Sudden death in athletic horses is a rare but distressing event. By definition it is seen in horses that, moments before, had appeared perfectly fit and healthy. The absence of any premonitory signs complicates the task of identifying causative factors.

Recently Catriona Lyle led a multicentre study in an attempt to gain a better understanding of the problem and find ways to reduce the risk of sudden death occurring. The work, undertaken at the Royal (Dick) School of Veterinary Studies in Edinburgh, was made possible by the Horserace Betting Levy Board funding a three-year scholarship.

Lyle coordinated a collaborative study drawing information from racecourses in North America, Australia, Japan and Hong Kong. Post-mortem data from 284 cases across a 20-year period were studied. In the UK post-mortem examinations are not always carried out in cases of sudden death and so gaining access to these international records was essential.

She explains: “The study has shown that the cause of death can be quite variable, ranging from severe lung bleeding to a pelvic fracture that causes massive bleeding into the abdomen. But in approximately half the cases I studied, the pathologist was uncertain as to the cause of death. The most likely explanation for death in these situations is cardiac rhythm irregularities, but this is very difficult to prove.”

Following her analysis of these international data, Lyle then looked at cases of sudden death in British racehorses. She found that sudden death of horses during races is a very rare event. Over a seven year period, in 705,914 race starts, there were 201 sudden deaths on British racecourses. The same syndrome is known to occur in eventing, show jumping and hunting but statistics have not been established in these sports.

In the UK study, she found that increasing age is a risk factor, steeplechases posed more of a risk than flat races and racing during the summer was associated with a greater risk of sudden death. However, this should be put in the context that, on average, steeplechasers are older than hurdlers or Flat horses. Horses that had raced within the last 60 days were less likely to be affected.

Jenny Hall, chief veterinary officer of the British Horseracing Authority, welcomed the findings. “This was an extremely useful project. We are continuing to build on Catriona’s research with an ongoing investigation currently running at Britain’s northern racetracks. Sudden death is very distressing and we hope that owners will understand that allowing a full investigation into every racecourse death will help us reduce this risk.”

For more details see:

Colic surgery need not spell the end of a horse's racing career, according to research published in the Journal of the American Veterinary Medical Association.

Lead researcher was Dr Samantha Hart of the University of Pennsylvania's New Bolton Center.

She reviewed the records of Thoroughbred racehorses that had been subject to colic surgery between 1996 and 2009. In all, 59 horses, between 2 and 5 years of age, were included in the study. She compared them with 90 untreated horses – chosen at random from runners in each treated horse's last race before surgery. Only horses that raced at least once before and after surgery were included in the analysis.

She found that 45 of the 59 horses (76%) returned to racing after surgery. She compared quarterly earnings and the number of starts for 12 quarters following the date of surgery and found no difference between treated and untreated horses in respect of the total number of quarters raced, number of starts, or earnings after surgery.

She concludes that, in this study, racing Thoroughbreds that underwent colic surgery and successfully returned to racing had no differences in performance variables, compared with their untreated cohorts.

Read more:
Impact of colic surgery on return to function in racing Thoroughbreds: 59 cases (1996-2009).
Hart SK, Southwood LL, Aceto HW
doi: 10.2460/javma.244.2.205.
Is crib-biting inherited?

Crib-biting, (or cribbing) is a stereotypic behaviour in which the horse grasps a fixed object with its incisor teeth, and draws air into the cranial oesophagus, before expelling it with a characteristic grunt.

Various factors have been suggested as a cause for the behaviour including gastric discomfort and lack of sufficient environmental stimulation. Stereotypies are generally considered to be more a response to an imperfect environment than simply bad behaviour on the part of the horse.

But is there a genetic component?

Researchers in University of Helsinki, Finland compared crib-biting and non-crib-biting horses, looking specifically at genes known or suspected to be related to stereotypic behaviours.

In particular they looked at genes such as Ghrelin, Ghrelin receptor, Leptin, Dopamine receptor, μ-­opioid receptor, N-cadherin, Serotonin receptor and Semaphorin.

Two groups of horses were compared. Horses in the crib-biting group had started to display the behaviour at any early age, and had done so for at least a year. They tended to crib-bite after feeding or when stressed.

Non-­crib-biting(control) horses were all over ten years old and had never been seen to crib-bite.

The researchers analysed the candidate genes in both groups and compared the allele frequencies between the cases and controls for each breed separately. They could find no evidence of an association at any of the tested loci.

They conclude: “These results suggest that the previously known stereotypic genes are not major risk factors for crib-biting in horses.” They suggest that further whole genome studies involving larger groups of crib-biting and non-crib-biting horses are required.

For more details see:

doi:10.1017/S1751731113002346
Details have been released of the main areas of laminitis research to be followed this year by SPILLERS® and the Waltham® International Research Consortium. Current projects range from practical studies that have an immediate bearing on the day-to-day management of the laminitis-prone animal, to fundamental scientific research to help find the missing pieces of the complex laminitis puzzle.

Current advice is that laminitis prone horses and ponies should be fed a diet that contains <12% sugars (water-soluble carbohydrate - WSC) and starch. This can be very difficult to achieve especially as hays and haylages in the United Kingdom often contain far higher levels of WSC. In fact, hays sampled last year had an average of 20.6% WSC on a dry matter basis.

How best to reduce the WSC content of hay to make it more suitable for laminitis prone animals is a current topic of research. Work with Annette Longland (Equine Nutrition and Livestock services) on how best to achieve this has suggested that soaking for 16 hours in tepid water is the most effective practical method. However, further research in collaboration with ELNS and the Royal Agricultural University College (RAUC) suggests that the bacterial load of soaked hay increases with time. So, for now, the recommendation for soaking in warmer weather conditions is to soak for no longer than 6 hours. Studies are continuing in this area to characterise the bacterial load in soaked hay. The results should be available soon. Analysis of the hay will still be recommended to be certain it is safe to feed.

Another topic for study is the role of insulin in the development of laminitis. Horses and ponies that have abnormal insulin responses to a glucose challenge, and/or have persistent high insulin levels in the blood may be at increased risk of laminitis. Recent work by the Consortium in the Australia and the USA has confirmed that there are breed and age differences in the way that horses and ponies respond to the same dietary challenge. Ponies and Andalusians are less insulin sensitive than Standardbreds and older horses are less so than younger horses. The Consortium is currently working with several groups around the world to try to understand how best to evaluate whether an animal has an abnormal insulin response, and why such abnormal responses may increase the risk of laminitis in some animals, but not others.

A research programme in collaboration with the Royal Veterinary College, London, is looking at the role of blood supply in laminitis to investigate whether the way blood vessels behave in some horses and ponies may have an impact on the development of the condition. Disturbances with some aspects of the blood supply to or from the hoof may be involved in laminitis. It may be that those animals that are at increased risk of certain types of laminitis have some underlying problem with how their blood vessels (and in particular the cells lining these vessels) behave in specific circumstances.

The relationship between laminitis and obesity is also under investigation, to understand further the effects that obesity has on the metabolism of some horses and ponies but not others.

Whilst obese animals may be at increased risk of laminitis not all fat horses or ponies will develop laminitis. Healthy conditioned animals can also develop laminitis. The Consortium are working with researchers all over the world to try to understand the effects that obesity has on the metabolism of horses and ponies and how this links with the risk of laminitis. Further important research continues into how owners can safely restore and keep their horses and ponies at a healthy bodyweight.

For more details see:


Research into the diet of our Stone Age ancestors suggests that horses were well adapted to cold winters.

We, and presumably our ancestors, have certain nutritional requirements that have to be met from our food. One requirement is for essential fatty acids such as linoleic acid (LA) and alpha-linolenic acid (ALA). Studies into the diet of stone age man have examined the essential fatty acid content of frozen animals such as mammoths, bison and horses, that might have formed part of the diet of our ancestors many years ago.

Researchers have been looking at the fatty acid (FA) profile of adipose tissue of animals found in the permafrost of Siberia. Lead researcher was José L Guil-Guerrero of the Chemistry of Biomolecules and Food Processing Research group at the University of Almeria Spain.

Six specimens were included in the study: two mammoths (one a baby calf, the other a young female, that died about 40,000 years ago); two bison from about 9,000 years ago; and two adult horses that died about 4,500 years ago. The researchers used gas-liquid chromatography-mass spectrometry (GLC-MS) and GLC-flame ionization detector (GLC-FID) to determine the current fatty acid content of the specimens.

Then, using information on how fats change when frozen for long periods, they were able to deduce the likely fatty acid profile of the animals at the time of death.

Several factors influence the FA profile of such animals. First is the composition of the vegetation on which the animals had been feeding. A detailed analysis of the stomach contents of the mammoth calf revealed plants known to be good sources of polyunsaturated fatty acids (PUFAs) such as ALA. The animal's digestive physiology is also important. Single stomach animals, such as mammoths and horses, are better able to assimilate fatty acids from the food they eat than are ruminants such as bison.

The researchers concluded that the fat of single-stomached mammals, like mammoths and horses, that were often eaten by stone age hunters contained suitable amounts of omega-3 and omega-6 fatty acids, possibly in quantities sufficient to meet today's recommended daily intake for good health.

They added that the results also suggest that mammoths and horses at that time were hibernators. They found high proportions of both LA and ALA in the reconstructed fatty acid profiles of both frozen horses examined. Such a profile is ideally suited to animals that hibernate.* These polyunsaturated fatty acids are important because they influence the metabolic rate and the length of hibernation bouts in hibernating mammals. Animals without linoleic acid in their diet tend to have higher metabolic rates and shorter bouts of hibernation. Shorter bouts of hibernation means that the animal arouses from hibernation more frequently, using more of its energy stores. This could adversely effect its chance of survival.

The researchers point to similarities with the present day Yakutian horses, which are well adapted to living in cold conditions. They have an unusually thick layer of fat under the skin and in the abdomen. During the winter, although they move a little, they stay mainly in the sleeping position with little feeding or other activity.

The researchers conclude: "The results of this study indicate that the monogastric animals analysed, i.e. the woolly mammoth and the horse, might have had a hibernating or semi-hibernating behaviour, while their subcutaneous fat could have been consumed by Stone Age hunters to fulfil the daily needs in essential FAs."

For more details see:


Magnetic resonance (MR) imaging may help support a diagnosis of Cerebellar Abiotrophy, according to recent research.

Cerebellar abiotrophy (CA) is a rare disease of Arabian and part-bred Arabian horses. It is believed to be due to an inherited (single autosomal recessive) abnormality that results in degeneration of Purkinje nerve cells in the cerebellum (that part of the brain that controls fine movement). Affected animals show signs of head tremor, jerky head movements and lack of a menace response. Most affected animals are born normal, but usually develop signs by six months of age.

A definitive diagnosis is made on post mortem examination by identifying the characteristic signs on microscopic examination of the cerebellum.

There is no treatment for the condition. An earlier diagnosis would allow euthanasia to be carried out promptly rather than engaging in fruitless attempts at treatment.

Recently a single nucleotide polymorphism has been identified in the TOE1 gene which is associated with the CA in Arabian horses. A test has been developed which can be used to identify affected foals.

Another approach which has been studied recently is to examine the shape of the cerebellum using MR imaging. Research carried out at the University of Veterinary Medicine Hannover compared five affected foals with control images of 15 unaffected horses.

Jessika Cavalleri, Julia Metzger and colleagues conducted a study to assess the value of magnetic resonance (MR) imaging and morphometry (taking measurements from the MR scans) and genetic testing in supporting a diagnosis of CA.

Measurements were taken from the mid-sagittal T2 weighted image of the brain. Of particular interest was the size of the cerebellum in relation to the rest of the brain and in relation to the space surrounding the cerebellum which is filled with cerebrospinal fluid.

All cases tested positive for the genetic test for CA (i.e. had TOE1 genotype A/A).

The researchers found that, compared to normal horses, in CA affected horses the cerebellum was smaller relative to the brain as a whole, and the CSF space was bigger. Using a cut off value of 11% for relative cerebellar CSF space, they would differentiate between CA-affected and controls, with 100% sensitivity and 93.3% specificity.

They warn that, because the study only involved a few affected animals, the data should be interpreted with care.

The results may have been influenced by the populations selected. Affected animals were Arabian or part-Arabian aged from 2 to 36 months. The 15 unaffected controls were mostly Warmblood (with one Arabian), ranging in age from 6 months to 10 years.

So the researchers suggest further work to confirm their findings should involve more horses at different stages of the disease and normal Arabian horses.

They conclude that morphometric MRI and genetic analysis could help to support a diagnosis of CA in the live animal.

For more details see:
Morphometric magnetic resonance imaging and genetic testing in cerebellar abiotrophy in Arabian horses.
BMC Veterinary Research (2013) 9, 105
http://www.biomedcentral.com/1746-6148/9/105
Post-anaesthetic colic risks identified

A new US colic study, published in Equine Veterinary Journal (EVJ), in partnership with the American Association of Equine Practitioners, has identified various risk factors, including delayed faecal output and increasing blood lactate, associated with post-anaesthetic colic. This new information should enable vets to implement preventative measures to help reduce incidences of colic in the future.

Gastrointestinal pain, generally referred to as colic, has been estimated to occur in 2.8–6% of horses following general anaesthesia for elective procedures, the most common cause being impaction of the large intestine or caecum.

The study “Risk factors associated with gastrointestinal dysfunction in horses undergoing elective procedures under general anaesthesia” was conducted by surgeons based at the College of Veterinary Medicine and Biomedical Sciences at Colorado State University, USA.

The medical records of 416 horses undergoing general anaesthesia were collected over a two-year period and the potential risk factors were examined.

8.7% of horses were diagnosed with gastrointestinal dysfunction – higher than previous estimates probably because the study included horses requiring treatment for decreased faecal output whereas previous studies did not. Potential risk factors were assessed, including faecal output, which was decreased in 38.9% of cases, blood lactate, position during surgery, rectal temperature and breed of horse.

The results showed that Arabian horses, increasing blood lactate, right lateral recumbency, decreased rectal temperature post-procedure and delayed passage of faeces were significantly associated with an increased risk of gastrointestinal dysfunction.

“These findings should help the clinician identify higher risk horses and be proactive about their management in the post-anaesthetic period,” said Diana Hassel, who instigated the study. “This may include preemptive nasogastric intubation and administration of mineral oil and/or water and electrolytes. Although core temperature control in horses is difficult to achieve in adult horses during surgery, further research into this field may prove beneficial.”

Professor Celia Marr, Editor of the Equine Veterinary Journal commented: “This study brings obvious and immediate practical benefits for clinicians and the horses under their care.

For more details see:
Risk factors associated with gastrointestinal dysfunction in horses undergoing elective procedures under general anaesthesia
Nelson, BB, Lordan, EE, and Hassell DM.
Equine Vet J (2013) 45, S45, pp 8–14,
DOI: 10.1111/evj.12162

Rigorous monitoring of higher risk surgical cases should lead to a reduction in incidences of post-operative colic, making recovery procedures less difficult and outcomes more favourable.”
Oxyuris equi: Lack of response to macrocyclic lactones

Anthelmintic resistance is common, especially in the small roundworms (cyathostomins) to products containing benzimidazole compounds. But recently signs of resistance have been noticed in Oxyuris equi, the horse pinworm.

A report from Germany describes two cases of horses that maintained persistent Oxyuris equi infections with continuous egg shedding, despite treatment with macrocyclic lactones (moxidectin and ivermectin).

In a report published in the journal Veterinary Parasitology, Denis Wolf and colleagues describe two small herds of horses, one comprising two horses, the other four. The horses had been dewormed over the previous two years with moxidectin and/or ivermectin, but still continued to shed Oxyuris eggs and adult worms.

Oxyuris equi lay their eggs on the perineum of the horse and so may not be found in routine faecal egg counts. Even so the adult worms may be seen at the anus and in the faeces.

The authors initiated a further course of treatment with moxidectin and monitored the horses closely for the presence of Oxyuris eggs. Adhesive tape samples were taken from the skin around the anus daily for 30 days (herd A) and 57 days (herd B).

They report that Oxyuris equi eggs reappeared in three of the six horses, within 1-4 weeks after treatment. In both herds, companions sharing the same stable and paddock remained negative for detection of O. equi (either eggs or adult worms) throughout the whole observation period.

For more details see: Oxyuris equi: Lack of efficacy in treatment with macrocyclic lactones

Wolf D, Carlos C, Taubert A
Veterinary Parasitology (2014) 201,163–168

Strategies to prevent Pasture Associated Laminitis

Excess pasture consumption is often cited as a factor associated with the precipitation of laminitis, a devastating disease affecting horses feet. However the relationship between pasture consumption and laminitis does not appear to be similar among all horses, i.e. some horses appear to be more at risk for developing laminitis while grazing pasture than others.

In this webinar the relationship between pasture consumption, horse-type and laminitis is discussed in the context of strategies aimed at preventing pasture-associated laminitis.

More details...

http://myhorseuniversity.com/resources/webcasts/laminitis
Equine Science Update

Up to date information on equine hormonal disorders has just become easier to find thanks to the Equine Vet Journal and Equine Veterinary Education. They have compiled a free online collection of their recent articles on Equine Endocrinology to raise awareness of these common disorders and to provide a source of references all in one place.

"Raising awareness of the benefits of early diagnosis [of these conditions] and sharing the latest research on these and other associated conditions are imperative to provide horse owners with the best diagnostic and treatment programmes for their horses" said Professor Celia Marr, Editor of Equine Veterinary Journal. However, "It is easy to under-estimate obesity: horse owners need to think about improving management of their horses' feeding and exercise in order to avert problems before they become a veterinary issue."

The virtual supplement is available (free) at:


Do you own or care for horses? Researchers at Liverpool Vet School are interested in understanding how people view their horses' health. Even if your horse has never been unwell, they would like to hear from you.

Horse-owners and carers play a pivotal role in the health of their horses. By understanding how people think about and address their horses health, vets will be better informed to provide tailored advice for specific issues communicated in a clear and practical way.

More details...

http://www.liv.ac.uk/equine/owners/horsehealthstudy/

Back issues of Equine Science Update from 2005 -2009 are now available. As PDF files they can be downloaded direct to your computer and are fully searchable.

Catch up with the information you missed.

With over 50 articles each year there is something for everyone.

For more details go to:

www.equinescienceupdate.com/store.html

Updated Foaling Guide now available.

Waiting for a foal to arrive can be a daunting prospect. The Foaling Guide gives you the background knowledge and information you need to approach the event with confidence.

Know what to expect, what can go wrong and what to do about it.

For more details go to: www.TheFoalingGuide.com
**UK Headshaking survey launched**

Headshaking is a distressing condition for both horses and owners and is estimated to affect at least 10,000 horses in the UK. At present the reasons why particular horses develop headshaking are poorly understood and a wide range of different treatments are routinely used but at best these are recognised to be effective in only a small proportion of horses.

An international team of researchers led by Kirstie Pickles, John Madigan, Monica Aleman, Jane Williams and David Marlin are trying to understand why some horses develop headshaking behaviour and others do not. With a better understanding it is hoped that more effective treatments can be developed.

The group have launched a simple online survey and the project is funded by UK based Science Supplements Ltd. The group want to hear from owners who have horses that headshake BUT just as importantly, from owners whose horses don't headshake. These horses will act as controls for the study.

As an incentive, Science Supplements are offering a cash prize of £250 for one owner who fills in the survey, who will be selected at random.

The survey takes around 10 minutes to complete and can be found here:


**Guelph equine lameness lab**

Clinicians at the University of Guelph have produced an online Lameness Lab for horse owners to develop or sharpen their skills at detecting lameness. It explains what lameness looks like and gives clues to look for in a lame horse.

The Lameness Lab includes a quiz and a Lameness Video Challenge to test your skills in identifying different types of lameness.

http://myhorseuniversity.com/resources/webcasts/laminitis

**Horse people relationship research**

Prof McLaren and Dr DeAraugo, at Federation University, Australia, are researching the relationships between people in horse sports.

Part one of the study investigates the attitudes and emotions of people in horse sports. In part two of the study, they are interested to see if horse riders have been exposed to bullying in horse sports.

They anticipate that the information being collected will be of value to help them understand the broad range of emotions and attitudes people have in horse sports and whether people are exposed to bullying in horse sports and, if so, how they react.

Click on the link to participate in the research which will take approximately 10 minutes to complete.

https://www.surveymonkey.com/s/Horsesportandpeople
Detecting larval Strongylus vulgaris

Collaboration between scientists in Denmark and the United States has seen the development of a diagnostic test that promises to help identify horses infected with the larval stages of the large strongyle Strongylus vulgaris.

Strongylus vulgaris, is the most pathogenic of the large strongyles (or large redworms). Damage is caused by the larval stages of the parasite, which migrate in the arteries that supply the large intestines. The larvae cause endarteritis and thrombosis and may result in blockage of the arteries and intestinal infarctions.

By the time eggs are detected in the faeces, the damage has already been done. A significant feature of the S vulgaris life cycle is the long prepatent period – the time taken for the larvae to mature into egg-producing adults. This can take up to six months or more. During this time the migrating larvae are virtually undetectable with current tests.

Colic due to damage caused by S vulgaris used to be common before the advent of effective anthelmintics. The interval worming schemes that became popular were very effective at controlling this parasite.

There is concern that S vulgaris may be making a come back. An accurate test that could detect migrating larvae during the pre-patent phase would be a useful tool for controlling the disease. Scientists in Denmark and the United States have been working to develop such a test.¹

The result of their research is a serum enzyme-linked immunosorbent assay (ELISA) which has been validated for detecting migrating larvae in the bloodstream of horses. The test detects antibodies against a polypeptide in the excretory/secretory fraction of the migrating larvae, named SvSXP.

Further work² using the test showed that foals receive colostral antibodies from the mare which may persist for up to 13 weeks of age. Foals start being able to mount their own immune response to the parasites from about three months of age, depending on the grazing conditions and the stage at which they were exposed to the parasites.

In younger foals, the serum ELISA does not give reliable diagnostic information despite heavy infections. The researchers found that young foals can be heavily infected without showing positive ELISA test results. They also found that higher infection levels tend to be associated with higher ELISA levels.

Once they had started producing antibodies, foals continued to maintain high ELISA levels throughout the study. There was a tendency for the ELISA levels to decline gradually as the numbers of migrating larvae declined and adult intestinal worm burdens increased.

The scientists suggest that further research into the time taken for antibody levels to decline after effective anthelmintic treatment would be very useful.

If the test becomes commercially available it will be a useful addition to the armoury of diagnostic tests for investigating parasitic disease in horses.

For more details see:

For a long time tapeworms (*Anoplocephala perfoliata*) were not thought to cause problems in horses. Then some studies, notably in England, found an association between tapeworms and certain types of colic. Other studies have not confirmed a link.

One of the problems with tapeworm infections is that of identifying which horses are infected. Standard faecal egg counting methods often do not detect the tapeworm eggs, which are only released into the faeces intermittently.

The tapeworm anti-12/13 kDa IgG(T) ELISA antibody test gives an indication of the severity of infection levels. Modified faecal examination techniques have been devised to improve the detection of tapeworm eggs in the faeces.

Recently Helena Back and colleagues in Sweden carried out research into the relationship between tapeworm infection and colic. The case-control study involved 67 horses with colic and 67 horses with no recent history of colic. Clinical cases were matched with horses of similar age, and with no history of colic in the previous year, that attended the clinic within a week of each colic case.

The researchers used a modified flotation technique to detect tapeworm eggs and the anti-12/13 kDa IgG(T) ELISA blood test to give serological evidence of the degree of tapeworm infection. They found a significant association between the presence of *A. perfoliata* eggs in faeces and colic. Horses were 16 times more likely to have colic if tapeworm eggs had been observed in their faeces.

The study showed a significant association between high tapeworm ELISA optical density values and the detection of eggs of *A. perfoliata* in faecal samples. However, although the ELISA test appeared to be useful for detecting horses infected with *A. perfoliata*, this particular study did not find an association between antibody levels and colic.

The authors conclude that infection with *Anoplocephala perfoliata* is a risk factor for colic in horses in Sweden. They suggest that the modified flotation technique can be used to identify horses at risk.

For more details see:

The association between *Anoplocephala perfoliata* and colic in Swedish horses—A case control study

H. Back, A. Nyman, E. Osterman Lind
Veterinary Parasitology (2013) 197, pp 580–585

http://dx.doi.org/10.1016/j.vetpar.2013.07.020

---

**Contents**

- Investigating sudden death in racehorses
- Racing after colic surgery
- Is crib-biting inherited?
- Current laminitis research
- Did prehistoric horses hibernate?
- MRI for cerebellar abiotrophy diagnosis
- Post-anaesthetic colic risks identified
- Oxyuris equi: Lack of response to macrocyclic lactones
- Strategies to prevent Pasture Associated Laminitis
- Equine hormonal disorders - latest research
- Owner views on horse health sought
- Guelph equine lameness lab
- Horse people relationship research
- UK Headshaking survey launched
- Detecting larval Strongylus vulgaris infections
- Tapeworm eggs associated with colic