Scientists have taken another step towards unravelling the mystery of laminitis. Researchers in Australia have implicated insulin as a cause of laminitis.

Insulin is the hormone responsible for reducing blood glucose levels. It stimulates insulin-sensitive cells to take up glucose from the blood. Only some tissues, such as muscle and adipose tissue, contain cells that respond to insulin. Normally, a meal containing sugar or starch leads to a rise in blood glucose, which stimulates the release of insulin, which in turn encourages the glucose into the cells. As a result, the blood glucose concentration returns to normal.

While many hormones, such as cortisol and adrenaline, act to raise the blood glucose concentration, only insulin reduces them.

Many horses with laminitis are “insulin-resistant,” especially those with underlying hormonal abnormalities (“endocrinopathic laminitis”) such as equine metabolic syndrome (EMS) or Cushing's disease (ECS). They fail to respond normally to insulin, although rarely have a high blood glucose concentration.

Work at the University of Queensland has shown that insulin itself has a more important role in the development of laminitis than previously thought. Katie Asplin and her colleagues have found that prolonged high levels of the hormone can induce laminitis in ponies.

Ponies were given sufficient insulin by intravenous infusion to cause abnormally high blood levels. Normally, this would be expected to cause a drop in the blood glucose concentration by stimulating the uptake of glucose from the blood. But the scientists kept the blood glucose levels within the normal range by giving glucose at the same time.

These were young healthy ponies with no history of laminitis. All of them developed laminitis within three days.

A second group of ponies received sterile saline instead of glucose and insulin. All had normal insulin and glucose levels throughout the study. None of these ponies showed any sign of laminitis.

The only difference between the two groups was that the insulin-treated ponies had high levels of insulin in their blood. The average insulin concentration was 1036 μU/mL, well above the normal upper limit.

The study showed that insulin could induce laminitis even if the blood glucose levels remained normal, and without any disturbance in hindgut function. It suggests that some physiological action of insulin could be a cause of equine laminitis.

How could insulin damage the laminae? One suggestion is that insulin resistance might interfere with the uptake of glucose by the lamellar epidermal basal cells. But recent work in the same laboratory has shown that these cells do not actually have insulin receptors. So how much glucose they take up does not depend on insulin.

However, there are insulin receptors in the blood vessels. So it is perhaps more likely that insulin exerts its effects by altering the blood flow to the foot.

Until now insulin has tended to be seen as an indicator of the metabolic changes present in horses with laminitis. But it seems that it may itself be a significant cause of the damage that occurs in the disease.

Clearly insulin could play a major role in the development of endocrinopathic laminitis - those cases with insulin resistance and high blood levels of insulin. The researchers also suggest that it may also be important in the development of other types of laminitis. For example, that insulin may also be involved in many cases of pasture associated or dietary laminitis where rich pasture and or high concentrate feeding can induce insulin resistance in susceptible horses and push the insulin above a threshold level. They say that more work needs to be done to identify the threshold above which levels of insulin are toxic.

Horses with raised insulin levels should be managed to reduce the risk of laminitis developing - by switching from high carbohydrate to high fibre diets, aiming for progressive weight loss in overweight animals and giving appropriate exercise.

For more details see:

Induction of laminitis by prolonged hyperinsulinaemia in clinically normal ponies.
KE Aspin, MN Sillence, CC Pollitt, CM McGowan.
Spavin: how good is medical therapy?

Bone spavin is a common cause of long-term hind limb lameness in horses. The hock is a complex structure. Apart from the tarso-crural joint at which most of the movement occurs, there are numerous joints between the two rows of small hock bones. Although little movement occurs at these joints, degenerative joint disease can cause pain that results in lameness.

Joint injection is often used to manage the problem. But just how effective is medical treatment?

Clinicians at the Glasgow University Veterinary School reviewed the response of cases that had been treated at the University’s Weipers Centre for Equine Welfare over a seven-year period. Fifty-one horses with bone spavin (identified by radiography and intra-articular anaesthesia) that had been treated medically, were included in the study.

Treatment consisted of an injection of corticosteroids (methyl prednisolone acetate or triamcinolone acetonide) with or without hyaluronic acid.

Mr Raphael Labens and his colleagues evaluated the response to treatment by assessing improvement (or otherwise) in the degree of lameness. They also contacted the owners for further information about the horse’s response.

They found no significant difference between the two preparations. Neither did there appear to be a different response if hyaluronic acid was given or not.

Horses usually responded within 8 weeks if they were going to do so. Some horses were treated twice. But all remained lame. So if a case does not respond, there was little to be gained by repeating the treatment. Only 3 of the 16 horses that responded well in the first place remained sound. So the initial response was not necessarily a good indication of the long-term outcome.

The long-term success rate was modest. Only 38% of horses were reported by their owners to be not lame and working normally without having to be given anti-inflammatory drugs such as “bute”. This is a lower success rate than that reported for some surgical methods of managing bone spavin. Surgical treatment might be a better option for improving the long-term prospects for horses with this condition.

For more details see:

Retrospective study of the effect of intra-articular treatment of osteoarthritis on the distal tarsal joints in 51 horses.
R Labens, DJ Mellor, LC Voûte.
Fractured ribs are surprisingly common in new born foals. Up to 20% of apparently healthy foals may show signs of damage to the chest wall, without any associated problem. But, in sick foals, rib fractures are often thought to contribute to the severity of their condition and influence the chance of recovery.

Physical examination of the foal may reveal fractures, or dislocation of the junction between the bony and cartilaginous portions of the rib (the costochondral junction). The foal’s chest may appear asymmetrical.

Radiography can be used to confirm suspected fractures, and may detect some fractures that are not apparent on clinical examination.

In human medicine it has been noted that an ultrasound scan is more effective than radiography at identifying rib fractures. Ultrasound does not penetrate the bone and so does not produce an image of the internal bone structure, but it can show the surface of the bone. Any disruption of the surface contour, such as occurs in fractures, will usually be visible. An ultrasound scan can also reveal changes within the structure of the cartilaginous parts of the ribs.

One disadvantage of the ultrasound scan for detecting rib fractures may be the time required to perform the examination. Unlike radiography, where images of several ribs can be produced at once, with ultrasound each rib has to be scanned individually. This can be time consuming - especially in an uncooperative foal that has difficulty breathing. It is also difficult to examine the ribs that lie underneath the shoulder - and these are often the very ribs that are likely to be injured.

Which technique offers the best chance of identifying rib fractures in young foals? A study, published in the Equine Veterinary Journal, compared the value of radiography and ultrasonography for identifying rib fractures in foals admitted to a critical care unit. Dr Daniel Jean led the investigation at the Département des Sciences Cliniques, Faculté de Médecine Vétérinaire, Université de Montréal.

Jean and his colleagues examined twenty-nine newborn foals that were admitted to the Centre Hospitalier Universitaire Vétérinaire. They found that most of the foals had one or more rib fractures.

Chest radiography revealed rib fractures in 19% foals. Radiographs were taken from both sides and with the foal lying on its back. This latter view was the one on which fractures were most easily detected.

With ultrasonography, the clinicians found that 65% of the foals had fractures. In only one foal did the clinicians detect a fracture on the radiographs that they did not find with the ultrasound scan. Ultrasonography was four times more likely than radiography to detect fractures.

Most of the rib fractures occurred in the second to seventh ribs. And 90% of fractures occurred within 3cm of the costochondral junction. The location of the fractures suggests that they are probably caused during the birth process. They are probably due to pressure of the flexed elbow on the ribs as the foal passes through the mare’s pelvis.

They found more fractures in fillies, and the left side of the chest was more often involved than was the right.

Dr Jean concludes that ultrasonography is a sensitive way of identifying rib fractures in newborn foals, and recommends that it should be considered the “gold-standard” technique.

He advises that the possibility of rib fractures should be considered in all sick foals and that they should be handled carefully to avoid causing further damage.

For more details see:

Detection of rib trauma in newborn foals in an equine critical care unit: a comparison of ultrasonography, radiography and physical examination.

D Jean, V Picandet, S Maciera, G Beauregard, MA D’Anjou, G Beauchamp
Further evidence of parasitic worms becoming resistant to ivermectin and moxidectin has been found.

*Parascaris equorum*, the large roundworm of horses, is a common parasite of foals. Older foals develop immunity to it, and it rarely causes problems in adult horses. Under optimum conditions, *P. equorum* eggs become infective within about two weeks of being passed in the faeces. At lower temperatures the eggs may survive for many years in stables and on pasture.

Infective eggs contain larvae, which hatch within the foal's intestines. The larvae penetrate the gut wall and migrate through the liver and lung before passing up the trachea and back to the intestines. They may cause a mild cough and nasal discharge during the migratory phase. A heavy intestinal infection leads to failure to thrive, and may cause intestinal impaction or rupture.

In a report in *Veterinary Parasitology*, Dr Owen Slocombe of the Ontario Veterinary College, and others describe how they found ivermectin- and moxidectin-resistant *P. equorum* on stud farms in Canada.

Ivermectin has been used for deworming horses for over 20 years. Its efficacy against a wide range of equine internal parasites has made it a popular choice. It is highly effective against migrating large strongyles. Early reports suggested that it was effective against *P. equorum*. Ivermectin has been widely used in foals, especially since the problem of cyathostomin resistance to fenbendazole has been recognised.

The problem was first suspected in 2001 by one of the authors of the report, Dr Rolph de Gannes. He had been monitoring faecal worm egg counts on various horse farms in Ontario for over twenty years. These routine tests alerted him to the apparent failure of ivermectin to remove *P. equorum*. Over the next two years, in conjunction with Dr Slocombe and Dr Mary Lake, he carried out a series of trials on two Thoroughbred farms and one Standardbred farm. Faecal worm egg counts were monitored before and after treatment with one of four anthelmintics. Some foals were left untreated to act as controls.

Overall, they found that ivermectin reduced the *Parascaris equorum* faecal worm egg count by only 33.0% and moxidectin by 47.2%. In contrast, fenbendazole and pyrantel pamoate were highly effective, reducing the faecal egg count by 97.6%. In fact, many foals had no *P. equorum* eggs in the faeces after treatment with fenbendazole or pyrantel.

It was a different story with strongyle eggs. All strongyle eggs look similar. It is only possible to tell them apart by culturing them and examining the larvae. However, resistance to anthelmintics is a particular feature of the cyathostomin (or small redworms).

The scientists found that neither pyrantel nor fenbendazole was fully effective at reducing the number of strongyle eggs in the faeces. All foals treated with pyrantel still had strongyle eggs in the faeces after treatment. Foals on the Standardbred farm had eggs in the faeces after treatment with fenbendazole, suggesting that resistant cyathostomins were present. However, no foals had strongyle eggs in the faeces after treatment with ivermectin or moxidectin.

This study emphasises that a single dewormer cannot be assumed to control all species of worms in foals. It may well be necessary to use more than one type of dewormer to control all the potential parasite problems in foals.

For more details see:

Macrocyclic lactone-resistant *Parascaris equorum* on stud farms in Canada and effectiveness of fenbendazole and pyrantel pamoate.

J OD Slocombe, RVG de Gannes, Mary C Lake.

Artificial insemination is becoming increasingly popular amongst horse breeders and owners.

It gives the mare owner a wider choice of stallions than would otherwise be available. The mare, with foal at foot, does not have to travel long distances to reach the chosen stallion. There is no physical contact between the stallion and the mare, avoiding the risk of injury and reducing the risk of disease transmission.

However, it is necessary to preserve the semen in some way to keep it viable until it reaches the mare.

Two methods of preserving semen are available - chilling and freezing. It is relatively simple to process and use chilled semen.

Frozen semen has advantages for the stud owner. Only a small volume of semen is needed. Usually, each dose contains less than 5ml of extended semen. So multiple doses can be prepared from each ejaculate.

It is easy for the stallion to combine competing with a breeding career. Semen collection can be arranged at a convenient time and is not dictated by the recipient mare being in season.

Frozen semen can be stored indefinitely and be readily available when requested.

In contrast the main difficulty to be overcome with chilled semen is the need to predict the day of ovulation to the semen to be collected and delivered on time. This has created problems, particularly in the UK, where it is difficult to arrange for delivery on a Sunday or Monday.

Once thawed, the frozen sperm do not survive as long as those in fresh or chilled semen. So when using frozen semen it is important to make sure the mare is inseminated close to the time of ovulation. Historically this has meant that multiple examinations are needed to monitor the size of the ovarian follicle as it gets near to ovulating - up to four examinations a day. This need for precise timing of insemination has been one of the reasons for the initial lack of enthusiasm for the use of frozen/thawed semen for artificial insemination.

Using frozen/thawed semen is commonly believed to less reliable. However, recent experience suggests that this may no longer be true.

Speaking at the recent British Equine Veterinary Association meeting on equine artificial insemination, Carolyn Crowe BSc BVetMed MRCVS of the Willesley Equine Clinic claimed it is possible to get good results using a fixed time protocol with frozen semen.

She described the results achieved over two breeding seasons by following a standardised procedure for both chilled and frozen semen. From a total of 139 mares bred with frozen semen, 115 (83%) became pregnant. In comparison, 78 (70%) of 112 mares inseminated with chilled semen were pregnant. “I’m not saying that frozen is better than chilled - but equal” However, she prefers to work with frozen rather than chilled semen because of the ease of use. You can have the semen in stock so there is no problem if ovulation occurs at the weekend.

She explained that she usually used one full dose of semen (>300 x 10⁶ sperm) before and after ovulation - although in 7 mares she used half of a dose each time. Ideally, only those mares less than 15 years old with a good breeding history were admitted onto this frozen semen breeding programme. All mares were checked to make sure they were clean when they came in season.

Ms Crowe concluded that the convenience and commercial advantages of using frozen semen for the stallion owner do not have to be at the expense of the mare owner in financial terms or conception rates.

Simple frozen AI protocol.

Day 1. 8am When the largest follicle reaches 30-35mm with marked oedema of the uterus, and the cervix is relaxed. Inject deslorelin subcutaneously.

Day 2. 8am Ultrasound scan to check that the follicle is still present

Day 2. 8pm Ultrasound scan to check that the follicle is still present. Inseminate mare.

Day 3. 8am: Ultrasound scan to check for post insemination endometritis. All mares are given penicillin and framomycin into the uterus. If any fluid is seen in the uterus, it is flushed with sterile saline and checked the following day as well.

Source:
BEVA AI Refresher course.
Warwick Racecourse
November 2007
New threat to horses teeth.

A new species of bacteria threatens horse’s teeth. Research from Sweden implicates a previously unknown bacterium in the development of tooth decay in horses.

Tooth decay (dental caries) is not often considered to be a common problem in horses. Caries have long been a problem in humans. But now it seems that horses too are becoming increasingly affected with rotting teeth. One study found that 1% of live horses in Sweden and Germany had signs of dental caries.

Caries affect the calcified tissues of the teeth. There is loss of mineral from the tooth and destruction of its connective tissue skeleton. Affected animals may be unwilling to eat, and show discomfort when ridden.

What is the cause of tooth decay? Experiments have shown that both bacteria and sugars are required. Bacteria digest the sugars to produce acids, which can dissolve the teeth. If the acidity falls below pH6.7 the cement starts to demineralise. Below pH5.5, and the enamel will dissolve. Once the minerals have been removed from the tooth the connective tissue matrix of the tooth is exposed and can be digested away.

Some species of bacteria are particularly suited to causing tooth decay. They assemble large polysaccharide molecules from sucrose (“polyglucans”) which help them to stick to the tooth surface.

In horses, caries are most often found in the cheek teeth, particularly of the upper jaw. Most commonly affected are the third and fourth upper cheek teeth (4th upper pre-molar and 1st upper molar). They can have serious consequences. They may result in discharging tracts or infection of the maxillary sinus.

Why is the upper jaw more often affected? This relates to the difference in structure between teeth of the two jaws. Upper cheek teeth have more prominent infundibula - cone-shaped depressions on the surface of the tooth, lined with enamel and filled with cement. Food material can be compressed into these depressions to provide a substrate for bacterial digestion.

Vets in Sweden have noticed that the number of cases with caries of the first upper cheek tooth has increased in the last 10 years. They have also recently identified a new species of bacterium, Streptococcus devriesei, which seems to be ideally suited to causing dental decay. It produces copious amounts of polysaccharides - creating a suitable environment for bacteria multiplication. It also ferments sugars to acid, which can demineralise the teeth.

So, Dr Torbjörn S Lundström and colleagues at the Swedish University of Agricultural Sciences, at Uppsala and the Laboratory for Oral Microbiology at Sahlgrenska Academy, Göteborg University conducted a study to investigate the role of this bacterium in dental caries in Swedish horses. They checked to see if the bacterium was present in all horses with caries and also whether it was present on healthy teeth (without caries)

Streptococcus devriesei was found in all samples taken from caries from 2002 onwards. The bacteria were also present in smaller numbers on four of 40 horses with healthy teeth. Interestingly, prior to 2002, the bacterium was not isolated at all in Swedish horses.

What is the explanation for this increase in dental decay in horses? Dr Lundström suggests that it may be related to the increased use of sweet foods, with a higher molasses content. There has also been a marked increase in the size of the Swedish horse population.

The scientists point out that although these findings link Streptococcus devriesei to dental decay in horses, they do not confirm that the bacteria are responsible for the caries. It is possible that they only invade after the caries have formed. More work needs to be done to find out the full story.

For more details see:

Caries in the infundibulum of the second upper premolar tooth in the horse.
TS Lundström, GD Dahlén, OS Wattle.
Many feed supplements are marketed for calming excitable horses. A common ingredient is L-tryptophan, often combined with other “calming” ingredients such as magnesium and thiamine.

Tryptophan is an essential amino acid. The horse is unable to manufacture it itself and needs to obtain it in the diet. That is normally not a problem because grass is usually a good source.

The body uses tryptophan to make serotonin, a neurotransmitter. Work in other species and humans shows that the concentration of serotonin varies during the day. It has the lowest concentration in the morning, and rises to a peak in the evening. Increased levels of serotonin in the brain have been associated with sedation, increased sleepiness, reduced aggression, and reduced fearfulness.

The reasoning behind giving extra tryptophan is that it should lead to an increase in serotonin in the brain, which in turn should have a calming effect. But it’s not quite as simple as that. A number of factors may influence the uptake of tryptophan by the brain, including the type and amount of fat, protein and carbohydrates in the diet.

A diet containing low levels of fat would reduce the availability of tryptophan by increasing the amount of tryptophan bound to the proteins in the blood. Conversely, horses on high carbohydrate diets may be more likely to take tryptophan into the brain. Horses on such diets tend to be more excitable anyway - so if the tryptophan has an effect it might be more noticeable.

Although tryptophan has been shown to have a calming effect in some species, there is little evidence that it is effective in horses. There have been few studies of the effect of tryptophan in horses, and none has produced evidence that it has a calming effect in horses. Indeed, high doses may have toxic effects. Shetland ponies given high doses (600mg/kg) of tryptophan by stomach tube became restless, had an increased respiratory rate, and haemolysis. Another study found that tryptophan supplementation caused reduced stamina.

A recent behavioural study found that a commercial tryptophan product, fed at the recommended dose rate, had no calming effect on horses subjected to standardised fear and handling tests. Dr Jens Malmkvist and Dr Janne Winther Christensen, at the Danish Institute of Agricultural Sciences Tjele, in Denmark, assessed the effect of tryptophan on the response of young horses to frightening stimuli.

Twenty-eight two-year-old Danish Warmblood horses were accustomed to wearing a heart monitor, and being separated from their fellows and fed individually. All of the horses received a similar diet and exercise regime. For the test, the horses were fed either the recommended dose of a commercial tryptophan-containing supplement, or a placebo. Neither the handler nor the observer knew which treatment each horse had been given.

The horses were tested 2-3 hours after being treated. Two experiments were carried out. The first one assessed the response of stallions to white noise. Stallions were individually turned into a pen to see if they were put off eating by a novel stimulus (white noise emitted from a CD player close to the feed container). The researchers recorded heart rate and assessed the horses’ behaviour.

In the second experiment mares were introduced to a pen that contained a red and white plastic curtain close to a feed container. The horses’ responses were recorded, and they were also assessed while an experienced handler tried to lead them through the plastic curtain.

The scientists found that a single dose of tryptophan, at the recommended dose rate, failed to have a calming effect on the horses. They found no significant differences in response to the frightening stimuli between the tryptophan or placebo groups. Neither did the tryptophan make the horses easier for the handler to lead.

Rather than rely on tryptophan to calm fearful horses, Malmkvist and Christensen recommend that a better approach is to use effective habitation methods, combined with a better understanding of the causes of fearful behaviour.

For more details see:
A note on the effects of a commercial tryptophan product on horse reactivity.
J Malmkvist, JW Christensen
App Anim Behav Sci (2007) 107, 361- 366

For a review of L-tryptophan- see also
Calmatives for the excitable horse: A review of L-tryptophan.
A Grimmett, MN Silence.
Stereotypies, previously referred to as stable vices, are now generally considered more a response to an imperfect environment than simply bad behaviour on the part of the horse. They stem from normal patterns of activity, such as loco-motor or eating behaviour. However they differ from normal by being repetitive and serving no obvious useful function.

They rarely cause physical harm, but do they interfere with the horse’s ability to learn?

Research by Dr Martine Hausberger and her colleagues at the University of Rennes in France, suggests that stereotypic horses do not learn as quickly as other horses.

Seventy horses were included in the study. The researchers divided them into two groups: those that consistently showed stereotypic behaviour and those that did not. Behaviours that were classified as stereotypies were cribbing and wind-sucking, weaving, head shaking or nodding, and tongue play.

Fifty-one horses showed stereotypic behaviour during two observation periods three months apart. Only nineteen showed no stereotypic behaviour at any time during the study. Hausberger attributed this high level of stereotypic behaviour to the environment in which the horses were kept.

All horses were given a learning test. They had to learn to use their nose to lift a lid of a box to find the food reward that had been placed inside. Previous work has shown that the response to this test gives a good indication of learning ability in horses.

The horses that had shown signs of stereotypic behaviour performed less well than those that did not.

Only 15 of 51 stereotypic horses learned to complete the task in the time allowed. In contrast, 16 of 19 non-stereotypic horses successfully completed the task. Even when the stereotypic horses were successful, they took longer to learn to open the box and find the food than did the non-stereotypic horses.

The type of stereotypy performed did not seem to influence the results.

The researchers also found that horses that showed stereotypic behaviour spent less time lying and sleeping than “normal” horses. This led them to suggest that the difference in learning ability may be due to differences in the horses’ attention span. Perhaps the stereotypic horse spends so much time concentrating on performing the stereotypy that it has less time to learn.

Hausberger points out that this is the first time a relation between stereotypy and learning has been demonstrated in horses, indeed in any animal species. The poorer learning ability of stereotypic horses has important implications for people involved in training horses. Trainers may need to be patient, and allow more time, for stereotypic horses to learn new tasks.

For more details see:
Lower learning abilities in stereotypic horses.
M Hausberger, E Gautier, C Miller, P Jego.
App Anim Behav Sci (2007) 107, 299 - 306
Do horses suffer from jet lag? That was the subject of an investigation carried out at the Maxwell H Gluck Equine Research Center, of the University of Kentucky at Lexington.

Jet lag is a phenomenon encountered by long-distance travellers. But it is not just the length of the journey that’s important. The significant factor is the rapid crossing of multiple time zones. So flying from the USA to UK is more likely to cause jet lag than flying from the UK to South Africa. Jet lag is due to the conflict between the new cycle of light and dark and the body’s natural circadian (literally “about a day”) rhythm.

Many of the body’s systems have a natural rhythm, controlled by an internal clock. The “suprachiasmatic nucleus,” a small group of cells at the base of the brain is the main pacemaker that controls circadian rhythms. It sets a regular rhythm for many body functions including sleeping, eating and drinking, and body temperature.

Light is an important signal that the body uses to synchronise the internal clock with the outside world. In the evening, a hormone, melatonin is secreted by the pineal gland to signal to the brain that it is time to sleep.

Rapidly crossing time zones confuses the internal clock. The preset rhythms are no longer in step with the outside world. The body clock seems to cope better with flying from east to west. It seems better able to adapt to a longer day than a shorter one.

Symptoms of jetlag in humans include disturbed sleep patterns, loss of appetite, lack of concentration and lethargy. It is said to take one day to recover from each time zone crossed.

Human athletes have noticed that jetlag can impair performance. So they take time to adapt to conditions in the country where the competition is to be held.

But what about horses? Reduced food and water intake is not uncommon for the first few days following air transport over three or more time zones. It is unclear whether this is due to the development of jet lag or to the adverse effects of the transportation itself.

In the Lexington Study, Dr Barbara Murphy and colleagues looked at how healthy horses responded to an abrupt change in the light/dark cycle.

Before the start of the investigation six two-year old mares had been accustomed to 12-hour light and dark cycles. They were kept in a lightproof barn for the duration of the investigation and fed every 6 hours.

Melatonin concentration and body temperature were monitored throughout the study. These two factors show a regular daily cycle, and provide a simple way of monitoring the circadian rhythm.

After taking baseline measurements of body temperature and melatonin, the scientists brought the light/dark cycle forward by 6 hours by turning the lights on six hours early. This change in the daylight cycle would have an effect similar to traveling eastwards across six time zones - for example from Houston, Texas to London.

They found that the melatonin rhythm reset rapidly. On the first day after the change in the light/dark cycle, the cycle of melatonin concentrations had settled into a stable new rhythm. In contrast, the body temperature rhythm had reset by the third day, although the waveform of the body temperature rhythm had not fully adapted for many days. This resynchronisation is significantly better than in humans or rodents - suggesting that the horse's central pacemaker resets more rapidly.

“Our studies reveal that in contrast to the human, the horse appears to possess a circadian pacemaker that is more amenable to rapid adjustment to a new photoperiod - suggesting in turn that their performance capacity at a new destination might be less compromised than in human athletes.”

For more details see:

Rapid phase adjustment of melatonin and core body temperature rhythms following a 6-h advance of the light /dark cycle in the horse. BA Murphy, JA Elliot, DR Sessions, MM Vick, EL Kennedy, BP Fitzgerald J Circadian Rhythms (2007) 5, 5

http://www.jcircadianrhythms.com/content/5/15
“Nothing is more likely to disrupt racing and breeding in the UK in the next few years than infectious diseases” warned Peter Webbon, Chief Executive of the Animal Health Trust, Newmarket, speaking at the Thoroughbred Racing and Breeding Seminar at Cheltenham recently. “We have seen how flu has ravaged the horse industry in Australia.”

One exotic disease with the potential to devastate the horse industry in Europe and the UK is African Horse Sickness. Brigadier Paul Jepson, Veterinary Director of the Horse Trust, a major provider of funding for scientific research and education, spoke at the seminar of the need to raise awareness of the disease.

First the good news. “You can’t catch it. One horse can’t catch it directly from contact with another horse. There is no evidence that it currently exists in Europe.”

So, why are we worried? “Firstly it is a truly horrible disease. You are unlikely to have insurance cover and the government is unlikely to offer compensation if the horse has to be slaughtered.”

The species of Culicoides biting midge that can carry AHS used to be found only south of the Mediterranean. The recent outbreak of bluetongue in cattle and sheep in the UK and Europe shows that the midge vectors are present. Last year when the risk of bluetongue disease in UK was mentioned people laughed. So what is the relevance of bluetongue to horses? “Bluetongue and African Horse Sickness are like non-identical twins” explained Jepson. “What suits bluetongue virus also suits AHS.”

The midges feed on the horse. If the horse is infected with the AHS virus, the midge becomes infected as well. The virus needs a temperature consistently above 14 degrees centigrade to mature and pass to the salivary gland. Once there, it can infect the next horse the midge feeds on.

If AHS does come to this country what could we expect? “In a word - dead horses.” Every horse that gets bitten by a midge infected with AHS is almost certain to die. The mortality rate can be as high as 90%.

Affected animals typically show signs of fever, with swelling of the face, neck and brisket. This usually progresses to great difficulty breathing and death within a week. “Essentially the horses drown in their own fluids.”

“If we are going to stop the spread of the disease we must be able to spot the signs. We need people to start to realise this could happen so any cases are identified.”

Another serious problem with this disease is carrier animals. Some can be infected without serious signs but can act as a reservoir. “We do know that rhinos can carry the disease. Donkeys and zebra are potential carriers. But there may be other species that can act as carriers. Current studies are being carried out at Pirbright to identify possible carrier species.”

The currently available vaccines are not very good. A number of horses that are vaccinated die. There is a new safer vaccine under development in France. “But don’t think it will be routinely available” he warned. “It is likely to be held in reserve to control an outbreak.”

So what is being done? The Horse Trust has set up a working party to raise awareness of this disease.

“We are working with the government to produce control measures. We want to avoid control measures that involve mass slaughter.”

The virus could easily reach Europe and the UK. Midges can be blown over 100km by the wind. It has been suggested that bluetongue-infected midges might have arrived in Europe by being carried in packed flowers from Africa. The same could happen with AHS.

“African Horse Sickness could come. The current risk is assessed to be low” Jepson concluded. “If it did come it would devastate the horse industry. The problem is being addressed. But you can help - the key word is vigilance. Keep your eyes open.”

For more details on AHS: http://www.oie.int/eng/maladies/fiches/a_A110.htm

For information on the Horse Trust: http://www.horsetrust.org.uk
Ginseng boosts vaccine response.

Research from Canada suggests that ginseng may help boost the response to vaccination.

Many claims have been made for the benefits of herbal medicines. People take ginseng to prevent stress and fatigue, and to improve mental alertness and concentration. It is said to enhance resistance to infection and improve energy metabolism.

It may reduce some cold and flu symptoms in people. Studies have reported that individuals who took ginseng had fewer colds than individuals given a placebo. Those who did get colds had less severe symptoms that did not last as long.

Could supplementing the diet with ginseng help horses respond better to being vaccinated? A study at the Equine Research Centre of the University of Guelph looked at the effect of ginseng on the response of horses to vaccination against EHV-1. All the horses in the study had previously been vaccinated regularly according to manufacturers instructions.

Dr Wendy Pearson and her colleagues compared the antibody response of horses that were given American ginseng (*Panax quinquefolium*) every day for a month with that of horses that did not receive any ginseng.

Ginseng contains a number of active substances - known as ginsenosides. They differ in both the ease with which they are taken up from the gut and their actions. Some of them even compete with each other. So, to ensure that adequate amounts of the active ginsenosides were absorbed, the scientists chose to feed a higher dose (35mg/kg) of ginseng than had been used in similar studies in people. Even so, the dose was still economical and practical for use in horses.

Two weeks into the study, both the ginseng-treated horses, and the controls, were vaccinated against EHV-1. The treated horses responded more quickly to the vaccine. They showed an increase in antibody levels by the second day after vaccination. In the control animals, an increase in antibodies was only detected on the sixth day.

Another finding was that horses treated with ginseng showed a significant fall in serum sodium and increase in serum potassium levels.

None of the animals showed any adverse effects of the ginseng. Dr Pearson suggests that supplementing healthy horses with ginseng may be useful to enhance their response to vaccination.

For more details:

Low-dose ginseng (*Panax quinquefolium*) modulates the course and magnitude of the antibody response to vaccination against equid herpesvirus I in horses.
W Pearson, S Omar, AGF Clarke.

Exercise affects tracheal aspirates.

Scientists have advised caution in interpreting the results of tracheal aspirates in relation to exercise in race-horses. Considerable difference in results between samples collected before and after exercise has been reported.

Inflammatory airway disease is a common cause of poor performance in young racehorses. It leads to an increase in respiratory secretions and inflammatory cells within the airway. Tracheal aspiration (or tracheal wash) is a relatively simple technique for assessing the extent of the problem. It is a routine procedure in many racing stables.

Using an endoscope, it is possible to see the respiratory secretions in the airway. These secretions tend to pool at the lowest point of the trachea, at the entrance to the chest, from where samples can be collected using a catheter passed through the endoscope’s biopsy channel.

Airway inflammation typically leads to an increase in the number of a particular white blood cell - the neutrophil - in the tracheal secretions. By collecting these secretions and counting the number of neutrophils as a proportion of all cells present it is possible to assess the degree of inflammation.

Tracheal aspirates can be used not only to confirm a diagnosis, but also to monitor the response to treatment. An increase in the number and proportion of neutrophils would indicate an increase in inflammation.

Conversely, fewer neutrophils would mean that inflammation was subsiding.

Continued...
Workers in Australia have been assessing how exercise affects the composition of tracheal aspirates.

Dr Nick Malikides and his colleagues examined young Thoroughbred and Standardbred racehorses in race training. The horses had been admitted to the Faculty of Veterinary Science, at the University of Sydney, for investigation of poor performance.

The scientists collected tracheal aspirates 24 hours before, and between 1-2 hours after, the horses were exercised on a high-speed treadmill.

They found a significant difference between pre- and post-exercise samples in the same horses. Exercise led to an increase in the (median) percentage of neutrophils in the tracheal wash compared with the counts before exercise. Before exercise, the median percentage of neutrophils was 18%. After exercise it increased to 34%.

Veterinarians should be aware that recent strenuous exercise may affect the proportion of neutrophils collected in a tracheal aspirate, Dr Malikides warns. They should bear this in mind when interpreting the results. He suggests allowing at least 1-2 hours after exercise before performing a tracheal aspirate in order to get the most useful diagnostic information.

For more details see:

Comparison of tracheal aspirates before and after high-speed treadmill exercise in racehorses.