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FOOT AND MOUTH DISEASE REAL-TIME TRAINING IN NEPAL

By Dr Andrew Hansen



In June of this year, I attended a Real Time Foot and Mouth Disease Training course in the Kathmandu valley of Nepal. The Department of Agriculture, Fisheries and Forestry (DAFF) commissioned the Food and Agriculture Organisation of the United Nations (FAO) to deliver foot and mouth disease (FMD) training tailored for Australian veterinarians and stock handlers. These are the people most likely to be confronted with and needing to be able to identify the disease if it should enter Australia. The courses provided a real experience in identifying FMD, implementing biosecurity strategies and conducting initial disease investigations and, as a result, increasing the likelihood of early detection of FMD in Australia as well as a response capability.

FMD can spread rapidly if detection is delayed. This could seriously amplify the scale and duration of an outbreak, the losses that are experienced and the nation's ability to recover.

The course gives attendees first-hand experience dealing with animals infected with FMD, increases their ability to identify the disease clinically and, by ageing lesions, tell how long the disease has been present in an infected animal. This narrows down the likely source of infection.

FMD is endemic in Nepal. It is a disease causing loss of production and rarely death in adult animals. Milk production, from cattle, buffalo and goats in Nepal, falls dramatically and usually does not return to post infection volume after recovery. Vaccination is available but duration of immunity is only about 6 months and although cheap by our standards, the farmers are very poor. So, farmers live with the disease. A government vaccination programme is operating in eastern Nepal.



I attended as a private veterinarian and representative of the Australian deer industry, along with nine other vets from both government agencies and private practice. We were joined by a number of veterinary colleagues from the Nepal. Other courses in the series included stock handlers and industry representatives.

The course is designed to equip attendees to raise disease awareness to those who observe animals regularly as part of their daily animal production management activities.

Over five days we were brought up to date on the latest knowledge of FMD - worldwide significance, vaccination, diagnosis, laboratory testing, but most importantly we were able to examine clinical cases of FMD in cattle and buffalo (observing bio-security protocols), take samples for laboratory diagnosis and interview farmers in the area of the outbreak we investigated. Wearing a PPD suit with double gloves, gum boots and hood in a Nepalese summer was demanding. Foot and Mouth Disease is an acute, highly infectious vesicular disease affecting cloven-hoofed animals, including deer. In Australia it is a notifiable disease and state authorities must be notified on suspicion of the disease. Early detection is critical to minimise spread, maximise the likelihood of control and early recovery and to minimise losses, costs and impacts. FMD is caused by a virus of the Picornoviridae family.

There are seven distinct serotypes of the FMD virus-A, C, O, Asia 1, SAT1, SAT2 and SAT3. Infection with one serotype does not confer immunity to infection by a different serotype, nor does vaccination protect across the serotypes.

The route of infection can be by direct contact with infected animals, contaminated animal products or by airborne virus. Ruminants are usually infected via the respiratory system, where a very low dose of virus can initiate infection. Ruminants are seldom infected by ingestion whereas this is the main route of infection for pigs. However, once infected, pigs become major generators of infected aerosols, liberating vast quantities of airborne virus in their expired breath, and are thus an important source of infection to ruminants.

The virus can spread long distances by air but this is not as common as other methods of spread such as movement of animals and contaminated material, or humans carrying the virus on clothing, skin or equipment. All species can be infected through non-intact skin and mucous membranes.

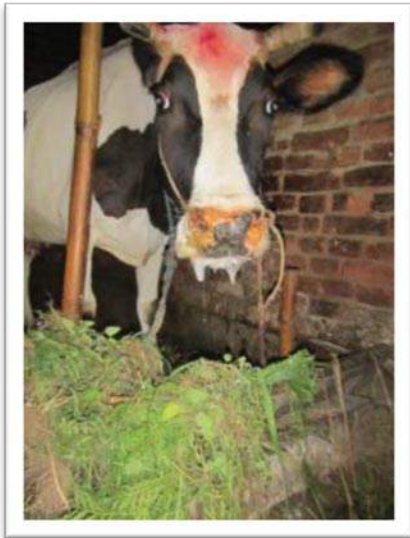
The incubation period varies from 2-14 days, usually 2-5 days, but may be as short as 24 hours. Excretion of the virus can begin up to four days before clinical disease and usually ceases 4-5 days after appearance of virus vesicles. All secretions and excretions - breath, milk, semen, faeces, tears, saliva and urine are infective, as are all body tissues during the acute phase of the disease.

The virus may persist in ruminants, and up to 50% of cattle become carriers for up to 3.5 years, sheep 9 months and goats up to 4 months. Virus excretion from carriers is intermittent, low level and declines over time. Infection from these carrier animals is rare. Virus survival decreases with increasing heat and decreasing humidity. The virus is susceptible to small changes in pH – below pH 6.5 or above 9.

Virus survival in the environment

Hay/straw	Up to 20 weeks
Cow hair	4 weeks at 18-20°C
Dry faeces	14 days
Urine	39 days
Slurry in winter	6 months
Soil in summer	3 days
Soil in autumn	28 days
Snow covered soil	185 days

Clinical signs vary with species. In cattle, signs are fever, depression, loss of appetite, loss of condition, salivation, nasal discharge, fall in milk yield, lameness and the appearance of vesicles on the gums, tongue, nares, inter-digital spaces and coronary band. Deaths in calves from myocarditis can occur. Ageing of vesicular lesions is important to determine when infection occurred, and thus help trace the source of infection.



In cattle the first signs
Noticed are usually
Lameness and stringing
Drools of saliva caused
By mouth lesions.



Day one of lesions.
Blanching of the epithelium
followed by formation of
vesicles.



Day 2. Vesicles rupture
with raw epithelium.
No deposition of fibrin.



Day 3. Lesions start to lose
their sharp demarcation
and bright red colour.
Deposition of fibrin starts.



Day 7. Extensive scar formation and healing has occurred. Some fibrin is still present.



Lesions also occur on the feet and teats. Foot lesions can be overgrown with bacterial infection and resemble footrot, as seen in the pictures above and below.

In Australia, the disease most likely to be confused with FMD is Three Day Sickness (Bovine Ephemeral Fever), which presents with fever, drooling, fall in milk production, lameness but without mouth and feet vesicles and with rapid recovery.

In pigs, initial signs are depression, lameness, inappetance. Foot lesions are the most obvious with some pigs exhibiting acute lameness sometimes with shedding of the hoof wall. Pigs may “dog sit” due to foot pain. Mouth lesions are hard to observe in pigs. Vesicles can form on snout and tongue. Piglets die from myocarditis.

In sheep, FMD is a mild to sub-clinical disease and difficult to detect. Lesions are located on the dental pad, tongue and coronary band with lameness, fever and depression. FMD in Australian sheep could easily be confused with other foot conditions. Lambs may die from myocarditis and ewes may abort.

Deer infected experimentally may not show symptoms for 2-20 days, and may not show outward signs of disease such as dribbling and lameness. The disease in deer in most cases is mild or sub-clinical. Some deer are found dead. Small vesicles develop on the tongue, gums, dental pad and inside of lips, inter-digital skin and heel bulbs. In an outbreak of FMD in cattle in California in 1924-25, feral deer were also affected and 22,000 killed. Deer would certainly be included in any FMD response in Australia, and attention would be drawn to feral herds of deer.

FMD is by far the most significant biosecurity threat to Australia's livestock industries. An outbreak would have devastating consequences to our community in lost production, trade and tourism as well as social disruption due to movement restrictions and response activities. Not to mention the heartbreak of mass destruction of susceptible species necessary to contain an outbreak.

The 2001 outbreak in the United Kingdom cost an estimated \$AU 19 billion. The 2010-11 Korean outbreak cost about \$US 2.7 billion.

ABARES, in 2011, estimated a small (i.e. controlled in 3 months) FMD outbreak in Australia would cost the nation \$AUD 7.1 billion, while an outbreak lasting more than 12 months, approximately \$AUD 16 billion. For comparison, the 2007 Equine Influenza outbreak cost the Australian government \$342 million. Loss to the equine industry is not included in this sum. As an example, the Australian Harness Racing Industry estimates total losses at \$23.8 million. This was an emergency animal disease outbreak confined to two states, animals were not slaughtered, only one species was affected and with little effect on export markets.

The response to an outbreak in Australia would be conducted in accordance with the AUSTVETPLAN FMD Strategy Manual. The policy is to eradicate FMD in the shortest possible time, while limiting economic impact, using a combination of strategies such as a stock standstill, pre-emptive destruction of susceptible animals, tracing, surveillance, disposal of destroyed animals and a public awareness campaign. The use of vaccination would certainly be considered. It would however delay Australia regaining free status and access to markets.

The greatest risk to Australia is the illegal, or inadvertent, importation of FMD virus infected material. This is a risk that has increased greatly with the boom in international air travel. Along with this is a growing disregard for authority, and a disconnect between urban dwellers and food producing Australia. Improving the awareness of travellers, plus effective border security is essential. How many travellers disregard the quarantine laws? During the 2010 Korean FMD outbreak, a Queensland man was convicted and jailed for the illegal importation of meat products! How many people think that a “yes” to the “have you been on a farm” question on the entry form is an impost that would delay their progress through immigration?

However, in a country like Nepal, or Namibia or Tibet, FMD is endemic and everywhere in the countryside should be regarded as a farm. How many hiking boots recently returned from an endemic country carry FMD virus between the treads, waiting to meet a pig on a visit to a neighbouring farm. Remember, the virus survives 14 days survival time in dry faeces.

People who are in contact with animals on a daily basis are on the frontline. Early recognition and reporting of Foot and Mouth Disease is essential. If you have a suspicion of FMD, the Emergency Animal Disease hotline is 1800 675 888.



Marijuana is also endemic in Nepal.