Novel components of honey that might have antibacterial properties have been identified by researchers in Scotland.

With the growing problem of bacteria becoming resistant to commonly used antibiotics, there is a need to find new antibacterial agents.

Some types of honey have been shown to have antibacterial properties, but not all honey is the same. Its antibacterial properties depend on the type of honey and the conditions under which it was harvested and processed.

Manuka honey, produced by bees foraging on manuka plants (Leptospermum scoparium), native to Australia and New Zealand, has been the subject of considerable research. Honey from other sources is often used in practice, but there has been little research into how effective it is.

Lorna Fyfe and colleagues, working at Queen Margaret University, Musselburgh, Scotland, found that some Scottish honeys had antimicrobial activity against antibiotic-resistant bacterial isolates, such as Staphylococcus aureus, Pseudomonas aeruginosa and Escherichia coli. Indeed, some types of honey (Highland and Portobello 2011) were as effective as the “gold standard” Manuka honey. Heather honey was the next most active. Blossom honey was less effective.

What was it about the honey that gave it its antimicrobial activity?

The research team found no correlation between the honeys’ ability to inhibit bacterial growth and its pH, sugar, total phenol content or antioxidant capacity.

Using liquid chromatography-mass spectrometry they found differences in the concentration of polyphenols and other components of the different honeys. They also identified other potential components that might have antibacterial activity, such as some fatty diacid glycoside derivatives, that had not been identified previously in honey.

For more details see:

Compositional analysis of Scottish honeys with antimicrobial activity against antibiotic-resistant bacteria reveals novel antimicrobial components.

Lorna Fyfe, Paulina Okoro, Euan Paterson, Shirley Coyle, Gordon J. McDougall
LWT - Food Science and Technology, Volume 79, June 2017, Pages 52-59
http://dx.doi.org/10.1016/j.lwt.2017.01.023
Bedding materials and infection

Various materials are used in stables to provide bedding for horses. Properties such as dust content, ease of cleaning, comfort, absorbency and cost are often considered. But what about resistance to infection?

Researchers at Nottingham Trent University, led by Kelly Yarnell, have been investigating how well some commonly used bedding materials support the growth of bacteria that cause disease in horses.

The bedding types tested were: Pinus sylvestrus (Scots pine shavings), Pinus nigra (Corsican pine shavings), Picea sitchensis (Sitka spruce shavings), Cannabis sativa (hemp) and chopped wheat straw.

To test the effect of the bedding materials on bacterial growth, the research team incubated standardized suspensions of each species of bacteria with sterilized samples of bedding materials.

Bacteria used in the study included: Streptococcus equi, the cause of strangles; Streptococcus zooepidemicus (responsible for uterine infections in mares and respiratory infections); Fusobacterium necrophorum and Dichelobacter nodosus (involved in thrush) and Dermatophilus congolensis (associated with mud fever).

They found that three of five bacteria tested, E. coli, D. nodosus and D. congolensis were not detectable when incubated with Corsican pine, Scots Pine and Sitka Spruce.

For Strep zooepidemicus, straw showed the highest bacterial count and Scots pine and Corsican pine the lowest.

Pine bedding supported significantly less growth of each of the bacterial species tested when compared to other commonly used equine bedding substrates including hemp and straw.

“Overall, hemp and straw showed the highest colony counts for all bacterial strains tested while Corsican and Scots pine showed the lowest colony counts” they report.

Furthermore, pine and spruce shavings absorbed and retained significantly more urine and continued to do so for up to twenty-four hours. In contrast, the other bedding types tested absorbed urine for up to eight hours.

For more details, see:
doi: 10.1111/jam.13298

Failure of ivermectin to control oxyuris

Equine pinworms (Oxyuris equi) may be becoming more of a problem. In particular, there have been reports of failure of the macrocyclic lactone, ivermectin, to eliminate these parasites.

The worms live in the terminal reaches of the large intestine, with the females depositing eggs around the anus of infected horses. As the eggs are not passed in the faeces, infections are rarely identified on routine faecal examination.

Although they cause minimal damage to the intestinal tract, the presence of the worms’ eggs on the perineum results in irritation and damage to the tail.

Researchers in France, led by Guillaume Sallé at the Université de Tours in Nouzilly, report the failure of ivermectin to control O. equi infection in an experimental Welsh pony herd.

They conducted two small scale trials.

In the first, six ponies with patent oxyuris infection despite recent treatment with moxidecctin, were monitored for 21 days after treatment with ivermectin. The research team monitored egg production by adhesive tape sampling of the perianal region, and looked for adult worms in the faeces. Oxyuris equi eggs were detected in half of the ponies within 21 days after treatment.

The following year, six ponies infected with Oxyuris equi were divided into groups for treatment with ivermectin, pyrantel or fenbendazole. The response to treatment was monitored weekly over five weeks. The researchers
found that Ivermectin treated ponies continued to excrete eggs throughout the study period. In contrast, both fenbendazole and pyrantel seemed to be effective, preventing oxyuris egg production within 8 and 14 days respectively.

Because of the small size of the study, it was not possible to make any firm conclusions. However, it serves as a reminder that, even though cyathostomins are now widely resistant to fenbendazole, the drug still has a place in strategic treatment for specific parasites like oxyuris.

For more details, see:

Ivermectin failure in the control of Oxyuris equi in a herd of ponies in France.

The route of administration drastically affects the activity of ivermectin against small strongyles in horses according to research published recently in Veterinary Parasitology.

Ivermectin is widely available as a paste or suspension for oral administration to horses. It is also available as a solution for injection for cattle.

Carlos Saumell, Adrián Lifschitz, and others conducted a study to compare the efficacy of ivermectin (IVM) against small strongyles (cyathostomins) when given orally and by intramuscular (IM) injection.

Naturally infected horses were treated with either orally administered IVM paste or suspension, or IVM liquid by intramuscular injection. A fourth group were left untreated as controls.

The response to treatment was assessed by monitoring faecal worm egg counts. Faecal samples were collected before treatment, and at weekly intervals afterwards. The researchers also looked at how the plasma ivermectin concentration differed between the treatment groups.

They found that oral administration of either paste or liquid formulation was highly effective (100%) at reducing the faecal worm egg count. However, although intramuscular injection resulted in higher plasma concentration than did oral administration, it was much less effective at reducing the faecal egg count (36-64%).

The authors suggest that the higher efficacy of IVM after oral administration can be explained by an enhanced drug exposure of the worms within the lumen of the large intestine.

For more details, see:

The route of administration drastically affects ivermectin activity against small strongyles in horses.

Equine Science Update e-news is now available.
Receive monthly news by e-mail
See: www.equinescienceupdate.com for details.
It seems that nowhere is free from anthelmintic resistance. A recent report describes a study into the problem in cart horses in Ethiopia.

Zewdu Seyoum, Alemu Zewdu and co-workers based at the Department of Paraclinical Studies, Faculty of Veterinary Medicine, University of Gondar, conducted a study in cart horses in Gondar, Northwest Ethiopia, between November 2015 and March 2016.

They collected faecal samples from 140 cart horses. Of those, only 45 (32.14%) were found to have at least 150 strongyle nematode eggs / gram in their faeces. The 45 strongyle-infected horses were randomly allocated to three groups and treated with fenbendazole or ivermectin, or left untreated.

Faecal worm egg counts (FWECs) were performed on samples before, and 14 days after, treatment.

The researchers found that the reduction in mean FWEC values for fenbendazole and ivermectin was 79.4% and 97.25%, with lower 95% confidence interval of 66.5% and 78.59%, respectively.

They explain that resistance of nematodes in domestic animals can be declared when the percentage reduction in egg counts is less than 95% and/or the lower 95% confidence level is less than 90%. If only one of the two criteria is met, resistance is suspected.

Consequently, they conclude that the findings provide evidence of resistance of strongyles to fenbendazole, and suspected resistance to ivermectin.

The researchers also conducted a questionnaire survey of 90 cart horse owners to control parasitic infection.

The authors conclude that strongyle nematodes of cart horses were developing fenbendazole resistance. It also appeared that ivermectin was not fully effective.

They point out the need for a sustainable control strategy to maintain the effectiveness of available anthelmintics. They suggest more work is needed to assess both the prevalence of strongyle infections in the country and the extent of anthelmintic resistance.

For more details, see:


Research in Spain suggests that regular feeding of pellets containing certain fungal spores can help in controlling roundworm parasites.

The regular use of anthelmintic drugs has led to widespread resistance amongst parasite populations – particularly the small strongyles (Cyathostomins).

Additional measures need to be found to help control high infection rates whilst avoiding excessive use of anthelmintics.

Scientists at the Equine Diseases Study Group at Santiago de Compostela University, have shown it is possible to produce feed pellets containing spores of nematode-killing fungi. These fungi can survive the production process and help postpone the need for anthelmintic treatment. The research has been published in the journal Veterinary Parasitology.

José Ángel Hernández and co-workers manufactured pellets containing spores of two fungi that have been shown to have activity against roundworm parasites.

*Mucor circinelloides* has oxicidal activity against the large roundworm (*Parascaris equorum*), and liver fluke (*Fasciola hepatica*). *Duddingtonia flagrans* acts on free living larval stages, trapping them with its adhesive hyphae.

Three groups, each of seven indigenous Raza Pura Galega mares, housed in separate meadows, were used.

At the start of the study, all horses had >500 strongyle eggs per gram (epg) in the faeces. Some also had *Parascaris equorum* eggs.

The first group was treated with ivermectin and then fed spore-containing pellets daily. The second group was treated with ivermectin but received pellets without the fungal spores. The third group received pellets without the fungal spores, and was not given ivermectin.

The researchers report that, in fecal samples taken from mares receiving the spore-containing pellet, the strongyle egg count remained below 300 EPG until the end of the study (15 months). Consequently, these mares did not need deworming again throughout this period.

In contrast, the mares that had been treated with ivermectin alone, started producing strongyle eggs again after 8 weeks after treatment, and soon followed a pattern similar to the untreated controls.

No *P. equorum* eggs were detected throughout the study (15 months), in any of the mares that had received ivermectin, but they were seen intermittently in the untreated animals.

No undesirable side effects on horses fed on pellets containing fungal spores were recorded.

Incorporating the fungal spores into the pellets did not appear to affect palatability, as the mares never refused to eat the pellets containing the spores.

The results show it may be possible to reduce the risk of infection by gastrointestinal nematodes by feeding horses pellets containing a blend of spores of an oxicidal fungus (*M. circinelloides*) and a larval-trapping species (*D. flagrans*).

For more details, see:

Feeding horses with industrially manufactured pellets with fungal spores to promote nematode integrated control.

Developing a facial expression ethogram for ridden horses

Researchers have been working to develop a facial expression ethogram to assess pain-related behaviour in ridden horses.

Co-author of the study, Sue Dyson, an expert in equine orthopaedics, came up with the idea for the project after observing changes in facial expression of horses during lameness examinations.

Owners, riders, and trainers often have difficulty recognizing signs of pain in ridden horses.

Indeed, Dyson revealed the extent of the problem in a previous study with Line Greve, which found that 47% of 506 sports horses in normal work and presumed to be sound, were overtly lame or had other pain-related gait abnormalities (such as stiffness or stilted canter.)

Recently there has been growing interest in the recognition of subtle behavioural changes associated with pain. For example, a Horse Grimace Scale, consisting of 6 features (the ears held stiffly backwards; orbital tightening [eyelids partly or completely closed]; tension above the eye; the mouth strained with a pronounced chin; the nostrils strained with flattening of their profile; and prominent strained chewing muscles) at 3 levels (not present, moderately, and obviously present) was developed to categorize the facial expressions of horses undergoing routine castration.*

Could a similar system be used to assess the degree of pain in horses with subtle lameness?

The researchers developed and tested an ethogram to describe facial expressions in still photographs of ridden horses. Then they went on to see if assessors from different professional backgrounds could interpret and apply the ethogram correctly and consistently.

They found that the ethogram could reliably be used to describe facial expressions of ridden horses.

They did not look at whether facial expressions could be used to differentiate non-lame and lame horses. That will be the subject of a separate study. It is hoped that eventually the ethogram will provide an additional tool for assessing lameness in the ridden horse.

In future work the research team also hopes to identify key features to enable the ethogram to be simplified so that it can be used more widely.

The authors conclude “This novel work is the first step toward assessing pain in ridden horses other than through obvious gait changes or physiological posture.”

The project was supported by World Horse Welfare and the Saddle Research Trust.

For more details, see:

Development of an ethogram to describe facial expressions in ridden horses.


Journal of Veterinary Behavior: Clinical Applications and Research, 18: 7-12.


*Development of the Horse Grimace Scale (HGS) as a Pain Assessment Tool in Horses Undergoing Routine Castration.

Emanuela Dalla Costa, Michela Minero, Dirk Lebelt, Diana Stucke, Elisabetta Canali, Matthew C. Leach

PLOS One (2014)

http://dx.doi.org/10.1371/journal.pone.0092281
Changing coat colour preference

Spotted horses were popular in the early days of domestication, but fell out of favour in the Middle Ages, according to recent research.

By studying the DNA of long-dead horses, it is possible identify genes for colour and deduce what colour the horses would have been.

Saskia Wutke & Arne Ludwig in the Leibniz Institute for Zoo and Wildlife Research, Berlin, in collaboration with an international team of scientists, examined DNA extracted from bones and teeth at sites in Europe and around the Caspian Sea.

They successfully genotyped 107 ancient samples for eight coat colour genes, and combined these data with information obtained in previous studies.

They found that spotted and diluted (eg dun, palomino) horses were considerably more frequent during the Bronze and Iron Ages, whereas solid phenotypes, especially chestnut, were predominant in the Middle Ages.

In an article in Scientific Reports, they write “In contrast to their Iron Age ancestors, early medieval horses displayed a strong reduction in spotted and diluted phenotypes. Such a decrease had apparently started in Roman times when, according to ancient Roman records, horses with uniform coat colour were preferred to spotted horses, as the latter were considered to be of inferior quality.”

They conclude: “The present study is the most comprehensive to date addressing coat colour differences in ancient horses. We found differential selection for spotted and solid phenotypes over time reflecting changes in human preferences. With the decline of the Roman Empire, solid phenotypes increased in frequency, whereas the frequency of spotted and diluted phenotypes decreased significantly.”

For more details see:

Spotted phenotypes in horses lost attractiveness in the Middle Ages.
New test for Atypical Myopathy available

Testing for the Equine Atypical Myopathy toxin (hypoglycin A) in tree samples, as well as in horse blood, is now available.

Atypical myopathy (AM) of horses is a severe and life threatening equine muscle disorder that is caused by the ingestion of Sycamore tree seeds, leaves or seedlings by horses that are kept at pasture.

However, not all Sycamore trees contain significant amounts of the toxin.

Many horse owners have found themselves in a dilemma. What to do about the sycamore tree in the paddock?

Testing for the Equine Atypical Myopathy toxin (hypoglycin A) in tree samples, as well as in horse blood, is now available.

Atypical myopathy (AM) of horses is a severe and life threatening equine muscle disorder that is caused by the ingestion of Sycamore tree seeds, leaves or seedlings by horses that are kept at pasture.

However, not all Sycamore trees contain significant amounts of the toxin.

Many horse owners have found themselves in a dilemma. What to do about the sycamore tree in the paddock?

It may be easier to make the decision now that a test is readily available to detect the toxin in seeds and seedlings. Knowing which trees are producing significant levels of the toxin should help owners prevent their horses being affected.

Veterinary surgeons can now submit horse blood or urine samples for testing if they suspect Atypical Myopathy, or to check exposure of field companions.

It is hoped that this will help establish a much more rapid and accurate diagnosis, and subsequent treatment, than with previous tests.

Professor Richard Piercy, Professor of Comparative Neuromuscular Disease, said: “We’re really pleased to be able to launch our testing service for owners who may be concerned about their horses. With the support of the Horse Trust and ACT, and through working with owners in this way, we hope to be able to improve the understanding of atypical myopathy and improve the welfare of horses with this severe condition.”

For more details, see:
A report published in the Equine Veterinary Journal presents evidence for marsh mallow (Malva parviflora) poisoning causing myocardial disease and myopathy in four horses.

Marsh mallow (other names include small-flowered mallow, cheeseseed, little mallow, Egyptian mallow) is found around the world, including parts of Europe, North and South America, Asia, Australia, and New Zealand. The plant is harvested from the wild for use as food and in traditional medicine.

However, an example of how something beneficial in small amounts can be dangerous in excess is provided by the report from Australia.

Four horses from the same farm developed severe muscle tremor, rapid heart rate, sweating and periods of recumbency leading to death or euthanasia. The signs resembled those of Atypical (or Seasonal Pasture) Myopathy, but none of the known culprits (Acer spp sycamore trees) was present. In fact, the pasture was practically bare, apart from an extensive covering of marshmallow. The horses had been receiving supplementary hay, but a week before the onset of signs this had been reduced to a minimal amount.

Dr Jenni Bauquier of the Faculty of Veterinary and Agricultural Sciences, University of Melbourne, and colleagues, describe the clinical signs, and the subsequent investigations.

They performed post-mortem examinations on three of the horses, which revealed acute, multifocal cardiac and skeletal muscle necrosis.

Serum samples from two cases contained malvalic and sterculic acids. Neither was detected in serum from 10 healthy control animals.

Malvalic and sterculic acids, which are cyclopropene fatty acids, are thought to be the main toxic components of the M parviflora, and probably act by interfering with fatty acid oxidation. They are found in all parts of the plant, but concentrations are particularly high in immature seeds. Poisoning in the cases included in the report occurred when the mature fruit containing seeds were present on the plant and there was little other food available.

Although the horses were in reasonable body condition (condition score 4/9), the authors suggest that negative energy balance (caused by withdrawal of supplementary feeding) was a significant factor in the development of clinical toxicosis.

When energy intake is inadequate, fat is mobilized to provide energy through the beta-oxidation pathway. Interfering with that pathway, which is how the toxins are thought to exert their effect, would thus have a more dramatic effect than under conditions of normal energy balance.

The authors conclude that ingestion of M. parviflora is probably related to development of acute myopathy and cardiomyopathy in horses in negative energy balance, due to its effects on fatty acid oxidation.

They recommend that this plant should be controlled in areas where horses and other species are grazing, especially if adequate supplementary feed is unavailable.

For more details, see:

Evidence for marsh mallow (Malva parviflora) toxicosis causing myocardial disease and myopathy in four horses.
Equine Vet J. (2016)
doi: 10.1111/evj.12604
**Equine Science Update**

**Ticks in South Africa**

A recent study in South Africa looked at the species of tick found on horses and donkeys. As well as causing local irritation at the site of their bite, some species of tick spread disease.

A total of 391 ticks were collected from horses and 76 from donkeys, representing 17 species from horses and eight from donkeys.

The most common species identified were:
- *Rhipecephalus evertsi evertsi* (72.1% of the ticks found on horses; 81.6% of those found on donkeys)
- *Amblyomma hebraeum* (19.4% and 23.7% respectively)
- *Rhipecephalus decoloratus* (15.6% and 10.5%)

*Rh evertsi evertsi* was found throughout South Africa—in all nine provinces of the country. This tick is an important disease vector, as it can transmit the protozoan parasite *Theileria equi*, the organism responsible for equine piroplasmosis.

For more details, see:

Parasites of domestic and wild animals in South Africa. L. Ixodid ticks infesting horses and donkeys.


**New Horse Health Survey**

The call has gone out for British horse owners to take part in the National Equine Health Survey (NEHS). Now in its seventh year, the survey has become an important endemic disease monitoring initiative.

NEHS is an opportunity for horse owners to give feedback about the health of their horses, ponies and donkeys so that the most common diseases and problems be identified, prioritised and addressed.

Last year survey records were returned for almost 17,000 horses ponies, donkeys and mules. Lameness (including laminitis) was the most common problem reported, followed by skin diseases.

Blue Cross Education Officer Gemma Taylor said: "Please put the date in your diary now and persuade your friends to do the same. The more data we can collect from the National Equine Health Survey the more robust our results will be, helping us to steer equine awareness, education and research to keep our horses healthier."

For more information go to: www.bluecross.org.uk/NEHS
Sometimes minor procedures – clipping, pulling the mane, injections – may be more easily carried out using some form of physical restraint – such as a twitch. Two common methods are the lip twitch, and the ear twitch.

A recent report by Benjamin Flaköll and others looked at how these techniques worked.

Twelve horses, all geldings, were included in the study. All of them were housed on the same equestrian complex and none had been twitched previously (either lip or ear) while they had been on the premises. They were divided into two groups, and received either a lip twitch or an ear twitch.

To assess the horses’ response to the procedures, Flaköll measured heart rate (HR), heart rate variability (HRV) and salivary cortisol levels before and after application of the twitch.

He found that horses in the lip twitch group had significantly decreased HR and HRV for the first five minutes, and reduced salivary cortisol levels – indicating increased parasympathetic nervous system activity and reduced stress levels. However, the response changed when the lip twitch was left on for longer, resulting in increased HR and decreased HRV.

On the other hand, the ear twitch significantly increased HR, decreased HRV, and increased cortisol levels in the saliva – typical of a stressful response. This effect was noticeable straight away and continued throughout the length of application. The authors conclude that the ear twitch evokes a stressful response, immobilizing horses through fear and/or pain.

Did the horses show any long-term effects of being twitched? The lip twitch did not seem to have any prolonged effect. None of the six horses that received the lip twitch showed any change of behaviour. However, four of the six horses restrained using the ear twitch became more resistant to having their ear touched, not only straight after twitching but also four weeks later.

Reporting the work in the Journal of Veterinary Behavior: Clinical Applications and Research, the authors conclude that the lip twitch and the ear twitch affect horses in different ways.

“Initially, the lip twitch increases parasympathetic nervous system activity, reduces stress levels, and has no effect on a horse’s behavior. This suggests that it subdues through a calming, probably analgesic effect. However, after the first five minutes of application, the lip twitch appears to significantly raise sympathetic tone, which raises questions about its suitability for periods longer than just a few minutes.

“The ear twitch, on the other hand, significantly raises sympathetic nervous system activity and stress levels and makes horses harder to handle both directly after application of the twitch and over time.”

They conclude that the ear twitch restrains horses through a stressful and aversive mechanism, and its use should be actively discouraged.

They further suggest that, as there is some doubt over how long the analgesic effect of the lip twitch persists, veterinarians needing to subdue horses for more than a few minutes should consider sedating the animal rather than using the lip twitch.
Does tryptophan calm horses?

Tryptophan is a common ingredient of supplements marketed for "calming" horses. However, there has been little research into its effectiveness.

Tryptophan is an amino acid that is used in the body to produce serotonin. Serotonin (also known as 5-hydroxytryptamine, or 5-HT) has various functions, including regulating mood, appetite, and sleep.

Does tryptophan really have behaviour modifying effects? Brittany Davis and colleagues at Colorado State University carried out a small study to investigate. A full report is published in Applied Animal Behaviour Science.

They gave varying doses of tryptophan to horses of differing breed sex and age and assessed the response.

Eleven horses (9 geldings, 2 mares) were assigned a series of four treatments: low (20mgTryptophan/kg bodyweight); medium (40mgTrp/kg BW) and high (60mgTrp/kg BW), and no supplementation (control).

Horses received each treatment for 3 days, followed by a 4 day wash out period during which they received no supplementation.

The researchers assessed the horses’ behaviour, and physiological response, using a reactivity or startle test, in which they recorded the time taken for the horse to move away from a stimulus (such as an alarm sound accompanied by an opening umbrella).

They saw no significant behavioral effects following tryptophan supplementation.

They did find different physiological effects on Day 1 and Day 3 of supplementation. On Day 1, all treatment groups showed at least one change associated with sedation. Low dose tryptophan treatment appeared to have a sedative effect in terms of changes in heart rate and serum lactate levels, whereas the medium and high doses reduced cortisol levels. In contrast, on Day 3, they found either no change or changes associated with excitation (significant increase in the time for heart rate to return to normal after startling in the medium treatment group).

They conclude: “Supplementing tryptophan to horses at higher doses (40 mg/kgBW and 60 mg/kg BW) may be an effective way to reduce cortisol levels in stressful situations. We also saw some evidence of calming effects of tryptophan at a lower dose (20 mg/kgBW). However, these findings were seen in only a few of the results variables measured in this experiment. The horses we used responded to tryptophan supplementation more favorably on the first day they received the supplement.”

They add: “It appears that supplementing horses with tryptophan may produce desired results only a few hours after administration and that longer-term use may provide no additional benefit or may even have unwanted effects.”

For more details, see:

Preliminary evaluation on the effectiveness of varying doses of supplemental tryptophan as a calmative in horses
Brittany P. Davis, Terry E. Engle, Jason I. Ransom, Temple Grandin
Doi: 10.1016/j.applanim.2016.12.006