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RAPID, ON SITE, DIAGNOSIS OF FMD AND SAFE AND COST-EFFECTIVE SHIPMENT OF SAMPLES USING LATERAL FLOW DEVICES FOR LABORATORY DIAGNOSTIC

Labib Bakkali Kassimi, Graham J. Belsham, Abdunaci Bulut, Kamila Gorna, Claude Hamers, Pascal Hudelet, Syed Jamal, Eve Laloy, Anthony Relmy, Aurore Romey, et al.

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Foot-and-mouth disease : FMD

- Highly contagious transboundary disease of domestic and wild cloven-hoofed animals
- One of the most economically devastating diseases of livestock
- Characterized by vesicles, with subsequent erosions in the mouth, also on the muzzle, feet, or teats
- High morbidity, low mortality in adults



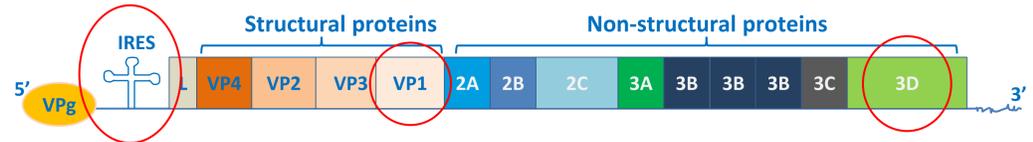
Jean-François Valarcher, SLU; Field, UK 2001 (The Pirbright Institute); www.afrivp.org/sites/default/files/FMD/diagnosis.html

Foot-and-mouth disease virus : FMDV

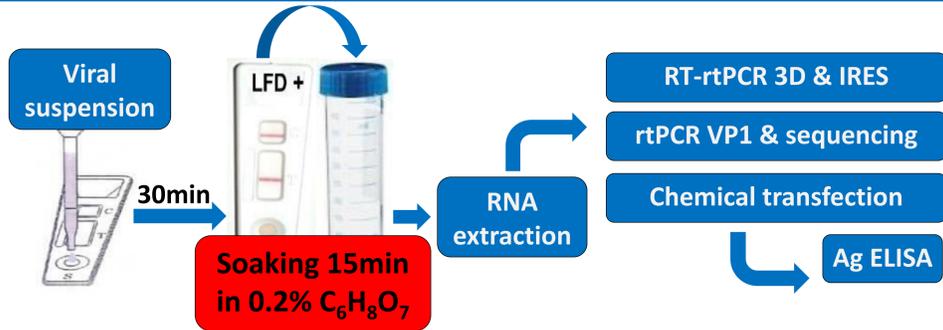
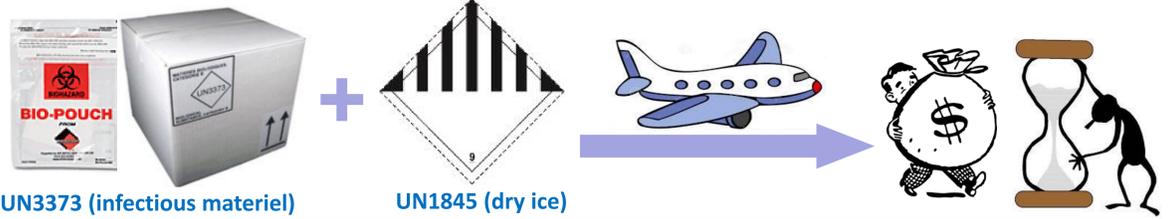
- Causative agent = FMDV
- *Picornaviridae*, genus *Aphthovirus*, genome: positive-sense, single-stranded RNA
- 7 serotypes (O/A/C/Asia-1/SAT1,2,3) sub-divided into multiple topotypes and genotypes
- 7 pools defined according to the world distribution of FMDV



http://www.virology.wisc.edu

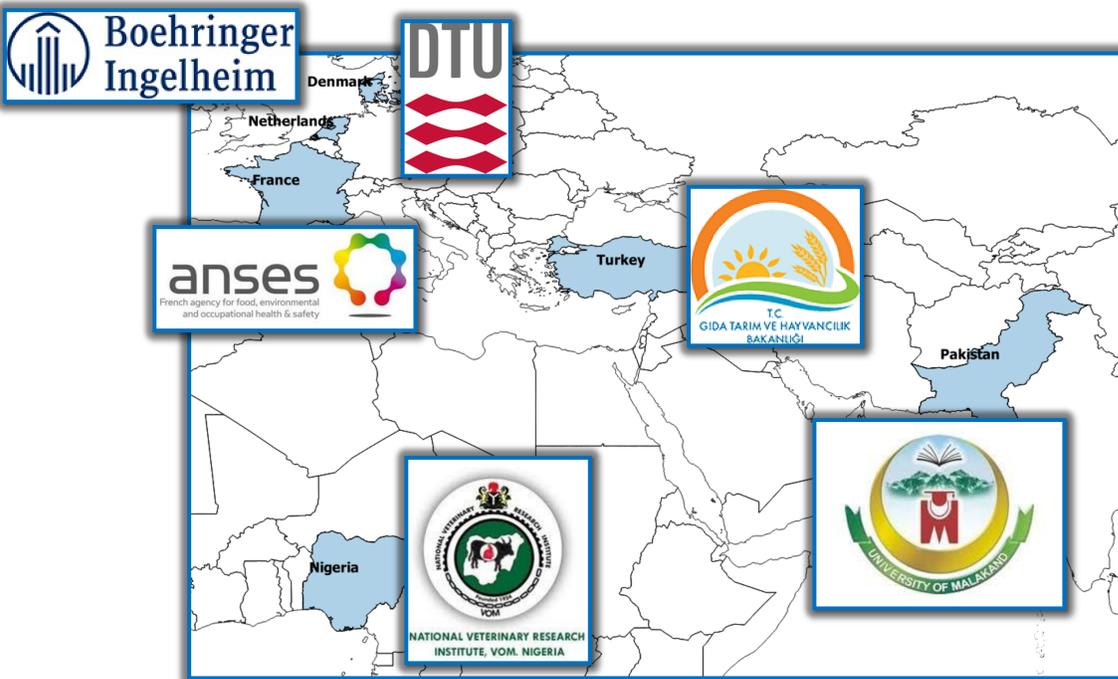


Identification of circulating strains is important for efficient FMD control. However, due to shipping requirements of potentially infected samples, the cost of sample submission to reference laboratories remains a major obstacle.



A cost-effective and safe method for shipment of samples from FMD-suspected cases, based on the inactivation of FMDV on lateral flow devices (LFDs) has been developed and validated in the laboratory which allows subsequent detection and typing of FMDV by RT-PCR and virus rescue using RNA transfection (Romey et al., TBED, 2017).

Evaluation of this protocol on freshly collected clinical samples through collaborations in endemic countries.



Samples collection and inactivation of LFD in the field:

- Turkey, n=20, completed
- Nigeria, n=20, completed
- Pakistan, n=400, in progress

Safety tests in the lab:

- Denmark
- France
- Nigeria
- Turkey

... in progress

Molecular detections in the lab:

- Denmark
- France
- Netherlands

... in progress

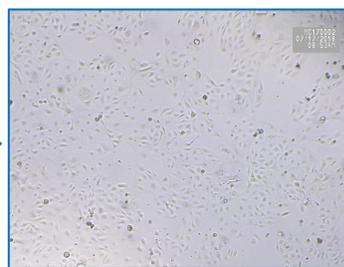
Virus rescue in the lab:

- Denmark
- France
- Netherlands

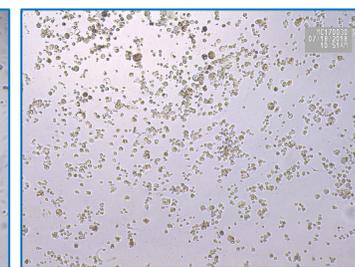
... in progress

Optimization of RNA chemical transfection to rescue infectious FMDV from positive inactivated LFDs

- Sample loading on LFD
- Inactivation of FMDV on LFD
- RNA extraction from LFD
- RNA transfection:
 - 5 transfection reagents
 - 8 conditions per reagent
 - 3 cells lines



Mock



CPE on ZZ-R-127 48h post-transfection

Selection of

- 2 transfection reagents
- 1 condition per reagent
- 1 cell line

... in progress

This project will allow to ensure that the use of LFD is a safe way for room-temperature dry-transport of FMDV samples from endemic areas. Once validated, this method will substantially decrease the cost of shipment and help in increasing sample submission from affected countries.