
A recent study shows that a common upper respiratory tract condition may respond as well to conservative treatment as to more radical surgical intervention.

Intermittent dorsal displacement of the soft palate, (DDSP) is a common cause of airway obstruction in Thoroughbred racehorses. Affected horses usually make a gurgling sound and suddenly slow down when racing.

In the normal horse, the soft palate fits snugly around the base of the epiglottis (the front part of the larynx) - see fig 1. This allows inhaled air from the nasal passages to pass directly into the trachea. As a result, the horse does not normally breathe through its mouth. The arrangement of the epiglottis and soft palate has been described as being like a button in a button hole.

When the horse swallows, the opening of the larynx closes and the soft palate moves up, allowing food to pass from the mouth into the oesophagus without entering the trachea. Once the bolus of food has passed, the larynx fits back in position in the buttonhole.

Dorsal displacement of the soft palate (DDSP) occurs when the soft palate becomes dislodged from its normal position around the base of the epiglottis, and moves up to sit on top of the epiglottis, in the laryngeal opening (see fig 2). When this occurs during high speed exercise, the high air flow causes the free border of the soft palate to vibrate. This causes significant obstruction to the horse’s breathing and makes the gurgling sound. The horse usually has to slow down and swallow to allow the soft palate to return to its normal position.

What causes DDSP? At the moment, nobody knows for sure, but several factors have been suggested: increased tension in the muscles that pull the larynx backwards; muscle weakness in the soft palate, larynx and/or pharynx - possibly due to previous herpes virus infection. It may be due to lack of fitness, or immaturity in young horses.

The bit has also been blamed for causing DDSP. It may tend to keep the mouth open, allowing air in to push the soft palate upwards. It may also make the horse more likely to swallow.

The unknown cause of DDSP has led to numerous surgical and conservative treatments being developed.

Different surgical techniques have been used with varying success. The aim is to stabilise the junction between the soft palate and larynx, to prevent dislocation at inappropriate times - when the horse is racing. The various methods try to achieve this by either strengthening the soft palate, or preventing the horse drawing the larynx backwards. The success rate with surgical procedures is often reported to be about 60%.

Non-surgical methods include the tongue tie and the dropped (Australian) noseband.

Dr Safia Barakzai and Professor Paddy Dixon, of the Department of Veterinary Clinical Studies at the University of Edinburgh, have been reviewing cases of intermittent DDSP that had been treated conservatively at Edinburgh between 1995 and 2003.

The early cases were diagnosed on the basis of a history of a characteristic respiratory noise gurgling at fast work, with sudden loss of performance. After the arrival of the high speed treadmill in 1999, the diagnosis was confirmed in most cases by endoscopic examination while the horse was exercising...

Conservative treatment was offered to the owners of all horses seen during the study period. However, many opted for surgical treatment.

What do Barakzai and Dixon mean by conservative treatment? They used various different approaches depending on the circumstances of the horse. For
The use of horses in therapeutic riding programs has become popular thanks to the work of organisations such as the North American Riding for the Handicapped Association, and the Riding for the Disabled Association in the UK.

As far as the riders are concerned, the benefits are well recognised. Horse-related activities can develop confidence and improve physical health and psychological well-being. Riding encourages muscle development and fitness, and helps develop coordination and communication skills.

But what of the horses? Do they suffer stress or frustration through being used for therapeutic riding? Does using horses in these programs compromise their welfare?

Dr Lana Kaiser and colleagues at Michigan State University set up a study to assess how horses behaved when used in a therapeutic riding program. Their aim was to see if the horses showed more signs of stress or frustration when involved in therapeutic riding than when they were used for normal recreational riding.

They watched fourteen horses being used in a therapeutic riding program, and recorded the number of stress-related behaviors that each horse showed. Not all of the horses were ridden by all riders.

Seven behaviors were interpreted as signs of stress or irritation: ears pinned back, head raised, head tossing, head shaking, head held down, defecation, and head turning.

One hundred twenty six riders with different degrees of handicap were involved in the study, which extended over a year. The researchers grouped the riders into five categories:

- recreational riders with no handicap
- physical handicap - including cerebral palsy, multiple sclerosis, fibromyalgia, and partial blindness
- psychological handicap - such as autism, down syndrome
- children at risk of poor performance or failure at school - including children with poor school performance or disciplinary action
- children with special educational needs

The research team found that therapeutic riding with children with physical or mental handicaps was no more stressful for the horses than normal recreational riding.

However, horses showed more stressful behavior when ridden by at-risk children than by any other riders, including the children with special educational needs. This was even though the special education children seemed to be at least as disadvantaged as the at-risk children. Dr Kaiser suggests that maybe due to a difference in attitude to the horses between the two groups of children. The at-risk children seemed to treat the horses as tools, while the special education children seemed to develop a greater empathy towards the horses.

Was stress associated with the skill level of the rider? In a separate study the research team looked at a further seven horses while they were being trained by more experienced riders. They found that these horses showed significantly more stress-related behaviors than did the horses in the therapeutic riding program.

Dr Kaiser concludes that it is possible for horses to take part in therapeutic riding programs without adverse effects. As the horses found being ridden by at-risk children more stressful, she suggests that the time each horse is ridden by at-risk children should be limited, both daily and weekly.

For more details see:

Improving the environmental conditions is the most important factor in managing heaves in horses, according to a recent report. Inhaled fluticasone may be helpful in severe cases.

Heaves (recurrent airway obstruction or RAO) is the equine equivalent of human asthma. It is believed to be caused by an excessive reaction to inhaled organic dust - such as molds. Typically the signs get worse when the horse is exposed to moldy hay.

The signs are caused by increased mucus production in the respiratory tract and spasm of the muscles surrounding the larger airways. This has the effect of narrowing the airways and making it more difficult for the horse to breathe.

Most affected horses will improve when moved to a dust-free environment. Being turned out to pasture is usually the best option. Treatment with drugs such as glucocorticoids (“cortisone”) will usually give some relief. But, if the horse continues to be exposed to organic dusts any improvement is likely to be only partial and short-lived.

Dr Laurent Couetil and colleagues, at the Purdue University School of Veterinary Medicine, have been looking at whether the improvement achieved by management changes alone can be enhanced by treating with glucocorticoids .

Glucocorticoid therapy carries the risk of side effects. Most dramatically, in the horse, it has been associated with laminitis. Glucocorticoids also tend to suppress the horse's own adrenal gland, which can lead to problems once the treatment stops.

One way of limiting the side effects is to administer the drugs directly into the respiratory tract. Fluticasone appears to be a suitable glucocorticoid for use by this route in horses. It has been shown to reduce airway inflammation. Unlike some other glucocorticoids it does so without interfering with the horse's adrenal gland function. This may be because any of the drug that is absorbed in the nose or throat is metabolized quickly in the liver before it can have more generalized effects. This appears to be the case in humans.

The horses used for the study had all shown signs of heaves for at least two years. They were assessed at the start of the study. The assessment comprised both a clinical examination and laboratory tests of lung function. The researchers also monitored adrenal gland function.

On the basis of the initial findings, the horses were grouped according to how severely they were affected. Most of the severely affected horses had been receiving hay before the study started.

Some horses in each group were chosen at random to receive one of three treatments: inhaled fluticasone; an inhaled inert substance for comparison; and oral prednisone. After two weeks the dosage of each medication was gradually reduced. From the start of the study, all horses were kept outside on pasture and fed a complete pelleted diet.

The researchers made further assessments two and four weeks after the treatment had started.

Horses in all three treatment groups showed a significant improvement in clinical signs and lung function tests after two weeks of treatment and a dust-free regime. The improvement persisted during the next two weeks of the study when the dosage was reduced.

Adrenal gland function was suppressed by oral prednisone, however, once the dose was reduced it quickly recovered.

The horses that had been the most severely affected before the study began showed the most marked improvement.

The degree of improvement was much the same for all treatment groups after four weeks. So the researchers suggest that the improvement was more likely due to the environmental improvements than to the drug therapy. Nevertheless, horses exhibiting the most severe signs of RAO improved significantly more when treated with inhaled fluticasone during the first two weeks.

They conclude that the most important step in controlling RAO is to improve the environmental conditions. In particular, horses should not be fed hay. Horses with severe RAO may benefit from the administration of inhaled fluticasone.

Reference:
Randomized, controlled study of inhaled fluticasone propionate, oral administration of prednisone, and environmental management of horses with recurrent airway obstruction. Laurent L Couetil, Clayton D Chilcoat, Denis B DeNicola, Shawn P Clark, Nita W Glickman, Lawrence T Glickman. AJVR (2005) 66, 1665 - 1674.
Pyrantel resistance.

Resistance to pyrantel pamoate has been identified in horses receiving pyrantel tartrate daily as part of a worm control program.

Cyathostomes (small redworms) resistant to anthelmintics (dewormers) present a growing problem throughout the world. Of the three main groups of drugs that are used to control roundworms in horses, only the macrocyclic lactones have not yet encountered problems of resistance. Benzimidazole resistance is widespread. Resistance to pyrantel is becoming more common, especially in the south-eastern United States.

Pyrantel pamoate* is used as a single treatment for adult roundworms and fourth-stage larvae in the gut at a dose rate of 6.6mg/kg. It is also effective at double the dose rate against the horse tapeworm Anoplocephala perfoliata.

Pyrantel is unique among the main deworming compounds, being also available (in the USA) for use as a daily preventative. Pyrantel tartrate is fed at a daily dose of 2.64mg/kg. As the drug is present in the gut all the time, the infective larvae are exposed as soon as the horse picks them up from the pasture. Pyrantel paralyzes the larvae and they are removed from the digestive tract by the normal peristaltic movements. The larvae are expelled before they are able to cause any damage or become encysted in the intestinal wall.

However, concerns have been raised that the constant presence of pyrantel in the gut favors the development of resistant worms. This may contribute to the growing resistance problem.

A recent report in the Journal of the American Veterinary Medical Association describes a farm on which a worm control program based on daily doses of pyrantel, broke down due to the development of resistance.

Dr Emily L. Brazik and Dr Jan T Luquire of the Carolina Coastal Equine Veterinary Service, found that horses on a particular farm had a high average fecal worm egg count (FWECE) despite having been maintained on a preventive daily regime of pyrantel tartrate. Further investigation, in association with Dianne Little, research assistant in the gastro-intestinal physiology laboratory at North Carolina State University College of Veterinary Medicine, showed that many of the horses carried cyathostomes that were also resistant to pyrantel pamoate at the full treatment dose of 6.6mg/kg.

The initial problem came to light when, as part of the routine health assessment, FWECS were carried out on all of the horses on the farm. Feces from sixteen horses of mixed breeds and ages was tested. The average count was 478 eggs per gram (epg), although there was a wide range from 0epg to 4075epg. Three individual horses accounted for 85% of the worm egg production. This level of worm egg production would not have been expected had the prophylactic treatment with pyrantel tartrate been effective.

The clinicians went on to carry out a fecal worm egg count reduction test (FWECRT) to determine if the full dose of pyrantel pamoate was still effective.

Nine horses with FWECs greater than 100 epg on the first test were treated with pyrantel pamoate at 6.6mg/kg, and a second fecal sample was tested two weeks later. The treatment was only fully effective in two horses. The rest showed only a slight decrease, or even an increase, in worm egg production.

The authors recommend that:

- Before using pyrantel tartrate as a daily preventative measure, a FWECRT should be performed to check that the cyathostomes on the farm are sensitive to pyrantel pamoate
- FWECs should be used twice yearly to check that pyrantel tartrate is still effective. The problem on this farm was only detected because of the routine fecal testing. If the testing had not been carried out the cyathostome burden in the horses could have built up unchecked, eventually resulting in signs of disease.

A control program should be based on selectively treating individual horses when their fecal worm egg production reaches 200 epg. Often, as on this farm, only a few horses are responsible for most of the worm eggs released onto the pasture. By treating only those with significant worm burdens it is possible to limit the use of anthelmintics (while still maintaining safe control of large strongyles, tapeworms (and ascarids in young horses)). This should help preserve the efficacy of the only remaining drug group that has not yet had resistance reported.

Also, important as ever, pasture hygiene reduces the exposure of the horse to cyathostomes - therefore lower FWEC, and fewer treatments necessary. Removal of feces from pasture, composting feces from stalls before spreading on pasture, resting pastures, cross-grazing, chain-harrowing when dry can all help reduce the need for dosing.

*Pyrantel pamoate is also known as pyrantel embonate (in Europe)

Reference:

Pyrantel pamoate resistance in horses receiving daily administration of pyrantel tartrate. Emily L Brazik, Jan T Luquire, Dianne Little. JAVMA (2006) 228, 101 - 103
Anthelmintics - too much of a good thing?

Resistance among horse roundworms to the drugs used to control them is a growing problem. Significant resistance has been reported both to the benzimidazole group (drugs such as fenbendazole) and to pyrantel. The only commonly-used anthelmintics to be widely effective are ivermectin and moxidectin. However, the large roundworm *Parascaris equorum* has been reported resistant to both of these drugs in both Europe and North America, and it is expected that the other roundworm species will follow. No new drugs are expected in the near future, which makes it even more important to delay the development of resistance.

In many countries, horse owners have unrestricted access to anthelmintics. As a result, veterinarians have little influence on the control strategies that are used. This has often led to the frequent deworming of horses, and often using a different product each time.

Excessive use of anthelmintics, and the rapid rotation of the different classes of drug, are now thought to encourage the spread of resistance.

The uncontrolled use of dewormers has led to calls for more restrictions on their availability. One of the most strict regulatory regimes is found in Denmark. In that country, products for deworming horses are available only on prescription. Legislation introduced in 1999 requires veterinarians to make a diagnosis before treating for worms and bans the preventive use of any anthelmintic.

Have the legislative changes influenced the way Danish equine vets approach worm control? Researchers at the Royal Veterinary and Agricultural University at Frederiksberg, Denmark carried out a study to find out. The research was based on a questionnaire sent out to all practices involved in equine work in Denmark.

Almost all of the vets that replied to the questionnaire used faecal worm egg counts (FWECS) to diagnose and monitor worm problems. The most popular time of year for doing FWECS was during the grazing season, with peaks in April and September. Treatments followed a similar pattern.

Larval cultures were used by 41% of those replying to the questionnaire. Different species of redworms produce eggs that look the same. Larval culture is used to identify species such as *Strongylus vulgaris*, which is responsible for damage to the arterial blood supply to the intestines. It tended to be the larger practices and those with predominantly equine work that used larval cultures.

Cyathostomins were reported to be the most significant problem, followed by the large strongyles (large redworms - such as *Strongylus vulgaris*) and *Parascaris equorum* (the large roundworm found commonly in foals).

Tapeworms were not considered important although they have been implicated in spasmodic colic and ileal impaction. The researchers suggest that this might be because faecal samples are unreliable for confirming tapeworm infection. A blood test gives a better indication of the level of infection but is more expensive.

How has the legislation altered the Danish approach to parasites in horses? A previous survey carried out in the country in 1995, found that horses were treated four times a year, using an average of 2.4 different products. So it seems that horses are not wormed as frequently now. It remains to be seen if the legislation will slow the development of resistance.

It was interesting that despite the greater involvement of veterinarians in controlling the use of anthelmintics, only 11% of those that completed the questionnaire routinely tested for anthelmintic resistance. Perhaps this was because most vets preferred to use ivermectin, a drug to which cyathostomins have not yet developed resistance.

The researchers conclude that, in Denmark, vets are now more involved in developing worm control strategies than they had been previously. But they recommend that more effort should be taken to monitor the effectiveness of the drugs used.

For more details see:

Prescription only anthelmintics - A questionnaire survey of strategies for surveillance and control of equine strongyles in Denmark.


RSS feeds now available.

No, not another advance in equine nutrition, but an additional way to receive news from Equine Science Update.

In response to webmasters’ requests for news they could use on their websites, we have now produced feeds on various topics.

So far we have feeds dedicated to equine nutrition, behaviour and lameness. Others are planned for the near future.

For more details see: [www.equinescienceupdate.co.uk/rssfeeds](http://www.equinescienceupdate.co.uk/rssfeeds)
Equine recurrent uveitis (ERU, also known as periodic ophthalmia or moon blindness) is a common condition of horses around the world. Typically, affected horses suffer repeated episodes of inflammation within the eye (“uveitis”). Among the most significant effects are the formation of adhesions (“posterior synechiae”) between the lens and the iris, and the development of cataracts. One or both eyes may be involved. ERU causes progressive damage, often leading to partial or complete loss of vision.

The condition appears to be a delayed type hypersensitivity reaction although the exact mechanism is unclear. Many affected horses show evidence of current or past infection with Leptospira spp. In some cases live leptospires can be isolated from within the eye.

If at least some cases of ERU are caused by leptospora, would vaccinating affected horses against the microorganism reduce the number of recurrent episodes and slow down the progression of the disease? Vaccination might help by reducing the risk of repeat infection with leptospora. On the other hand, it might make the condition worse by boosting the immune reaction to any leptospira that are present.

Investigators at the University of Tennessee College of Veterinary Medicine, at Knoxville, have been conducting a study to see whether vaccination could play a part in the management of ERU. The study, led by Dr Barton W Rohrbach, assessed the effect of vaccination on antibody levels and signs of ERU in horses with the disease.

A total of 41 horses with ERU completed the study. Regardless of whether or not they were vaccinated, all horses received the standard medical treatment for equine recurrent uveitis.

In addition, they were divided at random into two groups. Horses in the treatment group were each vaccinated. The researchers used a commercial leptospora vaccine that was marketed for use in pigs. They chose this particular vaccine as it contained 6 strains of leptospora, including L. bratislava, which is commonly found in horses.

Horses in the control (untreated) group were injected with a placebo, which appeared identical to the vaccine but contained only the aluminum hydroxide adjuvant. (An adjuvant is a substance added to a vaccine to enhance the response to the antigen. Aluminum hydroxide produces a granuloma, which releases the antigen slowly and so prolongs the stimulating effect of the vaccine. It has no antigenic action in itself.)

During the study, only Rohrbach knew which horses were receiving the active vaccine or the placebo.

All of the other researchers and staff were unaware of which horse were being treated with the active vaccine. This reduced the risk of bias in the results.

Horses were given an initial vaccination, followed by booster injections after one month, six months and a year. The research team found that the vaccine was safe. Only one horse had a localized reaction to it.

Before each injection, the investigators collected blood samples to check the antibody levels, and examined the eyes.

They found that vaccinated horses went longer between episodes of ERU than did unvaccinated ones. However, vaccination did not slow the development of the disease. Adhesions and cataracts continued to get worse despite the reduction in number of episodes of ERU.

It was perhaps surprising that the horses that had the most episodes of ERU did not necessarily have the worst signs at the end of study.

Dr Rohrbach concludes that the benefits of vaccination are not sufficient to justify the use of leptospira vaccination in addition to standard treatment for ERU.

For more details see:

Many horses are partial to an occasional mint. But what other flavors would they prefer if they had the choice?

A recent study carried out at Southampton University’s Equine Behavior Centre, by Dr Debbie Goodwin and colleagues, looked at the preference of horses for various different flavors.

Eight horses were involved in the study. The investigators started with fifteen flavors. They eliminated three (echinacia, coriander and nutmeg) as these were not accepted by all the horses in an initial trial. One horse refused to eat food flavored with echinacea or coriander. And three did not eat all of the food when it tasted of nutmeg, or echinacea.

Apple, turmeric, garlic, and ginger flavors were accepted by all of the horses. But foods with these flavors added were not eaten as quickly as the other flavors. The eight flavors that were eaten the most quickly were chosen for the second part of the study: banana, carrot, cherry, cumin, fenugreek, oregano, peppermint and rosemary.

The researchers went on to determine the horses’ order of preference for the flavors. They offered the horses a choice of two small meals with different flavors in each test. Eventually each horse had been offered all combinations of flavors. The investigators then calculated the preferred flavor overall. Fenugreek and banana came top of the preference list, followed by cherry, rosemary, cumin, carrot, peppermint, oregano.

Finally the researchers assessed the effect of the two most popular flavors (fenugreek and banana) on the acceptability of mineral pellets.

Unflavored mineral pellets were relatively unpalatable. On average, it took 195 seconds for them to be eaten. In fact two horses failed to eat all the unflavored pellets they had been given.

In contrast, horses took an average 66 seconds to eat the pellets flavored with fenugreek and only 52 seconds to eat those flavored with banana. The difference between the two was not statistically significant. Both flavors appeared to be effective in encouraging horses to eat the relatively unpalatable mineral pellets. There was some variation between individual horses. Some horses preferred one flavor over the other.

The research showed that horses accept a wide range of flavors - more than are used currently in formulating commercial diets and medications. Adding preferred flavors to the concentrate food, or to unpalatable mineral supplements, can make them more acceptable.


Photograph kindly supplied by Dr Debbie Goodwin

Research shows that a yeast may be helpful in the treatment of acute diarrhea in horses.

Severe sudden diarrhea due to enterocolitis is a feature of several potentially life-threatening diseases such as equine monocytic ehrlichiosis (Potomac horse fever) and clostridiosis. It may follow treatment with antibiotics.

However, in about 60% of cases it is not possible to identify a specific cause, so treatment tends to be symptomatic. Typically intra-venous fluids are given to replace the lost fluids and electrolytes. In addition, other treatments may be administered with the aim of maintaining the normal bacterial population within the digestive tract. But, despite the widespread use of products such as probiotics, live yoghurt, or a suspension of feces from a healthy horse, there is little scientific evidence to support their use.

In humans, the yeast, *Saccharomyces boulardii*, a subtype of *Saccharomyces cerevisiae*, has been reported to be effective in preventing diarrhea associated with antibacterial treatment, and as part of the treatment regime for colitis due to *Clostridium difficile*. It also shows promise for treating chronic diarrhea associated with acquired immune deficiency syndrome and traveler’s diarrhea in people.

With that in mind, investigators led by Dr Anne Desrochers at the University of Pennsylvania set up a study to assess its value in horses.

In a preliminary study they did not find *Saccharomyces boulardii* in the feces of normal horses. When the yeast was fed to healthy horses it was able to colonize the gut within five days. However this was short lived. The researchers were not able to isolate the organism in the manure of treated horses ten days after they had stopped feeding it.
None of the treated horses showed any adverse effects.

The second stage of the investigation looked at the effect of the yeast in horses with acute diarrhea, which had been admitted to the George D Widener Hospital for Large Animals at the University of Pennsylvania. Fourteen horses with severe watery diarrhea that had been present for less than 48 hours were included in the trial.

All horses received the standard anti-diarrheal treatment. In addition, half of the horses were given 25 grams of Saccharomyces boulardii (10 x10⁹ yeast cells) mixed in molasses. The other seven were given just molasses.

The researchers found that the watery diarrhea cleared up more quickly, and the gastro-intestinal disease did not last as long, in horses treated with Saccharomyces boulardii.

The findings suggest that combining Saccharomyces boulardii with conventional treatment for diarrhea may be more effective than the conventional treatment on its own. It may help reduce the severity and duration of diarrhea in horses with acute enterocolitis.

How does the yeast have its beneficial effect? The researchers suggest some possible mechanisms. The yeast appears to release enzymes that inactivate the toxins produced by Clostridium difficile. It may also stimulate the local immune defenses in the intestines - for example by stimulating the release of immuno-globulins. It may even have a direct effect on some disease-causing bacteria. Adhesion sites have been identified on the yeast that are specific for certain strains of Salmonella and E. coli.

For more details see:
Efficacy of Saccharomyces boulardii for treatment of horses with acute enterocolitis.
Anne M Desrochers, Brett A Dolente, Marie-France Rot, Raymond Boston, Sharon Carlisle.

Grass sickness is found in various countries throughout the world, but is a particular problem in Britain.

The disease is associated with damage to the autonomic nerves. Of greatest significance is the damage to the nerve supply to the gastro-intestinal tract. Affected animals are unable to swallow and show varying degrees of gastro-intestinal dysfunction. Other signs include patchy sweating and a heart rate higher than would be expected for the degree of pain that the horse shows.

In almost all cases the disease is fatal. Occasionally, mildly affected cases that still show an interest in eating may survive with intensive nursing. However,

Several tests have been described to help confirm that a horse has grass sickness.

The inability of the horse to swallow can be demonstrated using a barium swallow. Food containing barium, which shows up on radiographs, is fed and its progress down the oesophagus is followed by a series of radiographs.

Phenylephrine eye drops can be used to reverse the drooping of the upper eye lid (“ptosis”) that is often seen in horses with grass sickness. The drops have a greater effect on the ptosis associated with grass sickness than that caused by other conditions.

The gold standard test is to look for characteristic damage to the nerves in a biopsy of the lower small intestine (ileum). But to do this, the horse has to be anaesthetised.

Similar nerves are also present in the rectum, which is more accessible for sampling. A rectal biopsy can be taken without anaesthetising the horse and so is a much simpler procedure. But so far, rectal biopsies have not been reliable for confirming the disease.

Now recent work suggests that the accuracy of rectal biopsies for diagnosing grass sickness can be greatly improved if two or more samples are examined.

Dr Andrew Wales and Ms Katherine Whitwell, carried out the work at the Animal Health Trust’s laboratory in Newmarket, England.

They took samples of the rectal lining from fourteen horses that had been diagnosed with grass sickness at post mortem examination. They compared these samples with those taken from ten horses not affected with grass sickness.

First, they looked at whether there was a preferred site for taking the biopsy. Was a sample taken from a certain position in the rectum more likely than others to yield a useful result? They found that there was no consistent pattern of nerve distribution. So if only a single biopsy sample is collected there is a significant risk that it will not contain enough nerve cells to be able to make an accurate assessment.

However, when two or more samples were taken they found that the accuracy improved. In horses known to have grass sickness they found at least three damaged (chromatolytic) nerve cells when they examined four sections of each of two rectal biopsies. They correctly identified 71% of grass sickness cases.

They found that specialised stains did not give any benefit over the standard staining technique using haematoxylin and eosin. Damaged cells were shrunken with a pink non-granular cytoplasm and shrunken nuclei at the edge of the cell.

Modern sample preparation techniques allow sections of the biopsy to be examined within a few hours of collection. So, in the hands of an experienced pathologist, this method could give a rapid confirmation of grass sickness.

Read more about grass sickness in the next Equine Science Update e-news. See: www.equinescienceupdate.co.uk for details.
Thorn apple poisoning.

The danger of feeding hay contaminated with poisonous plants has been highlighted by a report in the Veterinary Record. The authors describe how horses became ill after eating Lucerne hay containing thorn apple.

Thorn apple, *(Datura stramonium)*, is also known as Jimsonweed, Jamestown weed, Moon Flower, stinkblaar, and olie-boon. It is a member of the solanacaea family, a close relative of *Atropa belladonna*, the deadly night shade.

Over 50% of the bale was *Datura stramonium* (left). Photo kindly supplied by Dr Francisco Soler-Rodriguez.

It has a characteristic appearance with large, jagged leaves and single tubular white flowers. The fruits form green spiny capsules containing numerous brown or black seeds.

The plant contains two main toxins: L-hyoscyamine, (which is partly converted to DL-hyoscymine (=atropine) as the plant dries), and scopolamine. The two alkaloids have similar parasympatholytic properties. They reduce the activity of sweat and salivary glands and bronchial glands, and inhibit gastrointestinal activity. They also have effects on central nervous system.

All parts of the plant contain the toxins, which are not inactivated by drying. Animals do not find the fresh plant particularly palatable. So they rarely consume enough to make themselves ill. However, when dry, the plant becomes more acceptable.

Most previous reports of poisoning of horses by thorn apple have involved the contamination of grain mixtures with seeds.

Once horses were prevented access to the contaminated hay, no further cases occurred.

Analysis of the hay by Dr Francisco Soler-Rodriguez and his colleagues, at the University of Extremadura, at Caceres in Spain showed that *D stramonium* accounted for over half the contents of the bale that was examined.

The report’s authors emphasise the importance of considering plant poisoning when investigating outbreaks of colic. They also highlight the potential risk of buying cheap hay, which may be of poor quality. They recommend that, at least, the hay should be inspected to make sure it contains no poisonous plants.

Reference:

*Datura stramonium* poisoning in horses: a risk factor for colic.

Dr Abel Martin, a veterinarian in Talavera de la Reina, near Toledo, Spain, attended an outbreak of colic among a group of horses. The horses started showing signs of colic three days after they had started to eat a new batch of lucerne hay, which was contaminated with *D stramonium*.

Four horses showed signs of colic, three improved with treatment and withdrawal of the contaminated hay. One horse died after its stomach ruptured.

Wales and Whitwell conclude that early examination of two or more rectal biopsies could be used to confirm the diagnosis in sub-acute or chronic grass sickness. This could remove the need for an ileal biopsy under general anaesthesia.

They emphasise that this was a post-mortem study. The value of the technique needs to be confirmed in tissues obtained from live cases.

For more details see:

Potential role of multiple rectal biopsies in the diagnosis of equine grass sickness.
AD Wales, KE Whitwell.

Details have just been released of the Conference on Equine Sports Medicine and Science, to be held in Cambridge this summer. It promises to be a rare opportunity to listen to and question many of the world’s leading authorities on the management of muscle, tendon, joint and bone disease.

The Conference runs from July 21 - 23, with seminars on July 20 and practical courses on July 24.

Full details of the program and speakers are available on the CESMAS website, www.cesmas.info.
Assessment and foot care for limb deformities in foals.

At a recent meeting at Addington Manor, near Buckingham, leading UK farrier, Simon Curtis, described how he assessed foal conformation and what, as a farrier, he could do for medio-lateral deformities.

To properly assess the foal's conformation, he required a level surface 3-4 meters by 20 meters. So you can walk around the foal and inspect it from all sides, and you can have the foal walked up and down.

The first step is to make a static assessment. He stressed the importance of looking from the front of the horse, not the front of the horse. If we only assess from the front of the horse, the leg may appear to be deviated from the fetlock when in fact the leg is straight.

Walking is often a better way of assessing them. With each step any deviation is exaggerated as the foal bears weight. He advised “concentrate on the front legs when the foal is walking towards you and the hind legs when it walks away.” If necessary, repeat the process. “Walking the foal is a great way of spotting any slight deviations.”

Thirdly look at the leg to see how the hoof relates to the leg (“eye-lining”). Even in one month old foals with a slight deviation, there may already be a distortion of the hoof capsule. The hoof problem is caused by the limb deviation.

These problems relate to every breed of horse; not just Thoroughbreds. They are all entitled to good hoof care from an early age.

He pointed out that the foal's hoof grows more quickly (15mm/month) than that of a mature horse (9mm/month). So he recommends that foals should have their feet trimmed from 4 weeks of age, and should be trimmed every four weeks.

He described three categories of medio-lateral deformities.

Rotational.

The leg is rotated outwards. A huge proportion of these correct themselves. The hoof tends to collapse on the inside and flare on the outside. “I think the farrier’s job is just to balance the foot and keep their fingers crossed,” he said. “I do not believe it is possible to turn the leg in by trimming the foot. It is certainly possible to make matters worse by over zealous foot trimming.”

Offset knee.
The forearm and the cannon bone do not appear to line up through the knee (carpus). This deformity is always associated with a varal deformity of the fetlock (see below). If severe, the foal will not go on to be an athlete. More subtle cases cannot be fixed by either the farrier or by surgery. But by keeping the pastern and cannon in better alignment, the farrier can reduce the incidence of splints on the inside of the leg.

Angular limb deformity.

There is a clear angulation of the limb when viewed up through the knee. The angulation is caused by one side of the limb growing faster than the other. It usually occurs at one of the growth plates (or physes) which are responsible for most of the increase in length of growing bones.

Carpal valgus - in which the leg bends outwards below the knee - is the most common. Fetlock varus, an inward deviation of the limb below the fetlock, is the next most common deformity and is often found with carpal valgus. “The good news is that they respond well to farriery, or to surgery in severe cases” he said. “What we do is to reduce the stresses in the leg and the horse straightens the leg itself.”

Carpal varus - where the leg bends inwards from the knee downwards (giving a bow-legged appearance) is very rare.

Often foals display a combination of problems. Curtis emphasized the importance of not concentrating on one and ignoring another.

All foals are slightly valgus when born, and straighten as they grow. He explained that some compression on the growth plate increased the rate of bone growth. But excessive compression reduced the growth rate and made the deviation worse.

There is a window of opportunity for treating angular limb deformities. It is only possible to make changes to the fetlocks up to three months of age - that is why you must check your foals early.

For deviations at the knee there is far longer - up to twelve months. He pointed out that these times are not the same as the published times for closure of the growth plate, which are slightly longer. Making significant corrections to the shape of the leg is only possible during the period of rapid bone growth.

Trimming to correct medio-lateral deformities.
The aim when trimming the foot is to:
- put the foot in balance with the pastern
- correct distortion and wear of the hoof capsule
- reduce uneven compression.

He emphasized the importance of not over correcting. “It is much better to trim level at two week intervals.”

What can be done if there is not enough hoof to allow adequate trimming? Extensions can be fixed to the inside (or outside) of the foot depending on the deformity. Curtis uses polyurethane for extensions, rather than shoes. You can trim the extensions as you would the foot, according to the same principles.

He suggested one reason extensions are effective is that they put the foot where it should be. But probably of greater importance is that the extension reduces compression in the leg by moving the limb under the body.

But he warned “You can be over aggressive with extensions and can cause deviation of the hoof.”

“We mustn't think that farriers work in isolation. Other things need looking at - management, feeding exercise, maybe surgery or shock wave treatment. But it doesn't make sense to start putting implants in the leg without first working on the foot.”
Recent research has sought to identify factors that increase the risks of musculoskeletal injury in athletic horses. Many factors may be involved such as racing surface, race conditions, and the horse's experience, fitness, and pre-existing injuries. Conformation also plays a part, but so far there has been little scientific work to investigate the influence that it has on racing injuries. Over the years the significance of conformation has usually been subjective and has been based on personal experience and opinion.

Professor Wayne McIlwraith, of Colorado State University, reported on work that his research team had conducted to get objective data on the significance of equine conformation. Speaking at the Thoroughbred Breeding and Racing seminar in Cheltenham, he described the results of a two-part study to investigate the relationship between conformation and musculoskeletal problems in racing Thoroughbreds.

The first part of the study looked at change in conformation with age. The aim was to take objective measurements of conformation and assess how they changed from weaning to 3 years of age. Various lengths and joint angles were measured from photographs taken from in front, behind, and from the left side of each horse. A measuring stick included in all the photographs allowed accurate measurements to be made.

The study revealed some interesting findings, which contradict a few commonly held beliefs. They found that the length of the forearm is highly correlated to the height at the withers. So, a long forearm simply means the horse is taller - not necessarily faster.

Contrary to popular belief, the angle of the scapular spine (shoulder) is not correlated with pastern angle. They also found that, in young animals, visual assessment of the scapula angle might not be accurate.

As the horse ages, the angles of the shoulder, shoulder joint and knee increase, and the leg becomes straighter. The adult height is due to both growth of the long bones and change in angle of the joints.

They found that knee conformation changed from being "back at the knee" in foals and weanlings, to "over at the knee" at three years of age. They advise against selecting foals or yearlings that are over at the knee.
knee, as they are likely to get worse as they mature. On the other hand, a foal that is back at the knee will probably improve.

Having established a reliable system for recording conformation, the scientists looked at the effect of conformation on racing soundness. They assessed the conformation of 115 Thoroughbreds, firstly when they were foals and then yearly until they were three years old. When the horses entered training they were examined at least weekly and any abnormalities were recorded.

Carpal valgus, ("knock-knees") in which the front feet are further apart than the knees, is commonly seen in foals. Affected foals are often subjected to surgery to "correct" the perceived abnormality. However, the study showed that a small amount of outward deviation at the knee is beneficial. A small degree of carpal valgus actually reduced the risk of knee fracture when the horse started racing. Horses that were straight in the knee were more likely to have a knee fracture than were those with carpal valgus.

McIlwraith recommended that surgery to correct carpal valgus is rarely indicated. Only foals with severe deviation at the knee (more than 10°ba) should be treated. On the other hand, carpal varus ("bow-legged") is a problem and should be treated.

Among other things, they found that horses with longer necks were more likely to develop swollen front fetlock joints, possibly due to increased weight. (An increase in neck length of 10cm increased the risk of fetlock joint swelling by 5.1 times). They also found that an increase in shoulder length actually decreased the risk of knee fracture or forelimb fracture. On the other hand, increased length of the front pastern gave an increased risk of forelimb fracture.

Prof McIlwraith pointed out that the study was based on elite horses. So some conformational abnormalities, such as sickle hocks or back at the knee, were not seen. However, he has noticed that Quarter horses with chip fractures of the knee are invariably back at the knee. He suggested that similar studies need to be performed on a wider range of horses to assess the significance of other features.

For more details see:
