VRA 26 - What are the risks of causing a new outbreak of foot and mouth disease (FMD) through the movement of fodder in the Protection Zone?

1. SUMMARY OF OVERALL RISK & RECOMMENDED ACTION

This risk assessment was based on EPIC's generic framework suitable for veterinary risk assessments (VRAs) and VRA02. This document 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 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.** This assessment is the combined risk offered by the potential risk pathways, detailed in section 5 below.

POTENTIAL OPTIONS FOR MITIGATING RISK (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 including the movement of fodder (defined as animal feed including concentrates, hay, straw and forage) 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

Specifically, the FMD (Scotland) Order 2006 prohibits transport of fodder within the PZ except under licence. It also prohibits sale/consignment for sale of fodder produced in the PZ except where it complies with specified conditions or under licence.

General prohibitions on movement of fodder in the PZ do not apply if authorised by a licence granted by a veterinary inspector or an inspector at the direction of a veterinary inspector: FMD (Scotland) Order 2006 at Schedule 4 (paragraphs 18 and 19).

Disinfectants used must be approved under the Diseases of Animals (Approved Disinfectants) (Scotland) Order.

3. HAZARD IDENTIFICATION

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

(b) **Specific risk**: Fodder (i.e. animal feed including concentrates, hay, straw and forage) can transfer FMDV if it becomes contaminated from infected animals or their excretions. That is, fodder can act as a fomite. Fodder produced, stored or moved within the PZ is at higher risk of transferring FMDV than equivalent material in lower risk zones (i.e. further from infected premises) as there is more chance of contamination with FMDV in or near FMD-infected premises.

The supply of fodder is essential to avoid the welfare problems associated with insufficient feeding.

4. POTENTIAL RISK PATHWAYS

Infection Sources:
A1 Fodder produced/stored on an infected premises may have become contaminated with FMDV.
A2 Fodder transported through the PZ may become contaminated with FMDV.
A3 Collection vehicle, personnel or equipment are contaminated with FMDV.
A4 Roads and environment are contaminated with FMDV.

Risks of transmission:
B1 Virus passing to uninfected premises via consumption of contaminated fodder by susceptible animals.
B2 Virus passing to uninfected premises via external contamination of the vehicle used for transporting the fodder.

5. EXPOSURE ASSESSMENT

Factors which are likely to affect this probability of exposure are:	***Comments and risk estimates if/where appropriate:***
***Infection source:* A1 Fodder produced or stored on an infected premises may become contaminated with FMDV**	
• Requires fodder to have been produced and/or stored on/near a premises where animals are infected with FMD. The infection may be apparent or unapparent, affected animals will shed FMDV.	• Virus shedding is most likely around the time of or shortly after the appearance of clinical signs (Charleston *et al.* 2011). However, 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 *et al.* 2003, Orsel *et al.* 2009). • Fodder can behave as a fomite, i.e. it can be externally contaminated by FMDV and thus carry the virus from one premises to another when the fodder is moved. The source of contamination is excretions from infected animals, e.g. faeces,

	exhaled virus, milk. The FMDV is deposited on the fodder directly through animal contact or indirectly e.g. via externally contaminated vermin, faecal splashing or aerosol. Thus the extent of contamination will depend on local conditions, including proximity of fodder store(s) to livestock. • When a FMDV infected premises has been identified, all fodder on the premises will be either destroyed or disinfected: FMDV contamination will therefore be removed. • The highest risk of spreading FMDV comes from fodder stored at premises where the animals are infected but not yet diagnosed. • There is a lower risk of FMDV contamination of fodder stored adjacent to infected premises: depending on local conditions, it may be possible for FMDV to be spread by aerosol, externally contaminated vermin (i.e. acting as fomites) or contaminated run-off from the infected premises. • Risk of airborne transmission decreases rapidly with distance from the infected premises and is only likely to occur over significant distances if many infected animals (especially pigs) are present (Donaldson and Alexanderson 2001). • The FMD (Scotland) Order 2006, Schedule 4 paragraph 19 permits fodder produced or stored in the PZ to be sold/consigned for sale if it was: produced at least 21 days prior to the earliest infection date and was kept away from possible contamination; produced on a premises with no susceptible livestock; has been treated with steam or formaldehyde; has been stored under cover at least 2 km from the nearest infected premises and is retained until at least 3 months after completion of cleansing and disinfection of the IP. Any other fodder can only be sold/consigned for sale under licence. • Prior to loading a consignment of fodder, spraying the exposed surface of the material with an approved disinfectant will reduce any surface contamination with FMDV to low levels.
Likelihood that premises is infected depends on • Extent and timing of movements of susceptible animals from high risk areas	• Requires movements of infected animals on to the premises before the National Movement Ban, or movements of animals with undisclosed infection by licence. • Likelihood of movements having taken place is influenced by type of premises: high number of movements on (e.g.

	finishing unit, flying dairy herd) would have a higher risk of importing infection than with a low number of movements on (e.g. closed herd). • Identifying the number and type of livestock movements from high risk areas (i.e. PZ/SZ) would allow more accurate assessment of risk.
• Stage of outbreak	• There is increased risk of undetected infection and lack of information on movements early in an outbreak.
• Likelihood of detection and transmission is influenced by FMDV strain	• 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 et al. 2008). Much UK research is based on the 2001 outbreak, which was caused by serotype O, strain PanAsia. However future outbreaks may involve other serotyopes/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.
***Infection source*: A2 Fodder transported through the PZ may become contaminated with FMDV**	
• Requires the load of fodder to become contaminated whilst in transit, e.g. from a FMD virus plume or splashes of contaminated faeces.	• Contamination of a load during transport is more likely in the PZ, where disease is known to exist/has existed recently, than in other areas of the country where there is no evidence of FMD infection. • Fodder would generally be transported in bags or bales. It is possible that the outer surfaces could be contaminated with FMDV during transport, e.g. if the load is splashed with liquid containing FMDV or if the vehicle drives through a FMD virus plume. On arrival at the destination premises, a mist of approved disinfectant applied to the outer surface of the load would destroy superficial FMDV contamination, reducing risk of infection to a low level.
***Infection source*: A3 Delivery vehicle, driver/personnel or equipment are contaminated with FMDV**	
• Presence of susceptible livestock at premises from which transport is dispatched	• Presence of livestock introduces risk of vehicle, personnel or equipment being contaminated on leaving the premises if undetected infection is present. Appropriate cleansing and disinfection of the vehicle, personnel and equipment prior to leaving the premises from which transport is dispatched will reduce the risk of contamination to a negligible level.

• Movement history of the vehicle	• Movements within the PZ increase the risk: the more pick-ups and/or deliveries on the driver's round, the higher the risk of FMDV contamination. • Fodder deliveries should be made in order of risk: low risk premises (i.e. those outside the PZ/SZ) should be visited first, then premises in the SZ, finally delivering to premises in the PZ. • Appropriate cleansing and disinfection of the vehicle, personnel and equipment prior at the start of each delivery round and after leaving each premises will reduce the risk of contamination to a negligible level.
• Failure to thoroughly cleanse and disinfect vehicle, personnel and/or equipment prior to leaving each premises visited	• FMDV is very sensitive to approved disinfectants; appropriate cleansing and disinfection will reduce risk of virus transfer via fomites such as personnel, vehicles and equipment.
***Infection source*: A4 Roads and environment are contaminated with FMDV**	
• Proximity to infected premises, stage of outbreak, FMDV strain type	• See A1, above
• Biosecurity of premises along route (including premises visited)	• FMDV is very sensitive to approved disinfectants and appropriate cleansing and disinfection will reduce risk of virus transfer to farm tracks/roads via fomites such as personnel, vehicles and equipment.
• Survival of FMDV on road	• FMDV can survive on average for 2-3 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).
***Risk of transmission*: B1 Infection passing to uninfected premises via consumption of contaminated fodder by susceptible animals**	
• Animals that ingest fodder contaminated with FMDV will become infected if they swallow sufficient virus.	• While the oral route requires a higher infective dose of FMDV, susceptible animals can and do become infected through ingestion of FMDV. The risk of infection is higher where the animals have abrasions/damage to the oral mucosa (Alexanderson *et al*. 2003) • Fodder has been identified as a vector of FMDV on at least two occasions: the 2000 FMD outbreak in Japan (Sugiura *et al*. 2001); and the 1967-68 outbreak in GB (Northumberland 1969).
***Risk of transmission*: B2 Infection passing to uninfected premises via external contamination of the vehicle used for transporting the fodder.**	
• All vehicles driving through the PZ are at risk of becoming externally contaminated, e.g. from a FMD virus plume, splashes of contaminated faeces, FMDV contamination on the road.	• FMDV is very sensitive to approved disinfectants; cleansing and disinfection on arrival at the destination premises, prior to unloading, will reduce the risk of virus transfer to livestock at the destination premises.
• Movement history of vehicle	• Fodder deliveries should be made in order of risk: low risk premises (i.e. those

	outside the PZ/SZ) should be visited first, then premises in the SZ, finally delivering to premises in the PZ. • Any movements in the PZ increase risk of contamination with FMDV. Multiple drop-offs would increase the possibility of exposure to the virus at one or more undiagnosed premises. • The vehicle must be cleansed and disinfected appropriately before starting the delivery round and prior to leaving each premises on the round: appropriate cleansing and disinfection would reduce the risk of spreading contamination by external contamination of the vehicle to a negligible level. This risk would be further reduced by restricting deliveries to one destination only.
• Failure to thoroughly cleanse and disinfect vehicle, driver/other personnel, equipment prior to leaving each premises visited.	• FMDV is very sensitive to approved disinfectants; good biosecurity will reduce risk of virus transfer via fomites such as people, vehicles and equipment.

6. CONSEQUENCE ASSESSMENT

Spread of disease to uninfected premises.

7. RISK MANAGEMENT OPTIONS/ADVICE

The risk in moving fodder within the PZ is that it will transfer FMDV between premises, particularly because unaffected animals may become infected after eating contaminated fodder. All transport of fodder within the PZ (regardless of origin) is prohibited except under licence.

In terms of safe sourcing of fodder, the lowest risk option is for farmers in the PZ to obtain fodder from outside the zone, preferably from an arable farm/supplier where no susceptible livestock are present. Where this is not possible fodder must be sourced from the PZ, in which case the safest options are outlined in the FMD (Scotland) Order 2006 at Schedule 4 paragraph 19 (detailed under A1, above). Where one of the Schedule 4 paragraph 19 options is not met, there is provision to licence the sale/consignment for sale of fodder originating from the PZ. Provided that the conditions of the licences are observed, it is suggested that movement of fodder within the PZ, including material originating from the PZ, carries a low risk of causing a new FMD outbreak.

8. POTENTIAL OPTIONS FOR MITIGATING RISK

Movement of fodder within the PZ, including material that originates from the PZ, presents a low risk of causing a new FMD outbreak provided that safeguards are in place. The following risk mitigation measures are suggested:

A prevent transfer of infection by transport of fodder within the PZ

i) The delivery vehicle, personnel and equipment must be clean and disinfected at the start of each delivery round

ii) The delivery round must be planned in order of disease risk: deliver to low risk premises (i.e. outside the PZ/SZ) first, then to SZ premises, then to PZ premises.

iii) On arrival at the premises of destination, and before unloading, the vehicle, delivery personnel and any associated equipment must be cleaned and disinfected.
iv) On arrival at the premise of destination, and before unloading, the exposed surfaces of the fodder on the vehicle must be misted with an approved disinfectant that is also suitable for consumption by livestock.
v) The delivery vehicle, personnel and equipment must be cleaned and disinfected on leaving each premises visited.

B Prevent transfer of infection through sale/consignment for sale of fodder originating in the PZ

i) Fodder, including concentrates, must not be moved from a FMD infected premises, except following veterinary risk assessment and carrying out any appropriate mitigation.
ii) Fodder sourced from a premises adjacent to an infected premises must be free from signs of vermin activity.
iii) Prior to loading the intended consignment on to the cleaned and disinfected delivery vehicle, exposed surfaces of the fodder must be misted with an approved disinfectant that is also suitable for consumption by livestock.

It is assumed that relevant legislation applicable during "peacetime" is followed, for example regarding good feed supply practice as per the agricultural industry's feed assurance schemes.

9. SOURCES OF EXPERT ADVICE

This VRA was based on:
VRA02 "*What are the risks of causing new outbreaks of foot and mouth disease (FMD) by moving fallen stock off premises to approved premises for disposal in the Restricted Zone?*" H Auty and L Boden, EPIC 14/02/2012
VRA 13 *"What is the risk of causing new outbreaks of FMD by moving hay and straw onto a farm?"* A Donaldson (IAH Pirbright) & KC Taylor (Veterinary Consultant) for MAFF, 26/04/2001.

10. AUTHORS

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11. REFERENCES

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12. NOTES

None