

**VRA 9: What are the risks of causing new outbreaks of foot and mouth disease (FMD) through movements of FMD susceptible livestock from Scottish Islands to a single premises on another Scottish Island or the Scottish mainland, when these areas fall within the Restricted Zone?**

## 1. SUMMARY OF OVERALL RISK

*This risk assessment was compiled according to terms of reference provided by the Scottish Government regarding time of delivery, title of veterinary risk assessments (VRAs) and level of detail required. EPIC scientists created a generic framework suitable for the VRAs; collated and updated existing information on risks; filled gaps in the documents (including references where appropriate); and drafted new VRAs where necessary. These documents may require updating as new information becomes available or legislation develops, or if more in-depth assessment is necessary.*

*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 proposed actions to mitigate the risks associated with the specified activity, and which could form the basis of license 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 Restricted Zone.**

## 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 is put in place (TCZ) surrounding the suspect premises. On confirmation of disease, a national movement ban (NMB) is enforced by introducing a national Restricted Zone (RZ). A 3 km Protection Zone (PZ) and 10km Surveillance Zone (SZ) are 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.

In the RZ movements of animals are permitted, but only under the authority of a licence granted by an inspector (FMD Order (Scotland) 2006, schedule 6, paragraph 1).

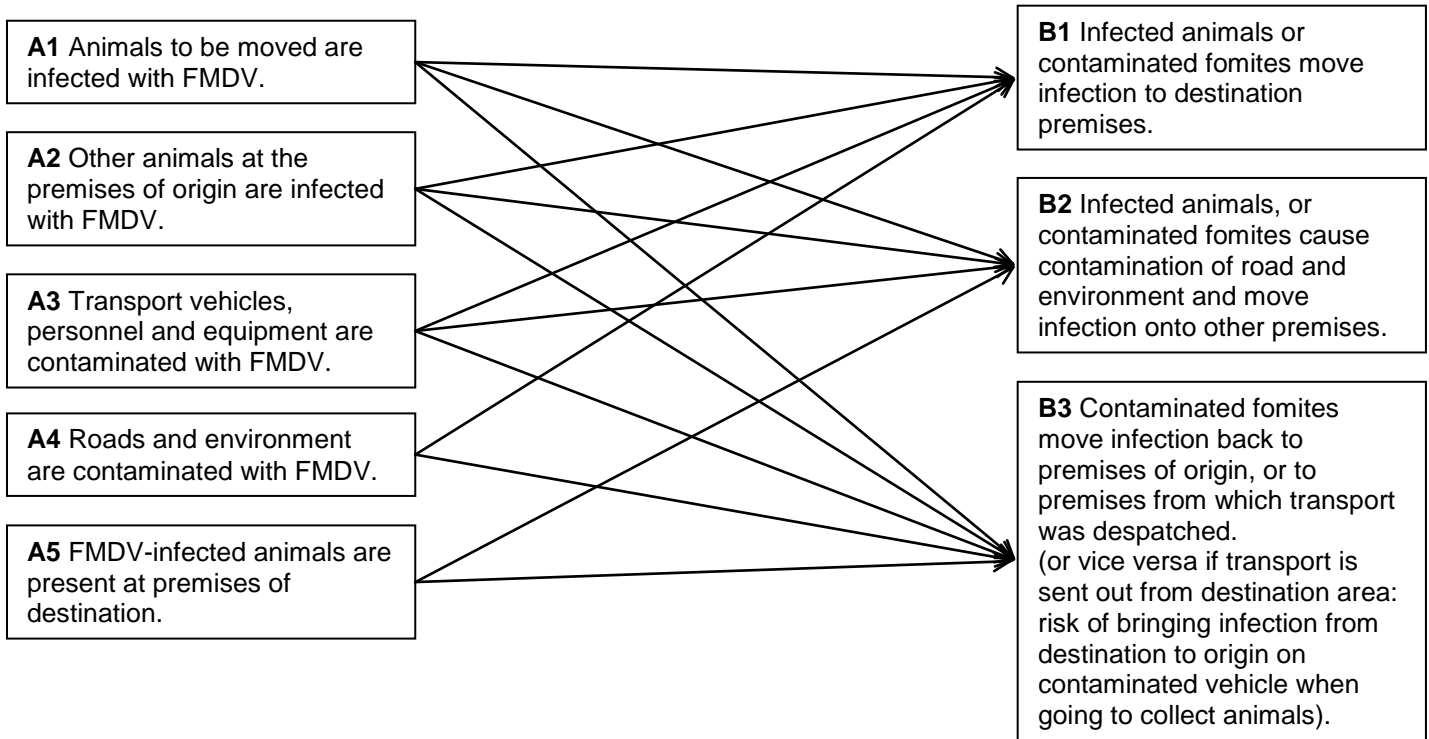
Disinfectants must be approved for use by the Diseases of Animals (Approved Disinfectants) (Scotland) Order 2008 as amended and used at the FMD Order dilution.

### 3. HAZARD IDENTIFICATION

(a) Hazard: FMD virus (FMDV)

(b) Specific Risk: Movement of livestock during a FMD outbreak increases the risk of spreading infection to previously uninfected premises or areas. Allowing movements of susceptible livestock from Scottish Islands to another Scottish Island, or to the mainland, increases the risk of moving disease to these areas, but does allow normal premises business to resume.

### 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 Animals to be moved are infected with FMDV</b>	
<ul style="list-style-type: none"> <li>Requires animals with undetected or incubating FMD 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>Whilst transmission is most likely around the time of or shortly after the appearance of clinical signs (Charleston <i>et al.</i> 2011), infected livestock may excrete FMDV 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> <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). There is</li> </ul>

	<p>therefore a higher risk of sheep spreading undetected infection.</p> <ul style="list-style-type: none"> <li>Inspecting livestock before any movement will reduce the risk of undetected infection.</li> </ul>
<p>Risk that animals are infected is influenced by:</p> <ul style="list-style-type: none"> <li>Proximity to premises with FMD</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 FMD. Once a NMB is in place, most transmission occurs by local spread (&lt;3k from premises with FMD) (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 the premises with FMD and is only likely to occur over significant distances if many infected animals (especially pigs) are present (Donaldson and Alexanderson 2001).</li> <li>Premises with FMD may be already detected (“infected premises”), or as yet undetected.</li> <li>In a RZ, there are no detected infected premises. There is a risk of as yet undetected premises with FMD but overall the risk of local transmission is very low.</li> </ul>
<ul style="list-style-type: none"> <li>Extent and timing of movements of susceptible animals from areas where FMD is present</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.</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, where as closed high security units would represent the lowest risk.</li> <li>In a RZ, transmission is most likely to result from movement of animals with undetected infection before the NMB.</li> <li>Identifying the number and nature of livestock movements from areas where FMD has been detected using livestock movement databases and tracings would allow better quantification of the risk.</li> <li>For Scottish Islands, it should be feasible to identify all movements to the islands during the potential risk period. The level of risk will depend very much on the extent of these movements, and the degree of certainty that all movements have been identified.</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.</li> </ul>
<ul style="list-style-type: none"> <li>Likelihood of detection and transmission is influenced by FMDV 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>Infection source: A2 Other animals at the premises of origin are infected with FMDV</b></p>	
<ul style="list-style-type: none"> <li>Proximity to infected areas, movement of animals prior to arrival at premises, stage of outbreak, presence of</li> </ul>	<ul style="list-style-type: none"> <li>See A1.</li> </ul>

undetected or incubating infection, strain differences	
<ul style="list-style-type: none"> <li>Number and species of animal present</li> </ul>	<ul style="list-style-type: none"> <li>Large numbers of animals increase the risk that some may be infected, and increases the number that would be exposed if infection were present.</li> <li>Cattle and pigs produce more virus, and present a higher risk of disease transmission during the incubation period.</li> <li>Whilst virus production in sheep is lower, disease in sheep can be difficult to detect (Hughes <i>et al.</i> 2002), meaning that the disease can often spread more widely before detection.</li> </ul>
<b>Infection source: A3 Transport vehicle, personnel and equipment are contaminated with FMDV</b>	
<ul style="list-style-type: none"> <li>Presence of infected livestock at premises of despatch of transport, if not livestock owner's own transport</li> </ul>	<ul style="list-style-type: none"> <li>Presence of livestock introduces risk of vehicle, personnel or equipment being contaminated on leaving the premises if undetected infection present.</li> </ul>
<ul style="list-style-type: none"> <li>Cleaning and disinfection of vehicle, equipment and personnel prior to leaving each premises visited, including disposal premises</li> </ul>	<ul style="list-style-type: none"> <li>FMDV is very sensitive to approved disinfectants and good cleansing and disinfection will reduce risk of virus transfer to roads or other premises.</li> </ul>
<ul style="list-style-type: none"> <li>Movement history of vehicle</li> </ul>	<ul style="list-style-type: none"> <li>Any previous movements close to infected areas increase risk. Movements to multiple slaughterhouses or premises increase risk.</li> </ul>
<ul style="list-style-type: none"> <li>Number of premises visited if multiple pick ups</li> </ul>	<ul style="list-style-type: none"> <li>Multiple pick ups in the same journey increases risk of FMDV transmission between premises. This risk can be avoided by not allowing multiple pick ups, although this may not be feasible in remote areas.</li> </ul>
<ul style="list-style-type: none"> <li>Length and duration of journey, number of stops en route</li> </ul>	<ul style="list-style-type: none"> <li>Longer journeys and multiple stops increases risk that vehicles are contaminated.</li> </ul>
<b>Infection source: A4 Roads and environment are contaminated with FMDV</b>	
<ul style="list-style-type: none"> <li>Proximity to premises with FMD, movement of animals prior to arrival at premises, stage of outbreak, presence of undetected or incubating infection, strain differences</li> </ul>	<ul style="list-style-type: none"> <li>See A1.</li> </ul>
<ul style="list-style-type: none"> <li>Length and duration of journey, number of stops, multiple pick ups, proximity to infected areas en route.</li> </ul>	<ul style="list-style-type: none"> <li>Increasing length, duration and number of stops increases risk of contamination with FMDV.</li> </ul>
<ul style="list-style-type: none"> <li>Contact with other livestock transport vehicles en route e.g. on ferries</li> </ul>	<ul style="list-style-type: none"> <li>If transporting between islands by ferry, livestock transport vehicles may be in close contact. This may increase risk of contamination of ferries with FMDV, and of transmission of FMDV occurring between vehicles.</li> </ul>
<b>Infection source: A5 FMDV-infected animals are present at premises of destination</b>	
<ul style="list-style-type: none"> <li>Proximity to infected areas, movement of animals prior to arrival at premises, stage of outbreak, presence of undetected or incubating infection, strain differences</li> </ul>	<ul style="list-style-type: none"> <li>See A1.</li> <li>Destination may be higher risk area than origin, e.g. if moving from Scottish Island to mainland. Risks of contaminating returning transport vehicle, personnel and equipment.</li> </ul>
<ul style="list-style-type: none"> <li>Number and species of susceptible animals</li> </ul>	<ul style="list-style-type: none"> <li>See A2.</li> </ul>
<b>Risk of transmission: B1 Infected animals or contaminated fomites move infection to destination premises</b>	
<ul style="list-style-type: none"> <li>Number and species of susceptible animals likely to be exposed at destination premises</li> </ul>	<ul style="list-style-type: none"> <li>Increasing the number/stocking density of animals increases risk of exposure.</li> </ul>
<ul style="list-style-type: none"> <li>Use of shared or common grazing</li> </ul>	<ul style="list-style-type: none"> <li>Allowing animals to move to premises which share common grazing could allow wide dissemination of disease if undetected or incubating disease was present.</li> </ul>
<ul style="list-style-type: none"> <li>Collection vehicle, personnel or equipment in contact with susceptible livestock</li> </ul>	<ul style="list-style-type: none"> <li>Risk will be higher if vehicle or personnel are in contact with other susceptible livestock if multiple pick ups are allowed.</li> </ul>
<ul style="list-style-type: none"> <li>Unsuitable vehicles, failure to appropriately cleanse and disinfect vehicle and personnel</li> </ul>	<ul style="list-style-type: none"> <li>See A3.</li> <li>FMDV is very sensitive to approved disinfectants and good biosecurity will reduce risk of virus transfer to roads</li> </ul>

	via fomites such as personnel, vehicles and equipment.
<b>Risk of transmission: B2 Infected animals or contaminated fomites cause contamination of road and environment and move infection onto other premises</b>	
<ul style="list-style-type: none"> <li>• Unsuitable vehicles, failure to appropriately cleanse and disinfect vehicle and personnel</li> </ul>	<ul style="list-style-type: none"> <li>• See B1.</li> </ul>
<ul style="list-style-type: none"> <li>• Length and duration of journey, number of stops, multiple pick ups, proximity to infected areas en route.</li> </ul>	<ul style="list-style-type: none"> <li>• See A4.</li> </ul>
<b>Risk of transmission: B3 Contaminated fomites move infection back to premises of origin, or to premises from which transport was despatched</b>	
<ul style="list-style-type: none"> <li>• Unsuitable vehicles, failure to appropriately cleanse and disinfect vehicle and personnel</li> </ul>	<ul style="list-style-type: none"> <li>• See A3.</li> <li>• See B1.</li> </ul>

## 6. CONSEQUENCE ASSESSMENT

Spread of FMD to other Scottish islands or mainland. The consequences of the disease occurring on a Scottish island and spreading to the mainland of GB are very grave. The consequences of an outbreak on a Scottish island which did not spread to other parts of Scotland would be very serious but could be contained.

## 7. RISK MANAGEMENT OPTIONS

The risk of causing new FMD outbreaks by permitting susceptible livestock to move from Scottish Islands to a single premises on another Scottish Island or the Scottish mainland, under licence, as an exemption from Restricted Zone measures is dependent on the risk level of the animals' origin, and on the numbers of movements between the infected areas and the origin of animals. The highest risks are associated with animals with undetected infection, either because they are still in the incubation period, or because there are few clinical signs, as is often seen with sheep.

In general the risk of FMD occurring on Scottish Islands is likely to be lower than for other parts of the UK. Accurate quantification of this risk will depend on identifying the extent of movements which have taken place directly or indirectly from infected areas or higher risk areas, to the island, and the level of certainty that all movements have been identified. No movements should be permitted until this information has been collected, and the risk of undisclosed infection has reduced.

Movement between Scottish islands have less severe potential consequences than movement to the mainland. However, there is still a risk of moving infection to uninfected islands. Depending on the location and extent of an outbreak, and what movement have taken place, different islands may have differing likelihoods of infection being present. Movements should only be permitted from an island perceived to be of lower risk, to one of higher risk, and not vice versa. The low risk of FMD occurring on a Scottish island must be accompanied by measures to minimise the risk of an outbreak spreading to the mainland of Scotland. These must take account of the distance and time of transport from the mainland of Scotland and other islands. The risks of movements from Scottish island to the Scottish mainland can be minimised further by restricting movements to those which are essential.

Potential risk management options are:

- (i) Do not allow any animal movements between Scottish islands, or to mainland Scotland.
- (ii) Allow movements, with certain conditions, but only between islands joined by bridges or causeways.
- (iii) Allow movements, with certain conditions, but only between islands within certain defined groups, for example the local authority areas.
- (iv) Allow movements, with certain conditions, but only between islands, and not to the Scottish mainland.
- (v) Allow animals to move, with certain conditions, between islands or to mainland Scotland.

Option (i) represents the lowest risk. This is likely to be appropriate in the early stages of an outbreak where there is a higher risk of undetected infection, there is little information available on animal movements and the relative risk of unidentified infected premises in different areas has not been quantified.

Later in an outbreak, in a RZ, where information on animal movements can confirm that the risk of undetected disease is very low, options (ii) to (v) become feasible. The choice of which option is appropriate will depend on the epidemiological picture at the time, the information available on animal movements to the respective areas, the certainty that this information is correct, and the confidence that the conditions will be adhered to.

Overall the risk is low in the RZ, provided mitigation measures are observed.

This risk level was assigned based on scientific literature available and expert opinion where appropriate by considering the risk pathways and the factors affecting each risk pathway, as listed in sections 4 and 5.

## 8. SUGGESTED RISK MITIGATION MEASURES

Before allowing movements of animals from one Scottish Island to another, or to the mainland, livestock movement and tracings data should be collected and analysed to assess the risk that undisclosed infection is present in each area. The decision to allow movements under licence should be taken based on the risk levels at the time and the degree of certainty that all movements have been identified. If the risk is low, these movements represent a low risk, provided the following risk mitigation strategies are in place:

### **A. Movement from one Scottish Island to another**

- (i) No animal may be consigned from a premises onto which an animal has moved from the mainland or another island during the risk period.
- (ii) On arrival at the destination port, consignments of animals must only be moved to a single destination premises. At the destination premises, the animals should be kept separate from other susceptible livestock for 21 days and should not join shared grazing or common land.
- (iii) Where consignments are unloaded from transport boats into lairages at ports, the resulting consignments must be transported to single destinations.
- (iv) Stockmen should inspect livestock to be transported for signs of FMD prior to movement.
- (v) Vehicles used to transport livestock, including any trailers, must be leakproof.
- (vi) Vehicles used to transport livestock must be appropriately cleansed and disinfected before and after use. Approved disinfectants must be used at the correct concentration.
- (vii) Livestock attendants must wear clean protective clothing that can be appropriately cleansed and disinfected with an approved disinfectant.
- (viii) No livestock should be moved from the destination premises for 21 days.

### **B. Movement from one Scottish Island to Scottish mainland**

- (i) No animal may be consigned from a premises onto which an animal has moved from the mainland or another island during the risk period.
- (ii) On arrival at the destination port on the Scottish mainland, consignments of animals must only be moved to a single destination premises with stockproof fencing and where the unit concerned does not involve shared grazing or common land. At the destination premises, the animals should be kept separate from other susceptible livestock for 21 days, and should not join shared grazing or common land.
- (iii) Where consignments are unloaded from transport boats into lairages at ports, the resulting consignments must be transported to single destinations.
- (iv) Livestock to be transported must be inspected for signs for FMD prior to movement.
- (v) Vehicles used to transport livestock, including any trailers, must be leakproof.
- (vi) Vehicles used to transport livestock must be appropriately cleansed and disinfected before use with an approved disinfectant.
- (vii) Livestock attendants must wear clean protective clothing that can be appropriately cleansed and disinfected with an approved disinfectant.
- (viii) No livestock should be removed from the destination premises for a period of 21 days.
- (ix) Movements must be directly from the originating island to the receiving single premises on the Scottish mainland.

The current provisions of the measures described in Schedule 6, paragraph 8(1) must remain in place to prevent contractors moving from the mainland of GB to work on the Scottish islands.

It is assumed that all relevant legislation normally applicable is followed, for example regarding livestock identification and recording of movements.

## 9. SOURCES OF EXPERT ADVICE

Based on:

VRA 2007 #5 held by SG "Movements of FMD susceptible livestock from Scottish Islands to a single premises on the Scottish mainland"

VRA held by SG "What is the risk of causing new outbreaks of FMD by removing the Restricted Zone measures from the Scottish Islands?" published 10 August 2007

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## 12. NOTES

None