VRA 10: What are the risks of causing new outbreaks of foot and mouth disease (FMD) by walking, and other similar activities such as dog walking, rambling and climbing?

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 where necessary.

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:

	PZ	SZ	RZ
With no mitigation measures	medium	medium	low
With mitigation measures described	medium	low	very low

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 general, access to infected premises or premises under suspicion of infection is not permitted. Scottish Ministers can prohibit access to land within a PZ, including core paths (FMD (Scotland) Order 2006, article 35). Local authorities can close land for up to six days. In addition landowners can request closure of their land for longer periods - subject to a risk assessment AHVLA and local authorities can sanction closure and notify Scottish Ministers (Land Reform Act (Scotland) 2003, chapter 4, paragraph 11).

This VRA covers both walking on designated paths, core paths and rights of way, and activities conducted off paths such as climbing, as permitted by the Land Reform Act (Scotland) 2003, including within agricultural areas, and includes the risks associated with travelling to the area.

In this VRA, the term 'agricultural land' or 'agricultural areas' refers to land that is being used or has been used for keeping livestock or other FMD-susceptible animals. It does not include arable land where no livestock have been present for an extended period of time.

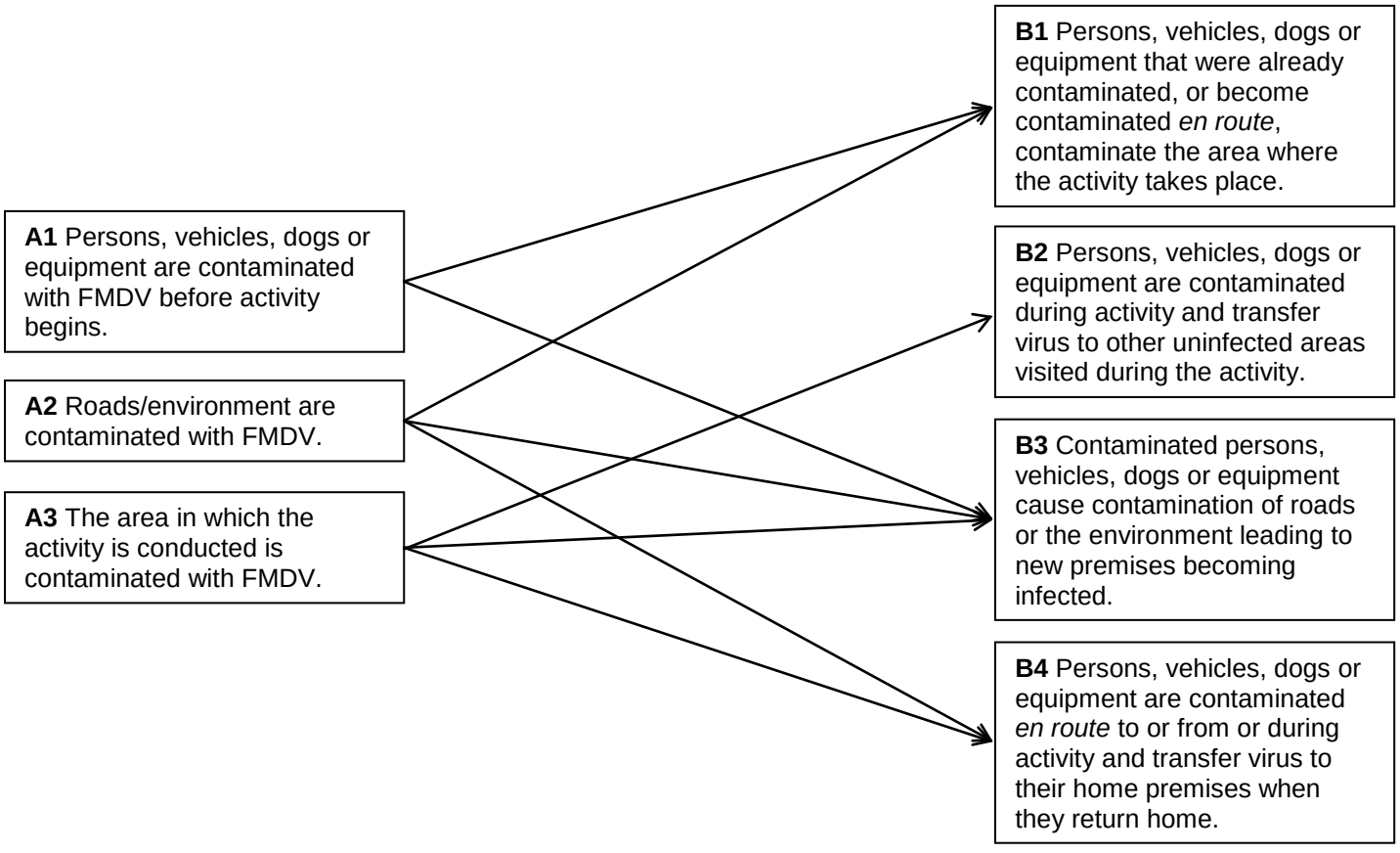
Disinfectants must be approved for use by the Diseases of Animals (Approved Disinfectants) (Scotland) Order 2008 as amended and be used at the FMD Order dilution.

3. HAZARD IDENTIFICATION

a) Hazard: FMD virus (FMDV)

b) Specific Risk: During an FMD outbreak people carrying out leisure activities in the countryside may come into contact with FMDV or with susceptible livestock. There is a risk that FMDV will spread via people or other fomites and cause further disease outbreaks.

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 Persons, vehicles, dogs or equipment are contaminated with FMDV before activity begins**	
In general, risk of contamination is influenced by: • Proximity to a premises where FMD has been detected ("infected premises")	• Risk of transmission is highest adjacent or close to premises with FMD. Once a NMB is in place, most transmission occurs by local spread (<3k from a premises with FMD) (Gibbens *et al.* 2001, Keeling *et al.* 2001, Haydon *et al.* 2003). • It is difficult to quantify relative risks associated with different transmission routes within local spread but indirect transmission via fomites and contamination of roads and environment around a premises with FMD are likely to play an important role. • 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). • In a PZ there are known infected premises which may be at varying stage of diagnosis, slaughter, cleansing and disinfection. The risk of local transmission from detected infected premises is medium. • In a SZ, there are no detected infected premises. The smallest distance at which infected premises could be located would be 3km away. The risk of local transmission from detected infected premises is low. • In a RZ, there are no detected infected premises. The smallest distance at which infected premises could be located is 10km so the risk of local transmission from detected infected premises is negligible.
• Presence of animals with undetected or incubating FMD, or failure to report FMD	• In addition to premises where FMD has been detected ("infected premises"), there may be premises where FMD is present but has not yet been detected. • Infected livestock may excrete FMDVfor 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). • 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 *et al.* 2002). In addition, sheep may be inspected less frequently/ thoroughly. There is therefore a higher risk of undetected infection on sheep-only premises. • The risk of undetected infection is highest in a PZ, followed by a SZ then a RZ. • The risk of undetected premises with FMD arising from spread over longer distances can be better quantified by analysis of movement data to identify movements of animals from areas where FMD has been detected, before the NMB.
• Stage of outbreak	• Early in the outbreak there is increased risk of undetected infection in all zones and lack of information on movements.
• Likelihood of detection and transmission is influenced by FMD virus 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 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.
Specific risks: Likelihood that vehicles are contaminated	
• Origin of vehicles	• The risk that vehicles are contaminated is influenced by the proximity of the home premises (or premises of despatch of transport, if different) to premises with FMD, and the presence of susceptible livestock with undetected infection at the home premises, as above.
• Movement history of vehicles	• Movement to other premises increases the probability of contamination.
• Cleansing and disinfection of vehicles	• FMDV is very sensitive to approved disinfectants and good biosecurity will reduce risk of virus transfer via fomites such as personnel, vehicles and equipment.
• Length and duration of journey, number of stops and proximity of route to premises with FMD	• Longer journeys, multiple stops and proximity of the route to premises with FMD increase the risk of vehicles becoming contaminated *en route*.
Likelihood that people are contaminated (walkers, climbers etc.)	
• Recent contact with infected livestock	• Risk is greatest if people have had contact with infected animals, and next greatest if they have been to premises with FMD. • The likelihood and amount of contamination varies with species, stage of infection, degree of contact and cleansing and disinfection.
• Occupation	• Likelihood and amount of contamination increases with potential occupational exposure to FMD (e.g. farmer, vet).
• Cleansing and disinfection prior to arrival	• Risk of contamination decreases if clean clothing worn and cleansing and disinfection of outerwear has been undertaken.
• Presence of other non-susceptible animals	• People may also bring dogs, which may be contaminated with FMDV. The likelihood of contamination is similar to people and will be highest if dogs have had access to infected livestock.
Likelihood that equipment is contaminated	
• Previous use in contaminated areas without cleansing and disinfection	• There is a risk of transmission through equipment such as climbing gear that has been used in other areas and become contaminated. The risk is reduced by ensuring equipment is cleansed and disinfected before arriving at the area where the activity is taking place.
Infection source: **A2 Roads/environment are contaminated with FMDV**	
• Proximity to premises with FMD, presence of undetected or incubating infection, stage of outbreak, strain differences	• Roads close to premises with FMD represent the highest risk.
Infection source: **A3 The area in which the activity is conducted is contaminated with FMDV**	
• Proximity to premises with FMD, extent and timing of movements of susceptible animals from or close to premises with FMD and stage of outbreak	• See A1.
• Presence and density of susceptible livestock at the	• The risk that the environment is contaminated is greatest

location where the activity takes place	if livestock with undetected infection are present in the area. • Since FMDV can survive in the environment, risk is also increased if the area has been used for grazing livestock within the last month (longer if cold weather).
• Level of use of land where activity takes place	• The risk that the environment is contaminated increases with increasing level of use.
• Wildlife in locality	• In other parts of the world, wildlife can play an important role in FMD transmission (Ward *et al*. 2007). • 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). • However in Western Europe post-outbreak serosurveys and diagnostic testing of animals with suspicious clinical signs have never revealed positive animals (Elbers *et al.* 2003, Mouchantat *et al.* 2005) and there is no evidence that deer or boar have played a role in FMDV spread in UK. • The density of wild boar in the UK at present is likely to be too low for boar to be of importance in transmission (Hartley 2010). • The risk of disease spread through infected deer or wild boar is therefore negligible, but this risk could change if ecological factors change, such as deer and boar densities or contact patterns. Ideally risks should be assessed using up-to-date information for a specific location. • Other species can be infected, such as hedgehogs, but are unlikely to be important in transmission. • Wildlife can also move FMDV mechanically if they become contaminated (for example scavengers such as seagulls, crows or foxes). • Overall, the risks of further spread of FMDV associated with wildlife are very low but any activity which causes disturbance to wildlife does increase this risk, especially close to premises with FMD.
• Meteorological conditions	• Favourable conditions will increase the probability of survival and thus probability of contamination being present. • FMD can survive on pasture for a few days in hot weather, and up to 2 to 3 months in bovine faeces at 4^{o}C. Survival duration increases with decreasing temperatures, increasing relative humidity and presence of organic material and varies with virus strain (reviewed by Bartley *et al.* 2002).
Risk of transmission: **B1 Persons, vehicles, dogs or equipment that were already contaminated, or become contaminated *en route*, contaminate the area where the activity takes place**	
• Contact between vehicles and susceptible livestock	• Movement of vehicles onto land where susceptible livestock are or will be present increases the risk of transmission if vehicles are contaminated. This can be reduced by ensuring cars are parked on hard standing in areas that susceptible livestock do not access. • Cleansing and disinfection of wheels and undercarriage can eliminate the risk if done properly but this is unlikely to be achievable for all people accessing the countryside.
• Number of people involved	• Higher numbers increase the risk that some will be contaminated.

• Number of contaminated personnel and vehicles	• Increasing numbers increases the total probable amount of FMDV that would be released, if present
• Proximity of the area where activity takes place to susceptible livestock	• The greatest risks are associated with the presence of susceptible livestock in the area where the activity is taking place. • Susceptible livestock on adjacent premises are also at increased risk. • Since FMDV can survive in the environment, there are also risks for livestock which are later moved onto to an area where contamination has been introduced. • If the activity is taking place in areas which are not agricultural land and are never used for grazing susceptible livestock or growing feed or bedding for susceptible livestock, the risks are negligible.
• Contact between people and susceptible livestock	• Any potential contact with susceptible livestock increases the risk of transmission.
• Distance covered	• The potential area that could be contaminated increases with the distance covered by the activity.
• Unrestrained dogs	• If dogs have access to susceptible livestock, or by covering larger distances are able to access contaminated areas, there is an increased risk that they will contaminate an area with FMDV or become contaminated. • Dogs may also disturb wildlife, increasing the risk of virus dissemination by infected or contaminated wildlife.
• Cleansing and disinfection on arrival	• FMDV is very sensitive to approved disinfectants and good biosecurity will reduce risk of virus transfer via fomites such as personnel, vehicles and equipment. • Disinfectant foot baths can be effective at reducing contamination, as long as foot wear are also cleaned and disinfectant is regularly replenished. Ensuring any equipment is clean also helps to reduce risks.
Risk of transmission: **B2 Persons, vehicles, dogs or equipment are contaminated during activity and transfer virus to other uninfected areas visited during the activity**	
• Contact with susceptible livestock or contaminated areas, number of people, size of group, unrestrained dogs	• See B1.
• Distance travelled and number of premises covered	• See B1 plus if the activity takes place on land comprising more than one premises, there is an increased risk of transferring FMD between premises.
Risk of transmission: **B3 Contaminated persons, vehicles, dogs or equipment cause contamination of roads or the environment leading to new premises to becoming infected**	
• Failure to disinfect vehicle, personnel and equipment before outgoing and return journey	• Appropriate cleansing and disinfection reduce risk of contamination.
• Length and duration of journey, number of stops en route and proximity of route to susceptible animals	• Longer journeys and multiple stops increase risk of contaminating roads or environment. • Proximity to high densities of susceptible animals increases risk of disease outbreak if contamination does occur.
Risk of transmission: **B4 Persons, vehicles, dogs or equipment are contaminated *en route* to or from or during activity and transfer FMDV to their home premises when they return home**	
• Presence of susceptible livestock at home premises	• Direct or indirect contact with susceptible livestock provides opportunity for transmission, if contamination is present.
• Failure to disinfect vehicles, personnel and equipment before entering the home premise	• Appropriate cleansing and disinfection reduce risk of contamination.

6. CONSEQUENCE ASSESSMENT

Spread of FMD to uninfected premises.

7. RISK MANAGEMENT OPTIONS

The movement of people (and other non susceptible animals) to, from and during walking, rambling, climbing and similar activities does carry a risk of indirect spread of FMD via fomites to uninfected farms. Indirect transmission of FMDV via fomites is an important source of infection, and any vehicles, people, equipment etc which come into contact with FMDV, risk passing disease to any livestock they come into contact with. However there is little information on the real importance of countryside access in FMD spread, meaning it is difficult to quantify this risk accurately. The risks associated with access to the countryside during an FMD outbreak are predominantly influenced by the likelihood that people will already be contaminated or that they will come into contact with contaminated land or infected but undiagnosed livestock whilst in the countryside. The highest risks are therefore associated with people who have had contact with infected livestock, or people who come into contact with livestock whilst walking. The risks are higher in the PZ and to a lesser extent to SZ, since there are likely to be undetected premises with FMD, and people and other fomites are more likely to have come into contact with infected livestock. An additional factor in Scotland is that access is not limited to paths or specific areas, and there are likely to be more opportunities for people to come into contact with livestock, wildlife and contaminated areas.

Potential risk management options:
(i) Do not permit access to the countryside for walking and similar activities.
(ii) Do not permit walking and similar activities in areas where the risk of FMDV being present is greatest (ie in a PZ or SZ at any time, in early stages of an outbreak, or over agricultural land where susceptible livestock are present).
(iii) Permit walking and similar activities from the early stages of an outbreak but under certain conditions such as:
a) Confine walking and similar activities to non-agricultural land.
b) Allow walking and similar activities on agricultural land, but take precautions to limit the risk.
c) Prevent or discourage access to the countryside by those who keep or handle susceptible livestock in the course of their work, and so are most likely to have been exposed to and contaminated by FMDV.
d) Permit access but encourage people to meet certain conditions such as wearing clean clothing and footwear, and ensuring any equipment is clean, so that they do not introduce infection to an area.

There is no veterinary justification for automatically preventing access to the countryside at a GB or Scottish level. Real risks remain, particularly close to premises with FMD, but the risk is very low at larger distances from premises with FMD, particularly once the early stage of an outbreak have passed and the risk of undetected infection has reduced.

The risk is:

	PZ	SZ	RZ
With no mitigation measures	medium	medium	low
With mitigation measures below	medium	low	very low

These risk levels were 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

The risk levels given in section 7 assume that the follow risk mitigation measures are followed:

(i) Ensure that people have not handled or been in contact with susceptible livestock before or during their activity. Enforcement of such a condition is not practicable but it is reasonable to suppose that most people will respect the interests of the community at large by taking precautions which will minimise the risk of spreading FMD.

(ii) Publicise and seek the co-operation of people in observing the following precautions:
a) Participants should not have visited an infected premises or any premises within the PZ where susceptible livestock are kept within the past 7 days;
b) Start activity wearing clean footwear and clothing;

c) Ensure any equipment is clean before starting activity;
d) Park vehicles on areas of hard standing and avoid any contact between vehicles and areas where livestock are present;
e) Choose routes which avoid agricultural land and particularly areas where livestock are present. This should be followed at all times in the SZ, and followed where possible in the RZ;
f) Do not approach, and never touch or handle, livestock;
g) Do not walk/cycle with dogs, even on a lead, where there may be cattle (because cattle are curious and approach dogs, and it may then be impossible to avoid contact with them);
h) Use any disinfectant footpads or baths which the landowner provides.

9. SOURCES OF EXPERT ADVICE

This VRA included information from the following VRA:
VRA 2001 #4 (AHVLA) "What is the risk of causing new outbreak of FMD if footpaths are open to the public?"
Dr A I Donaldson, Dr L Kelly, K C Taylor, Dr M Wooldridge

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12. NOTES

None