

## **VRA 3A: What are the risks of causing a new outbreak of foot and mouth disease (FMD) by moving stray susceptible animals from roads within a Protection Zone or Surveillance Zone ?**

### **1. SUMMARY OF OVERALL RISK & RECOMMENDED ACTION**

*VRA31 was compiled according to terms of reference provided by the Scottish Government*

*The purpose of this document is to qualitatively assess the risk of the specified activity in the face of an FMD outbreak in the UK. The assessment includes options for mitigating the risks associated with the specified activity, and which could form the basis of licence conditions, should the activity be permitted. The summary of overall risk below assumes that the risk mitigation measures in Section 8 are implemented.*

*DEFINITIONS OF RISK LEVEL (OIE 2004, DEFRA 2011):*

**Negligible** *So rare that it does not merit consideration*

**Very low** *Very rare but cannot be excluded*

**Low** *Rare but could occur*

**Medium** *Occurs regularly*

**High** *Occurs very often*

**Very High:** *Events occur almost certainly*

**Overall risk:** The risk of allowing the activity described is **Low in the Protection Zone and Surveillance Zone**. Conversely the risk of not permitting the activity would be Medium to High in the SZ and PZ, according to the level of straying.

RISK MANAGEMENT OPTIONS/ADVICE (SEE POINT 8).

### **2. LEGISLATION, DEFINITIONS & ASSUMPTIONS**

Statutory disease control requirements are applicable to livestock premises on suspicion and confirmation of FMD. When suspicion of disease cannot be ruled out, and diagnostic samples are taken, a Temporary Control Zone will be put in place (TCZ) surrounding the suspect premises. On confirmation of disease, a national movement ban (NMB) will be enforced by introducing a national Restricted Zone (RZ). A 3 km Protection Zone (PZ) and 10km Surveillance Zone (SZ) will be implemented which place restrictions on movements and activities around infected premises to prevent spread of disease. Later in the outbreak, restrictions may be relaxed either through reducing the size of the RZ or through allowing some resumption of normal activities under licence within the RZ, SZ or PZ. In this VRA, RZ is used to refer to areas which are within the RZ, but do not also fall within the PZ or SZ

The keeper of a susceptible animal in a protection zone or a surveillance zone shall take all such steps as are necessary to prevent it from straying from the premises on which it is kept. An inspector may detain any stray or feral susceptible animal found in a PZ or a SZ and if, having made reasonable inquiries, the inspector cannot ascertain the owner, the inspector may arrange for its destruction (FMD (Scotland) Order 2006 Schedule 4, paragraph 2). In the PZ and SZ, movements of animals are permitted, but only in limited conditions under the authority of a licence granted by an inspector (FMD Order (Scotland) 2006, schedule 4, paragraphs 10 & 26). Although movement of stray animals is not expressly permitted Paragraph 2 of Schedule 4 implies that they may return to owners. Movement could be licensed under the authority of a declaration by Scottish Ministers as a measure to prevent

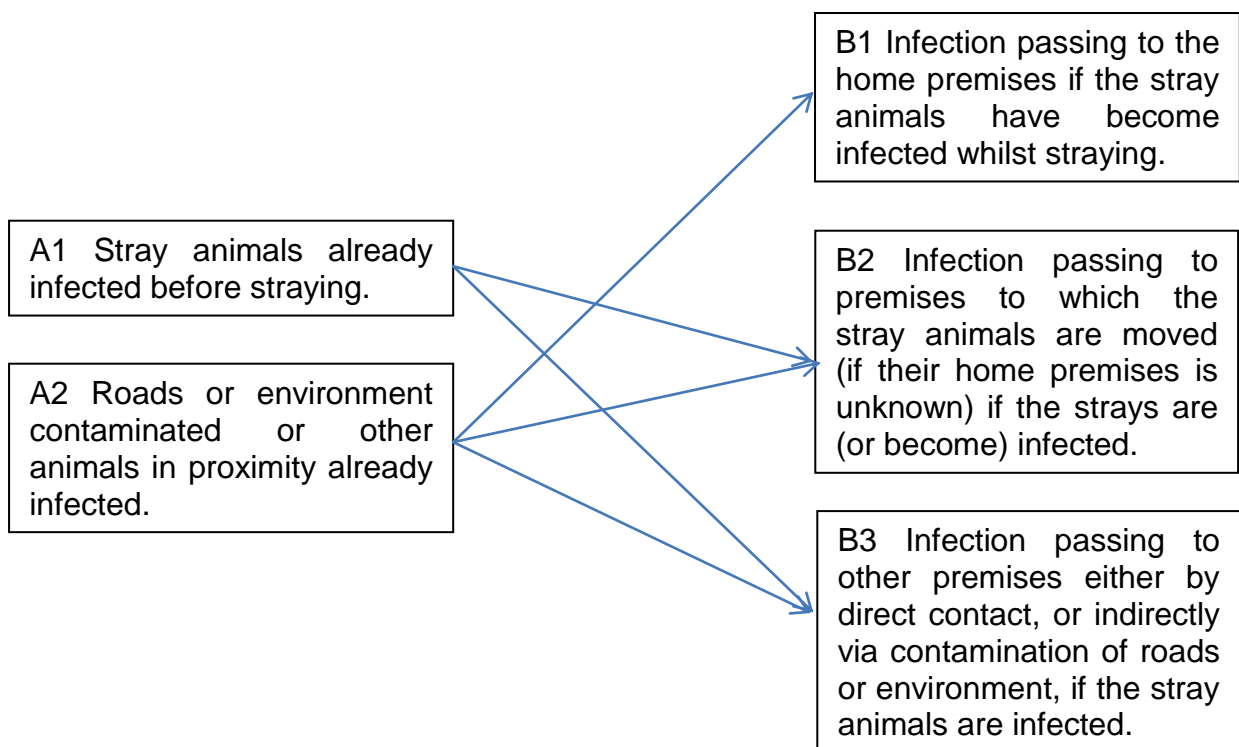
the spread of disease, (FMD (Scotland) Order 2006, Article 33(2)). Stray animals may not be moved from the PZ to the SZ, or from the SZ to the RZ.

### 3. HAZARD IDENTIFICATION

(a) **Hazard:** FMD virus (FMDV)

(b) **Specific risk:** When there is an outbreak of FMD any uncontrolled movement of stray animals increases the risk of further disease spread. There are risks that strays are or become infected and spread disease to other premises over a wide area via direct or indirect contact.

### 4. POTENTIAL RISK PATHWAYS



### 5. EXPOSURE ASSESSMENT

<b>Factors which are likely to affect this probability of exposure are:</b>	<b>Comments and risk estimates if/where appropriate:</b>
<b>Infection source: A1 Stray animals already infected before straying</b>	
<ul style="list-style-type: none"> <li>Requires animals with undetected or incubating FMDV infection, or failure to report FMD</li> </ul>	<ul style="list-style-type: none"> <li>Animals may incubate FMD for 2 to 14 days before the appearance of clinical signs (Sanson 1994), depending on initial dose, route of infection and virus strain.</li> <li>Infected livestock may excrete FMD virus for several days before the appearance of clinical signs, potentially leading to transmission or contamination prior to disease detection, particularly in cattle and pigs (Alexanderson <i>et al.</i> 2003, Orsel <i>et al.</i> 2009).</li> </ul>

	<ul style="list-style-type: none"> <li>FMD in sheep can be difficult to detect clinically as not all animals show clinical signs, and clinical signs are usually mild and short lived (Hughes <i>et al.</i> 2002). In addition, sheep may be inspected less frequently/ thoroughly. There is therefore a higher risk of sheep spreading infection.</li> </ul>
<p>Risk that the premises is infected depends on:</p> <ul style="list-style-type: none"> <li>Proximity to an infected premises</li> </ul>	<ul style="list-style-type: none"> <li>Risk of a premises being infected is highest if it is adjacent or close to premises with FMDV. Once a NMB is in place, most transmission occurs by local spread (&lt;3km from an infected premises) (Gibbens <i>et al.</i> 2001, Keeling <i>et al.</i> 2001, Haydon <i>et al.</i> 2003).</li> <li>Risk of airborne transmission decreases rapidly with distance from premises with FMDV and is only likely to occur over significant distances if many infected animals (especially pigs) are present (Donaldson and Alexanderson 2001).</li> <li>In a PZ, there are confirmed infected premises. There is a risk of as yet undetected premises with FMDV. Overall the risk of local transmission is Medium.</li> <li>In an SZ, there are confirmed infected premises within 10km but &gt;3km. There is a risk of as yet undetected premises with FMDV. Overall the risk of local transmission is Low.</li> <li>Livestock may stray a considerable distance, many kilometres, potentially between Zones, increasing the number of contact premises and roads, increasing risk.</li> <li>It may not be possible to establish the origin or ownership of stray livestock. If the premises of origin cannot be established the distance strayed, premises and Zones contacted cannot be established.</li> <li>The likelihood that an unidentified stray in the PZ or SZ is infected cannot be assessed.</li> </ul>
<ul style="list-style-type: none"> <li>Extent and timing of movements of susceptible animals from high risk areas</li> </ul>	<ul style="list-style-type: none"> <li>Requires movements of infected animals before the NMB, or movements of animals with undisclosed infection by licence prior to declaration of a PZ/SZ.</li> <li>Likelihood of movements having taken place is influenced by type of premises, for example finishing units are likely to move animals in on a regular basis, whereas closed high-security units would represent the lowest risk.</li> <li>In a PZ or SZ transmission is most likely to result from direct or indirect contact with infected animals on premises with FMDV. Indirect contact may be via</li> </ul>

	<p>fomites or airborne spread.</p> <ul style="list-style-type: none"> <li>• Airborne spread of FMDV has been documented over tens of km but is more commonly responsible for local spread only (&lt;3km) (Gibbens <i>et al</i> 2001), so is more likely to occur within the PZ than within the SZ.</li> <li>• Identifying the number and nature of livestock movements from high risk areas using livestock movement databases and tracings would allow better quantification of the risk.</li> <li>• Completion of tracings from all infected premises in the PZ would also give greater certainty.</li> </ul>
<ul style="list-style-type: none"> <li>• Stage of outbreak</li> </ul>	<ul style="list-style-type: none"> <li>• Early in the outbreak there is increased risk of undetected infection and lack of information on movements and links to infected premises.</li> <li>• Conversely the risk of local spread decreases with time from the last confirmation of disease in a PZ or SZ</li> </ul>
<ul style="list-style-type: none"> <li>• Likelihood of detection and transmission is influenced by FMD virus strain</li> </ul>	<ul style="list-style-type: none"> <li>• There are 7 serotypes of FMDV: O, A, C, SAT1, SAT2, SAT3 and Asia 1. The different serotypes (and different strains within each serotype) have different characteristics for example in terms of host species susceptibility, length of incubation period, ease of detecting clinical signs and likelihood of air borne transmission (Kitching and Hughes 2002, Gloster <i>et al.</i> 2008). Much UK research is based on the 2001 outbreak, which was caused by serotype O, strain PanAsia. However future outbreaks may involve other serotypes/strains and therefore present different epidemiological situations. On confirmation of FMD, the serotype and strain would be identified by The Pirbright Institute. This information would help to inform estimates of risk.</li> </ul>
<p><b><i>Infection source: A2 Roads or environment contaminated or other animals in proximity already infected</i></b></p>	
<ul style="list-style-type: none"> <li>• Proximity to premises with FMDV</li> </ul>	<ul style="list-style-type: none"> <li>• Risk of infecting livestock is highest where a road is adjacent or close to premises with FMDV. Once movement bans are in place, most transmission occurs by local spread as described above. It is difficult to quantify relative risks associated with different transmission routes within local spread but direct transmission through contact between strays and other susceptible livestock on premises with FMDV is high risk. Indirect transmission via fomites and contamination around premises with FMDV are also likely to play an important role.</li> </ul>
<ul style="list-style-type: none"> <li>• Extent and timing of movements of</li> </ul>	<ul style="list-style-type: none"> <li>• Roads could be contaminated with FMDV</li> </ul>

<p>susceptible animals from or close to premises with FMDV</p>	<p>if there have been movements of infected animals before the NMB, or movements of animals with undisclosed infection by licence.</p>
<ul style="list-style-type: none"> <li>• Biosecurity of local premises, cleansing and disinfection procedures in place</li> </ul>	<ul style="list-style-type: none"> <li>• FMDV is very sensitive to suitable disinfectants and good biosecurity will reduce risk of virus transfer to roads via fomites such as personnel, vehicles and equipment.</li> </ul>
<ul style="list-style-type: none"> <li>• Presence of susceptible wildlife species</li> </ul>	<ul style="list-style-type: none"> <li>• All British deer species are susceptible to infection and can transmit virus to domestic livestock experimentally (Gibbs et al. 1975). Wild boar are also susceptible (Elbers et al. 2003, Hartley 2010) but the density of wild boar in UK is very low. However, in Western Europe post-outbreak serosurveys and diagnostic testing of animals with suspicious clinical signs have never revealed deer or wild boar carrying FMDV antibodies or FMDV (Elbers et al. 2003, Mouchantat et al. 2005) and there is no evidence to suggest that deer or boar have played a role in FMDV spread in UK. Other wildlife species can carry FMDV mechanically but this is very unlikely to be important except close to infected premises. Overall the risks of wildlife causing contamination of roads or the environment in the RZ and SZ are negligible, and very low in the PZ.</li> </ul>
<ul style="list-style-type: none"> <li>• Survival of FMD virus on road</li> </ul>	<ul style="list-style-type: none"> <li>• FMD can survive on average for 2 to 3 months in bovine faeces at 4°C. Survival duration increases with decreasing temperatures and presence of organic material and varies with virus strain (reviewed by Bartley et al. 2002).</li> </ul>
<p><b><i>Risk of transmission: B1 Infection passing to the home premises if the stray animals have become infected whilst straying and are returned home</i></b></p>	
<ul style="list-style-type: none"> <li>• Risk of strays picking up infection from environment depends on the distance and duration of straying and density and proximity of susceptible livestock nearby</li> </ul>	<ul style="list-style-type: none"> <li>• Animals which have covered larger distances or strayed in the PZ or in areas of high livestock density have more potential for exposure to infected animals or contamination.</li> </ul>
<ul style="list-style-type: none"> <li>• Failure to detect FMD in the stray animals before movement</li> </ul>	<ul style="list-style-type: none"> <li>• Examination of the animals for clinical signs of FMD will reduce the risk, but unless animals have strayed for several days they are likely to be in the incubation stage of disease with no clinical signs.</li> <li>• Risk of undetected infection is greater in sheep where clinical signs are difficult to detect.</li> </ul>
<ul style="list-style-type: none"> <li>• Number and species of other susceptible animals on the home premises and ability to keep stray animals separate from other susceptible livestock</li> </ul>	<ul style="list-style-type: none"> <li>• Whilst these factors do not affect the risk of the home premises becoming infected, smaller numbers of animals or effective separation of animals may reduce the risk of onward transmission to other premises by decreasing the total</li> </ul>

	number of animals that become infected at the premises and hence total viral load. Statutory movement standstills will reduce risk of onward transmission to other premises through further animal movements.
<b><i>Risk of transmission: B2 Infection passing to premises to which the stray animals are moved (if their home premises is unknown) if the strays are (or become) infected</i></b>	
<ul style="list-style-type: none"> <li>Failure to identify the owner of the stray animal</li> </ul>	<ul style="list-style-type: none"> <li>More likely with sheep.</li> <li>The distance strayed and contact premises are unable to be assessed. The likelihood of contact with premises or livestock with FMDV is difficult to estimate.</li> </ul>
<ul style="list-style-type: none"> <li>Number and species of stray animals</li> </ul>	<ul style="list-style-type: none"> <li>Larger groups increase the risk of transmission if infection is present. Species vary in their virus production – pigs are higher risk than cattle, which are higher risk than sheep.</li> </ul>
<ul style="list-style-type: none"> <li>Failure to detect FMD in the stray animals before movement</li> </ul>	<ul style="list-style-type: none"> <li>As above</li> </ul>
<ul style="list-style-type: none"> <li>Number and species of other susceptible animals on the premises to which stray animals moved and ability to keep stray animals separate from other susceptible livestock</li> </ul>	<ul style="list-style-type: none"> <li>As above</li> </ul>
<b><i>Risk of transmission: B3 Infection passing to other premises either by direct contact, or indirectly via contamination of roads or environment, if the stray animals are infected</i></b>	
<ul style="list-style-type: none"> <li>Number and species of stray animals</li> </ul>	<ul style="list-style-type: none"> <li>Larger groups increase the risk of transmission if infection is present. Species vary in their virus production – pigs are higher risk than cattle, which are higher risk than sheep.</li> </ul>
<ul style="list-style-type: none"> <li>Distance travelled along public road</li> </ul>	<ul style="list-style-type: none"> <li>Increasing distance increases risk of contamination, and makes cleansing and disinfection increasingly difficult</li> </ul>
<ul style="list-style-type: none"> <li>Traffic volume</li> </ul>	<ul style="list-style-type: none"> <li>Busy roads will increase the risk as if virus is present it will be disseminated further.</li> </ul>
<ul style="list-style-type: none"> <li>Density of livestock on other premises and proximity to the road</li> </ul>	<ul style="list-style-type: none"> <li>The location of livestock within premises is likely to vary seasonally. If animals are grazed or housed close to the road there is a higher risk of direct or indirect transmission.</li> <li>Stray animals often join livestock grazing adjacent to roads</li> </ul>
<ul style="list-style-type: none"> <li>Cleansing and disinfection of public road after strays moved</li> </ul>	<ul style="list-style-type: none"> <li>Whilst this reduces risk, it is likely to become increasingly difficult if large distances have been covered.</li> </ul>
<ul style="list-style-type: none"> <li>Length and duration of journey whilst moving strays</li> </ul>	<ul style="list-style-type: none"> <li>Longer journeys or multiple stops increase risk but should not be necessary for movement of stray animals.</li> </ul>
<ul style="list-style-type: none"> <li>Suitability of vehicle used to move the strays, and cleansing and disinfection of vehicle, personnel and equipment before and after use</li> </ul>	<ul style="list-style-type: none"> <li>FMDV is very sensitive to suitable disinfectants and good biosecurity will reduce risk of virus transfer to roads via fomites such as personnel, vehicles and equipment.</li> </ul>
<ul style="list-style-type: none"> <li>Proximity of journey route to susceptible livestock</li> </ul>	<ul style="list-style-type: none"> <li>High density of susceptible livestock will increase risks.</li> </ul>

## 6. CONSEQUENCE ASSESSMENT

Spread of disease to uninfected premises

## 7. RISK MANAGEMENT OPTIONS/ADVICE

The movement of stray susceptible animals from a road within a Protection Zone or Surveillance carries a risk that FMD will spread to previously uninfected premises, either the home premises of the stray animals, alternative premises they are moved to or other premises in the vicinity. The greatest risks are associated with the presence of undetected infection and the possibility that stray animals could contaminate large areas with FMDV. These movements may need to take place early in an outbreak, before full information is available regarding movement history and before a full incubation period has passed, meaning that undisclosed infection may be present.

Options are:

- (i) Do not permit stray animals to move either to their home premises or to alternative premises. These animals would then have to be humanely destroyed.
- (ii) Allow animals to move to home premises if identified but under certain conditions, in particular ensuring no other movements from the premises for at least one incubation period. If the owner cannot be identified the animals have to be humanely destroyed.
- (iii) Allow animals to move to home premises as above. If the owner cannot be identified move animal to alternative premises under certain conditions regarding cleansing, disinfection and movements.

Option (i) represents the lowest risk of disease transmission. In the early days of an outbreak this degree of risk mitigation must be considered in the PZ and SZ where undisclosed premises with FMDV may exist. If an inspector cannot ascertain the owner of a stray in the SZ or PZ the inspector may arrange destruction without the need for a licence.

Once one incubation period has elapsed with no new cases options (ii) may be permitted provided the animal has not strayed greater than 3km, from the SZ to the PZ or from the RZ to the SZ. As the outbreak comes under control, and risk in the SZ or PZ is assessed to be low, conditions which apply to the RZ may be adopted.

## 8. SUGGESTED RISK MITIGATION MEASURES

Subject to the following safeguards, in a PZ or SZ movement of stray animals to their home premises represents a low risk and can be permitted under a general licence once one incubation period has elapsed without new infected premises:

### **A. When the animals are first discovered**

- (i) Check for any form of identification – ear tag, ear tattoo, EID.
- (ii) If owner can be confirmed assess how far and where the animals are likely to have strayed.

### **B. If the owner of the strays is known**

- (i) If the animals are judged to have
  - strayed more than 3km,
  - the owner is in the SZ and the animals have strayed to (or through) the PZ or
  - the animal has strayed to the SZ and the owner is in the RZ
  - they should not be permitted to be moved and should be humanely destroyed.
- (ii) If (i) above does not apply and the owner of the stray animals is known or can be quickly identified then the owner should immediately come and take the stray animals back home.
- (iii) The local AHVLA Field Services office and the local council should be informed of the details and destination of the stray animals. Allowing animals to stray in the SZ or PZ is an offence.

- (iv) Vehicle, personnel and equipment used to move the animals must be subject to appropriate cleansing and disinfection before leaving their home premises and immediately after moving the animals.

**C. If the owner of the strays is not known or return home is not permitted**

If the owner of the stray animals is not known or the animals have strayed beyond the limits specified at B (i) above the following authorities may be contacted to arrange humane destruction of the animals:

Police

Local council

Highway authority

Scottish SPCA

- i) Whichever authority is responsible for removal of the animals must inform the local AHVLA Field Services office and the local council of the details of the animals found, including details of the owner if known.
- ii) Where possible the animals should be humanely destroyed where they are unless they have to be moved to non-livestock premises for slaughter for reasons of animal welfare or health and safety. Distance moved should be kept to a minimum.
- iii) Carcasses should be uplifted in accordance with licence conditions for uplift of fallen stock.

**D. General movement rules**

- i) Stray animals must be inspected for any clinical signs of FMD before movement. Any animal humanely slaughtered may be inspected before collection for disposal.
- ii) The road on which the stray animals were present should be thoroughly brushed/scraped immediately after the animals have been moved. The owner of the animal (if identified) is responsible for ensuring that there is no presence of any faeces etc. which may contain FMDV and could contaminate passing vehicles. Any waste which requires disposal should be taken back to the owner's premises and disposed of by the livestock owner in line with their appropriate normal disposal methods, or uplifted with carcasses for disposal where the owner is unknown.
- iii) No animals should move off the premises to which the stray is moved for the length of one incubation period or the statutory standstill period, whichever is greater (incubation periods are 14 days for cattle and pigs, 21 days for sheep).
- iv) A detailed record of the move and the stray animal information must be kept (statutory legislation covers movement records).
- v) The move must be undertaken as quickly as possible.
- vi) The move must be undertaken by the most direct route with no stopping points en route.

NB It is assumed that "peacetime" legislation is also met, for example regarding recording of animal movements, animal identification and statutory movement standstills.

## 9. SOURCES OF EXPERT ADVICE

This VRA is substantially based on: VRA7, which was compiled by Harriet Auty and Lisa Boden (EPIC CEADO) Date: 10/02/2012.

## 10. AUTHORS

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## 12. NOTES

None