

# Foot and Mouth Disease - Know your enemy!

## Wildlife Information Network WildPro sponsors CD and website on FMD

The dreaded foot-and-mouth disease has been creating havoc in the agricultural, zoo and any other animal-based industry in UK since February 2001 and cases are being reported still. UK zoos closed down for months and as all of them depend on their visitor attendance for funds, the effect has been devastating. Many zoos lost as much as a million pounds each in gate receipts. Even now some exhibits are not open to the public and furious visitors from certain heavily infected areas are being turned away. This is a small price to pay when weighed against the cost of loss of a zoo's animal collection however. Animals in a zoo are priceless ... some species cannot be valued as no amount of money could replace them.

Down to Earth Magazine (DTE) reported in March (Vol. 9, No. 21, March 3', 2001, page 11) that Pakistani vets said that thousands of imported animals showed symptoms of the disease. DTE also quoted an ICAR research paper which estimated direct losses due to the disease to be more than 1,500 - 2,000 crore per annum. Yet Indian officials from the most important agricultural institutes in the country do not admit that the disease is a threat, as reported by DTE. This is the kind of "head in the sand" attitude which takes place so frequently in Indian officialdom and could lead to disaster.

Zoos, rescue centres, breeding centres in India would do well to become familiar with the disease and take steps to prevent its spread.

The Wildlife Information Network WIN, a UK based animal charity with which our regular readers would be quite familiar, has developed a website module on FMD with a vast quantity of material. The WIN website is a membership website but if you access the home page, all information on FMD is available to anyone. Please check it out. There is some information which may not apply here but also much that is valid anywhere in the world.

This disease could be particularly devastating in India where culling to prevent spread of the disease may not be permitted due to religious sentiments and political sensibility.

For South Asian zoos which do NOT have internet access, Wildlife Information Network has provided Zoo Outreach Organisation with 100 free CD's containing all the material in the FMD module. We are currently sending these to major zoos, wildlife vets that we know and some animal welfare organisations.

If any zoo or vet wants this CD please write to us with your request. A CD may be on its way to you but if you are particular to have one, write anyway. We do not have a special fund to distribute these and do not plan to send them by registered post. If you would like your copy sent by registered post, please send Rs. 20 in stamps along with your order.

In this issue we have included a couple of sample articles and illustrations of the site.

As you read this material, you may think it is only for the European Union and not for you. It has been included here

very deliberately because the danger in India is that, for example, zoos would NOT be closed for fear of political reaction from complaining visitors ! and other measures take also.

Indian zoos – including and especially policy makers in the Indian zoo context vide meeting on sanitation and hygiene in the last Indian Zoo Directors' meeting in Visak earlier this year -- resist suggestions for imposing effective sanitation standards on their keepers. Why ? Perhaps for economic reasons or fear of keeper and union reaction -- it is not known by this observer. It is a mystery.

Indian keepers sometimes live with their livestock. Many keepers are said to own livestock. For a zoo, one of the first steps in insuring control of contamination of disease via livestock should be to establish an effective (emphasis on effective) sanitation protocol for keepers. This means, in part, insuring that keepers do not work in the same clothing they wore to the zoo from home, or the same clothing they wore in the zoo the previous day, and without taking a bath both before and after work with an effective bacteria soap. This would not be excessive during any period but during times of disease lurking around, it is crucial. This means, of course, that keepers need a place to dress and clean up both before and after work. This is a good facility for keepers demonstrating the zoo's care for them as well as for the animals because zoonoses contracted while in the zoo are as dangerous to them, their families and their livestock as the diseases they might bring into the zoo.

This view will not be popular but it needs saying.

*Sally Walker, Editor Emeritus*



Could we do any of these things in India if FMD or some other disease broke out? Temporary workers engaged to disinfect every car coming into Knowlsey Safari. Sign requesting people living in infected areas not to enter the park. The zoo was closed, as were most English zoos, for months due to FMD.

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This document was produced by the Ministry of Agriculture, Farms and Fisheries FF as a specific response to the FMD outbreak in the UK in 2001 and was made available on their website. Risk Assessments and specific recommendations related to the conditions in the field at the time and should be viewed in this context as they may not be applicable to outbreaks occurring under different circumstances. The information is replicated directly and unabridged with the kind permission of the Ministry of Agriculture, Farms and Fisheries, UK. Further information may be found on <http://www.maff.gov.uk/>

## FMD: Advice and precautions for zoos, wildlife parks etc

This advice is based on consideration and assessment of problems faced by zoos and wildlife/safari parks in UK and updates some information distributed in February.

Most conventional zoos in UK are now open or about to open. There is no statutory requirement that zoos and wildlife parks should be closed to the public, unless they have a confirmed or suspected outbreak of the disease. If this does occur, or if an outbreak occurs in a neighbouring area, appropriate veterinary advice on epidemiological risk should be sought. Opening a zoo may increase the risk of introducing infection but the risk can be minimised by the application of precautionary measures. The question of opening is essentially one for the judgement of the individual enterprise. This note sets out the main risks and ways of managing them.

### Animals at Risk

Some animal species kept in zoos and wildlife parks are susceptible to foot and mouth disease. These include cattle, sheep, goats, and other ruminants, swine and elephants. Although zoo and park animals have no direct contact with farmed livestock, (*Editor's note: this is NOT true in India where keepers frequently own livestock and handle it on a daily basis*) they are still at risk of becoming infected.

For example, infection could be introduced to the zoo by

- Personnel, particularly those who handle susceptible animals
- Airborne spread from an infected farm. Infected pigs, in particular, excrete enormous amounts of virus. The virus plume which results can spread infection over considerable distances, depending on meteorological conditions and topography. The nearer the premises is to a confirmed case of FMD, the greater is the risk of contracting infection
- Infective material carried on inanimate objects or by visitors to the zoo or the wildlife park
- Contaminated food

### What can be done to reduce the risk?

All zoos and wildlife parks should implement measure to minimise the risks to susceptible animals in their collection. The best measures to take will vary according to layout, organisation and geographical situation, but the following should be considered.

### Staff working at the zoo or park

- They should not live on premises on which there are FMD susceptible animals, or handle such animals outside the zoo/park. This is particularly important for staff who look after susceptible animals in the collection.
- They should wear footwear and clothing provided by the zoo/park which never leaves the premises other than to be laundered.
- They should be familiar with the signs of FMD, aware of the importance of quick action if they suspect disease and know who to contact at any time of day or night
- They should be aware of the precautions visitors are asked to take and authorised to enforce them.

### Visitors

- They should be segregated from susceptible animals and their access should be prevented to any land, which will also be used by those animals.
- They should be prevented from having any direct contact with animals. Enterprises or parts of enterprises which promote direct contact - e.g Children's Zoos, Animal Corners, may have to be closed and animal rides and displays discontinued.

- Areas of the zoo/park where susceptible animals are kept might be closed to visitors.
- Visitors should be encouraged to disinfect footwear and wash hands on arrival, using facilities provided by the zoo/park.
- They must not feed animals in the collection, or leave food anywhere except in receptacles provided by the management which are regularly emptied.
- They must not be allowed near to susceptible species. Any cafés or picnic areas which are near to such livestock enclosures should be shut.
- If cars drive through areas where there are susceptible livestock (e.g. in a safari park) disinfection would be a useful precaution

**Susceptible livestock**

- Should be regularly inspected for clinical signs of FMD
- Should be housed if there are outbreaks of FMD close to the zoo/park.
- May be kept in an area which is closed to all visitors
- Should be fed and bedded on material not contaminated with FMD virus
- Should be tended by staff who take full disinfectant precautions before entering accommodation, pens or enclosures.

**General**

- Any meat used to feed animals is from licensed sources and not derived from premises where FMD is confirmed or suspected and that staff handling it have had no contact with susceptible livestock in the collection.
- Susceptible animals should not be moved between zoos and parks
- There should be vermin control adequate to reduce the risks of local infection.
- Notices about restrictions should be displayed prominently on the premises.
- Vaccination of animals is not currently permitted in UK.

**FMD and Wildlife**

... if FMD can affect UK wildlife, it can affect any country's wildlife if it gets started ...

**Does FMD affect any UK wildlife species?**

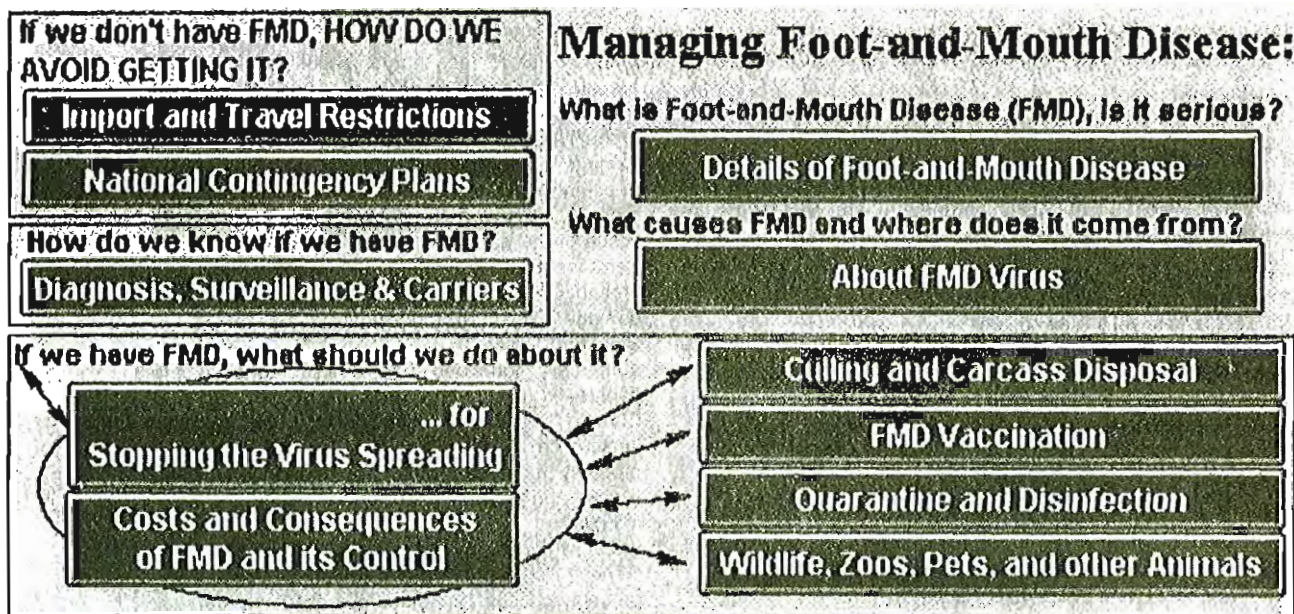
FMD virus is highly infective and all cloven-hooved animals appear to be susceptible, including deer and wild boar. Severe disease has also been reported in hedgehogs in Britain. Numerous other animal species have been infected experimentally with FMD virus, including cats, dogs, rats, mice, moles and water voles, but it would appear that for many species infection occurs only as a result of massive virus exposure or if injected with the virus.

**Would it be possible to control the disease in wild animals?**

Control of any disease in wild animals is difficult once it becomes established. Many wild animal populations are too widely dispersed for the virus to pass to sufficient new animals, so that FMD would be likely to die out in the population over a period of time. However, FMD has been known to persist in wild animal populations, including deer, and to return from wild populations into domestic stock. The best way to control disease in wild populations is to stop the disease getting into the population in the first place.



**Foot-and-Mouth Disease FLOWCHART from website**



## SOME GENERAL INFORMATION -- (Summarised -- much more is available on the website)

### Disease Summary

An acute, highly contagious viral disease, mainly (but not exclusively) of cloven-hoofed mammals (cattle, sheep, goats, deer, pigs, camels), which is characterised by the formation of lesions (initially vesicles, later erosions) on the feet and mouth (leading to lameness, salivation and unwillingness to eat), high fever, and sometimes a fatal myocarditis (particularly in juveniles). In most countries the government **MUST BE NOTIFIED** if Foot-and-Mouth Disease occurs or is suspected.

This is a usually a statutory requirement and is enforced through National legislation.

### Alternative Names (Synonyms)

FMD  
Foot and Mouth Disease  
Apthous fever  
Hoof-and-mouth disease  
Hoof and Mouth Disease  
Epizootic apthae  
Infectious apthous stomatitis  
Aftosa (Italian, Spanish)  
Fièvre aphteuse (French)  
Maul-und-Klauenseuch (German).  
Afta epizootica  
Bek-en-klouseer  
Fiebre aftosa (Spanish)

### Disease Type -- Viral

Infectious/Non-Infectious Agent (directly associated with the Disease)

The Foot-and-Mouth Disease Virus is classified within the family Picornaviridae

It is a small RNA virus which is very infectious, multiplying in and causing damage to cells throughout the body of susceptible animals, and which can survive in the environment for some time.

It causes particular damage to the epithelial cells of cloven-hoofed mammals: to the skin around the mouth and feet, and the mucous membrane lining the mouth and gut system (and may also damage heart muscle cells particularly in young animals, the milk-secreting cells of the udder and hormone-producing cells).

There are seven different serotypes (A, O, C, SAT1, SAT2, SAT3, Asia1), each of which can produce Foot-and-Mouth disease. Once an animal has had FMD caused by one serotype, it is still susceptible to attacks by the other serotypes and major different strains within the same serotype. Likewise, each serotype or major strain must be vaccinated against separately.

Information on Hazard / Legislation etc. is held on the Agent (Virus) page -- check the website or CD for this as it is too lengthy to print here.

### 2) NUMBER OF ANIMALS AFFECTED

The percentage of animals that become affected in a population (Morbidity Rate) is often extremely high and may approach 100%. However morbidity rate may be lower under these conditions:

- with less virulent FMD virus strains (e.g. with "occult FMD" morbidity may be very low in some populations).
- where species are less susceptible.
- where there is immunity either through naturally circulating virus (in endemic regions) or through vaccination.

### 3) EFFECTS OF BODY CONDITION AND OTHER DISEASES

Animals in good condition seem to be particularly severely affected.

### 4) EFFECTS OF AGES, SEX AND REPRODUCTIVE STATUS

Animals in all life-stages (age, sex, reproductive status) may be affected, although young animals are particularly severely affected and animals in good condition are generally affected to a greater extent than those in relatively poor condition.

### Overall Clinical Presentation

**1) TYPICAL CLINICAL SIGNS OF Foot-and-Mouth Disease:**  
FMD is an ACUTE viral infection, with clinical signs appearing within a few days of virus infection. The severity of the Clinical Signs in an animal depends on the virulence of the virus strain, the age of the animal (young animals are more severely affected), and the species or breed.

Recovery tends to occur within days or weeks, unless CHRONIC DISEASES subsequently develop. These are caused by long-standing tissue damage or secondary infection (see below), in which case full recovery may take many months, or in some cases not occur as the damage is permanent.

#### a) Commonly seen Clinical Signs with active FMD Virus infection:

Vesicles (Blisters); Erosions and/or Ulcers on the skin and mucous membranes:

probably due to damage to cells of the skin and mucous membranes, particularly areas subject to epithelial trauma (damage): usually feet and mouth, but also muzzle (snout), horns, knees, udder and teats.

Separation of hoof/horny tissue (complete hoof, heel bulbs and/or horns) from underlying tissue:

probably due to damage to cells of the skin and swelling of epithelial layers.

Unwillingness to eat; Dullness; Salivation; Jaw-champing; Lameness;

Lying down: probably due to pain accompanying vesicles, erosions and ulceration, and swelling of epithelial layers of mouth and feet.

Swelling and Pain of the mammary gland (udder); Reduced milk yield: probably due to damage to the cells that secrete milk.

Fever; Weight Loss; Abortion:

probably due to a number of systems suffering cellular damage.

**b) Additional Clinical Signs signs which may be seen in young animals, in very susceptible species (or breeds) and/or with particularly virulent virus strains:**

Diarrhoea; Dysentery:

probably ulceration and damage to the cells of the tissue lining the gut system

Weak, irregular pulse:

probably due to damage to the heart cells.

Difficulty in breathing; Collapse; Convulsions; Death:

probably due to damage to the heart cells.

Sudden death: probably due to damage to the heart cells.

### 2) CHRONIC DISEASES / PROBLEMS WHICH HAVE OCCURED AS A RESULT OF FMD VIRUS INFECTION:

Persistent Foot Infection -

probably due to secondary infection (usually bacterial) and chronic damage of the tissues of the foot (including the hoof)

Prolonged Enteritis - persistent diarrhoea:

probably due to secondary infection (usually bacterial) and chronic damage to the tissues lining the gut system.

Pneumonia;

probably secondary to infection (usually bacterial) of lesions in tissue of the upper respiratory system.

Permanent Udder Damage - reduced milk yield;

probably due to secondary infection (usually bacterial) and chronic damage to the milk-producing tissues

Diabetes Mellitus;

abnormally high blood sugar levels, probably due to damage to pancreatic (insulin-producing) tissue

Chronic "Poor-Doing" - specific syndrome with panting (heat intolerance), anaemia and long hair coat;

probably due in part to damage to endocrine (hormone-producing) tissues and possibly heart muscle tissue

Infertility;

probably caused by various chronic tissue damage

General Poor Condition and Reduced Growth Rate;

probably caused by various chronic tissue damage

**MUCH MUCH MORE ON WEBSITE OR CD -- CHECK IT OUT NOW**

# FMD from WildPro continued ...: Approach to Vaccination of Animals in Zoos

*Note* : This article contains references to governmental regulations regarding vaccinating against FMD and movement of animals that are country-specific to UK and the EU. India does vaccinate against FMD however. According to Dr. P. N. Bhat 'Four strains (of FMD) are endemic to India and we are vaccinating against these regularly'. According to the information from UK however, the efficacy of vaccination is questionable. Dr. Krishna from IVRI, Mukteshwar commented for Down to Earth, March 31, 2001, that India does not have the capacity to vaccinate the entire cattle population (of India). He also says that strains of FMD reported in UK are of Asian origin and their institute has asked for "more details."

In the wake of the Nandankanan disease tragedy, zoo managers and veterinarians may be inclined to consider vaccinating their animals but should think very hard and consult experts. Much of the information in the article below has relevance for India or South Asia or any part of the world. Some reasons to think twice are — FMD vaccine has not been tested on every species and may cause adverse side effects  
— vaccination may create a false sense of security leading to a reduction in biosecurity measures

A side issue with respect to Indian zoo management generally are the issues regarding restrictions on moving zoo animals from facility to facility over the country or continent in UK /EU. In Western countries, genetic management of threatened species of zoo animals in particular is very systematic. In most cases, the reason for an animal to be moved to another facility is very likely that the animal has contributed maximally to the gene pool of the taxa in its current abode. Therefore, if animals have been vaccinated and are not permitted to be moved, their conservation value virtually is nil. We do not have this level of genetic management (or movement of animals) in India or anywhere in South Asia. It is therefore, a warning call for better genetic management and a more liberal exchange system as well as health !!!! *Ed. Em.*

**FMD: Approach to Vaccination of Animals in Zoos General**  
A Commission decision of 12 April permitted, but did not require, Member States to use vaccination to protect endangered species (and possibly irreplaceable research animals). It also required zoos and similar enterprises containing endangered species to implement any biosecurity measures necessary to protect the animals; what is involved in implementing such biosecurity measures is set out on the MAFF website.

The Commission decision was not directed at improving the commercial position of zoos by allowing them to stay open despite real risk of infection. The conditions under which vaccination is allowed, and the arrangements for vaccination are very restrictive. There are also international trade implications to be taken into account.

## **When might a Member State agree that animals in a zoo qualified for vaccination?**

if the premises are within 25 km of an FMD outbreak  
if the premises contain endangered species as defined by the Red List laid down by the International Union for the Conservation of Nature now in force  
if these animals at risk from FMD  
if the zoo has put in place all other methods for protecting the animals. These include, as necessary: no movements on to the premises of susceptible species, housing of susceptible species indoors, ensuring that purchased food and bedding are not contaminated; closure of buildings which house animals susceptible species to the public; prevention of contact with and feeding of these animals by the public; ensuring that staff do not have contact with susceptible animals outside the zoo and (unless the zoo is in an infected area) do not enter any areas declared to be infected

areas under the Foot-and-Mouth Disease Order 1983; instituting disinfection controls at the entrance gates and the accesses of each service area; temporary closure of all or part of the zoo.

## **What conditions apply to the carrying out of vaccination?**

The owner must produce and submit to the Minister a plan of the premises, with details of the enclosures and pens in relation to the animals to be vaccinated and details of the perimeter boundaries and fencing or other control measures; and a detailed plan showing the location of the zoo and all animal holdings within a 3 kilometres radius. The Member State show any plans it has for allowing vaccination to the Commission and other Member States.

Once the Minister's agreement has been notified, all animals of susceptible species must be vaccinated. The entire vaccination procedure must be completed within 48 hours under official veterinary supervision.

Identification and marking of vaccinated animals is required and blood tests before vaccination and at least 30 days after must be taken wherever possible and kept for 10 years.

The keeper will need to contribute to a detailed report on the carrying out of vaccination, to be presented by the Member State to the Commission.

## **What are the consequences of vaccination for the zoo?**

Full records relating to all susceptible animals must be kept and produced on request.

For thirty days, the zoo must:

- keep all susceptible animals in their living quarters, or some other place where they can be isolated
- avoid moving any susceptible animals on or off the premises and move non-susceptible animals only under licence
- not move any material liable to transmit FMD on or off the premises except under licence
- not move any product off the premises except under licence
- prevent people or vehicles moving on or off the premises except under licence

Vaccinated animals can never be exported; they can be moved round the UK only under licence, nor will any products from the vaccinated animals ever be allowed to enter the food chain. It is not clear that vaccination would give protection to all zoo animals. It has not been tested on all the relevant species.

## **What would happen if FMD was found in a zoo?**

The affected animals would probably need to be slaughtered, but an epidemiological study would be conducted of other animals on the premises to see if there was a case for treating them differently. Whether the zoo had biosecurity measures in place and could isolate groups of animals would be relevant to any decision.

## **Approach in the light of this**

The cases in which zoo animals could be vaccinated are very limited and vaccination brings addition restrictions for thirty days and, in some respects for longer. Vaccination of zoo animals could also have significant implications for the UK's and possibly the EU's international disease and trading status. We are not clear that vaccines currently available are effective in all species in any case. In these circumstances, the best course is to encourage zoos and similar premises to rely on the biosecurity measures which have already been promulgated. The approach might be further considered if vaccination were adopted for farmed livestock or if there were unexpected developments in the spread of FMD.



*Wildlife Information Network - WIN*