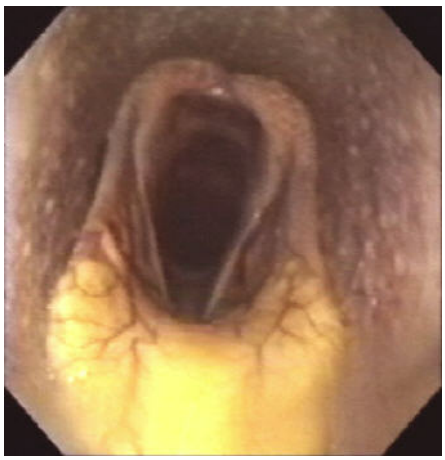
Equine Science Update

Reports from the world of equine research

Spring 2007

Progressive laryngeal paralysis.

The larynx is an important site of performance-limiting abnormalities in the horse. It acts as a shutter to keep food material out of the lower airway. When the horse breathes in, the arytenoid cartilages and the attached vocal folds are pulled wide open (abducted) to allow the air to pass. Any significant obstruction to air-flow through the larynx may limit the horse's performance.



Horse 1-first exam: This is the endoscopic appearance of the larynx of a three year Thoroughbred during maximal exercise. Note the fully abducted laryngeal cartilages.

Horse 1-second exam: This is the same horse during the second treadmill examination. Note the dynamic collapse of the left arytenoid cartilage and vocal fold.

Photos courtesy of Dr Elizabeth J Davidson, University of Pennsylvania

A common cause of laryngeal dysfunction is idiopathic laryngeal hemiplegia (ILH). This condition is also known by various other names such as recurrent laryngeal neuropathy (RLN), laryngeal paralysis, roaring and whistling.

Only one muscle, the crico-arytenoideus dorsalis, is responsible for abducting the arytenoid cartilage. Degeneration of the recurrent laryngeal nerve that innervates it leads to weakness of the muscle. If there is marked paralysis it may be possible to detect the muscle wastage by palpating the larynx. As a consequence the affected side of the larynx (usually the left side) hangs into the airway, causing obstruction to airflow. In the most severe cases the arytenoid cartilage and the vocal fold on the affected side may be sucked across to partly obstruct the airway when the horse is breathing heavily.

A flexible endoscope allows the function of the larynx to be assessed. Various systems of grading the severity of the laryngeal dysfunction have been described, with the aim of identifying horses whose performance will be significantly affected. Laryngeal function at rest does not correlate well with laryngeal function during exercise. The best way to confirm questionable cases of ILH is endoscopic examination while the horse exercises on a treadmill.

The picture is complicated further by the fact that some horses show signs of deteriorating laryngeal function over an extended period. Vets at the Widener Hospital for Large Animals, at the University of Pennsylvania's New Bolton Center, have described three race horses in which the signs of ILH deteriorated. Videoendoscopic examination of the larynx while the horses exercised on a high-speed treadmill, was used to document the changes.

One three-year-old Thoroughbred was examined for poor performance. At rest, the horse showed partial paralysis of the left side of the larynx (grade 3/4) , but it was able to fully abduct the arytenoid cartilages and keep them fully open when exercising on the treadmill. The vets also found signs of pulmonary haemorrhage and inflammatory lower airway disease, which they treated. The horse resumed its successful racing career.

Eighteen months later it again suffered exercise intolerance associated with upper respiratory tract noise. At rest, the left arytenoid was partially paralyzed (grade 3/4) and at exercise the left arytenoid

continued

cartilage and vocal fold collapsed completely, obstructing the airway.

Another three-year-old Thoroughbred was examined on two occasions a year apart. Initially, there was dysfuntion of the left arytenoid (grade 2/5) at rest, but normal function at exercise. A year later, the larynx appeared slightly worse at rest (grade 3/5), but collapsed completely at exercise. There was also palpable muscle wastage over the left side of the larynx.

The other example was a three-year -old Arabian, which showed progression of signs over a two-month period.

This work highlights the value of video-endoscopy of the upper respiratory tract during exercise to assess horses with suspected upper respiratory tract problems. It also confirms that idiopathic laryngeal hemiplegia can be a progressive disease.

For more details see:

Use of successive dynamic video-endoscopic evaluations to identify progression of recurrent laryngeal neuropathy in three horses.
Elizabeth J Davidson, Benson B Martin Jr, Eric J Parente.
JAVMA (2007) 230 555 - 558.

Encouraging sweet itch trial.

Sweet itch is the most common allergic skin disease in horses. All breeds can be affected, some more than others. Once a horse has had sweet itch, the condition tends to recur and get worse each year.

Currently there is no effective treatment for this disease. Various methods are used to try and prevent it, but overall the response is disappointing.

Over the past three or four years BioEos Ltd. and the National Sweet-Itch Centre have been working to develop a safe and effective treatment for sweet itch. Professor John Stanford explains "Sweet itch is a problem caused by an excessive reaction to the bites of midges. It begins with an intolerably itchy allergic reaction to the saliva of the midge, which is then followed by an autoimmune over reaction as the horse's immune system attempts to right the original wrong."

BioEos Ltd. have developed a product based on a suspension of an heat-killed bacterium (*Tsukamurella inchonensis*). This stimulates the horse's immune system to respond to midge bites in a normal way rather than in the excessive way seen in sweet itch. Stanford adds that a similar approach has been used in human medicine to treat eczema and asthma.

One practical difficulty has been to determine the optimal treatment protocol. "We began with injections alone and have moved on to a set of three priming injections, given by the vet, before the midge season starts. This is followed by treatment with capsules that can be given by mouth throughout the season."

Professor Stanford has released preliminary results of the 2006 trial, which involved nearly 300 horses. So far, reports have been received from 217 owners. The treatment was reported to have been successful in 151 horses (69%) but made little difference in 66 horses. Horses treated in 2005 showed further improvement with treatment in 2006.

Nine horses showed no signs of sweet itch throughout the midge season. 69% of owners reported that the sweet itch was better than the previous year, 22% thought it was the same. Only 8% of owners thought that the sweet itch was worse than the previous year. There were very few reports of even minor side effects. " We are very pleased with these results" states Professor Stanford.

A further trial, which will probably be the last one before those needed for international regulatory purposes, is already under way, starting in 2007.

For more details see:
www.sweet-itch.co.uk/trials.html

Cracking the code : Horse Genome Assembled.

The first draft of the horse genome sequence has been published and is freely available for use by researchers around the world.

The Horse Genome Project began with a workshop meeting in Lexington KY in 1995. Scientists from the United States, Europe, Asia, Australia, New Zealand and Africa cooperated to develop increasingly detailed versions of equine gene maps and related genetic tools for equine research.

This work has already help identify the causes for several inherited disorders of horses such as hyper-kalemic periodic paralysis (HYPP) and overo lethal white foal syndrome.

Sequencing of the domestic horse genome started in 2006, and built on the work of the Horse Genome Project. A team led by Dr. Kerstin Lindblad-Toh, at the Eli and Edythe L. Broad Institute of the Massachusetts Institute of Technology and Harvard University, in Cambridge, Mass., carried out the sequencing and assembly of the horse genome.

The "genome" is the term used to refer to an individual's full set of DNA. In the horse, it consists of about 2.7 billion base pairs. DNA carries the genes that code for thousands of different kinds of proteins. The precise characteristics of each gene is determined by the sequence in which four chemical building blocks - adenine (A), thymine (T), cytosine (C) and guanine (G) - are laid out along the DNA's double-helix structure.

They have identified the complete sequence of base pairs in the DNA of a single horse, a Thoroughbred mare called Twilight. A simple blood sample was all that was needed to provide the DNA for the work.

Researchers have sequenced the genome of Twilight, a Thoroughbred mare from Cornell University in Ithaca, NY.
Photo courtesy Dr Doug Antczak.

This information will make it easier to identify diseases with a possible genetic component. It should be possible to work out how genes exert their effect in different disease processes. In the same way, genes that regulate desirable traits could be identified and studied. It opens up a wide range of research topics. Eventually it will be possible to locate every horse gene and identify its exact DNA sequence.

Scientists have not only worked out the sequence of the 2.7 billion base pairs in this particular horse. They have also produced a map of horse genetic variation using DNA samples from a variety of modern and ancestral breeds, such as the Akel Teke, Andalusian, Arabian, Icelandic, Quarter, Standardbred and Thoroughbred. The map contains a million signposts of variation called single nucleotide polymorphisms, or SNPs, (pronounced "snips"). It will provide scientists with an indication of genetic variability in horses.

The researchers now plan to further improve the accuracy of the horse genome sequence and expect to deposit an even higher resolution assembly in public databases. Comparing the horse and human genomes will help medical researchers learn more about the human genome and will also serve as a tool for veterinary researchers to better understand the diseases that affect equines.

For more details see:

http://www.nih.gov/news/pr/feb2007/nhgri-07.htm

Leptospira common in British horses.

A recently published study shows that leptospiral infection is common in British horses.

Leptospira are thin, spiral or coil-shaped bacteria. The species that infects animals and man is Leptospira interrogans. But, by using serotyping, many different sub-types or "serovars" can be identified.

Infection occurs through intact mucous membranes, or through cuts and abrasions on the skin.

Leptospira have been implicated in various disease conditions in horses including: equine recurrent uveitis ("periodic ophthalmia"), liver disease especially in newborn animals, and abortion. However, many horses carry antibodies to leptospira without showing signs of disease.

Some serovars are better adapted to infecting certain hosts than others. These "host-adapted" serovars tend to cause less severe disease, and may continue to be excreted for longer in the urine of infected animals.

Different serovars are important in horses in different parts of the world. For example, the serovars Pomona and Grippotyphosa are the main ones found in horses in Eastern Europe. Pomona is also commonly found in the USA and South America. In Northern Ireland, Bratislava is the serovar that most often affects horses. It is also the serovar most commonly detected in samples from pigs and dogs in the UK.

To determine the extent of leptospiral infection in the UK horse population, Dr Ken Smith, now Professor of Companion Animal Pathology at the Royal Veterinary College in London, but previously Head of Pathology at the Animal Health Trust in Newmarket, and Charlie Dalley of the Veterinary Laboratories Agency at Weybridge, conducted a serological survey.

They tested 873 equine blood samples that had been submitted to the Animal Health Trust. Writing in the DEFRA/AHT/BEVA Equine Quarterly Disease Surveillance Report, they report that 25.2% of the sera tested were positive to one or more serovars. Half of all positive sera were positive to two or more leptospiral serovars. Bratislava was the predominant serovar in the blood samples tested.

What is the source of infection for these horses? Smith and Dalley point out that leptospira of the serovar Bratislava have been isolated from a variety of wildlife (including hedgehogs, rats, wood mice, short- and long-tailed voles and badgers) and from pigs and dogs. Any of these wild or domesticated species could be a source of Bratislava serovar infection in horses.

They conclude that leptospiral infections are common in horses in the United Kingdom. Further work is needed to establish whether those infections are associated with clinical disease.

For more details, see the Equine quarterly Disease Surveillance Report, which is available at:

http://www.aht.org.uk/equine_disease.html

http://www.beva.org.uk

http://www.defra.gov.uk/animalh/diseases/vetsurveillance/species/horses/index.htm

Causes of donkey impaction.

Impaction is recognised as a common cause of colic in donkeys. But so far, little is known of the causes of the condition.

Dr Ruth Cox, with colleagues at the Liverpool Vet School and vets at the Donkey Sanctuary have been investigating the causes of impaction colic in donkeys.

A report of their work is published in BMC Veterinary Research.

They had access to the clinical records of 4596 donkeys kept on farms in the south -west of England. Between January 1, 2000 and March 31, 2005, the records showed that there had been 807 cases of colic. Further inspection showed that 54% of the colic episodes were attributed to impaction of the gastro-intestinal tract.

Impaction colic was fatal in about half (51%) of affected donkeys. This mortality rate is higher than the similar figure for horses. The scientists suggest that this may be partly explained by the advanced age of many of the donkeys included in the records. The average age of donkeys in the study was 25 years.

More cases of colic occurred in the autumn. This coincided with a change to winter housing and was associated with a change of diet and reduced exercise.

Further analysis of the records showed that older donkeys, those fed extra rations and those that had suffered previous bouts of colic were all at greater risk of developing impaction colic. Donkeys with a history of colic were seven times more likely to suffer colic than were donkeys that had not had the condition before.

Previous musculo-skeletal problems also increased the risk of getting an impaction. Donkeys with dental disease were more likely to suffer impaction colic than those without dental disease.

The scientists conclude that colic affects the health and welfare of this ageing population of donkeys. Both the incidence and the mortality rate are high compared to other equine populations. Having identified some of the risk factors, they suggest that it may be possible to manipulate them to reduce the incidence of colic. In particular they emphasise the importance of regular dental attention.

For more details see:

Epidemiology of impaction colic in donkeys in the UK
R Cox, CJ Proudman, AF Trawford, F Burden, GL Pinchbeck
BMC Veterinary Research (2007) 3, 1

Reducing disease spread by flies.

Biting flies are a nuisance and can spread disease. The tabanid family (often referred to as horse flies or deer flies) contains a number of species that are frequent pests of horses.

Only female tabanids feed on blood. Their mouthparts are adapted for cutting and rasping the skin and then sucking up the blood and tissue fluid. Different species have different preferred feeding areas. Some feed mainly under the belly; others prefer the legs or the neck and withers.

The males have no biting mouth-parts so cannot feed on blood. They survive on honeydew and nectar from flowers.

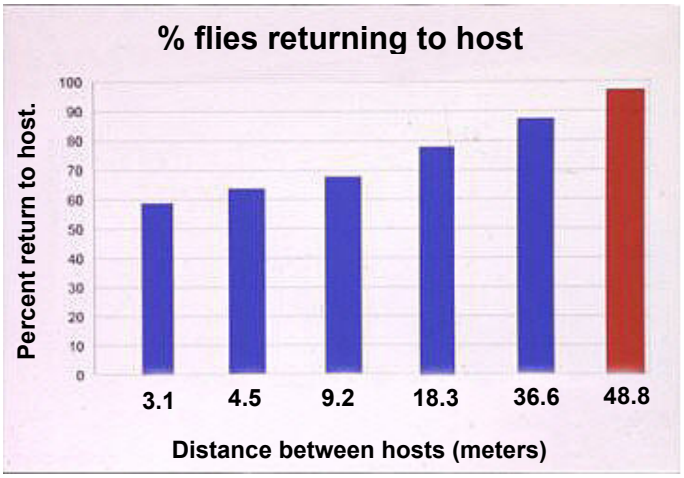
After finishing feeding, the female lays her eggs in vegetation, on the underside of leaves. The larvae hatch and drop into water or mud to continue their development. Under ideal conditions they take three months to develop. But in cold areas they may hibernate for several years.

The bites annoy their hosts. They are painful, and in sensitive-skinned horses may cause wheals. So flies are often disturbed before they have finished feeding. They may return to the same animal, or go to a different one to complete their meal.

As the flies move from one horse to another to feed they may act as mechanical vectors, carrying viruses and other infectious agents with them. Other secondary blood feeders, such as the house fly, may also feed on the exudates left by the biting flies, increasing the potential for spreading disease.

Among the more important diseases known to be spread by biting flies is equine infectious anemia (EIA)

So what can be done to reduce the risk of disease transmission by biting flies? Because many different habitats are suitable for larval development, trying to limit the fly population by treating the environment is not usually practical.



Flies were more likely to return to their original host horse as the distance between the horses increased. Courtesy of Dr Thadeu Barros.

Animal husbandry can influence the scale of the problem. For example, horses grazing pasture well away from woodland are less likely to be affected. Providing shelter for grazing horses may reduce the problem, as few tabanid species will enter barns.

Studies in Brazil have been looking at the influence of distance on the movement of biting flies between horses.

Dr Thadeu Barros, working at the Brazilian Farming Research Company's Research Center in the Panatal region of Brazil, carried out the study with Dr Lane Foil of the Louisiana State University Department of Entomology. Full details of the study are published in Veterinary Parasitology.

In the first part of the study they marked tabanids and captured them if they moved to another horse after feeding on the first one. They found that the number of flies moving between horses fell as the distance between the horses increased. 10.5% of the marked tabanids moved between horses when they were 5 meters apart, falling to 4.6% when the horses were 25 metres apart. No tabanids transferred between horses that were 50 metres apart.

In the second part of the study, the researchers actually took flies off one horse while they were feeding and released them 50 cm away. They recorded the number of flies that transferred to another horse. A similar fall was seen in the number of flies moving between horses as the distance between them increased. Again, no flies transferred between horses that were 50 metres apart.

Barros and Foil conclude that segregating animals reduces the risk of transmission of disease by tabanids.

For more details see:

The influence of distance on movement of tabanids (Dipterae: Tabanidae) between horses.
ATM Barros, LD Foil
Vet Parasitology (2006)
doi:10.1016/j.vetpar.2006.09.041

Treating mange.

Moxidectin oral gel is effective for treating chorioptic mange in horses according to a report from Egypt.

Chorioptic mites typically affect the para-anal fold, lower legs and tail. Infected horses rub, stamp, bite their legs and kick, especially at night. Chorioptes equi (which may actually be the same species as Chorioptes bovis) is a non-burrowing mite. It lives and feeds on the surface, without piercing the skin. Its mouthparts are adapted for chewing and it feeds on skin debris. The mite's presence may cause irritation, and thickening of the skin.

A recent study, reported in Veterinary Parasitology, found it to be the most common type of mange of horses in the province of Kafr El-Sheik, Egypt.

Dr SA Osman and colleagues examined 117 draft horses. They found that twenty were affected with one of three different types of mite. Chorioptes equi was the most common, being present on 14 horses . Other species of mites were found less frequently. Psoroptic mange was present on four horses. Sarcoptic mange was found on two.

The different species of mite tended to affect different parts of the horse's body.

The psoroptic mange mite was found especially at the withers mane shoulders and flank. Although this mite does not burrow into the skin, it has piercing and chewing mouthparts that can cause severe skin damage.

Sarcoptic mange tends to affect the head and neck. The mites burrow more deeply into the skin causing thickening. It is a rare disease and is notifiable to the authorities in some parts of the world

Control of all three types of mange is by strick hygiene. Isolate, clean and treat the horse and the environment and all tack and grooming equipment.

Ivermectin has been shown to be effective against all three types of mites in other host species. Two doses of the oral paste, two weeks apart, have been used to treat choroptic mange in horses.

Moxidectin is a newer drug, with a similar action. But it is excreted more slowly and has a longer duration of action than ivermectin.

So the researchers looked at whether a single dose of moxidectin oral gel would be effective for treating the horses with chorioptic mange.

They divided the 14 horses with chorioptic mange into 3 groups. Five horses received a single oral dose of moxidectin at the manufacturer's recommended dose (0.4mg/kg) . A second group of five horses received oral ivermectin (0.2mg/kg) on two occasions two weeks apart. They also treated the environment with delta-methrin to prevent re-infection.

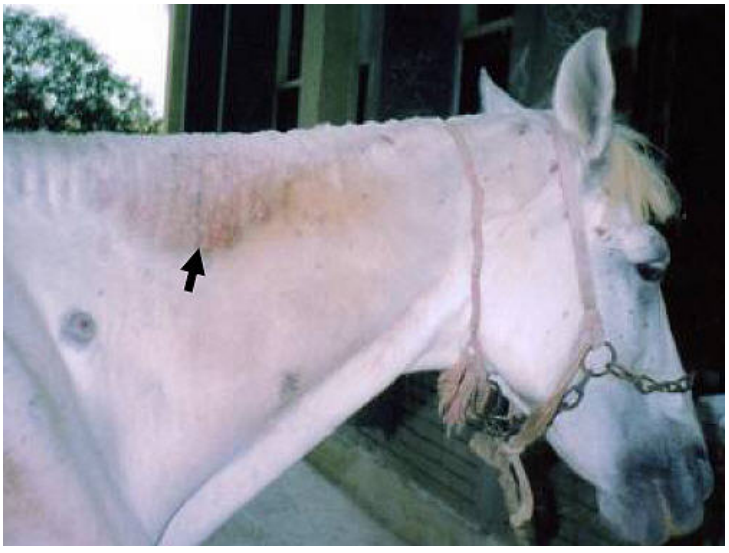
Four horses were left untreated for comparison..

"Clinical and parasitological cure was obtained within two weeks in both moxidectin and ivermectin treated groups with 100% cure rate" the authors report. They suggest that using moxidectin oral gel alongside ivermectin could reduce the intensive use of ivermectin alone. This might help reduce the risk of developing drug resistance.

Phots courtesy of Dr Said Amer.

For more details see:

Clinical and therapeutic studies on mange in horses.
SA Osman, A Hanafy, SE Amer
Veterinary Parasitology (2006) 141, 191 - 195.



Value of bee pollen supplementation.

Supplements containing bee pollen products have been used for some time in horses. Although a number of beneficial effects have been reported by trainers, there has been little scientific work to assess their value.

Scientists at Michigan State University have been looking at the effect of bee pollen supplementation on fitness and feed intake. Dr Kari Turner and colleagues published a full report of the study in the Journal of Animal Physiology and Animal Nutrition.

The investigation ran for 42 days. A standard exercise test was used to assess the horses' physical fitness at the beginning and end of the study.

Horses were paired according to gender and fitness. So the two fittest mares were paired together, and the two mares that performed least well in the SET were paired. The geldings were paired in the same way.

One of each pair was assigned to the bee pollen treatment group and received 118g of the bee pollen product*. The other horses received a placebo, which looked the same but contained no pollen. So the researchers did not know which horse had received the bee pollen or the placebo until the end of the study.

During the 42 days of the investigation, the horses were used regularly for horsemanship classes. They also received a gradually increasing exercise regime on the free-flow exerciser and treadmill.

Half way through the study the scientists measured the food intake and the total feces and urine output for three days. Only the geldings were used for this part of the study. Geldings are anatomically better suited than mares for making separate simultaneous collections of faeces and urine.

Not surprisingly, the regular exercise regime was beneficial. The horses were fitter at the end of the study than they had been at the beginning. But, bee pollen did not appear to confer any competitive advantage. Measures of fitness such as heart rate, blood lactate concentration and haemoglobin concentration showed no significant differences between the two groups.

Bee pollen treated horses tended to have lower lymphocyte counts at the end of the study. But the evidence was not strong enough to draw any definite conclusions about the effect of bee pollen on immunity.

Supplementation did seem to increase feed intake and nutrient retention. As horses in training have greater nutrient and metabolic requirements, the researchers suggest that bee pollen might be useful for improving appetite and ensuring adequate nutrient intake.

As this was only a pilot study Dr Turner suggests that a more detailed study is needed before firm conclusions can be drawn about the effects of bee pollen on feed intake.

Standard Exercise Test (SET).
Carried out on a free-flow exerciser.
The horses start exercising slowly.
3m/s for 5 mins
4m/s for 5 mins
5m/s for 5 mins
6m/s for up to 7.5mins
Between each step, the horse stood still for 90s to allow blood samples to be taken.

*Dynamic Trio 50/50 (Winners Bee Pollen Company, Phoenix, AZ, USA)

For more details see:

Bee pollen product supplementation to horses in training seems to improve feed intake: a pilot study.
KK Turner, BD Nielsen, CI O'Connor, JL Burton. Journal of Animal Physiology and Animal Nutrition (2006) 90, 414 - 420.

Persistent anthelmintic resistance.

A recent study in Sweden has further documented the extent of resistance to anthelmintics in the small red worms (or cyathostomins). The worms were still resistant to benzimidazoles, despite the use of those drugs being very limited over the past ten years.

The study, conducted by Dr Eva Osterman-Lind and colleagues at the Swedish University of Agricultural Sciences and National Veterinary Institute at Uppsala, assessed the efficacy of three anthelmintics.

Horses on 26 farms were involved in the study. The researchers checked the faecal worm egg counts before treatment, and weekly for three weeks afterwards. The reduction in the fecal egg count (FECR) between the before and after treatment egg counts gives an indication of the efficacy of the drug used.

The horses were treated with ivermectin, pyrantel pamoate or fenbendazole. Dr Lind points out that fenbendazole and other drugs of the benzimidazole group have been used very little (less than 5%) in horses in Sweden over the last ten years.

Ivermectin appeared to be fully effective. There was no evidence of resistance. The fecal egg count reduction (FECR) was over 99%.

The picture with pyrantel was less clear. Although the average FECR was 99%, uncertain results were obtained on 6 farms 2 weeks after treatment. The researchers went back and reassessed the efficacy of pyrantel on two of the farms. On one of them they found clear evidence of resistance. The FECR ranged from only 72% to 89%. However, they concluded that overall the efficacy of pyrantel was still acceptable.

Up to 72% of the groups of horses treated with fenbendazole showed evidence of resistance to the anthelmintic. It was significant that despite the low usage of benzimidazole drugs in Sweden recently, the cyathostomins had not started to become susceptible again.

They conclude that no substantial reversion to benzimidazole susceptibility has occurred, even though these drugs have not been used much over the last ten years.

These findings emphasise the importance of minimising the risk of resistance developing by appropriate use of existing anthelmintics.

Once anthelmintic resistance is present, it takes a long time, if ever, for the worms to become susceptible again.

For more details see:

A field study on the effect of some anthelmintics on cyathostomins of horses in Sweden.
EO Lind, T Kuzmina, A Uggla, PJ Waller, J Hoglund.
Vet Res Commun. (2007) 31, 53 - 65.

New test for CEM?

A new test for the organism responsible for contagious equine metritis has been developed in France.

Ever since it appeared in 1977, contagious equine metritis has complicated the process of horse breeding.

Affected mares fail to conceive and have a purulent vulval discharge. Stallions carry the organism on the penis and skin of the prepuce. They frequently show no adverse effects, but are still able to pass on the infection to mares during mating.

Biosecurity is the key to preventing the introduction of the disease to a stud. Protocols such as the UK's Horserace Betting Levy Board Code of Practice have been introduced to control the spread of the disease.

Identifying the causative organism, *Taylorella equigenitalis*, requires specialised bacteriological techniques. The organism is susceptible to drying and sunlight, and has to be protected in transport medium during its journey to the laboratory.

Once at the laboratory, special culture media are used to encourage the growth of *T equigenitalis* and inhibit the growth of other bacteria. *T equigenitalis* has to be cultured in an atmosphere of 5% -10% carbon dioxide, and grows slowly compared to other bacteria found on swabs from the equine reproductive tract.

Relying on bacteriological isolation and identification of the organism is a time-consuming process.

A rapid and accurate molecular method of identifying *T. equigenitalis* has been described by researchers at the Laboratoire d'Etudes et Recherches en Pathologie Equine, in Goustranville, France,

The new technique, developed by Dr F Duquesne and colleagues looks for a specific portion of DNA that is present only in the genetic material of *T equigenitalis*. Polymerase chain reaction (PCR) provides a way of amplifying very small amounts of DNA to give measurable quantities.

The researchers have identified a fragment of DNA that is present in *Taylorella equigenitalis*, but not in any of the other bacteria commonly found in the horse's reproductive tract. They were even able to differentiate between *T equigenitalis* and the closely related *T asinigenitalis*.

In fact , so sensitive is the test, that the researchers calculate that they could identify as few as 10 CFU ("colony forming units" ie bacteria). This is probably more sensitive than normal culture techniques, as such a small number of *T equigenitalis* might well be overwhelmed by other bacteria on the swab.

This method allows *T equigenitalis* to be identified without the need for any selective culture techniques. More work needs to be done before it could be used in practice situations. The research team is now working on an internal PCR control to ensure consistent results.

For more details see:

Identification of *Taylorella equigenitalis* responsible for contagious equine metritis in equine genital swabs by direct polymerase chain reaction.
F Duquesne, S Pronost, C Laughier, S Petry.
Research in Veterinary Science (2007) 82, 47 -49

Preference for water bowls.

Do horses have a preference for different types of automatic water bowls? One study found a clear preference for one particular model in young horses that had not previously encountered them.

The study, carried out in the Department of Animal Science at Texas A&M University, looked at four different automatic water bowls.

In two bowls, a float valve maintained the water level. As the horse drank, the water bowl refilled automatically. Two bowls were filled by a "push valve". These filled only when the horse pushed against a plate, which released the water. Little water remained in the bowl after use.

Yearling horses were used in the study. They had been used to drinking from water troughs and had not previously encountered automatic water bowls. During the study, the automatic water bowls were the only source of water. The position of the bowls was changed every 48 hours.

The researchers measured the water consumption from each of the bowls. One group of eight horses preferred either of the float valve bowls but took almost no water from either of the push valve bowls.

Significantly more water was taken from the larger float valve bowl.

Horses showed a clear preference when offered a choice of drinking bowls. Photos courtesy of Dr T Friend. Texas A&M University.

A second group of eleven horses showed a similar dislike of the push valve water bowls. They also tended to prefer the larger of the two float valve bowls. This finding was confirmed when the study was repeated with three individual horses. The research team found that significantly more water was taken from the larger float valve bowl*.

Why did the horses prefer this particular model? Of the four water bowls, this one had the largest, most open bowl. It kept more water in it at all times. It also made the least noise when refilling. The researchers noted that the horses tended to be startled by the noise and sudden inflow of water with the push valve bowls.

They are now studying the feasibility of using the SB NT 100 water bowl as an on-board watering system for horses being transported over long-distances.

*Lister SB NT 100

For more details see:

A note on the preference of naive horses for different water bowls.
PD Krawczel, TH Friend, R Johnson.
Applied Animal Behaviour Science (2006) 100, 309 - 313.

Transporting horses with mirrors.

Many horses find being transported stressful, especially when they are travelling alone. The physical and psychological trauma can have an adverse effect on their health and welfare. A novel way of minimising the stress experienced by horses being transported was presented at the National Equine Forum held in London in March 2007. Rachel Kay, from Nottingham Trent University, showed that transporting horses with a mirror reduces behaviour caused by stress- such as neighing, head tossing, turning around, and refusing food.

Her research into the effect of creating surrogate companionship on the physiology and behaviour of horses during transportation won the Royal Agricultural Society of England's Eqvalan Duo Equine Thesis of the Year Award for 2006.

The study monitored 10 mature horses transported in a trailer for 30 minutes, and studied how the horses responded when travelling alone, with another horse, or with a mirror for company.

It involved recording the horses' behaviour during the journey, and their heart rate. Also recorded were ear-pinna and rectal temperatures as an indirect measurement of peripheral circulation. This provided a way of assessing the changes in blood flow that occur as part of the horse's response to stress.

Ms Kay found that transporting horses with a mirror reduced stress-induced behaviours such as neighing, head tossing, turning around and refusing to eat, as effectively as travelling with another horse. In fact she found no significant differences in behaviour or physiological measures between the responses of horses travelling with a companion or with a mirror.

Compared with travelling alone, travelling with a companion significantly reduced the stress-associated fall in ear-pinna temperature and increase in rectal temperature.

She also pointed out the positive effect of the mirror on eating. "It would be interesting to study the effect of mirrors in the stable on poor feeders or convalescing horses.

Horses will usually travel better with a companion. But where this is not possible, they travel better if provided with a mirror as a substitute than they do travelling alone. "My recommendations from the study are to travel horses with a mirror as they seemed much calmer, although a real companion is best."

For more details see:

The effect of creating surrogate companionship on physiology and behaviour of horses during transportation.
Rachel Kay.
Thesis: Brackenhurst College (Nottingham Trent University)

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