



Project: Technical assistance to improve implementation of food safety standards and disease crisis preparedness

## **Training course: Epidemiological investigation**

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- General overview
- Purpose of investigation
- Epidemiology of the disease
- Outbreak dynamic
- Questions that need to be answered
- Elements of epidemiological investigation
  - Preparing of investigation
  - On spot investigation
  - Reporting

# What is epi investigation?



Investigating an outbreak of disease primarily involves **gathering, recording, analyzing and reporting information.** The general responsibility of the **'officials' investigating** the disease suspicion or an outbreak is to **detect the factors and circumstances leading** to the event.

Clinical investigation and sampling

Documents review

Interviews

Observation

Questionnaire form



1. **Stop production of virus-slaughter** infected and susceptible animals on farm
2. **Prevent spread**-trace all movements from & contacts with the farm that may have spread the disease
3. **Look for the source of disease** - back trace movements/contacts onto the farm
4. **Surveillance**
5. **Understand outbreaks** and impose appropriate additional control measures (? vaccination, enhanced biosecurity)

**ROLES FOR THE EPIDEMIOLOGIST**

# The purposes of investigation



- The purposes of investigation is to provide assessment of the **introduction** of FMD virus in a holding
- The **spread** of the virus on the holding and potential lateral **transmission** routes of the viruses from infected premises to other premises





The reasons for investigation can be the following which should as well be taken under consideration:

- suspicion
- contact holdings
- outbreak
- surveillance on holdings in restriction zones
- other



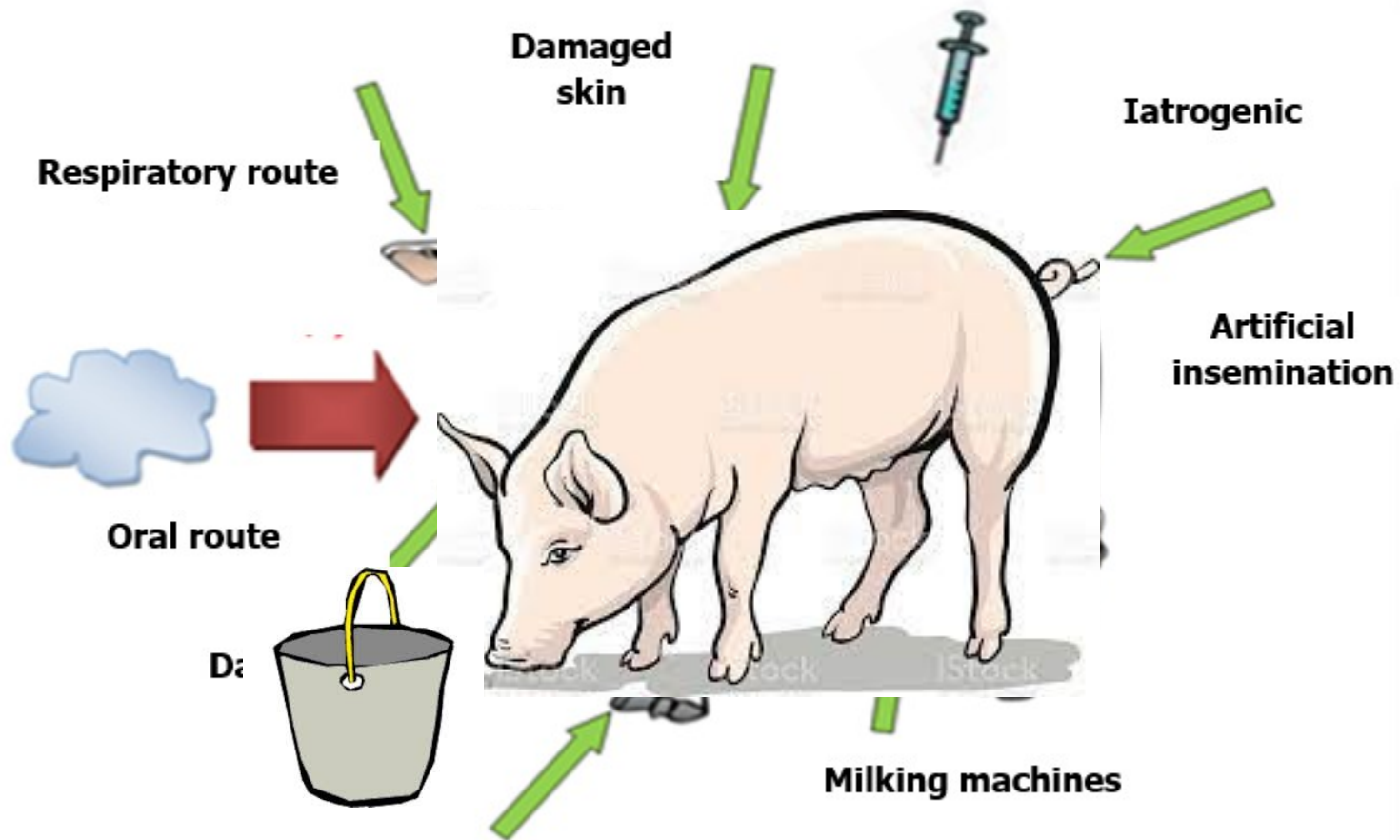
- One of the **most contagious** viral disease that mainly affects cattle and swine, but it can also affect sheep, goats and other cloven-hoofed ruminants and wild cloven-hoofed animals
- Family *Picornaviridae*, genus *Aphthovirus*
- **Seven** immunologically distinct serotypes: A, O, C, SAT1, SAT2, SAT3, and Asia1 which do **not confer cross immunity**
- **Low** mortality rate in old animals



- **Direct** contact
- Virus can be shed through the **breath saliva, faeces**, and urine; milk and semen (up to 4 days before clinical signs)
- Contaminated animal **products**
- **Fomites or iatrogenic**
- Through the **air** (wind)
- Incubation **few days to 2 weeks**



# Epidemiology of FMD - 3





## **Domestic**

Anorexia

Fever

Depression

Lameness

Reduced milk, mastitis

Salivation

Death of young animals

Vesicles and lesions

Recovery in 2 – 3 weeks

## **Wild**

No signs of disease or

Weakness

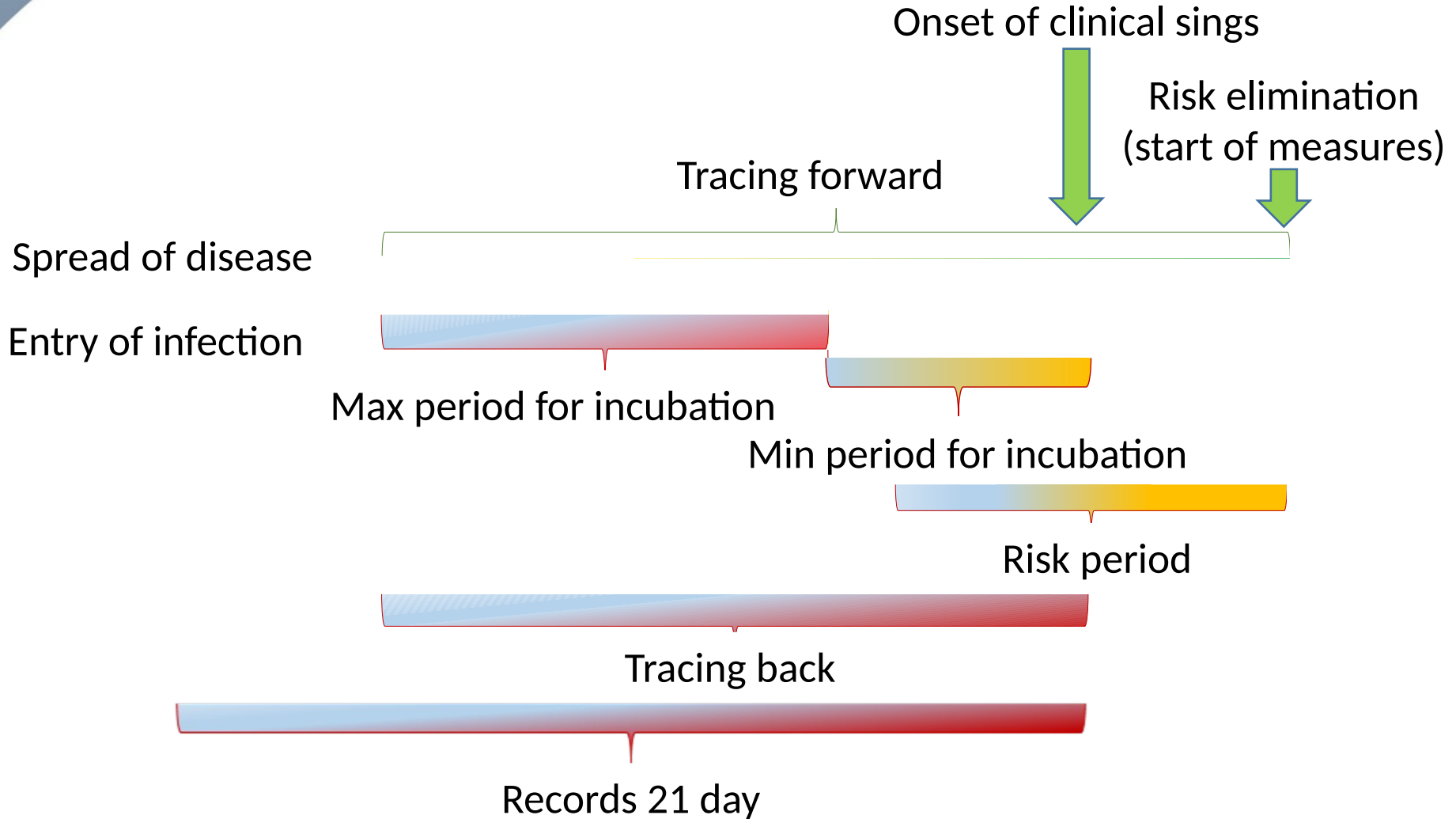
Fatigue

Acute lameness

Salivations and vesicles



## Outbreak dynamic



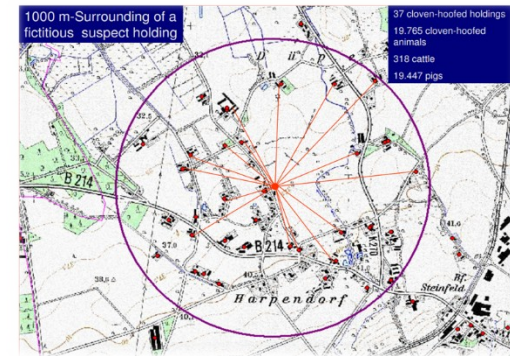


To facilitate the work of the investigator drafted forms, however there are main questions that require, and answers are

**What?**



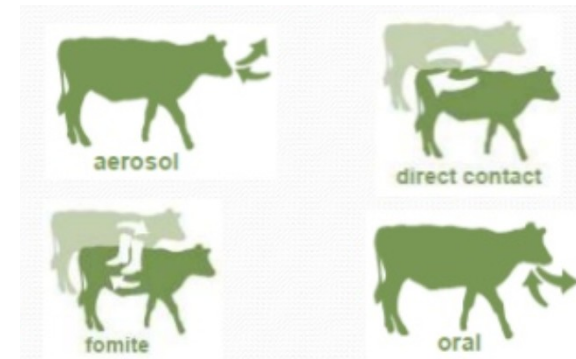
**When?**



**Where?**



**How?**





- identify the likely origin of the listed disease in question and the means of its spread;
- calculate the likely length of time that the listed disease has been present;
- identify establishments and epidemiological units therein, food and feed businesses or animal by-products establishments, or other locations, where animals of listed species for the suspected listed disease may have become infected, infested or contaminated;
- obtain information on the movements of kept animals, persons, products, vehicles, any material or other means by which the disease agent could have been spread during the relevant period preceding the notification of the suspicion or confirmation of the listed disease;
- obtain information on the likely spread of the listed disease in the surrounding environment, including the presence and distribution of disease vectors



Answers to this question can be obtained by asking general or more detailed questions.

The technique for asking questions is critical so there is provided recommendation and detail instruction how to conduct investigation and to populate the provided forms.



In general, the epidemiological investigation is divided in three parts:

- 1. collecting of data and preparation for visit of the establishment,**
- 2. on-spot investigation and analysis of the data post-investigation,**
- 3. reporting.**

Common ground for all three parts is providing of evidence and record keeping.



Before starting the on-spot investigation, the investigator should ensure that is well prepared for field activities.

The minimum you need to consider is to take:

- PPE;
- cleaning equipment;
- disinfection equipment;
- recording equipment (investigation forms, pens);
- other equipment you think will come useful and needed (torch, extra batteries).





Before you go to establishments it is also important to collect all information available for that establishments.

This information can come from different sources:

- data base
- previous reports
- notification received, etc.

Data that need to be collected on:

- location
- disease
- previous outbreaks of FMD (if it relevant)



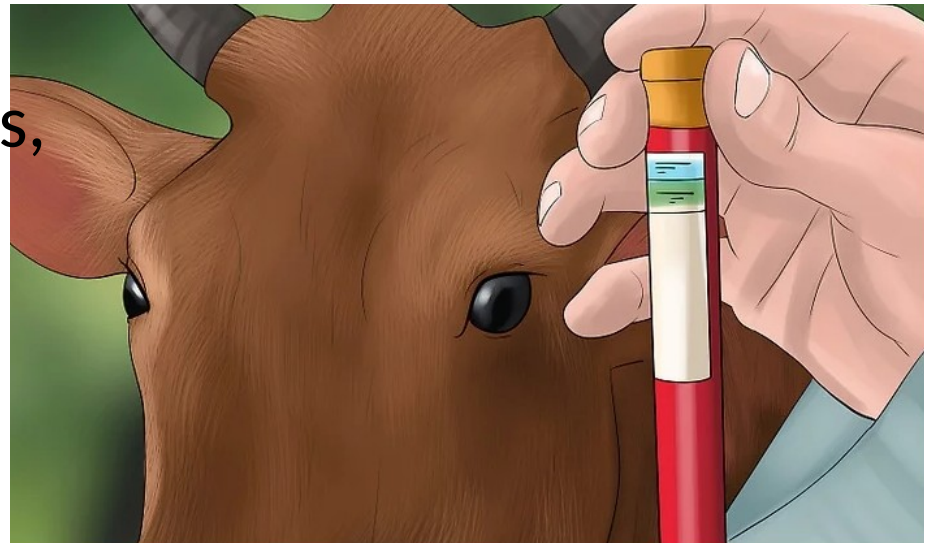
On-spot investigation can take place for the purpose of the suspicion or outbreak investigation, in the holding which is restricted zones, in contact holdings or for other purposes, for example before the 'official' surveillance may be lifted.

# Part 2 - On-spot investigation



- check of the production and health **records** of the holding,
- **drop in production**, feed-and water intake if any mortality,
- **onset** of clinical signs,
- a clinical inspection in each production unit, at the level on holding and individually,
- a check of **records on movement** of animals on and of the holding,
- investigation of **other movement** on and of the holding,
- assessment of the **biosecurity** at the holding,
- collecting of **samples**.

- Clinical examination
  - with clinical signs
  - healthy animals first
- Sampling for laboratory diagnostic
  - based on the clinical examination,
  - the disease profile should be considered,
  - the type of samples,
  - the number of samples,





The final part of the investigation is analysis of the data and drafting of report with the assumption on the possible introduction and spreading of the virus.

It is important to document details of the outbreak and the subsequent investigation and response. The outbreak investigation report is a way of communicating information about the outbreak and the effectiveness of your response to your colleagues and superiors within the veterinary 'services' and it will provide recorded evidence of the investigation. The report based mainly on the information gathered during the outbreak investigation, using the standard outbreak investigation form.



1. **General data** (title, date, author, outbreak No, etc)
2. **Executive summary** (basic summary information about the outbreak, including details of location (state-division, district, town, village), date of onset, date of first visit, species affected (using a table to indicate the total number of animals on the farm, the number affected, and the number dead), and the results of any laboratory tests.)
3. **Description of the outbreak** (a description of the outbreak and how it spread farm or village)
4. **Timeline of the key events** (details about the animals affected, the time of onset)
5. **Results of the on-spot investigation** (any particular information from the investigation which are not mentioned in other section)



6. **Overview of the tracing back and tracing forward** (as detailed as possible data on the findings and the priorities for investigation).
7. **Assumption and hypothesis** (a description of your hypotheses about how the outbreak might have started and what were the most likely risk factors/risk materials involved in the introduction of the disease)
8. **Measures implemented** (a description of the emergency control measures and biosecurity measures implemented, any other measures and restriction including, to the extent possible the actions from the other involved stakeholders)
9. **Conclusions, recommendations and follow-up actions** (a description of future actions that should be taken to fully control the outbreak and also to prevent future recurrence).



Ideally, the outbreak investigation report should be completed as soon as possible after the initial investigation in order to keep all levels of the veterinary 'services' well informed.





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# THANK YOU FOR YOUR ATTENTION



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