

LinkTAD webinar

Welcome! We will begin at 14.30 (Beijing time)

Before the webinar begins, you can check that your sound is working by selecting 'Meeting' and 'Audio Setup Wizard' and following the on-screen instructions. You don't need to set up a microphone.



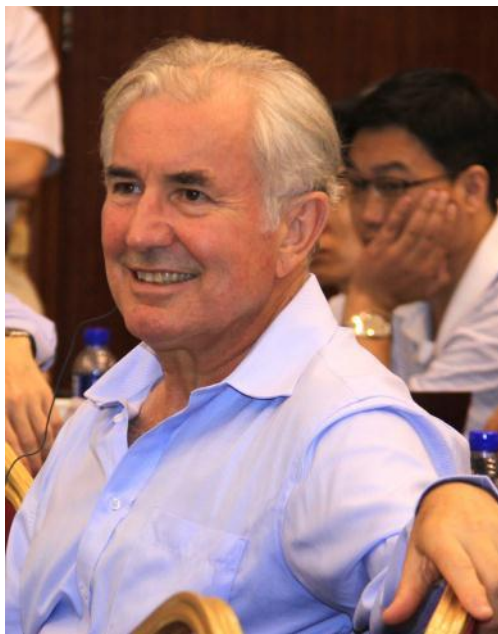
If you have any problems, please use the chat box to ask for our help. You can also say hello to your fellow participants using this box.



Agenda

- Introduction
- How to use the webinar screen
- Technical presentation:
 - *Disease Outbreak Investigation (DOI)-
more than “take a sample and run”!*
- Questions throughout- for you and us!
- We will be recording the webinar

Introductions



John Edwards

Jenny Maud



Chris Bartels



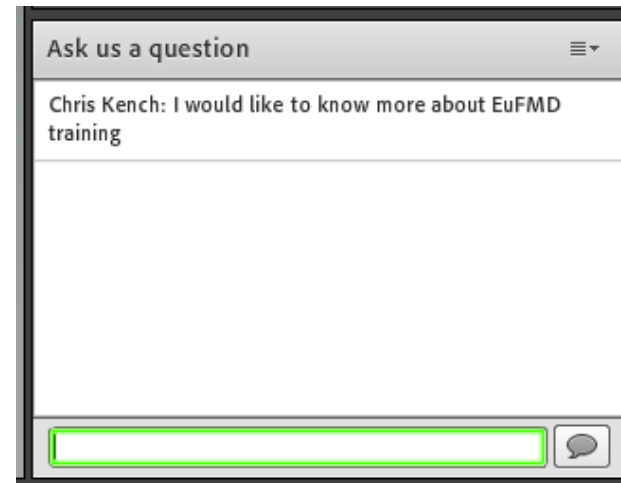
Introduction to the webinar series

Support to GF-TADS under LinkTADs – *LinkTADs aims to bring together world-class research institutes and experts in cross-border cooperation with the aim to coordinate research between the EU and China, thus improving scientific excellence in animal health (epidemiology and laboratory).*

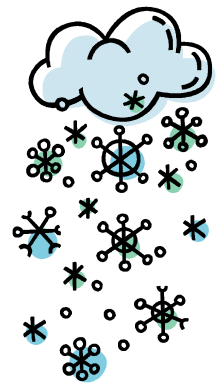
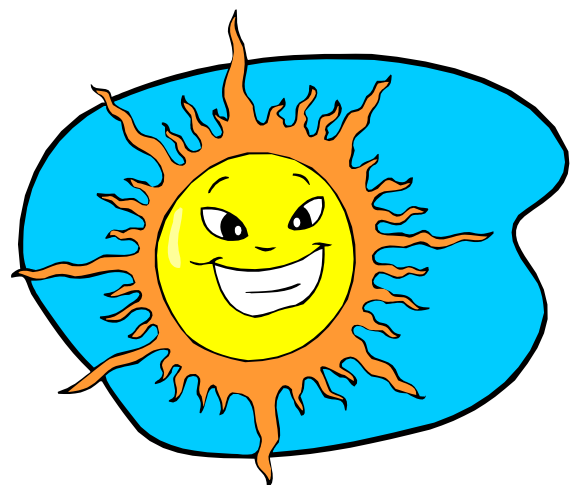
Main objectives:

- **identify the priority areas**, where joint actions are needed;
- **link research activities** carried out on by European and Chinese programmes;
- ensure a wide-range **networking of scientific communities** and stakeholders;
- provide a **long term vision** and coordinate future common research;
- contribute to the **EU international policies**;
- **support young researchers** through exchange programmes and training;
- **share the results and methodologies** within and outside the consortium;

Introduction to the webinar



How is the weather today?



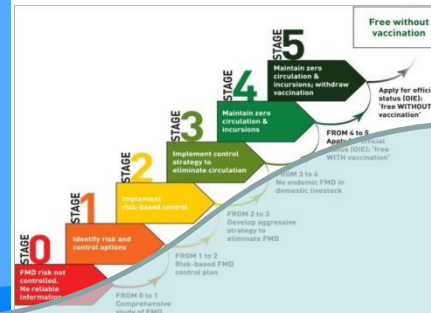
Where are you?



Disease Outbreak Investigation (DOI): more than “take a sample and run”!

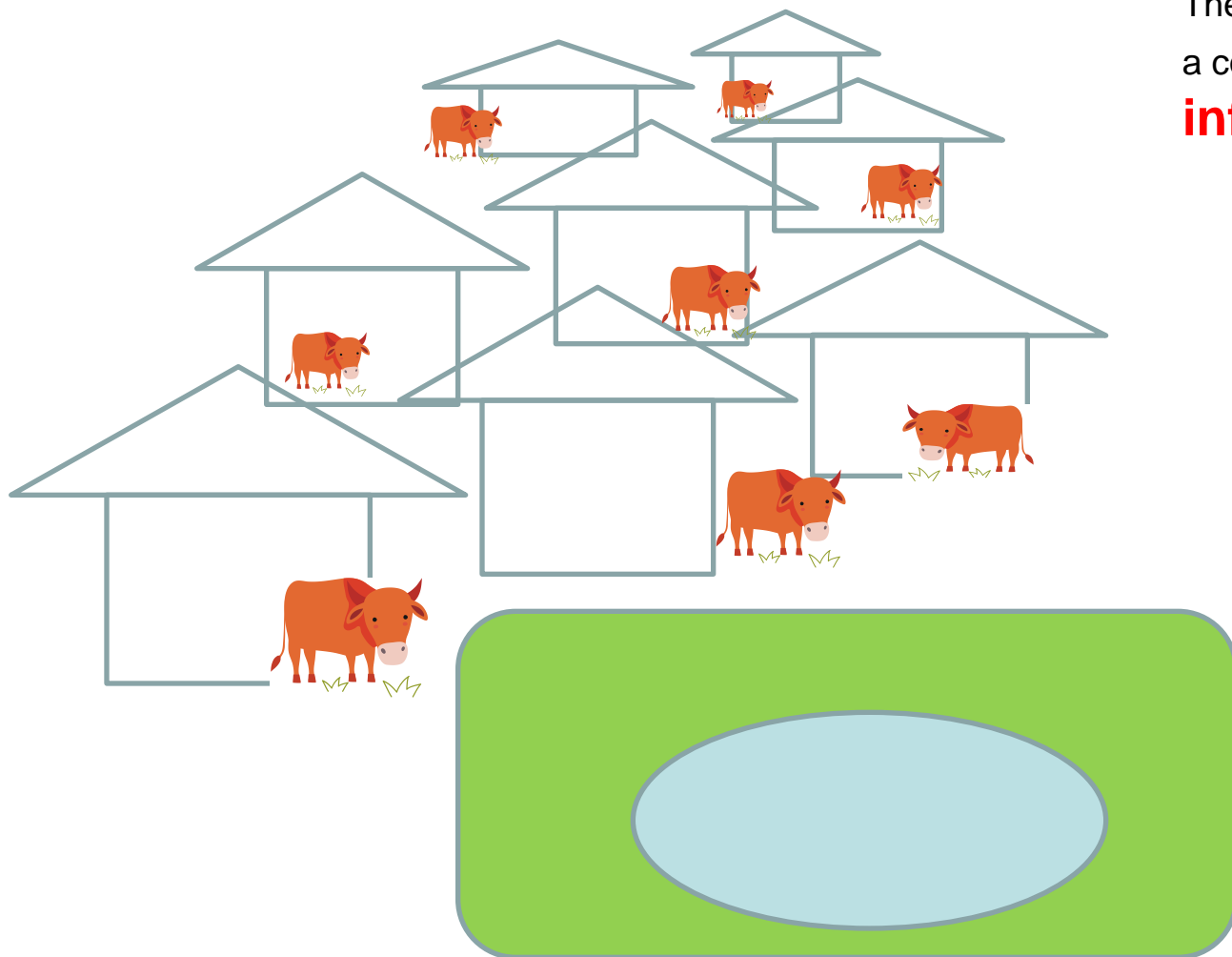
Chris Bartels

At the end of this webinar ...



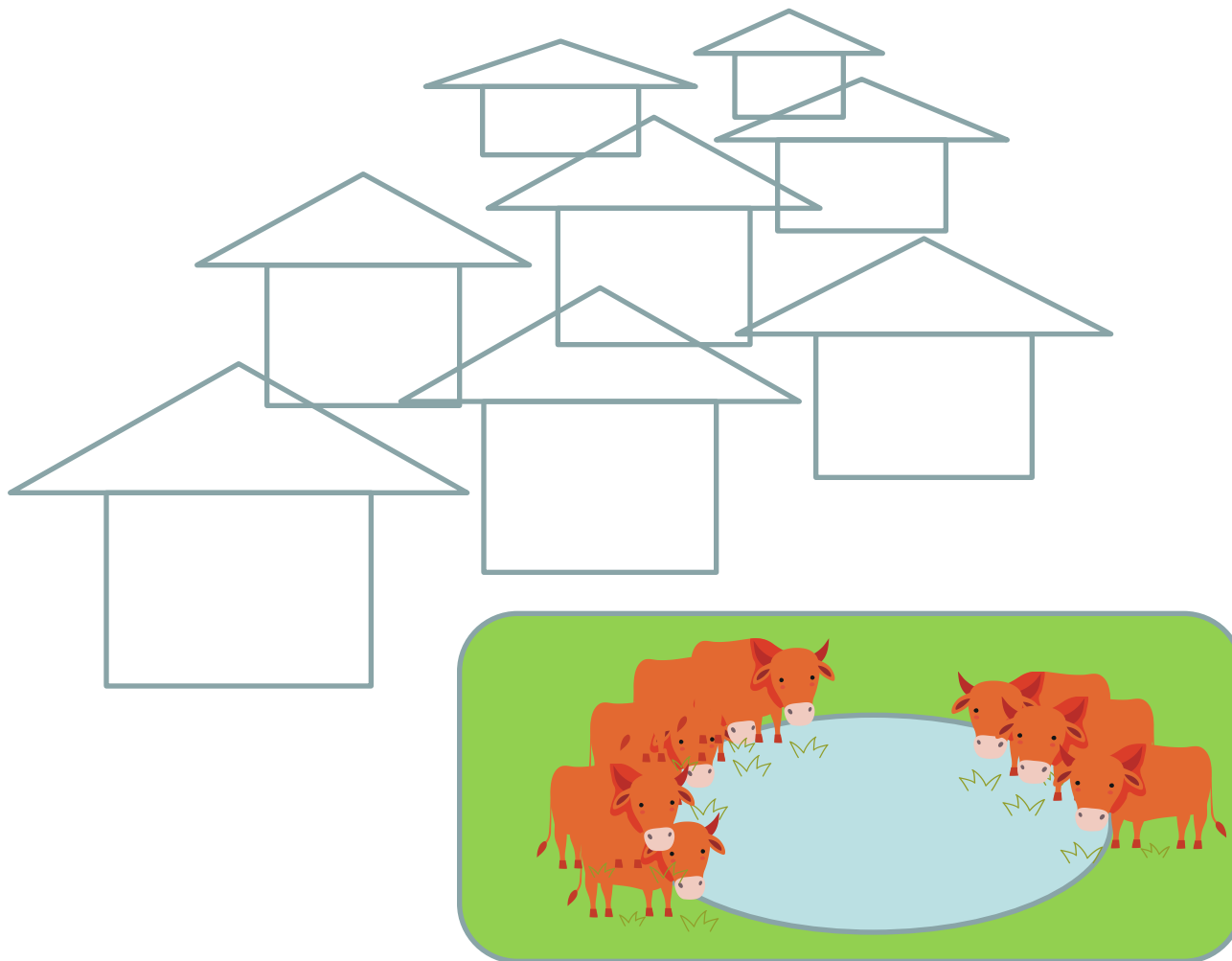
you are motivated to reflect on improving outbreak investigation protocols in support to decision making on FMD control, along the steps of the PCP-FMD framework

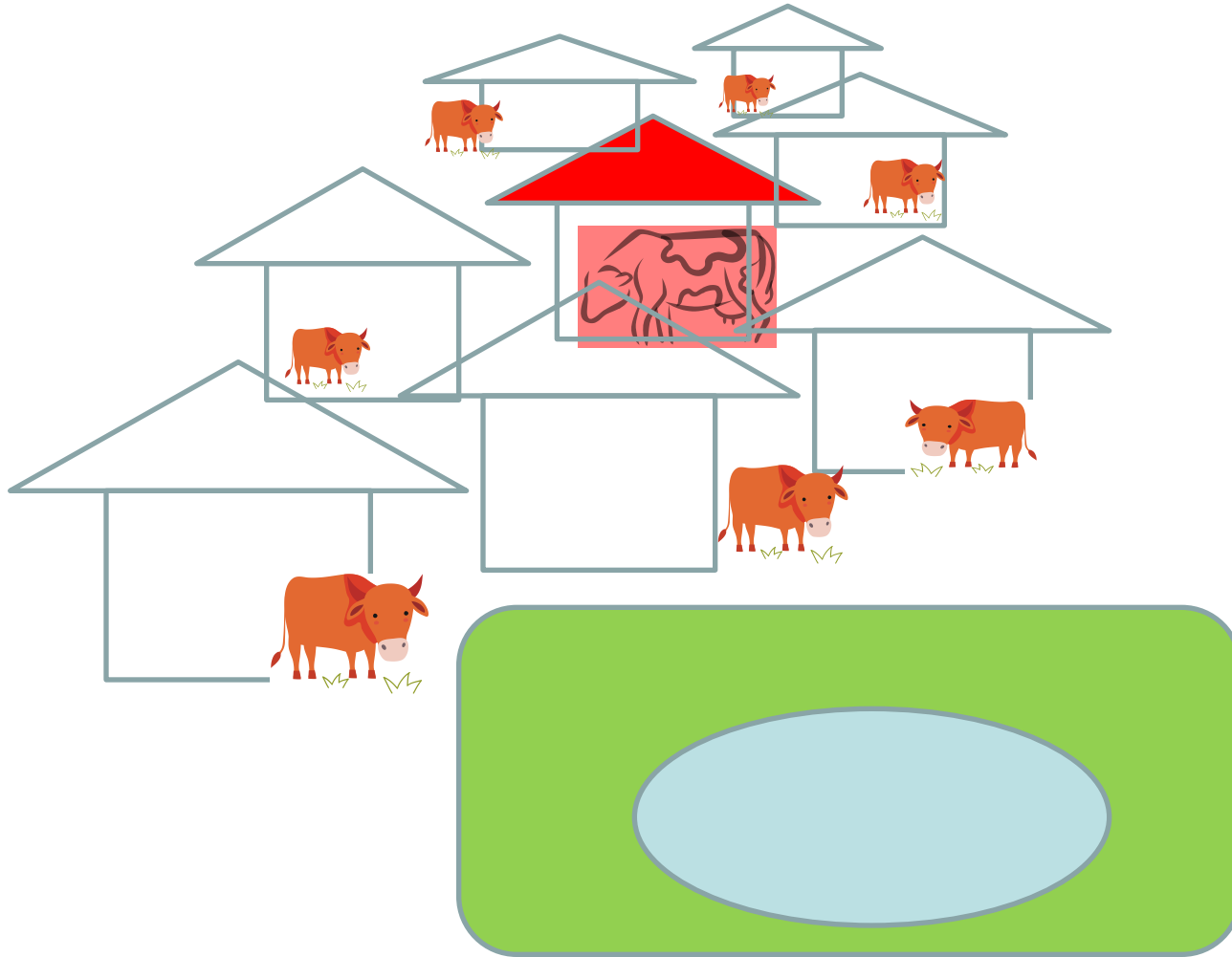
A simple story about FMD
There is a village in rural area in
a country **endemically**
infected with FMD,



A simple story about FMD

There is a village in rural area,
where for some reason
FMD virus is introduced.
Clinical signs are not yet
apparent and animals
happily graze and drink
together, until ...

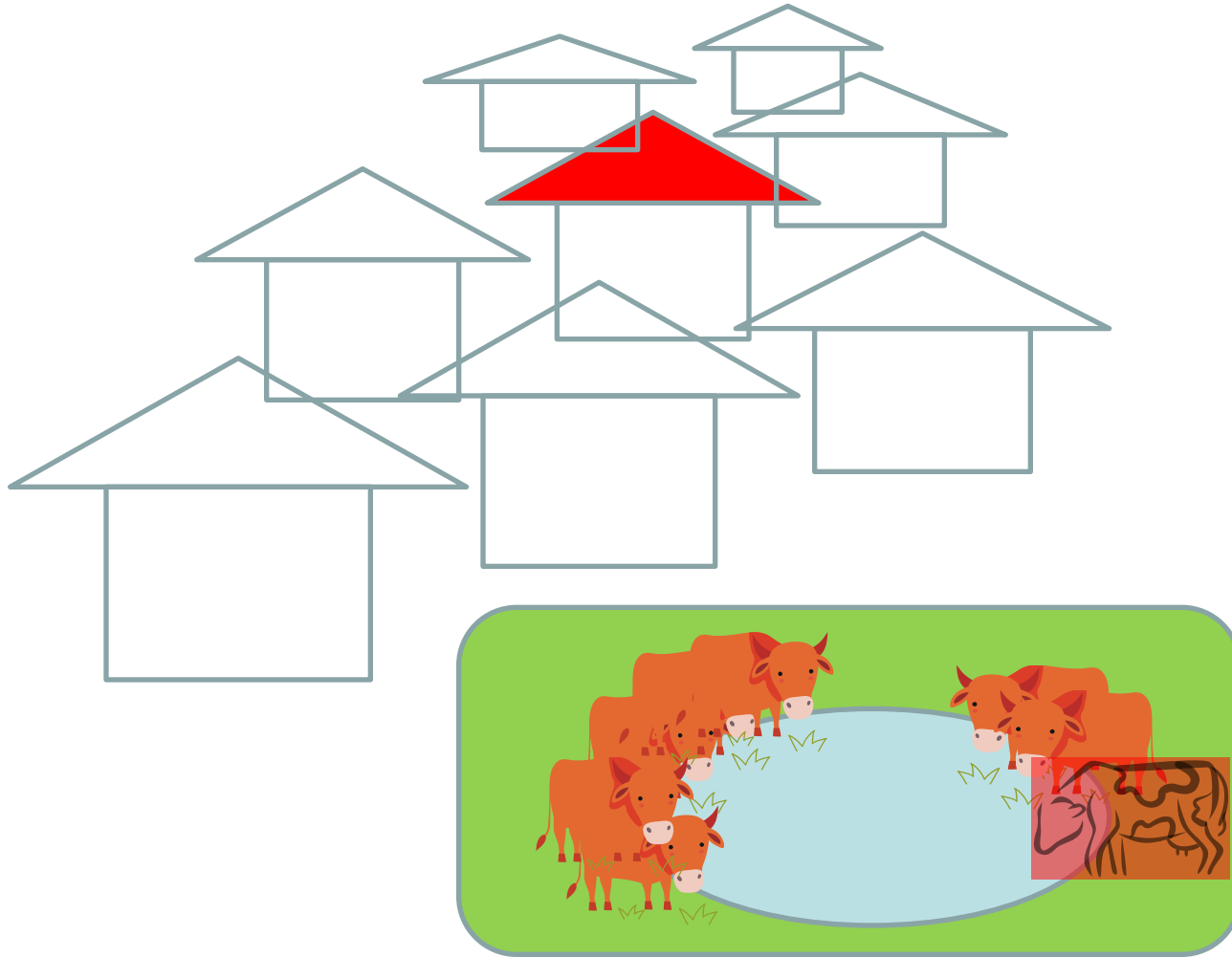




A simple story about FMD

There is a village in rural area, where for some reason FMD virus is introduced. Clinical signs are not yet apparent and animals happily graze and drink together, until that day that a cow falls sick.



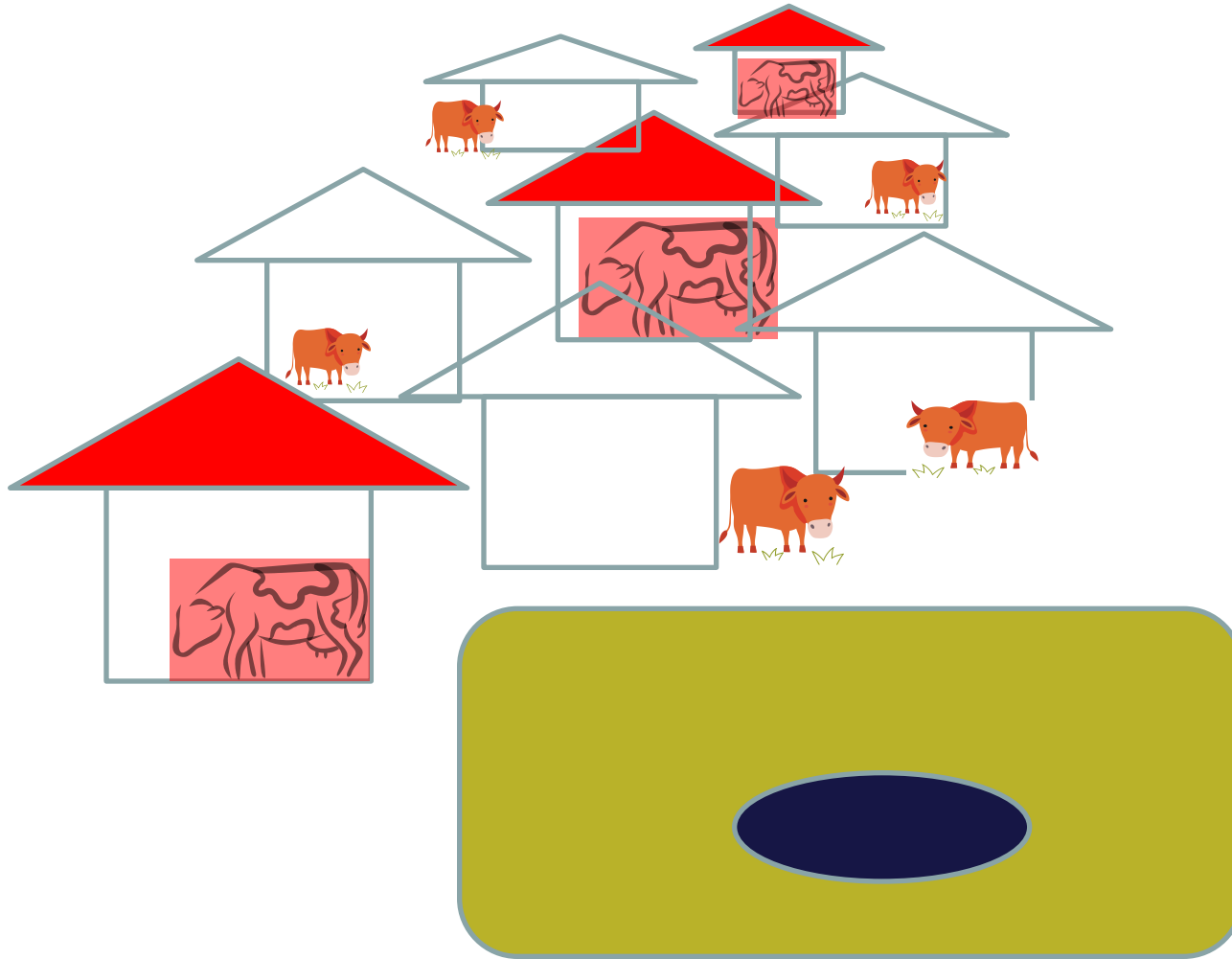


A simple story about FMD

There is a village in rural area, where for some reason FMD virus is introduced. Clinical signs are not yet apparent and animals happily graze and drink together, until that day that a cow falls sick.

Through many possible routes, FMD virus may spread to other livestock as all live very close with each other.

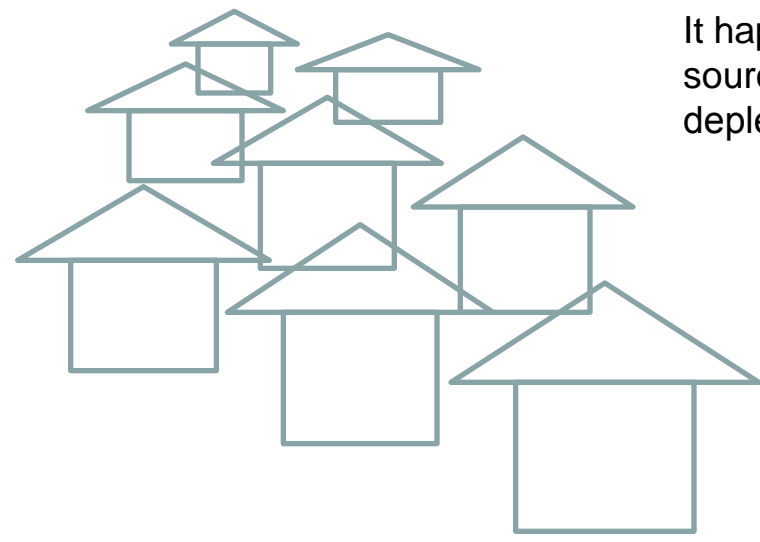
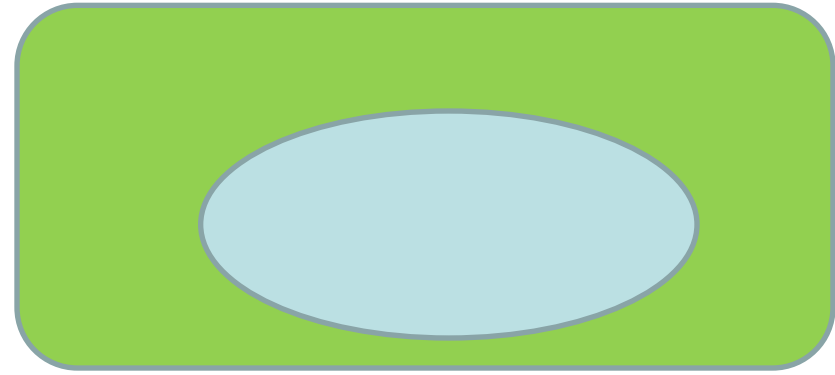
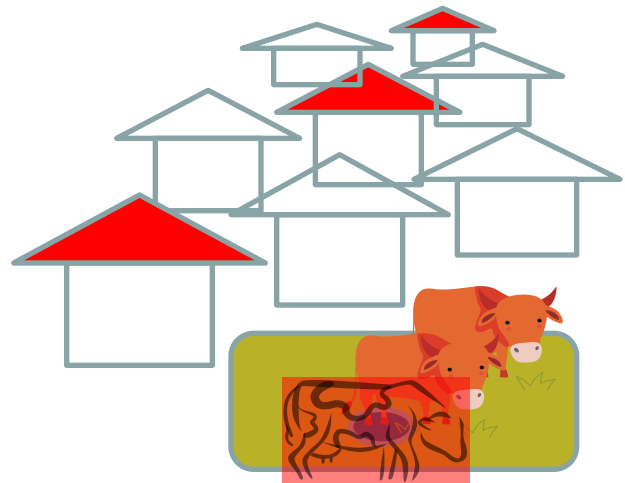
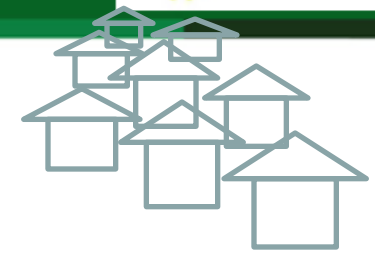




A simple story about FMD

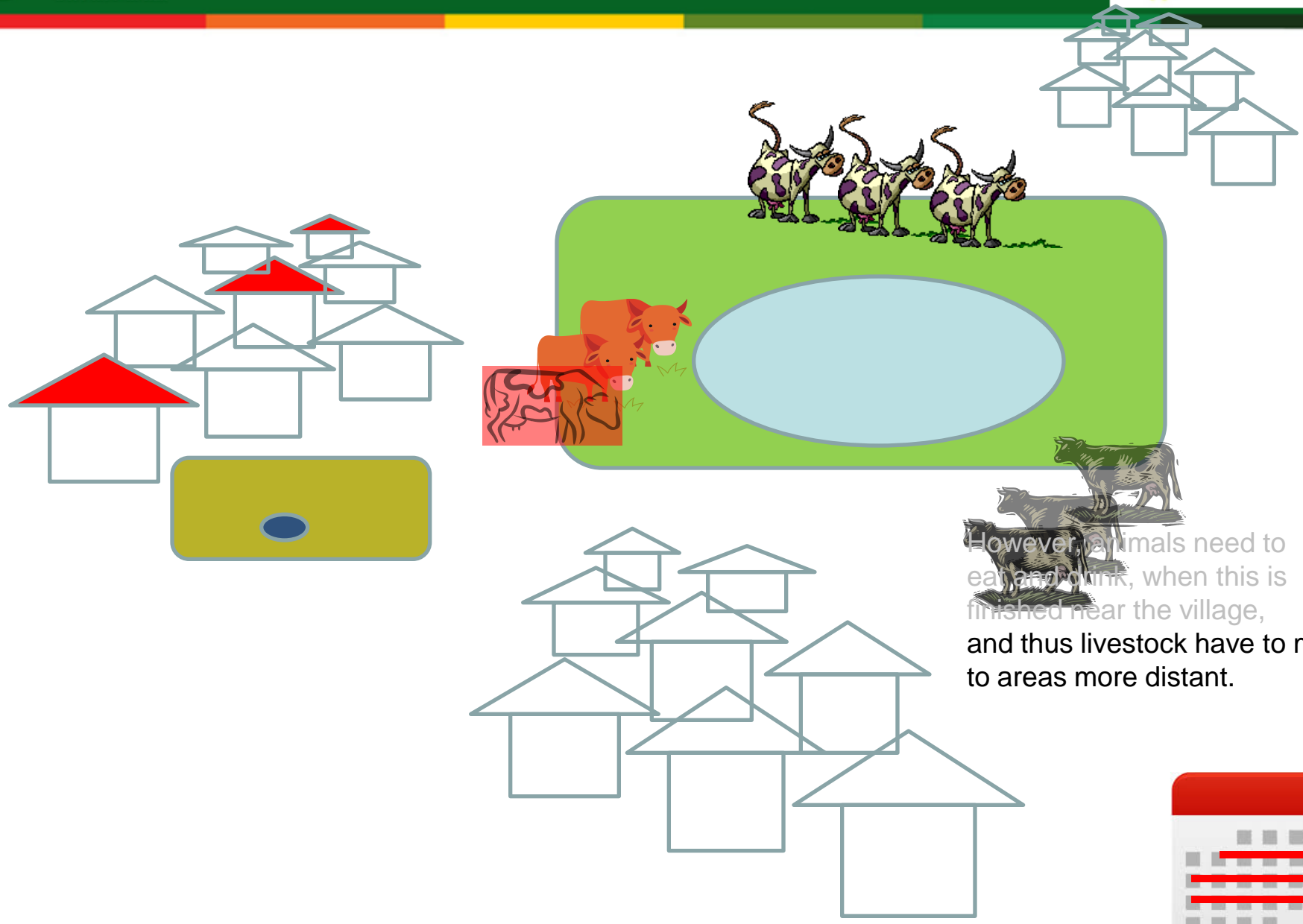
There is a village in rural area, where for some reason FMD virus is introduced. Clinical signs are not yet apparent and animals happily graze and drink together, until that day that a cow falls sick. Through many possible routes, FMD virus may spread to other livestock as all live very close with each other. Thus FMD affects more and more animals ...

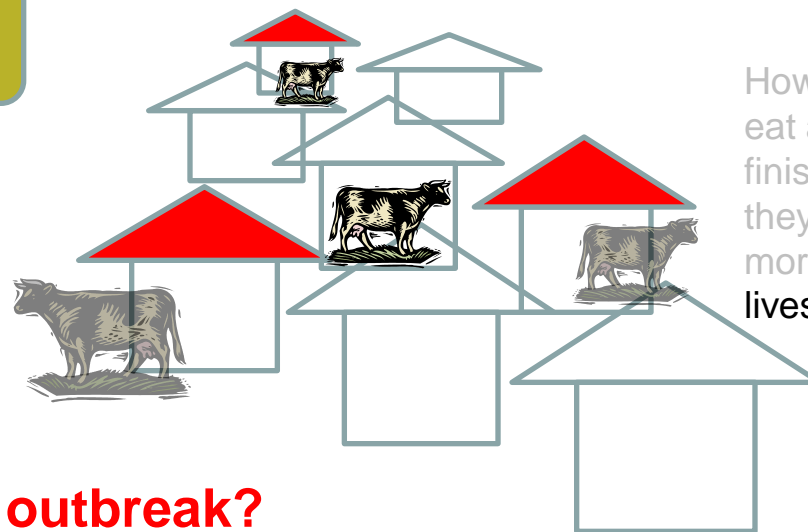
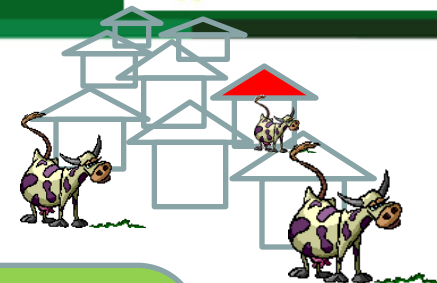
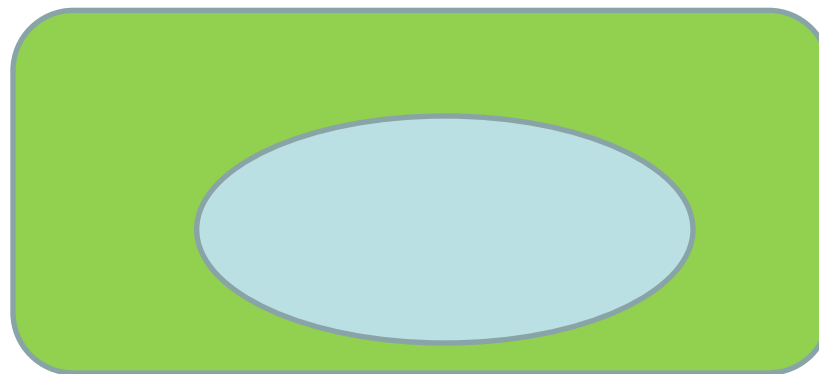
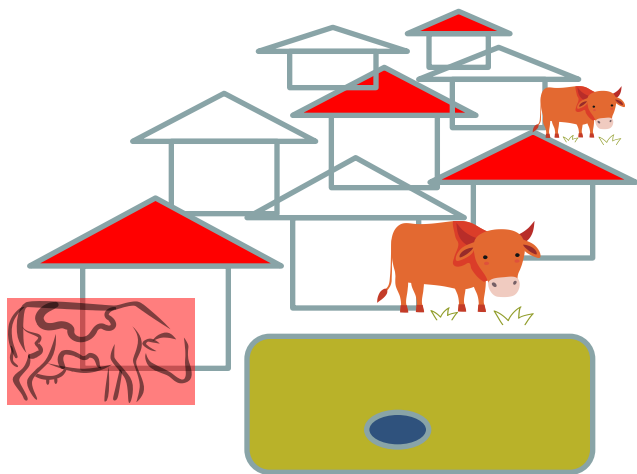




It happens so that the water source for this village becomes depleted ...

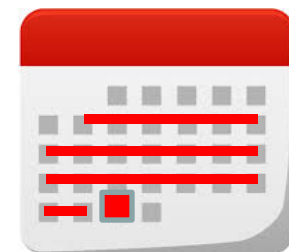






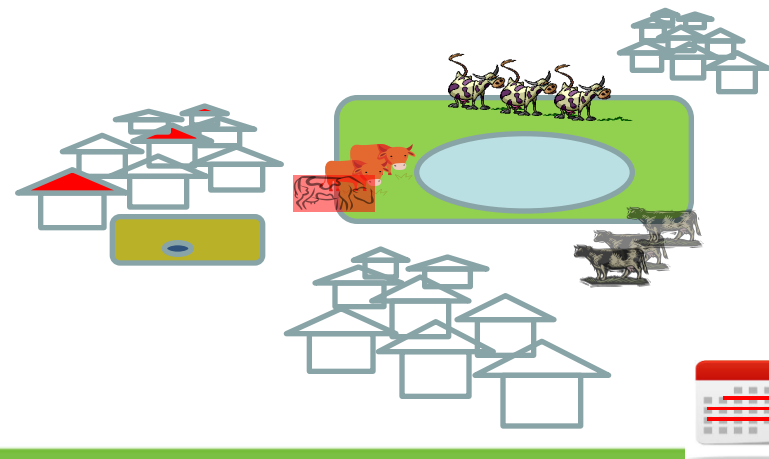
However, animals need to eat and drink, when this is finished near the village, they have to move to areas more distant, risking to infect livestock of nearby villages.

How to investigate this outbreak?
What information can be gained from this outbreak?



If one affected animal = one Case, how is one outbreak defined?

1. A **small holding** with one or more affected animal(s)
2. A **village** with one or more affected smallholdings/
animals
3. **All villages** with affected animals, that share the same
water source



An outbreak refers to an epi-unit with clinical FMD

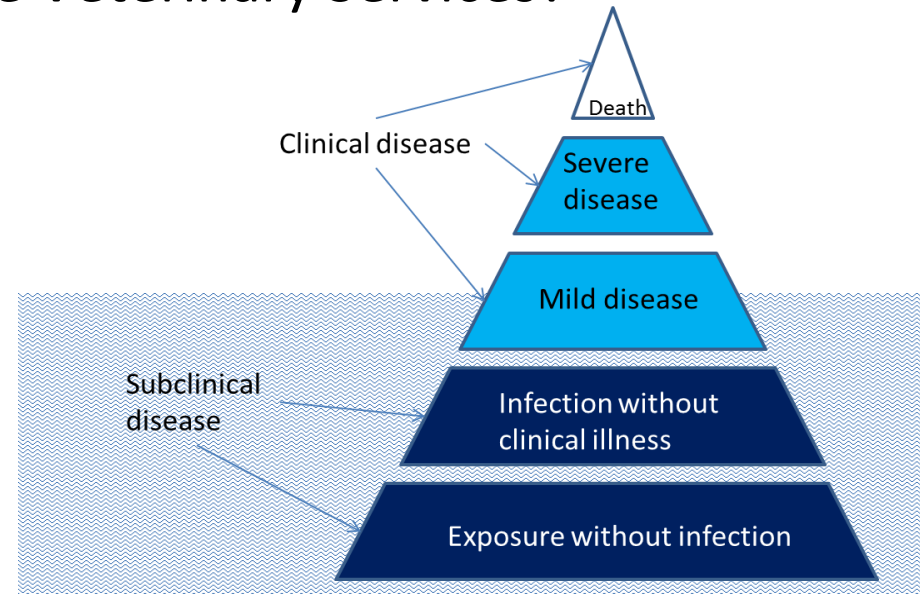
- **Epi-unit:** means a group of animals with a defined epidemiological relationship that share approximately the same likelihood of exposure to a pathogen
- In addition, one may consider administrative aspects eg. borders
- Focus for this webinar is on ‘village’ as in the above animation or ‘farm’ as in commercial farm
- How to register outbreak in an adjacent village?
 - Register as a new separate outbreak. For analysis of outbreak data, one may define that there needs to be a minimum of 30 days between notifications if reports from same or nearby epi-unit



Question

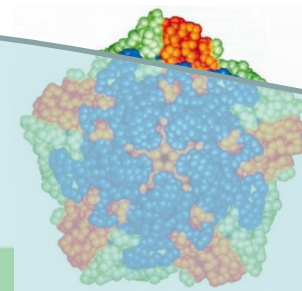
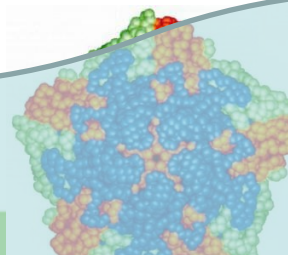
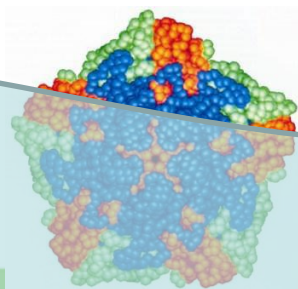
- What percentage of occurrence of FMD in livestock do you think is reported to the Veterinary Services?

1. Between 1 – 5 per cent
2. Between 6 and 10 per cent
3. Between 11 and 20 per cent
4. Between 21 and 40 per cent
5. More than 40 per cent



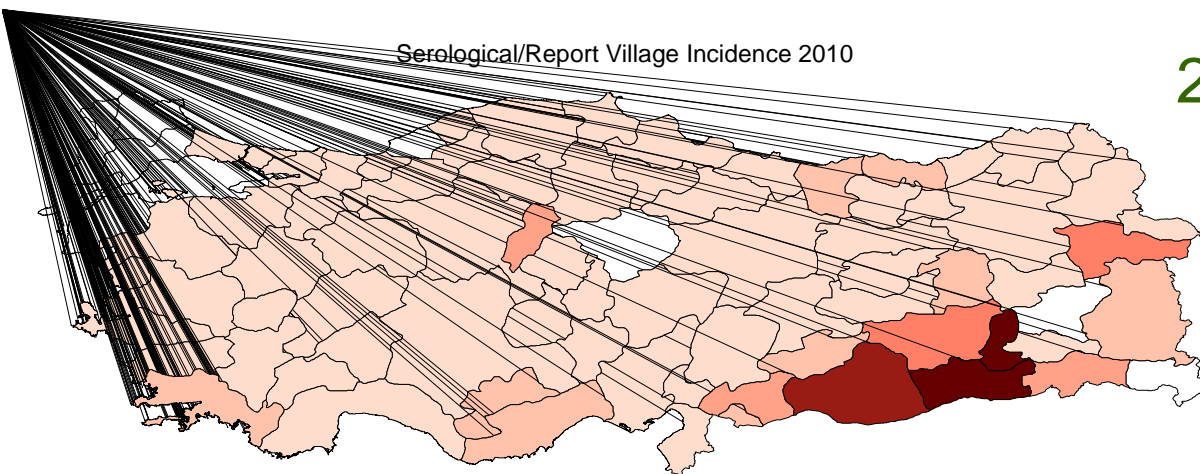
Feedback

- What percentage of clinical occurrence of FMD in livestock do you think is reported?
 1. Estimated for West Azarbaijan – Iran: 20 % (18% of villages with serological evidence of recent infection had notified FMD in last 12 months)
 2. Example Egypt 2011: $\pm 1\%$, an estimated 80% of villages had evidence of recent infection whereas no more than 25 outbreaks (out of 3000 villages) had been reported
 3. Turkey: 10% - next slide

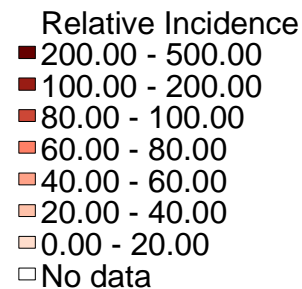


Relative comparison

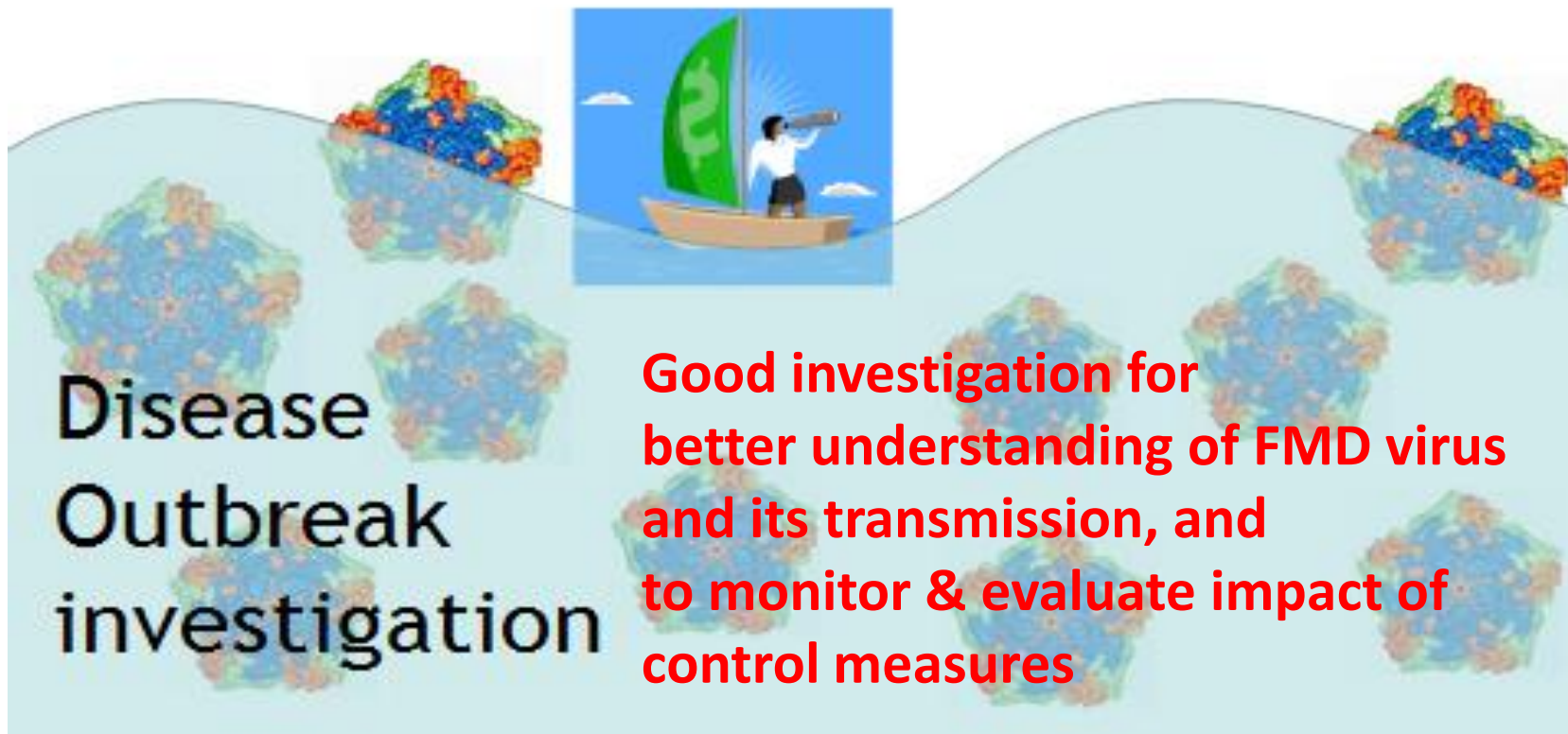
(serological \div report incidence)



2010: Median 11X



Why investigate an outbreak?



Contents of presentation

- What more steps than 'take a sample and run'?
- How to perform these steps?
- Considerations
- Relation between outbreak investigation and PCP-FMD stages 1-3
- Final remarks

Question



- What information is currently collected in your countries when an FMD outbreak is investigated?
(please check appropriate boxes, more than one option may be checked)
 1. FMD virus for serotype and strain identification
 2. Economic impact of clinical FMD
 3. Extent of infection in outbreak area
 4. Vaccine effectiveness
 5. Knowledge, attitude and practices of livestock owners about FMD control
 6. Possible source of FMD virus origin and routes by which FMD infection is spread
 7. Risk factors for clinical FMD

Relation outbreak investigation and progress in PCP-FMD

	<p>Stage 1 FOCUS Getting an understanding about FMD virus transmission and impact</p>	<p>Stage 2 FOCUS Implementation risk-based control to reduce impact of clinical FMD</p>	<p>Stage 3, 4 & 5 FOCUS Implementation control targeted at eliminating FMD virus circulation</p>
<p>Different objectives</p>	<p>Gaining a <u>general understanding</u></p>	<p>Gaining a <u>progressively better understanding and monitoring & evaluation of impact of control measures</u></p>	<p><u>Rapid detection and response</u> for each and every outbreak</p>







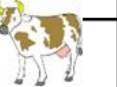
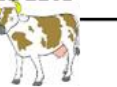


















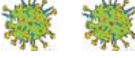

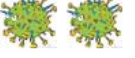








Is it really FMD?

Sampling for confirmation + getting to know the virus

Approach:

- Clinical investigation – at holding(s) that reporting FMD
 - Record findings – clinical signs (temp, lesions, morbidity, mortality, other)
 - Sufficient numbers – 3-5 animals per species per holding
 - Target sick animals...but include healthy looking animals (you might find ones that have recovered)
- Sampling to confirm diagnosis
 - Focus on antigen – vesicle, epithelium, serum, saliva, probang
 - Thus look for **most recent cases**
 - Sufficient samples – different species – minimum of 3-5 animals
- What sample to take?
 - Relation lesion ageing and available diagnostic tests

FMD – clinical signs and samples to take

Signs	2 days before	Day 0	Day 1	Day 2	Days 3-4	Days 5-7	Days 8-11	More than 11 days	What can you do?
General health									Take good care, keep inside but with fresh air
Temperature									Plenty of water and soft feed
Salivation									Clean mouth, give water and soft feed 6 times a day
Lameness									Clean, dry and disinfect claws every day and keep underground dry
Vesicles									
Virus present									Sample vesicular fluid, epithelium, saliva, probang or blood (purple cap)
Antibodies present									Sample sera = red cap blood tube

Monitoring of sample submission

Virus identification for:

- Vaccine matching
- Monitoring strains and virus evolution
- Detection new serotype incursion

Performance indicator

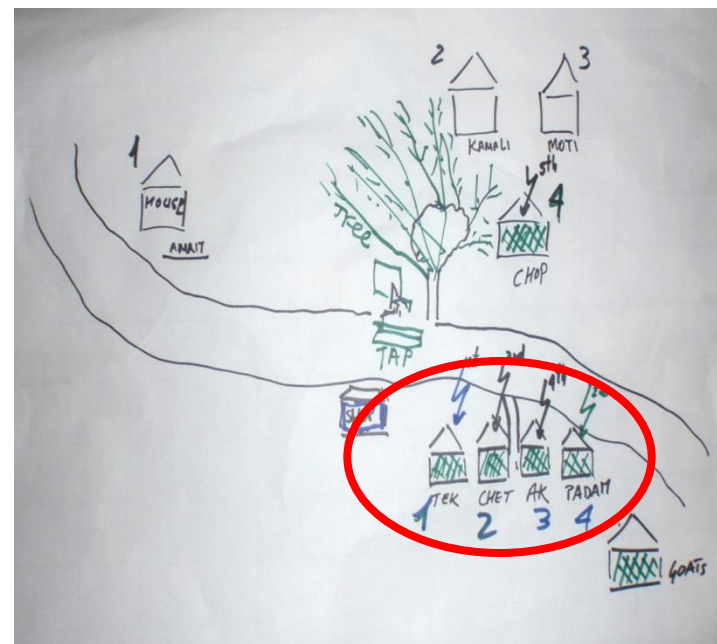
- Samples originating from different
 - Areas/location
 - Species
 - Production systems
- No virus detected, negative or other?
Is there a relation with:
 - Areas/ locations
 - Species
 - Production system

Need for additional training or support in certain areas for sampling and submission of samples

Where from and where to?

Understanding its origin and possibly onwards spread at epi-unit level

- Collect information on outbreak
 - Making sure that sufficient holdings of the epi-unit are covered to get full picture
 - Mapping the outbreak in the epi-unit
 - participatory approach
- Time line
 - **Oldest lesions** → needs active surveillance
 - Incubation time
- Prioritisation of contacts
 - ‘Hubs’
 - Pigs – cattle – sheep
 - Animal – people – fomites - local

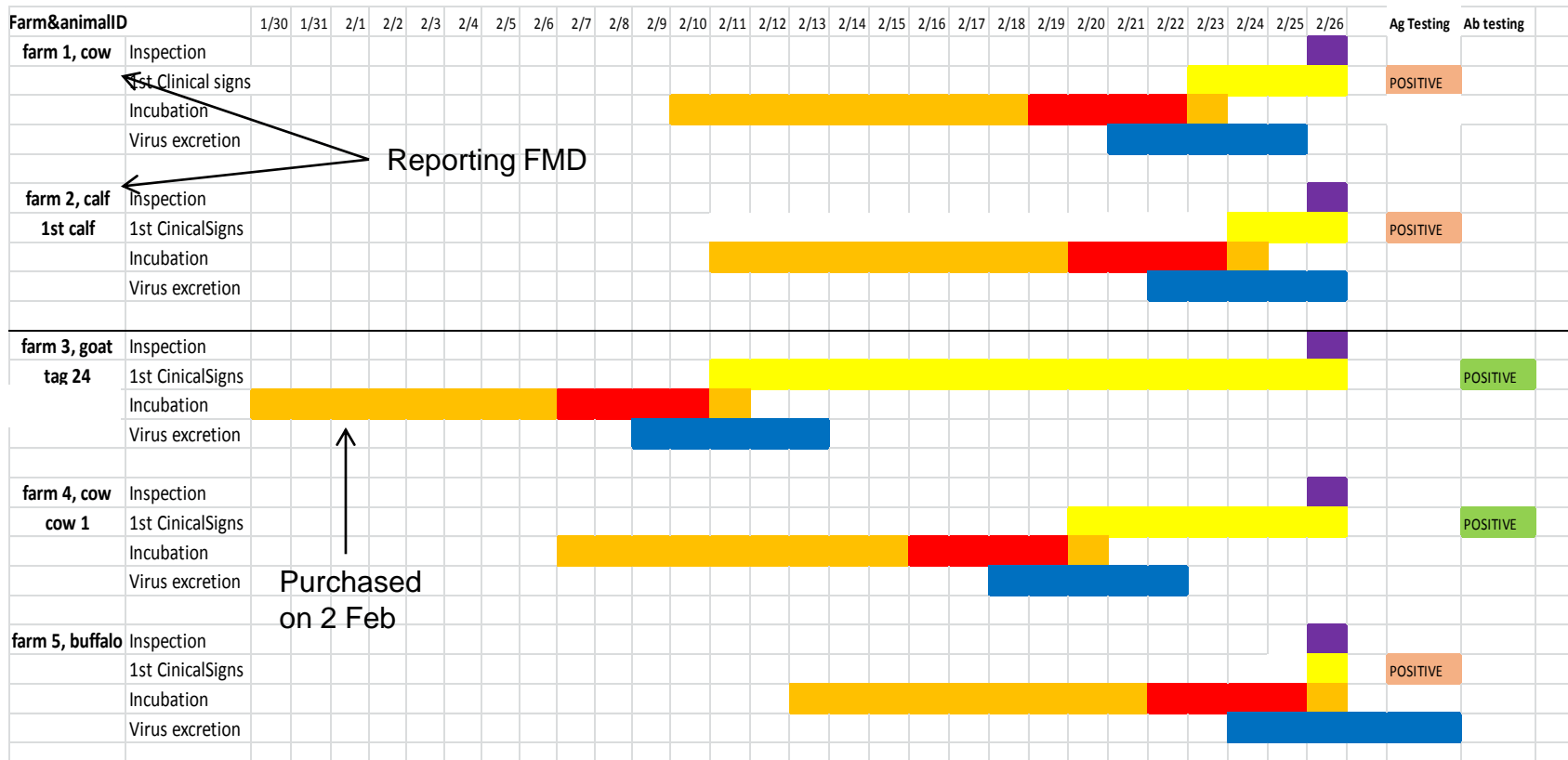


Constructing a time line: Oldest lesions – incubation period

1	Date FMD lesions examined	<i>Example: 31 Aug</i>
2	Estimated age of oldest lesion on premises	2
3	Estimated date of appearance of first lesions (subtract 2 from 1)	29 Aug
4	Range of potential infection dates: 1 to 14 days prior to first lesions (3)	15 – 28 Aug
5	Most likely infection dates for prioritising tracing: 2 to 5 days prior to first lesions (3)	24 – 27 Aug
6	Forward tracing: range of potential onward spread: 1-2 days prior to first lesion (3) to cull	28 – 31 Aug

Date	12/8	13/8	14/8	15/8	16/8	17/8	18/8	19/8	20/8	21/8	22/8	23/8	24/8	25/8	26/8	27/8	28/8	29/8	30/8	31/8
Lesions examined																				1
First clinical signs																		3		
Possible/likely infection period				4	4	4	4	4	4	4	4	4	5	5	5	5	4			
Virus excretion																	6	6	6	6

Use of time-line

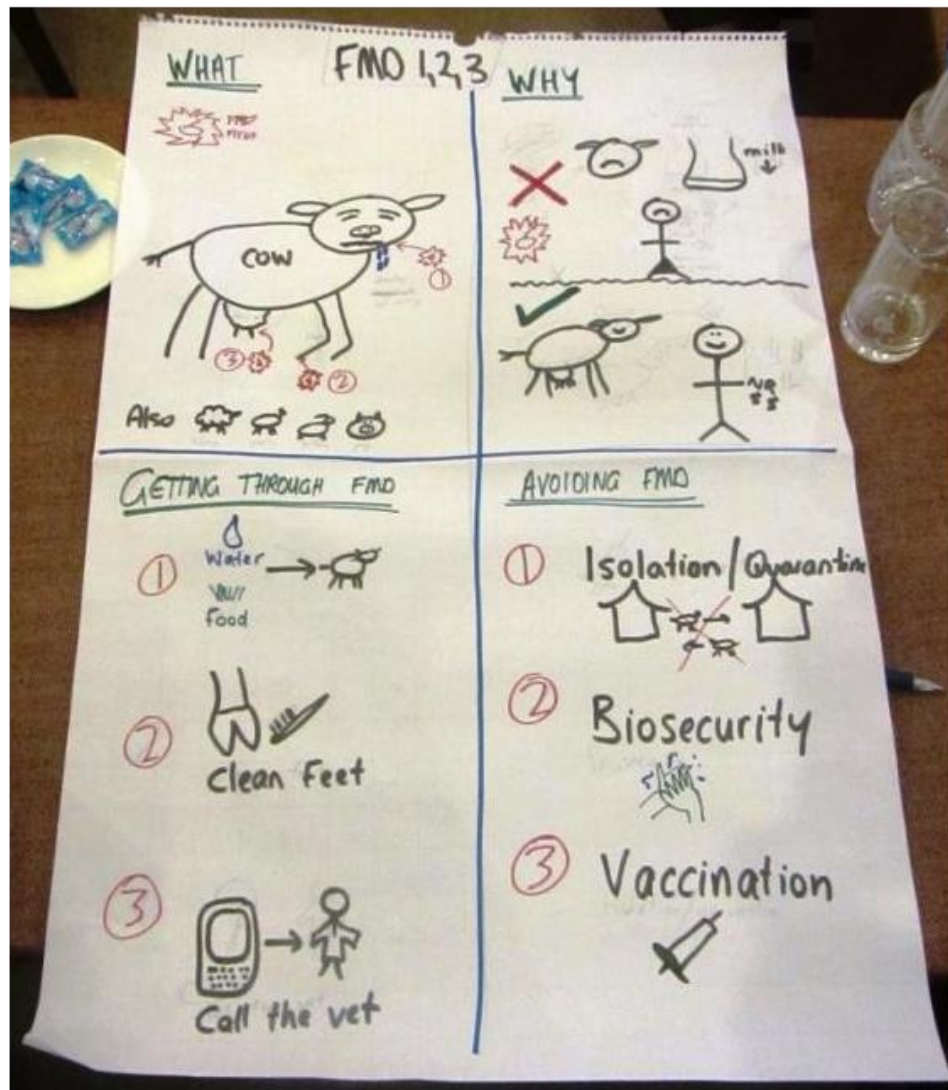


Local response to outbreak

- Communication with local community – empower local control against disease
 - Raise awareness about FMD on what can be done
 - to prevent disease entering holding
 - to care for diseased animals
 - Focus on “Keeping livestock healthy”
 - Mobilisation to mitigate impact FMD
 - Understanding the stakeholders

What can farmer and local vet do about it?





Keeping your livestock healthy

There are some small steps you can take to keep your animals healthy and free of disease.

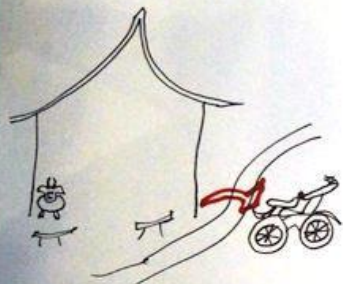


Keep livestock healthy

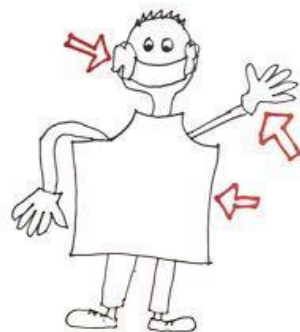
1. When introducing livestock, inspect it to make sure it is healthy and keep it separate for 5 days
2. Vaccinate your livestock
3. Wash your hands and feet after handling livestock
4. Ensure any visitors use good biosecurity
5. If your animal becomes sick separate it, provide treatment and care, including water and feed.

Contact your local DLSP Veterinarian or technician for further advice

ARRIVAL

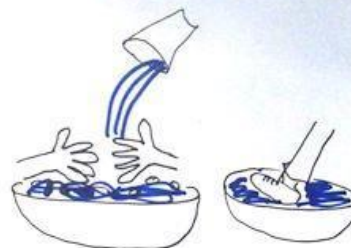


PARK BIKE
AWAY FROM
ANIMALS

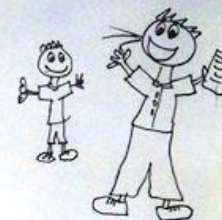


WEAR GLOVES,
MASK, APRON

DEPARTURE



WASH HANDS
WASH BOOTS



EMPOWER
OTHERS
WITH
KNOWLEDGE

BIOSECURITY FOR TECHNICIANS

BIKE STICKERS

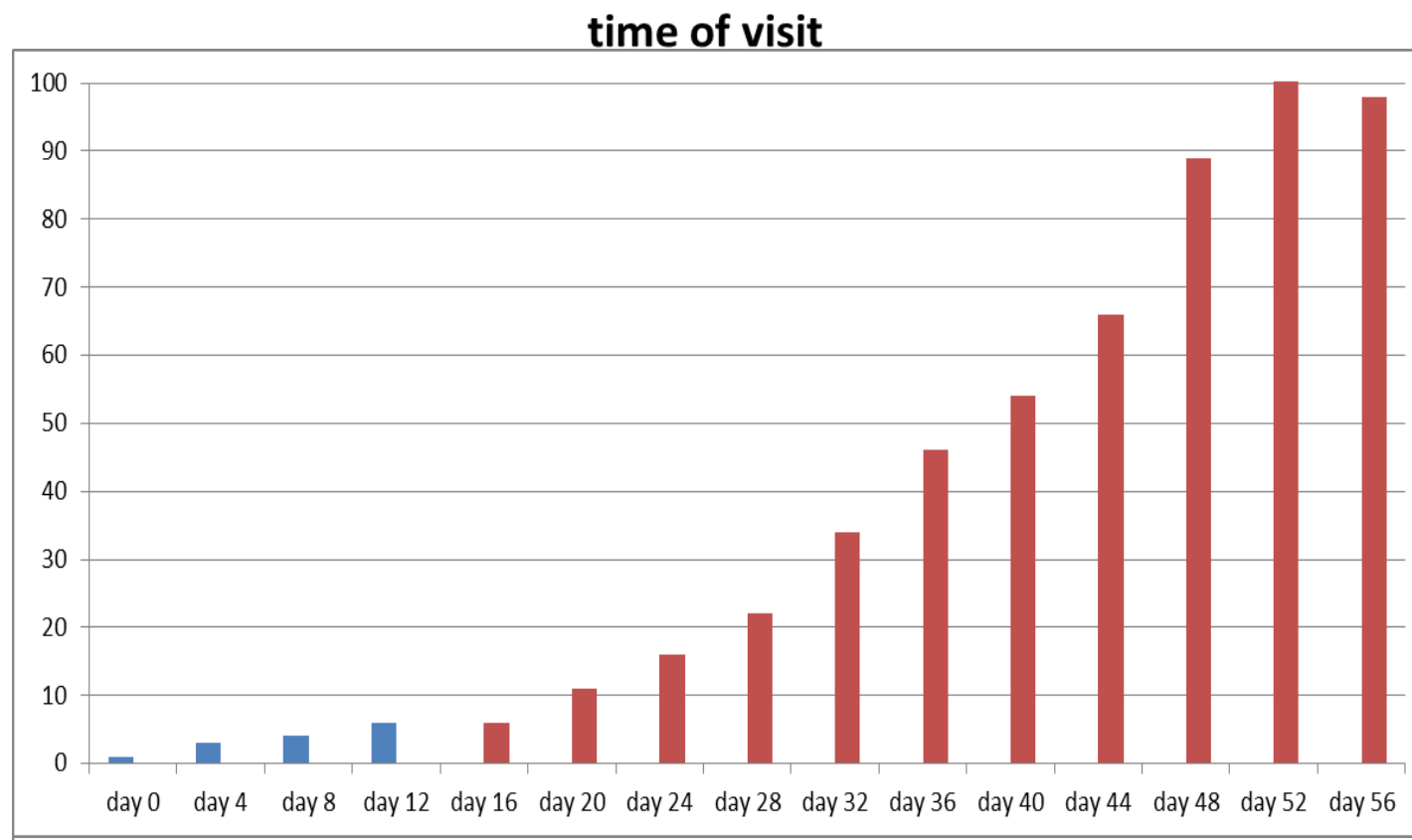
Question



- How do you communicate to livestock owners about FMD in your country? (choose one or more)
 1. through farmer associations
 2. through local vets and community animal health workers
 3. through the media (TV/radio)
 4. through religious organizations
 5. through the village leader
 6. through brochures/pamphlets
 7. other.....

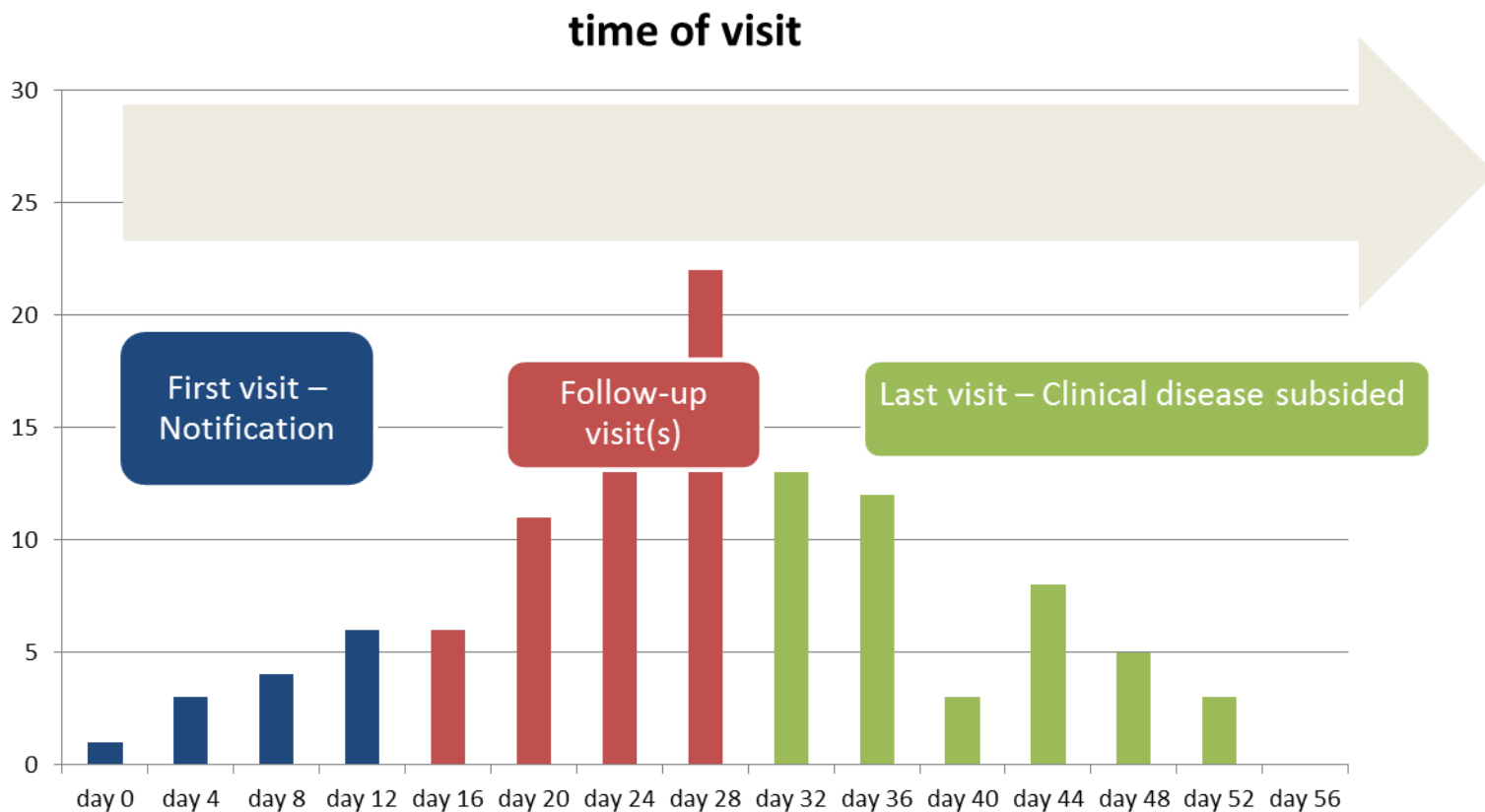
This first visit: where in the outbreak?

Number of households with (clinical) FMD



Follow up visits required!

Number of households with (clinical) FMD



What is the effect of clinical FMD?



Assessing the disease impact

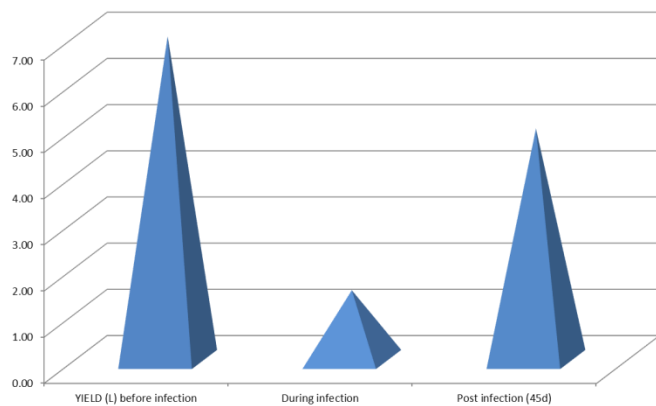
Accurate data on

- Morbidity
- Mortality
- Milk loss
- Involuntary culling
- Treatment costs
- Long-term effects of FMD

Through selection of 5-10 livestock owners to keep records on animal health and disease, standard questionnaires or participatory through discussion groups, key informants using proportional piling etc.

How much money is lost due to clinical FMD?

Assessing the economic impact



Impact on Milk Production

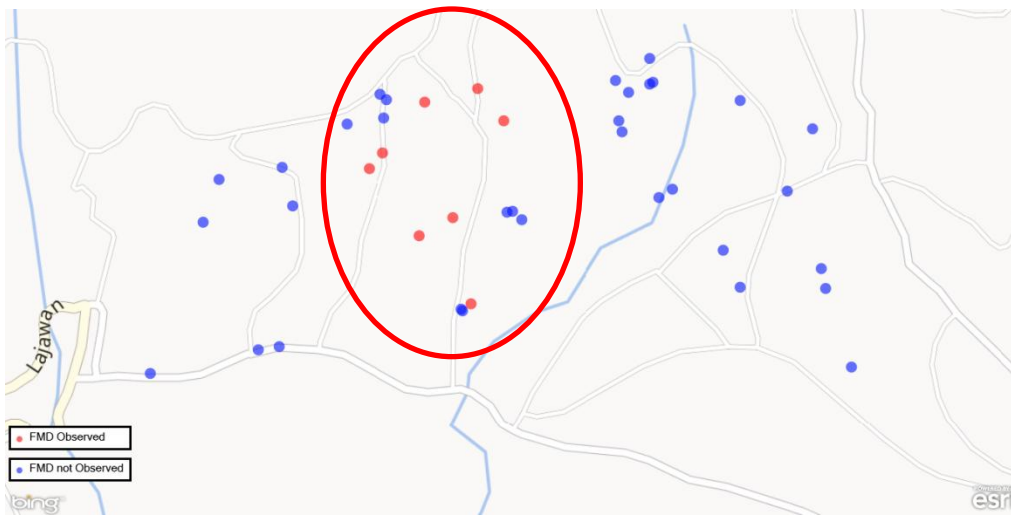
- 60-80% milk drop during FMD (2-3 weeks)
 - 10-20% after clinical FMD for extended period of time
 - Probability of mortality (1 – 10%)
 - Treatment costs
- ➔ Overall, for 1-year period: 15-20% income loss

Impact on Milk Production

- What quantity of milk was produced on the farm or from the herd before, during and after the infection? (Use a two-month period.)
- At what quantity has it stabilised?
- What treatments have you used at what have they cost (e.g., for mastitis)?
- Have you had any mortalities or abortions in your herd?

Why do some households get clinical FMD and others not?

Risk factors for FMD spread within epi-unit



- Transect
 - Visit 20-50 households in an FMD outbreak area
 - At time no new cases/households are reported (end of outbreak)
 - Assign FMD status to each household (case or non-case)
 - Data collected on potential risk factors of FMD at the household level
 - Data usually collected with smartphones and the EpiCollect application
- Tapping local knowledge

Some examples of questions

Risk Factors

- What is your herdsize (# cattle/buffalos)
- Do you also have small ruminants
- Have you vaccinated for FMD in the last 6-12 months? (May be a question for the district vet.)
- **In the last two months**, have you:
 - used a water source for your animals that is also used by other farmers?
 - moved animals off your property?
 - grazed or fed your animals where other animals have grazed or fed (troughs)?
 - brought feed onto your property?
 - introduced new animals onto your property?

Variable	Odds ratio	95% CI	P-value
Mix with other livestock	5.0	1.6-16.0	0.012
Small ruminants present in same household	2.8	1.0-8.0	0.045
Additional cow owned (herd size)	1.1	1.0-1.2	0.045

Combined Results from Nakuru region, Kenya
courtesy of Nick Lyons

To what extent has the infection spread subclinically?

Gaining a deeper understanding



- Spread of infection – NSP sero-survey in young animals (6-12 months of age)
 - Disease in large ruminants but what is the role of small ruminants?
 - Sample sufficient animals with respect of
 - Species
 - Production systems
 - Location within epi-unit
 - Neighbouring epi-units may be included
- Discrepancy between reporting and extent of FMD virus spread

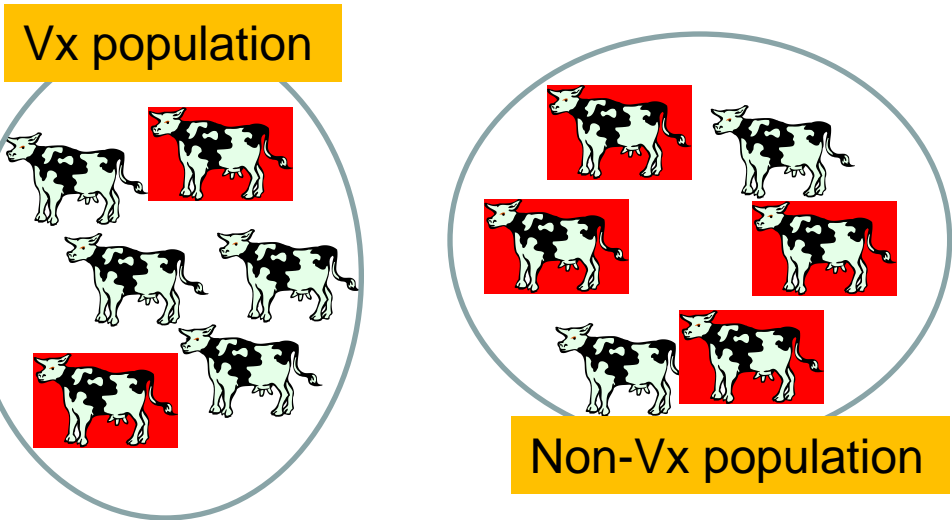
Question?



How well is vaccination performing? Gaining a deeper understanding

- Vaccination effectiveness
 - Level of protection after vaccination

$$VE = \frac{\text{incidence of disease in Vx}}{\text{incidence of disease in non Vx}}$$



New Asia-1 vaccine	FMD affected groups only			
	Total	FMD cases	Relative risk	Vaccine effectiveness [95%CI]
No	122	66 (54%)	-	-
Yes	23	4 (17%)	RR=0.32 [0.15-0.67]	68% [33%-85%]

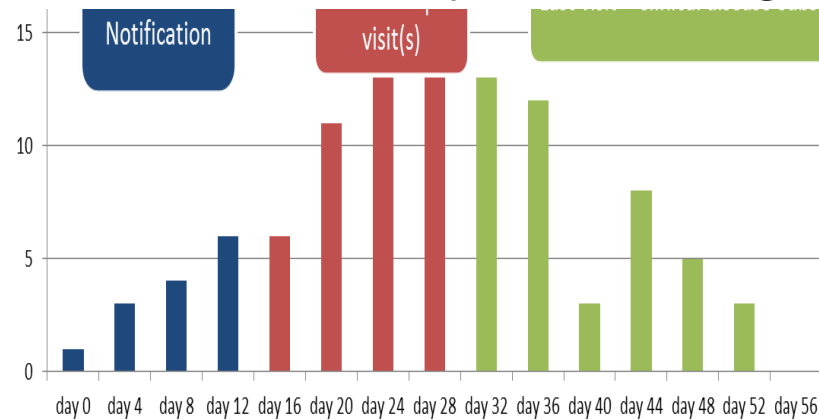
- Outbreak after vaccination?

How can outbreak investigation improve vaccination programs?

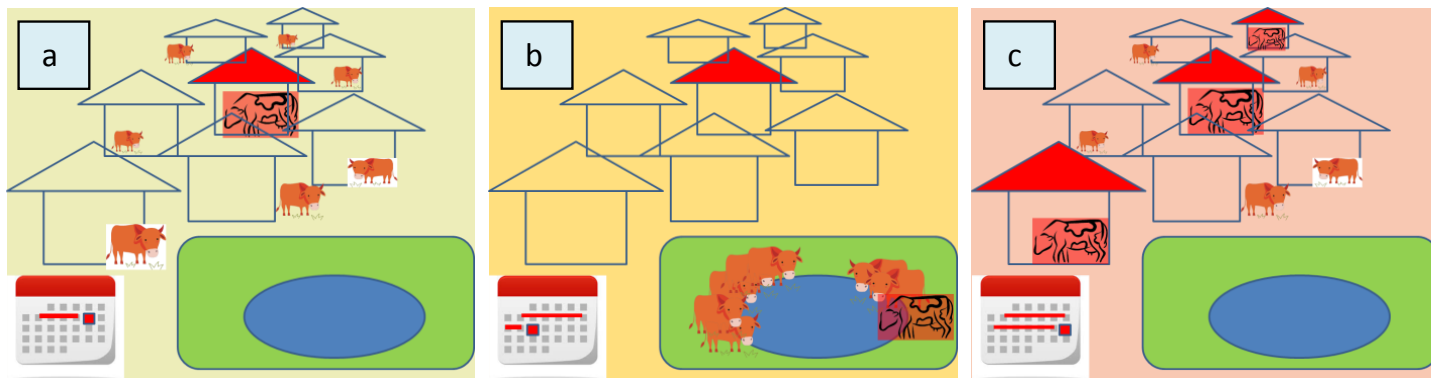
- **Sampling**: ensure matching between vaccine and field strain
- **Educating** livestock owners on vaccination
 - Reluctance to vaccinate (pregnant) animals
- **Measure** vaccination effectiveness
- **Improve** vaccination coverage
- **Measure** duration of protection after vaccination
- **Application** biosecurity measures by vaccinators

Dimensions:

Time: when are you investigating?

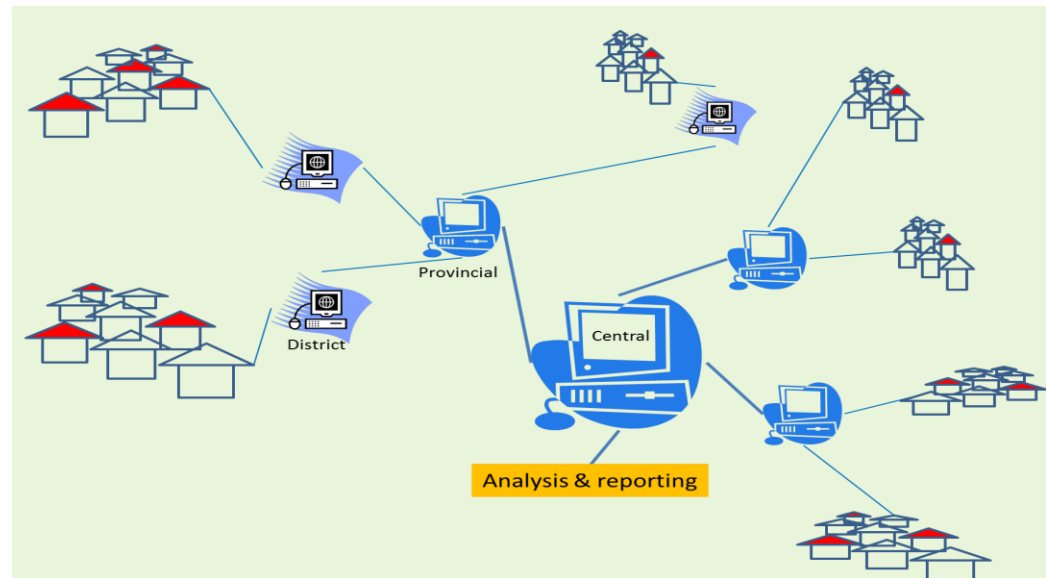


Space: where in outbreak are you investigating?



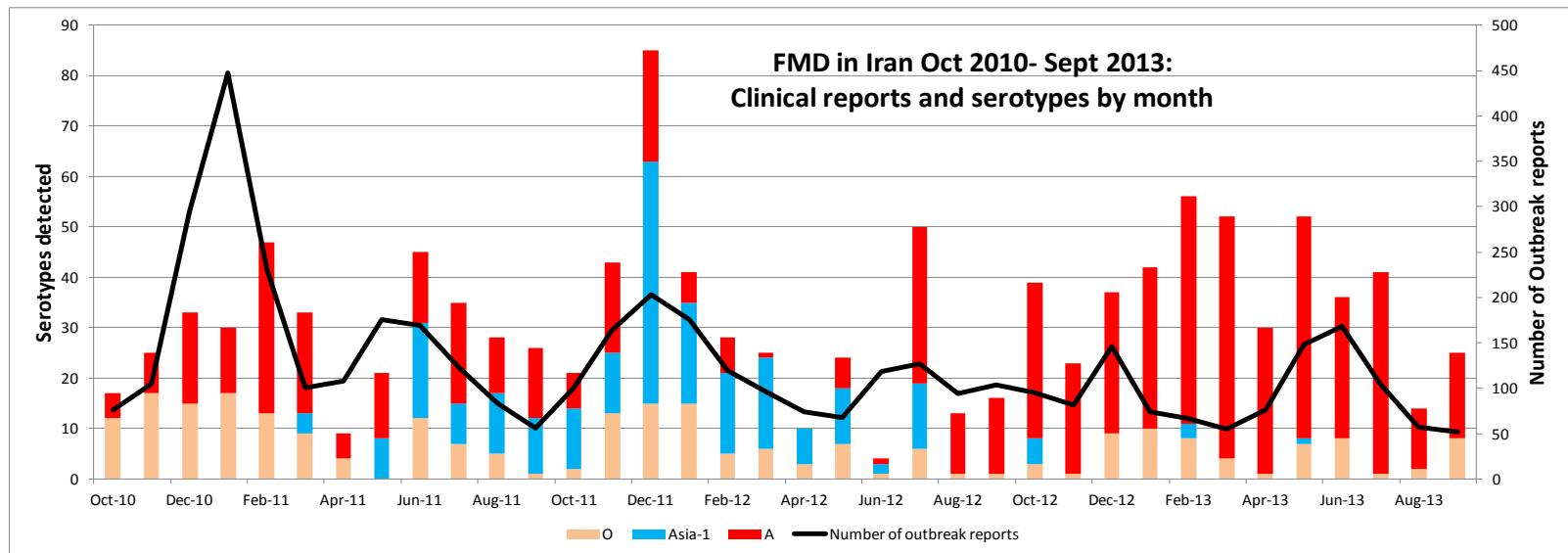
Supervision by central level

- Need for accurate, complete, uniform, timely data
- Develop and test SOPs
- Raw data available at central level
 - capacity to aggregate, analyse and report
- Frequent reporting



Reporting by central level

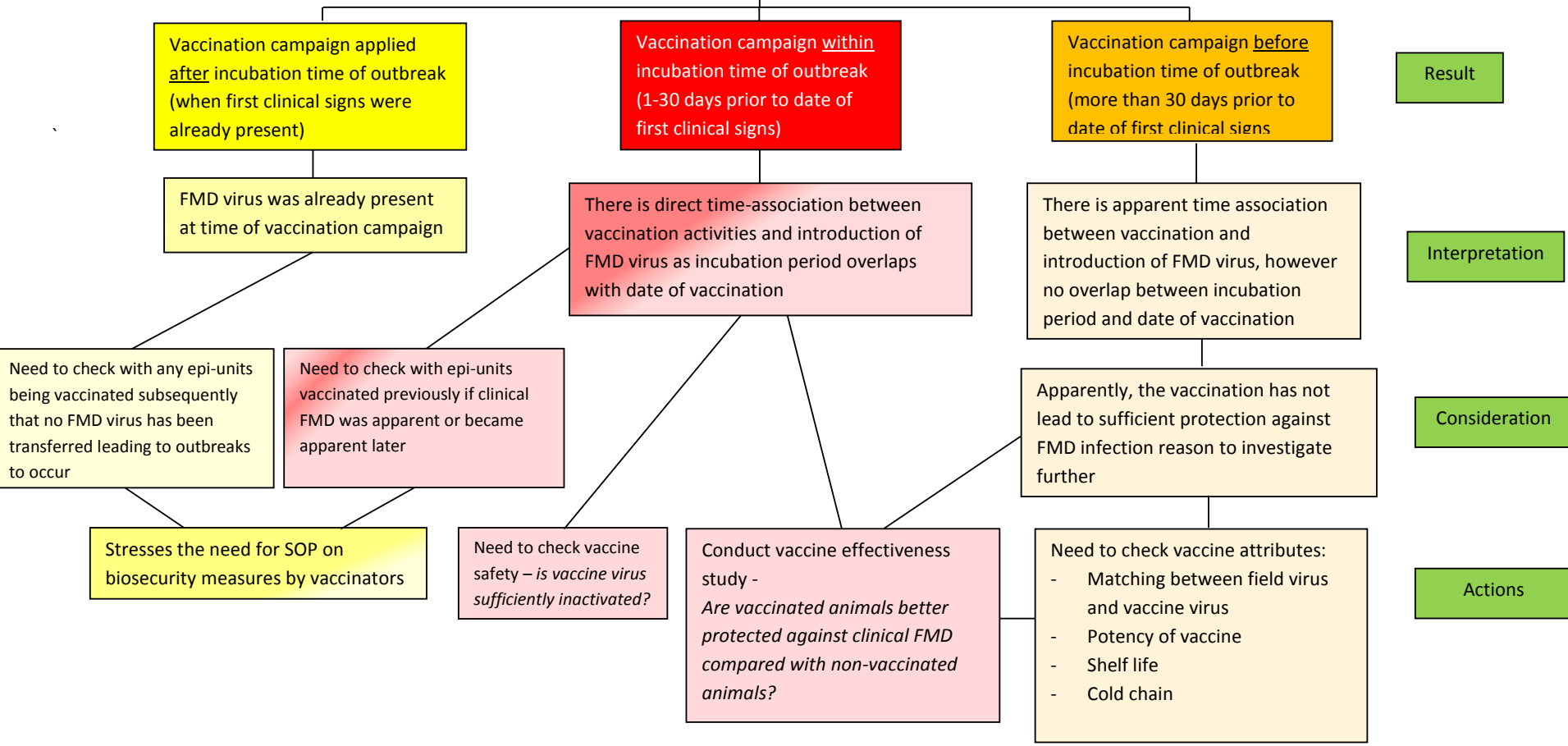
- Monthly reporting on
 - # outbreaks, by species, production system
 - Serotypes identified
 - Geographical mapping of outbreak locations



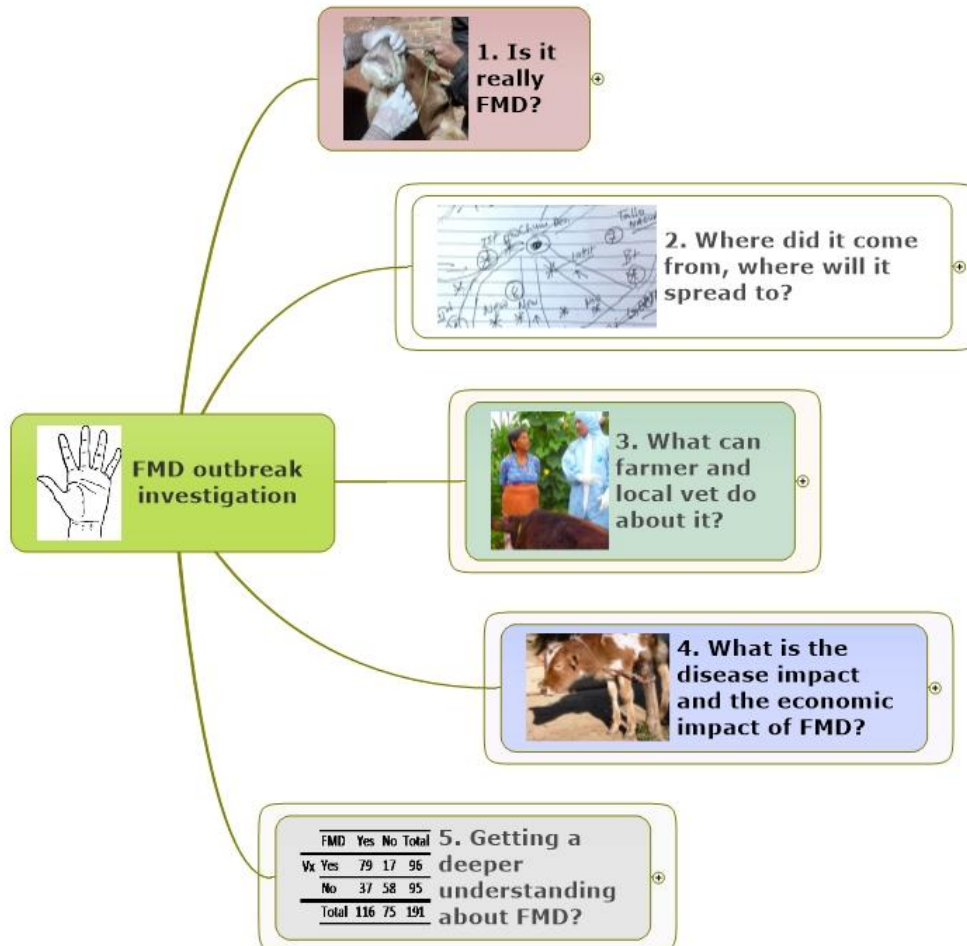
	Confirm FMD suspicion	Understanding introduction and spread	Local response to an outbreak	Assessing impact	Getting a deeper understanding
Method and number of samples	<p>FRESH lesions</p> <ul style="list-style-type: none"> -Clinical examination 3-5 animals per species -Sampling of 3-5 clinically-affected animals 	<p>OLDEST lesions</p> <ul style="list-style-type: none"> -10 or more livestock owners and constructing time lines including contacts during incubation period 	<ul style="list-style-type: none"> -Inform livestock owners about FMD -Train on biosecurity -Train on taking care of sick animals -Use participative methods as there will be farmers who are aware of the above issues 	<ul style="list-style-type: none"> - 5 – 10 livestock owners, keep records -Participatory methods may be used 	<ul style="list-style-type: none"> -Transect study (20-50 households) -Sero-survey (50 animals per species) in young stock 6 and 12 months -Vaccine effectiveness study (minimally 50 records per group)
Time needed	0.5 day	1-2 days including reporting	2-5 days, across multiple visits	3-5 days across multiple days	1 day for transect study 2-5 days for NSP survey 2-5 days for vaccine effectiveness
Frequency in stage 1 and 2	Every newly reported outbreak (epi-unit) with > 30 days between adjacent outbreaks			Once every six month for every region (considering different production systems)	

	Stage 1 FOCUS	Stage 2 FOCUS	Stage 3, 4 & 5 FOCUS
	Getting an understanding about FMD virus transmission and impact	Implementation risk-based control to reduce impact of clinical FMD	Implementation control targeted at eliminating FMD virus circulation
Sampling for confirmation	Relevant	Relevant	Relevant
Identification of routes of introduction and spread	Gaining a <u>general understanding</u> about routes of introduction and spread	Gaining a <u>progressively better understanding</u> about routes of introduction and spread	Detection of source, and follow-up of onwards routes of spread
Raising awareness and local response	Awareness raising to support local response	Awareness raising to support local response	Response under responsibility of competent authority
Assessing disease and economic impact of FMD	Getting a <u>general understanding</u> of morbidity, mortality, treatment costs	Getting a <u>progressively better understanding</u> of morbidity, mortality, treatment costs	Every outbreak to be fully documented
Getting a deeper understanding – testing assumptions	Optional	Getting a <u>progressively better understanding</u> about risk factors, vaccine effectiveness and infection spread – means of M&E	Every outbreak requires full investigation into risks, spread and vaccination effectiveness

Disease outbreak investigation –
determining relation between vaccination campaign and incubation period of current outbreak



Disease Outbreak Investigation (DOI): more than “take a sample and run”!



The opportunity to get more information

It requires:

- sufficient numbers investigated
- lead by example – biosecurity
- raise awareness with farmers
- define, train and follow up on Standard Operating Procedures

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Any questions?



Thank you for your attention!

