Foot and Mouth Disease 101

A basic overview of the disease and progression

Foot-and-mouth disease (FMD) is a viral disease of cloven-hoofed animals that has substantial impact on global agricultural production and trade

- Prototype Aphtovirus in the Picornaviridae family
- Highly diverse: 7 serotypes with multiple linaeges and subtypes
- All wild and domestic cloven hoofed animals (Rabies host range)
- Some similarities in symptoms but big differences too
- Depends primarily on the characteristics of the virus and the susceptibility of the host
- The phenomenon of subclinical FMDV infection in ruminants adds to the complexity of the disease and it’s control.

Why SAT serotypes are especially difficult

SAT strains:

- Mutate rapidly
- Have poor cross-protection between strains

Vaccines:

- Must be strain-matched. Pirbright
- Offer shorter immunity than vaccines used in Europe or Asia

Because buffalo continuously generate viral diversity, perfect vaccination is impossible

Why SAT-2 is worse than SAT-1 or SAT-3

Factor	SAT-1	SAT-2	SAT-3
Buffalo reservoir	Yes	Yes (dominant)	Yes
Genetic variability	Moderate	Very high	Lower
Vaccine reliability	Moderate	Poor	Better
Long outbreaks	Occasional	Common	Rare
Trade impact	Medium	High	Lower

Subclinical Infection – why is it important?

- Neoteric subclinical infection which refers to the acute stage of the disease in vaccinated or animals naturally resistant to the disease.
- Carrier state of the disease

- So, in short both above options are animals that can potentially shed virus and be a source of infection to susceptible hosts

- WE CANNOT SEE THIS

Sources of infection

1,Clinically ill cloven hoofed animals with blisters secretes plenty of infected virus

2.Neoteric subclinical cases

3.Carrier state animals especially Cape Buffalo but definitely also cattle and some other ruminants

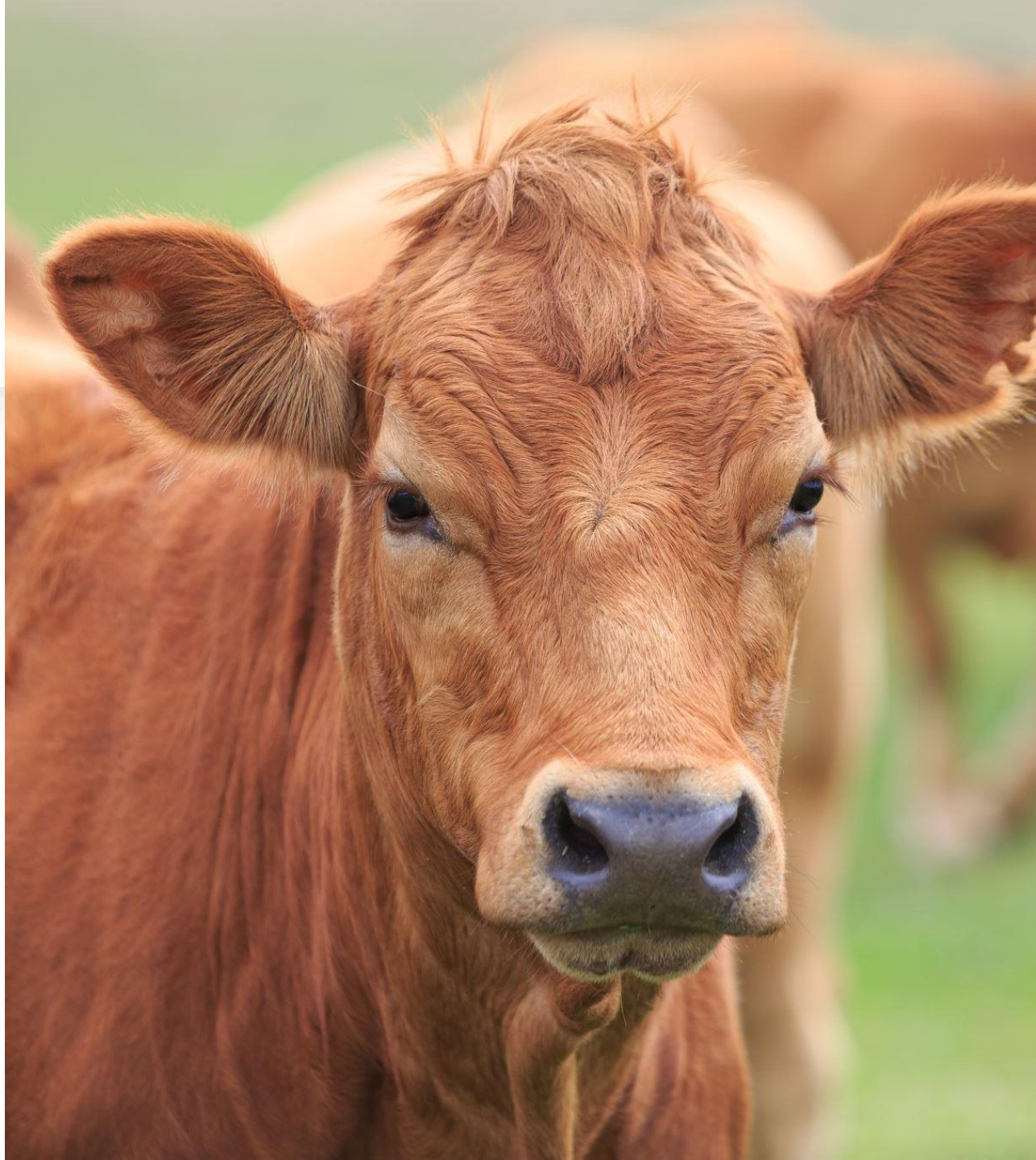
4.For some reason porcines never becomes carriers

How is it transmitted?

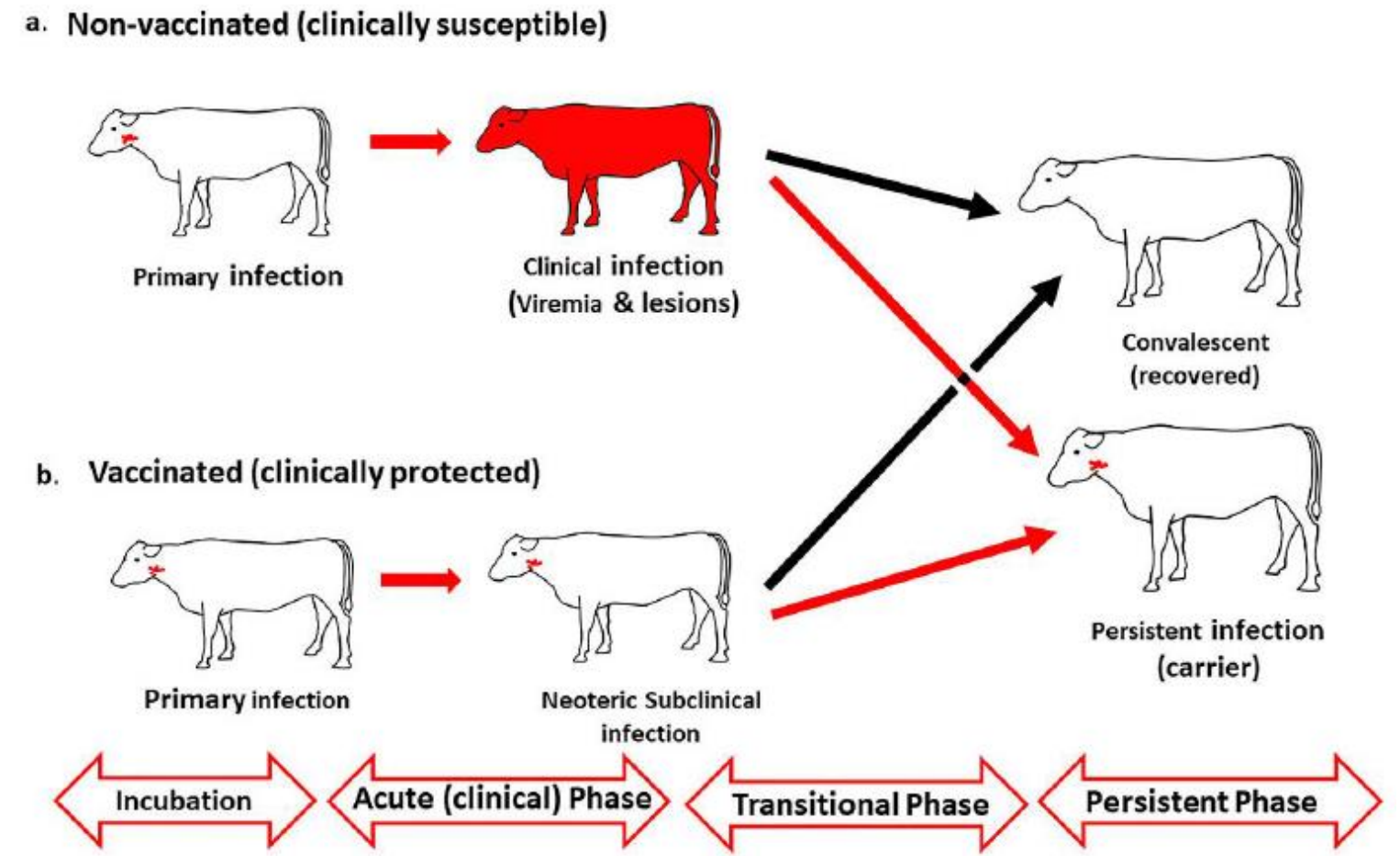
- Direct from animal to animal – nose to nose
- Indirect via fomites
- Airborne distribution under certain climatic conditions
- Fomites: Water, Food, Vehicles, Veterinarians, Workers……..
- The virus is definitely quite resistant to environmental challenges and can survive significant amounts of time in the environment

Routes of Infection and why it is interesting:

- Bovines: Definitely more through the nose than the mouth
- Ovine and Caprine: Mixed nose and mouth – although very little data on caprine available
- Porcine: Definitely more through the mouth
- The route of infection seems to be related to the probability of becoming carriers: Nose – more likely carriers Mouth – less likely carriers
- PIGS NEVER BECOME CARRIERS



What happens when exposed?



NEOTERIC INFECTION

Why it complicates control?

Visual inspection fails

Movement of “healthy” animals spreads disease

Explains why outbreaks:

- Leap between farms
- Appear “suddenly”

This is a key reason **movement bans** are critical even when no disease is visible.

Neoteric state:

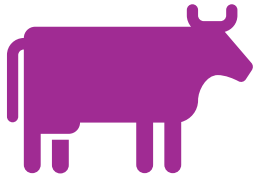
- **<u>Important fact to remember:</u>**

- More virus are shed during the neoteric state than from animals in the carrier state

What we see in affected animals:

- Varies greatly depending on the characteristics of the virus and the susceptibility of the host
- FMD is generally infective at very low dosages of infective pathogen
- Vesicles in mouth
- Vesicles around coronary band
- Lameness
- Vesicles on udders
- Peracute deaths in especially juveniles and rarely adults, so called tiger heart disease

Morbidity and Mortality



The rule of thumb is that the morbidity is very high and the mortality is low in cattle

This depends on the virulence of the pathogen and the susceptibility of the hosts

Porcines probably worst affected and highest mortality, but they can never become carriers. All surviving porcines are cleared of virus in 28 days

“My cattle has FMD, please Doc, how can I pull them through?”

- There is no effective treatment for FMD
- Don’t waste your time on silver bullets and supplements
- Only supplement if your herd is not in good condition
- If an animal is in optimal condition, there is no such thing as a “booster”. Those are for internal combustion engines.
- This is a disease where less is more. Please don’t handle your affected animals if not absolutely necessary. Handling stress does a lot of harm.