

Foot and Mouth Disease session: Summary of papers at the NADVet Conference, Austin, Texas, 19-20 Feb, 2002

C Mackintosh

Abstract

Three speakers, John Fletcher, Ken Waldrup and Paul Gibbs, presented different perspectives on the recent foot-and-mouth disease (FMD) outbreak in Britain, especially as it related to deer and the implications for an outbreak of FMD in the USA.

The UK outbreak started in February 2001, rose to a peak of 50 new cases a day, and ended in September. Over 4 million animals were killed and disposed of, usually by burning. There were two major factors that increased the severity of the outbreak: it was at least 2 weeks before the outbreak was first detected and infected animals were sold through the biggest market in Europe at the busiest time of year.

Farmed deer: A well known deer farm deer farm in Cumbria, which had fallow, sika, Pere David's and red deer, had a number of deer develop suspicious clinical signs. A sika deer stopped eating, was salivating, drinking, trembling and had a vesicle in its mouth. Samples were taken but were negative. There were four similar cases, all of which were negative to tests. No decision was made until FMD was found in cattle and sheep on neighbouring farms and then all the deer were killed. All samples were negative and serology was negative.

Wild deer: A number of deer were found dead with suspicious lesions, and 50 samples were collected from these wild deer and all were negative to the ELISA test.

Based on previous experimental studies a decision was made to do nothing with the wild deer, but to treat farmed deer like livestock.

***Experimental infections:** Five free-living species of deer found in the British countryside (red, fallow, roe, sika and muntjac) were found to be susceptible to infection with foot-and-mouth disease (FMD) virus after exposure to diseased cattle. Clinical disease was typical and severe in the roe and muntjac deer, less severe in the sika deer, and usually subclinical in the fallow and red deer. Each species transmitted disease to its own species and to cattle and sheep. The carrier state in red, fallow and sika was similar to sheep. It was concluded that wild deer would be unlikely to cause significant transmission of the virus to domestic livestock in an FMD epidemic.*

If FMD hits the USA, vaccination would only be practicable in a limited outbreak in a limited area because there are only 2 million doses in stock. Diagnostic samples would be sent to Plum Island for confirmation. A "dipstick" test is being evaluated.

FMD and the involvement of deer; lessons from the 2001 epidemic in the UK

*Paul Gibbs, Professor of Virology at College of Vet. Med. University of Florida.
(Paul worked at Pirbright in the 1970s and experimentally infected deer with FMD)*

Background on FMD outbreak in the UK.

The Scale of Sheep Movements:

- Prestwick farm sold 16 infected sheep at Hexham market on Feb 13
- Two dealers and a local butcher bought the sheep.
- One dealer then sent 10 sheep for sale to Longtown Market in Cumbria on Feb 15.
- At Longtown from Feb 14 to Feb 23 at least 24,500 sheep were sold to 181 purchasers. Most before FMD was known to be in the country.

Where did it come from?

- Suspected to be from swill feeding and illegal meat imported to UK

- 200 illegal international consignments of meat intercepted in UK per month
- 730 tonnes as hand luggage annually
- 67 tonnes in containers annually

Epidemiology of FMD

- Pigs are amplifiers, cattle indicators, and sheep silent spreaders
 - Infected pigs excrete \log_{10} 6.3 virus particles/30 min
 - Cattle excrete \log_{10} 3.9 virus particles/30 min
 - Sheep excrete \log_{10} 4.0 virus particles/30 min
- Pigs relatively resistant to aerosol but susceptible to oral route
- Cattle are 10 times more susceptible than sheep and 100 times more than pigs
- FMD: fast moving disease
- Transmission is by mainly aerosol, once fomite and animal movement is controlled
 - Controllable - food, excreta, saliva, milk, people, vehicles
 - Uncontrollable - wind
- Ruminants can become carriers
- Incubation is 2-14 days
- Prodromal virus excretion
- Virus titer 10,000,000 tissue culture infectious doses/ml in vesicular fluid.
- Aerosol infective dose for cattle ~ 10 tissue culture infectious units
- Relatively fragile virus; stable for days rather than months
- Cattle, sheep and pigs differ in their susceptibility to infection with FMD virus
- Effect of species and number of animals excreting FMD virus on the risk for different species downwind
- Wildlife can become infected

What is our knowledge base?

- The 1967-68 FMD Epidemic in the UK
- Infection of Deer with FMD Virus in 1970's at Pirbright, UK
- Involved 5 species found free-living in UK
- Red, fallow, roe, muntjac and sika
- Series of experiments involving needle injection and natural exposure
- Clinical disease developed after natural exposure to cattle in all 5 species
- Severe disease in small species (roe and muntjac)
- Transmission to same species deer, cattle & sheep
- Carrier state in red, fallow and sika similar to sheep
- (Gibbs, E.P.J., Herniman, K.A.J., Lawman, M.J.P. and Sellers, R.F. (1975). Foot and mouth disease in British deer. Transmission of virus to cattle, sheep and deer. Vet. Rec., 96, 558-563)

Comments Relative to Disease Control

- Only the red, fallow and sika form herds in the wild and none of the 5 species is likely to come into close contact with domestic livestock, except in some areas of common, unfenced grazing, such as the New Forest in Hampshire.
- In conclusion, the natural behaviour of *free-living* deer in the UK suggests that, while all 5 species studied are susceptible to FMD, they are unlikely to be an important factor in the maintenance and transmission of virus during an epidemic of FMD in domestic livestock.
- If FMD were to be confirmed in *free-living* deer, any attempt to control the disease by culling should be carefully reviewed to avoid dispersion of infected animals to uninfected areas.

Conclusions regarding deer and the FMD epidemic of 2001 in the UK

- Clinical suspicion that FMD occurred in deer in UK in 2001 FMD outbreak, but no laboratory confirmation
- Geographical distribution and populations of deer have increased significantly in recent years. Deer farming is established
- Lack of any proactive policy by DEFRA. No surveillance information available upon which risk analysis can be based.