung inflammation was “feeding with round bales”. Since horses kept outside are 6 times more likely to be fed round hay bales, the major risk factor for horses to develop lung inflammation is to be fed with round hay bale.

Take-home message: Round hay bales are bad for horses' lungs.

Treatment of lung diseases should focus first and foremost on prevention, by decreasing

exposure to dust and molds. This is the best and cheapest way to decrease lung inflammation. We will go over some options available to improve the horses' environment.

The cornerstone medications in RAO and IAD are corticosteroids, because they are very powerful anti-inflammatory drugs. However, with steroids, the more effective they are, the more side effects they are also going to induce. In most cases the side effects are mild, but they have the potential to be catastrophic, like inducing laminitis (also called "founder", where the phalanx bones are detaching or rotating in the hooves). This is why we are now using more and more often inhaled steroids: The same puffers as people with asthma use. The advantage of the puffers is that the active medication stays in the lung and is destroyed when reaching the blood stream. The good about inhaled corticosteroids: They decrease tremendously the risk of side effects. The bad: They are human preparations used at a horse dose, which means that they are expensive. Horses do tolerate very well the handheld inhalation device used with these puffers. I recommend the Aerohippus.

Results of several clinical trials in horses with RAO and IAD treated with various injectable as well as inhaled corticosteroids will be presented. The way to use the Aerohippus will also be shown.

Take-home message: Avoiding dust and molds are the best treatment for lung inflammation. If that is not doable, there are treatment options that can be cheap and simple or go as far as including puffers used for asthmatic people.

Conclusion:

Optimal airflow from the nose down to the lungs is extremely important for horses to perform well. In the first part of the presentation we use a unique and innovative equipment to address obstructions to airflow in the throat (upper airways). In the second part we review recent developments in research on inflammatory diseases that decrease airflow deep into the lungs. These diseases are very frequent in Alberta, and feeding with round hay bales is one of the major contributors to these diseases. Results from research at the U. of C. on treatment options are presented, but the best treatment is prevention by maintaining a good air quality.