Wildlife and Foot and Mouth Disease

A look from the Wild Side

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Exec. Vice President - EcoHealth Alliance, USA
President - OIE Working Group on Wildlife Diseases
Co-Chair - IUCN SSC Wildlife Health Specialist Group
## Wildlife Defined

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Wild Animal ≠ Wild Species

Domestic Animal ≠ Domestic Species
Sus scrofa

Eurasian Wild Pig  Domestic Pig
**African Buffalo – Syncerus caffer**

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| NO                                            | Captive Wild Animals (c)     |
| Wild Animals (d)                              |                             |
## Water Buffalo – Bubalus bubalis

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### Asiatic Buffalo - Bubalus amee
American Buffalo – *Bison bison*

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Foot and Mouth Disease
Foot-and-Mouth Disease in wildlife

>100 species have been infected naturally or experimentally

All seven of the serotypes (O, A, C, Asia-1, SAT-1, SAT-2, and SAT-3) have been found in wildlife.
**Foot-and-Mouth Disease in wildlife**

All serotypes are endemic to domestic livestock except for SAT’s in African buffalo (*Syncerus caffer*)

No wildlife reservoir for FMD except for SAT types in African buffalo (*Syncerus caffer*)
Foot-and-Mouth Disease in wildlife

Clinical signs in wildlife are similar to domestic animals

Degree of disease varies widely with Serotype and species infected

Inapparent infection (i.e. African buffalo, Syncerus caffer) to high mortality (i.e. mountain gazelle, Gazella gazella)
Carrier States

Defined as an animal with an inapparent infection and where virus can be isolated beyond 28 days post-virus infection
Carrier States

Domestic cattle up to 3.5 years after infection

Domestic Water buffalo (*Bubalus bubalis*) up 1-2 years

Domestic goats and sheep up to 9 months

African buffalo (*Syncerus caffer*) up to 5 years
Carrier States

Sable antelope (*Hippotragus niger*) up to 28 days

Eland (*Taurotragus oryx*) up to 32 days

Wildebeest (*Connochaetes taurinus*) up to 45 days

Kudu (*Tragelaphus strepsiceros*) up to 160 days
Carrier States

Fallow deer (*Dama dama*) up to 77 days

Sika deer (*Cervus nippon*) up to 77 days

White-tailed deer (*Odocoileus virginianus*) up to 77 days
Carrier States

FMD Carrier State does NOT equal source of infection

Carrier animals shown to have 500 times lower virus levels than clinically ill animals

Carrier status livestock or wildlife never documented to infect susceptible animals (except for African Buffalo)
Asia

No evidence for the maintenance of FMDV in wildlife in Asia

Mongolian gazelles (*Procapra gutturosa*)
never seen independent of livestock outbreaks

Saiga antelope (*Saiga tatarica*)
severe mortality (up to 70%)
Asia

Mithun (*Bos frontalis*), Yak (*Bos grunniens*), and Gaur (*Bos gaurus*)
Severe disease – associated w/ livestock infections

Asian elephants
Moderately severe disease

Water Buffalo (*Bubalus bubalis*)
Domestic animals – sometimes feral
Middle East

No evidence for the maintenance of FMDV in wildlife in the Middle East

Dromedary camels (*Camelus dromedaries*) domestic animals - All serotypes but resistant to disease and do not appear to play a role in transmission to other livestock

Captive Arabian Oryx (*Oryx leucoryx*) – high mortality
Mountain Gazelle (*Gazella gazelle*) – high mortality
Europe

Reindeer (*Rangifer tarandus*)

Roe deer (*Capreolus capreolus*)

Wild boar (*Sus scrofa*)
Europe

No evidence for the maintenance of FMDV in wildlife in Europe

After the 2011 outbreak of FMD in livestock in Bulgaria - low seroprevalence and clustered distribution of positive roe deer and wild boar indicated that FMD failed to become established in wildlife.

After 2001 outbreak in U.K, FMD failed to become established in wildlife
North America

No evidence for the maintenance of FMDV in wildlife in North America

North American bison (*Bison bison*)
Elk (*Cervus elaphus nelsonii*)
   Experimentally infected

The first and only known natural infection in wildlife occurred in mule deer (*Odocoileus hemionus*) after an outbreak in cattle in California in 1924
Central and South America

No evidence for the maintenance of FMDV in wildlife in Central or South America

Many susceptible species but no history of outbreaks despite repeated livestock infections.

New World camelids experimentally infected but resistant to disease and not able to transmit well
Africa

Large number of susceptible species

Sable antelope (*Hippotragus niger*)
Eland (*Taurotragus oryx*)
Wildebeest (*Connochaetes taurinus*)
Kudu (*Tragelaphus strepsiceros*)
Africa

Bush pigs (*Potamochoerus porcus*)

Warthogs (*Phacochoerus aethiopicus*)

Severe clinical disease after experimental infection but do not excrete the virus as heavily as domestic pigs
Africa

African buffalo can be persistent carrier

spillover to *impala* (*Aepyceros melampus*) and transmission to domestic cattle

See Dr. Misheck Mulumba presentation this conference
Control of FMD in Wildlife

Prevention, Prevention, Prevention

Control movement of people and livestock
+ / - good vaccination efforts
Control of FMD in Wildlife

Culling of wildlife has not been demonstrated to be effective

- difficult to observe through stages,
- difficult to eliminate all infected individual
- other economic and ecological impacts
Control of FMD in Wildlife

Cordon fencing – potential applications in a limited number of places

- Local “buy-in” essential
- Expensive and difficult to maintain
- Not 100% effective
- Other economic and ecological impacts

See: Dr. Moetapele Letshwenyo presentation this conference
Hunting Based Revenue

2008

7 of 14 SADC countries = US$ 192 Million

Source: Booth, CIC/FAO 2010
Nature Based Tourism Revenue

2000 – 2001

10 of 14 SADC countries = US$ 3.2 Billion

Source: Booth, CIC/FAO 2010
Conclusions

In the vast majority of situations, wildlife do not play a significant role in the maintenance of FMD infections.

Scientific evidence indicates that outside of the sub-Saharan Africa situation, effective control of FMD in domestic livestock will result in both the protection of livestock and wildlife.
Conclusions

Actual method used to control FMD will ultimately be regionally specific

Eradication is not feasible and may not be needed everywhere (hence PCP levels)
Conclusions

Sub-Saharan Africa has unique situation with a significant wildlife reservoir of FMD – thus other strategies warrant consideration:
Conclusions

• Trade mechanisms, i.e. compartmentalization, zonation, commodity-based trade (Article 8.5.25 & 8.5.26)
• Improved vaccines (efficacy, duration, topotype/field strain specific)
• Improved vaccination programs
• Alternative revenue streams
• Development resulting in better local/regional markets for animal products

Both to be discussed further by Dr. Mulumba and Letshwenyo
Conclusions

Effectively controlling FMD in domestic animals can be a benefit to wildlife and natural resources, providing an opportunity for Veterinary Services to contribute to additional national and regional priorities.
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