

Infectious bovine rhinotracheitis (IBR) and other features of bovine herpesvirus 1 (BHV-1) infection of cattle

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- **IBR** is a disease that can have a major impact on the profitability of any cattle rearing enterprise and control programmes should be in place to minimise the risk of introduction of the disease or to vaccinate when the risk of disease is considered to be high.
- **Pedigree breeders** should make sure that they are aware of the BHV-1 status of their herds. Infection and mild signs of disease could have been overlooked. Eradication of infection where it exists and certification of BHV-1 free herds through a health scheme are likely to play a major part in the sale of pedigree animals in the future.
- **Commercial producers** may find eradication is not economic but should employ herd health security to prevent BHV-1 entering their herds and/or the use of vaccine depending on the production system.
- **Vaccines currently available** will give rise to antibody indistinguishable from that arising from natural infection. This will interfere with eradication and certification of disease free status should the herd require this in the future. This problem will not occur when marker vaccines are available in the UK.
- **Veterinary advice specific to the farm must be sought before embarking on any control or eradication programme.**

The disease

Infectious bovine rhinotracheitis (IBR) is an acute infectious disease of the upper respiratory tract that commonly affects cattle aged 6 months or more. Bovine herpesvirus type 1 (BHV-1), the cause of the infection, is an alphaherpesvirus found only in cattle. The virus is fragile and does not survive for long outside the body; contact between cattle is therefore the main way that infection spreads. If the virus infects a previously uninfected group an outbreak of IBR is likely. The lining of the nasal passages and trachea suffer severe inflammation resulting in fever, coughing, mucopurulent nasal discharge, depression, inappetance and weight loss. Conjunctivitis may also be a feature. Most individuals recover over 2 to 3 weeks though deaths from secondary pneumonia can occur. The severity of disease outbreaks is very variable ranging from mild to fatal. Mild infections may go unnoticed by the farmer, but a drop in appetite or milk production with or without signs of conjunctivitis, coughing or nasal discharge should be considered suspicious.

Infection with BHV-1 may less commonly cause disease syndromes other than IBR depending on the strain of the

virus and the route of infection. Inflammation of the vulva and vagina (infectious pustular vulvovaginitis - IPV) and prepuce (infectious pustular balanoposthitis - IPB) are features of the venereally transmitted form of the disease. However, in these conditions the productivity and fertility of the affected animals are usually not significantly affected and individuals recover over 10-14 days. Abortion is a feature of BHV-1 infection particularly in North America but is rarely if ever a feature of the infection in Scotland.



Severe IBR : Clinical case showing upper respiratory signs



Severe IBR : Gross pathology showing severe purulent tracheitis

Very rarely neonatal calves can be infected and show severe enteritis, respiratory disease or nervous disease. Death rates in this form of the disease can be high.

It is unusual to find more than one of these various manifestations of BHV-1 disease in the same herd at the same time.

A major feature of the disease is that after infection the virus invariably remains dormant in the nervous system for the rest of the animal's life and this is known as **latent infection**. Latent infection can be re-activated at any time by stress such as transport, dehorning, castration, housing or calving and results in large amounts of infectious virus being shed from the respiratory or genital tracts. This can cause further spread of infection and outbreaks of disease.

The importance of BHV-1

BHV-1 infection is widespread among both beef and dairy herds in the UK. A recent survey, using milk antibody, showed around 90% of dairy herds in Scotland to be infected. Uncomplicated BHV-1 infection with the strains currently found in the UK often results in only mild signs of infection in adult animals and the disease may go unrecognised. However, in immature cattle, such as market purchased stores, severe IBR is regularly seen. Death rates are variable, but the setback to growth is usually of significant economic importance. In beef cattle this may, for example, result in lengthening of the finishing period by a month or so. Different strains of the virus are found in the field and this is thought to explain some of the variation in the severity of clinical disease observed. It is possible that uncontrolled movement of cattle from outwith Britain could cause the introduction of more severe forms of the disease as occurred in the 1970s. BHV-1 can be eradicated quite easily from herds and geographic areas and several European countries have already achieved BHV-1 free status. In the future only stock that can be demonstrated to be free of BHV-1 will be eligible for export to these countries and restrictions could conceivably extend to meat and dairy products. **Therefore BHV-1 has now achieved political importance and should be of particular concern to pedigree and high genetic merit herds.**

How is BHV-1 spread?

The movement of infected cattle spreads BHV-1 virus. Infectious cattle are either undergoing a primary infection or suffering a reactivation of a latent infection. Transmission of the virus between animals is by direct contact

such as licking, nuzzling and contact with infected body fluids and also by aerosol over a short distance. Venereal transmission occurs for IPV / IPB. BHV-1 can be shed intermittently into semen by infected bulls. Therefore artificial insemination using frozen semen is a potentially important route of transmission. The sale of semen from antibody positive bulls to third countries within the EU is forbidden and most studs now require bulls to be antibody negative before entry.

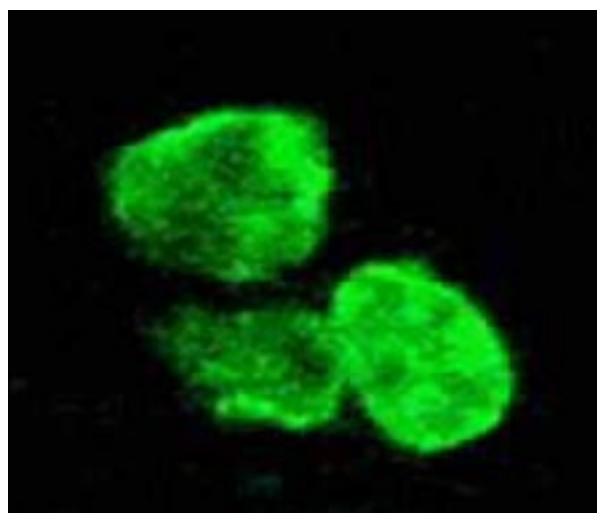
The virus can survive in mucus or blood carried on clothes or equipment from one group of cattle to another. Effective cleansing and disinfection should be considered an essential element of disease prevention. Best practice is to use dedicated clothing and equipment for a particular farm or group of cattle.

In practice BHV-1 is most commonly spread following mixing of cattle purchased from several sources or the introduction to a susceptible herd of a latently infected animal which subsequently experiences re-activation of the latent infection. Alternatively, if susceptible youngstock are introduced to a latently infected herd, reactivation of the latent infection can cause disease in the introduced cattle. Less commonly infection spreads between herds by contact at farm boundaries. To prevent this double fencing with a 3 metre gap is advised.

Routine diagnosis of BHV-1 infection

The fluorescent antibody test (FAT) or virus isolation in cell culture are used to detect the virus in nasopharyngeal swabs (live animals) or tracheal tissue (dead animals). Virus isolation is the technique of choice for diagnosing IPV / IPB and for testing semen. The maximal amount of virus is present in the early stages of disease and these are the animals that should be tested in order to detect the virus. Where IBR is under investigation the animals to be sampled should have a clear nasal discharge with no evidence of pus. These tests cannot be used to identify latently infected animals unless the infection is re-activated.

Following infection with BHV-1 a serological response is stimulated and antibody can be detected by several techniques. The most widely used test is the enzyme linked immunosorbent assay (ELISA). Where doubtful results are achieved with the ELISA the serum neutralisation test



IBR Fluorescent Antibody Test (FAT), showing apple green fluorescence of infected cells

is used as a second test. A rising antibody level in blood samples collected 14 days or more apart in association with typical clinical signs confirms primary infection. Latently infected animals are antibody positive and can be detected using a single blood sample. Rarely, however, latently infected cattle may not have detectable antibody. Calves from mothers that are positive for antibody to BHV-1 or that have received colostrum from positive cows acquire antibody from the colostrum. These animals are unlikely to be infected with BHV-1, but this possibility cannot be completely excluded. This antibody usually disappears by the time the calf is 6 months old, but may persist up to 8 months of age.

An idea of the status of dairy herds can be achieved by testing bulk milk for antibody; however, herds with a small number of antibody positive animals may not have detectable antibody in bulk milk due to the dilution effect.

Examination for BHV-1 infection in aborted calves is by histopathological examination of foetal liver tissue or virus isolation from the placenta.

Control of BHV-1

Vaccination: There are effective live attenuated vaccines against the IBR form of BHV-1 infection which can be given intranasally (the most effective route) or intramuscularly. If an outbreak of IBR is confirmed early immediate intranasal vaccination is considered to reduce its severity. Where commercial producers purchase large numbers of cattle from different sources routine vaccination of new arrivals should be employed to prevent outbreaks of IBR. Although vaccination prevents disease it does not eradicate virus from the herd, so once vaccination is started in an infected herd all introduced cattle (purchased or

homebred) should be vaccinated before they contact the infected herd. The current UK vaccines induce an antibody response indistinguishable from that arising from natural infection with BHV-1. Marker vaccines that overcome this have been used as part of an eradication programme in The Netherlands. This helped with eradication programmes in herds with large numbers of latently infected cattle. Vaccination of such herds interrupted viral spread whilst permitting differentiation between vaccinated and naturally infected cattle. The latter could be targeted for culling at a convenient time. Problems with contamination of the marker vaccine in the Netherlands led to suspension of its use. Consequently introduction of the marker vaccine to the UK has been delayed but could be expected in 2-3 years.

Eradication: Any cattle over 8 months of age with antibody to BHV-1 are almost certainly latently infected for the rest of their lives and can excrete infectious virus at any time. Herd eradication is based on herd health security to prevent the virus entering from outside sources followed by testing all cattle individually for antibody and removing those that are positive and therefore latently infected. In herds with large numbers of latently infected animals removal may not be an option. Eradication will be problematical in such herds until marker vaccines are available. However it may be achieved over a number of years where control programmes are implemented. SAC's Premium Cattle Health Scheme offers programmes for control and eradication of BHV-1.

Public Health Implications

There is no evidence that BHV-1 presents a risk to humans in contact with infected animals or the virus.

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