

stimulants may also help. By careful attention to the management regime we have developed, the recent recovery rate for carefully selected cases in the Easter Bush Veterinary Centre Equine Hospital is now approximately 70% and veterinary practitioners in the field report success when following the same regime. Contrary to commonly held views, a follow-up study has shown that 41% of these recovered cases were back to work including hunting, racing, eventing, 33% were being hacked, preparing for competitive work or being used for breeding and the other 26% (the more recent cases) were still gaining weight and recovering at the time of the survey. None of the survivors were described as being of no use. This represents a major improvement in the prognosis for such cases compared with the situation before the late 1980s.

PREVENTION

Until the cause is known, it is difficult to give sound advice regarding prevention. In areas where the disease is prevalent, stabling the animals during the spring and early summer will reduce the likelihood of disease. Following the discovery of an association with weather, some owners living in affected areas now stable their horses when dry weather with a temperature of 7-11°C has persisted for 10 consecutive days. Stabling is particularly advisable for a new horse that has been moved onto premises where the disease is known to occur. If certain fields are 'bad' for the disease, they can be grazed by other stock, especially in spring and summer. If a case occurs amongst a group of horses, it is probably best to move the others out of that field provided this does not involve too much stress associated with transportation or mixing with strange horses.

CURRENT RESEARCH

The Grass Sickness Research Team, and others are currently undertaking several lines of investigation. The main line of investigation at present is the role of soil borne *Clostridium botulinum* type C as the cause of grass sickness. It has been discovered that the concentration of *C.botulinum* type C toxin is high in the intestine of acute cases and that horses with low levels of antibody to the bacteria and its toxin are at increased risk from the disease. Recent epidemiological studies carried out by the University of Liverpool, the Animal Health Trust and the R(D)SVS also provide supportive evidence for the involvement of *Clostridium botulinum*. This includes the increased risk when grass is contaminated by soil or birds present on the pasture.

If you would like to know more about supporting grass sickness research or make a donation, please contact **Joyce McIntosh, Secretary, Equine Grass Sickness Fund, The Moredun Foundation, Pentlands Science Park, Bush Loan, Penicuik, Midlothian, EH26 0PZ.**

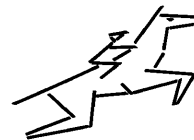
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SUPPORTING GRASS SICKNESS RESEARCH

The Equine Grass Sickness Fund is the only registered charity in the UK raising funds specifically for research into grass sickness. EGSF is dedicated to supporting and advancing research into grass sickness and further improving the treatment of chronic cases.

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GRASS SICKNESS IN HORSES

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INTRODUCTION

Grass Sickness is a disease of horses, ponies and donkeys in which there is damage to parts of the nervous system which control involuntary functions, producing the main symptom of gut paralysis. The cause is unknown but the nature of the damage to the nervous system suggests that a type of toxin is involved. The disease occurs almost exclusively in horses with access to grass.

The disease was first recognised about 1907 following an outbreak in army remount horses near Dundee. The incidence increased markedly and at least in Scotland, hundreds of horses, mainly draught animals, died annually from grass sickness in the 1920's. It is said that the losses were so severe that the introduction of tractors was artificially accelerated as a result. In the 21st century, grass sickness continues to kill horses of all breeds and it has been estimated that approximately 1 in 200 die annually from the disease in some parts of the UK. Grass sickness has been a research interest of the Moredun Foundation for many decades and an active Grass Sickness Research Team involving collaboration between the Moredun, Royal (Dick) School of Veterinary Studies (R(D)SVS) and other institutes has been in existence since 1986.

DISTRIBUTION

Great Britain has the highest incidence of grass sickness in the world and the disease occurs in most areas of England, Wales and Scotland. It is a significant problem in many areas of Great Britain, with eastern counties being particularly at risk. The disease is well recognised in northern Europe, especially Sweden, Denmark and Germany, with fewer cases in France, Belgium, Italy, Holland, Norway, Finland and Switzerland. Several cases have been identified in Ireland, and two in North America. The disease has not been authentically reported from Africa, Australia or Asia but a condition indistinguishable from grass sickness called mal seco (dry sickness), has been recognised in Argentina, the Falklands, Colombia and Chile.

SPECIES, BREED AND SEX

Grass sickness affects horses, ponies and donkeys, and there have even been cases in a captive zebra and a Przewalski's horse. It used to be thought that Clydesdales were more susceptible and that Shetland ponies and thoroughbreds were resistant but this has been disproved and the incidence in different breeds reflects their numbers in the general population in the worst affected areas of the country.

In the early 1990's, a disease almost identical to grass sickness was discovered in hares, some of which occurred on pastures where there had been recent cases of the equine disease. Soon after, it was discovered that the disease also affects wild and domestic rabbits. However, there is no evidence that hares, rabbits and horses can pass the disease to each other. Dogs and cats also develop a similar disease. Thankfully, there is no human equivalent of grass sickness.

AGE

Grass sickness occurs in all ages from 4 months to over 20 years but the greatest number of cases occurs in 2 to 7 year olds with a peak at 3 to 4 years. The reason for the age distribution is uncertain although young foals are very rarely affected. The lower incidence in older horses, and surviving horses in a

group in which a case has occurred suggest that animals exposed to the causative agent may develop a degree of resistance to the disease.

SEASON

Cases occur in every month of the year but most are seen between April and July with a peak in May. In some years, a second, smaller peak occurs in the autumn or winter. At least in Scotland, the lowest incidence is in August which may be a weather-associated effect (see below).

PREDISPOSING FACTORS

Grass sickness, as its name suggests, is strongly associated with grazing but there have been a few cases in animals with no access to pasture. In these rare cases, hay has been implicated as the source of the causal agent. Although most cases have been at grass full-time or during the day, the disease can affect horses which have only a few minutes' access to grass daily. Giving supplementary feeding in the form of concentrates does not have a protective effect, but hay feeding reduced the risk factor in one study.

It is well recognised that certain premises, or even fields within single premises are associated with the occurrence of grass sickness cases. Animals which have been on affected premises for less than 2 months are more likely to develop the disease. Commonly, only one animal is affected at a time but 'outbreaks' of the disease with several cases in a period of a few weeks are not infrequent.

There is no clear association with type of pasture (new ley, permanent pasture, hill grazing, clean or 'horse-sick' pasture) but recent evidence suggests that high nitrogen content of soil and soil disturbance may be risk factors. While it was previously thought that grass sickness was more common in pastures with a high clover content, recent studies indicate that it can also occur on pastures with no clover. Thus clover is not the sole cause of the disease, and at worst may be a trigger for a bacterium such as *Clostridium botulinum*.

Other suggested risk factors include increased numbers of horses on the pasture, mechanical droppings removal and presence of domesticated birds on fields. Stress appears to be a factor in predisposing to the disease and a significant number of animals have a history of recent stress including recent purchase, mixing with strange horses, travelling a long distance, breaking and castration. Animals in good to fat condition also appear to be predisposed.

Many horse owners have firm opinions about the type of weather prevailing when grass sickness cases occur. In a survey of weather conditions in the two weeks preceding multiple-case outbreaks, it was found that cool, dry weather with a temperature between 7 and 11°C was recorded in a statistically significant number of instances. This may partly explain the higher incidence of the disease in the eastern side of Britain where such conditions are more prevalent.

Results of two surveys suggest that the risk of developing grass sickness is slightly higher in horses which are wormed more frequently with certain types of wormers. However, it should be emphasised that the consequences of not worming can be very serious or even fatal and it is not suggested that owners should decrease their use of wormers. There is also no indication that wormers themselves contain the toxin that causes grass sickness.

CAUSAL AGENT

The cause of grass sickness is unknown despite almost 100 years of investigation. Many potential causes have been examined over the years including poisonous plants, chemicals, bacteria, viruses, insects and metabolic upsets. A common suggestion by horse owners is that mineral or vitamin deficiencies may be the cause. None have any proven link with the disease, although selenium deficiency, which results in reduced levels of protective antioxidants in the body, may have some role to play. Grass sickness does not appear to be contagious and the type of damage to the nervous system suggests that a toxic substance is likely to be involved. The currently favoured theory under investigation is the possible involvement of *Clostridium botulinum*, a soil-associated bacterium.

CLINICAL SIGNS

Grass sickness occurs in three main forms, acute, subacute and chronic, but there is considerable overlap in the symptoms seen in the three forms. The major symptoms relate to partial or complete paralysis of the digestive tract from the oesophagus (gullet) downwards. In acute grass sickness, the symptoms are severe, appear suddenly and the horse will die or require to be put down within two days of the onset. Severe gut paralysis leads to signs of colic including rolling, pawing at the ground and looking at the flanks, difficulty in swallowing and drooling of saliva. The stomach may become grossly distended with foul-smelling fluid which may start to pour down the nose. Further down the gut, constipation occurs. If any dung is passed, the pellets are small, hard and may show a 'cheesy' coating of mucus. Fine muscle tremors and patchy sweating may occur. In this form, the disease is fatal and the horse should be put down once the diagnosis is made.

In subacute grass sickness, the symptoms are similar to those of the acute disease but are less severe. Accumulation of fluid in the stomach may not occur but the horse is likely to show difficulty swallowing, mild to moderate colic, sweating, muscle tremors and rapid weight loss. Small amounts of food may still be consumed. Such cases may die or require to be put down within a week.

In chronic grass sickness, the symptoms come on more slowly and only some cases show mild, intermittent colic. The appetite is likely to be reduced and there will be varying degrees of difficulty in swallowing but salivation, accumulation of fluid in the stomach and severe constipation are not a feature. One of the major symptoms is rapid and severe weight loss which may lead to emaciation. Previously, it was thought that nearly all such cases died and that the few which survived made only a partial recovery and were subsequently useless for work. This is now known to be incorrect (see section on treatment).

DIAGNOSIS

The symptoms described above may seem quite clear-cut but unfortunately not all affected animals show all these signs and it can sometimes be very difficult for the veterinary surgeon to distinguish grass sickness from other causes of colic, difficulty in swallowing and weight loss. This is compounded by the fact that there is no non-invasive test for diagnosing the disease in the live animal although certain blood tests (haptoglobin, cortisol and catecholamines) and examination of peritoneal fluid can be helpful, when considered together with the symptoms. A definite diagnosis can be made only by microscopic examination of nerve ganglia after death or by surgical removal of a piece of small intestine by opening the abdomen. Characteristic degenerative changes in the nerve cells can then be demonstrated in the tissues. A test involving application of 0.5% phenylephrine eye drops, which reverses the drooping eyelids seen in grass sickness, has shown potential as a test for use in the live horse.

TREATMENT

As previously stated, treatment should not be considered in acute and subacute cases. However, in chronic cases, if the animals are not in much pain, can still eat at least a small amount and are still interested in life, treatment of chronic cases can be attempted. The correct selection of potentially treatable cases using these criteria requires experience but is essential. Not all chronic cases are treatable. The management of selected cases has been the subject of study by the Grass Sickness Research Team since 1989 and the results have challenged the view that chronic cases either die or at best only partly recover. Treatment of chronic cases involves provision of palatable, easily swallowed food e.g. chopped vegetables, grass and high energy concentrates soaked in molasses. It is essential that high energy foods are consumed as chronic cases fed roughages and succulents alone will invariably die. Nursing is also vital and provides the mainstay of management. The patients require constant stimulation by human contact, frequent grooming to prevent them becoming scurfy and sticky with sweat and, in some cases, rugging which has been found to reduce sweating and prevent hypothermia. Appetite