Workshop: harmonization of the FMD vaccination strategy in the North Africa
/
Atelier : harmonisation de la stratégie de vaccination contre la fièvre aphteuse en Afrique du Nord

30-31 mars 2016 - Tunis

Elements of FMD post-vaccination monitoring programme
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Éléments du programme de surveillance post-vaccination contre la fièvre aphteuse

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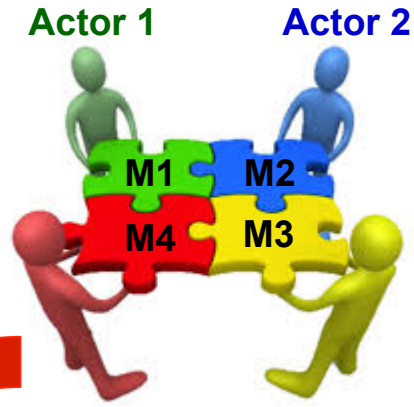
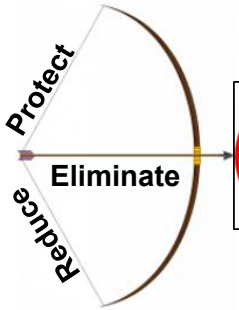
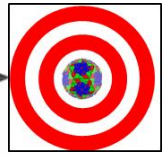
Control of FMD is a complex process

- ✓ Control of animal movement and trade
- ✓ Active and/or passive surveillance
- ✓ Early warning and detection system
- ✓ Establishment of a contingency plan
- ✓ Vaccination (emergency/preventive)
- ✓ Post-vaccination monitoring (PVM)







Farmer

FMD

Farm

FMD monitoring and surveillance Network

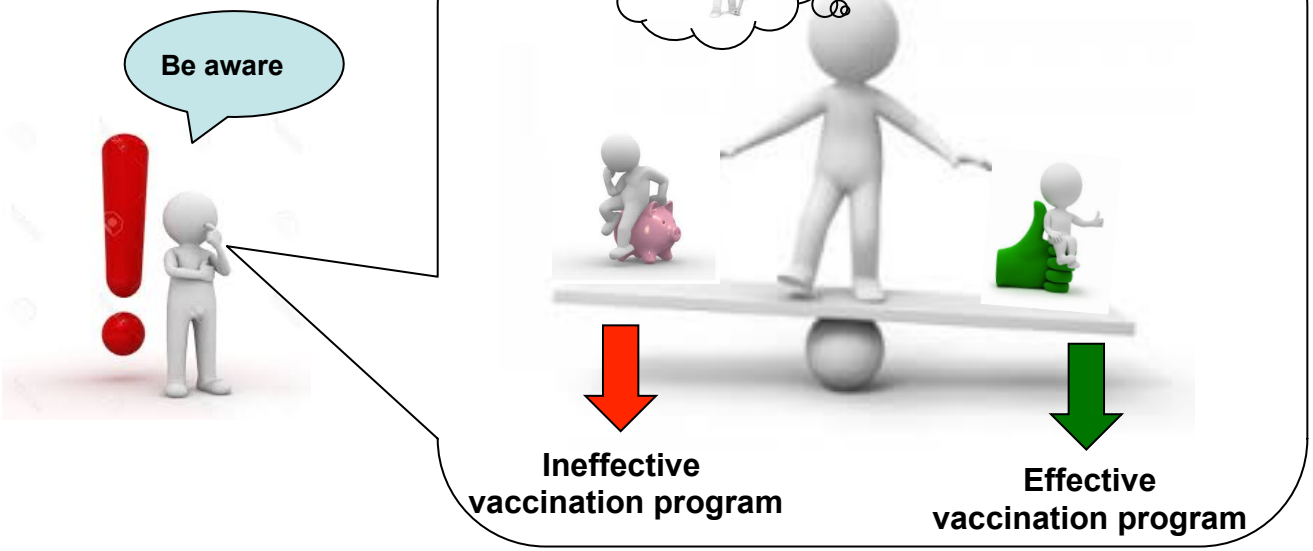
Monitor the epidemiological situation

Adapt measures

- ✓ **Analyze**
- ✓ **Assess**
- ✓ **Decide**

Vaccination is one of the most important components of FMD control

- to reduce clinical disease
- to eliminate virus circulation
- to maintain FMD freedom
- to regain FMD freedom



Factors affecting vaccination program effectiveness

Vaccine strain

Match to circulating strain(s)

Vaccination strategy

Vaccination campaign

Cold chain

Trained vaccinators

Application

Vaccination Program Effectiveness

Host factors

Age

Prior exposure

Health condition

Time since vaccination

Vaccine characteristics

Potency

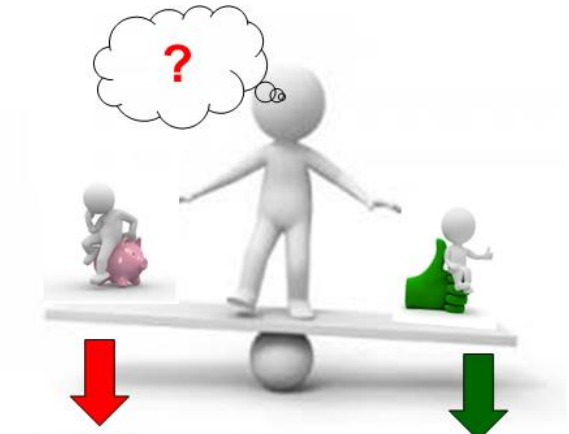
Vaccine composition and adjuvant

Stability

Purity

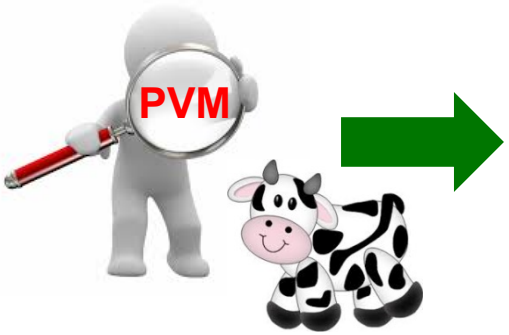
Shelf life

Need a post vaccination monitoring program (PVM)



Ineffective vaccination program

Effective vaccination program



monitor continuously

Follow up of the performance

- **PVM is necessary to optimise the vaccination programme, and the use of limited resources in attaining expected objectives,**
- **Important component in vaccine-based FMD control (PCP stage 2-3),**
- **A requirement for countries seeking official recognition by OIE (endorsed national control programmes or freedom with vaccination)(PCP stage 3 and beyond)**

Objectives of post vaccination monitoring (PVM)

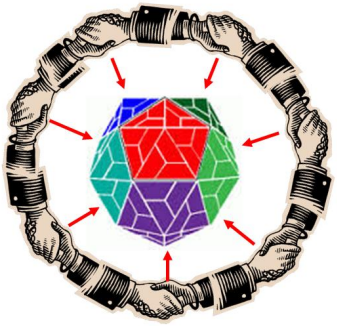
- ✓ Determine vaccination coverage
- ✓ Evaluation of immune response
- ✓ Demonstrate impact of vaccination
- ✓ Demonstrate FMD freedom

- ✓ Evaluate vaccine performance
- ✓ Identify causes of ineffective vaccination
- ✓ Optimize vaccination strategy and program
- ✓ Optimize use of resources
- ✓ Improve quality of vaccines

Checklist for PVM

- ✓ Vaccine characteristics (expected serological response: purity, duration Abs, protective titer)
- ✓ Desired percent of vaccination coverage,
- ✓ Desired percent protection,
- ✓ Representative sample
- ✓ Awareness of livestock owners,
- ✓ Training in effective sampling, preservation and shipment of samples,
- ✓ Training of lab staff and adequate Lab capacity, (Accuracy, turnaround time,…)

Who needs to be Involved in PVM?



- ✓ Decision makers : set up the objectives of PVM and assign resources ,
- ✓ Epidemiologists and statisticians : select and design the appropriate methods and carry out data analyses ,
- ✓ Field veterinarians, nongovernment organisations and animal health workers : collect samples ,
- ✓ Veterinary diagnostic laboratories : share information on the performance of the serological tests , carry out the diagnostic analysis and participate in the interpretation of the serological test results ,
- ✓ FMD Reference Laboratories for additional advices if needed.

PVM tools

Serological surveillance:

- ✓ Animal identification system
- ✓ Sampling design based on farming system and means
- ✓ Day post vaccination for sampling (30dpv)
- ✓ Sample size (CI ≥ 95%)
- ✓ Test to be used (SP and NSP)
- ✓ Reference sera

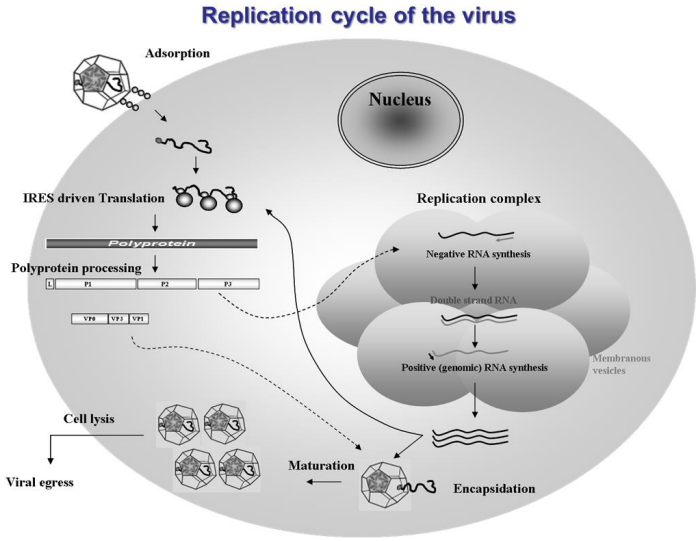
Virological surveillance:

- ✓ Clinical and passive surveillance (regular field investigations)
- ✓ Probang test (if NSP positive)

Data analysis and interpretation:

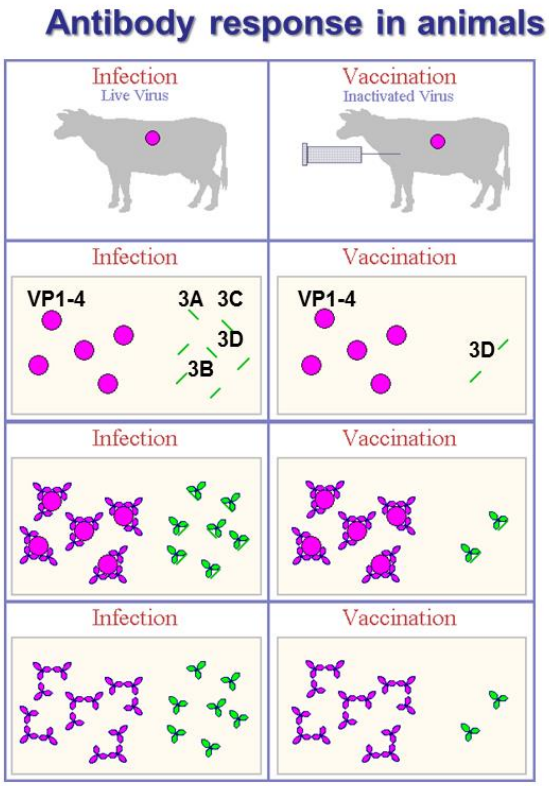
- ✓ Specificity and sensitivity of the tests
- ✓ Context of production system, delivery system and epidemiological situation
- ✓ Vaccination coverage and protection

PVM tools : serological surveillance



Virus replication in the animal produces structural (capsid) proteins, which form virus particles, and non-structural proteins, with enzymatic and regulatory functions.

Infected animals produce antibody to both structural (capsid) proteins and non-structural proteins.



The animal receives predominantly structural proteins in the form of purified virus particles and small amounts of non-structural protein contaminants.

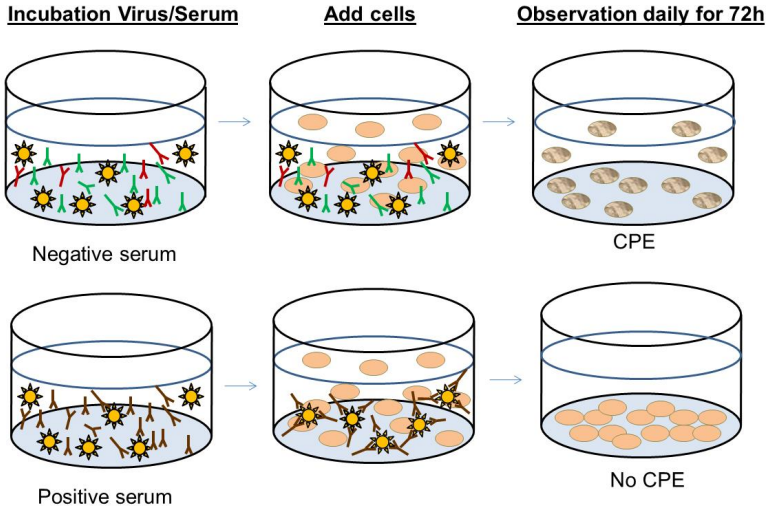
Vaccinated animals produce antibody primarily to structural (capsid) proteins and respond only weakly to contaminating non-structural proteins.

Can discriminate between infected and vaccinated animals on basis of differential antibody response to structural and non-structural proteins.

Tests for Serological surveillance

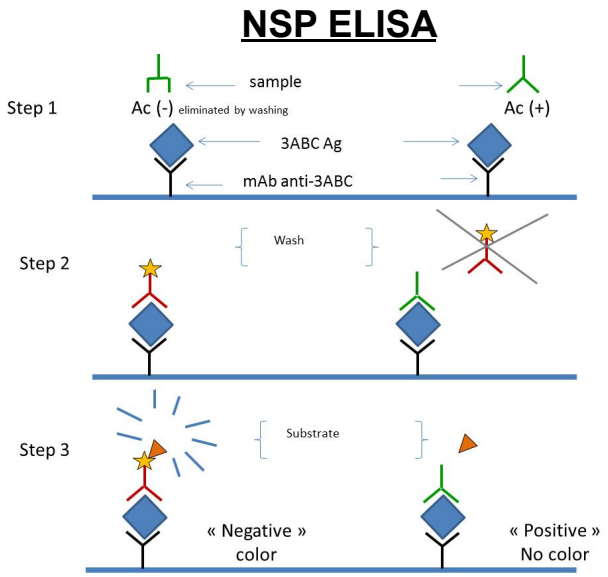
Antibodies against SP

- **Virus neutralisation test**



- **Liquid Phase Blocking ELISA (LPBE)**
- **Solid Phase Blocking ELISA (SPCE)**

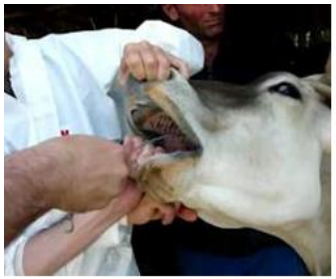
Antibodies against NSP



PVM tools : Clinical and virological surveillance

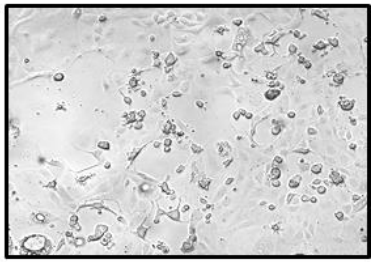
Regular field investigationst

Laboratory tests

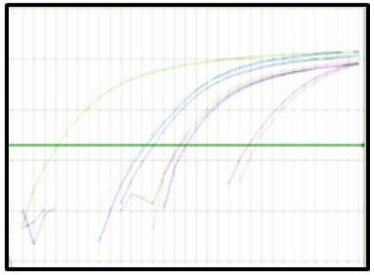


Probang

Virus isolation

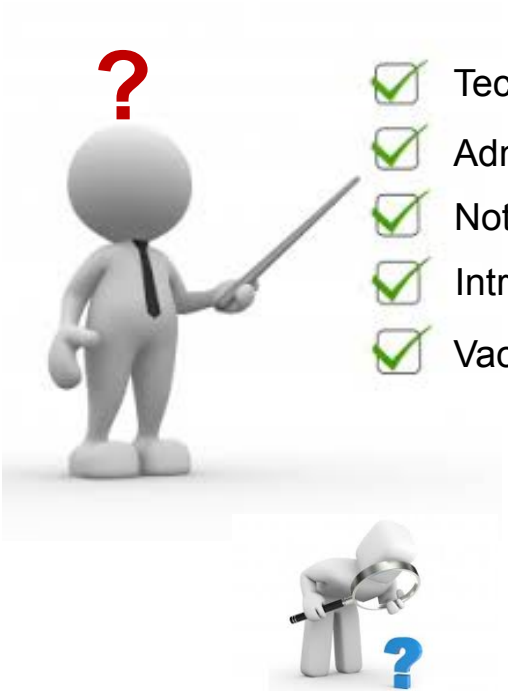


RT-PCR



Interpretation of PVM data

If low sero-prevalence and/or protection:



- Technical gap (e.g. vaccine quality, cool chain, training of staff, etc)
- Administrative gap (e.g. vaccine delivery)
- Not all animals were vaccinated
- Introduction of new animals after vaccination
- Vaccinated animals have moved and unvaccinated were introduced

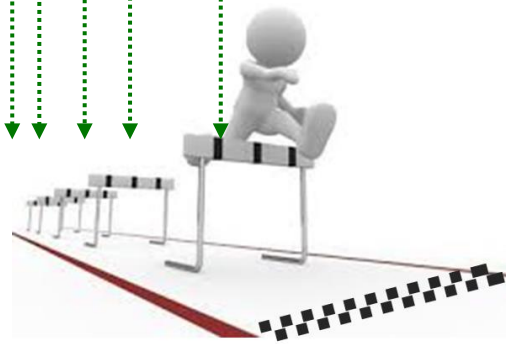
Investigation → **Improvement**

Improve vaccination program effectiveness

- Improve vaccine (strain, quality,..)
- Improve vaccine storage (cold chain)
- Improve delivery system
- Improve training
- Improve awareness

Challenges

- ✓**Animal identification**
- ✓**Awareness and incentives**
- ✓**Vaccine quality control centers**
- ✓**Correlation between protection and antibody titers**
- ✓**Validated PVM screening tools**
  (Calibrated tests, tests with vaccine strain)



Conclusion

- Vaccination is one of the most important components of FMD control,
- Ineffective vaccination is a risk and a cost,
- Several factors my lead to ineffective vaccination and should be controlled,
- PVM is necessary to ensure the effectiveness of vaccination,
- PVM program have to be well prepared according to the objective of vaccination and the local situation,
- Several elements are to be considered to establish an effective PVM,
- Collaboration between all actors and their involvement is mandatory for success of vaccination/PVM programs,
- Effectiveness of a control program is the result of a combined effect of vaccination (if used) and additional measures,
- Guidelines for FMD PVM established by OIE/FAO working group will be soon available.

THANK YOU