



**anses**

# Laboratory capacity survey

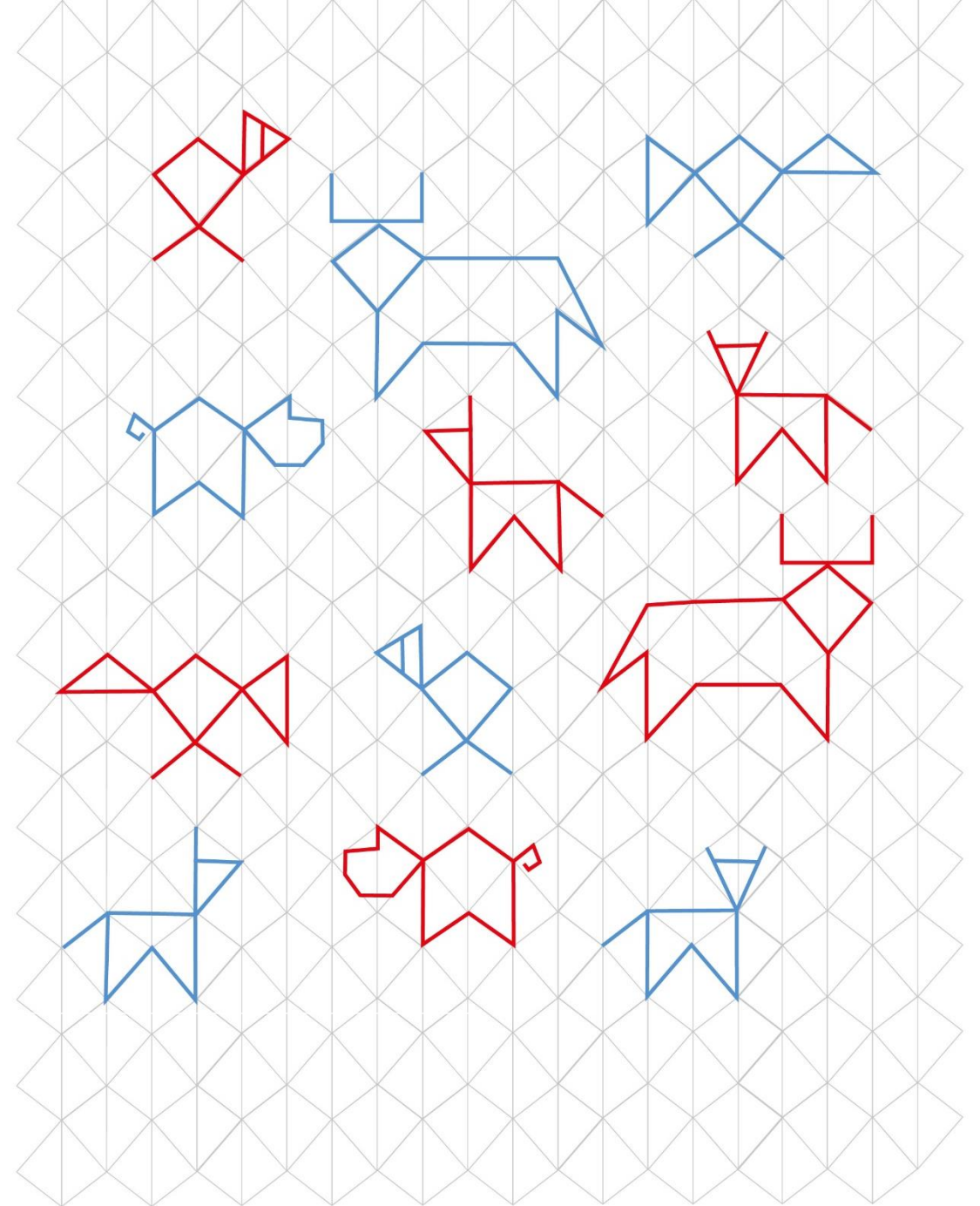
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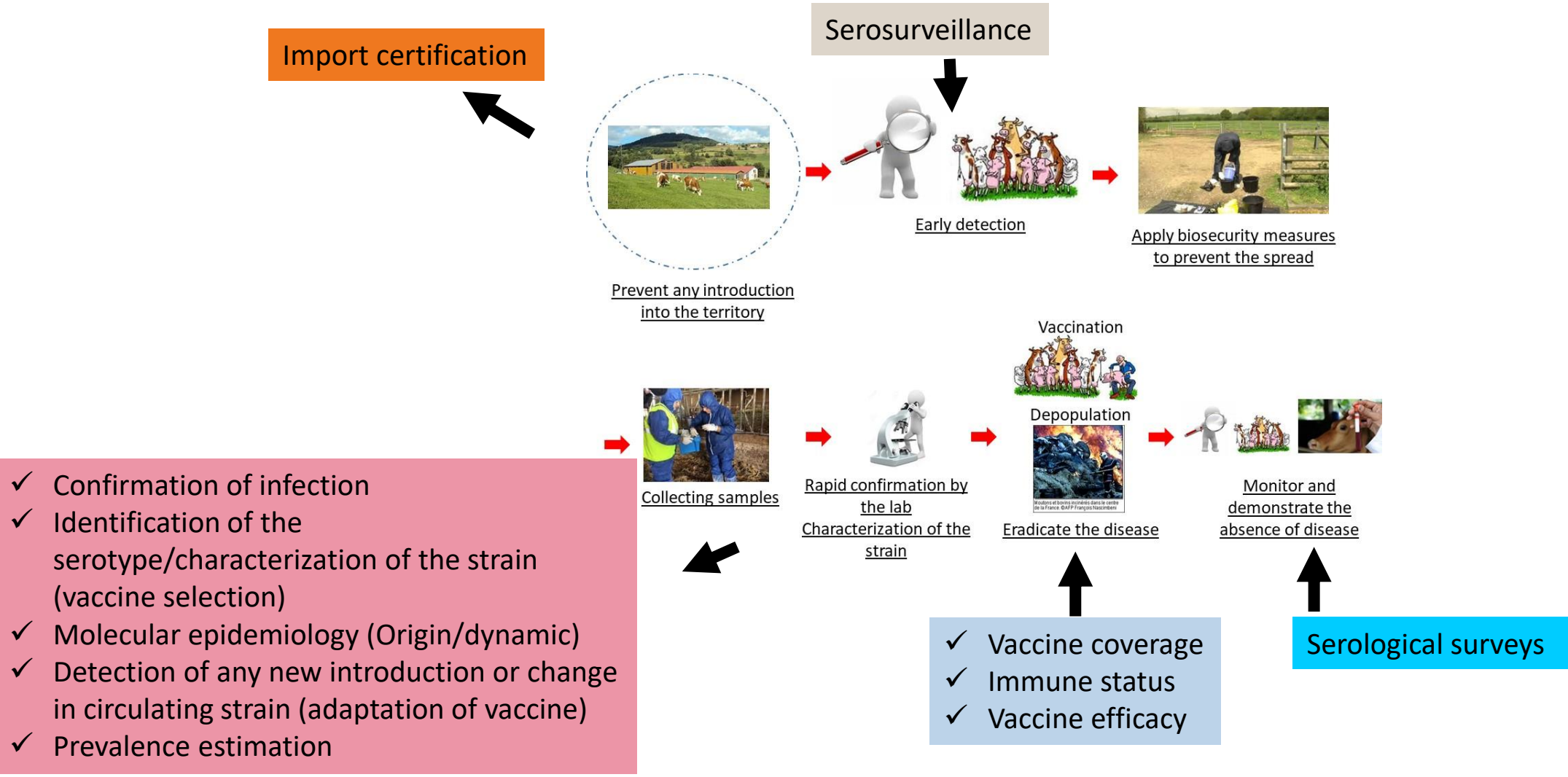
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# Laboratory diagnosis is one of the key elements in the control of FMD



## Quick, reliable and accurate laboratory results are needed

➔ Requires laboratories with good capacity



### Main key elements :

- Qualified and trained staff.
- Adequate facilities, availability of well maintained material.
- Implementation of operating procedures & quality assurance & Biosafety.
- Use of validated methods.
- Use of adequate reagents and of good quality.
- Availability of reagents and kits in laboratory and in sufficient quantity.

➔ **There is a need to identify the requirements for improving the capacity of laboratories.**

# Study on the capacities and expertise of laboratories for the diagnosis of FAST diseases

**9 national reference laboratories  
from South Eastern European  
neighbouring countries**



**As part of the EuFMD workplan  
(2019-2023) - *Risk Reduction  
programme* (Pillar II) to support  
WELNET,**

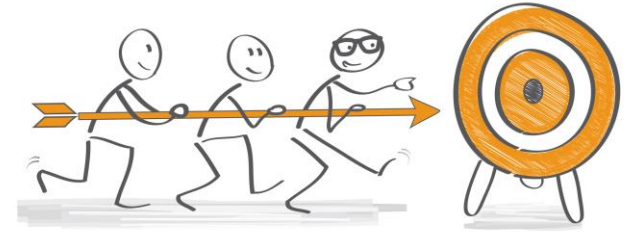
in 2020,

- Armenia
- Azerbaijan
- Georgia
- Iran (Islamic Rep, of)
- Iraq
- Pakistan
- Turkey (3 labs)

## Objectives of the study

To provide an overview of the laboratories main strengths and weaknesses regarding the detection of FMD and other TADs, including Peste des Petits Ruminants (PPR), Sheep and Goat Pox (SGP), Rift Valley Fever (RVF), Bovine Ephemeral Fever (BEF) and Lumpy Skin Disease (LSD).

- Identify the individual difficulties highlighting the needs for improvement
- Identify actions required to update and improve the functionality of individual laboratories
- Define priorities and take targeted measures to extend the diagnostic capacities and ensure the improvement of the control of FMD and other TADs
- Define and plan training sessions
- Provide objectives and indicators to help monitor progress over time



# Questionnaire design



## Online survey : Sphinx tool

- Dynamic
- User friendly
- Accessible through various electronic devices
- Qualitative and quantitative approach
- Rapid analysis – rapid follow-up
- Immediate feedback

# Questionnaire design

## Adaptation of the FAO laboratory mapping tool

### LABORATORY MAPPING TOOL (LMT) features

LMT IS A STANDARDIZED TOOL TO ASSESS THE FUNCTIONALITY OF VETERINARY LABORATORIES AND IMPROVE THEIR STANDARDS

LMT MAY BE USED BY ANY VETERINARY LABORATORY IN ANY REGION OR BY ANY DEVELOPMENT PARTNERS WORKING ON VETERINARY LABORATORY CAPACITY BUILDING

THE CORE LMT WAS RELEASED PUBLICLY IN MAY 2014

Table 1: Modules and categories for designing the Laboratory Mapping Tool questionnaire

Module	Category <sup>a</sup>	Main information captured	Number of subcategories
Module 1: General laboratory profile	Geographic location <sup>a</sup>	Strategic placing, location, accessibility	3
	Laboratory budget <sup>c</sup>	Financial autonomy	3
	Basic supply <sup>c</sup>	Electricity, water supply	3
	Organization <sup>b</sup>	Sustainable personnel organization system	1
	Linkage to satellite laboratories <sup>b</sup>	Exchange with satellite laboratories	3
Module 2: Infrastructure, equipment and supplies	Communication means <sup>b</sup>	Functionality of communication means, access to publications	4
	Infrastructure <sup>c</sup>	Containment, functionality, set-up for polymerase chain reaction (PCR) testing	8
	Equipment <sup>c</sup>	Equipment for disease (all agents) diagnosis, including post-mortem and molecular biological tools	6
Module 3: Laboratory performance	Reagent supply <sup>c</sup>	Fresh reagent supply, production, stocking, validity, procurement, affordability	8
	Staff skills and availability <sup>c</sup>	Number of trained and experienced staff, their expertise, effective working time, emergency service	8
	Sample accession <sup>b</sup>	Sample throughput, processing, reporting	6
Module 4: Quality assurance and biosafety/ biosecurity	Available technology <sup>b</sup>	Pathology, virology, bacteriology, serology, molecular biology, animal experiment	9
	Training <sup>b</sup>	External and internal training in laboratory performance, good laboratory practice, QA/quality control, maintenance, management, biosafety, sample shipment	7
	Quality assurance (QA) <sup>c</sup>	Standard requirements for competence to carry out tests and calibrations, best practice, standardization, internal and external QA testing, sample identification system	8
	Biosafety/biosecurity <sup>b</sup>	Biosafety/biosecurity application, unintentional release of pathogens from the laboratory	6
	Staff security/health <sup>b</sup>	Staff and environmental protection	3
Module 5: Laboratory networking	Laboratory collaboration <sup>b</sup>	In-country, regional, international, laboratory networking, twinning	5
	Use of databases/ platforms <sup>a</sup>	Information retrieval and sharing from public sources, use of e-platforms	4

<sup>a</sup> Experts' ranking: <sup>a</sup> = medium importance (rank 3); <sup>b</sup> = medium-high importance (rank 4); and <sup>c</sup> = high importance (rank 5).

50 questions, multiple-choice and open-ended when relevant



# Questionnaire design

## 1. Logistics of national laboratories

## 2. Diagnostic capabilities of national laboratories

- Global surveillance of diseases
- Virological diagnostic competencies
- Serological diagnostic competencies
- Molecular biology competencies

## 3. Resources for diagnostic and research

- Availability of reagents
- Quality assurance and metrology procedures

## 4. Staff skills and availability

- Staff general level of competencies in diagnostic techniques
- Training of staff in laboratory quality management, biosafety and biosecurity

## 5. Sample management, biosafety and biosecurity

- Sample management
- Biosafety/Biosecurity

## 6. National, regional and international networks and inter-laboratory coordination

- Proficiency test (PT) experience
- Information retrieval
- National, regional and international laboratory network

**eofmd** *Identification of FAST diagnostic capacities*

**Virological diagnosis**

**10. Expertise in virology (number of biological samples per year)**

Few routine samples  Some samples  Many samples  Major routine activity

**11. Cell culture (virology) capability**

No cell-culture  Limited cell types with limited expertise  Limited cell types with good expertise  Well-established and biosafe cell culturing with different cell lines

**12. Virological diagnosis equipment**

Lack of functional equipment  Sufficiently equipped to carry out biosafe and rapid diagnosis of selected diseases (Ag ELISA)  Sufficiently equipped to carry out biosafe and rapid diagnosis including by virus isolation  Sufficiently equipped to carry out biosafe and rapid characterization (neutralization tests, vaccine matching)

**Needs for improvement of virological diagnosis capabilities.**

4/20

Powered by Sphinx

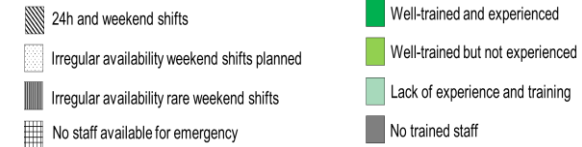


## Main findings

### Staff diagnostic skills and availability

- The staff **skills vary from country to country** for the virology, serology and molecular biology competencies.
- Need for training : **virus isolation** and **serology** was expressed specifically for some countries but was less important than the need for **training in molecular biology** (PCR, RT-PCR) and **sequencing**, with a strong interest expressed in data analysis by some of the participants.
- The need for the **implementation of serological tests** specific for some of the FAST diseases was strongly expressed, especially for SGP, RVF, BEF and LSD.

Laboratory	1	2	3	4	5	6	7	8	9
Virology	Well-trained but not experienced	Lack of experience and training	Well-trained and experienced	Well-trained and experienced	Well-trained but not experienced	Well-trained and experienced	Lack of experience and training	Well-trained but not experienced	No trained staff
Immunoserology	Well-trained but not experienced	Well-trained but not experienced	Well-trained and experienced	Well-trained and experienced	Well-trained but not experienced	Well-trained and experienced	Well-trained and experienced	Well-trained and experienced	Well-trained and experienced
Molecular biology	Well-trained but not experienced	No trained staff	Well-trained and experienced	Well-trained and experienced	Well-trained but not experienced	Well-trained and experienced	No trained staff	Well-trained but not experienced	Well-trained and experienced
Staff availability for emergency	24h and weekend shifts	Irregular availability rare weekend shifts	24h and weekend shifts	24h and weekend shifts	24h and weekend shifts	Irregular availability rare weekend shifts	24h and weekend shifts	24h and weekend shifts	24h and weekend shifts

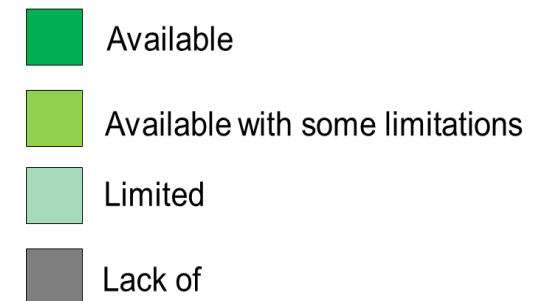


## Main findings

### Levels of training in quality management

- The staff **skills vary from country to country** in QA, QC, maintenance, metrology and laboratory management.
- A third of the participants asked for **training in Quality and in laboratory management**
- **Harmonization of practices** at the regional level would improve the standards and allow the implementation of a coherent quality system throughout the region, improving the confidence of the diagnostic results provided by the laboratories.

Laboratory	1	2	3	4	5	6	7	8	9
QA/QC	Available	Limited	Available	Available	Available	Lack of	Available with some limitations	Available with some limitations	Available
Maintenance and calibration	Available	Limited	Available with some limitations	Available	Available with some limitations	Lack of	Limited	Available with some limitations	Lack of
Biosafety	Available	Limited	Available	Available	Available	Available	Available with some limitations	Available with some limitations	Available
External training in laboratory diagnosis	Available with some limitations	Lack of	Available with some limitations	Available	Available with some limitations	Available	Available with some limitations	Available with some limitations	Available
Internal training in laboratory diagnosis	Available with some limitations	Available with some limitations	Available	Available	Available	Available	Available with some limitations	Available with some limitations	Available
Laboratory management	Available	Available with some limitations	Available	Available with some limitations	Available with some limitations	Lack of	Limited	Limited	Available with some limitations



## Main findings

### Biosafety/biosecurity

- Some countries pointed out the need for **trainings in biosafety/biosecurity** regarding the **shipping of infectious substances**.
- **Biosafety/biosecurity in the lab** training could allow the proper handling of the FAST threats.
- Furthermore, **awareness on the waste management modalities** should be improved as few countries have an incineration circuit of biological waste and a proper disposal of chemical waste.

Laboratory	1	2	3	4	5	6	7	8	9
Infectious substances shipping	Dark Green	Light Green	Grey	Grey	Dark Green	Grey	Grey	Grey	Dark Green

Shipping of infectious substances (IATA standards)

- Dark Green: Up-to-date certification for shipping of infectious substances (IATA standards) for more than one person
- Light Green: Up-to-date certification for shipping of infectious substances (IATA standards) for one person in the lab
- Light Grey: Out-of-date certification for shipping of infectious substances (IATA standards)
- Dark Grey: Shipment within national borders only

## Follow up

- Establish a training action plan to improve laboratory diagnostic capacity for FAST diseases in the region.
- The survey and the follow-up actions might be an example to consider for other countries in the region.
- Implement virtual/face-to-face training sessions.



## Follow up: Training

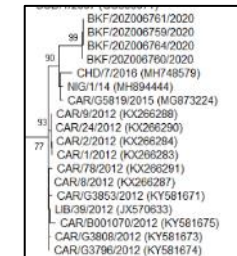
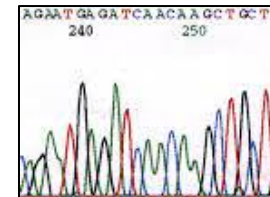
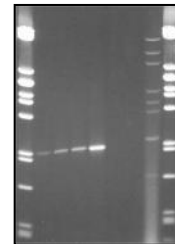
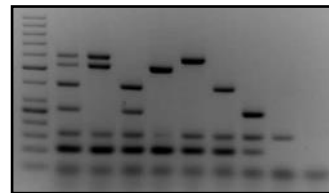
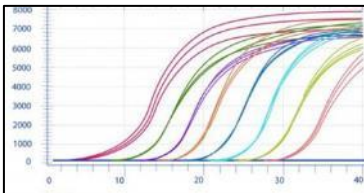


### Virtual workshop “Improved FMDV detection and typing using molecular tools”

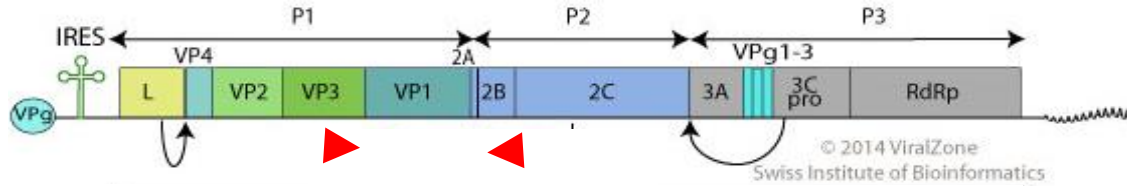
30 Nov. & 4 Dec. 2020



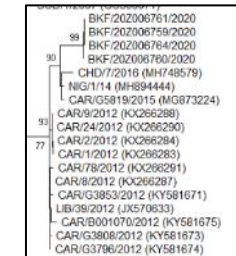
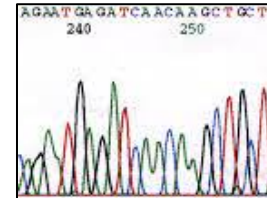
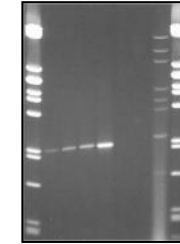
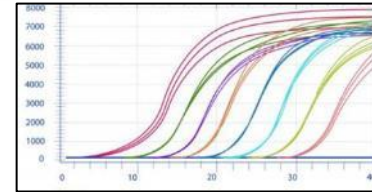
- 16 participants from 8 countries : Bulgaria, Croatia, Greece, Montenegro, N. Macedonia, Serbia, Turkey & Ukraine.
- Focus on molecular detection & typing, VP1 sequencing and phylogenetic analysis.



## Follow-up : molecular typing and sequencing exercise



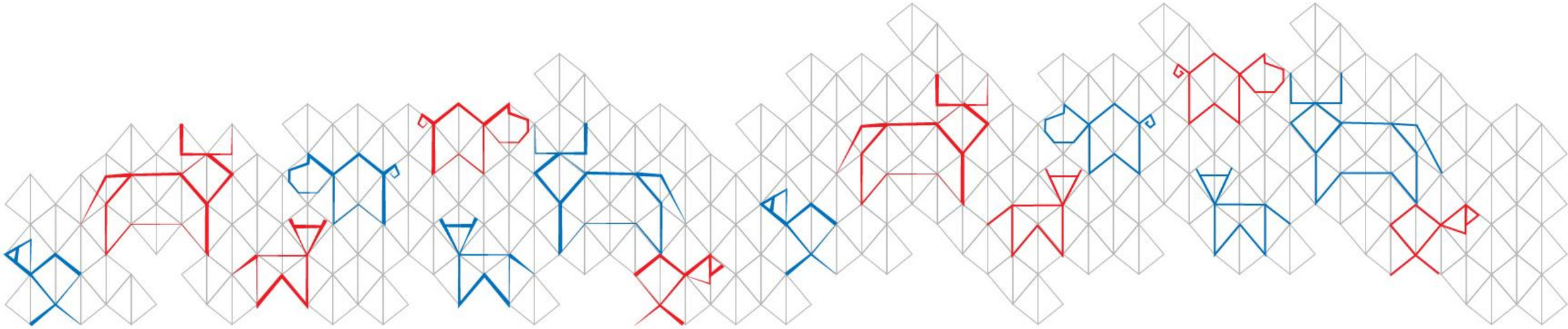
- Shipment of a panel of synthetic RNAs, primers and kits to 6 laboratories from Croatia, Greece, N. Macedonia, Serbia, Turkey, Ukraine.
- Laboratories should detect and type FMDV by RT-PCR, amplify and sequence the VP1, do phylogenetic analysis



## Follow up: Training

- Virtual training for 'Improving the diagnostic capacity of FAST diseases of laboratories: emergency diagnosis with focus on workflow, objectives and prioritization of tests, critical points, quality controls & reliability of the results, interpretation of results... (e.g. REMESA training).





*Thank you*

