



Animal &  
Plant Health  
Agency

# Guidance document to enable the assessment of risk to livestock post flooding

## Medium to long-term endemic disease risks associated with flooding events in Great Britain

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APHA is an Executive Agency of the Department for Environment, Food and Rural Affairs and also works on behalf of the Scottish Government, Welsh Government and Food Standards Agency to safeguard animal and plant health for the benefit of people, the environment and the economy.

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# Purpose

This document explores potential medium and longer-term livestock endemic disease risks associated with flooding events in Great Britain.

The focus is on farmed livestock species including cattle, sheep, pigs and poultry.

The guidance is intended to highlight some of the hazards that might be present following flooding so that individual risk assessors in different localities in Great Britain are able to identify relevant potential hazards, assess risks and enable effective risk management measures to be put in place.

## Definitions of short, medium and longer term risks

- Short – whilst flood waters remain
- Medium – once flood waters recede
- Longer – when land and buildings come back into use

# Flooding

In the short term livestock welfare is of immediate concern. Under current welfare legislation (Animal Welfare Act (England and Wales) 2006, Animal Health and Welfare (Scotland) Act 2006) all livestock keepers, including owners, have a legal responsibility to ensure all animals under their care are provided with a suitable environment. Specific legislation for farmed livestock requires keepers to provide protection from adverse weather conditions, predators and risks to their health and must, at all times, ensure they have access to a well-drained lying area. Livestock owners will likely be familiar with the local history of flooding risk and it is expected that a reasonable stockperson will avoid keeping livestock on land known to have high flood risk at these times. However unusual and unexpected flooding (flash flooding) might also occur. Species specific welfare codes require all livestock keepers to plan for such events. To report welfare concerns please contact:

### England: Defra Rural Services Helpline

For customers in England, call 03000 200 301 and choose the relevant options for APHA.

### Wales

For customers in Wales, contact 0300 303 8268. There is an option for callers to hear the telephone message in Welsh.

## Scotland

In Scotland phone your local APHA Field Services Office:

Ayr: 03000 600703; Galashiels: 03000 600711; Inverness: 03000 600709;

Inverurie: 03000 600708; Perth: 03000 600704

During periods of heavy rainfall weather forecasts should be closely monitored and flood advice lines checked regularly. Animals should be moved to areas deemed to be at low risk of flooding. Animal movements should be timely and ideally pre-empt the flood to avoid access routes being obstructed and destroyed.

<https://www.gov.uk/check-flood-risk>

It is recommended that livestock keepers sign up for flood alerts associated with livestock locations; these can be delivered by email, text message or phone:

<https://www.gov.uk/sign-up-for-flood-warnings>

If a herd or individual animals are restricted for statutory animal disease control reasons, for example under bovine tuberculosis restrictions, on premises affected or threatened by flooding it is important to contact APHA as soon as possible (ideally before any movement takes place). This is to ensure that emergency movements are properly licensed, recorded and do not put other livestock at risk. For cattle which normally require a mandatory pre-movement skin test APHA will restrict the animals on their destination premises until they have had a post-movement test with negative results.

## Risks for livestock returning to potentially contaminated pastures once waters have receded

### Potential contaminants

The main contaminants associated with flood water are human and animal faecal waste (which may contain microbial and other contaminants depending on whether the sewage is raw or processed), chemical contaminants including agrochemicals (e.g. pesticides), heavy metals (e.g. lead, cadmium and zinc especially in former mining areas) and hydrocarbons (e.g. diesel from road run off).

There is a wide range of potential microbial contaminants associated with human and animal faecal material, including agents that could cause endemic diseases of livestock and a number of zoonotic organisms e.g. *Cryptosporidium* and *Salmonella*. There are a number of risks associated with exposure of livestock to human faecal material e.g. tapeworm infection causing cysticercosis in cattle. Microbial hazards also include the introduction of 'resistant' organisms, e.g. antimicrobial resistant bacteria.

Keepers should consider risks specific to the area where livestock are kept, for example any chemical industries present in the area or the industrial / agricultural heritage of the area (e.g. historical mining activities and anthrax history) will help to establish key hazards.

A large range of waste material (such as vehicles, general rubbish, silts and sludge) may be deposited by flood water, some of which could pose additional potential health hazards for livestock. Keepers have a legal obligation under animal welfare rules to protect animals from these hazards.

## Impacts and changes in risk from vector-borne endemic diseases

By common usage, with respect to disease transmission, vectors are often considered to be invertebrate animals, usually arthropods. However in this document a broader definition of vector has been adopted to include arthropods, wild birds and wild rodents.

### Arthropods

*Culicoides* biting midges are thought to be the vector for transmission of certain diseases, for example Schmallenberg virus (SBV). SBV is now endemic in many parts of GB. There has been speculation that flooding events will be conducive to subsequent increases in *Culicoides* populations.

The main tick-borne endemic diseases of livestock in GB are louping-ill, babesiosis ('red water' in cattle) and tick-borne fever. The likely impact of flooding events on tick populations and distribution is uncertain, but it is important to note that multiple environmental factors influence tick distribution. In other countries, it is reported that tick problems can increase after flooding events.

The frequency of arthropod-borne endemic diseases will be influenced by other factors including host immunity, in addition to vector distribution.

In other countries, it has been reported that populations of nuisance flies and blowflies may increase subsequent to flooding events. Nuisance flies can cause distress to livestock and may act as mechanical vectors of disease (e.g. new forest eye and summer mastitis in cattle). Blowfly strike can be a serious welfare problem in sheep. Again, multiple factors will influence nuisance and blowfly population numbers and the likelihood of associated clinical disease.

### Wild birds

Wild birds can act as vectors for a number of diseases of poultry and other livestock e.g. salmonellosis and avian influenza. Recent flooding events may offer new habitats for wild waterfowl especially as food sources become accessible. Conversely an increase in habitat could also reduce the density of wild waterfowl populations (and the infections they carry) as they become more dispersed across larger areas, with an associated reduction in local infection pressures.

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## **Wild rodents**

It has been suggested that flooding events may result in concentration of vermin, including wild rodents, in drier areas. Wild rodents can spread certain disease agents e.g. *Salmonella* and *Leptospira*.

# **Other endemic disease risks associated with livestock returning to previously flooded pastures**

## **Helminthosis**

Wet ground conditions may have an influence on the incidence/prevalence of certain helminth diseases e.g. fascioliasis and rumen fluke may be influenced by an increase in potential habitats for the snail intermediate hosts.

## **Soil-borne bacterial spores**

Erosion of soil by flooding could potentially increase the risk of exposure of livestock to soil-borne bacterial spores e.g. anthrax and various clostridial spores. A good knowledge of previous disease in the vicinity is also essential to mitigate potential incidents. An important example would be an anthrax burial site.

## **Botulism**

An increased number of dead animal carcasses (e.g. wild rabbits) as a result of flooding may increase the risk of botulism cases occurring.

Soil compaction post flooding can create anoxic soil conditions leading to the stunting and death of grass and vegetation. The dead vegetation may increase the risk of soil-borne botulism.

## **Foot and skin conditions**

Persistent wet ground conditions may predispose livestock to foot and skin problems. It is a legal requirement to ensure farmed animals have access to dry bedding or a well-drained lying area, whether they are kept indoors or outdoors.

## **Plant and blue-green algae poisoning**

It has been suggested that flooding can cause the growth or increased abundance of some toxic plants. Changes in nutrient levels in water associated with flooding events may also predispose to development of blue-green algal blooms, some of which can be toxic.

## **Favourable survival conditions for some potential pathogens**

Wet ground conditions may provide a suitable environment for multiplication of certain pathogens e.g. outbreaks of yersiniosis ('flood mud scours') have been reported in cattle in Australia following winter flooding. It has been suggested that wet ground conditions may provide favourable survival conditions for leptospiral organisms.

## **Other disease risks**

Wet ground conditions may result in exacerbation of other endemic disease risks e.g. an increase in bovine mastitis due to increased levels of environmental challenge with potential mastitis pathogens.

# **Indirect endemic disease risks associated with livestock returning to previously flooded pastures**

## **Mixing with livestock on other farms**

Livestock may return to the home farm after deliberate or inadvertent exposure (direct or indirect) to livestock on other farms. This type of breakdown in biosecurity may carry a high risk of introduction of endemic disease. Introduction of 'resistant' organisms e.g. antimicrobial resistant bacteria or anthelmintic resistant nematodes may occur as a result of this type of biosecurity breakdown.

## **Fields unsuitable for return of livestock**

The unavailability of certain fields for livestock may result in increased stocking densities and prolonged housing periods, with associated endemic disease risks e.g. respiratory disease in housed cattle and neonatal diseases post calving or lambing. There may also be an impact on management systems e.g. reduced ability to move housing between batches in outdoor pigs.

## **Reduction in yield/quality of grazing/forage**

Flood associated damage to pasture or forage crops may result in reduced yield and/or quality of the grass/crop. Pressure on grazing and forage supplies may have direct consequences associated with malnutrition or indirect consequences such as increased purchased feed costs resulting in reduced investment in other areas of animal health. Poor quality forage may be unpalatable and may result in animal health risks if fed. There may be specific 'contamination' risks associated with production of forage from previously flooded pasture/crops (see above). The suitability and quality of purchased (or donated) feeds will need to be considered.



## **Manure/slurry recycling**

The unavailability of certain fields for manure/slurry application may result in application to pasture/crops with reduced intervals between spreading and grazing/cropping, with associated animal health risks.

## **Water damaged stored feed**

Stored feed that has been spoiled as a result of water damage may be unsuitable for feeding, adding to the feed pressures mentioned above. There are potential animal health risks associated with feeding spoiled feed e.g. mycotoxicoses.

## **Water damaged buildings**

The unavailability of livestock buildings or reduced functionality of buildings as a result of water damage could have negative consequences for animal health and welfare.

## **Disruption to normal health management procedures**

The challenges associated with flooding events may have resulted in disruption to routine health management procedures e.g. vaccinations or routine treatments may not have been carried out (or carried out at a less than optimal time).

# **Mitigation of risks associated with livestock returning to previously flooded pastures**

## **Contamination risks**

Identify and report potential hazards and seek further advice as necessary.

A site specific risk assessment may be required to establish whether any identified hazards pose a significant risk or not. There are a number of regulations that may help with risk management decisions e.g. The Sludge (Use in Agriculture) Regulations may assist risk management decisions related to contamination of fields with human sewage.

Chemical contamination issues, although relatively infrequent, have been encountered. For further advice on a case by case basis, contact APHA. APHA is able to liaise with other appropriate agencies including the Food Standards Agency should carcass or produce residue issues be of concern.

## **Other endemic disease risks**

Although potentially exaggerated by flooding events, many of the other endemic disease risks highlighted can be considered ever-present risks. These risks are probably best mitigated by ongoing veterinary risk assessments, preferably using the results of these

assessments to regularly update proactive herd/flock health plans delivered in partnership by farmers and their private veterinary surgeons.

## Other notable points

### **Frank flooding versus high rainfall**

Although this document considers the endemic disease risks associated with frank flooding events, many of the risks highlighted are also applicable to parts of the country that have experienced heavy (anomalous) rainfall.

### **Coastal versus inland flooding**

Flooding can be from coastal (sea) water or inland water, each having somewhat different impacts on the flooded land and possibly on welfare and endemic disease risks.

### **Scientific uncertainty**

The potential risks highlighted in this review have been identified by a combination of elicitation of expert opinion and review of some reported experiences elsewhere in the world. Although the recorded risks are all plausible, it is necessary to point out that there is some scientific uncertainty associated with a document of this nature.