

VRA 7 - What are the risks of causing a new outbreak of foot and mouth disease (FMD) through movement of FMD-susceptible animals from a Restricted Zone for slaughter in an approved slaughterhouse 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.

Movements from premises within the RZ are only permitted under the authority of a licence granted by an inspector (FMD (Scotland) Order 2006 schedule 6 paragraph 1).

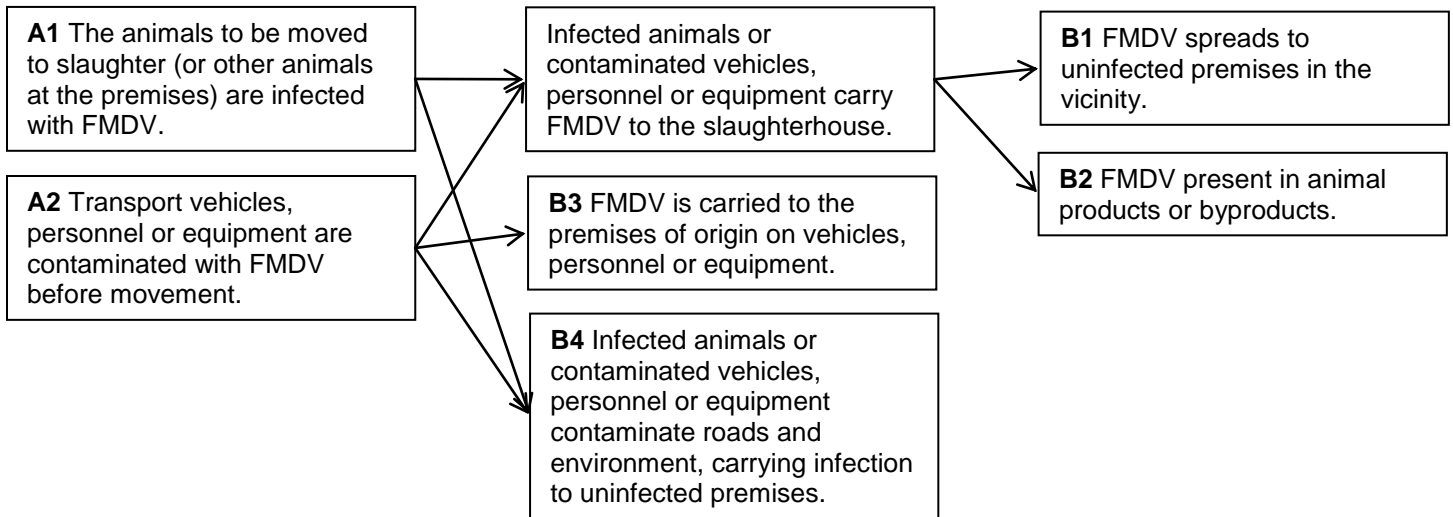
Disinfectants must be approved for use by the Diseases of Animals (Approved Disinfectants) (Scotland) Order 2008 as amended and used at the FMD Order dilution.

3. HAZARD IDENTIFICATION

(a) Hazard: FMD virus

(b) Specific risk: Any animal movements during a FMD outbreak increase the risk of further disease transmission. Movement of animals to slaughter within a RZ allows agricultural businesses to continue to operate and may be necessary to prevent overcrowding and other welfare issues but does increase risk of transmission of FMD to uninfected premises.

4. POTENTIAL RISK PATHWAYS



5. EXPOSURE ASSESSMENT

Factors which are likely to affect this probability of exposure are:	Comments and risk estimates if/where appropriate
Infection source: A1 The animals to be moved to slaughter are infected with FMDV	
<ul style="list-style-type: none"> Requires animals with undetected or incubating FMD infection, or failure to report FMD 	<ul style="list-style-type: none"> 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. 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). 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 therefore a higher risk of sheep spreading undetected infection. Inspecting livestock before any movement will reduce the risk of undetected infection.

<p>Risk that the premises is infected depends on:</p> <ul style="list-style-type: none"> Proximity to premises with FMD 	<ul style="list-style-type: none"> 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 (<3k from premises with FMD) (Gibbens <i>et al.</i> 2001, Keeling <i>et al.</i> 2001, Haydon <i>et al.</i> 2003). 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). Premises with FMD may be already detected (“infected premises”), or as yet undetected. 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.
<ul style="list-style-type: none"> Extent and timing of movements of susceptible animals from areas where FMD is present 	<ul style="list-style-type: none"> Requires movements of infected animals before the NMB, or movements of animals with undisclosed infection by licence. 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. In a RZ transmission is most likely to result from movement of animals with undetected infection before the NMB. 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.
<ul style="list-style-type: none"> Stage of outbreak 	<ul style="list-style-type: none"> Early in the outbreak there is increased risk of undetected infection and lack of information on movements.
<ul style="list-style-type: none"> Likelihood of detection and transmission is influenced by FMDVstrain 	<ul style="list-style-type: none"> 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 FMDV, the serotype and strain would be identified by The Pirbright Institute. This information would help to inform estimates of risk.
<ul style="list-style-type: none"> Number and species of animal at premises of origin 	<ul style="list-style-type: none"> Larger numbers of animals increase the risk that some may be infected, and increases the number that would be exposed if infection were present. Cattle and pigs produce more virus, and present a higher risk of disease transmission during the incubation period. 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.
<p>Infection source: A2 Transport vehicles, personnel or equipment are contaminated with FMDV before movement</p>	
<ul style="list-style-type: none"> Presence of infected livestock at premises of despatch of transport, if not livestock owner’s own transport 	<ul style="list-style-type: none"> Presence of livestock introduces risk of vehicle, personnel or equipment being contaminated on leaving the premises if undetected infection present.

<ul style="list-style-type: none"> Cleansing and disinfection of vehicle, equipment and personnel prior to leaving each premises visited, including disposal premises 	<ul style="list-style-type: none"> FMDV is very sensitive to approved disinfectants and appropriate cleansing and disinfection will reduce risk of virus transfer to roads or other premises.
<ul style="list-style-type: none"> Movement history of vehicle 	<ul style="list-style-type: none"> Any previous movements close to infected areas increase risk. Movements to multiple slaughterhouses or premises increase risk.
<ul style="list-style-type: none"> Number of premises visited if multiple pick ups 	<ul style="list-style-type: none"> 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.
<ul style="list-style-type: none"> Length and duration of journey, number of stops en route 	<ul style="list-style-type: none"> Longer journeys and multiple stops increases risk that vehicles are contaminated.
<p>Risk of transmission: B1 Infected animals or contaminated vehicles, personnel or equipment carry FMDV to the slaughterhouse, which spreads to uninfected premises in the vicinity</p>	
<ul style="list-style-type: none"> Cleansing and disinfection of vehicle, personnel and equipment on leaving premises of origin 	<ul style="list-style-type: none"> Appropriate cleansing and disinfection with an approved disinfectant reduces risk of contaminated fomites moving infection to slaughterhouse.
<ul style="list-style-type: none"> If FMDV reaches the slaughterhouse, local spread to premises in the vicinity could occur through indirect transmission via vehicles or personnel, or via airborne infection. 	<ul style="list-style-type: none"> The risk is reduced by normal slaughterhouse practices to reduce disease transmission, such as appropriate cleansing and disinfection with an approved disinfectant.
<ul style="list-style-type: none"> Ante mortem inspection 	<ul style="list-style-type: none"> Prompt detection of any clinical signs allows mitigation measures to be put in place to prevent further transmission. At this point the slaughterhouse would become an infected premises and other procedures put in place to reduce risk of dissemination of the virus.
<ul style="list-style-type: none"> Vehicle cleansing and disinfection procedures in place at slaughterhouse 	<ul style="list-style-type: none"> Appropriate facilities for cleansing and disinfection reduce risk of contaminated vehicles and personnel leaving slaughterhouse.
<ul style="list-style-type: none"> Unloading and lairage facilities and time spent in lairage 	<ul style="list-style-type: none"> There is a theoretical risk of airborne transmission to surrounding premises. However the species most likely to cause airborne transmission is pigs, which also usually show clear clinical signs and would be unlikely to carry undetected infection. Disease may be hard to detect in sheep, but aerosol FMDV production by sheep is very low.
<p>Risk of transmission: B2 Infected animals or contaminated vehicles, personnel or equipment carry FMDV to the slaughterhouse, leading to the presence of FMDV in animal products or by-products</p>	
<ul style="list-style-type: none"> Ante and post mortem inspection 	<ul style="list-style-type: none"> Prompt detection of disease reduces the risk of FMDV in animal products or by-products
<ul style="list-style-type: none"> Time spent in lairage and degree of mixing between animal groups 	<ul style="list-style-type: none"> Increasing time spent in lairage increases risk of transmission between animals if disease is present. As animals are likely to be slaughtered before clinical disease develops, there is unlikely to be significant further dissemination of FMDV, but does increase risk that FMDV will be present in meat and animal by-products. Risks can be minimised by limiting the time that animals spend in lairage before slaughter and preventing mixing of groups of animals.
<p>Risk of transmission: B3 FMDV is carried to the premises of origin on vehicles, personnel or equipment</p>	
<ul style="list-style-type: none"> Cleansing and disinfection procedures in place at slaughterhouse 	<ul style="list-style-type: none"> Appropriate cleansing and disinfection with an approved disinfectant reduces risk of FMDV contamination of fomites.
<p>Risk of transmission: B4 Infected animals or contaminated vehicles, personnel or equipment contaminate roads and environment, carrying infection to uninfected premises</p>	
<ul style="list-style-type: none"> Length and duration of journey, number of stops, proximity of route to susceptible animals 	<ul style="list-style-type: none"> Longer journeys, multiple stops and proximity to high densities of susceptible animals increases risk.
<ul style="list-style-type: none"> Suitable vehicle and cleansing and disinfection of 	<ul style="list-style-type: none"> Suitable vehicles and appropriate cleansing and

vehicle, personnel and equipment	disinfection with an approved disinfectant will reduce risk of virus transfer to roads via fomites such as personnel, vehicles and equipment.
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6. CONSEQUENCE ASSESSMENT

Spread of FMD to uninfected premises.

7. RISK MANAGEMENT OPTIONS

The movement of animals from premises in a RZ to a slaughterhouse in a RZ does carry the risk of spreading FMDV to uninfected premises. The most important risks are likely to be undisclosed FMD at the premises of origin, and failure to ensure that animal transport has been appropriately cleansed and disinfected before and after collection.

Risk management options are:

- (i) Do not allow movement of animals to a slaughterhouse.
- (ii) Allow movements to slaughter as long as certain conditions are met.

Allowing the movement of animals to slaughter in the RZ is a balance between the increased risk associated with any animal movements, allowing agricultural businesses to continue to operate and preventing overcrowding and other welfare issues. Option (i) is likely to be necessary in the early stages of an outbreak, when there is still a high risk of undetected infection. Once the initial phase of the outbreak has passed and information is available on animal movements, the risk of undisclosed infection drops, and risks of transmission via other movements can be better quantified. Option (ii) is then appropriate.

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 to slaughterhouses in the Restricted Zone, livestock movement and tracings data should be collected and analysed to assess the risk that undisclosed infection is present in the area of interest. If the risk is low, movement of animals from premises in an RZ to slaughterhouses in an RZ represents a low risk, provided the following risk mitigation strategies are in place:

A. At the premises of collection

- (i) Ensure that the vehicle which will move stock is clean and has been disinfected before collection, and that driver wears clean protective clothing. Approved disinfectants must be used at the correct concentration.
- (ii) Allow movement only if the slaughterhouse is expecting the consignment
- (iii) Stockman to check animals not more than 3 hours before movement to ensure no clinical signs of FMD in stock to be moved, or in other stock on premises.
- (iv) No animals should have moved onto the premises of origin from another premises or market within 21 days. In this instance, the exemption of the standstill periods normally given to movement of animals to slaughter should not apply.

B. En route

- (i) Require direct movement from the premises to the slaughterhouse.
- (ii) Do not allow multiple collections or deliveries.
- (iii) Prevent movement within PZ or SZ.
- (iv) Prevent movement through PZ or SZ, even by motorway.
- (v) Minimise delays or stops *en route*.
- (vi) If a stop is unavoidable the vehicle must be parked at least 100m away from susceptible livestock preferably in an urban location.

C. At the slaughterhouse

Facilities

- (i) Arrangements must be in place to accept in advance of deliveries
- (ii) Facilities must be available on site and used accordingly for the appropriate cleansing and disinfection of parts of vehicles, crates and modules used to transport animals to the slaughterhouse. Approved disinfectants must be used at the correct concentration.

Practices

- (i) The slaughterhouse must not source any animals from premises within a PZ or SZ.
- (ii) Animals are inspected in the lairage by the OV immediately on arrival.
- (iii) Slaughter may only take place when the Meat Hygiene Service are present at all times.
- (iv) Slaughter must take place within 24 hours.
- (v) No live animals are allowed to leave the slaughterhouse.
- (vi) Personnel (other than office staff who do not have contact with the slaughterhouse operations) to follow good biosecurity procedures when entering and leaving the premises.

Cleansing and disinfection

- (i) Approved disinfectants must be used at the correct concentration.
- (ii) Require appropriate cleansing and disinfection of vehicle at the slaughterhouse.
- (iii) Only one vehicle may use the C&D facilities at one time.
- (iv) Clean and dirty vehicles must not be parked next to each other.
- (v) Driver must appropriately cleanse and disinfect boots and clothing (or change into clean clothing) on leaving the slaughterhouse.
- (vi) Lairage must be cleansed and disinfected after the last animal is slaughtered within a 24 hour period, and in any case, before any other animals are admitted to the lairage.

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

This VRA is based on VRA 2007 #1 "What is the risk of causing new outbreaks by moving FMD susceptible animals to slaughter within Scotland?" and VRA 2010 #11 "What is the risk of causing new outbreaks by moving FMD susceptible animals to slaughter, allowing multiple pickups?" both held by Scottish Government.

10. AUTHORS

Compiled by: Harriet Auty, Lisa Boden (EPIC CEADO)	Date: 10/02/2012
Reviewed by: Dom Mellor (EPIC CEADO)	Date: 14/02/2012
Reviewed by: Martyn Blissitt (AH&WD, Scottish Government)	Date: 28/03/2012
Reviewed by: The FMD National Experts Group (NEG)	Date: 01/02/2013

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12. NOTES

None