Follow-up Regional training Workshop on WOAH Procedures for official status recognition, endorsement of official control programmes and maintenance with regard to foot and mouth disease (FMD) and peste des petits ruminants (PPR)

Requirements of the Terrestrial Code for FMD surveillance:

Clinical surveillance and NSP surveys

25 - 27 February 2025, Issyk Kul, Kyrgyzstan

Manuel J Sanchez Vazquez DVM MA MSc PhD

Coordinador del Área de Epidemiología PANAFTOSA-OPS/OMS

PAHO Pan American Health Organization | World Health Organization Americas Region

PANAFTOSA
Pan American Center for Foot-and-Mouth Disease and Veterinary Public Health

Passive Surveillance for FMD

Passive surveillance, or clinical surveillance, is an essential component of FMD detection and **relies on the routine reporting of suspected cases by sensors or field observers** (and, on the sensors, animal keepers, veterinarians, and other stakeholders).

- The sensitivity and specificity of clinical observations depends on the **criteria used to define a suspected case and, on the sensors,**
- The **case definition** should be standardized.
- This approach is **crucial for the early detection** of potential outbreaks and contributes to overall disease surveillance.
- **A good understanding of what is happening in the filed** is essential to maintain transparency
- Ideally, both positive and those observations ruled out should be recorded and analyzed as indicators of the strategy.

FMD case definition

Article 8.8.1. 3)

The following defines the occurrence of infection with FMDV:

a) **FMDV has been isolated** and identified as such from a sample from a susceptible animal;

b) or **antigen or nucleic acid specific to FMDV** has been detected in a sample from a susceptible animal, showing clinical signs consistent with FMD, or epidemiologically linked to a confirmed or suspected case of FMD, or giving cause for suspicion of previous association or contact with FMDV;

c) or **antibodies** to structural proteins (SP) or non-structural proteins (NSP) of FMDV, that are not a consequence of vaccination, have been detected in a sample from **a susceptible animal**, showing clinical signs consistent with FMD, or **epidemiologically linked** to a confirmed or suspected case of FMD, or giving cause for suspicion of previous association or contact with FMDV.

World Organisation for Animal Health

Codes and Manuals

The World Organisation for Animal Health (WOAH) Terrestrial and Aquatic Animal Health Codes provide standards for the improvement of animal health and welfare and veterinary public health worldwide, including through standards for safe international trade in terrestrial and aquatic animals and their products. The manuals provide a standardised approach to the diagnosis of the diseases listed in the Terrestrial and Aquatic Codes.

Handling of suspected cases

- Sensors report suspected cases based on **clinical signs** such as vesicles, salivation, lameness, fever, etc.
- Reported to **official veterinary services** (local office)
- After notification, **veterinary services investigate** the suspected cases and collect samples for **laboratory testing**.
- **Diagnosis is confirmed** through laboratory techniques such as PCR, virus isolation, or serological testing according to the case
- If negative, identify the differential diagnosis
- Sensors Engagement:
  - **Awareness and training programs to sensitize sensor** to recognize and report FMD clinical signs and lesions.
  - **Clear reporting mechanisms** (e.g., telephone, mobile apps, online portals) should be established to ensure efficient and timely reporting.

Active Surveillance /Surveys

It complements passive surveillance and has key as key objectives:

- Detect FMD Virus Transmission.
- If not detected, support evidence of its absence.

NSP (Non-Structural Proteins) for FMD are proteins produced by the Foot-and-Mouth Disease Virus (FMDV) during replication.

They are important in serological surveillance because they help differentiate naturally infected animals from those vaccinated with purified FMD vaccines (which do not contain NSPs).

Define epidemiological area and population

Two-Stage Sampling strategy:

- Selection of farms
- Selection of animals within farms

Key Phases:

1. Define epidemiological area and population
2. Sample size
    - Calculate farm sample size
    - Determine number of animals per farm
3. Selection of Epidemiological Units
4. Visualizing and analyzing the results

Define epidemiological area and population

- Define the **epidemiolocal units** (e.g. farm, village, etc.)
- It is important to define our **target population**, which will guide our interpretation of the results and the selection of our epidemiological units.
- Determine whether the sampling will be applied to the **entire country or just a part of it**.
  - To delineate areas within the country, we must have clear criteria, such as **using natural boundaries** like mountains and rivers, or **administrative and official divisions.**
- It is crucial that when we consider a sampling area and its animal population, this population must exhibit **cohesion and similar characteristics**

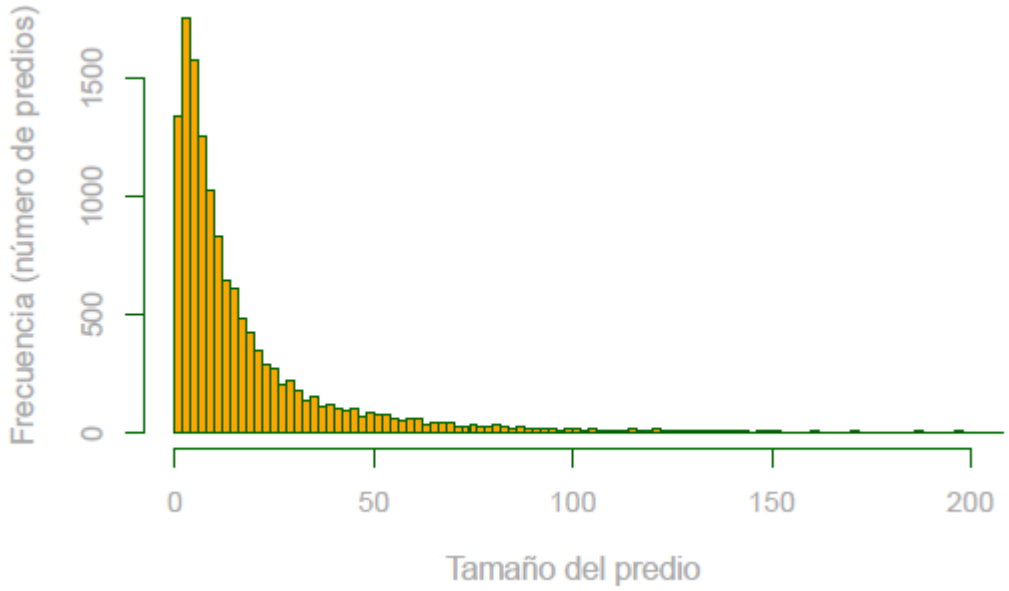
Sample size Calculations

- Define **Herd Sensitivity and Specificity**
- Define **Animal Laboratory Test Sensitivity and Specificity**
  - Screening versus confirmatory testing.
- Estimating the **Number of Herds and Animals**

Sample size according to herd size	Number of animals sampled
Up to 10	All to 9
from 11 to 15	All to 13
from 16 to 20	All to 16
from 21 to 25	All to 22
from 26 to 35	All to 31
from 36 to 50	36
from 51 to 100	51
from 101 to 250	58
from 251 to 500	63
More thton 500	67

Selection of Epidemiological Units

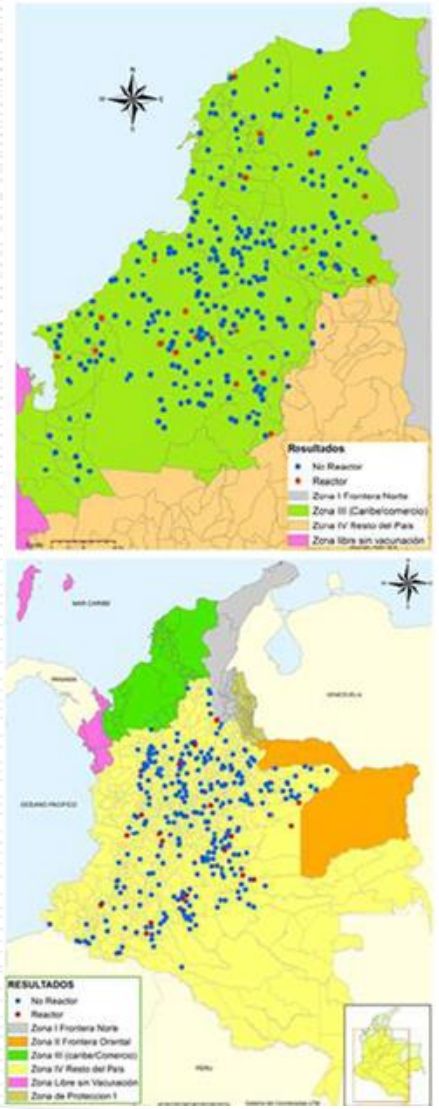
- Sample must be **representative of the population** and a must have a **clear recruiting strategy**
- When selecting epidemiological units:
  - a **purely random sampling approach** may lead to an overrepresentation of more common establishments, such as smaller farms.
  - In this case, **stratified sampling** based on farm size can be employed.
  - Additionally, **risk criteria** or convenience sampling may also be used.
- Regardless of the strategy for selecting epidemiological units, it must be **well justified.**



Visualizing and analyzing the results

It is crucial that the **results of the positive reactors are analyzed correctly**, considering several factors (Article 8.8.45.):

- Any **reactor in serology should be treated as a potential positive**, and it must be verified as such.
- The **proportion and strength of seropositive** reactors is informative.
- Consider the **sensitivity and specificity of the tests combined**; for instance, **extensive sampling with an imperfect test** that does not provide 100% specificity requires justification for the absence of “false” positives.
- **Perform paired sampling**.
- Conduct **epidemiological and clinical investigations** of the susceptible animals present on the premises.
- When interpreting the results, **the age of the animal and its vaccination status** should be taken into account.
- It is also important to investigate the presence of **geographic clusters** or reactive animals within the same epidemiological unit.



Paired Sampling

Key considerations (Article 8.8.45.)

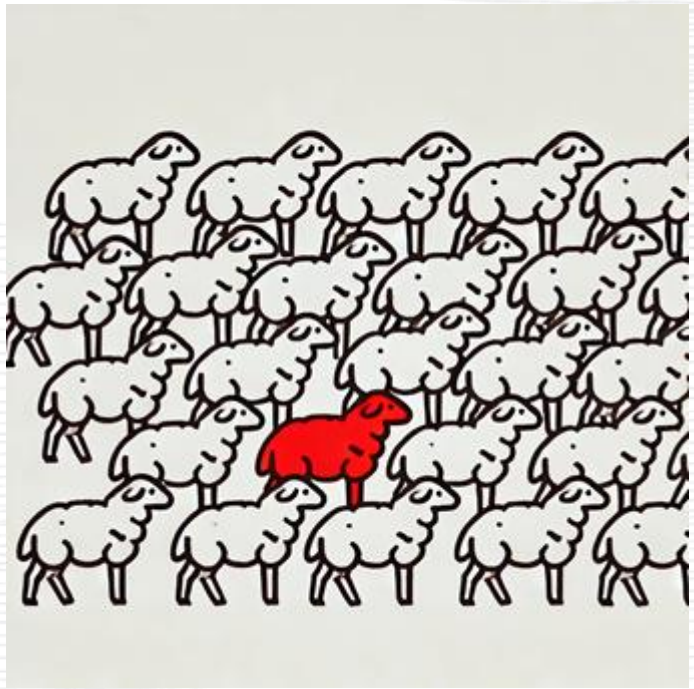
- Ensure sampled animals are **identified, remain on-site, and are not vaccinated** until retesting is complete.
- In the second sampling, include **reactor animals, susceptible animals within the epidemiological unit, and those in contact with reactors** in the **second sampling**, aiming to sample the same animals as in the first round.
- If FMDV **is absent, antibody reactivity should remain statistically unchanged.** FMDV transmission is detected by an increase in seropositive animals or antibody titers at the second sampling.

Use of Sentinel Animals:

- Unvaccinated young animals or those without maternal immunity can act as sentinels.
- Sentinels should stay in close contact with the epidemiological unit for **at least two incubation periods**—remaining seronegative if no FMDV transmission occurs.

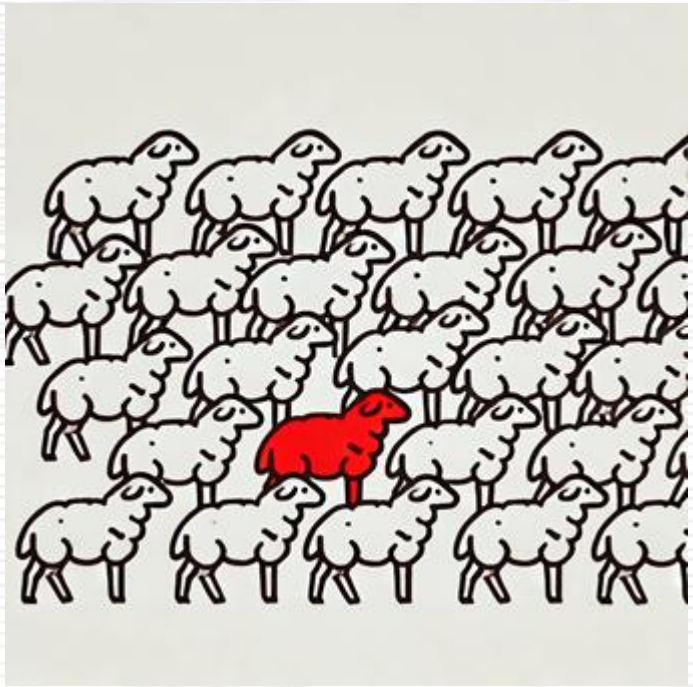
Paired Sampling: Comparison of Two Snapshots of the same group Over Time

First sampling



Time

Second sampling



Key Requirements for Risk-Based Surveillance

When implementing risk-based surveillance, certain minimum prerequisites must be met to ensure its robustness, including:

- A **clear objective** for the surveillance strategy.
- A **comprehensive understanding** of the hazard and the risk being studied.
- A **strong knowledge** of the population and its interactions.
- **Access to reliable, comprehensive, and up-to-date information,** including well-structured information systems and databases.
- A **well-organized veterinary services structure** to support study implementation.
- **Technical capacity** for study design and a well-structured approach to developing the surveillance strategy.

Many Thanks!!

Большое спасибо!!