CODE OF PRACTICE FOR EQUINE HERPESVIRUS

The Disease

Equine herpesvirus is a common virus that occurs in horse populations worldwide. The two most common types are EHV-1, which causes respiratory disease in young horses, abortion in pregnant mares and neurological disease in horses of all ages and types, and EHV-4, which usually only causes low-grade respiratory disease but can occasionally cause abortion. Following first infection the majority of horses carry the virus as a latent (silent) infection that can reactivate at intervals throughout life. EHV-3 is a venereal disease that causes pox-like lesions on the penis of stallions and the vulva of mares (Equine Coital Exanthema - see page 45) and EHV-5 is a virus that is currently associated with unusual sporadic cases of debilitating lung scarring (Equine Multinodular Pulmonary Fibrosis) in adult horses.

EHV abortion can occur from two weeks to several months following infection with the virus, reflecting either recent infection or recrudescence (re-activation) of latent infection in a carrier horse. Abortion usually occurs in late pregnancy (from eight months onwards) but can happen as early as four months. Respiratory disease caused by EHV is most common in weaned foals and yearlings, often in autumn and winter. However, older horses can succumb and are more likely than younger ones to transmit the virus without showing clinical signs of infection. It is the continual cycling of EHV respiratory disease in young horses and the periodic reactivation of latent EHV in older horses that maintains the risk of EHV abortion in pregnant mares and EHV neurological disease in horses of all types and ages.

Although EHV-1 may cause outbreaks of abortion, particularly in non-vaccinated mares, EHV-4 has only been associated with single incidents and is not considered a risk for contagious abortions.

Occasionally, EHV-1 can cause neurological disease, which ranges in severity from a mild incoordination of the hindlimbs to quadriplegia (total paralysis where the horse is unable to stand). The most important risk factors for this form of disease include animals greater than 5 years of age, season (autumn, winter and spring when animals are more likely to be stabled or UV light levels are low). Clinically, the onset of neurological signs may be sudden, with no prior clinical signs of respiratory disease and usually occurs in the second week following infection.

Notification Procedures

There are no legal notification requirements for EHV in the UK although it is recommended that owners inform their national breeders' association if EHV abortion or neurological diseases occur. In the UK, Thoroughbred breeders should notify the Thoroughbred Breeders' Association and non-Thoroughbred breeders their relevant breed association.

Because the infection may spread easily between horses and can have severe consequences, it is very important to quickly alert owners of horses that might be at risk of infection through contact with infected horse(s) or premises.

Clinical Signs

Signs of respiratory disease include mild fever, occasional coughing and discharge from the nose.

Foals born alive but infected in utero are usually abnormal from birth, showing weakness, jaundice, difficulty in breathing and occasionally neurological signs. They usually die, or require euthanasia, within three days. The most common sign in older foals, usually following weaning, is a nasal discharge. Less commonly, secondary bacterial infection may cause pneumonia.

There are usually no warning signs of abortion caused by EHV. A sudden and unexpected abortion with a sometimes-jaundiced foal enclosed within the placenta ("red bag" placenta), should always be treated with suspicion, the mare isolated and veterinary help sought to confirm or rule out EHV infection without delay.

Horses affected by neurological EHV often display incoordination of the hind, and occasionally front limbs, urine and/or faecal retention and, in severe cases, recumbency (lying down and unable to stand). These signs may or may not be preceded by initial respiratory signs and there may have been a history of EHV abortion on the premises. A sudden and unexpected uncoordinated or collapsed horse should always be treated with suspicion, the horse isolated and veterinary help sought to confirm or rule out EHV infection without delay.

Transmission of Disease

Infection can be transmitted between horses in any of the following ways:

- EHV respiratory infections are spread most commonly via the respiratory route (e.g. via droplets from coughing and snorting);
- When mares abort with EHV infection, the fetus, fetal membranes and fluids are particularly dangerous sources of infection, releasing large quantities of infectious virus into the local environment, to be inhaled via the respiratory route (particularly when abortions occur in enclosed shared air space environments) and transmission may occur indirectly via attendants and their implements;

- Mares who have aborted or whose newborn foals have died from EHV infection may transmit infective virus via the respiratory route or genital tract and transmission may occur indirectly via attendants and their implements;
- Older foals with EHV respiratory disease ('snotty noses') and sometimes horses with neurological signs are highly contagious and can transmit infection to other horses via the respiratory route and by shedding virus into the environment;
- EHV does not travel long distances (greater than 50 metres) as an aerosol so close contact between horses should be minimised by physical separation into smaller group sizes;

- All these sources of infection are intensified when infected horses are stabled, particularly in shared air space stables, e.g. 'American-type barns'. Evidence from outbreaks linked to this type of stabling suggests that large quantities of infective virus can be released into the surrounding air following any EHV abortion. When this happens at pasture, there is a greater opportunity for dispersal and dilution of the viral 'cloud' than if the abortion occurs when horses are stabled. Breeding stock, particularly pregnant mares and their foals at foot should spend as much time as possible turned out in small groups in adequately sized and well managed paddocks and, when essential, in individually ventilated stabling with provision for heads to be out in the fresh air. It is believed that fresh air has beneficial effects on horses' natural respiratory and immune defence mechanisms. It may help the horse's natural respiratory defence system to feed hay from the ground;

- Indirect EHV transmission can occur through the environment because the virus may survive for up to a month, once it has been shed by the horse. Very often the circumstances and handling/management of the first case of abortion is critical to the risk of exposure of other animals on the stud to EHV and ultimately whether there are subsequent abortions due to EHV infection. Consequently, stud farms should develop appropriate biosecurity protocols before any major outbreaks of disease with appropriate protective clothing, equipment, utilities and hand washing facilities for staff specifically allocated when abortions occur, in order to prevent indirect spread of infection to other pregnant mares.

The nature of herpesviruses means that all horses can be 'carriers' of EHV in a latent form (meaning that horses are not always infectious to others), which can, under conditions of stress, be reactivated, meaning that they may then transmit infection without showing signs of illness. As EHV is a common endemic infection, it is probable that the vast majority of adult horses are latent carriers and as such have the potential to act as a source of reactivated EHV-1. Currently there is no reliable test for carrier status. In carriers, illness (respiratory, abortion or neurological) may become apparent from time to time, especially after stress (particularly travelling and changing of location and social groups) or after

suffering another disease. The virus is potentially contagious at these times and may be transmitted to otherwise healthy but susceptible horses, who may then develop EHV disease.

In late pregnant mares, transport, location, social group change and other types of stress may increase the risk of carrier horses, shedding virus from the nose (often with no accompanying clinical signs of disease in the carrier) as well as the virus crossing the placenta in the pregnant uterus, resulting in fetal infection, leading to abortion. Stud owners and managers should think ahead and group pregnant mares in small group sizes with similar due dates, early in their pregnancies, which can then be maintained without transportation and re-mixing until they foal. Pregnant mares that arrive from sales or from overseas, following associated transportation and social disruption, should always be considered 'high risk' for EHV abortion and should be quarantined and managed accordingly. All new arrivals and horses returning from elsewhere should be quarantined and maintained separately from resident horses.

Prevention

The most important ways to prevent EHV infection are good management of breeding stock, good hygiene at all times, especially during breeding activities, and regular vaccination of all equine animals as part of a good biosecurity protocol.

Management of breeding stock

All horses and ponies, including foals, can be a source of EHV. Breeding stock should, therefore, be managed in ways that will minimise the risk of spread of infection between horses:

- Pregnant mares should be kept separate from all other stock, e.g. young stock (weaned foals, yearlings and horses out of training), non-pregnant horses of all types and ponies;
- Pregnant mares should spend as much time as possible in small groups with similar due dates, out at pasture and should not be stabled, especially in shared air space stabling, unless essential. Larger mare groups in close proximity, particularly in shared airspace stabling, increase the risk of transmission of infection to more mares in the event that there is EHV abortion and/or respiratory EHV infection, potentially overwhelming vaccinial immunity. EHV does not travel long distances as an aerosol so close contact between horses should be minimised by sensible management;
- Suddenly stabling pregnant mares who have been out at pasture may precipitate an EHV abortion, even in a vaccinated herd;
- Where possible, mares should foal at home and go to the stallion with a healthy foal at foot;

- If foaling at home is not possible, pregnant mares should go to the stallion or boarding stud at least 28 days before foaling is due. These mares should be placed in quarantine for 2 weeks and then isolated in small groups with other healthy mares who are at a similar stage of pregnancy. The groups should be as small as possible in order to minimise transmission of infection in the event that EHV abortion and/or EHV respiratory infection occur;
- Mares arriving from sales yards or from overseas are particular risks as they are more likely to have recently mixed with other animals of unknown EHV infectious and vaccinal status and should be grouped and isolated away from other pregnant mares;
- Isolated groups and individual pregnant mares should be separated as far as possible from weaned foals, yearlings, horses out of training and all other types of non-pregnant horses and ponies. On stud farms, fillies out of training are a particular risk to pregnant mares but the same is true for all young horses;
- Pregnant mares should not travel with other horses, particularly mares that have aborted recently;
- Any foster mare introduced to the premises should be isolated, particularly from pregnant mares, until it has been proved that EHV did not cause her own foal's death;
- Stallions should wherever possible be housed in premises separate to the mare operations and should be attended by separate dedicated staff, adopting strict biosecurity measures. If it is not possible to have dedicated stallion staff then it is even more important that strict biosecurity measures are adopted to minimise indirect transmission of infection between different horse groups on the stud.

Hygiene

All horses can be potential sources of infection, and the virus may survive in the environment for up to one month, depending on conditions, following excretion by a horse. Good hygiene is therefore essential:

- EHV is destroyed readily by heat and contact with virucidal disinfectants. Stables, equipment and vehicles for horse transport should therefore be cleaned, steam cleaned and then disinfected with an approved disinfectant regularly as a matter of routine and certainly between occupants. Wherever possible virucidal disinfectant should be allowed to dry naturally in contact with surfaces in order to maximise the chance of destroying the virus;
- Staff should be made aware of the risks of indirect (by people) transmission of EHV and hand washing/alcohol sprays should be provided and used, whenever possible, for the use of staff when moving between horses;

- Wherever possible, separate staff should deal with each group of mares. If this is not possible, pregnant mares should be handled first each day in order to avoid the possibility of indirect transmission of EHV from other horses and strict biosecurity measures, including hand washing/alcohol sprays, separate tack, change of clothes etc. are even more important;
- Separate equipment and clean water should be used for each horse or group of horses;
- Foaling staff should wear single use disposable coveralls and a new pair of disposable gloves each time they foal a mare and then must dispose of them safely afterwards.

Vaccination

Specific vaccination of all horses in a herd will raise the level of protection within the population against EHV. Although it will not prevent individual animals from aborting due to EHV infection, experience suggests that vaccination is advantageous in reducing the risk of multiple abortions (so-called 'abortion storms') on stud farms. Experience shows that 'abortion storms' are much less likely to occur in properly vaccinated pregnant mare populations and specific vaccination is highly recommended. However, because of the nature of herpesviruses and their ability to cause latent (carrier) infections, vaccination will not provide total protection, so good management and biosecurity remain paramount.

It is recommended that a herpesvirus vaccine, licensed for use as an aid in the prevention of both abortion and respiratory disease caused by EHV-1 and/or EHV-4, is used for all horses on stud farms.

It is recommended that **all horses resident on a stud farm** are fully vaccinated with **a primary course followed by regular 6-monthly boosters**. Pregnant mares should be **additionally booster vaccinated at 5, 7 and 9 months of gestation**.

Consult your veterinary surgeon. See Appendix 8 for vaccine details.

Diagnosis

Although it may be suspected on clinical grounds, the presence of EHV can only be definitively diagnosed by a suitably equipped and experienced laboratory. Where disease is suspected, the attending veterinary surgeon should take the following samples and submit them to an appropriate laboratory:

- Suspected respiratory disease: blood samples and nasopharyngeal swabs;
- Following any abortion, stillbirth or newborn foal death: fetus and placenta or foal carcass should be sent for specific post mortem examination for EHV at a suitable pathology facility where spread of infection can be contained, thereby preventing the possibility of further contamination of the stud farm environment and/or personnel;

- Suspected neurological disease: blood samples and nasopharyngeal swabs. In the event of death, the whole carcass should be submitted for specific post mortem examination. If this is not possible, contact the laboratory to agree appropriate post mortem samples to be sent.

Veterinary surgeons should submit blood samples preserved with heparin or EDTA in addition to clotted (serum) samples.

For members of the Thoroughbred Breeders' Association in Great Britain, a contribution may be available towards laboratory costs for aborted fetuses or foals that die within 14 days of birth. Further details are available from the TBA.

Control of Infection

No horse known or suspected to have disease caused by EHV should be sent to a stallion stud or to premises where there are brood mares, particularly pregnant mares.

Where abortion, stillbirth, foal death or illness in a foal within 14 days of birth may be EHV related, the following actions should be taken:

1. Seek veterinary advice immediately;
2. For abortions, stillborn foals and newborn foal deaths:
    - Where it was found, immediately place the aborted fetus and its placental membranes or the dead newborn foal in double wrapped strong leak-proof bags and/or containers, taking care to avoid further contamination of the stud farm environment and/or personnel during transportation;
    - Place the mare in strict isolation;
    - Immediately cordon the area where the aborted fetus and its placental membranes were found to prevent other pregnant mares (including those that the aborted mare has been in contact with prior to abortion) accessing the area and once the material has been safely removed apply liberal amounts of virucidal disinfectant to the area;
    - In conjunction with the attending veterinary surgeon, arrange for appropriate samples (preferably the entire aborted fetus with its placental membranes or the dead newborn foal, carefully double-wrapped in strong leak-proof plastic bags and containers) to be sent to a suitable laboratory for specific examination for EHV. These materials must be handled under strict hygienic conditions;
    - Ensure that the attendant dealing with the aborted material and area has no contact with other horses, especially pregnant mares.

3. For sick, live foals:

   - Place the mare and foal in strict isolation;
   - In conjunction with the attending veterinary surgeon, arrange for samples (usually nasopharyngeal swabs and heparinised or EDTA blood) to be sent in leak-proof containers to a laboratory for specific examination for EHV;
   - Ensure that the attendant has no contact with other horses, especially pregnant mares.

4. Stop horse movements off the premises and do not allow any pregnant mare onto the premises until EHV is excluded as the cause of the abortion, stillbirth, foal death or foal illness;

5. Disinfect and destroy contaminated bedding; clean and disinfect the premises, equipment and vehicles used for horse transport under the direction of the attending veterinary surgeon;

6. If preliminary laboratory results indicate EHV, divide pregnant mares with which the infected mare had contact into smaller groups of similar foaling dates to minimise the spread of any infection and turn them out into isolated paddocks on the same stud farm as the abortion occurred. If the infected mare was already in a small group of pregnant mares, divide the group into even smaller groups, as some may still abort and this may minimise further spread of infection. Any non-pregnant mares with which the infected mare had contact should be maintained as a 'closed' group until EHV infection is ruled out.

If EHV is confirmed:

1. Maintain isolation, movement restrictions and hygiene measures for at least 28 days from the date of the last EHV abortion, stillbirth or newborn foal death.

2. Barren mares, maiden mares and mares with healthy foals at foot, can be admitted onto the premises (providing there is no sign of infection at their home premises) but must be kept separate from pregnant mares.

3. Barren mares, maiden mares and mares with healthy foals at foot on the affected premises can be moved 28 days after the last EHV abortion, providing they can be placed in quarantine for 14 days following arrival at their new premises. Serological monitoring at a 10-14 day interval to look for signs of seroconversion during this period is advised.

It may be possible, under the direction of the attending veterinary surgeon and in consultation with stud owners/managers of where they may move, to move non-pregnant mares earlier than 28 days e.g. for mating if:

- The geography and management of the stud farm (separate staff and utilities, e.g. tractors, feed deliveries and muck disposals) allows for strict isolation of the aborted mare(s). This should include separate

access roads, stables and paddocks, with adequate separation between the isolated area and the other mares (see Appendix 6);

- The non-pregnant mares for movement, including for mating as a walking-in mare, have been isolated from pregnant mares and handled by separate staff (see Appendix 6)at least from the time of the abortion, stillbirth or newborn foal death;
- testing of blood samples taken immediately and again 14 days later (in the same laboratory as a paired serological assay) indicates that they have not been infected;
- there is no other clinical or laboratory evidence of spread of infection;
- the owner/manager of the premises (or stallion unit) to which the mare(s) is(are) to be moved understands full details of the EHV infection and, following his/her own veterinary advice, agrees to the move or to allow the mare to walk in.

4. Pregnant mares due to foal in the current season must stay on the premises until they foal a healthy foal;

5. Mares that have aborted must be isolated from other horses for 28 days after abortion and from pregnant mares due to foal that season and mares in early pregnancy for the remainder of that season;

6. Present evidence indicates a low risk of spread of infection if mares are mated on the second (30 days) heat cycle after their EHV abortion. Following veterinary advice further testing may be requested by the stallion owner before mating is allowed.

7. Mares that return home pregnant from premises where abortion occurred the previous season should foal in isolation at home. If this is not possible, the stud to which the mare is to be sent in the current season must be informed so that they can seek veterinary advice and take appropriate managerial and biosecurity precautions.

Walking-in mares

If the stallion unit is separated geographically from the pregnant mares, and is attended by separate staff, walking-in for covering by the stallions can continue unhindered (except for pregnant mares who have aborted or are in contact with an abortion, for at least 28 days following the last abortion – see above). Following mating, the mare(s) involved should be kept isolated from any pregnant mares who are still due to foal that season.

If neurological EHV is suspected in any horse:

1. Seek veterinary advice immediately;

2. Stop all breeding activities unless (where the affected horse(s) is(are) not at the stallion unit) the stallion unit is separated geographically from the pregnant mares, and is attended by separate staff;

3. Stop all movement on and off the premises until neurological EHV has been ruled out or, if it is confirmed, for at least 28 days after resolution of the last case;
4. Keep the affected horse in isolation with strict barrier nursing and biosecurity;
5. Arrange for separate staff to attend to the affected horse(s), using appropriate protective clothing and biosecurity protocols to reduce the risk of spread of infection;
6. In conjunction with the attending veterinary surgeon, arrange for appropriate samples, including the carcasses of dead animals (see 'Diagnosis' on page 36) or appropriate samples in leak-proof containers to be sent to a laboratory for examination;
7. Divide horses into small groups in order to minimise exposure in the event that EHV infection is active among the affected group of animals, keeping pregnant mares separate from all others;
8. Do not allow any pregnant mare onto the premises until EHV has been excluded as the cause of the neurological disease;
9. Disinfect and destroy bedding; clean and disinfect premises, equipment and vehicles used for horse transport, (under the direction of the attending veterinary surgeon), using appropriate protective clothing and biosecurity protocols.

If neurological EHV is confirmed, a policy should be decided with the attending veterinary surgeon. This should include screening and clearance of each group before individuals in the group return home. Individuals should then be isolated at home, especially pregnant mares until after foaling. Detailed advice on specific cases can be obtained from equine infectious disease experts or specialist equine veterinary practices. An outline control protocol for neurological EHV is provided below:

- Implement high standard biosecurity and biocontainment procedures as advised by the attending veterinary surgeon;
- Wherever possible attending veterinary surgeons should liaise closely with equine infectious disease experts and/or specialist equine veterinary practices
- In the early stages of many neurological EHV outbreaks it is necessary for an entire premises to be quarantined and tested in order to establish the likely extent of the infection, that may be entirely subclinical (no obvious clinical signs) in some horses. These animals may act as an important source of new infection in susceptible horses;
- The most effective sampling strategy for neurological EHV involves:
  - Two clotted blood samples taken at a 10-14 day interval from onset of clinical signs for serological testing (antibody levels in the blood),

- Blood sample taken in heparin or EDTA anticoagulant tubes for PCR testing or virus isolation (during viraemia, when the virus is circulating in the bloodstream),
- Nasopharyngeal swabs for PCR testing (when the virus is being shed from tissues in the nose and throat);

- It is recommended that a second clotted blood sample is taken to detect fourfold or greater rises in antibody levels (seroconversion) that would indicate infection occurring at about the time of the first sample (a technique called 'paired serology');
    - Initial laboratory testing may quickly establish that the infection is geographically restricted to isolated parts of the premises. In these situations it may be possible, following review of laboratory data and with the approval of the attending veterinary surgeon and the testing laboratory, to resume normal operations in the non-affected parts of the premises, usually though with heightened disease awareness and biosecurity measures in place.
- Approval to resume normal operations on the entire premises is made by the attending veterinary surgeon and the testing laboratory in the light of accruing clinical and laboratory information.

In all the situations above, communication of and about the EHV infection is extremely important. Failure to communicate can contribute to spread of infection to the detriment of all owners and their horses, particularly mare owners. The owner/manager of the affected horse(s) or premises should inform:

- The national breeders' association;
- Owners (or those authorised to act on their behalf) of:
    - Mares at the premises;
    - Mares due to be sent to the premises;
- Others:
    - Those responsible for the management of premises to which any horses from the stud are to be sent;
    - Those responsible for the management of premises to which any horses have been sent in the previous 28 days, with the condition that owners of those horses (or those authorised to act on their behalf) must be informed immediately;
    - Those responsible for the management of premises to which any pregnant mares (that have been in contact after the first three months of pregnancy) have been sent, with the condition that owners of those mares (or those authorised to act on their behalf) must be informed immediately.

Treatment

No validated specific anti-equine herpesviral treatments are currently available. Any necessary treatment of clinical abnormalities and complications will be determined by the attending veterinary surgeon.

Good stud management and vaccination of all horses against EHV-1 and EHV-4 is recommended as a general principle (see Prevention above). The costs of prevention are likely to be far less than the costs associated with an abortion storm and significantly less than the disruption following a single abortion.

When cases of EHV neurological disease occur, caution must be exercised when considering the vaccination of previously unvaccinated horses either on the same premises or those that have recently left. The latter may have had contact with infection and may therefore be in the process of incubating the disease. Experience suggests that vaccination during the incubation stage can increase the chances of neurological signs.

Confirmation of Freedom from Disease

EHV respiratory disease is, to a certain extent, endemic among the horse population in the UK. Total freedom from disease can never be confirmed and vigilance is therefore important in the management of breeding stock, particularly pregnant mares, in order to minimise cases of EHV abortion, stillbirth, newborn foal death and neurological disease.

Export

EHV is not notifiable by law. However, no horse with clinical signs or recent contact with the disease should be exported.