Foot and Mouth Disease
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Introduction
Foot and mouth disease (FMD) is an acute, highly contagious viral disease of domestic and wild cloven-hoofed animals (ungulates). The disease is characterised by the formation of vesicles (fluid-filled blisters) and erosions in the mouth and nostrils, on the teats, and on the skin between and above the hoofs. FMD may cause serious production losses and is a major constraint to international trade in livestock and their products. It does not occur in Australia.

Economic significance
Because an outbreak of FMD in Australia would result in the closure of most of our meat, dairy and wool export markets until the outbreak was eradicated, the social and economic costs of an FMD outbreak in Australia would be huge. Herds and flocks would be destroyed and sales of animals and animal products restricted until the disease was eradicated which would be devastating for individual farmers. Unlike the United Kingdom or South Korea, Australia is a major exporter of livestock and livestock products so the impact of an FMD outbreak would be catastrophic for our economy.

The Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) recently costed a small scale three month outbreak at $7.1 billion while a 12 month duration large scale outbreak was estimated to cost $16 billion. The UK outbreak in 2001 is estimated to have cost the UK economy about $10 billion while the recent outbreak in South Korea resulted in destruction of 25% of the national cow and swine herd.

What causes FMD?
FMD is caused by a virus of which there are 7 serotypes: Types O, A, C, SAT1, SAT2, SAT3 and Asia 1. Infection with one serotype does not offer any cross protection against another serotype. Within these serotypes there are over 60 strains which vary in the level of cross protection they offer against other strains, depending on how immunologically similar they are.

The practical implication of this is that vaccines usually have to be manufactured to match the specific FMD serotype and strain causing the outbreak.

Which species are affected?
Most cloven footed animals are susceptible to FMD infection including both domestic and wild animal species. FMD does not affect humans, horses, or companion animals such as dogs and cats. Cattle, sheep, goats, pigs and buffalo are the usual domesticated livestock species affected while more than 70 species of wildlife can also be infected experimentally. Species vary between each other in their susceptibility to infection, the clinical signs displayed and their ability to transmit infection. For instance camels, alpacas and llamas would need to be considered in an FMD outbreak but appear somewhat resistant to field infection. Deer also vary between species in their susceptibility but clinical cases have been seen in some outbreaks.

Generally wildlife become infected from contact with infected livestock and have only rarely been implicated in spreading infection. The exception is in Africa where African Buffalo can be long term carriers of FMD virus and have played a role in spreading infection throughout sub Saharan Africa. Australian native species have been tested for susceptibility to infection and are regarded as unlikely to be involved in the spread of FMD. However, feral pigs, goats and camels would pose a major risk for spreading FMD.

What are the symptoms?
The symptoms can vary from mild to severe. Blisters or vesicles developing on the feet, mouth and teats which rupture leaving raw ulcers are the most characteristic lesion. Lameness, excess salivation and fever are often seen. However as mentioned earlier the clinical expression of infection varies between species according to the dose and strain of the virus. For instance some O
strains have caused barely noticeable illness in cattle and buffalo while causing classical severe illness in pigs in contact with infected stock. Sheep and goats generally show fairly mild signs when infected which may be missed if not examined carefully. Because the disease is very contagious the number of animals in a herd that become infected may approach 100%, but deaths are unusual except in young animals.

The incubation period can be as short as 24 hours or as long as 14 days and varies between species and the dose and strain of the virus involved in the outbreak.

**Figure 1:** Blisters in the mouth causing excess salivation

**Figure 2:** Ruptured vesicle on the snout of a pig

**Figure 3:** Ruptured vesicle on tongue of a cow

**Figure 4:** Typical feet lesions on the coronet and interdigital area of the hooves

How long does the virus persist in the environment?

Under cool moist conditions the FMD virus can survive for up to 6 months. The virus does not survive for long in hot dry conditions. It can survive for extended periods in hides, some dairy products, and in chilled, cured or salted meats. The strict quarantine conditions on bringing animal products into Australia are in part to protect against the introduction of FMD virus in these types of products.

How is it spread?

Infected animals shed the virus in expired air, urine, faeces, milk, saliva and semen and the virus can be shed by infected animals for up to 4 days before any symptoms are noticed. Indirect transmission of infection can also occur when vehicles, clothing, hands or feedstuffs get contaminated with the virus and then come in contact with susceptible animals. Windborne spread can occur and has on several occasions
caused transmission of the virus over significant
distances.

The various ways FMD virus may be spread and
the high level of contagiousness make it one of the
most feared animal diseases. In the UK outbreak in
2001 the movement from saleyards of infected
sheep before they displayed any symptoms
resulted in the spread of infection very rapidly
throughout the country and vastly increased the
size of the outbreak.

Spread of FMD by feral animals is a major risk in
Australia. There are large populations of feral pigs,
goats and camels in many areas of Australia and
FMD would be difficult to eradicate once it got
established in feral animals.

Where does it occur in the
world?

FMD is endemic in many parts of Africa, Asia,
Eastern Europe, the Middle East and South
America. It is not present in Indonesia or New
Guinea nor in the South Pacific islands. Both
Australia and New Zealand are free from FMD.

How would FMD get into
Australia?

Feeding food refuse (swill) to pigs is thought to
have started the FMD epidemic United Kingdom in
2001. New South Wales and all other Australian
states and territories have strict laws that prohibit
the feeding of food scraps or refuse to animals. To
help avert the establishment of FMD and other
diseases in Australia, it is important to prevent pigs
(including wild pigs) from gaining access to food
scraps. Rubbish tips and ports are monitored
regularly to ensure that food scraps do not end up
being fed to livestock.

Importing or carrying FMD contaminated food
products is the most likely route for FMD entry in to
Australia. The widespread availability of
international air travel has increased the risk of
FMD contaminated products entering Australia.
Australia has strict quarantine requirements to
mitigate this risk.

What action would occur in
Australia if FMD was to occur?

Australia has nationally agreed response plans for
animal emergency diseases such as FMD called
AUSVETPLANS. For an FMD outbreak the
response would focus on stopping the spread of
infection by:

- controlling the movements of animals and their
  products by quarantine;
- using strict hygiene procedures when working
  with animals and their products;
- slaughtering infected and at risk animals; and
- strategic vaccination using strain specific
  vaccines.

The National Livestock Identification System
(NLIS) would play a key role in tracing animal
movements rapidly as speed is the key to limiting
the spread of FMD. It would be important to not
allow infection to get established in feral animals
as that would make eradication more difficult.

Reporting possible FMD

Early diagnosis is the key to controlling FMD.

If you suspect FMD you should immediately notify
in one of the following ways:

- Call the emergency animal disease hotline –
  1800 675 888 – which is monitored 24 hours a
day, or
- Phone a Livestock Health and Pest Authority
  (LHPA) District Veterinarian or Ranger, or a
  NSW Department of Primary Industries (NSW
  DPI) veterinarian or regulatory officer.

Every year vets investigate a number of suspicious
disease cases where the clinical signs are serious
enough to warrant samples being sent to the
Australian Animal Health Laboratory (AAHL) at
Geelong for FMD exclusion.