Food and Agriculture Organization of the United Nations

Texas A&M AgriLife

Frontline curriculum
Participant manual

IN-SERVICE APPLIED VETERINARY EPIDEMIOLOGY TRAINING

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Table of Contents

Acronyms/Abbreviations

AI	Avian Influenza
A-P-T	Animal, Place and Time
ASF	African Swine Fever
AU-IBAR	African Union InterAfrican Bureau for African Resources
BSE	Bovine Spongiform Encephalopathy
BT	Blue Tongue
CAHWs	Community Animal Health Workers
CBPP	Contagious Bovine Pleuropneumonia
CCA	Critical Control Areas
CFR	Case Fatality Rate
CQI	Continuous Quality Improvement
CRD	Chronic Respiratory Disease
CSF	Classical Swine Fever
DAR	Directorate of Animal Resources
DTR	Disease Transmission Risk
DVO	Local area Veterinary Officer
ECF	East Coast Fever
EID	Emerging Infectious Disease
ELISA	Enzyme Linked Immunisorbent Assay
FAO	Food and Agriculture Organization of the United Nations
FETPV	Field Epidemiology Training Program for Veterinarians
FMD	Foot and Mouth Disease
FN	False Negative
FP	False Positive
GEMP	Good Emergency Management Practices
GIS	Geographic Information Systems
HPAI	Highly Pathogenic Avian Influenza
IFA	Immunofluorescent Antibody
IR	Incidence Rate
ISAVET	In Service Applied Veterinary Epidemiology Training
KAP	Knowledge, Attitude and Practices
LBM	Live Bird Market
LPAI	Low Pathogenic Avian Influenza
MAIFF	Ministry of Agriculture, Animal Industry and Fisheries
MS	Microsoft
NARO	National Agricultural Research Organisation
NCD	New Castle Disease

NGOs	Non-governmental Organisations
No.	Number
OB	Outbreak
OH	One Health
OIE	World Organisation for Animal Health
PAR	Population at Risk
PCR	Polymerase Chain Reaction
PM	Post-Mortem
PPE	Personal Protective Equipment
PPR	Peste des Petits Ruminants
RT-PCR	Reverse Transcriptase Polymerase Chain Reaction
RTPs	Risk Transmission Pathways
RVF	Rift Valley Fever
RVFv	Rift Valley Fever Virus
SCC	Somatic Cell Count
SOP	Standard Operating Procedure
SSRT	Surveillance Rapid Response Teams
TAD	Transboundary Animal Disease
TB	Tuberculosis
USDA	United States Department of Agriculture
UVA	Uganda Veterinary Association
VFE	Veterinary Field Epidemiology
WHO	World Health Organization
ZDCO	Zoonotic Disease Coordination Office

Acknowledgements

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The competencies and skills that serve as the framework for Frontline ISAVET were developed by a global technical working group organised by FAO in July 2018. The lessons, exercises, case studies, field activities and standard operating procedures were developed by the following authors and contributors:

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About this Manual

This manual serves as the primary reference for Frontline ISAVET participant trainees to utilise the Frontline ISAVET course curriculum and is a companion manual to the Frontline ISAVET Trainer Manual. It includes the 36 lessons and exercises of the Frontline ISAVET course curriculum based on two pilot trainings in Uganda and Senegal between October and December, 2018 as well as extensive post-pilot internal and external reviews.

Target Audience

The intended audience for this Manual is the Frontline ISAVET participants who will be trainees during the four-week didactic and applied Frontline ISAVET course. Participants include field level veterinarians and para-veterinary professionals enrolled in the course.

Development of the Frontline ISAVET Curriculum

The curriculum foundation work for Frontline ISAVET was developed by a global technical working group organised by FAO in July 2018. The FAO technical working group includes animal health, public health and wildlife health professionals under a One Health approach. This group developed a competency-skills matrix for the frontline veterinary field epidemiology level which was used to develop specific lesson learning objectives.

Specific Objectives of the Frontline ISAVET Curriculum Participant Manual

The specific objectives of the Frontline ISAVET Curriculum Participant Manual are as follows:

1. Provide the structure, format and content of the Frontline ISAVET curriculum lessons, exercises and case studies.
    a. This includes specific learning objectives for each lessons.
    b. English or French language versions are available.
2. Demonstrate clear linkage between lesson learning objectives and expected outputs of exercises and case studies.
3. Provide supportive curriculum resource materials include MS Excel training videos, standard operating procedures and relevant references.
4. Provide a flexible base upon which to include relevant examples based on the regional and national context.
5. Emphasise the flexibility of classroom exercises designed to accommodate veterinary and para-veterinary trainees that may have different levels of computer experience.

Content Development and Review

The content of the Frontline ISAVET curriculum was developed according to the following steps:

1. The specific learning objectives were developed by TAMUS, IIAD based on the FAO technical working group competency-skills matrix.
2. Lesson outlines were developed which were completed by contributors previously listed.
3. Lessons were adjusted in real-time during the pilot trainings as part of a continuous quality improvement process.

Following the Uganda and Senegal pilot trainings, the Frontline ISAVET Curriculum was re-aligned and further developed as follows:

1. English internal review by FAO IIAD epidemiologists.2. English external review by experienced field epidemiologists from animal health (Thailand), public health (USA) and wildlife health (Uganda).
2. French internal review by FAO epidemiologists from west and central Africa.
3. Final internal review by FAO IIAD epidemiologists.
4.

Frontline ISAVET Curriculum and Exercise Matrix Overview

The Frontline ISAVET course is comprised of 4 weeks of classroom training that includes one week of field application. The classroom portion of the training covers 8 domains, 14 competencies and 51 skills that were developed by an FAO technical working group. The Frontline ISAVET curriculum is the common framework to adapt the Frontline ISAVET curriculum for country programmes in the future. The Frontline ISAVET Curriculum Matrix is provided in Table 1.

For National Programmes wanting access to the training Power Point Slides, please send a request to ISAVET@fao.org

Table 1. Frontline ISAVET Curriculum Matrix

LESSON NUMBER	LESSON TITLE	EXERCISE
	Course Introduction and Orientation	Group introductions, sharing and discussion
	PRE-TEST	NA
1	Introduction to Animal Health Surveillance	**Exercise 1:**
2	Data for Information and Response	**Exercise 2:** **Exercise 3:**
3	Defining and counting disease cases	**Exercise 4:** **Exercise 5:**
4	Data Quality Principles	**Exercise 6:**
5.1	Describing and Acting upon Animal Disease and Health Data: Central tendency	**Exercise 7:**
5.2	Describing and Acting upon Animal Disease and Health Data: Disease Occurrence and Impact	**Exercise 8:**
5.3	Describing and Acting upon Animal Disease and Health Data: Descriptive analysis by animal-place-time	**Exercise 9:**
6	Display data for decision making	**Exercise 10:** **Exercise 11:** **Exercise 12:**
CASE STUDY 1:	PPR	**Case study 1:**
7	Data Interpretation and Reporting to Improve Situational Awareness and Decision Making	**Exercise 13:** **Exercise 14:**
8	Elements of a surveillance report	**Exercise 15.1:**
9	Making recommendations for animal disease prevention and control	**Exercise 15.2:**

LESSON NUMBER	LESSON TITLE	EXERCISE
10	Sharing surveillance information in a network for animal disease prevention and control	**Exercise 16:**
11	Assessing Surveillance in Your Local Area to Improve Response to Animal Disease and Health Events	**Exercise 17:**
12	Animal field investigations	**Exercise 18:**
13	Investigation strategies for early prevention and control of animal disease transmission	**Exercise 19:**
14	Establish Two-Way Linking Between Laboratory Disease Diagnosis and Field Investigation	**Exercise 20:**
15	Biosafety and biosecurity for animal disease investigations	**Exercise 21:**
16.1	Apply the steps of a animal health outbreak investigation for animal-specific and zoonotic diseases	**Exercise 22:**
16.2	Apply the steps of a public health outbreak investigation for zoonotic diseases	
CASE STUDY 2	AI Tabletop Exercise	**Case Study 2:**
17.1	Managing Outbreak Investigation Data: Collect Data and create a line listing	**Exercise 23.1:**
17.2	Managing Outbreak Investigation Data	**Exercise 23.2:**
18	Follow up investigations and special studies	**Exercise 24:**

LESSON NUMBER	LESSON TITLE	EXERCISE
19	Surveillance situation assessment for prevention and control	**Exercise 25:**
20	Display outbreak investigation findings and make relevant recommendations for prevention and control	**Exercise 26:**
21	One Health Panel Discussion: Multi-disciplinary Outbreak Investigation	**Panel Discussion and Q&A session**
22	Preparing MS PowerPoint Presentations	**Exercise 27:**
23	Guidelines for Outbreak Investigation Reports	**Exercise 28:**
24	Communicating disease transmission risk to diverse audiences	**Exercise 29:**
25	Stakeholder Risk Communication Before, During and Following an Animal Disease Event	**Exercise 30:**
26	How to Plan and Prepare the Frontline ISAVET Field Study Proposal and Report	**Exercise 31:**
CASE STUDY 3	FACE - Ethical Decision Making Framework	**Case Study 3**
28	Professionalism in the Practice of Veterinary Field Epidemiology	**Exercise 32:**
29	Emergency Preparedness for Animal Health Emergencies at the Local Level: Part 1	**Exercise 33:**
30	Emergency Preparedness for Animal Health Emergencies at the District Level: Part 2	**Exercise 34:**

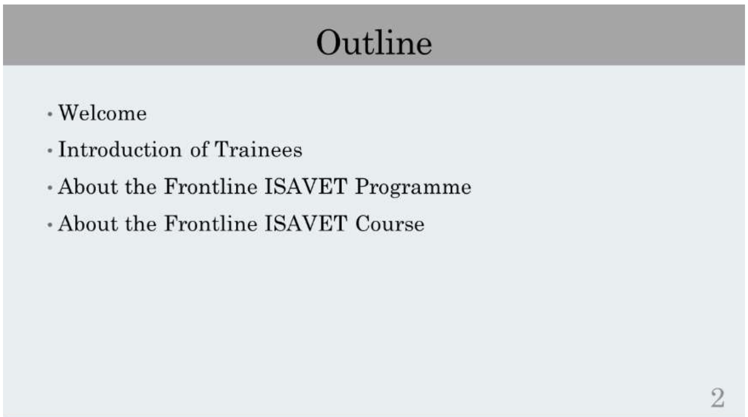
LESSON NUMBER	LESSON TITLE	EXERCISE
31	Disease preparedness and response at the district level	**Exercise 35:**
32	Characteristics of a functional disease prevention and control program at the district level	**Exercise 36:**
33	Local Area Profile	**Question and Answer Session**
34	(Disease name)	**Question and Answer Session**
35	The Role of Wildlife for Priority Disease(s)	**Question and Answer Session**
36	Preparing for Field Work	**Question and Answer Session**

Section I: Week 1 – Epidemiological Surveillance

Introduction

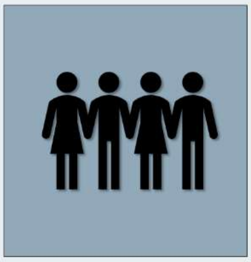
Estimated Lesson and Exercise Time	1 hour
Instructor Materials	Introduction.pptx
Participant Materials	Introduction.PDF

INSTRUCTOR COMMENTS: LESSON ACRONYMS AND ABBREVIATIONS



Introduction of Trainees

- Please introduce yourself, where you live and work
- Why are you attending this course?
- What do you want to gain from the Frontline ISAVET training?



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Importance of Frontline Veterinarians and Veterinary Paraprofessionals

Frontline Veterinarians and Veterinary Paraprofessionals:

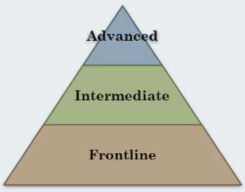
- Have strong ties to the community level where disease events occur
- Are at the leading edge of an animal disease outbreak
- Have the best access to field data
- Have high quality field data for analysis of risk factors for disease prevention and control
- Are the primary source of epidemiological information for decision-making and action

Reference: Frontline ISAVET, 2018

4

What is Frontline ISAVET?

- Based on the field epidemiology training programme (FETP) public health training model in 73 countries
  - One Health focus: animal-human-wildlife interface
- Focuses on applied veterinary-specific competencies and skills
- The field epidemiology training programme for veterinarians (FETPV) was initiated in 2008 in Thailand and has since developed in China and Indonesia



Levels of ISAVET Programme

- **ISAVET** is the new name of the programme with **Three levels** (Frontline, Intermediate and Advanced)

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Overview of Frontline ISAVET

- Frontline ISAVET includes 14 countries in West, Central and East Africa:
  - Burkina Faso, Cameroon, Côte d'Ivoire, Democratic Republic of Congo (DRC), Ethiopia, Ghana, Guinea, Kenya, Liberia, Mali, Sierra Leone, Senegal, Tanzania and Uganda
- Frontline ISAVET Programme training occurs in 5 locations:
  - **Pilot Phase:** Uganda and Senegal

African Countries Associated with Frontline ISAVET Programme

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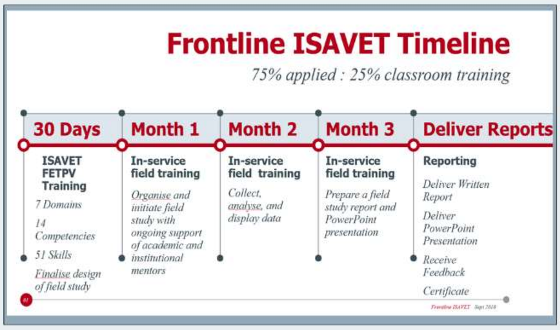
Overview of Frontline ISAVET (cont.)



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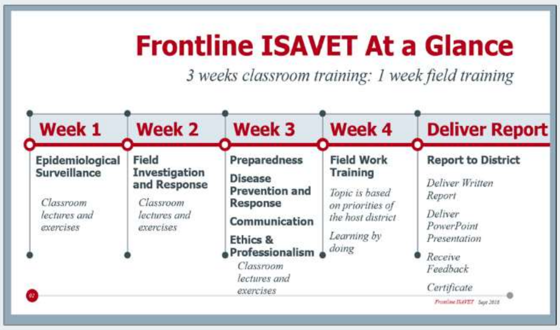
The Frontline ISAVET Course



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Requirements

- Attend all course modules/lectures
- Sit for all quizzes, pre and post tests
- Complete all homework & assignments
- Active participation in case studies and other learning exercises
- Completion of field project
- Presentation of your project findings to your peers and stakeholders

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Frontline ISAVET Programme Requirements

TRAINEE WORK REQUIREMENTS FOR CERTIFICATE IN FRONTLINE ISAVET PROGRAMME

Required field products for Frontline ISAVET in 12 weeks of field activities:

1. **Conduct Two Data Exercises: COMPULSORY**
   - Weekly surveillance reports and systematic disease monitoring;
2. **Data Quality Audits at the animal health office level** (summarize findings through a SWOT Analysis or Problem Analysis using a Fishbone Diagram to produce a report): **COMPULSORY**
3. **Conduct One Brief Field Study (maximum of 10 pages in length): COMPULSORY**
   - Field or Outbreak investigation;
   - Survey or KAP study;
   - Secondary data analysis;
   - Other, including value chain mapping and risk pathway analysis.

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How Can You Apply Your Knowledge and Skills?

- Introduction to animal health surveillance
- Using data to inform follow up action
- Defining and counting disease cases
- Apply data quality principles
- Describing and acting upon animal disease and health data
- Collecting high quality data
- How data analysis can provide information and knowledge for decision-making
- Data interpretation and reporting to improve situational awareness and decision-making
- Develop weekly of surveillance reports
- Making recommendations for animal disease prevention and control
- Sharing surveillance information in a network for animal disease prevention and control
- Assessing surveillance in your district to improve response to animal disease events

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ISAVET Contributing Universities
Partners
Contributors
TEXAS A&M UNIVERSITY
TEXAS A&M AGRILIFE
MAKERERE UNIVERSITY
E.I.S.M.V. DE DAKAR
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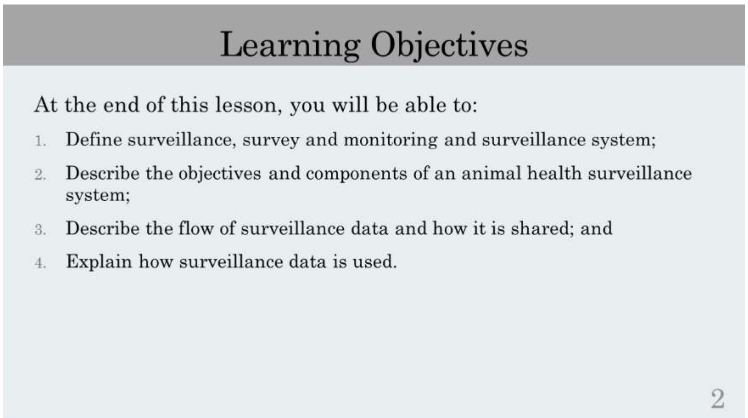
Lesson 1 – Introduction to Animal Health Surveillance

Estimated Lesson and Exercise Time	1 hour 30 minutes
Participant Materials	ISAVET Lesson 1 Introduction to Animal Health Surveillance Participant Guide.PDF
	Computer and Microsoft Word
	Pen or Pencil



What is a Survey?

- A survey is an investigation in which information is systematically collected using samples from a defined subpopulation group within a defined time period *(Salman, 2003)*
  - *Example: One elephant group in a park*
- Survey sample must be representative of the entire population
  - "A sample is a selected subset of a population". *(Dictionary of Epidemiology)*

Reference: Google images

3

What is Monitoring?

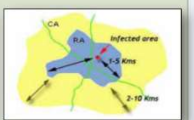
- The ongoing collection of data related to various disease factors
- NO action is implied
- Examples:
  - Insect vector monitoring
  - Wild bird populations
  - Carcass quality
- Can you think of other examples?

Reference: Google images

4

What is Surveillance?

- Surveillance is the systematic, ongoing collection, collation and analysis of data and the timely dissemination of information to those who need to know **so that action can be taken.** *(OIE Terrestrial Animal Health Code)*
- Desired outcomes of animal disease surveillance:

Prevent	Control	Eradicate
		

References: Google images; USDA; OIE

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What is a Surveillance System?

- A surveillance system is described by:
  - A method of surveillance that may involve one or more component activities that generates information on the health or disease status of animal populations.” (Source: OIE)
- **What is a ‘system’?**

1. Identified parts/components of the system
2. Coordinated objectives and methods
3. Inter-connections using mechanisms and networks

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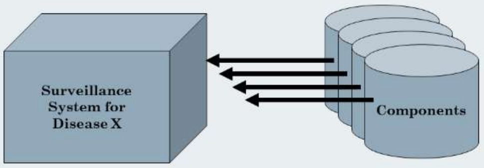
1. Surveillance System Components



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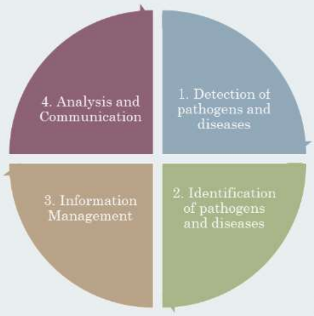
Wildlife Surveillance

(OIE, Training Manual of Wildlife Diseases and Surveillance, 2010)

Some important wildlife diseases for domestic animals:

- *Foot and Mouth Disease*
- *Anthrax*
- *African Swine Fever*
- *Classical swine fever*
- *Avian influenza*
- *Fowl cholera*
- *Rabies*
- *Bovine tuberculosis*
- *Bluetongue*
- *Leptospirosis*

Four activities of wildlife surveillance:



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Examples of Surveillance System Components – Bovine TB

- Slaughter inspection of bovine TB-susceptible species
- Tuberculin testing
- Passive reporting of suspect cases

9

Examples of Surveillance System Components – African Swine Fever

- Sampling and testing of sick /dead wild boar/domestic pig
- Sampling and testing hunted boar/domestic pig
- Sampling and testing suspect holdings
- Sampling and testing meat and animal product
- Testing home slaughter
- Inspection of personal baggage
- Sampling, testing, quarantine of imported pigs

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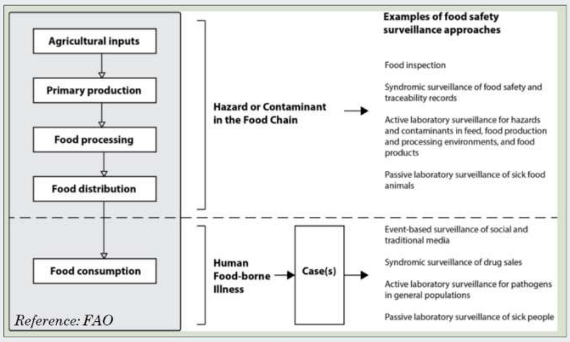
Food Safety: Surveillance Along The Food Chain



Reference: FAO

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2. Coordinated Objectives

A country disease surveillance system will require clear objectives that will be adapted for each country and each disease situation.

Some types of objectives may include:

- Early detection of livestock diseases
- Enabling early reaction to such diseases
- Correct identification of resource needs in the field.
- Provision of strategic decision-making support
- Measurement of surveillance system performance

Source: FAO Manual on Livestock Disease Surveillance and Information Systems

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What components does surveillance Target?

1. Early reporting
2. Early detection
   a. Targeted surveillance at poultry aggregation sites using value chains
   b. Rapid screening tests
   c. Collaboration and communication with poultry producers and marketers
3. Rapid response
4. Containment
5. Continual improvement of the surveillance system in terms of sensitivity and timeliness

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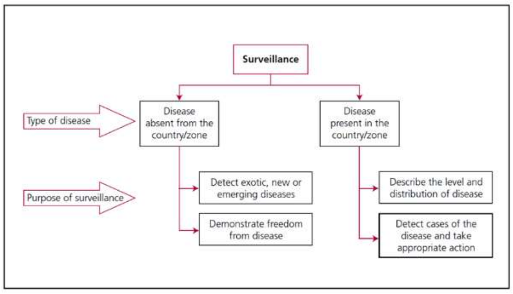
Surveillance Objectives Will Depend on Whether the Disease is Present or Absent



Reference: Manual of Basic Animal Disease Surveillance, AU-IBAR, 2012

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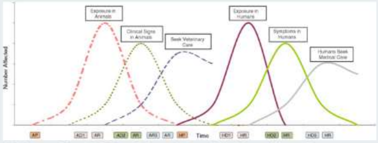
Example: Zoonotic Disease Surveillance

Definition of a zoonosis:

A disease that can be transmitted between animals and humans.

The objective of surveillance for zoonotic disease is to detect the pathogen as early as possible to prevent further animal and human exposure as shown in the graph.



Reference: Keusch GT et al. Sustaining Global Surveillance Response to Emerging Zoonotic Diseases

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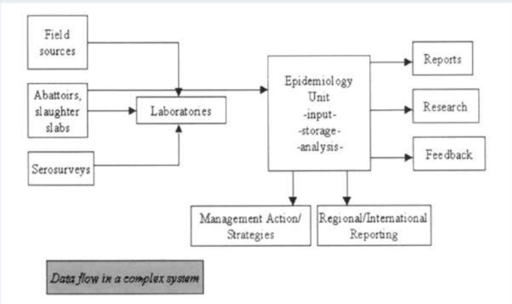
2. Coordinated Methods



(FAO Manual on Livestock Disease Surveillance and Information Systems)

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Exercise 1: Epidemiological Surveillance

1. This exercise will take 60 minutes – take 20 minutes to draw a flow diagram to be followed by 4 group reports of 10 minutes each.
2. Form yourselves into groups based on country.
3. Draw a diagram on a flip chart that describes the surveillance system with reference to animal health, wildlife, zoonotic diseases, food safety and antimicrobial resistance in your local area, province and country. Include the following elements in your diagram:
   - Label country stakeholders at each administration level from field to national levels
   - Information inputs including direction, origin and destinations
   - Information outputs including direction, origin and destinations
4. One group will describe their surveillance system related to food safety linking local area, province and country.

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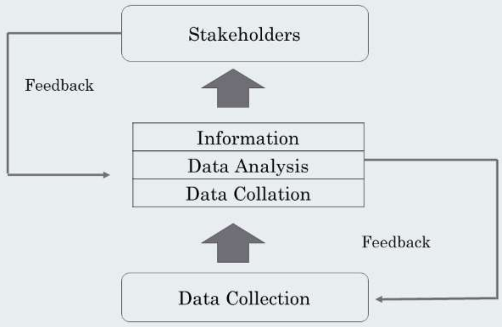
3. Interconnection Mechanisms and Networks



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Flow of Surveillance Data

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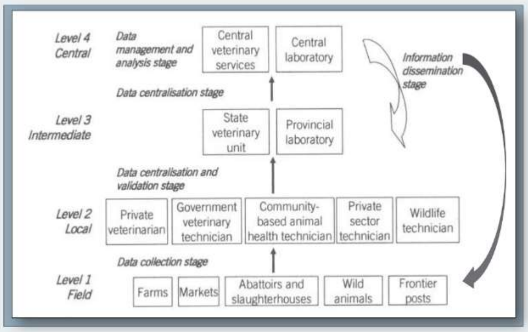
Data Sharing and Flow Within an Animal Health Epidemiological Surveillance System

(OIE, Epidemiological Surveillance in Animal Health, 2011)



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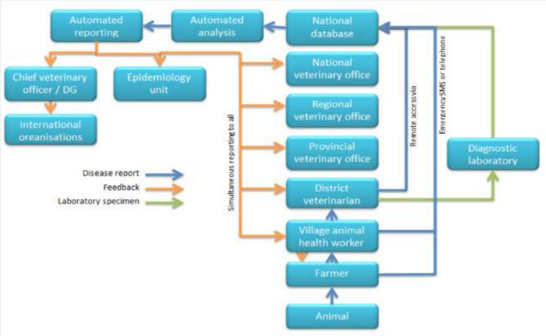
Data Flow Within AU-IBAR Animal Health Epidemiological Surveillance Model



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How is surveillance data shared?

Data collection	Written data from farm, abattoir, market, laboratory, other government ministries etc.
Data stored and analysed	Field, subnational and national level records and results of analysis
Data integrated	Integrate data from field, subnational and national levels
Data interpreted and reported	Field, subnational and national level reports
Information shared	Feedback provided to all stakeholders including written reports and research, presentations and meetings

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Think, Pair and Share!

Why do we need animal health information?

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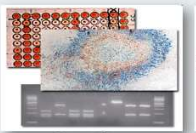
Need For Animal Health Information

- Identify what diseases exist (in a country, area or farm)
- Determine frequency and distribution of diseases
- Determine the importance or "burden" of different diseases
- Set priorities for the use of resources for disease control activities
- Plan, implement and evaluate disease control programmes
- Respond to disease outbreaks
- Meet reporting requirements of international organizations
- Demonstrate disease status to trading partners

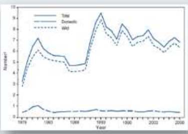
24

Use of Animal Health Surveillance Data

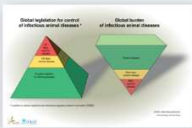
(Epidemiological Surveillance in Animal Health, OIE)



Detect New Emerging Diseases



Assess Disease Trends



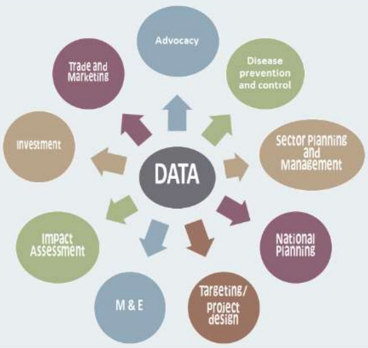
Estimate the Burden of Disease

Define Important Diseases

Evaluate Control Programmes

25

Application of Animal Health Surveillance Data



26

In Summary…

Animal Health Surveillance:

- Includes public and private sectors and the communities.
- Is a system that includes disease detection, data collection, analysis, interpretation and sharing at all levels so that action is taken on the best available evidence.
- Occurs at all levels from local to international levels.
- Is used to assess disease status, trends, and animal disease programs **to take action** for animal disease prevention and control.

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In Summary: Flow of Surveillance Data

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Contributors

MAKERERE UNIVERSITY

E.I.S.M.V. DE DAKAR

Exercise 1 – Epidemiological Surveillance

Description of Exercise:

Develop a flow diagram that describes the surveillance system in your local area, province, and country with reference to animal health, wildlife, zoonotic diseases, food safety and antimicrobial resistance. Should you have any questions about the exercise, please ask a trainer for clarification before, during, and after the exercise.

Time: 30 minutes

Organisation of Group Work:

1. Form yourselves into groups based on country.
2. Draw a diagram on a flip chart that describes the surveillance system related to food safety in your local area, province and country.

At least one group will describe their surveillance system linking local area, province and country with reference to animal health, wildlife, zoonotic diseases, food safety and antimicrobial resistance.

Include the following elements in your diagram:

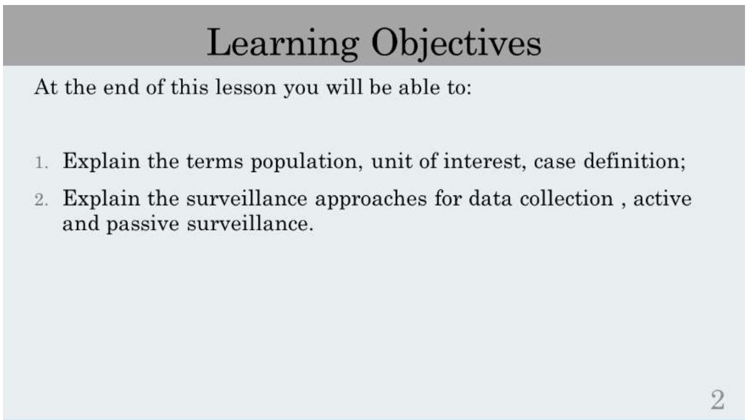
Label country stakeholders at each administration level from field to national levels
- Information inputs including direction, origin and destinations
- Information outputs including direction, origin and destinations

Materials, Data or Information:

1. Preferably, information is collected and displayed using MS Word or MS PowerPoint Flip chart and markers if computers are not available

Lesson 2 – Data for Information and Response

Estimated Lesson and Exercise Time	1 hour 30 minutes
Participant Materials	Frontline ISAVET Lesson 2 Data for Information and Response Participant Guide.doc
	Computer and Microsoft Word
	Pen or Pencil



What is Epidemiology?

"Study of **distribution** and **determinants** of health related **states or events** in specified **populations**, and the application of this to the control of health problems"

Dictionary of Epidemiology

- Surveillance is used to collect epidemiological data
- **Epidemiologic Approach at the population level is** necessary to achieve surveillance

3

…Distribution…

- What = Clinical signs in affected animals
- Who = Type of animals that are affected
- Where = Place where the disease is found
- When = Date when clinical signs appear

Descriptive Epidemiology

- Why/How = Cause / Risk factors
  Modes of transmission

4

…Determinants of Disease…

- What = Clinical
- Who = Animal characteristics
- Where = Place
- When = Time

- Why = Possible risk factors
- How = Modes of transmission

Analytic Epidemiology

5

…Health- and Disease-Related States or Events…

Type of Event	Examples
• Laboratory diagnosis • Indicators of disease • Syndromes or signs • Risk factors for disease • Ancillary data	• FMD laboratory confirmation • Mortality, production drops • Animal movement, lack of biosecurity • Animal census data

6

What is a Population?

- A collection of individual elements (i.e. units) that share common traits, such as:
  - Attributes (species, age, sex, breed, production, etc)
  - Place
  - Time

Category	Subpopulations
• Cattle	• Dairy • Beef
• Sheep • Goats	• Milk • Meat • Dual purpose • Breeder
• Poultry	• Meat producing • Eggs producing
• Wildlife (Carnivores)	• Leopards • Hyenas • Lions

Example of populations with corresponding subpopulation

7

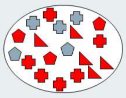
Populations: A Collection of Elements
(Salman)

1. All cattle in a country
2. All animals susceptible to PPR
3. Three chickens in a cage on a poultry farm
4. All fish in the Atlantic ocean
5. All buffaloes in a national park
6. All pigs in a village on 1 January 2009

8

Unit of Interest

- **Unit of interest:**
  - Refers to what we actually identify and count when we conduct surveillance
  - Requires that we are able to identify each element of a population
    - Identification numbers or names are required for each unit (e.g. animal, herd and farm)
  - Need to specify at what level we are measuring
- Examples of animal health units of interest:
  - Individual animal or person
  - Herd or flock
  - Village, local area, region, etc.



9

What Do We Count?

Local Area	Total Cattle	Beef Cattle	Milking Dairy Cows	Sheep	Swine	Broilers	Egg Layers	TOTAL
A	18,000	8,000	500	4,224	4,581		1,556	28361
B	15,000	10,000		6,336	120		133	21,589
C	12,000	1,000	3,300	71	27	150	229	12,477
D	60,000	16,000	17,900	6,722	2,362		764	69,848
E	55,000	20,000	16,200	3,601	1,561		1,552	61,714
F	7,000	4,000		1,607	1,128		6,133	15,868
G	44,000	25,000		4,138	913		459	49,510
H	32,000	9,000	10,200	11,146			358	43,504
I	18,000	10,000		9,418	2,408	510	4,451	34,787
J	67,000	46,000		7,055	143		359	74,557
TOTAL	328,000	149,000	48,100	54,318	13,243	660	15,994	412,215

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What is Case Definition?

A set of standard criteria for deciding whether a unit of interest has a disease

11

When Do We Use Case Definitions?

- For surveillance
- For reportable diseases
- For outbreak investigations
- For epidemiological studies
- For disease eradication programs

Case definitions will vary for a given disease depending on the purpose for the collection of data

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Case Definition Objectives

1. To create systematic method to classify units of interest in a population with respect to a disease
2. Link the field and the laboratory diagnostic components in defining a 'case' through "two-way linking"

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Components of a Case Definition

- **Clinical criteria**
  - The characteristic symptoms of the disease
  - Are not intended for use for individual clinical diagnosis
- **Production criteria**
  - Early, subclinical signals due to production drops, feed and water intake
- **Epidemiologic criteria**
  - Defined epidemiological links
- **Laboratory criteria**
  - Specific test must be named (i.e., PCR, culture)
  - Positive and negative results must be defined
- **Case classification criteria**
  - Suspect, probable, confirmed

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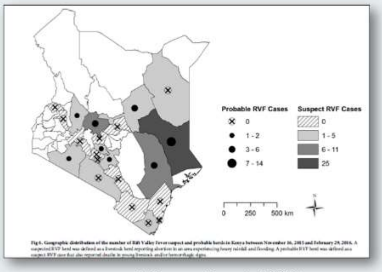
Rift Valley Fever (RVF) in Kenya: 2015 - 2016

Type	Definition
Suspect Case	A suspect herd is one reporting abortion (clinical signs) in any of the livestock from herds in an area experiencing heavy rainfall and flooding (ancillary data)
Probable Case	A probable RVF herd is defined as a herd reporting abortions and/or hemorrhagic signs (clinical signs), mortalities (production indicator) in the young ones, in any of the livestock in the herd in an area experiencing heavy rainfall and flooding (ancillary data)
Confirmed Positive Case	A confirmed RVF herd is defined as a herd where an animal tested positive to RVF by RVF IgM ELISA (laboratory confirmation)



Reference: Oyas et al 2018

15

Exercise 2: Develop Case Definitions

Instructions: In pairs, please answer the following information and share in a plenary. This exercise should take 10 minutes total – 6 for developing case definition and 4 for sharing in plenary

1. Develop suspect, probable and confirmed case definitions for one of the following diseases in animals
   a. Rabies in wild carnivores
   b. Food and Mouth Disease in Goats and sheep
   c. Anthrax in cattle
   d. Highly Pathogenic Influenza in birds

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Types of Data Collected in Surveillance

- Identifying information
- Demographic information
- Clinical information
- Exposure / risk factor information
- Reporter information (name of laboratory/clinic)

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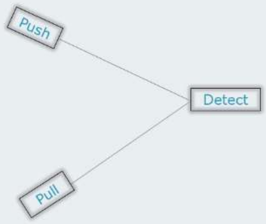
Detecting Disease "Events"

- **Passive Reporting**
  - Effective and efficient
  - Rumor tracking
  - Reports from owners, veterinarians or allied industry
  - Laboratory
- **Active Reporting**
  - Existing disease surveillance programmes
  - Zero-reporting (reporting negative results especially during an outbreak))



18

Methods for Gathering Surveillance Data

Passive surveillance	Active surveillance
• Incentive to report** • Awareness of what to report • How to report • Access to supportive infrastructure (laboratory)	• Resource intensive (manpower) • Probability based sampling • Potentially less subject to bias • Targeted • Expensive!

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Exercise 3:
Data Reporting Active and Passive Surveillance

- This exercise should take 20 minutes.
- Work in small groups of four persons per group.

1. Review the disease scenario provided; and
2. Answer the questions provided to describe how you would collect data both actively and passively.

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In Summary…

- To achieve surveillance we use the epidemiologic approach targeting populations as opposed to individual animals.
- A population is a collection of individual elements (i.e. units) that share common traits. When conducting surveillance we distinguish between target, study and sample populations.
- A case definition is essential to enable us to count positive cases of disease or disease related events.
- Surveillance data can be gathered actively or passively.

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UNE AMBITION RÉGIONALE POUR LE DÉVELOPPEMENT

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Exercise 2 - Creating Suspect, Probable, and Confirmed Case Definitions

Description of Exercise:
Develop suspect, probable and confirmed case definitions for one of the following diseases in animals

Rabies in wild carnivores

Foot and Mouth Disease in Goats and sheep

Anthrax in cattle

Highly Pathogenic Influenza in birds;

Time: 25 minutes

Organisation of Group Work:
For each group, create the suspect, probable and confirmed case definitions in MS Word or MS PowerPoint and be prepared to share your list.

Exercise Components and Structure:
For each group, create the suspect, probable and confirmed case definitions in MS Word or MS PowerPoint and be prepared to share your list. for one of the following diseases in animals:

Rabies in wild carnivores
Foot and Mouth Disease in Goats and sheep
Anthrax in cattle
Highly Pathogenic Influenza in birds;

Materials, Data or Information:

1. MS Word or MS PowerPoint

Expected Outputs and Deliverables of Each Participant:

1. Provide examples of active and passive surveillance.
2. Show how surveillance data flows including two-way linking between field and laboratory data.

Disease	**Suspect**	**Probable**	**Confirmed**
Rabies in wild carnivores			
Foot and Mouth Disease in Goats and Sheep			
Anthrax in cattle			
Highly Pathogenic Influenza in birds			

Exercise 3 - Use of Active and Passive Surveillance for Brucella Mellitensis in Sheep and Goats

Description of Exercise:

Review the scenario provided and answer the questions related to use of active and passive surveillance. Should you have any questions, please ask a trainer for clarification before during, and after the exercise.

Work in pairs to answer the questions for the data report forms.

Exercise Components and Structure:

1. This exercise should take 20 minutes.
2. Work in small groups of four persons per group. Be prepared to report back to the class to share your group responses.
3. Review the disease scenario provided; and
4. Answer the questions provided to describe how you would collect data both actively and passively.

Materials, Data or Information:

1. Scenario for Exercise 3.
2. Provide responses in MS Word or MS PowerPoint

Expected Outputs and Deliverables of Each Participant:

1. Provide examples of active and passive surveillance.
2. Show how surveillance data flows including two-way linking between field and laboratory data.

Scenario

Background (Reference: Franc et al. BMC Public Health (2018) 18:125 DOI 10.1186/s12889-017-5016-y):

In 2013, a study. was conducted to estimate the economic impact of brucellosis in the developing nations of Africa and South/ Southeast Asia. In all, 259 studies on brucellosis from these regions were analyzed and encompassed observations from 500,000 animals, 30,000 people, and 600 food samples. The data revealed an average prevalence range of 0–88.8% in sheep and goats, 0–68.8% in cattle, 0.4–20% in camels, and 0–12.9% in other species (pigs and dogs).

In the case of brucellosis, visible losses include livestock abortion, reduced milk production, lost draught power, reduced weight gain from chronic infections and ill-thrift, premature death or culling of unproductive stock, veterinary costs associated with treating clinically ill animals and diminished animal welfare. In endemic areas, Brucella spp. can cause a significant reduction in herd productivity that compromises food security and the livelihood of farmers who depend on the sale or trade of surplus meat, dairy, and offspring from their animals.

Scenario:

You receive a call from the local health department concerning a rise in the number of human cases of B. mellitensis who went to the local hospital in your local area that are confirmed by the national laboratory based on positive bacterial culture.. Twice as many females as males are affected and there has been a significant increase in human abortions has occurred during the past 3 months. Brucellosis is a reportable animal health disease and is a high priority disease in your country. Your veterinary supervisor in the national government has asked you to become a member of a special task force that has been created by the Ministry of Health and the Ministry of Agriculture to investigate the presence of B. mellitensis in your local area.

Please answer the following questions:

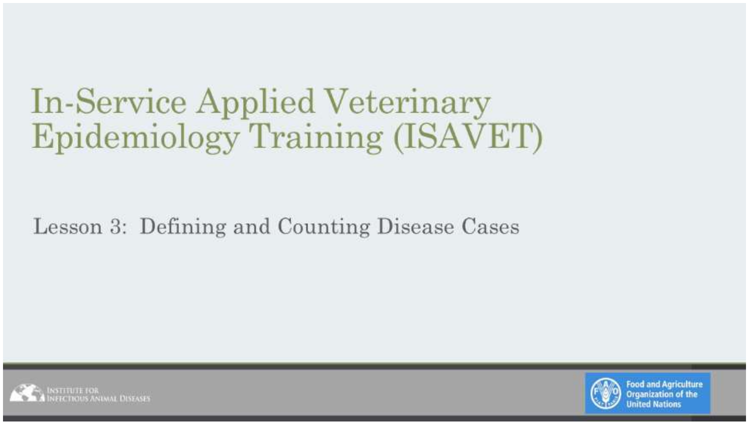
1. Is the discovery of B. mellitensis in humans from the local area hospital an example of active or passive surveillance? Please explain your answer.

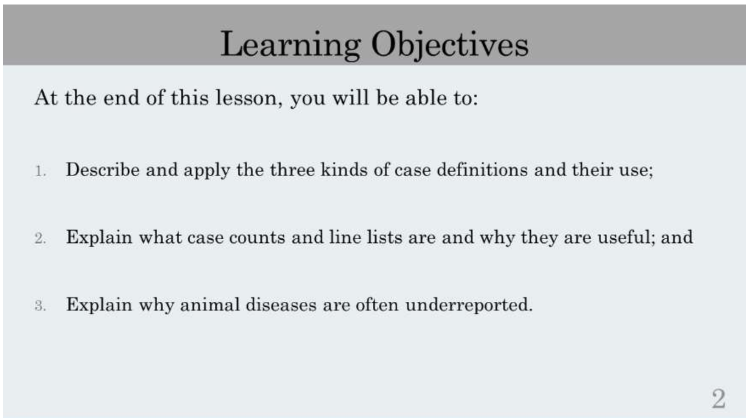
2. Your supervisor would like you to conduct ongoing surveillance of the local abattoirs to identify sheep and goats that react positively to the rose bengal test. Is the surveillance passive or active? Briefly explain your answer.

3. The local health department has decided to conduct as survey of the abattoir workers and sheep and goat farmers in your local area. They would like to collaborate with you and have asked you to collect information about abortion history and chronic illness in some selected sheep and goat herds.
    a. Is the farm survey active or passive? Briefly explain your answer.
    b. Some farmers choose to contact you following the survey to report cases of of abortion in their sheep and goats of their own free will. Is this voluntary reporting by farmers active or passive? Briefly explain your answer.

Lesson 3 – Defining and Counting Disease Cases

Estimated Lesson and Exercise Time	2 hours
Participant Materials	Frontline ISAVET Lesson 3 Defining and Counting Disease Cases Participant Guide.PDF
	Microsoft Word and Excel
	Computer
Handout Materials for Exercises	Frontline ISAVET_PivotTable Handout.PDF
	Frontline ISAVET_PivotTable.xls





Case Definitions

A set of standard criteria for deciding whether a unit of interest has a disease

Uses of Case Definition?

1. Reportable diseases
2. Disease control/eradication programmes
3. Outbreak investigation

3

Case Definitions will vary depending on the purpose for the collection of data

Surveillance	Outbreak Investigation
• Standard across a country or area • Revised as more is learned about the disease • Revised as laboratory tests improve • Comparisons can be made across animal (herd/flock), place, and time	• Different for every outbreak • Contains specific time and place constraints • Revised as more is learned about the outbreak • Comparisons might be possible with surveillance data

4

Case Definition: Components and Criteria

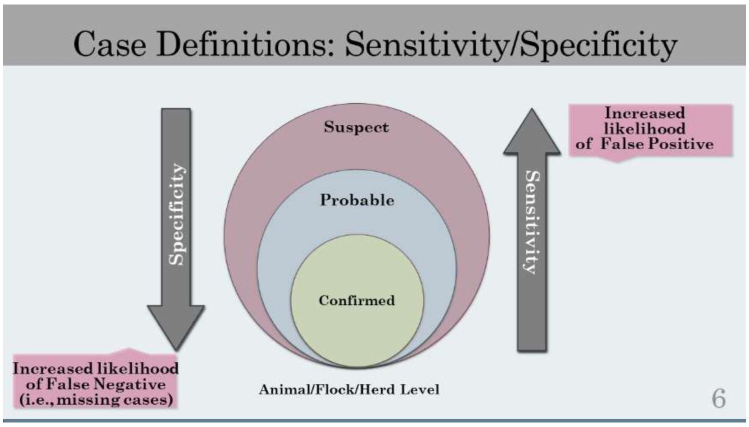
Clinical
- Characteristic clinical signs, progression and duration of the disease
- Used at herd/flock level not at the individual animal level

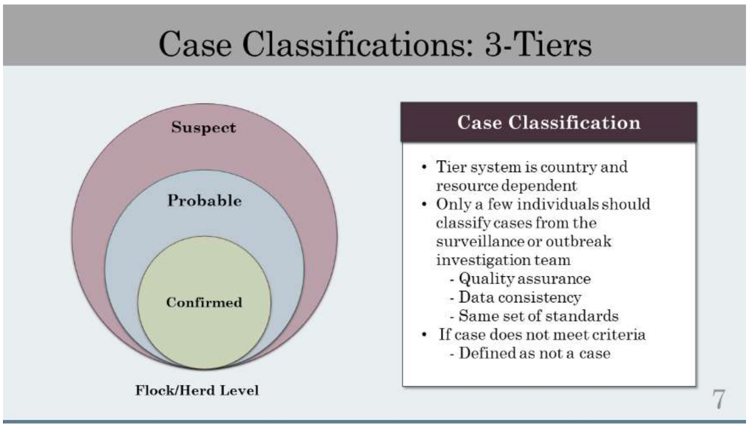
Epidemiologic
- Determined epidemiological exposures and linkages

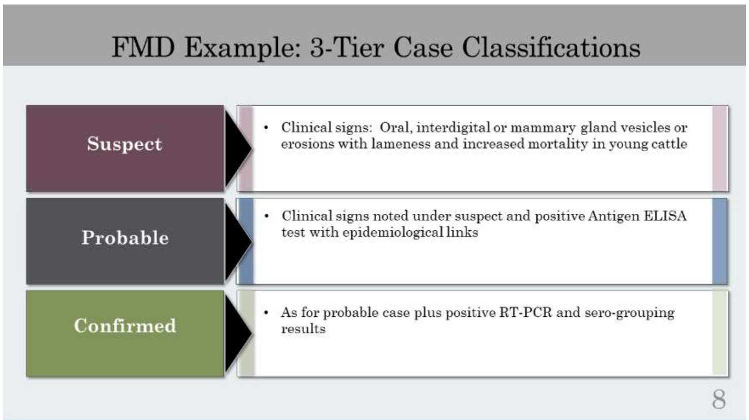
Laboratory
- Specific test must be named (e.g., PCR ELISA)
- Positive and negative results must be defined

3-Tier Case Classification
- Suspect
- Probable
- Confirmed

5


Case Definitions: Sensitivity/Specificity
Specificity
Suspect
Probable
Confirmed
Sensitivity
Increased likelihood of False Positive
Increased likelihood of False Negative (i.e., missing cases)
Animal/Flock/Herd Level
6


Case Classifications: 3-Tiers
Suspect
Probable
Confirmed
Flock/Herd Level
Case Classification
• Tier system is country and resource dependent
• Only a few individuals should classify cases from the surveillance or outbreak investigation team
- Quality assurance
- Data consistency
- Same set of standards
• If case does not meet criteria
- Defined as not a case
7


FMD Example: 3-Tier Case Classifications
Suspect
• Clinical signs: Oral, interdigital or mammary gland vesicles or erosions with lameness and increased mortality in young cattle
Probable
• Clinical signs noted under suspect and positive Antigen ELISA test with epidemiological links
Confirmed
• As for probable case plus positive RT-PCR and sero-grouping results
8

Exercise 4: Case Definitions

- This exercise should take 30 minutes.
- Divide into four groups of roughly equal size. Select one spokesperson from your groups to report on outcomes.
- Develop a 3 tiered case-definition.
- Provide examples of a suspect, probable and confirmed case definition for one of the following diseases
  - Rabies
  - Anthrax
  - Foot and Mouth Disease
- Please provide examples of wildlife where applicable

9

Case Counts

- Represents a number of suspect, probable or confirmed cases
- Can be calculated from a line listing
- It may be affected by underreporting and how certain or inclusive is the case definition is that is being applied.

10

What is a Line List?

- A list of each possible case in a field investigation, with detailed information presented in a consistent manner
  - Provides information on possible cases in an ordered and uniform fashion (species, gender, date of onset, etc.)
  - Used to evaluate if each suspect case meets the case definition

Herd ID	Species	Gender	Onset Date	Current Status	Case Category	Location	Epidemiological Linkage
1	Caprine	Male	7/2/2018	Clinical signs	Probable	District A	No vaccination
2	Caprine	Male	7/2/2018	Clinical signs	Suspect	District A	Vaccination
3	Ovine	Male	7/3/2018	Clinical signs	Confirmed	District B	No vaccination
4	Caprine	Male	7/402018	Dead	Confirmed	District C	No vaccination

11

Creating and Managing a Line Listing

- Creation
  - Paper (hard copy)
  - Computer (electronically)
- Information received from field questionnaires
  - Animal (Herd/Flock/Clinical signs/Species/Production class)
  - Time (Date of onset of clinical signs and mortality/date of visit)
  - Place (Geographic coordinates)
- Should include the components of the developed case definition of the outbreak
- Provides a quick assessment of different aspects of an outbreak
- ***Refer to Excel YouTube Video # 3.1: Creating a Line Listing by Hand***
- ***Refer to Excel YouTube Video #3.2: Creating a Line List in MS Excel***

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Line Listing

Reporting Province or Local area: Local area A-C Date of Initial Report:_7/2/2018

Herd ID	Species	Gender	Onset Date	Current Status	Case Category	Location	Epidemiological Linkage
1	Caprine	Male	7/2/2018	Clinical signs	Probable	Local area A	No vaccination
2	Caprine	Male	7/2/2018	Clinical signs	Suspect	Local area A	Vaccination
3	Ovine	Male	7/3/2018	Clinical signs	Confirmed	Local area B	No vaccination
4	Caprine	Male	7/402018	Dead	Confirmed	Local area C	No vaccination

- Herd ID – Unique identifier assigned to each species for a investigation
- Species – Species under investigation
- Gender – Male or female
- Onset date – Date of clinical signs onset
- Current status – No clinical signs, clinical signs, or dead
- Case category – Confirmed, probable, or suspect
- Epidemiology linkage – Exposure or connections with other cases

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Line Listing (Continued)

Reporting Province or Local area: Local areas A - C Date of Initial Report:_7/2/2018

Herd ID	Species	Lameness	Fever of Unknown Origin	Dyspnoea	Diarrhoea
1	Caprine	Negative	Negative	Negative	Positive
2	Caprine	Negative	Positive	Negative	Positive
3	Ovine	Positive	Negative	Positive	Positive
4	Caprine	Negative	Positive	Positive	Positive

- Herd ID – Unique identifier assigned to each herd for an investigation
- Clinical Signs – Varies by disease

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Line Listing (Continued)

Reporting Province or Local area: Local areas A-C Date of Initial Report:_7/3/2018

Herd ID	Specimens Collected	Testing Requested	Results (Screening)	Results (Confirmatory)
1	Blood, Serum	Serology	……	……
2	Blood, Serum	Serology	Negative	……
3	Blood, Serum, Swab	Serology	Positive	Positive
4	Blood, Serum, Swab	Serology	Positive	Positive

- Herd ID – Unique identifier assigned to each herd for an investigation
- Specimens collected – Examples include blood, urine, serum, swab etc.
- Testing requested – Examples include: culture, antigen detection, serology, PCR
- Results (screening) – Findings of field laboratory testing
- Results (confirmatory) – Finding of diagnostic laboratory testing

15

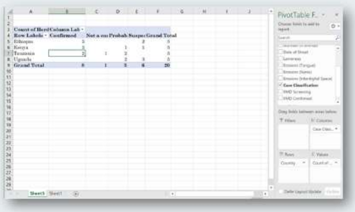
MS Excel PivotTable: A Tool to Review Your Count Data

- MS Excel tool that can calculate, summarise and analyse data in your MS Excel worksheet
- Allows for a 2x2 cross tabular table in MS Excel
- Can develop multiple graphical displays from this tool
- Allows you to see comparisons, patterns, and trends in your data
- Provide information for case counts
- Allows you to identify data errors and/or missing data
- ***Refer to Excel YouTube Video # 7: Developing a Pivot Table***

16

Developing a PivotTable from a Line Listing

- **Step 1:** Click the Insert Tab
- **Step 2:** Select the data
- **Step 3:** Click PivotTable Icon
- **Step 4:** Select new worksheet.
  Click Ok.
- **Step 5:** Drag and drop variables to
  pivot table squares



  - *Filter:* Stratifies data (looks at counts by each category of variable)
  - *Rows:* Sets variable up in the exposure status of 2X2 table
  - *Columns:* Set variable up in the outcome status of 2X2 table
  - *Values:* Sets variable up as a count (will need to be changed from "sum" to "Count"

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Demonstration: Developing a PivotTable From a Line Listing

Foot-and-Mouth Disease MS Excel Demonstration of Developing a PivotTable

Microsoft Excel
Worksheet

From our line listing, lets determine how many cases are classified as suspect, probable, and confirmed in each Country using the PivotTable Tool

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Exercise 5: Line Listing

- This exercise should take 45 minutes.
- Divide into groups of three participants.
- Develop a line listing from the data provided in L3_Ex5_1.xlsx as follows:
  - Create and enter by hand first
  - Create and enter using MS Excel.

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Underreporting of Disease

- Notifiable/reportable diseases are usually based on passive reporting
  - Result: only a fraction of cases overall are reported
- What are the causes of under-reporting?

20

Underreporting of Disease

- Underreporting occurs due to:
  - Lack of knowledge of reporting requirements
  - Lack of awareness of responsibility to report or which diseases must be reported
  - Lack of awareness of how or to who to report to
  - Lack of access to the field
  - Assumption that another group (i.e., the laboratory) will report

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Underreporting of Disease

- Underreporting can occur due to a negative attitude towards reporting
  - Take to much time
  - Lengthy and complex report or procedure
  - Lack of incentive
  - Lack of feedback to information sources
  - Distrust in the government
  - Concern than report might result in an economic issue
  - Disagreement with need to report
  - Lack of access to remote areas

22

In Summary…

- Case definitions identify what is and is not a case and what we count
- Case definitions include four common criteria
- The type of case definition needed is dependent upon the objectives at the time and can have the draw back of having too many or too many false positives
- A line listing provides an up to date "pulse" of an outbreak situation for case classifications.
- PivotTables are a powerful tool to calculate, summarise, and analyse data that lets you see comparisons, patterns, and trends in your data
- Always consider factors which can cause underreporting!

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Exercise 4 – Case Definition

Description of Exercise:

Based on the information provided in the handout, use the following exercise to develop a case definition for brucellosis or theileriosis (east coast fever). Use the example provided in the case definition lecture as a reference for how a case definition should be structured and what information should be included at each level (i.e., 3-tier case definition). Should you have any questions over the exercise, please ask a trainer for clarification before during, and after the exercise.

Allotted Time: 45 minutes

Exercise Components and Structure:

1. Develop the following descriptions for your case definition.
    a. Case classification (3-tiered case definition)
2. After 45 minutes, each spokesperson will present their findings.

Organization of Group Work:

1. Divide into four groups. Select one spokesperson from your group to report outcomes to the entire group.
    a. Group A – Conducting routine surveillance for brucellosis in your country.
    b. Group B – Conducting outbreak investigation for brucellosis in your local area.
    c. Group C – Conducting routine surveillance for east coast fever in your country.
    d. Group D – Conducting outbreak investigation for east coast fever in your local area.

Materials, Data or Information:

1. Internet access
2. Computer with Microsoft Word
3. Paper and pen

Expected Outputs and Deliverables of Each Participant:

1. Provide examples of a suspect, probable, and confirmed case definition.

Group A
Conducting Routine Surveillance for Brucellosis in Your Country

1. *Case Classification (3-Tiered Case Definition):*

Suspect:

Probable:

Confirmed:

Group B
Conducting Outbreak Investigation for Brucellosis in Your Local area

1. *Case Classification (3-Tiered Case Definition):*

Suspect:

Probable:

Confirmed:

Group C
Conducting Routine Surveillance for East Coast Fever in Your Country

1. *Case Classification (3-Tiered Case Definition):*
   Suspect:

   Probable:

   Confirmed:

Group D
Conducting an Outbreak Investigation for East Coast Fever in Your Local area

1. *Case Classification (3-Tiered Case Definition):*
   Suspect:

   Probable:

   Confirmed:

Exercise 5 – Create a Line Listing in MS Excel Using the Field and Laboratory Data Provided

Description of Exercise:

Based on the information provided in the handouts, use the following exercise create a line listing in an electronic format (MS Excel) and paper-based format using the field case reports and laboratory information for a specific disease. Use the example provided in the case definition lecture as a reference for how a line listing should be structured and what information should be included. Should you have any questions over the exercise, please ask a trainer for clarification before during, and after the exercise.

Allotted Time: 30 minutes

Exercise Components and Structure:

1. Determine the variables that should be included in a line listing from field and laboratory case reports.
2. Create a line listing.
3. Use a PivotTable in MS Excel to obtain values of count data from variables in a line listing.

Organisation of Group Work:

1. Each group has 45 minutes to complete the work.
2. Divide into groups of three participants.
   a. Participants can choose from two case report types to develop their line listing.
   b. The line listing should be developed at the herd level.
   c. Each group will develop a paper-based and electronic format of their line listing.

Materials, Data or Information:

1. Computer with Microsoft Word and Microsoft Excel
2. Participant Exercise ISAVET_Exercise_5_Line_Listing_ECF_Participant
3. Paper and pen

Expected Outputs and Deliverables of Each Participant:

1. Develop a line listing from field and laboratory data for a disease.
2. Be able to count and sort data using a pivot table in an electronic format.

Field Case Report and Screening Test Results: East Coast Fever

Review the following three field case reports from local area A.

Field Case Report for Country X		
Case Report Number: 1 **Date of Visit:** 9/2/2018	**Field Inspector:** B. Mbasa	**Region:** Central **Sub-Local area:** A
Premise ID: 1 **Herd ID:** 1 **Age:** Not recorded **Farm Production Type:** Commercial beef with a hobby-scale goat	**GPS Coordinates:** **Longitude:** 22.324761 **Latitude:** 63.452188	

Species	Total Number at Risk	Number Sick	Number Dead	Age (M) = Mature (Y) = Young	Breed	Sex (F) = Female (M) = Male
Dairy Cattle						
Beef Cattle	15	13	3	M	Angus	F
Ducks						
Poultry						
Sheep						
Goats	4	0	0	Y	Boer	F
Swine						

Herd/Flock Level Clinical Signs	Yes	No	Notes:
Anorexia	✓		Clinical signs only seen in beef cattle. No other species affected on farm.
Loss of body condition	✓		
Lacrimation	✓		
Corneal opacity	✓		
Nasal discharge	✓		
Dyspnoea	✓		
Diarrhoea	✓		

Case History

1. **What diseases are present in the local area?**
   Trypanosomiasis, East Coast Fever, Anaplasmosis, Babesiosis, and Brucellosis

2. **What were the dates for the following?**
   - Symptoms first observed: 8/31/2018
   - First death: 9/2/2018
   - Laboratory submission: 9/2/2018

Field Case Report for Country X		
Case Report Number: 2 **Date of Visit:** 9/3/2018	**Field Inspector:** C. Raseasala	**Region:** Central **Sub-Local area:** A
Premise ID: 2 **Herd ID:** 2 **Age:** Not recorded **Farm Production Type:** Hobby-Scale	**GPS Coordinates:** **Longitude:** 23.224578 **Latitude:** 74.312217	

Species	Total Number at Risk	Number Sick	Number Dead	Age (M) = Mature (Y) = Young	Breed	Sex (F) = Female (M) = Male
Dairy Cattle						
Beef Cattle	4	2	0	M	Angus	F
Ducks						
Poultry						
Sheep						
Goats						
Swine						

Herd/Flock Level Clinical Signs	Yes	No	Notes:
Anorexia	✓		
Loss of body condition	✓		
Lacrimation			
Corneal opacity			
Nasal discharge	✓		
Dyspnoea	✓		
Diarrhoea	✓		

Case History

3. **What diseases are present in the local area?**
   Trypanosomiasis, East Coast Fever, Anaplasmosis, Babesiosis, and Brucellosis

4. **What were the dates for the following?**
   - Symptoms first observed: 9/1/2018
   - First death: Not applicable
   - Laboratory submission: 9/3/2018

Field Case Report for Country X

Case Report Number: 3 **Date of Visit:** 9/3/2018	**Field Inspector:** R . Mutowembwa	**Region:** Central **Sub-Local area:** A
Village ID: 3 **Herd ID:** 3 **Age:** Not recorded **Farm Production Type:** Hobby-Scale	**GPS Coordinates:** **Longitude:** 99.115678 **Latitude:** 88.257322	

Species	Total Number at Risk	Number Sick	Number Dead	Age (M) = Mature (Y) = Young	Breed	Sex (F) = Female (M) = Male
Dairy Cattle	3	2	1	M	Holstein	F
Beef Cattle						
Ducks						
Poultry						
Sheep						
Goats	15	10	0	M	LaMancha	F
Swine	2	0	0	Y	Duroc	F

Herd/Flock Level Clinical Signs	Yes	No	Notes:
Anorexia	✓		Late term abortions seen in goats. Clinical signs in all species, but swine.
Loss of body condition	✓		
Lacrimation			
Corneal opacity			
Nasal discharge			
Dyspnoea			
Diarrhoea			

Case History

5. **What diseases are present in the local area?**
   Trypanasomiasis, East Coast Fever, Anaplasmosis, Babesiosis, and Brucellosis

6. **What were the dates for the following?**
   - Symptoms first observed: 9/1/2018
   - First death: 9/3/2018
   - Laboratory submission: 9/3/2018

1. What categories of information should be collected from each of the case reports and transferred to a line listing? Identify specific variables for each category.

Category	Variable(s)

2. Create a line listing from the three field case reports using MS Word.

Animal (Herd/Flock)																	
										Clinical Signs							
Premise ID	Herd ID	Species	Production Type	Total No. At Risk	No. Sick	No. Dead	Age	Breed	Sex	A[1]	LBC[2]	L[3]	C[4]	ND[5]	Dy[6]	Di[7]	C[8]

[1] A= Anorexia; [2] LBC = Loss of Body Condition; [3] L= Lacrimation; [4] C = Corneal Opacity; [5] ND = Nasal Discharge; [6] Dy = Dyspnoea; [7] Di = Diarrhoea; [8] C = Classification (Suspect, Probable, or Confirmed)

		Time				Place				Other	
Premise ID	Herd ID	Date of Visit	Date Symptoms First Observed	Date of First Death	Date of Lab Submission	Country	Region	Local area	GPS Coordinates	Screening Test	Confirmatory Test

Open the MS Excel Spreadsheet titled "ISAVET_Exercise_5_Line_Listing_ECF_Participant". In the first worksheet tab, there are six rows for which herd-level cases should be created from the field case reports. Enter the data from the five field case reports into the line listing on your electronic spreadsheet.

The following laboratory results were obtained in the field from screening tests.

		Other	
Premise ID	**Herd ID**	**Screening Test**	**Confirmatory Test**
1	1	Positive	
1	1	----	
2	1	Negative	
3	1	Negative	
3	1	Positive	
3	1	----	

3. Add the screening test results to the line list and determine what other laboratory results should be included in the line list for confirmation.

What does this change the line list classification for each of these?

Premise ID	Previous Classification	Changed To
1	Suspect	
1	Not a Case	
2	Suspect	
3	Suspect	
3	Suspect	
3	Not a Case	

Make the changes to the classification status in your spreadsheet

Using a PivotTable, identify the number of cases for the following questions.
a) How many herds are suspect?
b) How many herds are probable?
c) How many herds are confirmed?

Samples were taken and submitted to the lab for confirmation**.** On the 5th day of the outbreak, the following results for the herd IDs came back with the following confirmatory laboratory results.

		Other	
Premise ID	Herd ID	Screening Test	Confirmatory Test
1	1	Positive	Positive
1	1	----	----
2	1	Negative	Positive
3	1	Negative	Positive
3	1	Positive	Positive
3	1	----	----

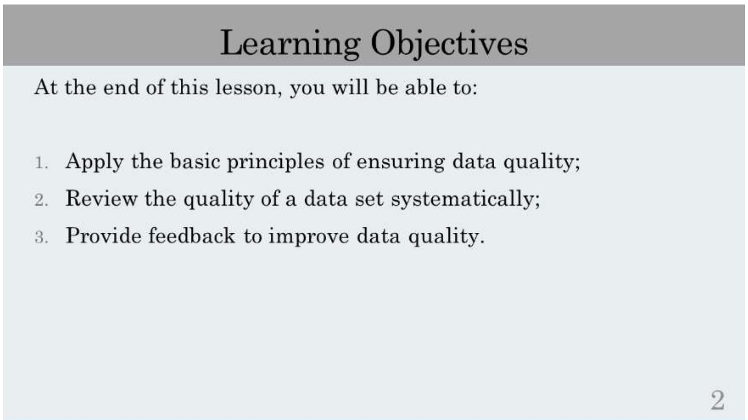
4. Add the above test results to your electronic line listing.

5. After confirmation, make the correct changes to the classification status in your worksheet.

6. After confirmation testing, how many herds are confirmed positive for theileriosis (east coast fever)?

Lesson 4 – Data Quality Principles

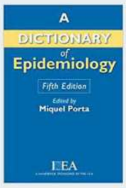
Estimated Lesson and Exercise Time	1 hour
Participant Materials	ISAVET Lesson 4 – Data Quality Principles Participant Guide. PDF
	Computer and Microsoft Word
	Pen or Pencil



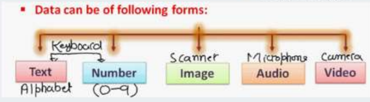
What is data?

DATA: "A collection of items of information."
Dictionary of Epidemiology, 2008

- The individual elements of measurements recorded during data collection



Google Images



3

How Data is Transformed and Applied

1. **Data is collected to create information.**
2. **Information is compiled to improve knowledge**
3. **Knowledge is assessed to improve understanding**
4. **Understanding is required to provide wisdom**
5. **Wisdom is required to take evidence-based decisions for ACTION**

4

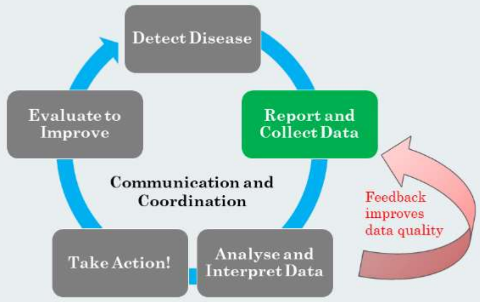
Data Quality

- **Data quality:**
  - Refers to accuracy and completeness of data gathered and that they convey the intended meaning
  - Begins by ensuring that data is gathered in a standard way
    - Need to have a standard data collection form
    - Garbage in – garbage out
    - Good data is needed if we are to make good decisions

Google Images

5

Flow of Surveillance Data



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Reasons for Poor Data Quality

(Adapted: Frontline FETP, 2016)

- Poorly completed forms
- Un-entered forms
- Underreporting
- Overreporting
- Duplicate reporting
- Unsystematic data collection / reporting
- Untruthful reporting
- Inconsistent reporting formats
- Late submission/ reporting
- Calculation errors
- Lack of documentation
- Data files are lost

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Example of Good Quality Data

Local Area	FarmID	AnimalID	Sex	Age	Breed
1	1	1	F	2	Friesian
1	1	2	M	4	Jersey
1	2	1	M	5	zebu
1	2	1	F	6	zebu

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Examples of Poor Quality Data

Unique ID	Local Area	Farm ID	Animal ID	Sex	Age	Weight	Clinical signs	Date of visit
1	1	23	25	f		64	vomiting, pyrexia	2017/1/12
2	1	23	25	male		64 KG	pyrexia	1/12/2017
3	1	1	2	m	1	100 lbs	diaroa	11/1/2017
4	1	1	1	female	4		diarrhoea	10/01/2017
4	1	12		4	2 yrs		death	11/1/2017
6	1	25		femal				11/1/2017
7	1	2		mal				11/1/2017

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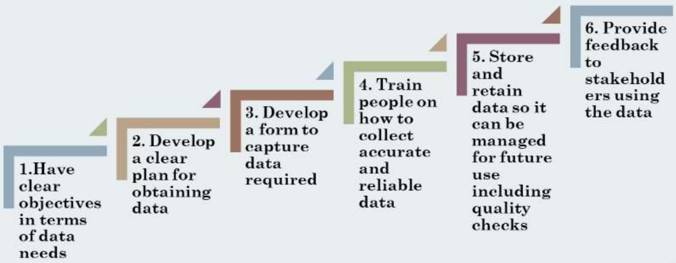
Systematic Method for Data Quality Control



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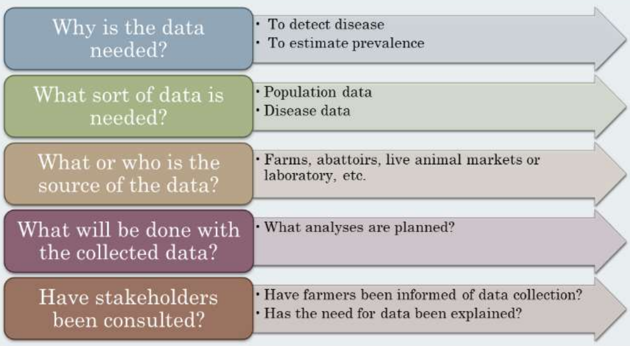
Step 1: Develop Clear Objectives



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Step 2: Have a Clear Data Collection Plan

What?
- What data needs to be gathered?

How?
- Active versus passive collection
- Reporting methods

Who?
- Who will gather the data and are they trained in a standard way?

Where?
- Where will the data be stored?

When?
- Timelines of data collection

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Step 3: Have a Form for Data Collection

Tool	Advantages	Disadvantages
1. Hard copy form	- Widely accessible for field use - Retain a permanent copy	- Handwriting quality varies - Can be delayed, lost or damaged
2. Mobile phone	- One step input process - Timely submission - No transcription required to electronic format	- Variable phone signal access - Input errors difficult to catch when entering data
3. Electronic mail	- Scanned copies can be sent directly to the destination	- Transcription required to electronic format
4. Fax	- Fax is an original of the hard copy	- Requires dependable phone access on both ends

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Step 4: Standardised Data Input Training

- Train data collectors to collect accurate and reliable data
  - Standard training to ensure personnel are given clear step-by-step instructions about each data element and how to enter the data
  - Standard training on interviewing methods to ensure data quality

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Step 5: Store and Retain Data

- **Hardcopy storage:**
  - Paper copies should be stored in a secure and safe location for a period of time specified by the veterinary authority
  - Forms should be filed systematically so that they are accessible

- **Electronic storage:**
  - Electronic data should be stored in a standard format (e.g. MS Excel, comma delimited, etc)
  - Should be backed up and saved on an external drive at least weekly
  - Ensure that anti-virus and security access is in working order

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Step 5: Data Management – Data Quality Checks

- An important step is to check the quality of the data that has been gathered.
- This includes:
  - Ensuring the correct number of records have been entered
  - Performing quality control checks on each data field related to:
    - **Errors:** Incorrect values that have been recorded wrongly or entered/typed incorrectly into a database or spreadsheet
    - **Outliers**: An extreme observation that does not appear to be in line with other observations
    - **Missing data**: Data not entered

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Data Quality Audit

COMPONENT	DESCRIPTION	METRICS	EXAMPLES
Data Collection	Standarised line list for each priority, notifiable disease	Completeness, timeliness, accuracy, zero reporting, format	Sublocal area reports were 50% complete and 30% timely
Case Reporting	Classify cases as suspect (S), probable (P) or confirmed (C)	S,P, C case definitions exist for each priority, notifiable disease	Suspect case of HPAI: Hemorrhage, necrosis diarrheoa, discharges
Analysis and Interpretation	Graphic representations	Describe disease distribution, trendline with explanation	Increase in FMD cases spatially and temporally
Follow up Confirmatory Investigation	Laboratory and field investigations	Rapid confirmatory laboratory testing and field questionnaires	A suspect case of PPR confirmed by laboratory diagnosis
Reporting	Official reports for stakeholders	Internal and external reports and presentations	1. Report to national level 2. Report to farmers

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Step 6: Provide Feedback

- All stakeholders:
  - Should be consulted when data collection is planned to ensure that the right data can be collected
  - Should be asked to provide feedback on the strengths and weaknesses of the data collection methods to ensure continuous quality improvement (CQI)
  - Results of data collected from stakeholders MUST be shared to provide an incentive to continue to support ongoing data collection

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Threats to Data Quality

Lack of reporting	No incentives to report leading to underestimation of disease cases
Design flaws	Not collecting the right data
Data collection method	Not collecting data in the best way
Technical errors	Incorrect entry, transfer and analysis of data
Misinterpreting data	Improper data scale, units, meaning
Data sharing	File formatting, data transfer and compiling data from different databases

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Promote Quality by Providing Feedback!

Table 1: Weekly Sublocal Area Reporting Summary of Completeness and Timeliness

Subdistrict Name	No. Reports Received This Week	Cumulative YTD* No.(%) Weekly Reports Received in [2019]	Mode No. Days from Laboratory Submission to District Reporting	Mode No. Days from District Notification to Farmer Reporting (Days)	No. of Surveillance Events Reported this Year
Subdistrict/Facility A	L	2 (29%)	2	1	12
Subdistrict/Facility B	T	6 (86%)			1
Subdistrict/Facility C	T	7 (100%)	3	5	2
Subdistrict/Facility D	L	1 (14%)	2	3	5
Subdistrict/Facility E	L	4 (57%)	2	3	3
Subdistrict/Facility F	NR	0 (0%)	2	0	15
Subdistrict/Facility G	T	2 (29%)			2
Subdistrict/Facility H	T	4 (57%)	Not applicable		12
% Reports Received to Date	Total: 4/8 = 50%	% Cumulative YTD: 46%	District Mode: 2	District Mode: 3	District Total = 52

Legend:

This week			% Cumulative YTD		
On time T	Late L	No report received NR	≥80% on time	≥50-79.9% on time	<50% on time

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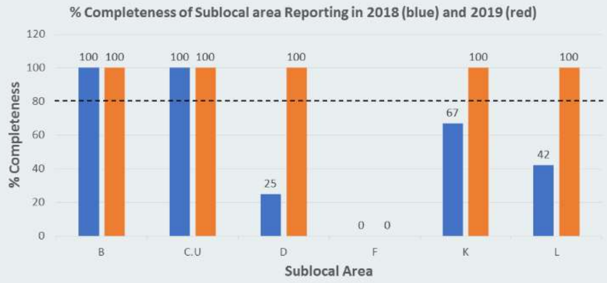
Promote Quality by Providing Feedback



Source: Frontline ISAVET, Guinee

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Exercise 6: Data Quality

1. This exercise will take 45 minutes.
2. Pair yourselves into groups of two.
3. Review the dataset provided.
4. Identify corrections from the dataset and identify all errors and omissions.
5. Provide suggestions for improving data quality in the process just described in this lesson.
6. Plenary review with facilitated discussion with trainer

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In Summary…

- Understanding different data types allows us to correctly analyse and make use of the data
- High quality surveillance data is the basis of reliable information for good decision-making in animal health
- To ensure good quality data it is important to:
  - Have clear objectives about the data that is needed
  - Develop a clear plan about the best way of obtaining the data
  - Use standardised forms or formats that can capture the data
  - Train people about how to collect accurate and reliable data
  - Store, review and retain the data so that you can retrieve it for future use
  - Provide feedback to all stakeholders using the data

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ISAVET Contributing Universities
Partners
TEXAS A&M UNIVERSITY
TEXAS A&M AGRILIFE
Contributors
MAKERERE UNIVERSITY
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Exercise 6 – Data Quality Principles

Review and Identify Corrections Required for Dataset with Errors and Omissions

Description of Exercise:

Using the data quality checklist, review and identify corrections required for a dataset with errors and omissions. Should you have any questions over the exercise, please ask a trainer for clarification before during, and after the exercise.

Allotted Time: 45 minutes

Exercise Components and Structure:

1. Work in pairs of two people.
2. You have 45 minutes to complete this exercise
3. For the dataset provided, review and identify corrections required for a dataset with errors and omissions

Materials, Data or Information:

1. Dataset of HPAI H5N1 Outbreaks in Nigeria
2. Record answers in MS Word or PowerPoint

Expected Outputs and Deliverables of Each Participant:

1. Follow a systematic method to review and correct data
2. List ways to improve the data set provided

Dataset Dictionary

HPAI H5N1 Outbreaks in Nigeria

Records from an H5N1 HPAI outbreak from Nigeria are presented in the dataset *Exercise_6.version 4.xls*.

Each row of the data in MS Excel spreadsheet represents an outbreak report (multiple rows per affected farm) and details of the fields can be found in Table 1.

Table 1. Details of variables in the *Exercise_6.xls*.

Variable	Description
farmerid	Unique identifier for each farmer
LGA	Local government area
GPS location	Geographic coordinates of farm
Location	Farm name
farmtype	Type of farm
Type of birds	Bird types on farm
Age	Age of birds on farm
flocksize	Bird population
Susceptiblepop	Number of susceptible birds
Date of onset	Date clinical signs observed
Date reported	Date reported
Mortality	Number of dead birds
Number slaughtered	Number of birds slaughtered
Bases for diagnosis	How cases were diagnosed
Date samples sent to lab	Date samples were sent to the laboratory
Date of confirmation	Date outbreak confirmed
Control measure	Measures implemented to control the outbreak
Status	HPAI status
Remarks	Comments

farmerid	LGA	farmtype	Type of birds	Age	flocksize	Susceptiblepop	Date of onset	Date reported		Mortality	Number slaughtered	Bases for diagnosis	Date samples sent to lab	Date of confirmation	Control measure	Status	Remarks
1	Dala	layer	Layers	22weeks, 10 wks, 4wks	1568	1568	2/1/2015	2/1/2015	1/0/1900	1370	198	Clincal and	7/1/2015	8/1/2015	Quarantine	Positive	
1	Dala		Layers				3/1/2015			350	66						
1	Dala		Layers				4/1/2015			50	63						
2	Sabon gari	mixed	Chickens (Local & exotic, geese, turkeys, peacock)	Different age groups	30,000	30,000	22/12/2014	24/12/2014		919	450	Clincal and Laboratory	7/1/2015	8/1/2015	Quarantine	Negative	
3	Gwale		Layers	24wks	570	570	11/1/2015	11/1/2015		4	0	Clincal and Laboratory	12/1/2015	13/1/2015	Quarantine	Positive	Farmer visited Rimi LBM on 06/01/2015
3	Gwale						12/1/2015			48							
3	Gwale						13/01/2015			120							
3	Manjibir	mixed	Growers	12 weeks	3,257		8/1/2015	9/1/2015		62	0	Clincal and	12/1/2015	13/01/2015	Quarantine	Positive	
3	Manjibir		Pullets	18 weeks	2800		13/01/2015			287 pullets							
3	Manjibir		Cocks	10 weeks	6000		13/01/2015			672 cocks						Positive	
3	Manjibir		Pullets				15/01/2015			185 pullets							
3	Manjibir		cocks				15/01/2015			1105 cocks							
4	Kumbotso		Pullets	19 weeks								Clincal and	12/1/2015	13/1/2015		Negative	
5	Gwale	layer	Layers	20 weeks	3500	3500	11/1/2015			16	0	Clincal and Laborator	15/01/2015	Pending	Quarantine	Pending	There are some bags of feed
5	Gwale		Layers in battery cage	Adult laying birds, Apparently healthy	175		12/1/2015			86					Quarantine		
6	Kumbotso	layer	Layers	Room 1- 19weeks (affected flock)	1600	1600	9/1/2015	9/1/2015		10	0	Clinical and laboratory	10/1/2015	15/01/2015	Quarantine	Positive	
6	Kumbotso		Layers	Room 2 - 44 weeks	1753		10/1/2015			30			15/01/2015	Pending		Pending	
6	Kumbotso		Layers	Room 3 - 44 weeks	680		11/1/2015			102							
6	Kumbotso		Layers	Room 4 - 19 weeks	1233		12/1/2015			202							
6	Kumbotso		Layers	Room 5 - 7 weeks	4884		13/01/2015			578							
7	Kumbotso	layer	Layers	12 months	1200	1200	7/1/2015	7/1/2015		470	60	Clinical and laboratory	12/1/2015	13/01/2015	Quarantine	Positive	670 live birds were taken to the livebird market,
7	Kumbotso	mixed	Pullets	7 weeks	300												60 dressed birds were taken to Wudil LBM
8	Tofa		Pullets (point of lay)	20 weeks	576												
8	Tofa		Pullets (point of lay)	Geese	7												
8	Tofa		Pullets (point of lay)	Turkeys	4												
8	Tofa		Pullets (point of lay)	Guinea fowl	40												
8	Tofa		Pullets (point of lay)	Local chickens	6												

1. Identify data quality issues that are found in the aforementioned dataset with a corresponding solution.

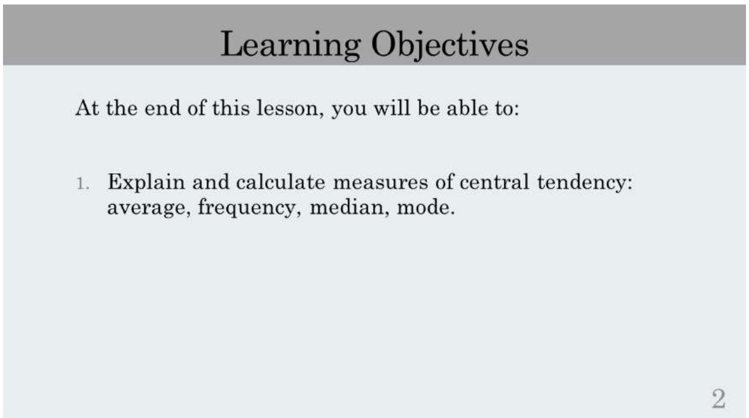
To be assigned as homework assignment and then follow the SOP provided:

Conduct data quality audit for any five selected variables and 10 randomly selected entries using the data quality audit tool provided and interpret your findings.

Data Audit Tool blank.xlsx

Lesson 5.1 – Describing and Acting upon Animal Disease and Health Data: Central Tendency

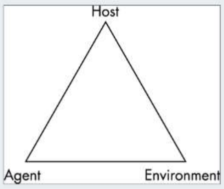
Estimated Lesson and Exercise Time	1 hour and 30 minutes
Participant Materials	Frontline ISAVET Describing and Acting upon Animal Disease and Health Data: Central Tendency Participant Guide.doc
	Computer and Microsoft Word
	Pen or Pencil
Handout Materials for Exercises	MS Excel Lesson 5_Ex7 .xls (Lesson 7)



Basic Principles of Biological Data Distribution

1. DISEASE DOES NOT OCCUR RANDOMLY

Epidemiological Triad: Risk factors create patterns of disease based on the relationship between agent, host and environment



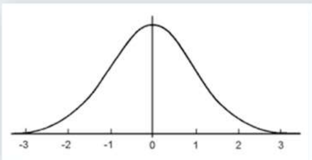
Reference: (Google images)

3

Basic Principles of Biological Data Distribution

2. MANY BIOLOGICAL HEALTH PARAMETERS FOLLOW A STANDARD NORMAL DISTRIBUTION

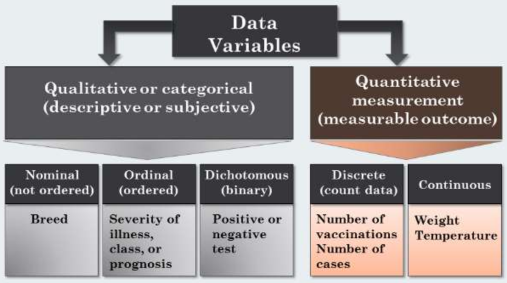
- Examples include how weight and height are distributed in a population around a central area in the middle



Reference: (Google images)

4

Understanding Types of Data Variables



5

Describing Data: Frequency, Average, Median and Mode

Reference: https://www.africa-uganda-business-travel-guide.com/

A farm that you visit has 8 broiler chickens, and the farmer wants to find out how uniform the weights are since he suspects that the day old chicks are coming from different sources. You then weigh and record the weight of each of the 8 chickens.

Chicken Weights	
Animal ID	Weight (kg)
1	2.5
2	1.0
3	2.5
4	2.0
5	1.5
6	1.5
7	6.0
8	2.0

6

Average

- **If you selected any one of the 8 chickens, about how much would it weigh?**
- Weight is a continuous variable and we can calculate the arithmetic mean by doing the following:
  1. Sum up all observation values
  2. Divide the sum by the number of observations

Step 1: Add together the results of your observations

Chicken Weights		
Animal ID	Weight (kg)	
1	2.0	+
2	1.0	+
3	2.5	+
4	2.0	+
5	1.5	+
6	1.5	+
7	6.0	+
8	2.0	=
Sum	**18.5**	

7

Average

Step 2: Calculate the average

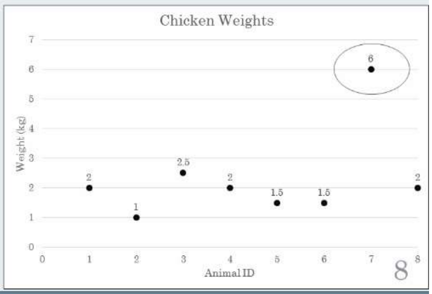
N = 8 chickens

Sum = 18.5 kg

Average = 18.5 kg /8 chickens

X = 2.3 kg / chicken

Step 3: Plot the results



What's wrong here?

8

Frequency

Step 4: Calculate frequency
How many times does each weight appear?

Chicken Weights	
Weight (kg)	Frequency
0.5	0
1.0	1
1.5	2
2.0	3
2.5	1
3.0	0
3.5	0
4.0	0
4.5	0
5.0	0
5.5	0
6.0	1

Reference:
Image: Google

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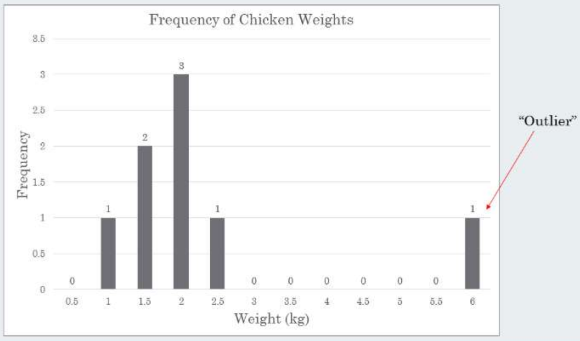
Frequency and Outliers



10

Outliers

You have identified an outlier. Now what?

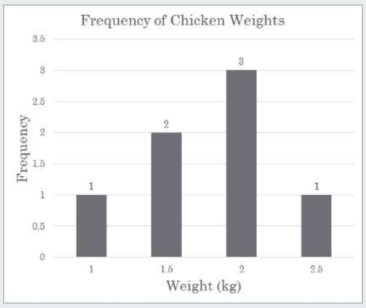
First, find out why it's an outlier

- Then, either

1. Remove the data point from your data set

OR

2. Start over



11

Class Exercise

- Remove the outlier(s)

Step 2: (Re)Calculate the average

N = 7 chickens

Sum = 12.5 kg

Average = 12.5 kg /7 chickens

X =

Chicken Weights	
Animal ID	Weight (kg)
1	2.0
2	1.0
3	2.5
4	2.0
5	1.5
6	1.5
~~7~~	~~6.0~~
8	2.0
Sum	**12.5**

12

Median

Step 5: Order the observations from lowest to highest

Chicken Weights	
Animal ID	Weight (kg)
1	2.0
2	1.0
3	2.5
4	2.0
5	1.5
6	1.5
8	2.0
Sum	**12.5**

Step 5

Chicken Weights	
Animal ID	Weight (kg)
2	1.0
5	1.5
6	1.5
1	2.0
4	2.0
8	2.0
3	2.5
Sum	**12.5**

Step 6: Identify the middle value

Step 6

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Class Exercise

What is the median value?

Chicken Weights	
Animal ID	Weight (kg)
2	1.0
5	1.5
6	1.5
1	2.0
4	2.0
8	2.0
3	2.5
Sum	**12.5**

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Mode

Step 7: Calculate the mode

Chicken Weights	
Animal ID	Weight (kg)
2	1.0
5	1.5
6	1.5
1	2.0
4	2.0
8	2.0
3	2.5
Sum	**12.5**

What weight is most commonly shared among my chickens?

Which data value occurs most frequently?

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Exercise 7: Measures of Central Tendency

1. This exercise should take 60 minutes.
2. Work in pairs or groups of three.
3. Use the dataset titled, "Lesson 5_Ex7Ex8Ex9.xlsx".
4. Calculate the measures of central tendency: mean, median and mode for the following variables:
   - *HHAge*
   - *Distance to main road*
   - *Herd size*
5. For each of these variables, create histograms of each of these variables.

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Exercise 7 – Calculate and Apply Measures of Central Tendency: Mean, Median, Mode, and Range

Description of Exercise:

Calculate measures of central tendency and make frequency histograms.

Allotted Time: 60 minutes

Organisation of Group Work:

- This exercise will take 60 minutes
- Work in pairs or small groups of three.

Exercise Components and Structure:

1. Calculate the measures of central tendency: mean, median and mode for the following variables:
   - HHAge
   - Distance to main road
   - Herd size
2. For each of these variables, create histograms of each of these variables

Materials, Data or Information:

Use the dataset titled, "Lesson 5_Ex7Ex8Ex9.xlsx".

Expected Outputs and Deliverables of Each Participant:

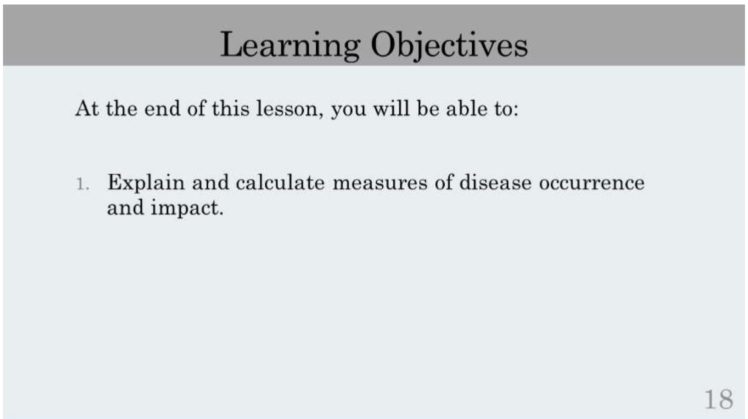
1. Mean, median and mode value for the following variables:

Measure of Central Tendency	HHAge	Distance to main road	Herd size
Mean			
Median			
Mode			
Min			
Max			

2. Frequency histograms of the data from the same three variables.

Lesson 5.2 – Describing and Acting upon Animal Disease and Health Data: Disease Occurrence and Impact

Estimated Lesson and Exercise Time	2 hours
Participant Materials	Frontline ISAVET Describing and Acting upon Animal Disease and Health Data: Disease Occurrence and Impact Participant Guide.doc
	Computer and Microsoft Word
	Pen or Pencil
Handout Materials for Exercises	MS Excel Lesson 5_Ex8.xlsx .xls (Lesson 8)
	MS Excel MS Excel Topic 6: Prevalence and Incidence.xls



Measuring Disease Occurrence and Impact

STEP 1: COUNT affected units of interest such as animals, farms, villages, cases, etc.)
- Include: Animal, Place, Time

STEP 2: COMPARE counts to measure disease occurrence and impact:
- Qualitative data: Proportion
- Quantitative data: Proportion, rate, ratio

Reference: Gregg M. (ed). Field Epidemiology, Third Edition. Oxford University Press. New York. 2008.

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Measuring Disease Impact Using a Ratio

A ratio is a fraction where the numerator is not included in the denominator
Ratio = a/b

STEP 1: COUNT

A field epidemiologist counts 1020 sick ducks and 310 sick geese in one village.

STEP 2: COMPARE

To compare the number (count) of sick ducks to the number (count) of sick geese in the village we divide one count by another to give the ratio of ducks to geese:

Ratio (ducks/geese) = 1020/310 = 3.3

Interpretation: There are 3.3 times more sick ducks than sick geese in the village

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Measuring Disease Impact Using a Proportion

A proportion is a fraction that includes the numerator in the denominator.
Proportion = a/(a+b)

STEP 1: COUNT

A field epidemiologist counts 1020 sick ducks and 310 sick geese in one village.

STEP 2: COMPARE

To calculate the proportion of sick water fowl in the village that are geese:

Proportion of water fowl that are sick geese = 310 / (310 + 1020) = 0.23 (23%)

Proportion of water fowl that are sick ducks = 1020 / (310 + 1020) = 0.77 (77%)

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Measures of Disease Occurrence

Measures of disease occurrence:

1) Incidence and prevalence
2) Defining the susceptible **population at risk (PAR)**
3) Incidence (new cases)
   - Incidence risk (CI) – Approximate method
   - Incidence rate (IR) – Exact method
4) Prevalence (new and old cases)
5) Other measures of disease risk: Attack risk
6) Crude and Specific risk ("rate")

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Caution about Epidemiology Terms: Risk versus Rate

- Some epidemiological terms used in public health apply the term "rate" when in fact it is measuring a "risk" expressed as a proportion:
  - Example 1: Attack Rate is really an Attack Risk
  - Example 2: Case Fatality Rate is really a Case Fatality Risk
- To account for this difference, the public health term "rate" will be included in parenthesis in this lesson so that you are aware of this difference in terminology
- Remember that a rate must refer to the number of events per unit time

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Key Concepts: Risk versus Rate

Risk	Rate
Is a probability expressed as a proportion: Example 2 of 10 animals are dead = 20%	Measures risk per unit time
Equation: Risk = a / (a+b)	Equation: Count/Animal-time at risk
Units: Percentage affected (%)	Units: Animal time at risk e.g. 40 cattle-weeks at risk

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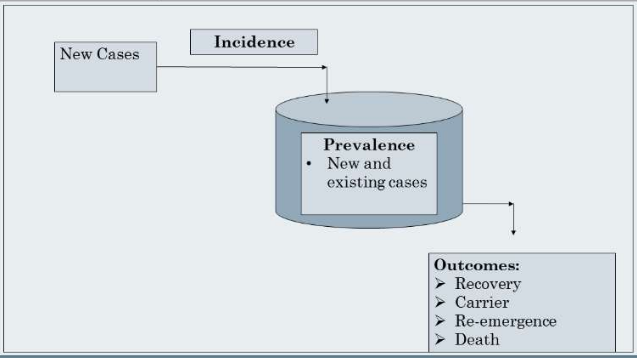
1) Incidence and Prevalence



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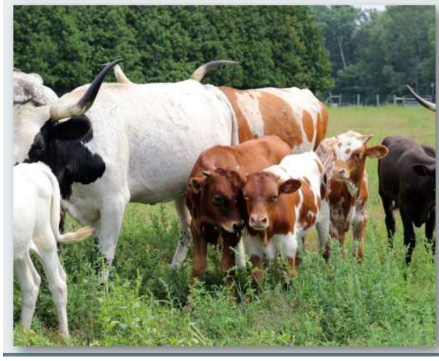
2) Defining the Population at Risk (PAR)



- Risk is expressed as a proportion: R = P = a/(a+b)
- Coccidiosis is a parasitic disease that affects calves under the age of 90 days of age.
- A small herd of beef cattle contains 35 young calves under the age of 90 days and 40 mature cows.
- What is the PAR for coccidiosis in this beef herd?
- **Answer:** The population at risk for coccidiosis is 35 and this will become the denominator

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3) Cumulative Incidence (CI) – Closed Population

$$CI = \frac{\textit{Number count of new cases during a specified period}}{\textit{Number count of Invididuals initialy at risk during the period}}$$

Process: Count and then compare the numerator and denominator

- **Numerator:**
  - Counts the new cases that occur during a defined period
- **Denominator:**
  - **Closed populations (stable population):**
    - Option 1 : Count of healthy animals initially at risk at the start of the period
  - **Open populations (dynamic population):**
    - Option 2: Average count of population at beginning and end of the period

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Example – Cumulative Incidence (CI)

Closed Population (stable):

There are 40 new cases of Rabies diagnosed in cattle in local area x over a one year period. The cattle population was estimated as 1000 in January at the start of the year. What is the incidence risk or the CI?

$$CI = \frac{\textit{Number count of new Cases during a specified period}}{\textit{Initial count of PAR at begining of the period}}$$

$$\text{CI} : \frac{40}{1000} = \text{ 0.04 cases per animal-year at risk}$$

- Multiply the incidence rate (IR) by either 100, 1000 or 10,000 or some other number (human health incidence rates are often compared per 100,000 population).
  - The CI : [0.04 X 1,000] = 40 cases of rabies per 1,000 head of cattle in one year in local area X

Reference: Thrusfield, 2008. Veterinary Epidemiology, Third Edition.

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Cumulative Incidence (CI) – Open Population

Open Population (dynamic):

To be used when the population at risk (PAR) is changing over time

$$\text{CI} = \frac{\textit{Count of new cases that occur in the population during a specified period}}{\textit{(Count at risk at the start of the period+ number at risk at the end of the study period)/2}}$$

- **Numerator:** same as incidence risk
  - Counts the new cases that occur during a defined period
  - Excludes diseased individuals at the start of the period
- **Denominator:**
  - Average population at risk during the period

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Example: Cumulative Incidence – Open Population

Open population:

There are 40 new cases of Rabies diagnosed in cattle in local area x over a one year period. The cattle population was estimated as 1000 in January at the start of the year. A number of Cattle were marketed in May, leaving 660 animals in December at the end of the year. What is the incidence rate?

$$\text{CI} = \frac{\textit{Count of new cases that occur during a specified period}}{\textit{(Count at risk at the start of the period+ number at risk at the end of period)/2}}$$

$$\text{IR} = \frac{40}{(1000 + 660)/2} = \frac{40}{830} = \text{0.048 cases per animal-year at risk}$$

- Multiply the incidence rate (IR) by either 100, 1000 or 10,000 or some other number (human health incidence rates are often compared per 100,000 population).
- **The CI : [0.048 X 1,000] = 48 cases of rabies per 1,000 head of cattle in one year in local area X**

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Incidence Rate (IR) – Exact Method

Measures how quickly new cases of disease occurs over time

$$\text{IR} = \frac{\textit{Number of new Cases during a specified period}}{\textit{Animal}-\textit{time at risk duing the period}}$$

- **Numerator:** same as incidence risk
  - Counts the new cases that occur during a defined period
  - Excludes diseased animals at the start of the period
- **Denominator:**
  - Number of animals x the time that each animal is at risk (‘**animal-time at risk’**)
    - e.g. 30 animals at risk for 2 years = 30 x 2 = 60 animal years at risk

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Summary: Prevalence, Incidence Risk, Incidence Rate

Animalid	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	diseased	months at risk
1				Disease									Yes	3
2										Disease			Yes	9
3							Removed						No	6
4													No	12
5			Disease										Yes	2
6												Disease	Yes	11
7										Disease			Yes	9
8													No	12
9													No	12
10							Removed						No	6
Total													5	82

No. of disease events: 5

Prevalence in June: 20%(2 cases in 10 animals)

Number present at start: 10

Number of removals: 2

Number present at end: 8

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Example: Comparing Prevalence, Incidence Risk, Incidence Rate

Animalid	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	diseased	months at risk
1				Disease									Yes	3
2										Disease			Yes	9
3							Removed						No	6
4													No	12
5			Disease										Yes	2
6												Disease	Yes	11
7										Disease			Yes	9
8													No	12
9													No	12
10							Removed						No	6
Total													5	82

No. of disease events: 5

Point Prevalence in June: 20% (2 cases in 10 animals)

Point Prevalence in December: 62.5% (5 cases in 8 animals)

Incidence risk (Approximate): 50% (5 cases in 10 animals)

Incidence rate (Exact) 5 cases per 84 animal-months at risk

Number present at start: 10

Number of removals: 2

Number present at end: 8

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4) Prevalence Risk or Proportion (P)

- Refers to the number of existing cases including those previously existing and new cases that have developed at some point during a given time period.

$$P = \frac{\text{(Count of existing cases)}}{\text{(Total count of population at risk)}}$$

- **Process: Count** and **Compare** the numerator and denominator
- **Point prevalence:**
  - Counting the existing cases at one brief point in time divided by the population at risk (PAR) at that time
- **Period prevalence:**
  - Counting cases over a longer period of time

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Example: Prevalence risk (P)

If 100 cows in a herd of 800 cows are positive for mastitis during one month, what is the period prevalence of mastitis for that month?

$$P = \frac{\text{Count of existing cases during time period}}{\text{Total count of population at risk during time period}}$$

$$P = \frac{100}{800} = 0.125 \text{ or } 0.125 \times 100 = 12.5\%$$

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5) Other Measures of Disease Risk

- A rate is a risk (probability) that is calculated over a given time period and includes the following:
  - A numerator: **count** of animals diseased or dead in a specified time period
  - Denominator: total **count** of all animals at risk or animal-time
  - Specified time period
  - *Example:*
    - *In a chicken flock, the rate of new cases of infectious coryza in the flock over a 12 month period:*

      Incident rate is 25 cases/100 birds/12 months

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Attack (Rate) Risk

- Refers to incidence risk with a short duration
- Generally used during an outbreak situation
- Commonly referred to as "attack rate" in Public Health – it is really is a measure of risk since there is no time component

$$AR = \frac{\text{Number of new Cases of disease during a specified period}}{\text{Number of animals initialy at risk during the period}}$$

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6) Crude and Specific (Rates) Risks

- **Crude risks:** are risks that are expressed for the entire population at risk
  - Morbidity or illness
  - Mortality or deaths
    - Example : Crude morbidity and mortality risks
- **Stratum specific risks:** are those risks expressed for specific subpopulations based on factors such as age, breed, sex, production type, etc
  - Example: Age-specific mortality risk

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Crude (Rates) Risk – Morbidity Risk

- **Morbidity risk:** refers to the number of cases that are clinically affected of the population at risk over an identified time period

$$\textbf{Crude Morbidity} = \frac{\textbf{Number clinically ill}}{\textbf{Population at risk (PAR)}}$$

- **Example:**
  - *In a flock of Pekin ducks, 120 clinically ill and 50 deaths were observed out of 1100 ducks.*
  - *The crude morbidity risk was:*

$$\textbf{Crude Morbidity Risk} = \frac{120}{1100} = 1.0\%$$

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Crude (Rates) Risk – Mortality Risk

- Mortality risk – the number of deaths in a population over a specific time period

$$\text{Crude Mortality Risk} = \frac{\text{Number of animals that die during the period}}{\text{Population at risk (PAR)}}$$

- ***Example***
  - *In a flock of Pekin ducks, 120 clinically ill and 50 deaths were observed out of 1100 ducks.*
  - *The crude mortality rate was:*

Crude Mortality Risk = 50/1100 = 4.5%

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Crude (Rates) Risk – Case Fatality Risk (CFR)

- Case fatality risk (CFR) – the number of deaths amongst all infected cases during a specified time period

$$\text{CFR} = \frac{\text{Number of deaths}}{\textit{Number clinically ill}\text{ (cases)}}$$

- **Example:**
  - *In a flock of Pekin ducks, 120 clinically ill and 50 deaths were observed out of 1100 ducks. The case fatality rate was:*

CFR = 50/120 = 41.6%

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Stratum- Specific (Rates) Risks

- These refers to description of clinical disease and death rates according to specific parts of the population such as :
  - Age, sex, breed, production type, etc.

- **Example:**
  - *The crude mortality risk in a flock of Peking ducks was 50/1100 = 4.5%*
  - *We know that more ducklings died than adult ducks. Prior to the occurrence of deaths in the flock, 20% of the flock were ducklings. We also know that 30 out of 50 duck deaths were ducklings. We can calculate age- specific risks as follows:*

$$\textit{Duckling Age - specific risk} = \frac{30}{1100 \times 0.2} = 13.6\% \text{ of ducklings died}$$

$$\textit{Adult duck Age –specific risk} = \frac{20}{1100 \times 0.8} = 2.3\% \text{ of adult ducks died}$$

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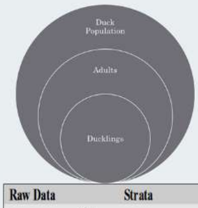
Stratification of Disease Frequency Data

- Many risk associations are hidden when the population data is considered as a whole
- It is necessary to separate out or ***stratify*** the data into layers or levels as we did for different age groups
- Assumption: The PAR is well defined and we can identify and count members of each strata
- In this example ruminant farms are stratified by cattle, sheep and goat farms



Raw Data		Strata	
Ruminant Farms	Non-Ruminant Farms	Species	Total # Farms
5040	200	Cattle	1000
		Sheep	40
		Pigs	200
		Goats	4000

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Exercise 8: Measures of Disease Occurrence and Impact

1. This exercise should take 60 minutes.
2. Work in pairs or in groups of three.
3. Part 1: Calculate proportion and ratio to assess disease risk.
   a) Use dataset titled, "Lesson 5_Ex7Ex8Ex9.xlsx".
   b) Calculate the proportion of HH with outbreaks
   c) Calculate the ratios of dog bites among regions of your choice.
4. Part 2: Calculate incidence and prevalence to assess disease impact.

- Copy of Day 2 MS Excel Topic 6_Prevalence and Incidence_instructor.xls
- Refer to MS Excel Topic 6_Prevalence and Incidence_instructor.xls and MS Excel Video Topic 6: Prevalence and Incidence.xls

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Exercise 8 – Calculate Measures of Disease Occurrence (Incidence and Prevalence) and Disease Impact (Important Rates and Ratios)

Description of Exercise:

- Calculate measures of disease occurrence and disease impact

Allotted Time: 60 minutes

Organisation of Group Work:

- This exercise will take 60 minutes
- Work in pairs or in groups of three.

Exercise Components and Structure:

Part 1: Proportion and ratio

1) Calculate the proportion of HH with outbreaks
2) Calculate the ratios of dog bites among regions of your choice.

Part 2: Incidence vs prevalence

Follow the instructions for MS Excel Topic 6: Calculating incidence and prevalence.

Materials, Data or Information:

Part 1. Use dataset titled, "Lesson 5_Ex7Ex8Ex9.xlsx".

Part 2. Copy of Day 2 MS Excel Topic 6_Prevalence and Incidence_instructor.xls

Expected Outputs and Deliverables of Each Participant:

Part 1. Use dataset titled, "Lesson 5_Ex7Ex8Ex9.xlsxIsigiro.xlsx".

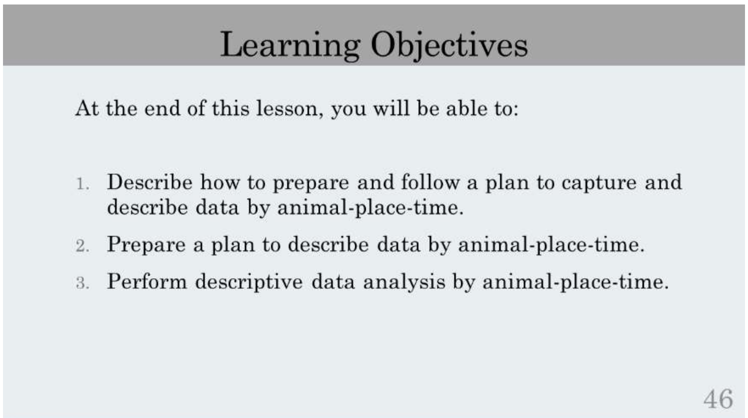
1) Calculate the proportion of HH with outbreaks

2) Calculate the ratios of dog bites among regions of your choice.

Part 2. Copy of Day 2 MS Excel Topic 6_Prevalence and Incidence_instructor.xls

Lesson 5.3 – Describing and Acting upon Animal Disease and Health Data: Descriptive Analysis by Animal-Place-Time

Estimated Lesson and Exercise Time	1 hour and 30 minutes
Participant Materials	Frontline ISAVET Describing and Acting upon Animal Disease and Health Data: Descriptive Analysis by Animal-Place-Time. Participant Guide.doc
	Computer and Microsoft Word
	Pen or Pencil
Handout Materials for Exercises	MS Excel Lesson 5_Ex7Ex8Ex9.xlsx .xls (Lessons 7, 8 and 9)



Usefulness of Data to Explain Disease Events

Descriptive Epidemiology

- **What** happened? (DISEASE)
- **When** did it occur? (TIME)
- **Where** did happen? (PLACE)
- **Who** is affected (pigs, poultry, etc.) ? (ANIMAL)

Analytical Epidemiology

- **Why** did it happen (research hypothesis)? (RISK FACTORS)
- **How** will the data be processed and used? (INTERVENTIONS)

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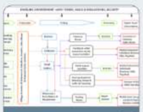
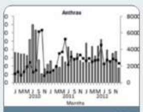
Forms of Data


Numbers (Forms, Excel spreadsheets)


Words (Reports)


Maps (Paper / electronic)


Images (Diagrams)


Graphic symbols

Reference: Google Images

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Part 1: Elements of a Plan to Capture and Describe Data

Capture Data	Describe Data
1. What data variables to collect: - Animal - Place - Time	1. Enter data into the spreadsheet 2. Assess data quality (Lesson 4)
2. Data collection tool - Design and test questionnaire - Smartphone, computer	3. Measure central tendency: - Quantitative data: mean, median, mode - Qualitative data: count, proportion, mode
3. Design spreadsheet/database to record data - Create a data dictionary - Create a line list with variable headings	4. Measure disease occurrence/impact: - Morbidity - Mortality 5. Display data – tables, graphs, maps
4. Collect data and ensure all data is complete and of high quality	6. Interpret and report results

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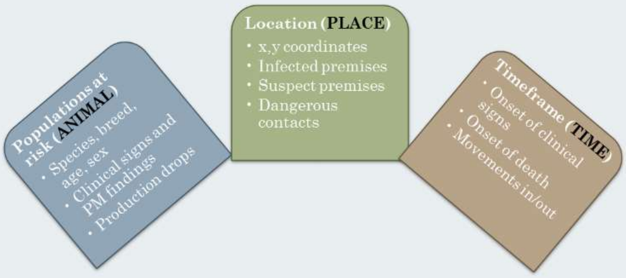
1. Data Collection: Data variables

(Ch. 1.4 Terrestrial Animal Health Code. OIE, 2018)



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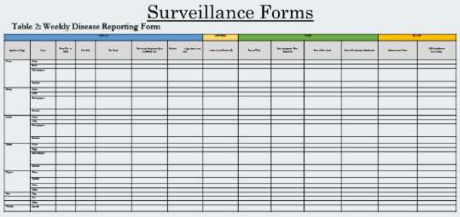
2. Data collection tools

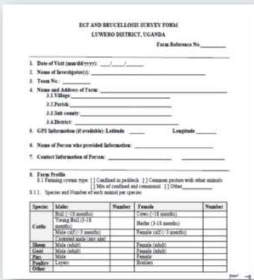
Surveillance Forms



Reference: Frontline ISAVET

Reference: Google Images

Survey Forms



Reference: MAIFF, Uganda

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3. Data Spreadsheet and Dictionary

Data Spreadsheet

Data Dictionary

Question No.	Variable Name	Variable	Type/Description	Subtype	Code
Farm Reference No.	famref_no	Quantitative	Discrete		NA
1	date_ques	Date	Discrete		dd/mm/yyyy
2	name-inv	Nominal	Text		NA
3	team_no	Quantitative	Discrete		NA
4	sub_county	Nominal	Text	KAMIRA SUB-COUNTY	1
			Text	KIKYUSA SUB-COUNTY	2
			Text	KATIKAMU SUB-COUNTY	3
			Text	MAKULUBITA SUB-COUNTY	4
			Text	LUWEERO SUB-COUNTY	5
			Text	BUTUNTUMULA SUB-COUNTY	6
5	lat_coord	Latititude	Discrete	Decimal-degrees (6 decimals)	number
	long_coord	Longitude	Discrete	Decimal-degrees (6 decimals)	numebr

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4. Data Collection Plan

Case Example

A retrospective study was conducted to understand the geographic and seasonal distribution of anthrax in Bangladesh using passive surveillance data from 1 January 2010 to 31 December 2012.

Scope of the Data Collection Plan

What disease = anthrax (laboratory data)
Who (population) = livestock
Where = Bangladesh (map data)
When = 3 years (1 January 2010 to 31 December 2012)
Why/how = to understand the geographic and seasonal distribution of endemic diseases of livestock/ retrospective study using data collected through passive surveillance

References:
Mondal SP, Yamage M (2014) A Retrospective Study on the Epidemiology of Anthrax, Foot and Mouth Disease, Haemorrhagic Septicaemia, Peste des Petits Ruminants and Rabies in Bangladesh, 2010-2012. PLoS ONE 9(8): e104435. https://doi.org/10.1371/journal.pone.0104435
https://doi.org/10.1371/journal.pone.0104435
https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0104435&type=printable

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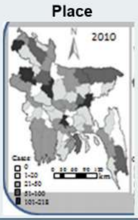
Organising Animal-Place-Time Data for Action

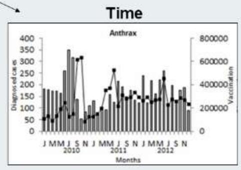
Animal

		2010	
Disease[a]	Species	Diagnosed cases (%)	Death cases (CFR[b], %)
Anthrax	Buffaloes	67 (3.1)	0
	Cattle	1879 (86.4)*	423 (22.5)*
	Goats	220 (10.1)	10 (4.6)
	Sheep	8 (0.4)	0

Place



Time



References:
Mondal SP, Yamage M (2014) A Retrospective Study on the Epidemiology of Anthrax, Foot and Mouth Disease, Haemorrhagic Septicaemia, Peste des Petits Ruminants and Rabies in Bangladesh, 2010-2012. PLoS ONE 9(8): e104435. https://doi.org/10.1371/journal.pone.0104435
https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0104435&type=printable

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Descriptive Data Analysis and Display of Data Variables

Count data can include quantitative or qualitative data.

Table 1. Estimated number of diagnosed cases, death cases and vaccination coverage of anthrax, foot and mouth disease, haemorrhagic septicaemia, peste des petits ruminants and dog bite/rabies in livestock (cattle, goats, sheep and buffaloes) in Bangladesh, 2010–2012.

Disease	2010	2011	2012	Total
Anthrax				
Diagnosed cases	2,174	1,668	2,095	5,937
Prevalence rate, % (95% CI*)	0.14 (0.13–0.15)[a]	0.09 (0.08–0.09)	0.17 (0.16–0.18)	0.13 (0.12–0.13)
Death cases	433	173	195	801
Case fatality rate, % (95% CI)	19.92 (18.23–21.61)	10.37 (8.90–11.84)	9.31 (8.06–10.56)	13.49 (12.62–14.37)
Vaccination	2,602,967	3,417,136	3,325,525	9,345,628
Vaccination rate, % (95% CI)	6.11 (6.10–6.12)[†]	8.02 (8.01–8.03)	7.81 (7.80–7.82)	7.31 (7.31–7.32)

The table shows continuous variables include quantitative number counts and values.

References:
Mondal SP, Yamage M (2014) A Retrospective Study on the Epidemiology of Anthrax, Foot and Mouth Disease, Haemorrhagic Septicaemia, Peste des Petits Ruminants and Rabies in Bangladesh, 2010-2012. PLoS ONE 9(8): e104435. https://doi.org/10.1371/journal.pone.0104435
https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0104435&type=printable

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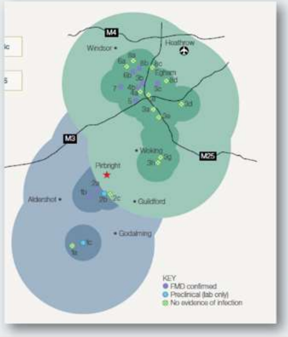
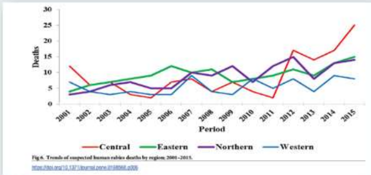
Examples: Displaying Data by Place and Time





References:

Masiira B, Makumbi I, Matovu JKB, Ario AR, Nabukenya I, Kihembo C, et al. (2018) Long term trends and spatial distribution of animal bite injuries and deaths due to human rabies infection in Uganda, 2001-2015. PLoS ONE 13(8): e0198568. https://doi.org/10.1371/journal.pone.0198568

Foot and Mouth Disease 2007: A Review and Lessons Learned, LONDON: The Stationary Office. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/250363/0312.pdf

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Exercise 9: Prepare a Plan to Analyse Data

1. This exercise should take 45 minutes.
2. Work in pairs or in small groups of three.
3. Prepare a plan to analyse a dataset called "Lesson 5_Ex7Ex8Ex9.xlsx"

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In Summary…You now know how to:

1. Calculate measures of central tendency in data including:
   - Mean (average), frequency, median and mode; and
2. Calculate measures of disease occurrence and impact from data including:
   - Ratios and proportions
   - Incidence
   - Prevalence
   - Attack risk
   - Crude and specific morbidity and mortality risks.
3. Prepare and follow a plan to capture and describe data by animal-place-time.

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Exercise 9 – Prepare a Plan to Analyze Data by Animal-Place-Time

Description of Exercise:

Prepare and follow a plan to capture and describe data by animal-place-time using the MS Excel file L5_Ex7Ex8Ex9.xls.

Allotted Time: 45 minutes

Organisation of Group Work:

- Total time 45 minutes
- Work in groups of two or three people.
- For the first 20 minutes groups will answer the questions below.
- During the last 25 minutes, the instructor will lead a plenary discussion.

Exercise Components and Structure:

1. Under the tab labelled "data", list the variable names in the following table that describe characteristics of animal, place and time.

ANIMAL	PLACE	TIME

2. Define a data dictionary and explain how it is used.
3. Review the data in the spreadsheet. Do you see any errors or omissions?
4. How many total animals are there in the 20 herds? What is the size of the smallest and largest herds?

Materials, Data or Information:

MS Excel file L5_Ex7Ex8Ex9.xls. contains all data under the tab labelled "data".

Expected Outputs and Deliverables of Each Participant:

1. Under the tab labelled "data" list the variable names in the following table that describe characteristics of animal, place and time. Note that record ID and occupation pertain to the line list number and the occupation of the animal owner, respectively.

ANIMAL	PLACE	TIME

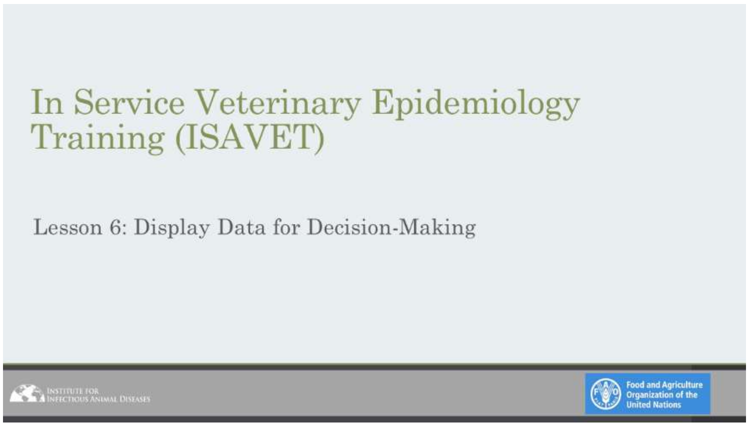
2. Define a data dictionary and explain how it is used.

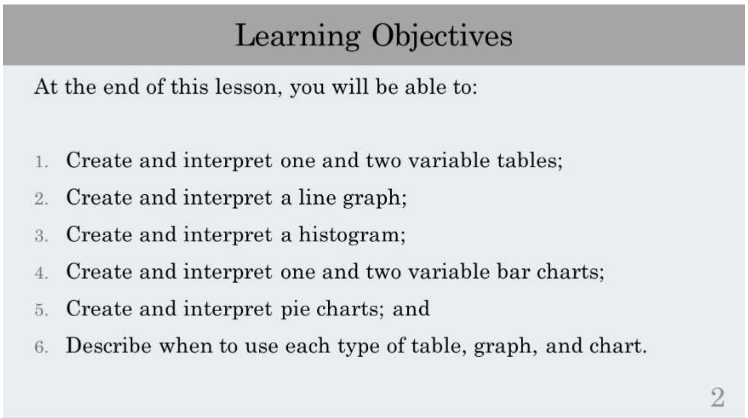
3. Review the data in the spreadsheet. Do you see any errors or omissions?

4. How many total animals are there in the 20 herds? What is the size of the smallest and largest herds?

Lesson 6 – Display Data for Decision-Making

Estimated Lesson and Exercise Time	3 hours
Participant Materials	Frontline ISAVET Lesson 6 Display Data for Decision-Making Participant Guide.PDF
	Computer Microsoft Word and Excel
	Pen or pencil
Handout Materials for Exercises	MS Excel PivotTable.doc





Tables

- Frequencies (counts) of qualitative data are often best presented in a table
  - Single variable
- An advantage of tables over graphs is that actual values can be presented (i.e., specific amounts rather than approximations)
- Sometimes tables communicate information better than graphs
- Do not provide a method to showcase trends in data

3

Tables: Data Representation

Cases of FMD in Country X by Species, October, 2018

Species	Number of Cases
Caprine	10
Ovine	30
Bovine (Beef)	25
Bovine (Dairy)	12
Porcine	30
Total	**107**

Note: Notional data

What type of variable is being presented here?

4

Table Components

Cases of Disease FMD in Country X by Species, October, 2018

Species	Number of Cases
Caprine	10
Ovine	30
Bovine (Beef)	25
Bovine (Dairy)	12
Porcine	30
Total	**107**

Note: Notional data

Component 1: There is a labelled descriptive title.

5

Table Components

Cases of Disease FMD in Country X by Species, October, 2018

Species	Number of Cases
Caprine	10
Ovine	30
Bovine (Beef)	25
Bovine (Dairy)	12
Porcine	30
Total	**107**

Note: Notional data

Component 2: Each row and column are clearly labelled and data is arranged in rows and columns

6

Table Components

Cases of Disease FMD in Country X by Species, October, 2018

Species	Number of Cases
Caprine	10
Ovine	30
Bovine (Beef)	25
Bovine (Dairy)	12
Porcine	30
Total	**107**

Note: Notional data

Component 3: Totals for rows and columns are clearly defined

7

Table Components

Cases of Disease FMD in Country X by Species, October, 2018

Species	Number of Cases
Caprine	10
Ovine	30
Bovine (Beef)	25
Bovine (Dairy)	12
Porcine	30
Total	**107**

Note: Notional data

What is another item that is not included on this table which may help to describe the data?

8

Two Variable Table

Cases of Disease FMD in Country X by Species and District, October, 2018

Species	Number of Cases	
	District A	District B
Caprine	20	10
Ovine	3	30
Bovine (Beef)	4	25
Bovine (Dairy)	20	12
Porcine	25	30
Total	**72**	**107**

Note: Notional data

9

Summary of Table Components

1. Components 1: There is a labelled descriptive title.
2. Component 2: Each row and column are clearly labelled and data is arranged in rows and columns.
3. Component 3: Totals for rows and columns are clearly defined
4. Component 4: List any codes used in the table, (e.g., yrs, or mg/dl), need to be explained in a footnote: yrs = Years; mg/dl = milligrams per deciliter.

10

Exercise10: Display Data in a Table

1. ***Refer to MS Excel YouTube Video #7 Creating a Pivot Table***
2. This exercise should take 30 minutes.
3. Open the Exercise 10 MS Word participant document located in your Exercise 10 participant folder on your flash drive.
4. Work in pairs.
5. Construct tables in MS Excel using the dataset provided in Exercise 10.

11

Examples of Line Graphs

- Represent a trend over time
  - Years
  - Months
  - Days
- Showcases a change in direction
- Types
  - Simple:
    - One trend based on cumulative values per unit time
  - Stacked:
    - Compare trend lines of different strata from the same variable over time
  - Comparative:
    - Shows stratification of multiple variables

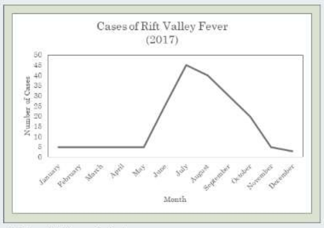
Note: Notional data

12

Simple Line Graph

- Shows the relationship between two variables
  - *X-axis*: time
  - *Y-axis*: variable you are looking at over time to monitor changes

    Examples: number of cases, prevalence and, incidence etc.



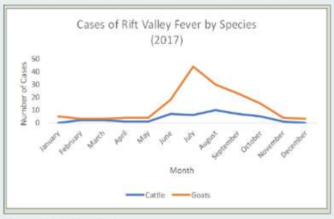
Note: Notional data

13

Stacked Line Graph

- Includes multiple variables of data
  - *X-axis*: time
  - *Y-axis*: variable you are looking at over time to monitor changes

    Examples: number of cases and prevalence
- Shows stratification of <u>one</u> categorical variable
  - *Examples: species, country and gender*



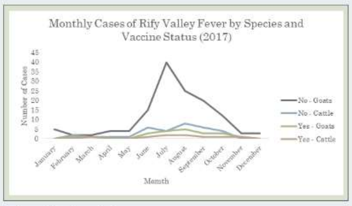
Note: Notional data

14

Comparative Line Graph

- Includes multiple variables of data
  - *X-axis*: time
  - *Y-axis*: variable you are looking at over time to monitor changes

    Examples: number of cases and prevalence
- Shows stratification of multiple categorical variables
  - *Examples: species and vaccination status*



Note: Notional data

15

Line Graphs: Advantages/Disadvantages

- Advantages
  - Easy to read and create
  - Can visually see the trend of the data (how the data increases or decreases)
  - Useful for making comparisons of two sets of data
  - Useful for showing periods of change over time
- Disadvantages
  - If axis are not properly labeled, it may lead to an inaccurate representation of the data
  - Usually can only apply to continuous data points

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Exercise11: Display Data Using a Line Graph

1. ***Refer to MS Excel YouTube Video #8 Pivot Table Line Graphs***
2. This exercise should take 45 minutes.
3. Open the Exercise 11 MS Word participant document located in your Exercise 11 participant folder on your flash drive.
4. Work in pairs of two.
5. Review handouts for Pivot Tables.
6. Construct line graphs in MS Excel using the dataset provided in Exercise 11.

17

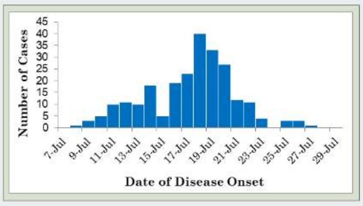
Histograms

- Graph of the frequency distribution of a quantitative variable
- Useful for summarising statistical properties of the data set, including the shape of the frequency distribution, modality, and symmetry
- Columns are adjoining
- Height of each column is proportional to number of observations in that interval

18

Frequency Histogram

- Epidemiologic curves are histograms that show the frequency of cases over time
- They are fundamental tools of an outbreak investigation

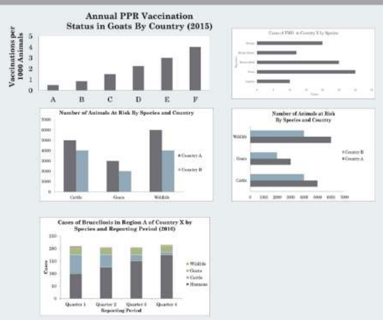


Note: Notional data

19

Bar Charts

- Use with qualitative/categoric data
- Can vertically or horizontally displayed:
  - Simple
  - Grouped
  - Stacked



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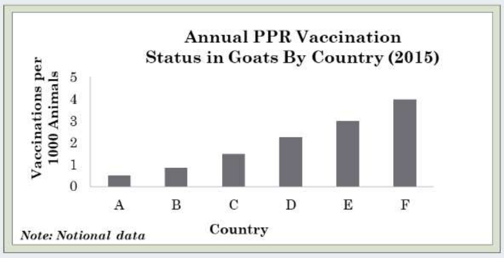
Vertical Bar Chart



- Graph of the frequency of a qualitative variable
- Each variable is represented by a bar
- Length of bars is proportional to the number of events
- Bars do not touch

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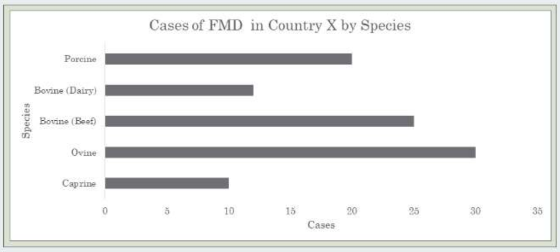
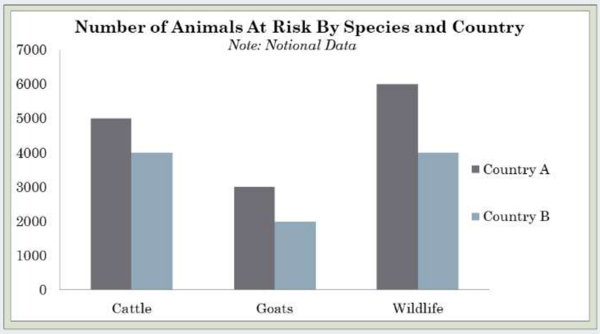
Horizontal Bar Chart



- Graph of the frequency of a qualitative variable
- Each variable is represented by a bar
- Length of bars is proportional to the number of events
- Bars do not touch

22

Grouped Vertical Column Chart



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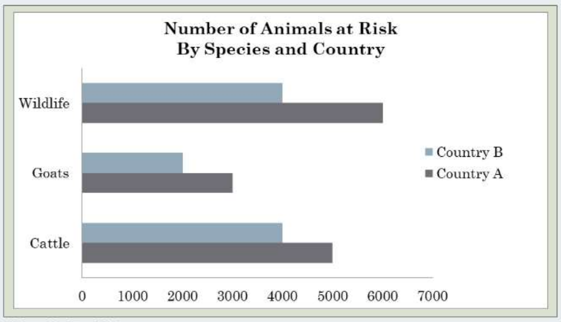
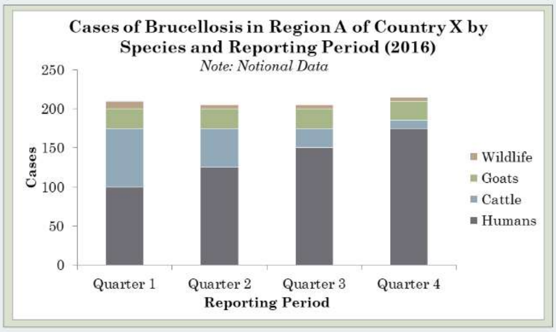
Grouped Horizontal Column Chart



Note: Notional Data

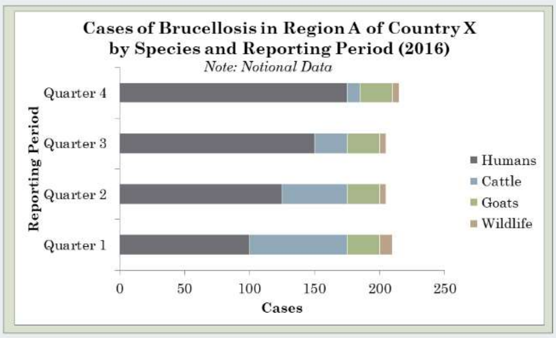
24

Vertical Stacked Bar Chart



25

Horizontal Stacked Bar Chart



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Bar Charts: Advantages/Disadvantages

- Advantages
  - Shows each category in a frequency distribution
  - Displays relative numbers/proportions of each category
  - Easy to understand
- Disadvantages
  - Fail to expose patterns
  - Can be easily manipulated to give false impressions
  - Less effective than line graphs in showing trends over time
  - They do not provide a good showcase for "acceleration" of the data, a quick rise in the number of cases

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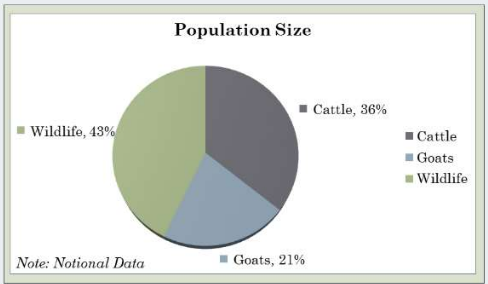
Pie Charts

- Presents information that shows categories as parts of a whole
- Usually represented in percentages



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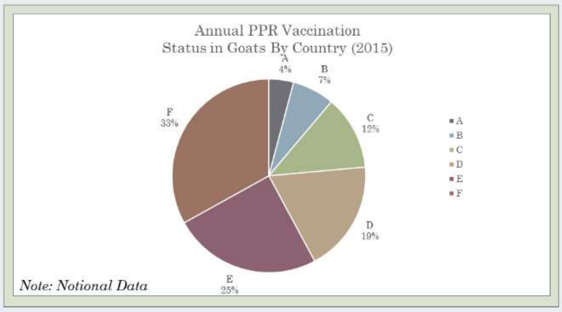
Example of a Pie Chart



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Pie Charts: Advantages/Disadvantages

- Advantages
  - Shows percent of total for each category
- Disadvantages
  - Hard to compare to datasets
  - No exact numerical data
  - Use only with discrete data
  - Best for 4 to 7 categories

30

Exercise12: Display Data in a Bar Chart and Pie Chart

1. ***Refer to MS Excel YouTube Videos: #9 Pivot Table Bar Charts and #10 Pie Charts***
2. This exercise should take 30 minutes.
3. Open the Exercise 12 MS Word participant document located in your Exercise 12 participant folder on your flash drive.
4. Work in teams of two persons.
5. Review handouts for Pivot Tables.
6. Construct bar charts and pie charts in MS Excel using the dataset provided in Exercise 12.

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In Summary…

- Tables are used for both qualitative and quantitative variables.
- Frequencies (counts) of qualitative data, especially those with a single variable, are best presented in a table.
- There are several components which should be incorporated into a table to best describe the data for the user.
- Quantitative data is best represented by tables, line graphs, or histograms
- Qualitative data is best represented by tables, bar graphs, or pie charts.
- Line graphs provide a temporal function and display trends in the data over time.
- Bar charts are used to present and compare qualitative data
- Pie charts represent categorical variables or values of variables

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Exercise 10 – Display Data in a Table

Description of Exercise:

Use the tables provided to construct an appropriate two-variable and multi-variable table of brucellosis and theileriosis (east coast fever) cases by species, local area, region, and test results. Should you have any questions over the exercise, please ask a trainer for clarification.

Allotted Time: 30 minutes

Exercise Components and Structure:

1. You have 30 minutes to complete this exercise
2. Construct the following tables based on the data provided
    a. Two-variable table
    b. Multi-variable table

- Work in pairs for this exercise;
- Each pair should review the provided tables for brucellosis and theileriosis (east coast fever) field testing;
- Create the appropriate two-variable and multi-variable tables from the data table provided.
- Copy and paste the data tables from this exercise into an MS Excel worksheet.

Materials, Data or Information:

1. MS Word
2. MS Excel
3. Paper and pen

Expected Outputs and Deliverables of Each Participant:

1. Depict animal-place-time by creating tables using MS Excel.

Brucellosis Data

Village ID	Local area	Species	Total Animals	Total Blood Samples	Total Milk Samples	Card Test	Brucellosis confirmation	*Brucella* Strain Typed
1	Luwero	Goat	5	4	2	+	+	*B. Melitensis*
2	Luwero	Sheep	7	7	4	+	+	*B. Melitensis*
3	Luwero	Dairy Cattle	10	10	5	+	+	*B. abortus*
4	Luwero	Goat	15	15	10	+	+	*B. Melitensis*
5	Luwero	Goat	12	12	8	-	-	-----
6	Luwero	Sheep	10	10	6	+	+	*B. Melitensis*
7	Luwero	Sheep	5	4	3	+	+	*B. Melitensis*
8	Luwero	Beef Cattle	3	3	----	+	+	*B. Abortus*
9	Luwero	Dairy Cattle	9	6	4	+	+	*B. Melitensis*
10	Luwero	Dairy Cattle	6	5	4	+	+	*B. Melitensis*
11	Luwero	Goat	9	9	6	+	+	*B. Melitensis*
12	Luwero	Sheep	3	3	1	-	+	*B. Melitensis*
13	Luwero	Sheep	7	7	5	+	-	-----
14	Luwero	Goat	12	12	4	+	-	-----
15	Luwero	Goat	15	15	9	-	+	*B. Melitensis*
16	Kayunga	Goat	17	17	15	+	+	*B. Melitensis*
17	Kayunga	Dairy Cattle	9	9	6	+	+	*B. Abortus*
18	Kayunga	Dairy Cattle	4	4	2	+	+	*B. Melitensis*
19	Kayunga	Goat	3	3	----	+	+	*B. Melitensis*
20	Kayunga	Sheep	5	5	2	+	+	*B. Melitensis*
21	Kayunga	Dairy Cattle	7	7	4	+	+	*B. Melitensis*
22	Kayunga	Goat	15	15	10	+	+	*B. Melitensis*
23	Kayunga	Sheep	10	7	5	-	+	*B. Melitensis*
24	Kayunga	Sheep	10	7	5	+	+	*B. Melitensis*
25	Nakasake	Beef Cattle	5	4	----	+	+	*B. Abortus*
26	Nakasake	Beef Cattle	7	6	----	+	+	*B. Abortus*
27	Nakasake	Beef Cattle	3	3	----	+	+	*B. Abortus*
28	Nakasake	Beef Cattle	4	4	----	-	+	*B. Abortus*
29	Nakasake	Beef Cattle	5	4	----	-	-	-----
30	Nakasake	Beef Cattle	2	2	----	-	-	-----

Data Dictionary

Variable	Description	Variable Type	Coding
Village ID	Village number	Quantitative, Discrete	None
Local area	Name of local area where sample was collected	Qualitative, Nominal	1 = Luwero; 2= Kayunga; and 3 = Nakasake
Species	Species	Qualitative, Nomina1	1 = Goat; 2 = Sheep; 3 = Dairy Cattle; 4 = Beef Cattle
Total Animals	The total number of animals in the herd	Quantitative, Discrete	None
Total Blood Samples	The total number of blood samples collected	Quantitative, Discrete	None
Total Milk Samples	The total number of milk samples collected	Quantitative, Discrete	None
Card Test	A positive or negative reading of the brucellosis card test from field collection	Qualitative, Categorical	1 = +; 0 = -
Brucellosis Confirmation	Laboratory confirmation of a brucellosis positive case	Qualitative, Categorical	1 = +; 0 = -
Brucella Strain Typed	Laboratory confirmation of the *Brucella* strain typed	Qualitative, Nominal	1 = *B. Melitensis*; 2 = *B. Abortus*

1. Open a new MS Excel workbook and enter the above data into the spreadsheet.

2. Using the sort and filter function in MS Excel, group total animals into the following categories. Insert a new variable in the spreadsheet titled operation size.

Category	Total Animals
1 – No animals	0
2 – Small operation	1-10
3 – Medium operation	11-20
4 – Large operation	>21

3. Construct an appropriate table showing all confirmed cases of brucellosis by *Brucella* strain type. Copy and paste your table from MS Excel into this document.

4. Construct an appropriate table showing all confirmed cases of brucellosis stratified by operation type and local area. Copy and paste your table from MS Excel into this document.

5. Construct and appropriate table showing the total number of animals sampled by blood stratified by species and local area. Copy and paste your table from MS Excel into this document.

East Coast Fever (Theileriosis) Laboratory Submissions Dataset

Sample ID	Local area	Species	Gender	ECF[1] Positive Lab Confirmation
1	Dokolo	Cattle	Male	-
2	Dokolo	Cattle	Male	+
3	Dokolo	Cattle	Female	+
4	Dokolo	Cattle	Male	+
5	Dokolo	Cattle	Female	-
6	Dokolo	Cattle	Female	-
7	Dokolo	Cattle	Female	-
8	Kibuku	Cattle	Female	-
9	Kibuku	Cattle	Male	-
10	Kibuku	Cattle	Female	-
11	Kibuku	Cattle	Male	-
12	Kiruhura	Cattle	Female	-
13	Kiruhura	Cattle	Male	+
14	Kiruhura	Cattle	Male	-
15	Kiruhura	Cattle	Female	+
16	Kiruhura	Cattle	Male	+
17	Kiruhura	Cattle	Female	+
18	Kiruhura	Cattle	Female	+
19	Kiruhura	Cattle	Female	-
20	Budaka	Cattle	Male	+
21	Budaka	Cattle	Female	+
22	Budaka	Cattle	Female	+
23	Luwero	Cattle	Male	+
24	Luwero	Cattle	Female	+
25	Luwero	Cattle	Male	-
26	Luwero	Cattle	Female	+
27	Budaka	Cattle	Female	+
28	Isingiro	Cattle	Male	+
29	Isingiro	Cattle	Male	+
30	Isingiro	Cattle	Male	+
31	Luwero	Cattle	Female	+
32	Luwero	Cattle	Male	-
33	Luwero	Cattle	Female	-
34	Luwero	Cattle	Female	-
35	Luwero	Cattle	Female	+
36	Luwero	Cattle	Male	+
37	Luwero	Cattle	Female	+
38	Amolatar	Cattle	Female	+
39	Amolatar	Cattle	Male	+
40	Amolatar	Cattle	Male	+
41	Amolatar	Cattle	Female	+
42	Amolatar	Cattle	Male	+

[1] = ECF (East Coast Fever)

Data Dictionary

Variable	Description	Variable Type	Coding
Sample ID	Sample number	Quantitative, Discrete	None
Local area	Name of local area where sample was collected	Qualitative, Nominal	1 = Dokolo; 2= Kibuku; and 3 = Kiruhura; 4 = Budaka; 5 = Luwero; 6 = Isingiro; 7 = Amolatar
Species	Species	Qualitative, Nominal	1 = Cattle
Gender	The gender of the species	Quantitative, Discrete	1 = Male; 2 = Female
ECF Positive Lab Confirmation	Laboratory confirmation of east coast fever	Qualitative, Nominal	None

6. Open a new worksheet in your MS Excel Workbook and enter the above East Coast Fever Data.

7. Using the sort and filter function in MS Excel, group local areas into the following categories.

Category	Local areas
1 – Northern region	Amolatar and Dokolo
2 – Central region	Luwero and Nakasongola
3 – Western region	Kiruhura and Isingiro
4 – Eastern region	Budaka and Kibuku

8. Construct an appropriate table showing cases of East Coast Fever (Theileriosis) by gender. Copy and paste your table from MS Excel into this document.

9. Construct an appropriate table showing cases of East Coast Fever (Theileriosis) by region. Copy and paste your table from MS Excel into this document.

Exercise 11 – Display Data Using a Line Graph

Description of Exercise:

Use the tables provided to construct line graphs from cases of brucellosis and theileriosis (east coast fever) in a quarterly fashion and over a ten-year period. Should you have any questions over the exercise, please ask a trainer for clarification.

Allotted Time: 45 minutes

Exercise Components and Structure:

1. You have 45 minutes to complete this exercise.
2. Work in pairs of two for this exercise.
3. Each pair should review the provided tables for brucellosis and east coast fever field testing and create the appropriate line graphs from the data table provided.
4. Manipulate data to calculate prevalence and prepare data for graphical display.

5. Construct the line graph based on the data provided using MS Excel graphing function.
    a. Line graph (prevalence of brucellosis stratified by species over 7 quarters)
    b. Line graph (theileriosis (east coast fever) cases over a 10-year period) in several local areas

6. Construct the line graph based on the data provided using MS Excel PivotTable function.
    a. Line graph prevalence of brucellosis stratified by species over 7 quarters
    b. Line graph theileriosis (east coast fever) cases over a 10-year period

Materials, Data or Information:

1. MS Word
2. MS Excel
3. Paper and pen

Expected Outputs and Deliverables of Each Participant:

1. Depict animal-place-time by creating line graphs using MS Excel.

Brucellosis Cases in Luwero Local area (January 2017 – September 2018) for Dairy Cattle, Sheep, and Goats

2017									
Month	Dairy Cattle			Sheep			Goats		
	Total Cases	Total Population (Herds)	Prevalence (%)	Total Cases	Total Population (Herds)	Prevalence (%)	Total Cases	Total Population (Herds)	Prevalence (%)
January	25	1000		50	1000		60	1000	
February	35	1000		65	1000		85	1000	
March	22	1000		55	1000		65	1000	
April	10	1000		45	1000		75	1000	
May	45	1000		25	1000		65	1000	
June	30	1000		25	1000		65	1000	
July	25	1000		45	1000		80	1000	
August	45	1000		35	1000		80	1000	
September	40	1000		33	1000		80	1000	
October	37	1000		30	1000		80	1000	
November	35	1000		25	1000		75	1000	
December	29	1000		24	1000		50	1000	
2018									
Month	Dairy Cattle			Sheep			Goats		
	Total Cases	Total Population (Herds)	Prevalence (%)	Total Cases	Total Population (Herds)	Prevalence (%)	Total Cases	Total Population (Herds)	Prevalence (%)
January	25	1000		18	1000		45	1000	
February	23	1000		15	1000		35	1000	
March	20	1000		10	1000		33	1000	
April	15	1000		5	1000		30	1000	
May	18	1000		2	1000		22	1000	
June	11	1000		1	1000		20	1000	
July	5	1000		0	1000		10	1000	
August	2	1000		0	1000		7	1000	
September	0	1000		0	1000		7	1000	
October	----	----	----	----	----	----	----	----	----
November	----	----	----	----	----	----	----	----	----
December	----	----	----	----	----	----	----	----	----

Data Dictionary

Variable	Description	Variable Type	Coding
Year	Year sample collected	Quantitative, Discrete	None
Month	Month sample collected	Qualitative, Nominal	1 = January; 2 = February; 3 = March; 4 = April; 5 = May; 6 = June; 7 = July; 8 = August; 9 = September; 10 = October; 11 = November; 12 = December
Species	Species	Qualitative, Nominal	1 = Dairy Cattle; 2 = Sheep; 3 = Goats
Total Cases	Total cases positive	Quantitative, Discrete	None
Total Population (Herds)	Total population in herd	Quantitative, Discrete	None
Prevalence	Prevalence	Quantitative, Continuous	None

1. Open a MS Excel Workbook and enter in the aforementioned data into the spreadsheet.

2. Conduct data manipulation and insert columns to where you six variables across the top row with the necessary data from the above tables in each column by variable. Identify those six variables.

3. In your spreadsheet, calculate the prevalence of cases for each species by month. Prevalence should be showcased as a percentage in the spreadsheet.

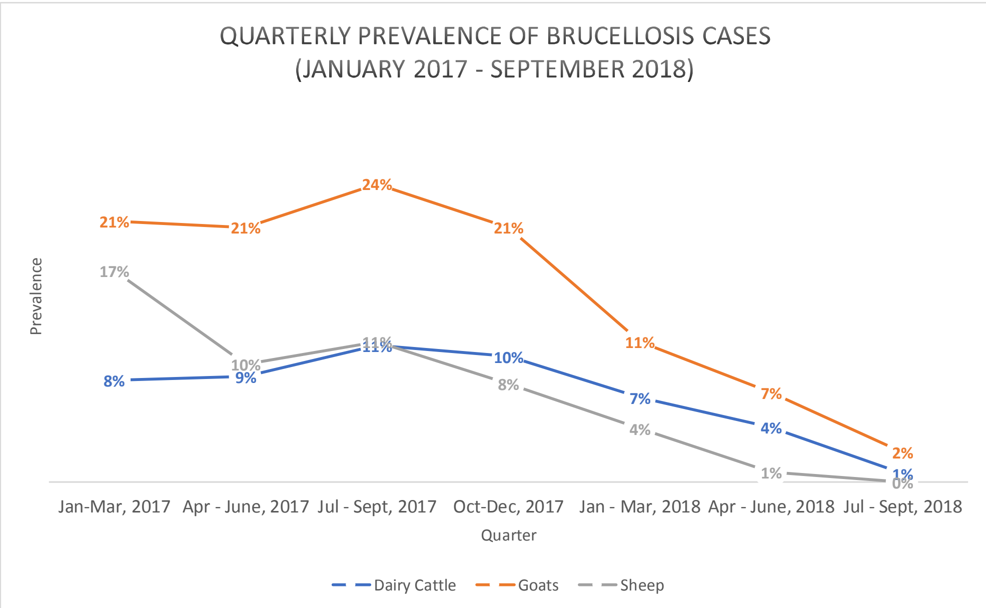
2017 and 2018 Prevalence by Species						
	Dairy Cattle		Sheep		Goats	
	2017	2018	2017	2018	2017	2018
January						
February						
March						
April						
May						
June						
July						
August						
September						
October						
November						
December						

4. In Excel, add a new variable to your spreadsheet. Use the sort and filter function to code the new "Quarter Variables" by the following numbers.

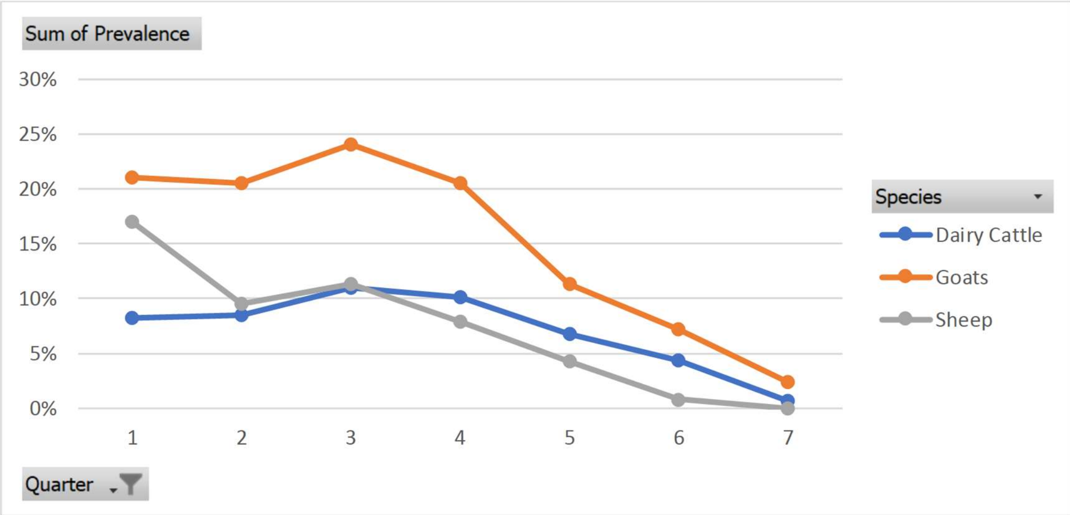
Variable Code Category	
1 – Quarter 1	January – March, 2017
2 – Quarter 2	April – June, 2017
3– Quarter 3	July – September, 2017
4– Quarter 4	October – December, 2017
5– Quarter 5	January – March, 2018
6– Quarter 6	April – June, 2018
7– Quarter 7	July – September 2018

5. Construct a line graph which demonstrates the prevalence of brucellosis stratified by species over a seven-quarter period. Title the graph "Quarterly Prevalence of Brucellosis Cases (January 2017 – September 2018)". The x axis should be labeled "Prevalence" and the y axis should be labeled "Cases". Copy and paste your answer into this document.

a) *Use the MS Excel line graph function to develop this.*



b) *Use the MS Excel PivotTable function to develop this. Refer to Pivot Table handout for how to use this function in Excel.*



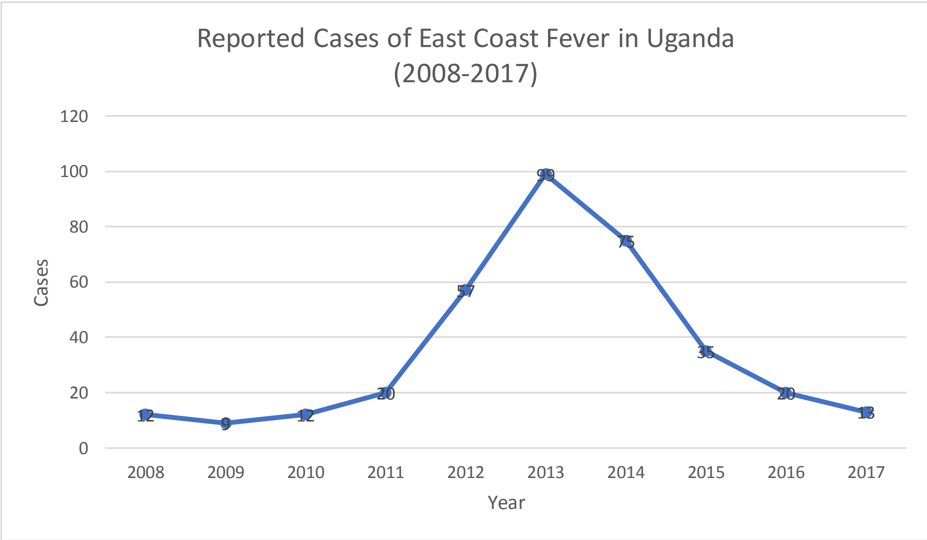
Cases of Theileriosis (East Coast Fever) from 2008-2017

Region	Local area	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Northern	Amolatar	0	0	0	0	0	20	15	5	2	0
Northern	Dokolo	0	0	0	0	10	15	12	7	3	1
Central	Luwero	0	0	0	5	10	7	0	0	0	3
Central	Nakasongola	0	0	3	5	15	20	10	5	2	1
Eastern	Budaka	5	4	4	5	12	15	13	4	4	4
Eastern	Kibuku	7	5	5	5	10	22	7	6	6	3
Western	Kiruhuna	0	0	0	0	0	0	10	5	2	0
Western	Isingiro	0	0	0	0	0	0	8	3	1	1

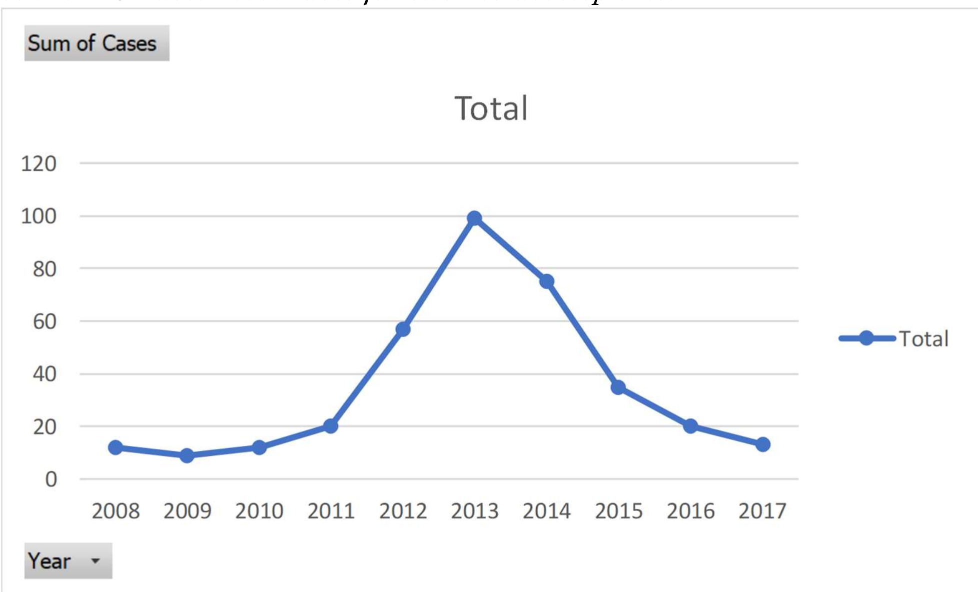
6. Click on a new Excel worksheet in your MS Excel workbook and enter in the above data into the spreadsheet.

7. Construct a line graph which demonstrates the cases of Theileriosis (East Coast Fever) across all regions over a 10-year period. Title the graph "Reported Cases of East Coast Fever in Uganda (2008-2017)". The x axis should be labeled "Year" and the y axis should be labeled "Cases" Copy and paste your answer into this document.

a.) *Use the MS Excel line graph function to develop this.*

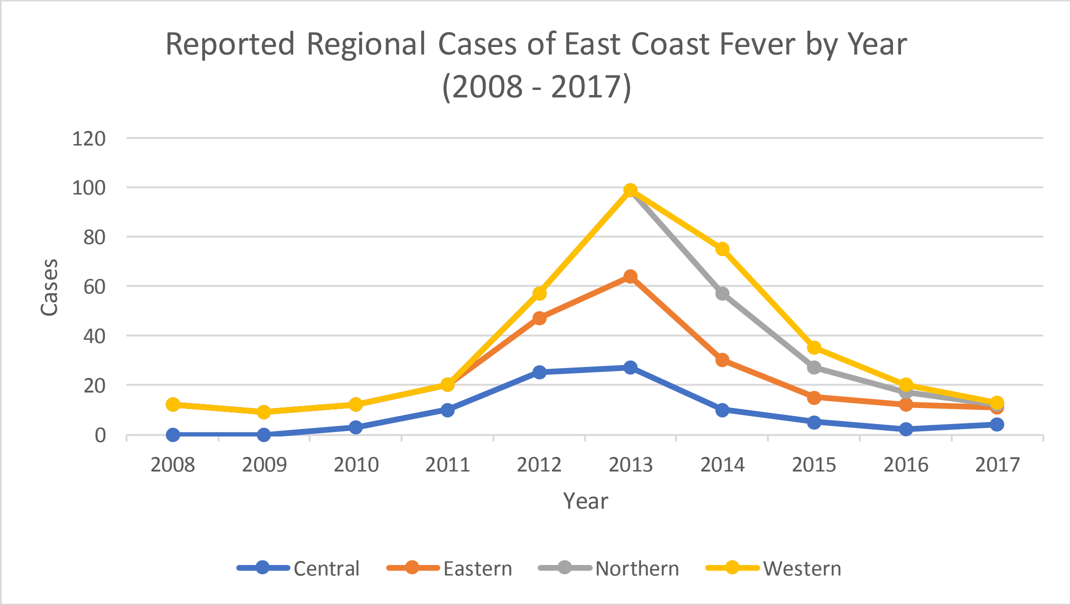


b.) *Use the MS Excel PivotTable function to develop this.*

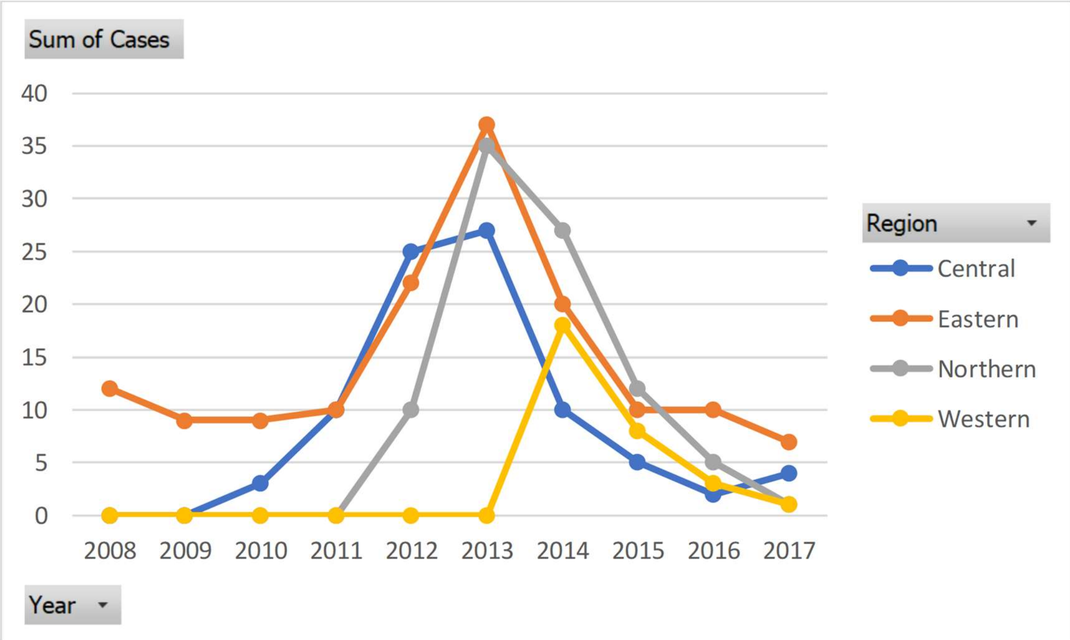


8. Construct a line graph which demonstrates the cases of Theileriosis (East Coast Fever) stratified by each region over a 10-year period. Title the graph “Reported Regional Cases of East Coast Fever by Year (2008-2017)”. The x axis should be labeled “Year” and the y axis should be labeled “Cases” Copy and paste your answer into this document. Copy and paste your answer into this document.

a) *Use the MS Excel line graph function to develop this.*



b) Use the MS Excel PivotTable function to develop this.



Exercise 12 – Display Data Using a Bar Chart and Pie Chart

Description of Exercise:

Based on the information provided in each of the following tables, use the following exercise to develop and display a bar chart and pie chart. Should you have any questions over the exercise, please ask a trainer for clarification.

Allotted Time: 30 minutes

Exercise Components and Structure:

- You have 30 minutes to complete this exercise
- Work in pairs for this exercise;
- Each pair should review the provided tables for brucellosis and east coast fever field testing;
- Create the appropriate bar graphs and pie charts from the data table provided.
- Copy and paste the line graphs from this exercise into an MS Excel worksheet.

Materials, Data or Information:

1. MS Word
2. MS Excel
3. Paper and pen

Expected Outputs and Deliverables of Each Participant:

1. Depict animal-place-time by creating bar and pie charts using MS Excel.

Brucellosis Data

Dairy Cattle									
Sample ID	Local area	Region	Country	Year	Rose Bengal	ELISA	Brucellosis Confirmed	Farmer Consumes Raw Milk	Farmer Boils Raw Milk
1	Luwero	Central	Uganda	2016	+	+	+	+	-
2	Luwero	Central	Uganda	2016	-	+	+	+	-
3	Luwero	Central	Uganda	2016	+	+	+	+	-
4	Isingiro	Western	Uganda	2016	+	+	+	+	-
5	Marsabit	Eastern	Kenya	2016	-	-	-	-	+
6	Marsabit	Eastern	Kenya	2016	+	+	+	+	-
7	Nyeri	Central	Kenya	2016	+	+	+	+	-
8	Nyeri	Central	Kenya	2016	+	+	+	+	+
9	Chifra	Afar	Ethiopia	2016	-	+	+	+	-
10	Chifra	Afar	Ethiopia	2016	-	+	+	-	-
11	Dubti	Afar	Ethiopia	2016	-	+	+	-	-
12	Banja	Amahara	Ethiopia	2016	-	-	-	-	+
13	Longido	Arusha	Tanzania	2016	+	+	+	+	-
14	Longido	Arusha	Tanzania	2016	+	+	+	+	-
15	Longido	Arusha	Tanzania	2016	+	+	+	+	+
16	Luwero	Central	Uganda	2017	+	+	+	+	+
17	Luwero	Central	Uganda	2017	+	+	+	+	-
18	Isingiro	Western	Uganda	2017	+	+	+	+	-
19	Meru	Eastern	Kenya	2017	+	+	+	-	-
20	Meru	Eastern	Kenya	2017	-	+	+	-	-
21	Meru	Eastern	Kenya	2017	+	+	+	+	-
22	Nyeri	Central	Kenya	2017	+	+	+	+	-
23	Nyeri	Central	Kenya	2017	+	+	+	+	-
24	Nyeri	Central	Kenya	2017	+	+	+	+	+
25	Banja	Amahara	Ethiopia	2017	+	+	+	+	+
26	Banja	Amahara	Ethiopia	2017	+	+	+	+	+
27	Longido	Arusha	Tanzania	2017	+	+	+	-	-
28	Longido	Arusha	Tanzania	2017	+	+	+	+	+
29	Longido	Arusha	Tanzania	2017	+	+	+	+	+

Brucellosis Data Continued

Goats									
Sample ID	**Local area**	**Region**	**Region**	**Year**	**Rose Bengal**	**ELISA**	**Brucellosis Confirmed**	**Farmer Consumes Raw Milk**	**Farmer Boils Raw Milk**
30	Isingiro	Western	Uganda	2016	+	+	+	+	-
31	Isingiro	Western	Uganda	2016	-	+	+	+	-
32	Marsabit	Eastern	Kenya	2016	+	+	+	+	-
33	Nyeri	Central	Kenya	2016	+	+	+	+	-
34	Nyeri	Central	Kenya	2016	-	-	-	-	+
35	Nyeri	Central	Kenya	2016	+	+	+	+	-
36	Marsabit	Eastern	Kenya	2016	+	+	+	+	-
37	Marsabit	Eastern	Kenya	2016	+	+	+	+	+
38	Dubti	Afar	Ethiopia	2016	-	+	+	+	-
39	Dubti	Afar	Ethiopia	2016	-	+	+	-	-
40	Dubti	Afar	Ethiopia	2016	-	+	+	-	-
41	Karatu	Arusha	Tanzania	2016	-	-	-	-	+
42	Karatu	Arusha	Tanzania	2016	+	+	+	+	-
43	Karatu	Arusha	Tanzania	2016	+	+	+	+	-
44	Karatu	Arusha	Tanzania	2016	+	+	+	+	+
45	Luwero	Central	Uganda	2017	+	+	+	+	+
46	Luwero	Central	Uganda	2017	+	+	+	+	-
47	Luwero	Central	Uganda	2017	+	+	+	+	-
48	Marsabit	Eastern	Kenya	2017	+	+	+	-	-
49	Marsabit	Eastern	Kenya	2017	-	+	+	-	-
50	Marsabit	Eastern	Kenya	2017	+	+	+	+	-
51	Nyeri	Central	Kenya	2017	+	+	+	+	-
52	Nyeri	Central	Kenya	2017	+	+	+	+	-
53	Nyeri	Central	Kenya	2017	+	+	+	+	+
54	Karatu	Arusha	Tanzania	2017	+	+	+	+	+
55	Dubti	Afar	Ethiopia	2017	+	+	+	+	+
56	Dubti	Afar	Ethiopia	2017	+	+	+	-	-
57	Dubti	Afar	Ethiopia	2017	+	+	+	+	+
58	Karatu	Arusha	Tanzania	2017	+	+	+	+	+

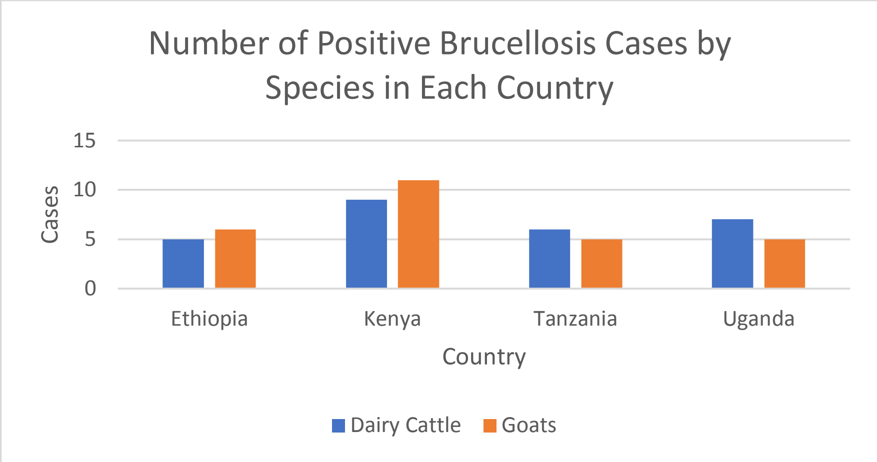
Data Dictionary

Variable	Description	Variable Type	Coding
Sample ID	Sample ID number	Quantitative, Discrete	None
Local area	Local area sample collected in	Qualitative, Nominal	1 = Luwero; 2 = Isingiro; 3 = Marsabit; 4 = Nyeri; 5 = Chifra; 6 = Banja; 7 = Longido; 8 = Marsabit; 9 = Dubti; 10 = Karatu
Region	Region local area is located in	Qualitative, Nominal	1 = Central; 2 = Eastern; 3 = Afar; 4: Amahara; 5: Arusha
Year	Year	Quantitative, Discrete	1 = +; 0 = -
Rose Bengal	Positive Pose Bengal test	Qualitative, Binary	1 = +; 0 = -
ELISA	Positive ELISA test	Qualitative, Binary	1 = +; 0 = -
Confirmed Brucellosis	Confirmed Brucellosis positive	Qualitative, Binary	1 = +; 0 = -
Farmer Consumes Raw Milk	Farmer consumes raw milk from herd	Qualitative, Binary	1 = +; 0 = -
Farmer Boils Raw Milk	Farmer boils raw milk collected from herd	Qualitative, Binary	1 = +; 0 = -

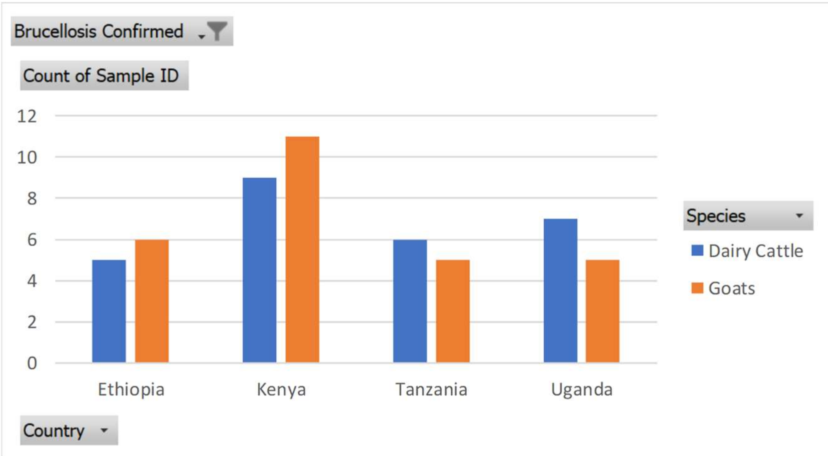
1. Open a MS Excel Workbook and enter in the above data into the spreadsheet.

2. Develop a bar graph to display the relationship of Species to the number of cases of diagnosed brucellosis through confirmatory testing stratified by country. Show countries separately from each other. Title the graph “Number of Positive Brucellosis Cases by Species in each Country” The X axis should be titled “ Country” and the Y axis should be titled “Cases” The legend should include each species.

a. *Use the MS Excel bar graph function to develop this.*

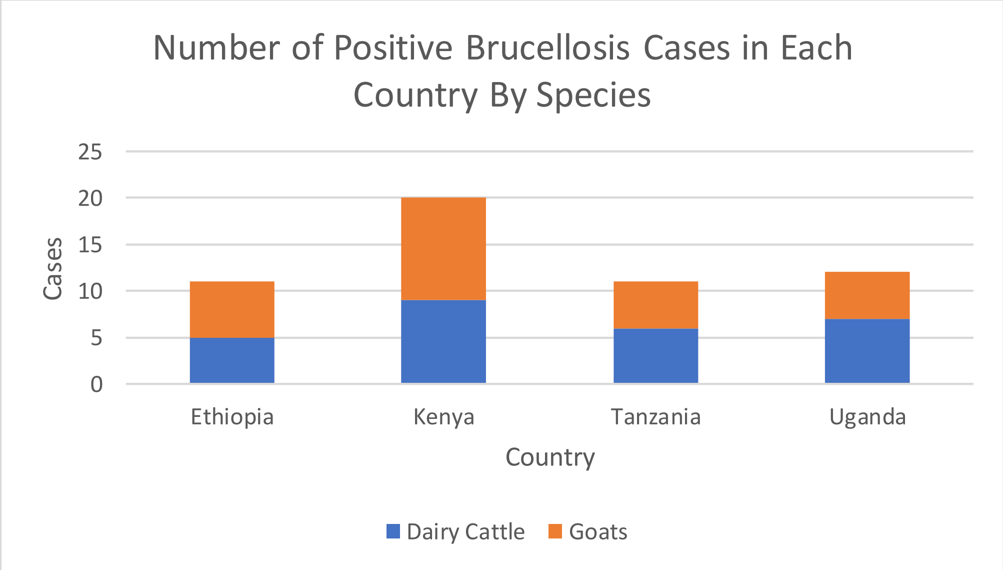


b. *Use the MS Excel PivotTable function to develop this.*

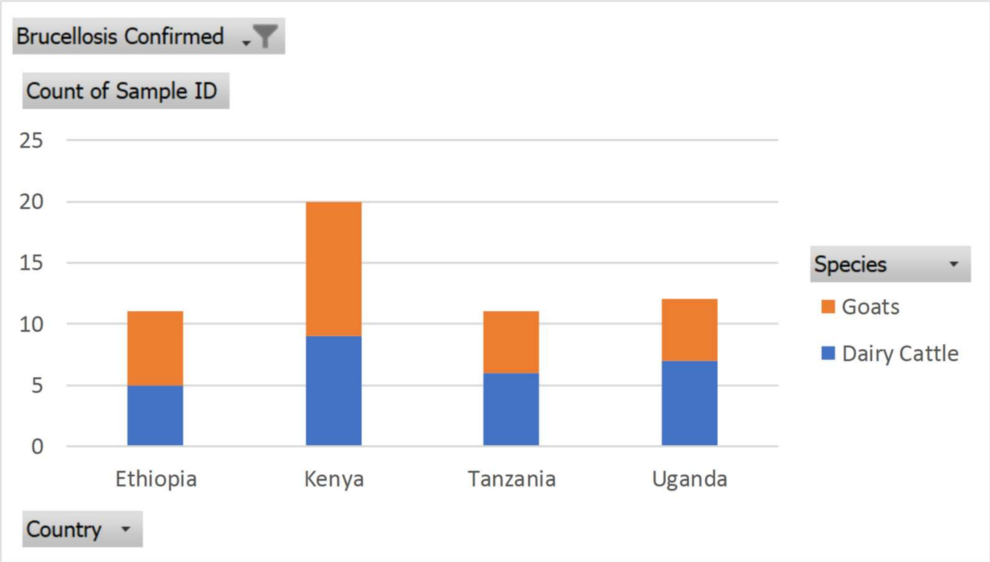


3. Develop a bar graph to display the relationship of Species to the number of cases of diagnosed brucellosis through confirmatory testing stratified by country. Show countries separately from each other. Title the graph "Number of Positive Brucellosis Cases by Species in each Country" The X axis should be titled " Country" and the Y axis should be titled "Cases" The legend should include each species.

a. *Use the MS Excel stacked bar graph function to develop this.*

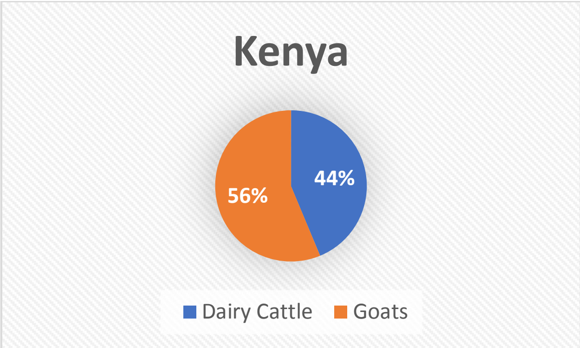


b. *Use the MS Excel PivotTable function to develop this.*

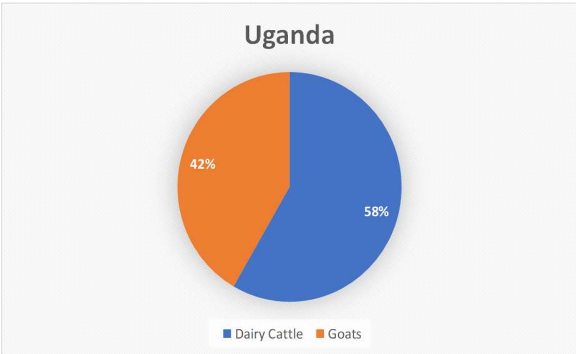


4. Develop a pie graph that shows the percentage of farmers who consumed raw milk from all herds that were brucellosis positive by species for each country.

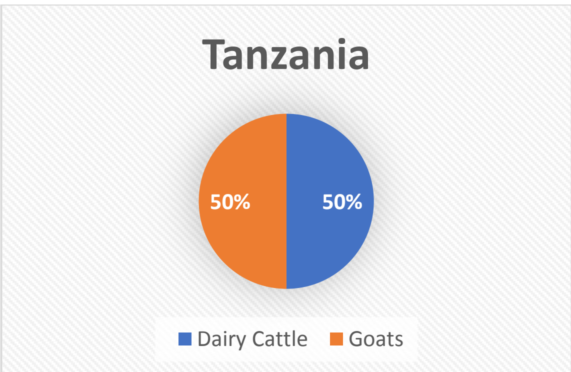
    a. Kenya:



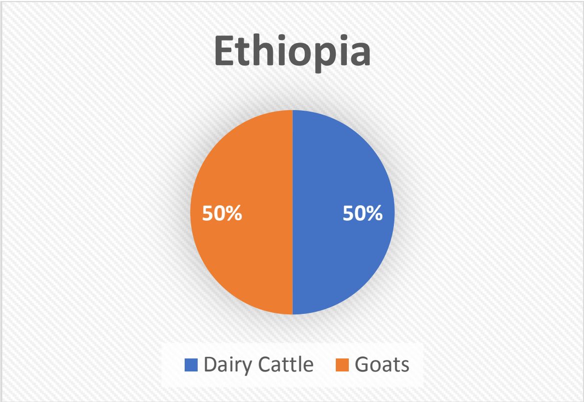
    b. Uganda:



    c. Tanzania:



    d. Ethiopia:


Ethiopia
50%
50%
Dairy Cattle
Goats

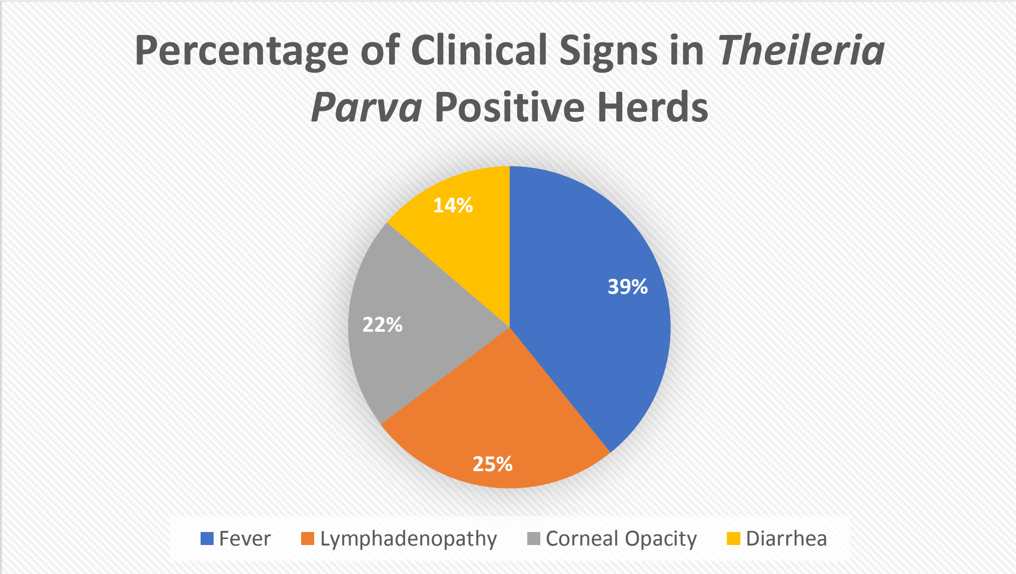
Theileriosis (East Coast Fever) Data

Herd ID	Fever	Lymphadenopathy	Corneal Opacity	Diarrhoea	*Theileria parva sp.* Positive
1	+	+	+	-	+
2	-	-	+	-	-
3	+	-	+	-	+
4	+	-	+	-	+
5	+	-	+	-	+
6	+	+	+	-	+
7	+	+	+	-	+
8	+	+	+	-	+
9	-	+	+	-	-
10	+	+	+	-	+
11	+	+	-	-	+
12	+	+	-	-	+
13	+	+	-	-	+
14	+	+	-	-	+
15	+	-	-	-	+
16	+	-	-	+	+
17	+	-	-	+	+
18	+	+	-	+	+
19	+	+	-	-	-
20	-	+	-	-	-
21	+	+	-	-	-
22	+	-	-	-	-
23	+	-	-	-	-
24	-	+	-	-	-
25	+	+	-	+	-
26	+	-	-	+	+
27	-	-	-	+	-
28	+	+	+	+	+
29	+	+	+	+	+
30	+	+	+	+	+

Data Dictionary

Variable	Description	Variable Type	Coding
Herd ID	Herd ID number	Quantitative, Discrete	None
Fever	Local area sample collected in	Qualitative, Binary	1 = +; 0 = -
Lymphadenopathy	Region local area is located in	Qualitative, Binary	1 = +; 0 = -
Corneal Opacity	Year	Quantitative, Discrete	1 = +; 0 = -
Diarrhoea	Positive Pose Bengal test	Qualitative, Binary	1 = +; 0 = -
Theirleria parva sp. positive	Positive ELISA test	Qualitative, Binary	1 = +; 0 = -

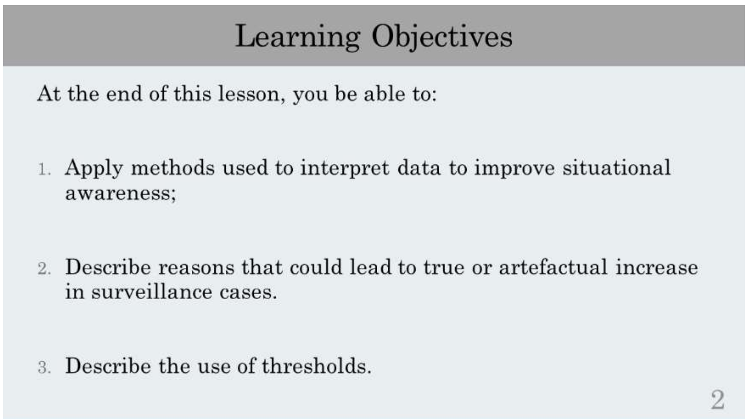
5. Develop a pie graph that shows the percentage of clinical signs (i.e., fever, lymphadenopathy, corneal opacity and diarrhea) which were in *theileria parva* positive herds.



Case Study 1: PPR

Lesson 7 – Data Interpretation and Reporting to Improve Situational Awareness and Decision-Making

Estimated Lesson and Exercise Time	2 hours
Participant Materials	Frontline ISAVET Lesson 7 – Data Interpretation and Reporting to Improve Situational Awareness and Decision-Making Participant Guide.PDF
	Computer and Microsoft Word
	Pen or Pencil



Flow of Surveillance Data

3

Data Interpretation

- The main aim is to differentiate between real vs artifacts in surveillance data
  - To detect first signals of outbreaks
  - How are outbreaks detected?
- Passive surveillance:
  - Farmers reporting of cases
  - Frontline veterinarians/clinicians who see multiple cases and make an association
  - For certain diseases, one case may be enough to raise an alarm
- Active surveillance systems:
  - Syndromic surveillance
  - Abattoir
  - Laboratory
  - Production

4

Principles of Data Interpretation

1. Assess the quality of your data before proceeding further.
2. Identify the limitations in your data.
3. Create simple statements that summarise each point of analysis.
4. Compare the results of your data analysis to what you would expect based on the results of previous analysis.
5. Explain possible reasons why there is a difference between observed and expected results.
6. Explain what the results infer for those making decisions.

5

Basic Assumptions

- Assumption 1: Have you collected high quality data?
- Assumption 2: Do you have high quality data to compare it to?
- If you cannot answer yes to both questions, it's not too late to begin the process of improving data quality in your local area office.

6

Step 1. Assess the Quality of Your Data

- What are the considerations for data quality?
  - Refers to accuracy and completeness of data gathered and that they convey the intended meaning
  - Begins by ensuring that data is gathered in a standard way
  - Standardised application based on a standard data collection form
- Data quality measures and indicators:
  - Must be agreed upon and written down
  - Provide insights to assess data quality

7

Assess the Quality of Your Data

- Data quality measures and indicators - some guidelines in assessing data quality:
  - Relevance: to stated objectives
  - Accuracy: to what we intend to measure
  - Integrity: data is stable and reliable
  - Timeliness / time lag: we require data for immediate response and action
  - Accessibility and clarity: clear and accessible data
  - Comparability: can compare with existing data
  - Coherence: the data makes sense
  - Coverage / representativeness: data represents the population
  - Redundant / duplicates: remove duplicate values

8

Step 2. Assess the Limitations of Your Data

There are inherent limitations in all datasets

Data collected must be fit for the purpose at hand

Limitations arise due to the following :

- Lack of planning and preparation prior to collecting data
- Data collected is not aligned with the stated goal of surveillance in the local area
- The way the data is collected and managed
- Bias due to lack of incentives and response from surveillance stakeholders

9

Step 3. Create Simple Statements for Each Point of Analysis

- Include Animal-Place- Time components for each statement
- Epidemiologic patterns of disease occurrence:
  - **Endemic**: The habitual presence (or usual occurrence) of a disease within a given geographic area
  - **Epidemic**: The occurrence of an infectious disease clearly in excess of normal expectancy, and generated from a common or propagated (i.e., recent outbreaks of African swine fever in China)
  - **Pandemic**: A worldwide epidemic affecting an exceptionally high proportion of the global population (i.e., Highly pathogenic avian influenza globally)
  - **Sporadic**: The irregular and haphazard presence (or occurrence) of disease (i.e., rabies, foot-and-mouth disease)

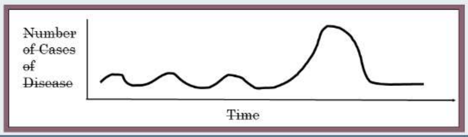


Image 1: Lockhart, FAO

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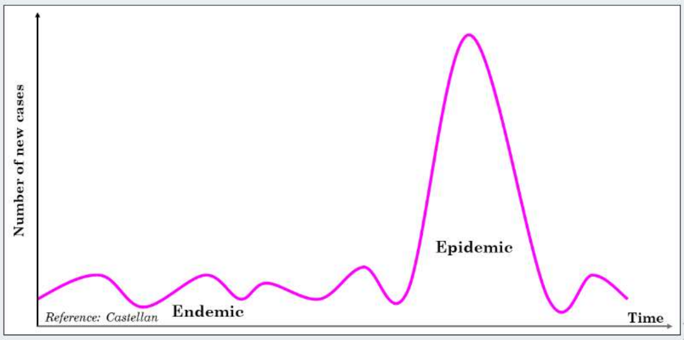
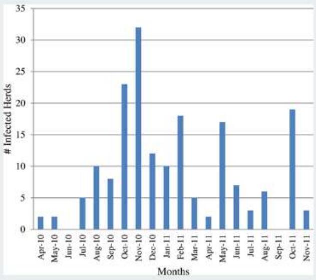
Endemic vs Epidemic



11

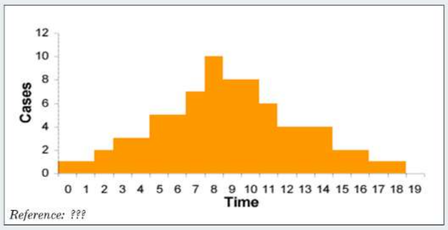
African Swine Fever, Uganda

- There was a continuing source of ASF infected pig herds in Uganda between the months April and November.
- Reference: https://www.researchgate.net/publication/275952468_Estimating_the_Basic_Reproductive_Number_R_0_for_African_Swine_Fever_Virus_ASFV_Transmission_between_Pig_Herds_in_Uganda [accessed Oct 19 2018].



12

Vector-borne Diseases

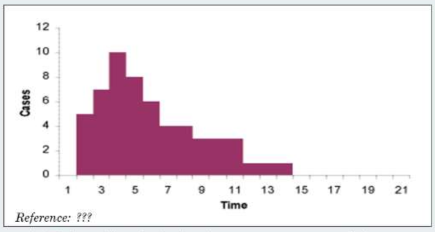


Reference: ???

- Statement: This vector-borne disease outbreak begins and ends gradually peaks in week 8.
- Time between the first case and the peak is comparable to the incubation period
- Slow tail

13

Point Source Transmission

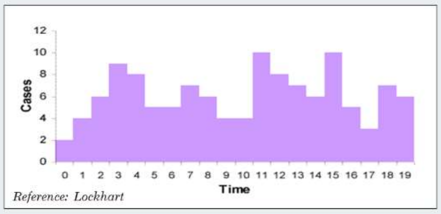


Reference: ???

- Statement: This epidemic is due to a common or point source of infection that spreads rapidly to a peak in the number of cases that gradually subsides over time.
- Point source epidemic: This is the most common form of transmission in highly contagious infections, and food-borne disease, in which a large population is exposed for a short period of time.

14

Continuing Common Source or Intermittent Exposure



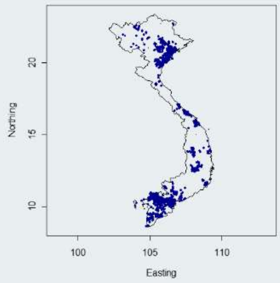
Reference: Lockhart

- Statement: This epidemic is due to a common or point source of infection that spreads rapidly followed by a peak in the number of cases that gradually subsides over time.
- In this case, there are several peaks, and the incubation period cannot be identified.

15

Spatial Distribution of Highly Pathogenic Avian Influenza H5N1 in Viet Nam

- Maps provide complementary information to animal and time data to describe disease occurrence.
- Statement: Highly Pathogenic Avian Influenza H5N1 detection in Viet Nam is concentrated near the major cities in North and South Viet Nam, as well as along transportation routes.



Reference: Caryl Lockhart

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Step 4. Compare Observed Data with Expected Data

- Example:
  - If the expected (i.e. normal) prevalence of disease X in country Y is 0.02
  - Local area 1 has population of 20,000 animals
    - The expected number of cases of disease would be = 0.02 X 20,0000 = 400
    - If the number of cases observed in local area X is 500, then we have 100 more cases than we expect based on previous estimates
    - ACTION STEP: Consult with the national epidemiologist to discuss the interpretation of the results and the action to be taken. Remember that disease crosses boundaries and needs to be considered at both the local and the higher levels.

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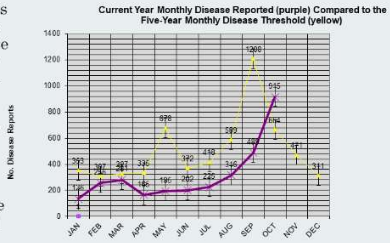
Making Decisions Based on Thresholds

- A threshold is an expected value that is calculated for a given time period. We then compare our current data with the threshold value to determine whether there is an unexpected increase in the disease.
- **EXAMPLE: No. Reported Suspect Animal Cases of FMD**
- Yellow line – 5 year threshold line:
- Blue line – current year: Note that the level in October exceeds the threshold value and action must be taken



Reference: Frontline ISAVET

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Step 5. Explain the Reasons for the Difference Between Observed and Expected Results

Real increase based on statistical evidence

Apparent increase

- Reporting error
- Measurement error
- Reporting bias (population changes over time)
- Change in reporting procedures / change in surveillance system
- New personnel
- Change in case definition
- Improvements in diagnostic procedures
- Increased awareness/interest
- In or out migration of populations
- Change in denominator or population size

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Exercise 13: Calculation of a 5-Year Average

1. ***Refer to MS Excel YouTube Video #12: Calculating Thresholds in Excel***
2. This exercise should take 45 minutes to complete.
3. Work in pairs.
4. Calculate the 5-year average incidence of lung lesions from abattoir data provided.
5. Describe the use of thresholds.

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Step 6. Explain What the Results Infer for Decision Makers

- What do the results infer about the disease?
  a. Is it an epidemic or endemic?
  b. What are the spatial and temporal patterns of disease?
  c. Is this a single incident or should you look further for more cases?
  d. Are the results realistic and biologically plausible?
  e. Is one location or part of the population affected more than others?

- How do the results reflect the quality of your data?
  a. Have you accounted for the limitations of the data?
  b. Is your data consistent and comparable with existing data?
  c. Do your recommendations reflect the limitations of your data?

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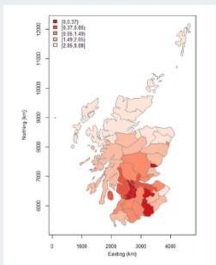
What Can You Infer from these Maps?

Spatial Kernal – Hotspot detection

Global test for clustering:
Pottho Whittinghill's test -
Scottish lip cancer data SMR:



Reference: Image 1 & 2: Lockhart

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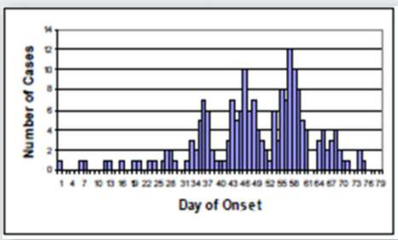
What Type of Outbreak Does this Epi Curve Demonstrate?

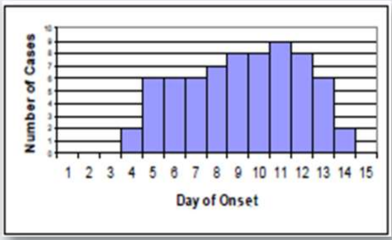
A. Animal-to-Animal (propagated)
B. Point-Source
C. Continuous Common Source



23

What Type of Outbreak Does this Epi Curve Demonstrate?

A. Person-to-Person (propagated)
B. Point-Source
C. Continuous Common Source ✓



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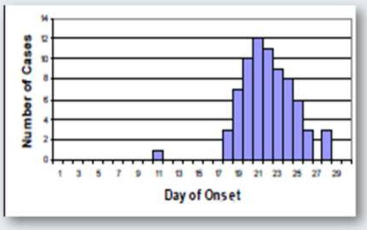
What Type of Outbreak Does this Epi Curve Demonstrate?

A. Person-to-Person (propagated)
B. Point-Source ✓
C. Continuous Common Source



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Exercise 14: Identify the Challenges in Threshold Deviations

1. This exercise will take 45 minutes to complete.
2. Divide into groups of four.
3. Answer the guiding questions and identify specific challenges in interpreting thresholds and making recommendations.

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In Summary…

1. Data quality is fundamental to good decision making.
2. Make it a habit of providing clear and simple statements for each one of your descriptive analysis results.
3. Understand the limitations of your data.
4. Thresholds are used to make recommendations for action by comparing observed and expected data results; and
5. Bew aware of challenges in interpreting thresholds and making recommendations.

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ISAVET Contributing Universities

Partners

TEXAS A&M UNIVERSITY

TEXAS A&M AGRILIFE

Contributors

MAKERERE UNIVERSITY

E.I.S.M.V. DE DAKAR

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Exercise 13 – Calculation of a 5-Year Average

Description of Exercise:

Calculate a 5-year average of the lung lesion disease count from the abattoir data provided. Should you have any questions over the exercises, please ask a trainer for clarification before, during, and after the exercises.

Allotted Time: 45 minutes

Exercise Components and Structure:

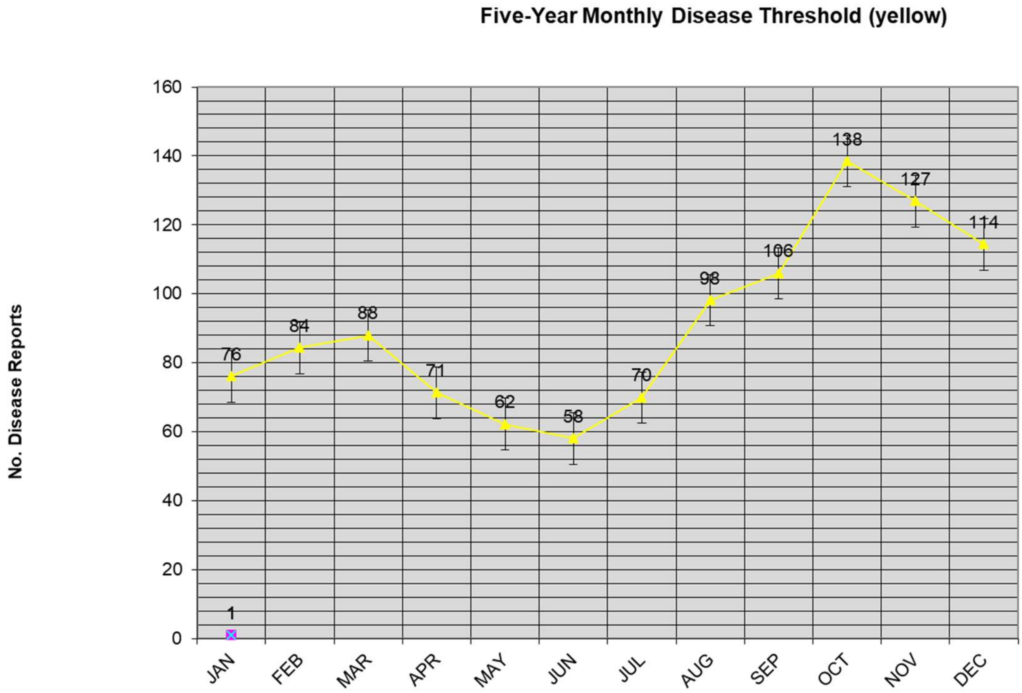
1. Refer to MS Excel YouTube Video #12: Calculating Thresholds in Excel
2. This exercise should take 45 minutes to complete.
3. Work in pairs.
4. Calculate a 5-year average incidence of lung lesions from abattoir data provided.
5. Describe the use of thresholds.
6. Copy data into the MS Excel spreadsheet provided as follows:
   a. Copy the following number of cases of cattle lung lesions for each month between 2000 and 2004 below.

Materials, Data or Information:

1. Data set
2. MS Excel File: L7_Ex13

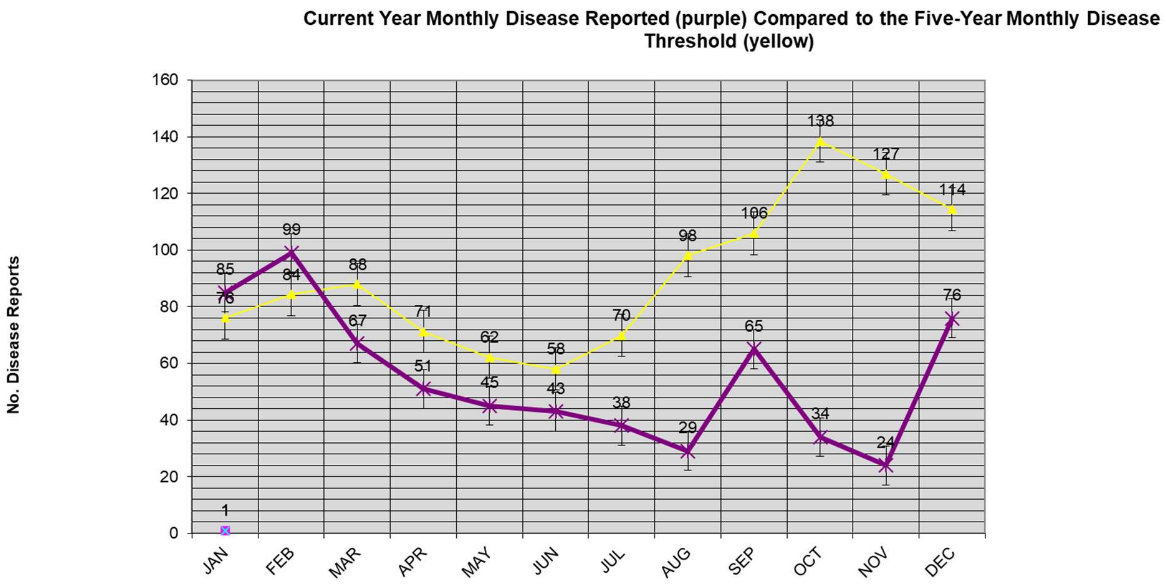
1. Using the MS Excel spreadsheet, titled "ISAVET Exercise 13 Participant", calculate the following.

Number of Cattle with Lung Lesions												
Year	**January**	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**	**October**	**November**	**December**
2000	45	34	42	56	48	38	29	26	27	23	23	24
2001	31	39	47	54	57	50	37	30	27	30	36	38
2002	50	56	65	63	57	39	27	19	19	25	28	34
2003	57	73	77	68	55	35	34	55	66	99	88	91
2004	66	61	65	57	57	52	66	86	88	103	99	82



b. Copy the number of cases of cattle lung lesions for the current year below:

Current year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	85	99	67	51	45	43	38	29	65	34	24	76



2. Using the MS Excel spreadsheet, titled “ISAVET Exercise 13 Participant”, calculate the 5-year average disease counts from abattoir data.

Exercises 14 – List the Challenges in Recognizing Deviations Above Thresholds

Description of Exercise:

Identify the challenges in recognising deviations above the threshold. Should you have any questions over the exercises, please ask a trainer for clarification before, during, and after the exercises.

Allotted Time: 45 minutes

Organisation of Group Work:

- Divide into groups of four.

Exercise Objective(s):

1. Apply methods used to interpret data to improve situational awareness.
2. Describe signals and thresholds, and how they are used to make recommendations for action.
3. Answer the guiding questions and identify specific challenges in interpreting thresholds and making recommendations.

Exercise Components and Structure:

1. Discuss and list the challenges in recognising deviations above thresholds.

Guiding Questions:

1. Which months of the current year recorded the highest number of lung lesions?

2. List possible reasons for the decline in the number of lung lesions from September to November in the current year as compared with the five year average?

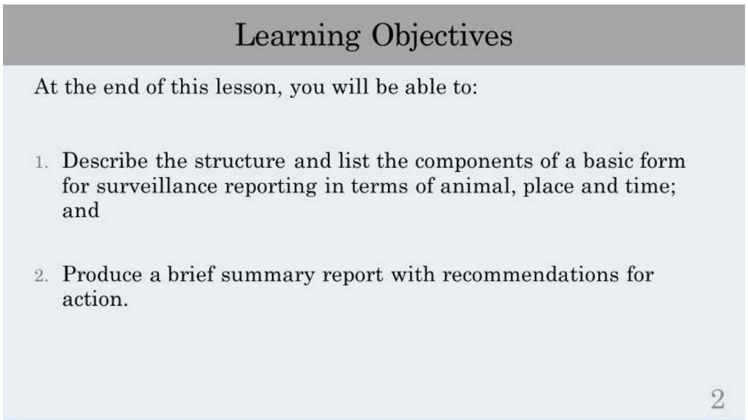
3. At this stage, how would you interpret the results of this year's lung lesions to your supervisor?

4. What additional information do you need to assess in order the determine if the results reflect a real change in the number of lung lesions or if they reflect a change in how we detect lung lesions?

Response Checklist:

Lesson 8 – Elements of a Surveillance Report

Estimated Lesson and Exercise Time	2 hours
Participant Materials	Frontline ISAVET Lesson 8 Elements of a Surveillance Report Participant Guide Version 5.PDF
	Computer Microsoft Word and Excel
	Pen or pencil



Objectives and Use of Animal Health Surveillance

(Epidemiological Surveillance in Animal Health, OIE)

Objectives	**Detect new introductions and emerging diseases:** e.g. Nipah virus, Ebola virus
	Assess disease trends over time: e.g. TB, rabies, brucellosis
	Estimate the burden of animal diseases – estimate disease prevalence: e.g. FMD, Newcastle disease
	Define important priority diseases: e.g. RVF, anthrax
	Evaluation of animal disease control programmes – establish freedom from disease: e.g. rinderpest, PPR

3

Surveillance Objectives with Examples

- Determine prevalence of an existing disease
  - Endemic brucellosis, rabies, highly pathogenic avian influenza (HPAI)
- Prove freedom from disease
  - Foreign animal diseases such as bovine spongiform encephalopathy (BSE)
- Detect a new disease
  - Bat viruses, H1N1 in swine

4

Elements of Surveillance Reports

(Ch. 1.4 Terrestrial Animal Health Code. OIE, 2018)

1. A-P-T	2. Definitions	3. Data	
Populations at risk (Animal)	Epidemiological Unit	Data Collection and Management	
Clustering (Place)	Case Definition	Application of the Appropriate Data Analysis	
Time Period (Time)	Diagnostic Testing	Quality Assurance	Validation

5

Sources of Surveillance Data

(Ch. 1.4 Terrestrial Animal Health Code. OIE, 2018)

1. Sub-local area and local area level office data
2. Wildlife data
3. Farm production records
4. Targeted testing programmes (e.g. swill feeding)
5. Ante-mortem and post-mortem inspections (abattoirs, markets)
6. Laboratory investigation records
7. Sentinel surveillance sites
8. Field observation and investigation reports
9. National disease control programmes

6

Scenario: Laboratory Surveillance of Anthrax, Nakuru, Kenya

- This retrospective study includes a data review of anthrax cases in livestock and wildlife at RVIL, Nakuru Kenya from January 2013 to December 2018. This facility serves all livestock and wildlife populations in Nakuru County and its border counties like Baringo, Nyandarua, Laikipia and Narok.
- The National Census of 2009 showed that livestock populations in Nakuru were:
  - Cattle 513,286
  - Sheep 567,009
  - Goats 355,306
  - Poultry 1,844,180
  - Pigs 20,137
  - Rabbits 89,813
  - Donkeys 51,935

7

1a. Animal Data Elements

Species	Production Class	Production System	Demographic Details	Number Counts
• Cattle	• Dairy • Beef • Dual purpose Breeder	• Intensive • Semi-intensive • Extensive	• Breed • Age • Sex • Health and vaccination status • Feed and water source	• Total at risk • Sick • Treated • Dead
• Sheep • Goats	• Milk • Meat • Dual purpose • Breeder			
• Chickens • Ducks • Geese • Other	• Meat • Eggs • Dual purpose Breeder	• Closed house • Semi-closed • Extensively raised smallholder	• Breed • Strain • Age • Sex • Health and vaccination status, • Feed and water source	
• Horse • Donkey • Mule • Other	• Draft • Pleasure • Meat • Dual purpose	• Intensive, • Semi-intensive Extensive	• Breed • Age • Sex • Health and vaccination status • Food and water source	
• Pets	• Dogs, cats, other	• Domestic • Feral • Mixed		

8

Scenario: Anthrax Animal Data
(Frontline ISAVET)

- Animal data is disaggregated (stratified) by species to permit analysis and comparison of the number of samples received

Species Screened	No. Samples tested
Bovine	128
Caprine	1
Ovine	2
Canine	1
Buffalo	16
Rhino	8
Zebra	4
Lagomorph	9
Total	169

9

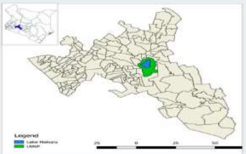
1b. Place Data Elements

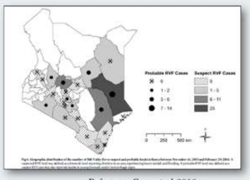
- GPS latitude and longitude coordinates
- Administrative boundaries
- Nearby roads, railways, rivers and water bodies
- Housing and mobility
- Value chain maps for each production class
- Do you have a map with important animal data in your office to show disease distribution and clusters?

10

Scenario: Anthrax Place Data
(Frontline ISAVET)

- The top map displays the anthrax surveillance area but does not include GPS spot map coordinates of the locations of all positive and negative samples
- The bottom map is an example of what a spot map looks like based on GPS coordinates of the spatial distribution of Rift Valley Fever (RVF) cases in Kenya
  - The size of each circle is proportional to a range in the number of positive cases of RVF





Reference: Oyas et al 2018

11

Scenario: Anthrax Place Data by Sub County and by Year (Frontline ISAVET)

Table 4: Summary of spatial distribution of livestock and wildlife anthrax (B.anthracis) at RVIL, Nakuru, 2013 to 2018 (n=76)

Sub County	2013	2014	2015	2016	2017	2018	Total
Bahati	0	0	0	0	1	0	1
Elda Ravine	0	1	0	0	0	0	1
Gilgil	0	0	0	0	1	0	1
Kipipiri	0	0	0	0	0	0	0
N.East	0	0	1	0	1	0	2
N.West	0	11	31	0	1	0	43
Naivasha	0	0	0	0	0	0	0
Nanyuki	0	0	1	0	0	0	1
Njoro	0	0	0	0	0	0	0
Ol Kalou	0	0	0	0	0	0	0
Rongai	0	5	4	11	3	4	27
Total	0	17	37	11	7	4	76

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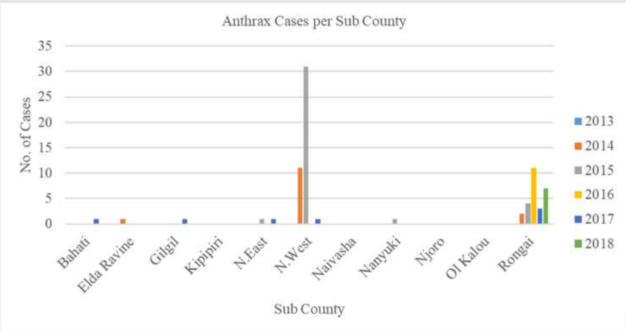
Scenario: Anthrax Place Data Grpahic Display
(Frontline ISAVET)



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1c. Time Data Elements

Reporting	Observation	Diagnostic Testing	Treatment	Movement (since last report)
❑ Date report submitted	❑ Date of visit or inspection: either active or passive	❑ Date test collected	❑ Date of last antibiotic treatment	❑ Date of new introductions into the flock or herd
❑ Date reviewed	❑ Date clinical signs observed	❑ Date test submitted	❑ Date of recent vaccinations	❑ Date of movement from the flock or herd
❑ Date feedback provided	❑ Evidence of temporal clustering	❑ Date test result received	❑ Tick and insect control	❑ Movement control measures
❑ Seasonal events	❑ Date of on farm post-mortem	❑ Date result shared with farmer	❑ Date last given supplements	

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Scenario: Anthrax Time Data Analysis
(Frontline ISAVET)

Table 2: Summary of temporal distribution of reported livestock and wildlife anthrax (B. anthracis) positive cases at RVIL, Nakuru, 2013 to 2018 n=76

Year	Number of sample tested	B.anthracis (Positive)	Number dead
2013	7	0	0
2014	48	17	16
2015	54	37	19
2016	26	11	7
2017	22	7	7
2018	12	4	3
Total	169	76	52

Positivity rate = Number diagnosed with anthrax / Number sampled for anthrax : 76/169 = 45%

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2. Surveillance Report Definitions

Epidemiological unit	"Animals with a defined epidemiological relationship that share approximately the same likelihood of exposure to a pathogenic agent." *(Terrestrial Animal Health Code. OIE, 2018)*
Case definition	Suspect: clinical signs
	Probable: screening test and epidemiological links
	Confirmed: gold standard test e.g. PCR
Diagnostic testing	Preliminary: screening test e.g. Rose bengal
	Interim: e.g. ELISA
	Confirmed: e.g. culture, PCR

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3. Surveillance Report Data Elements

Table A: Disaggregated Data (detailed data provided)

	Dairy Cattle	Beef Cattle	Dual Purpose Cattle	Local Area Total
Sublocal area A	1, 510	10,101	8,000	18,101
Sublocal area B	150	8,555	6,544	15,249
Sublocal area C	3,226	5,498	2,563	11,287
Sublocal area D	2,500	3,400	876	6,776
Sublocal area Total	5,876	27,554	17,983	51,413

Table B: Aggregated Data (detailed data lost)

	Dairy Cattle	Beef Cattle	Dual Purpose Cattle	Local Area Total
Local Area Total	5,876	27,554	17,983	51,413

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Scenario: Anthrax Animal Data Analysis

(Frontline ISAVET)

Table 1: Summary of Livestock and wildlife species distribution of anthrax (B. anthracis) at RVIL, Nakuru, from 2013 to 2018 (n=76)

Species Screened	No. Samples tested	B.anthracis (Positive)	% samples tested positive
Bovine	128	44	57.9
Caprine	1	1	1.3
Ovine	2	2	2.6
Canine	1	0	0
Buffalo	16	14	18.4
Rhino	8	8	10.5
Zebra	4	4	5.3
Lagomorph	9	3	4
Total	169	76	100

Ratio of livestock to wildlife anthrax positivity: 47:29

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Steps in Completing the local area Weekly Surveillance Report

STEP 1:
- ✓Complete Table 1: Weekly Metrics

STEP 2:
- ✓Colour Code “No. of Reports” and “Year to Date” columns in Table 1

STEP 3:
- ✓Complete Table 2: Weekly Disease Reporting Form

STEP 4:
- ✓Complete Table 3: Summary of Key Notifiable Diseases this Week and Cumulatively

STEP 5:
- ✓Create weekly and monthly graphs of two major animal diseases of concern in your local area to show the disease trend over time

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Step 1: Complete Table 1 Weekly Surveillance Report Metrics

A metric is something we measure to assess the performance of the surveillance system

Table 1: Weekly Sublocal area Reporting Summary of Completeness and Timeliness

Subdistrict Name	No. Reports Received This Week	Cumulative YTD* No. (%) Weekly Reports Received in [Year]	Mode No. Days from Laboratory Submission to District Reporting	Mode No. Days from District Notification to Farmer Reporting (Days)	No. of Surveillance Events Reported this Year
Subdistrict/Facility A					
Subdistrict/Facility B					
Subdistrict/Facility C					
Subdistrict/Facility D					
Subdistrict/Facility E					
Subdistrict/Facility F					
Subdistrict/Facility G					
Subdistrict/Facility H					
% Reports Received to Date	Total:	% Cumulative YTD:	District Mode:	District Mode:	District Total =

YTD: Year to Date

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Step 2: Colour Code The No. of Reports and %Cumulative Columns in Table 1

- Legend for Colour Codes
  - Green: On Time
  - Yellow: Late
  - Red: No Report Received

This week			% Cumulative YTD		
On time T	Late L	No report received NR	≥80% on time	≥50-79.9% on time	<50% on time

Subdistrict/Facility	This Week	% Cumulative YTD
Example AA	L	80.8
Example BB	T	90.0
Example CC	NR	60.4

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STEP 3: Complete Table 2: Weekly Disease Reporting Form

ANIMAL						
Species or Type	Class	Total No. at Risk	No. Sick	No. Dead	Disease(s) Suspected (S) or Confirmed (C)	Details: (Age, breed, sex, etc.)

METHOD	TIME			
Active (A) or Passive (P)	Date of Visit	Date Symptoms First Observed	Date of first death	Date of Laboratory Submission

PLACE	
Sublocal area / Facility Name	GPS Coordinates Lat./Long.

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STEP 4: Summary of Key Notifiable Diseases this Week

1. List the key notifiable diseases in your local area
2. Count and record the number of suspected and confirmed cases
3. Count and record the number of deaths due to the disease
4. Calculate the case-fatality rate (No. deaths / No. of Cases)

	Current Week No.			Cumulative Weekly No.		
Disease	Cases	Deaths	Case Fatality Rate	Cases	Deaths	Case Fatality Rate

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STEP 5: Create weekly and monthly graphs of two major animal diseases

- First create a table to record the total number of tests and number of positives by month and by year
- Source: Frontline ISAVET

Table 3: Summary of livestock and wildlife anthrax occurrence trend at RVIL, Nakuru, 2013 to 2018 n=76

YM	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec		T	+
	T	+	T	+	T	+	T	+	T	+	T	+	T	+	T	+	T	+	T	+	T	+	T	+		
2013	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	5	0	0	0	7	0
2014	0	0	5	5	11	4	7	2	9	4	0	0	6	2	0	0	7	0	0	0	3	0	0	0	48	17
2015	0	0	5	0	1	0	1	0	0	0	2	2	39	34	1	0	2	0	0	0	1	1	2	0	54	37
2016	0	0	0	0	1	0	2	0	7	3	7	5	5	3	2	0	0	0	2	0	0	0	0	0	26	11
2017	6	2	3	0	2	0	0	0	0	0	1	1	1	1	3	1	2	0	4	2	0	0	0	0	22	7
2018	0	0	0	0	3	0	0	0	4	2	0	0	1	0	0	0	0	0	4	2	0	0	0	0	12	4
Total	6	2	13	5	18	4	10	2	20	9	10	8	53	40	6	1	11	0	11	4	9	1	2	0	169	76

Y= Year, M= Month, T= Total number of samples tested and += samples positive

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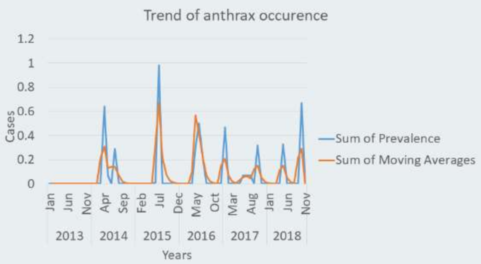
Scenario: Graph of Time Trend of Anthrax Prevalence



- Figure 3: Summary of livestock and wildlife anthrax occurrence trend (rolling averages) at RVIL, Nakuru, 2013 - 2018

Reference: Frontline ISAVET

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Exercise 15a: Weekly Surveillance Report

1. This exercise will take 60 minutes.
2. Form yourselves into groups of roughly equal size.
3. Create a surveillance report with the information provided.
4. Each group will make comments on what the data reveals.

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Lesson Summary…

- There are three elements required in an animal disease surveillance report:
  - Animal-Place-Time
  - Definitions
  - Data Management
- Raw, disaggregated data is required in a surveillance report in order to analyse data and take action!
- There are three steps for completing a Weekly local area Surveillance Report
  - STEP 1: Complete Table 1: Weekly Metrics
  - STEP 2: Colour Code "No. of Reports" and "Year to Date" columns in Table 1
  - STEP 3: Complete Table 2: Weekly Disease Reporting Form

Reference: OIE

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Lesson Summary Continued…

1. A-P-T

- Populations at risk (Animal)
- Timeframe (Time)
- Clustering (Place)

2. Definitions

- Epidemiological Unit
- Case Definition
- Diagnostic Testing

3. Data

- Data Collection and Management
- Application of the Appropriate Data Analysis
- Quality Assurance
- Validation

Reference: OIE

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ISAVET Contributing Universities

Partners

Contributors

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Exercise 15a – Local Area Disease Surveillance Report

Description of Exercise:

Create a surveillance report from information provided in tables below. Determine what the data reveals and provide comments in the surveillance report. Should you have any questions over the exercise, please ask a trainer for clarification before during, and after the exercise.

Allotted Time: 1 hour

Exercise Components and Structure:

1. This exercise will take 60 minutes to complete.
2. Form yourselves into 5 groups of roughly equal size.
3. Review the below local area disease surveillance report.
4. Conduct calculations from report data.
5. Conduct calculations from animal-place-time data.
6. Develop definitions from data provided in the local area disease surveillance report.

Materials, Data or Information:

1. Computer
2. Microsoft Word
3. Microsoft Excel
4. Pen or Pencil

Expected Outputs and Deliverables of Each Participant:

1. Surveillance report.

Local Area Disease Surveillance Report

1. Monthly local area reporting summary (Table 1):

Monthly Data and Metrics

Sublocal area Name	No. Monthly Reports Received in 2020	No. Days from Laboratory Submission to Local area Reporting	No. Days from Local area Notification to Farmer Reporting (Days)	No. of Surveillance Events this Month
Sublocal area A	5	2	1	1
Sublocal area B	1	1		
Sublocal area C	4	3	5	5
Sublocal area D	5		1	
Sublocal area E	3	2		
Sublocal area F	5	2	1	
Sublocal area G	4	2	1	
Sublocal area H	0	0		5
% Reports Received to Date		Mode:	Mode:	

A. With the data provided from the Monthly Reporting Summary (Table 1):

1. Calculate the percentage of Reports received to date in 2020.
2. Calculate the mode for the No. of days from laboratory submission to local area reporting.
3. Calculate the mode for the No. of days from local area notification to farmer reporting (days).
4. Calculate the total No. of surveillance events this month in the local area.

2. Active (A) and Passive (P) surveillance data by animal-place-time (Table 2):

ANIMAL							Active (A) or Passive (P)	TIME				PLACE	
Species or Type	Class	Total No. at Risk	No. Sick	No. Dead	Disease(s) Suspected (S) or Confirmed (C)	Notes: (Age groups, breed and sex, etc.)		Date of Visit	Date Symptoms First Observed	Date of first death	Date of Laboratory Submission	Sublocal area Name	GPS Coordinates
Cattle	Dairy												
	Beef	45	2	0	Trypanosomiasis (S)	Mature cows	P	June 10	June 9	NA	June 10	C	
	Dual purpose	82	4	2	Trypanosomiasis (S)	Mature cows	A	June 6	June 5	June 5	None	C	
	Breeder												
Sheep	Meat												
	Milk												
	Dual purpose												
	Breeder												
Goats	Meat												
	Milk												
	Dual purpose												
	Breeder	150	10	5	PPR (S)	5 dead kids	P	June 11	June 5	June 5	None	H	
Poultry	Meat												
	Eggs												
	Dual Purpose	5,000	0	2	Marek's Disease (S)	50-week old layers (daily mortality)	P	June 5	Not applicable (NA)	June 5	None	B	
	Breeder												
Equine	Horse												
	Donkey												
	Mule												
	Other												
Pets	Dog												

ANIMAL							Active (A) or Passive (P)	TIME				PLACE	
Species or Type	**Class**	**Total No. at Risk**	**No. Sick**	**No. Dead**	**Disease(s) Suspected (S) or Confirmed (C)**	**Notes: (Age groups, breed and sex, etc.)**		**Date of Visit**	**Date Symptoms First Observed**	**Date of first death**	**Date of Laboratory Submission**	**Sublocal area Name**	**GPS Coordinates**
	Cat	1	1	0	Rabies (S)	1 feral dog	P	June19	June 18	NA	June 19	E	
	Other												
Wildlife	Specify												

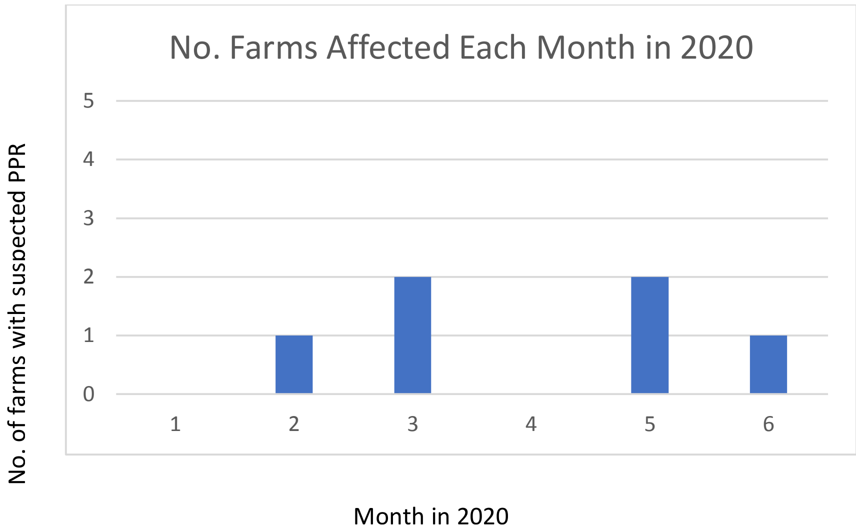
B. Review Table 2. With the surveillance data provided data by animal-place-time (Table 2):

1. Calculate the percent (%) mortality for:

    a. Suspected Trypanosomiasis reports in Beef in June 2020.

    b. Suspected PPR in Goats in June 2020.

2. Interpret the following graph of PPR in the local area for Goats so far in 2020. What pattern do you observe and what does it mean for the occurrence of PPR in the local area?



3. Definitions (Table 3):

Disease	Species	Epidemiological Unit	Case Definition	Diagnostic Testing

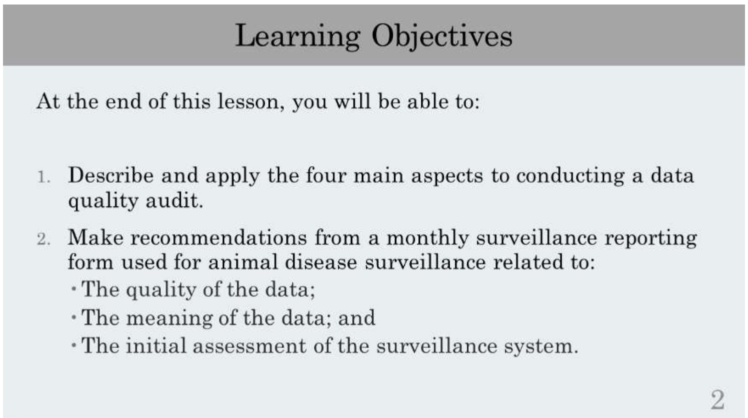
Disease	Species	Epidemiological Unit	Case Definition	Diagnostic Testing

C. Review the definitions table (Table 3).

Try to gradually complete the definitions table with the assistance of a veterinary epidemiologist from your national animal health agency (Ministry of Agriculture).

Lesson 9 – Making Recommendations for Animal Disease Prevention and Control

Estimated Lesson and Exercise Time	2 hours
Participant Materials	Frontline ISAVET Lesson 9 Making Recommendations for Animal Disease Prevention and Control Participant Guide.PDF MS Excel Exercise 15b
	Computer Microsoft Word and Excel
	Pen or pencil



Assessment of Surveillance Data Using the Four Components of a Data Quality Audit

1) Data collection

2) Data analysis

3) Data use

4) Laboratory data

Reference: Chen et al., Int. J. Environ. Res. Public Health 2014, 11, 5170-5207; doi:10.3390/ijerph110505170

3

1. Data Collection

AUDIT		ATTRIBUTE	MEASURE	OUTPUT
DATA COLLECTION	*1*	**Collector**	Name of Surveillance Focal Points: Indicate whether training has been provided on data collection	
	2	**Collection Method**	Specify the method of data collection from the farm, village or facility (e.g. abattoir) to the district level including: 1) Field observation; 2) Interview; 3) Survey (strcutured, unstructured); and 4) Audit of existing field data ***Attach forms if possible***	
	3	**Priority Diseases**	List the priority diseases under surveillance	
	4	**Completeness**	Completeness: the percentage of blank or unknown data, not zero/missing; or proportion of filling in all data elements in the facility report form. ALL DATA SHOULD BE IN A DISAGGREGATED FORM TO PERMIT FURTHER ANALYSIS	
	5	**Timeliness**	Timeliness: the percentage of reports from the subdistricts, abattoirs and facilities that were received on time	
	6	**Accuracy**	Accuracy: the percentage of data variables on the collection form without an error: EXAMPLES - missing data, incorrect coding, transposed error, incorrect units, incorrect/inconsistent format	
	7	**Action**	What actions are taken to correct late, absent, or incomplete reporting from the reporting sites?	
	8	**Data Storage and Security**	How is the data stored and maintained and backed up?	

4

Data Collection Tools

- Plan and develop the collection tool with stakeholders – sublocal area and national
- Pre-test the data collection tool
  - Leads to good quality data
  - Leads to reliable epidemiological results for decision-making and action
- The data can be a primary and secondary source

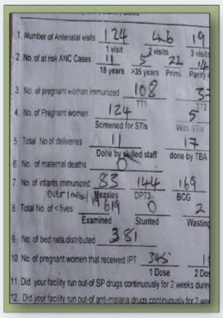


Photo: Frontline FETP

5

What is Primary and Secondary Data?

Primary data

- It is data you collect yourself.
- You understand how the data was collected.
- You input the data yourself.
- You understand the limitations of the collection tool and of the data.

Secondary data

- It is data that already exists from a field office or from a laboratory.
- You do not fully understand how the data was collected (you were not part of the collection).
- You did not input the data yourself.
- You do not fully understand the limitations of the collection tool and of the data.

6

Integrity and Quality of the Surveillance Data

Data Quality

- Missing data
- Transcription errors
- Misplaced data
- Formatting errors
- Coding errors
- Copy errors
- Omission of animal-place-time
- Not providing disaggregated data

7

What Do You Think of this Dataset?

Brucellosis Testing for January 2018

Herd ID	Date of Onset	Age	Sex	Abortion	Brucellosis Screening Test	Brucellosis Confirmation
796	5-Jan-18	1	Female	No	Neg	Pos
797	5-Jan-18	4	Male	...	Neg	Pos
799	5-Jan-18	2	Male	...	Neg	Pos
800	5-Jan-18	5	Male	...	Neg	Pos
801	5-Jan-18	4	Female	Yes	X	Pos
802	5-Jan-18	33	Female	No	Neg	Neg
803	5-Jan-18	2	Male	Yes		
804	5-Jan-18	6	Female	Yes	Neg	Pos
805	5-Jan-18	3	Female	Yes	Neg	Pos
806	5-Jan-18	1	Male	...	Neg	Neg
807	5-Jan-18	2	Male	...	Neg	Neg
8008	5-Jan-18	3	Female	No	Z	Pos
809	5-Jan-18	1	Female	No	Neg	Neg
810	5-Jan-18	4	Female	Yes	Neg	Pos
811	5-Jan-18	2	Male	...	Neg	Neg
812	5-Jan-18	5	Male	...	Neg	Neg
813	5-Jan-18	3		Yes	Pos	Pos
814	5-Jan-18	3	Female	No	Neg	Neg
815	5-Jan-18	1	Male	...	Neg	Neg
816	5-Feb-18	1	Male	...	Neg	Neg
817	5-Jan-18	0.5	Female	Yes	Pos	Pos
818	5-Jan-18	4	Male	...	Neg	Neg
818	5-Jan-18	2	Female	Yes	Pos	Pos

Identify the data quality issues with this dataset

Reference: Heather Simmons

8

Caution When Combining Datasets

Photo: Frontline FETP, Google Images

9

Ways to Improve Data Quality

Surveillance Design
- Select the right data and target group
- Pilot/beta test your data tools
- Avoid open-ended multiple choice questions

Data Collection
- Collectors follow standard operating procedures (SOP)
- Keep the form simple and easy to use
- Choose the right format (paper, electronic)

Data Entry
- Check for the correct Excel cell formats e.g. dates
- Check for transposed data in the wrong place

Quality Assurance
- Review the data step by step
- Take corrective action continuously

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2. Data Analysis

AUDIT		ATTRIBUTE	MEASURE	OUTPUT
DATA ANALYSIS	9	Data Tools	Describe the tools used for analyzing data at: 1) the farm or village to the district level	
	10	Software	Describe the computer software used	
	11	Quantitative Data	Calculate percentage (%)	
	12	Qualitative Data	Calculate percentage (%) and create groupings/categories	
	13	Animal-Place-Time	Analyse disaggregated data according to animal, place and time	
	14	Graphic Display	Tables, graphs, maps, flow diagrams, SWOT table, Fishbone Diagram, etc.	

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2. Data Analysis and Interpretation

1. Analyse and display your data
   - Calculate measures of central tendency and disease occurrence that illustrate the impact of disease
   - Create graphs or maps to illustrate the meaning of the data
2. Describe each analysis and compile a list of the main findings
3. Make inferences only from data that is of sufficient quality to analyse
4. Make recommendations based on the surveillance data analysis

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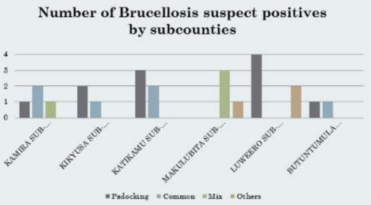
Example: Brucellosis sub-counties at risk

- All sub - counties sampled had at least 1 farm Brucellosis positive
- **MEANING: % brucellosis positivity is higher among paddocked than communal farms**



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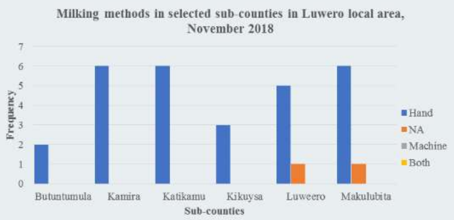
Example: Milking method

Milking practice is one of the predisposing factors for brucellosis

- **MEANING: In most of the sub-counties, hand milking is the most popular practice that farmers use**



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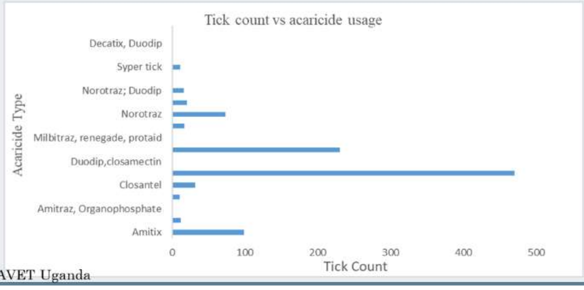
Example: Tick Counts and Acaracide Use

- **MEANING: Duodip with Closamectin are related to high tick burden.**



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3. Data Use

AUDIT		ATTRIBUTE	MEASURE	OUTPUT
DATA USE	*15*	**Data Sharing**	Describe the frequency and kind of reports used to share data from one level to the next: 1) the farm or village to the district level; 2) the district to the subnational level; from the province to the national level.Describe, or ***attach if possible.***	
	16	**Data for Action**	Calculate how many surveuillance data reports led to conducting field investigations, initiated further training at the subdistrict level, were shared with other agencies such as public health and wildlife health	
	17	**Data for Planning**	Describe the frequency and how analysed data contributed to any planning reports developed by the district, subnational or national offices related to animal health, public health or wildlife health. Describe, or ***attach if possible.***	
	18	**Data for Research**	Describe the frequency and how analysed data contributed to any research reports developed by the district, subnational or national offices related to animal health, public health or wildlife health. Describe, or ***attach if possible.***	
	19	**Feedback Mechanism**	Describe the data feedback mechnism among subdistrict/local, district, subnational and national levels for field and laboratory.	
	20	**Awareness of data use by stakeholders**	Describe stakeholder awareness of how the data is used and what incentives are required to improve reporting.	

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How will the Data be Used?

USE	EXAMPLES
DATA SHARING	- District reports - National laboratory reports
DATA FOR ACTION	- A threshold is exceeded that prompts and outbreak investigation
DATA FOR PLANNING	- Burden of disease estimates serve as a basis for disease prioritisation
DATA FOR RESEARCH	- Validation of laboratory tests
FEEDBACK MECHANISM	- Provide a PowerPoint presentation for farmers on a priority disease in the district
AWARENESS OF DATA USE BY STAKEHOLDERS	- Maintain confidentiality by aggregating data results into groups rather than individuals

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4. Laboratory Data

AUDIT		ATTRIBUTE	MEASURE	OUTPUT
LABORATORY DATA	21	**Laboratory Information**	Name and location of veterinary laboratory providing diagnostic support	
	22	**Laboratory Submissions**	Number of samples submitted to the laboratory during the past week	
	23	**Submission Time**	Provide the minumum and maximum time (days, hours) required to collect and deliver samples to the laboratory during the past week	
	24	**Reporting Time**	Provide the minumum and maximum time (days, hours)required to receive feedback about laboratory about test results	
	25	**Two-Way Linking of Field and Laboratory Data**	Describe if and how laboratory and field data are combined for analysis.	

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Example: Secondary Data of Laboratory Data

- Analysis of existing laboratory data improves our understanding of the burden of disease at the field level
- Source: Frontline ISAVET

Table 3: Summary of livestock and wildlife anthrax occurrence trend at RVIL, Nakuru, 2013 to 2018 n=76

YM	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec		T	+
	T	+	T	+	T	+	T	+	T	+	T	+	T	+	T	+	T	+	T	+	T	+	T	+		
2013	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	5	0	0	0	7	0
2014	0	0	5	5	11	4	7	2	9	4	0	0	6	2	0	0	7	0	0	0	3	0	0	0	48	17
2015	0	0	5	0	1	0	1	0	0	0	2	2	39	34	1	0	2	0	0	0	1	1	2	0	54	37
2016	0	0	0	0	1	0	2	0	7	3	7	5	5	3	2	0	0	0	2	0	0	0	0	0	26	11
2017	6	2	3	0	2	0	0	0	0	0	1	1	1	1	3	1	2	0	4	2	0	0	0	0	22	7
2018	0	0	0	0	3	0	0	0	4	2	0	0	1	0	0	0	0	0	4	2	0	0	0	0	12	4
Total	6	2	13	5	18	4	10	2	20	9	10	8	53	40	6	1	11	0	11	4	9	1	2	0	169	76

Y= Year, M= Month, T= Total number of samples tested and += samples positive

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Making Recommendations from Data Quality Audits

- There are three types of recommendations arising from a review and analysis of surveillance data.

1. Integrity and quality of the data
2. Meaning of the surveillance data
3. Assessment of the surveillance system

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Methods to Improve the Surveillance Data Quality

1. We need to measure certain "metrics" or measures in order to assess the performance of a surveillance system
2. We can assess the data flow in terms of timeliness and completeness of the surveillance reports received from the sublocal area level.
3. Recommended ways to improve the surveillance system include the following:
   - Holding regular meetings with stakeholders and staff
   - Staff Training
   - Reviewing the surveillance format and protocols
   - Asking for technical assistance from the national level

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In Summary…

- There are four main aspects to conducting a data quality audit: 1) Data collection; 2) Data analysis; 3) Data use; and 4) Laboratory Data
- The quality of data affects the entire surveillance system
- Many types of errors can affect data quality
- You can put measures in place to ensure quality data collection, merging and storage
- Feedback works in order to improve:
  - The quality of the data;
  - The meaning of the data; and
  - The assessment of the surveillance system.

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Exercise 15b: Local Area Disease Surveillance Report

This exercise will take 75 minutes.

Part I:
1. Work in groups of 3 to 4 individuals.
2. Review the data provided, answer the guiding questions
3. Draw conclusions and recommendations for further action related to:
   - The quality of the data
   - The meaning of the data
   - The assessment of the surveillance system

PART II:
1. Work alone or in pairs.
2. Based on your knowledge of the surveillance system in your district, do an initial assessment the quality of data in your district using the following Data Quality Audit Tool:

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Contributors
MAKERERE UNIVERSITY
E.I.S.M.V. DE DAKAR
24

Exercise 15b – Local Area Disease Surveillance Report

Description of Exercise:

Review a local area disease surveillance report and draw conclusions and recommendations for further action related to the quality of the data, the meaning of the data, and assessment of the surveillance system. Should you have any questions over the exercise, please ask a trainer for clarification before during, and after the exercise.

Allotted Time: 1.25 hours

Exercise Components and Structure:

1. You have 1 hour and 15 minutes to complete this exercise
2. Work in groups of 3-4 individuals and answer the questions in the exercise.
3. Review the exercise and work in groups to assess the quality of the local area surveillance report.

Materials, Data or Information:

1. Microsoft word
2. Pen and paper

Expected Outputs and Deliverables of Each Participant:

1. Applying critical thinking for making conclusions and recommendations.

Local Area Disease Surveillance Report

4. Monthly local area reporting summary (Table 1):

Annual Data and Metrics

December 31, 2020

Sublocal area Name	No. Monthly Reports Received in 2020	No. Days from Laboratory Submission to Local area Reporting	No. Days from Local area Notification to Farmer Reporting (Days)	No. of Surveillance Events this Year
Sublocal area A	11	2	1	12
Sublocal area B	1			1
Sublocal area C	8	3	5	2
Sublocal area D	12	2	3	5
Sublocal area E	7	2	3	3
Sublocal area F	12	2	0	15
Sublocal area G				2
Sublocal area H	0	Not applicable		12
% Reports Received to Date		Mode: Mean:	Mode:	Total =

1. Make the calculations on the bottom row of the table. Assess the surveillance system in this local area with regards to:

   a) Timeliness

   b) % Reports Received to Date

   c) Give your assessment of surveillance in each sublocal area listed below.

Sublocal area A –

Sublocal area B –

Sublocal area C –

Sublocal area D –

Sublocal area E –

Sublocal area F –

Sublocal area G –

Sublocal area H –

ANIMAL							Active (A) or Passive (P)	TIME				PLACE	
Species or Type	**Class**	**Total No. at Risk**	**No. Sick**	**No. Dead**	**Disease(s) Suspected (S) or Confirmed (C)**	**Notes: (Age groups, breed and sex, etc.)**		**Date of Visit**	**Date Symptoms First Observed**	**Date of first death**	**Date of Laboratory Submission**	**Sublocal area Name**	**GPS Coordinates Lat./Long.**
Cattle	Dairy	1251 822	3 5	2	Trypanosomias (S) RVF (C)	Mature cow Mature	P P	12/2/20 12/20/20	11/29/20 12/20/20	11/3/20 12/20/20	12/2/20 Not applicable (NA)	A	
	Beef	744		10	Anthrax (C)	Mature Females	P	12/12/20	12/7/20	12/7/20	12/12/20	A	
	Dual purpose												
	Breeder	5	0	1	Brucellosis (S)	Bull	S	1212/20	11/24/20	12/12/20	NA	H	
Sheep	Meat												
	Milk												
	Dual purpose	230	1	1	PPR (C)	Lamb on pasture	P	12/3/20	12/3/20	12/3/20	NA	D	
	Breeder												
Goats	Meat												
	Milk												
	Dual purpose	451	3	2	PPR (S)	Kids on tether	P	12/17/20	12/15/20	12/17/20	NA	E	
	Breeder												
Poultry	Meat	4525	62	45	Newcastle disease (S)	28 day broilers	A	12/5/20	12/5/20	12/5/20	12/5/20	F	
	Eggs												
	Dual Purpose												
	Breeder												
Equine	Horse												
	Donkey												
	Mule												

ANIMAL							Active (A) or Passive (P)	TIME				PLACE	
Species or Type	**Class**	**Total No. at Risk**	**No. Sick**	**No. Dead**	**Disease(s) Suspected (S) or Confirmed (C)**	**Notes: (Age groups, breed and sex, etc.)**		**Date of Visit**	**Date Symptoms First Observed**	**Date of first death**	**Date of Laboratory Submission**	**Sublocal area Name**	**GPS Coordinates Lat./Long.**
	Other												
Pets	Dog	23	0	1	Rabies (S)	4-month puppy	P	12/31/20	12/25/20	12/31/20	12/31/20	F	
	Cat												
	Other												
Wildlife	Specify												

2. Assess the data quality for each disease line item in the December local area report.

Sublocal area A –

Sublocal area B –

Sublocal area C –

Sublocal area D –

Sublocal area E –

Sublocal area F –

Sublocal area G –

Sublocal area H –

3. What is the meaning of the data following your analysis?

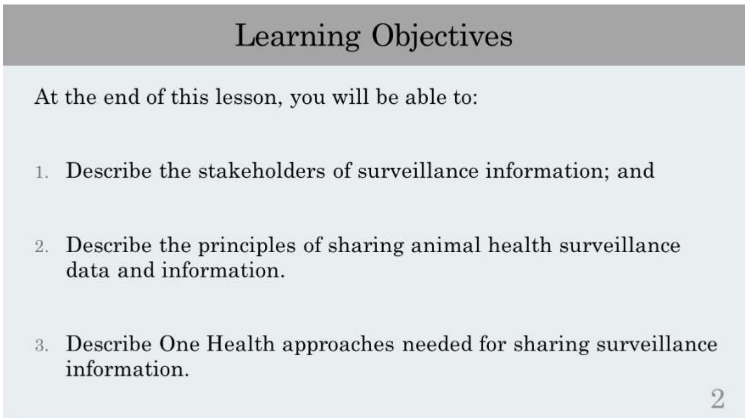
4. What is the disease with the highest impact in this local area? Please explain your answer.

5. What type of surveillance is most commonly used in the local area? Why is this important to record and what does it say about the ability to have early disease detection?

6. What do you recommend for improving the surveillance in this local area?

Lesson 10 – Sharing Surveillance Information in a Network for Animal Disease Prevention and Control

Estimated Lesson and Exercise Time	2 hours and 30 minutes
Participant Materials	Frontline ISAVET Lesson 10 Sharing Surveillance Information in a Network for Animal Disease Prevention and Control Participant Guide.PDF
	Flip chart
	Markers

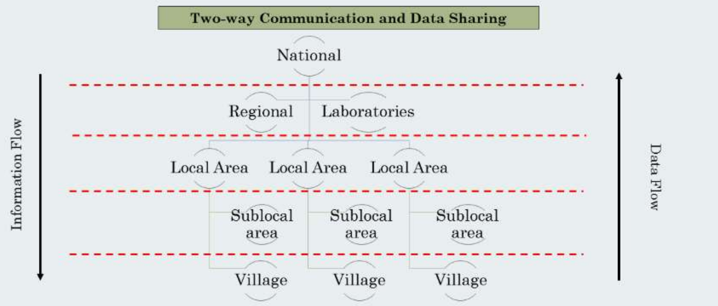


Why is it Important to Share Data and Information from Surveillance Systems?

Reason for data and information sharing:	To use a network of people involved in animal health, food inspection and extension education to continuously **improve surveillance of animal health** at the local area level
	To **interpret animal health data** and contribute to **appropriate follow-up actions** to improve livestock animal health
	To link, summarize, interpret and **act upon data that connects animal health, food safety and public health** using a broad network of partners
	To raise awareness and **reduce the risk of threats to animal health from beyond the local area's borders**
	To **support animal health surveillance of the national government**, to maintain and demonstrate the health of national livestock

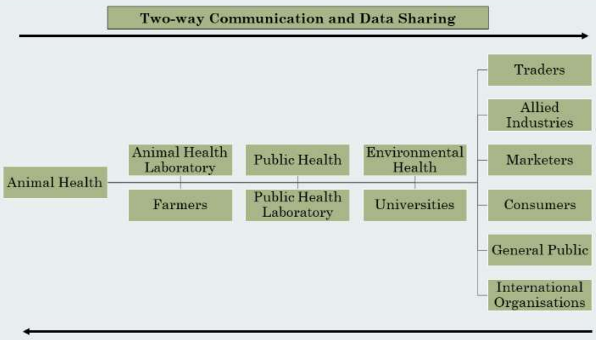
3

How is Surveillance Data Shared Vertically?



4

How is Surveillance Data Shared Horizontally?



5

Who are the Key National Animal Health Stakeholders?

1. Ministry of Agriculture and Ministry in charge of Wildlife animals
2. Animal owners
3. Independent farmers
4. Farmer cooperatives
5. Livestock private enterprises
6. Allied industries – feed, drugs, waste removal
7. Trade groups
8. Universities and research organizations
9. Public health and wildlife partners e.g. Tour companies, Fisheries
10. General Public

6

Principles of Data and Information Sharing

- Network*(Oxford Dictionary)*:

  "A series of vertical and horizontal connections among people"

Reference: Google images

7

Why is it Important to Share Data and Information from Surveillance Systems?

Who should the information be shared with?	Those from the public and private sector who have a stake in improving animal health
Why is it important to share information?	Cannot act if unaware of the problems or if data not available to support efforts
	With knowledge comes responsibility to take action
How can the information be disseminated?	Real-time alerts during an emergency
	Surveillance summaries / reports
	Bulletins and newsletters
	Press releases
	Veterinary / epidemiologic journal articles
	Meetings

8

Principles of Data and Information Sharing

- The animal health local area office plays an critical and necessary role, namely:
  - Gathering disaggregated raw data from the sublocal area level;
  - Compiling data; and
  - Sharing data from the local area to the regional and national levels.
- What is the incentive to collect and compile data?

Key Principle

If data is not improved in quality so that it can be analysed and interpreted, the incentive to collect the data is reduced.

9

Principles of Data and Information Sharing

- The animal health local area office plays an important role:
  - By making meaning and recommendations to sublocal area and national levels
- What is the incentive to make recommendations?
  - Improve capacity for detection and response
  - Enables national and international collaboration, capacity strengthening, insight into public health system performance, and ultimately better control of infectious diseases

Key Principle

Evidence-based decision-making depends on making sound recommendations based on sound data.

10

Basic Building Blocks of Network Data Sharing

Build Trust
- Facilitates successful data sharing
- Data should be used for the intended purposes

Explain the Value and Benefits
- Timely sharing to ensure more coordinated and effective risk management
- Improves capacity for disease detection and response

Plan for Data Sharing
- Consider expectations and needs of the key stakeholders

Improve Data Quality
- High-quality data enables the generation of high-quality evidence leading to better animal health outcomes

Understand the Legal Context
- Understand limitations for data sharing

Establish Data Sharing Agreements
- Rights and interests of stakeholders are safeguarded

11

Principles of Data and Information Sharing

- There are two additional things you can do right now to improve the usefulness of surveillance data in your local area:

1. Evaluate the timeliness of reporting; and
2. Evaluate the completeness of data you receive.

Provide Feedback to and from Other Levels.

12

Principles of Data and Information Sharing

- Results must be shared with people and officials who are in a position to take action to improve animal health
  - Optimal sharing requires an understanding of the roles and responsibilities of these stakeholders.
- TWO WAY FLOW: Feedback **must always** be shared with those who provide the data!
- Determine the best method to communicate results
  - Official communication channels
- Determine when and how often results will be shared
  - During peace time
  - In an emergency

13

Take Action

- The purpose of a surveillance system is to create evidence for action
- Optimal sharing requires an understanding of the roles and responsibilities of these stakeholders
  - Do you understand your local area stakeholders?

Key Question

How could you change the way you use surveillance data so that it leads to action?

14

Scenario

- You are waiting for a laboratory report to arrive in order to share results with a farmer. The farmer calls you with news that the situation is getting worse.
- What action will you take?

Reference: Google images

15

Exercise 16: Sharing Surveillance Information

- Form four groups
- This exercise will take 60 minutes followed by 30 minutes of plenary discussion
- Country-based group work using MS Word, MS PowerPoint or flip charts
- Describe:
  1. The key stakeholders in your country/local area for animal health surveillance data including public health and wildlife health partners.
  2. The existing information / data sharing mechanisms
     a) focus on data quality, interpretation of surveillance data and attributes of an efficient surveillance system
  3. How you will improve information sharing to support fact-based decisions by conducting a gap analysis to identify challenges that hinder efficiency of the existing surveillance system - suggest solutions to the identified gaps that are within local area's reach.

16

In Summary…

- Data sharing is guided by a set of a well defined principles.
- Sharing surveillance data to appropriate stakeholders improves the effectiveness of animal health interventions and response, trust and transparency
- If data is not improved in quality so that it can be analysed, the incentive to collect the data is reduced.
- Provide feedback to other levels and seek feedback from other levels.

17


ISAVET Contributing Universities
Partners
TEXAS A&M UNIVERSITY
TEXAS A&M AGRILIFE
Contributors
MAKERERE UNIVERSITY
E.I.S.M.V. DE DAKAR
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Exercise 16 – Sharing Surveillance Information in a Network for Animal Disease Prevention and Control

Description of Exercise:

Participants will describe the key stakeholder in your country/local area for animal health surveillance data while focusing on data quality, meaning of the surveillance data and discussion of attributes on an efficient surveillance system. Should you have any questions over the exercise, please ask a trainer for clarification.

Allotted Time: 60 minutes + 30 minutes for plenary

Exercise Components and Structure:

- Form into four groups will

Materials, Data or Information:

1. MS Word, MS PowerPoint or Flip charts
2. Markers

Expected Outputs and Deliverables of Each Participant:

1. List the key stakeholders who need animal surveillance information in your country and show how surveillance data is shared.
2. Provide suggestions on how to improve sharing surveillance information in your country under a One Health approach.

1. Describe the key stakeholders in your country for animal health surveillance data including public health and wildlife health partners.

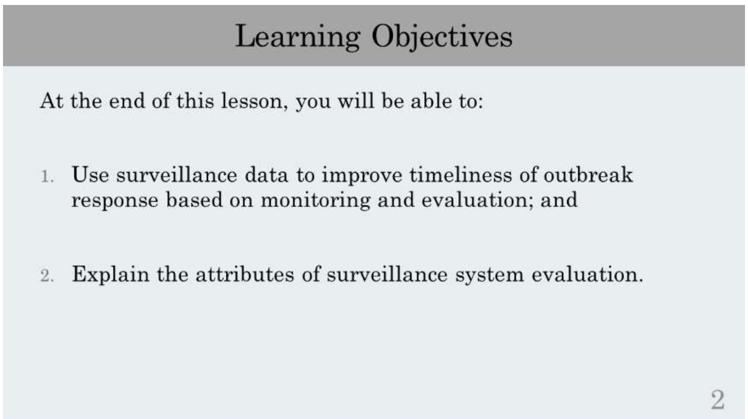
2. Describe the existing information / data sharing mechanisms in your country.

Data Quality	
Meaning of the Surveillance Data	
Attributes of an Efficient Surveillance System	

3. Describe how you will improve information sharing to support fact-based decisions by conducting a gap analysis to identify challenges that hinder efficiency of the existing surveillance system - suggest solutions to the identified gaps that are within local area's reach.

Lesson 11 – Assessing Surveillance in Your Local Area to Improve Response to Animal Disease and Health Events

Estimated Lesson and Exercise Time	1 hour and 30 minutes
Participant Materials	ISAVET Lesson 11 Assessing Surveillance in Your Local Area to Improve Response to Animal Disease Events Participant Guide.doc
	Computer
	Microsoft Word



Flow of Surveillance Data

3

Monitoring and Evaluation (M&E)

(Adapted, Frontline FETP)

1 Monitoring

- Routine and continuous tracking of planned surveillance activities

2 Evaluation

- Periodic (e.g. annual) assessment of whether surveillance and response objectives have been achieved

4

Indicators and Targets

(Adapted, Frontline FETP)

Indicator	Target
Statement to measure achievement of an activity objective	Desired level of achievement
Example: Is reporting done on time?	Example: 80% of monthly reports have been sent on time to national level

5

What Are Some Surveillance Indicators For Your Local Area in These Areas?

Local Area Response	Local Area and Laboratory Response	Completeness of Sublocal area Reporting	Use of Active Surveillance

6

What Are Some Surveillance Indicators in Your Local Area?

Local Area Response	Local Area and Laboratory Response	Completeness of Sublocal area Reporting	Use of Active Surveillance
Time to respond to farmer request for field investigation	Time from sample collection to laboratory reporting	Percentage of monthly reports received from sublocal area offices	Median number of active surveillance samples collected per month
Percentage of local area field investigations with a complete report	Time from laboratory report received by local area until farmer notification	Percentage of complete disease data from each sublocal area.	Number of secondary field investigations generated from a primary field investigation

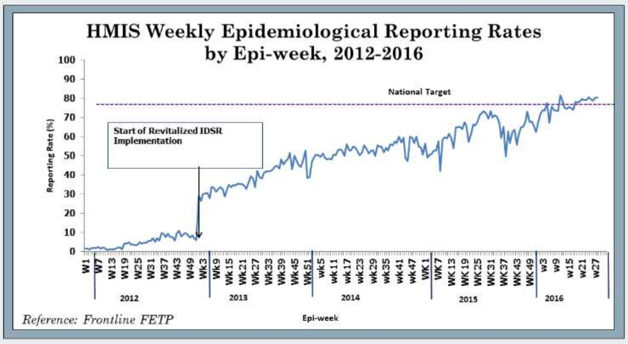
7

What Are Some Surveillance Indicators in Your Local Area?

Local Area Response	Target	Local Area and Laboratory Response	Target	Completeness of Sublocal area Reporting	Target	Use of Active Surveillance	Target
Time to respond to farmer request for field investigation	4 hours	Time from sample collection to laboratory reporting	48 hours	Percentage of monthly reports received from sublocal area offices	80%	Median number of active surveillance samples collected per month	200
Percentage of Local Area field investigations with a complete report	80%	Time from laboratory report received by Local Area until farmer notification	4 hours	Percentage of complete disease data from each sublocal area	60%	Percentage of secondary field investigations generated from a primary field investigation	20%

8

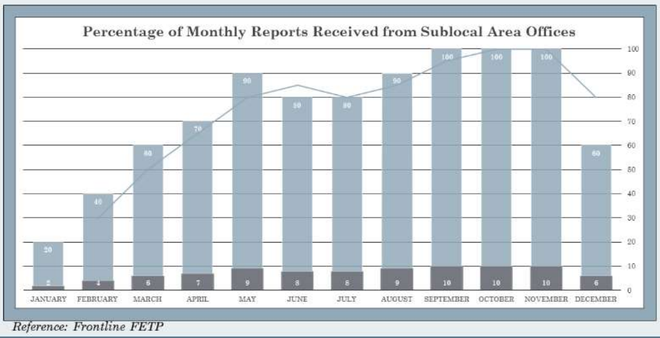
Improved Reporting Rates



Reference: Frontline FETP

9

Improved?



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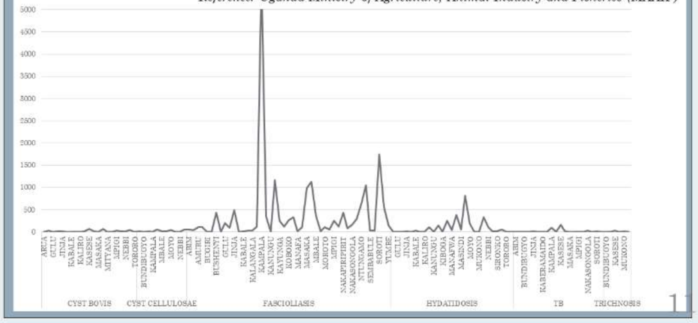
Reference: Frontline FETP

PM Lesions Surveillance Uganda MAAIF, 2008

Reference: Uganda Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)



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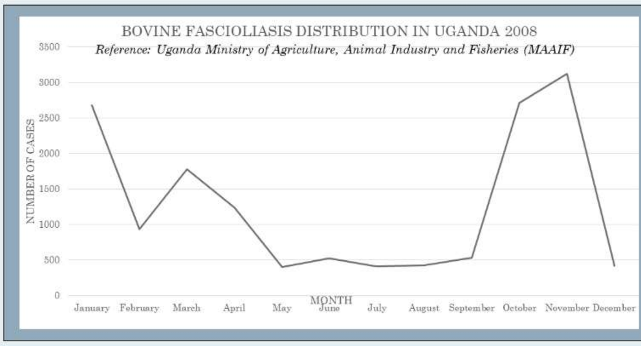
Example Monitoring and Evaluation



12

Surveillance System Evaluation (Adapted: U.S CDC)

1.Usefulness

- Does the system support effective response?

2. System attributes

- Simplicity: Structure and ease of operation
- Flexibility: Can be changed/adapted
- Data quality: Data is valid and complete
- Acceptability: Encourages participation
- Sensitivity: Can detect actual cases
- Representativeness: Accuracy of Animal-Place-Time data
- Timeliness: Rapid detection and response

Reference: (Adapted: U.S CDC)

13

Examples: Timeliness, Completeness, Data Quality

Attribute	Performance Indicator	Target	Finding
Timeliness	4 out of 8 (50%) sublocal areas have reported on time this week	80% on time	Deficient in timely reporting for half of the sublocal areas
Completeness	Last week, 7 out of 8 sublocal area reports provided incomplete information	90% complete reports	88% of Local Areas provided a report generally meeting the target
Data Quality	The % of reports with blank data for at least one variable was 80% this week	Maximum 10% of reports with blank data for at least one variable	The data quality is short of the target by 70%

14

Exercise 17: Assessing Surveillance Information in a Network for Animal Disease Prevention and Control

1. This exercise will take 60 minutes.
2. This is a small group discussion and sharing in plenary discussion.
3. Divide into three groups by surveillance purpose (Group A. Reduce disease burden; Group B. Freedom from disease; and Group C. detection of disease).
4. Use flip charts to address the items below.
   - List the ways you can improve surveillance in your Local Area and develop 5 key indicators, including targets for each.
   - Describe how you can use surveillance data to improve outbreak detection and response in your Local Area.
6. Have one individual from each group present in plenary session.

15

In Summary…

1. Monitoring is essential to maintain the function and quality of the surveillance system;
2. Develop indicators to monitoring performance of reporting sites for timeliness and completeness;
3. Surveillance system evaluation can be used to develop strategies for improvement; and
4. Improved performance of the surveillance system will lead to improvements in outbreak detection and response.

16

ISAVET Contributing Universities

Partners

TEXAS A&M UNIVERSITY

TEXAS A&M AGRILIFE

Contributors

MAKERERE UNIVERSITY

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17

Exercise 17 – Assessing Surveillance Information in a Network for Animal Disease Prevention and Control

Description of Exercise:

Participants will develop five indicators and targets for specific surveillance objectives. Should you have any questions over the exercise, please ask a trainer for clarification before during, and after the exercise.

Allotted Time: 60 minutes

Exercise Components and Structure:

1. You have 60 minutes to complete this exercise.
2. Divide into 3 groups by surveillance purpose.
    - Group A: Reduce disease burden
    - Group B: Freedom from disease
    - Group C: Detection of disease in an area previously not known to have a disease burden
3. Each group should develop 2 objectives for their surveillance system. They can choose the disease of their choice.
4. Use flip charts to:
    - List the ways you can improve surveillance in your local area and develop 5 key indicators, including targets for each.
    - Describe how you can use surveillance data to improve outbreak detection and response in your local area.

Materials, Data or Information:

1. Flip chart and markers
2. Pen and paper

Expected Outputs and Deliverables of Each Participant:

1. A list of the ways to improve surveillance in your local area.
2. Describe how you can use surveillance data to improve outbreak response in your local area.

1. List up to five ways you can improve surveillance in your local area.

Surveillance Purpose	Surveillance Objectives
Reducing Disease Burden	
Freedom from Disease	
Detection of Disease (Area previously does not have a disease burden)	

2. Identify 5 indicators with specific targets for your groups surveillance system.

Group A: Surveillance System Purpose: Reducing Disease Burden	
Indicator(s)	**Target(s)**
Indicator 1:	Target 1:
Indicator 2:	Target 2:
Indicator 3:	Target 3:
Indicator 4:	Target 4:
Indicator 5:	Target 5:

Group B: Surveillance System Purpose: Freedom from Disease	
Indicator(s)	**Target(s)**
Indicator 1:	Target 1:
Indicator 2:	Target 2:
Indicator 3:	Target 3:
Indicator 4:	Target 4:
Indicator 5:	Target 5:

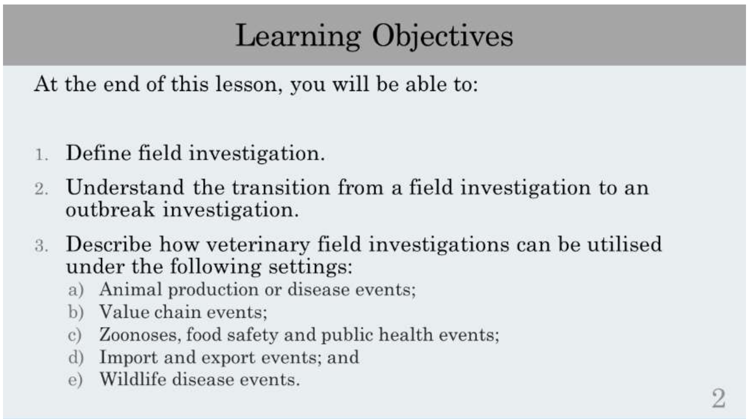
Group C: Surveillance System Purpose: Disease Detection	
Indicator(s)	**Target(s)**
Indicator 1:	Target 1:
Indicator 2:	Target 2:
Indicator 3:	Target 3:
Indicator 4:	Target 4:
Indicator 5:	Target 5:

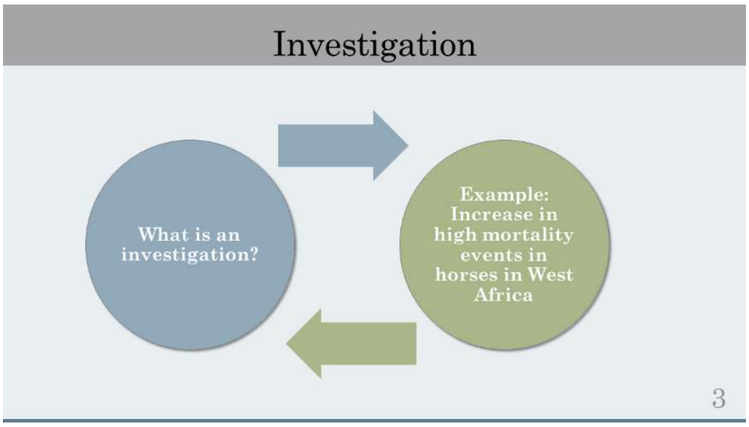
3. Describe how you can use surveillance data to improve outbreak detection and response in your local area

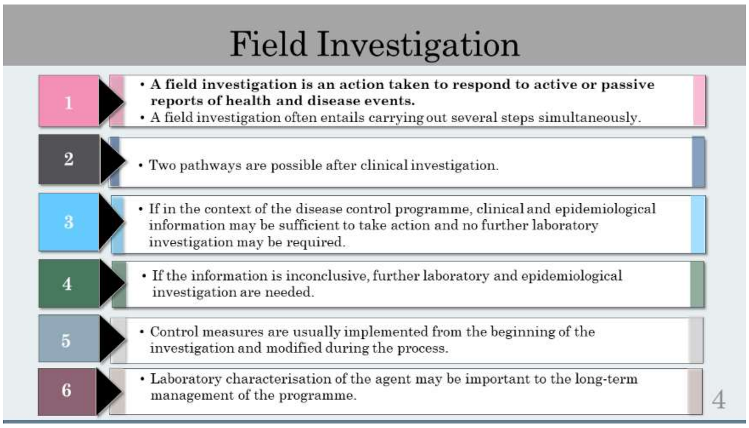
Section II: Week 2 – Field Investigation and Response

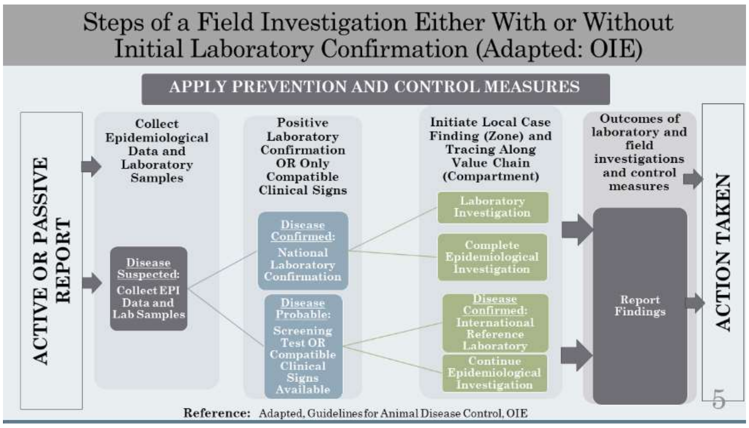
Lesson 12 – Animal Field Investigations

Estimated Lesson and Exercise Time	2 hours
Participant Materials	ISAVET Lesson 12 Animal Field Investigations Participant Guide.doc
	Computer
	Microsoft Word




Investigation
What is an investigation?
Example: Increase in high mortality events in horses in West Africa
3


Field Investigation
1
• A field investigation is an action taken to respond to active or passive reports of health and disease events.
• A field investigation often entails carrying out several steps simultaneously.
2
• Two pathways are possible after clinical investigation.
3
• If in the context of the disease control programme, clinical and epidemiological information may be sufficient to take action and no further laboratory investigation may be required.
4
• If the information is inconclusive, further laboratory and epidemiological investigation are needed.
5
• Control measures are usually implemented from the beginning of the investigation and modified during the process.
6
• Laboratory characterisation of the agent may be important to the long-term management of the programme.
4

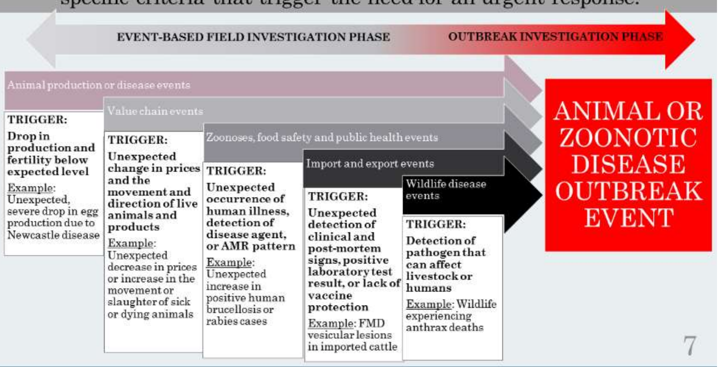

Steps of a Field Investigation Either With or Without Initial Laboratory Confirmation (Adapted: OIE)
APPLY PREVENTION AND CONTROL MEASURES
ACTIVE OR PASSIVE REPORT
Collect Epidemiological Data and Laboratory Samples
Disease Suspected: Collect EPI Data and Lab Samples
Positive Laboratory Confirmation OR Only Compatible Clinical Signs
Disease Confirmed: National Laboratory Confirmation
Disease Probable: Screening Test OR Compatible Clinical Signs Available
Initiate Local Case Finding (Zone) and Tracing Along Value Chain (Compartment)
Laboratory Investigation
Complete Epidemiological Investigation
Disease Confirmed: International Reference Laboratory
Continue Epidemiological Investigation
Outcomes of laboratory and field investigations and control measures
Report Findings
ACTION TAKEN
5
Reference: Adapted, Guidelines for Animal Disease Control, OIE

Objectives and Methods Used for Various Types of Investigations

Investigation Type	Objectives	Methods	Action Taken
Animal production	Determine reasons for drops in reproductive performance	Nutrition and disease and production history	Review historical surveillance records to assess trends Conduct a survey to estimate the burden of disease
Priority national endemic diseases	Determine the cause for increased morbidity and mortality	Conduct an investigation: measure the impact of disease; review records	Address methods of disease entry and transmission; disease
Priority national zoonotic diseases	Confirm and contain the disease from spreading	Apply biosafety and biosecurity practices; collect and submit samples	Sample collection using PPE; Test samples and respond by taking preventive action
Internationally reportable high-impact animal diseases	Investigate a potentially high-impact disease	Treat the investigation as a potential high-impact animal disease; Follow the standard steps for an animal disease outbreak investigation	Farm quarantine; Area movement controls; Aggressive case finding Detailed epidemiological investigation of index farm; Notification of farmers; Preparation for possible ring vaccination.

6

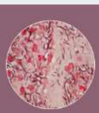
Field investigation can evolve into outbreak investigations based on specific criteria that trigger the need for an urgent response.



7

What is an Outbreak?

Occurrence of cases of disease in excess of what would normally be expected in a defined community, geographical area or season. An outbreak may occur in a restricted geographical area or may extend over several countries.



In epidemiology, an outbreak is a sudden increase in occurrences of a disease in a particular time and place beyond the expected level.

Reference: Disease Outbreaks, World Health Organization www.searo.who.int/topics/disease_outbreaks/en/

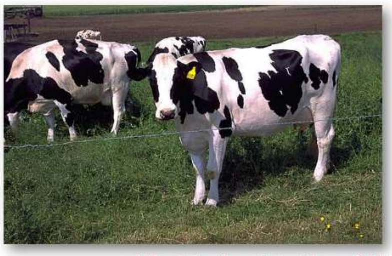
8

Veterinary Field Investigations

- Various objectives and methods used
- Each of them unique
- Different factors and reasons at play
- One type of event can evolve into another as more information is collected

9

Animal Production of Disease Event



Scenario 1

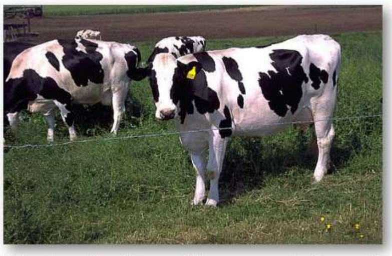
A dairy farmer calls you to investigate some recent late-term abortions and reduced fertility in his herd of 10 cows.

What is the objective of this investigation?

Reference: Google Images

10

Animal Production or Disease Event



Scenario 1

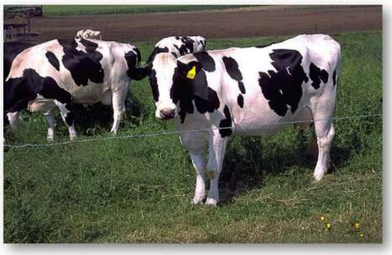
A dairy farmer calls you to investigate some recent late-term abortions and reduced fertility in his herd of 10 cows.

What methods would you use to investigate the drop in production?

Reference: Google Images

11

Zoonoses, Food Safety and Public Health Event



Scenario 1

The laboratory has confirmed that the late-term abortions and reduced fertility in the herd is due to *Brucella abortus*.

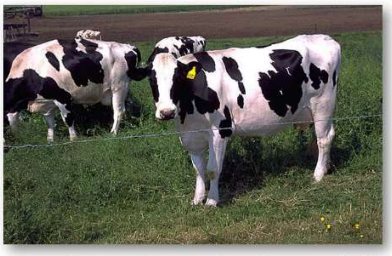
Brucellosis in cattle is thought to be endemic in this local area.

What actions would you take next to deal with this at the population level?

Reference: Google Images

12

Zoonoses, Food Safety and Public Health Event



Scenario 1

Brucellosis represents a zoonotic disease risk to the farmer's family and the local community.

In the case of zoonosis, the outbreak investigation should be done in coordination with the public health authorities.

What is the objective of a zoonotic disease field investigation?

Reference: Google Images

13

Animal Production Event

Scenario 2

A small poultry broiler producer has experienced an increase in the amount of morbidity and mortality in his flock of 5,000 broilers. In the past, he has noticed some respiratory signs when chickens are 4-weeks old.

What is the objective of this investigation?

Reference: Google Images

14

Animal Production or Disease Event

Scenario 2

A small poultry broiler producer has experienced an increase in the amount of morbidity and mortality in his flock of 5,000 broilers. In the past, he has noticed some respiratory signs when chickens are 4-weeks old.

What methods would you use for this investigation?

Reference: Google Images

15

Animal Production or Disease Event

Scenario 2

Laboratory confirmation reveals that the flock is infected with mesogenic Newcastle disease virus. Avian influenza testing is in progress, but not yet complete. Newcastle disease is likely endemic in this local area.

What actions would you take next to deal with this at the population level?

Reference: Google Images

16

Possible Zoonotic Disease Event Due to AI

Scenario 2

Newcastle disease is not a zoonotic disease risk to the farmer's family and the local community aside from a mild conjunctivitis.

However, laboratory confirmation has just been received for low pathogenic avian influenza (LPAI) subtype H7N3 was confirmed through egg inoculation and RT-PCR tests.

What action should be taken?

Reference: Google Images

17


Scenario 3: Animal Production or Disease Event
How would you go about investigating the sudden death of a cow reported by a farmer who had foot skin lesions?
What is the objective of the field investigation?
Reference: Situational Report to the National Task Force, Uganda on the status of Anthrax outbreaks in Arua, Kirihura and Kween districts, July 2018.
18


Scenario 3: Animal Production or Disease Event OR Zoonoses, Food Safety and Public Health Event
- Zoonotic
- High-Impact TAD
What method of field investigation should be conducted?
Reference: Situational Report to the National Task Force, Uganda on the status of Anthrax outbreaks in Arua, Kirihura and Kween districts, July 2018.
19


Scenario 3: Zoonoses, Food Safety and Public Health Event
- Zoonotic
List the methods for the investigation.
Reference: Situational Report to the National Task Force, Uganda on the status of Anthrax outbreaks in Arua, Kirihura and Kween districts, July 2018.
20

Scenario 3: Zoonoses, Food Safety and Public Health Event

Identify 3 field components to conduct during a zoonotic disease investigation?

1. Sample collection using PPE
2. Testing of samples
3. Respond by taking preventive action (community awareness, risk communication, treatment and vaccination)

Reference: Situational Report to the National Task Force, Uganda on the status of Anthrax outbreaks in Arua, Kirihura and Kween districts, July 2018.

21

Scenario 3: Zoonotic Investigations Community Awareness is Done Based on a One Health Approach

Reference: Preliminary Report on Suspected Anthrax Outbreak, Kween District, Ministry of Health, 26/07/2018 to the National Task Force. Prepared by: Esther Kisaakye and Kenneth Bainomugisha, Supervised by: Lilian Bulage. Report to the One health Platform, Uganda.

22

Animal Disease Events: Internationally Reportable Animal Diseases

Examples include Transboundary Animal Diseases (TADs) that:

- Are of significant economic, trade and or food security importance for a considerable number of countries
- Can easily be spread to other countries and reach epidemic proportions
- Have control and management measures which require exclusion, including cooperation between several countries

23

Internationally Reportable High-Impact Animal Diseases

Scenario 4

A beef farmer in your local area has 200 cross-bred cows currently nursing 3-month old calves. The farmer reports a very sudden increase of 20% mortality among the calves in the herd, as well as, some lameness and recumbence among cows.

He also reports seeing blisters and raw areas on the mucosal membranes of the mouth, as well as, interdigital lesions.

What is the objective of this investigation?

Reference: Google Images

24

Internationally Reportable High-Impact Animal Diseases

Scenario 4

A beef farmer in your local area has 200 cross-bred cows currently nursing 3-month old calves. The farmer reports a very sudden increase of 20% mortality among the calves in the herd, as well as, some lameness and recumbence among cows.

He also reports seeing blisters and raw areas on the mucosal membranes of the mouth, as well as, interdigital lesions.

What are the methods you would use for this field investigation?

Reference: Google Images

25

Internationally Reportable High-Impact Animal Diseases

Scenario 4

The original field investigation objective and methods may remain.

Alternatively, the field investigation may turn into an outbreak investigation with different objectives and methods.

What action needs to be taken?

Reference: Google Images

26

Exercise 18: Animal Disease Investigations

1. This exercise will take 60 minutes.
2. Form four groups.
3. Using the below examples, complete a table that describes the objectives, methods and actions for each type of investigation.
   a) Animal production field investigation – milk production loss due to bovine mastitis
   b) Endemic disease field investigation – Marek's disease
   c) Zoonotic disease field investigation – Rabies
   d) Internationally reportable high-impact field investigation – PPR
4. Each group will report their output.
5. Additional feedback will be provided.

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Summary…

1. A field investigation is an action taken to respond to active or passive reports of health and disease events.
2. A field investigation can evolve into an outbreak investigation based on specific criteria that trigger the need for an urgent response.
3. There are five (5) types of veterinary field events:

   a) Animal production or disease events;
   b) Value chain events;
   c) Zoonoses, food safety and public health events;
   d) Import and export events; and
   e) Wildlife disease events.

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ISAVET Contributing Universities

Partners

TEXAS A&M UNIVERSITY

TEXAS A&M AGRILIFE

Contributors

MAKERERE UNIVERSITY

E.I.S.M.V. DE DAKAR

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Exercise 18 – Animal Field Investigations

Description of Exercise:

Determine the objectives methods and actions for four different field investigation types. Should you have any questions over the exercise, please ask a trainer for clarification before during, and after the exercise.

Allotted Time: 1 hour

Organisation of Group Work:

Divide into four groups of roughly equal size.

Exercise Objective(s):

1. Describe four (4) types of veterinary field investigations including, objectives and the methods and actions to be taken for each.

Exercise Components and Structure:

1. Complete a table that describes the objectives, methods and actions for each type of investigation.
    a) Animal production field investigation – Milk production loss due to bovine mastitis
    b) Endemic disease field investigation – Marek's disease
    c) Zoonotic disease field investigation – Rabies
    d) Internationally reportable high-impact field investigation – PPR
2. Each group will report their output and additional feedback will be provided.

Materials, Data or Information:

1. Word and PPT

Expected Outputs and Deliverables of Each Participant:

1. Description of the types of investigation related to:
    a) Animal health and production – Milk production loss due to bovine mastitis
    b) Endemic diseases affecting trade – Marek's disease
    c) Zoonotic diseases – Rabies
    d) Internationally reportable diseases – Peste des Petits Ruminants (PPR)

Situation/issue	Objective	Methods	Action
Milk production loss due to mastitis			
Endemic Marek's disease field investigation			
Rabies disease field investigation			
High impact disease investigation			

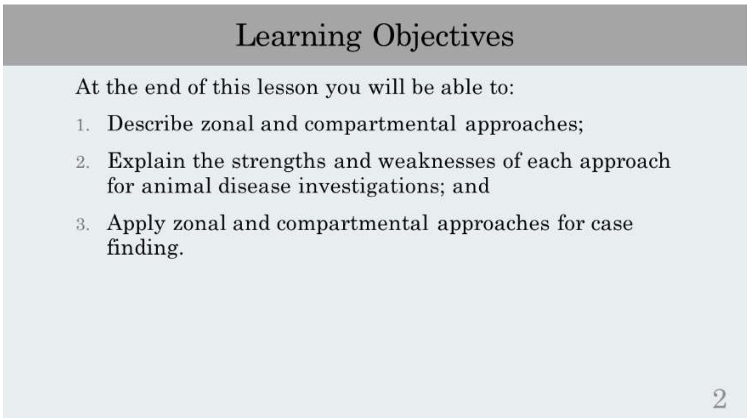
Table 1. Stages of Outbreak Investigation and Response

Outbreak Investigation	Outbreak Response

1. Preparation
2. Surveillance
3. Outbreak investigation
    a. Confirmation and assessment
    b. Observation and description
4. Full investigation
    a. Analytical component
    b. Environmental component
    c. Laboratory component
	1. Outbreak control
	2. Outbreak communication
	3. Outbreak documentation

Lesson 13 – Investigation Strategies for Early Prevention and Control of Animal Disease Transmission

Estimated Lesson and Exercise Time	1 hour and 30 minutes
Participant Materials	ISAVET Lesson 13 Investigation Strategies for Early Prevention and Control of Animal Disease Transmission Participant Guide.PDF
	Computer and Microsoft Word
	Pen or Pencil



Investigation Scenario

Report:

A medium size pig producer in your local area notifies you that he is experiencing sudden spiking mortality in his herd.

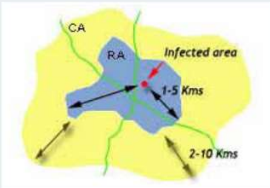
1. Is this an active or passive disease report?
2. What are important differential diagnoses to consider?
3. What immediate action could you take prevention and control spread of this disease assuming it could be due to ASF?
4. What is your strategy to investigate the extent or scope of pig mortality in your local area?

Reference: Google images

3

Strategy 1: Investigate the zone immediately surrounding the affected farm

- Looking within the zone immediately surrounding the affected farm we can understand how disease spreads to adjacent pig farms that are in the same geographic area
- Disease movement may begin from the first affected farm to neighbouring farms within the zone
  - Mechanisms include tick vectors
  - Scavenging animals (wildlife, domestic)
  - Pigs, people, equipment movement

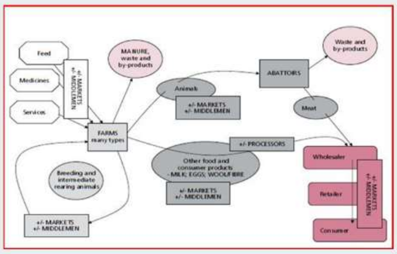


Reference: Google OIE

4

Strategy 2: Investigate the Pig Production System Compartment

- If we look within the pig production system compartment we can understand how disease spreads within the system
- A compartment is defined as an animal subpopulation that shares a common biosecurity management system
- Disease movement begins from the first affected farm to all farms and markets along the value chain by way of farmers and marketers of live animals, meat, feed and other products and services



Reference: FAO, Designing and Implementing Value Chain Studies

5

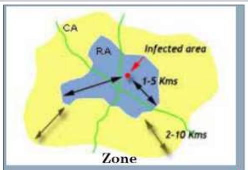
Disease Investigations Require Both Zonal and Compartmental Approaches

Think and act in terms of zonal and compartment disease spread

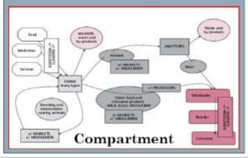
OIE definitions in Ch.1.1.1

- Zone/Region
  - a clearly defined part of a country containing an animal subpopulation with a distinct health status with respect to a specific disease…
- Compartment
  - one or more establishments (premises in which animals are kept) under a common biosecurity management system containing an animal subpopulation with a distinct health status …

Reference: Google images, OIE



Zone


Compartment

6

Application of Zoning

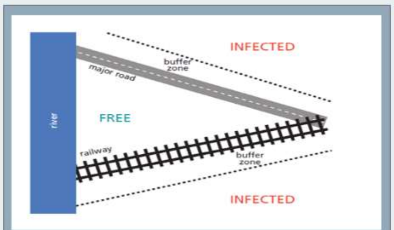
The extent of a zone is established on the basis of natural, artificial or legal boundaries

Reference: FMD Zones, Botswana

7

Application of Zoning

A zone is defined based on the establishment of three areas:
- Infected area
- Buffer area
- Disease free area

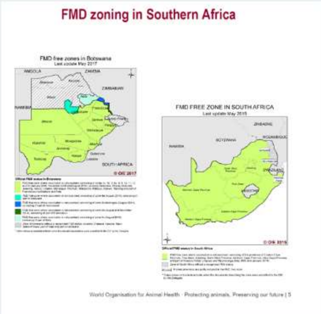


Reference: OIE

8

Example of Zoning

- *Ref: OIE, 2017. OIE standards on zoning and compartmentalization and their implementation*
- FMD free zones are based on freedom with or without vaccination (green and blue)
- FMD zones without a defined disease status are shown as a striped diagonal line.



9

Assessment of the Zonal Approach to Case Finding

Strengths	Weaknesses
• May provide a date for the index case • Defines the geographic extent of an outbreak • Identifies spatial disease clusters • Assesses local high risk areas • Guides prevention and control activities • Permits contact tracing	• Does not focus on value chain contacts like traders who travel extensively • Limits case finding to local spread • Does not consider value chain actors who transmit viruses widely • Does not consider transboundary transmission

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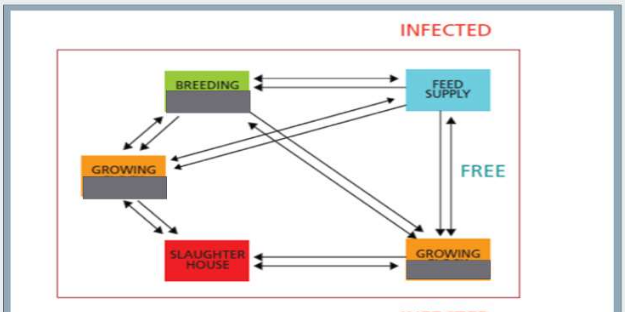
Application of Compartmentalisation



Reference: OIE

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Example of Compartmentalisation:

- *Ref: ABPA, 2017. http://www.abpa-br.org/*
- Poultry value chain map within the broiler compartment in one area of Brazil
- Note that the subpopulation is: commercial broiler chickens with associated links in the value chain

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Assessment of the Compartmental Approach to Case Finding

Strengths	Weaknesses
• Extends beyond the geographic boundaries of an outbreak • Focuses on value chain decision makers like traders • Considers the economic motives for animal movement • Considers animal market movement and transboundary transmission • Provides sites in which to conduct risk-based surveillance including high risk gathering points (abattoirs)	• Does not provide a date for the index case • Provides a limited amount of information about local spread • Traders and marketers distrust governments and may not cooperate • Does not assess local high-risk disease clusters

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How can we be sure the disease does not exist in a zone or a compartment?

Apply the Iceberg Principle:

- Only part of the disease picture is apparent to the epidemiologist.
- It is always safest to assume that we are likely arriving sometime after disease transmission began.
- Therefore, **aggressive case finding** is absolutely essential to assess the extent of disease transmission zone or a compartment!

Reference: Google Images

14

Case Finding and Data Collection

- **Active Case Finding**
  - Aggressive
  - Door-to-door and farm-to farm
  - Direct observation of animals
  - Tracing movement in and out of a farm or premises
  - Tracing movement along the value chain
- **Systematic Data Collection**
  - Questionnaire
  - Taking samples
  - Animals, people, equipment, etc.
  - Movement

Reference: Google Images

15

How do we conduct case finding using zonal and compartmental approaches?

- Both approaches are important and should be considered for every outbreak investigation
- For zonal case finding:
  - Begin at the index farm and conduct surveillance on all neighbouring farms in an outward direction.
- For compartmental case finding:
  - Trace and record all incoming and outgoing movements during the high risk period as defined by OIE and investigate each contact along the value chain.
    - High risk gathering points (e.g. markets, abattoirs)
    - Contact tracing

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Exercise 19: Investigating an Outbreak

1. This exercise should take 1 hour to complete.
2. Divide into groups of four.
3. Explain which strategies your would use to investigate the following:
   a) FMD in a communally pastured beef herd
   b) Avian influenza in a commercial poultry flock
   c) African swine fever in a smallholder pig herd

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In Summary….

- Disease investigation in a zone is based upon finding disease in a subpopulation in a geographic area.
- Disease investigation in a compartment is based upon finding disease links in a subpopulation that are part of the same biosecurity system along the value chain.
- Know the advantages and disadvantages of each approach and use both methods to increase the chance of finding the disease when it exists.
- Case finding should be conducted using both zonal and compartmental approaches to get a more complete picture of the extent of the disease transmission.

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Exercise 19 – Investigating an Outbreak

Description of Exercise:

Explain the strategies you would use to investigate different disease situations by production type. Should you have any questions over the exercise, please ask a trainer for clarification.

Allotted Time: 1 hour

Organisation of Group Work:

Divide into three groups.

Exercise Objective(s):

Working in groups, explain which strategies you would use to investigate the following:

1. FMD in a communally pastured beef herd
2. Avian influenza (AI) in a commercial poultry flock
3. African swine fever (ASF) in a smallholder pig herd

Exercise Components and Structure:

1. Flip Chart

Materials, Data or Information:

1. No data

Expected Outputs and Deliverables of Each Participant:

1. Description of traditional zonal case finding and tracing approach.
2. Description of compartmental approach including value chain mapping.

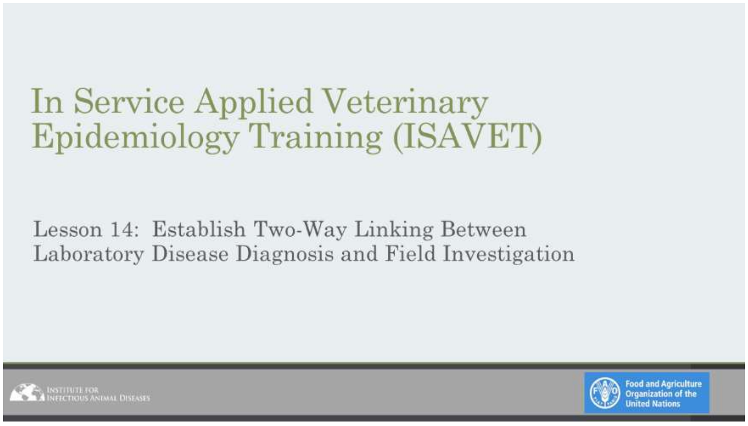
1. Explain which strategies you would use to investigate FMD in a communally pastured beef herd.

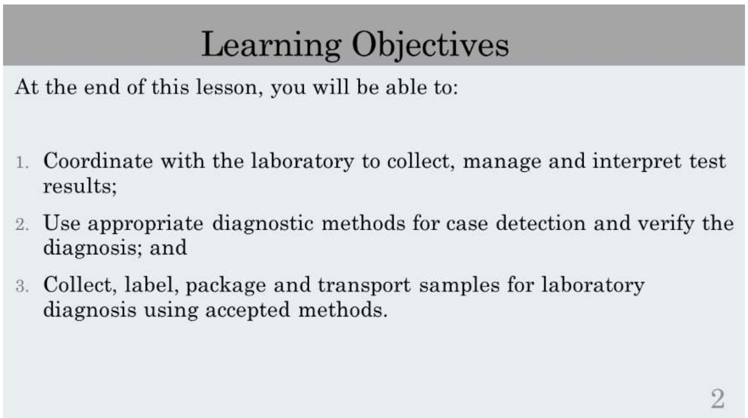
2. Explain which strategies you would use to investigate avian influenza in a commercial poultry flock.

3. Explain which strategies you would use to investigate African swine fever in a smallholder pig herd.

Lesson 14 – Establish Two-Way Linking Between Laboratory Disease Diagnosis and Field Investigation

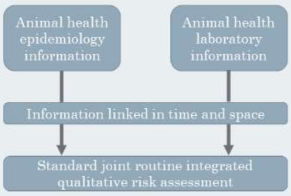
Estimated Lesson and Exercise Time	2 hours and 30 minutes
Participant Materials	Frontline ISAVET Lesson 14 – Establish Two-Way Linking Between Laboratory Disease Diagnosis and Field Investigation.PDF
	Computer and Microsoft Word
	Pen and Pencil





Two-way Linking

Availability of information from at least two information "streams" - epidemiological and laboratory, from animal health.



Reference: Adapted from WHO, 2013

3

Four-way and Two-way Linking

Availability of information from at least four information "streams" - epidemiological and laboratory, from animal and human health under a One Health Approach.

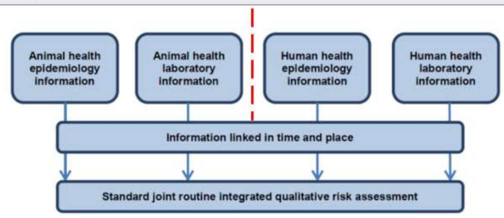
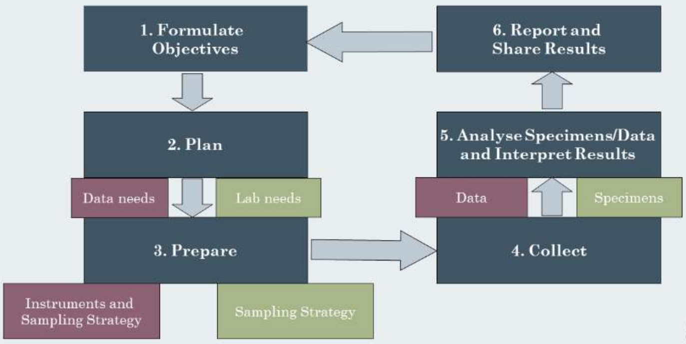


Figure 1. Linking and assessment of information from the four information streams

Reference: WHO, 2013

4

Planning a Collaborative Investigation: Two-Way Linking



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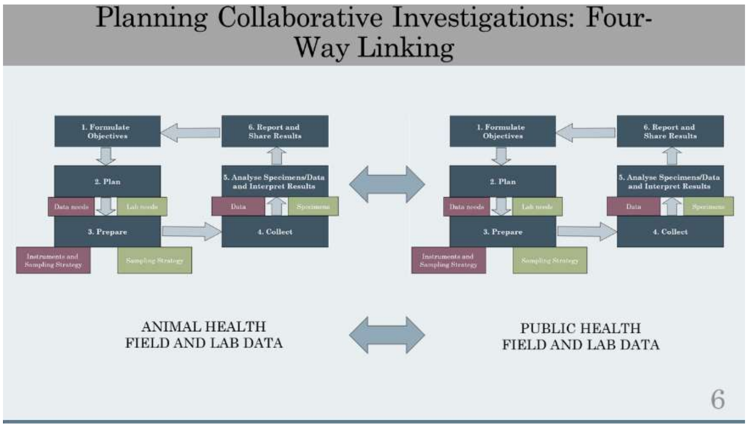
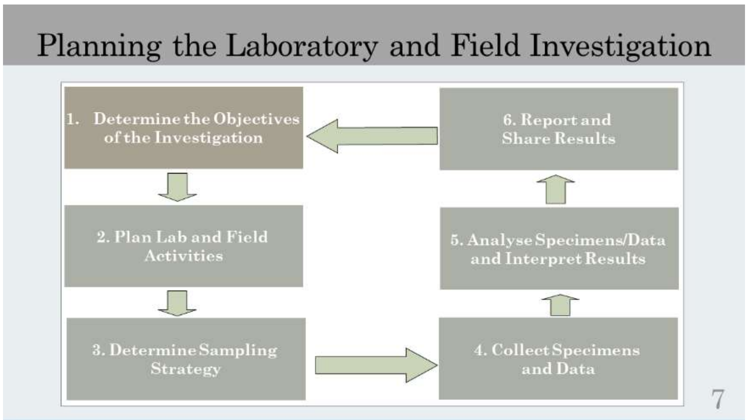
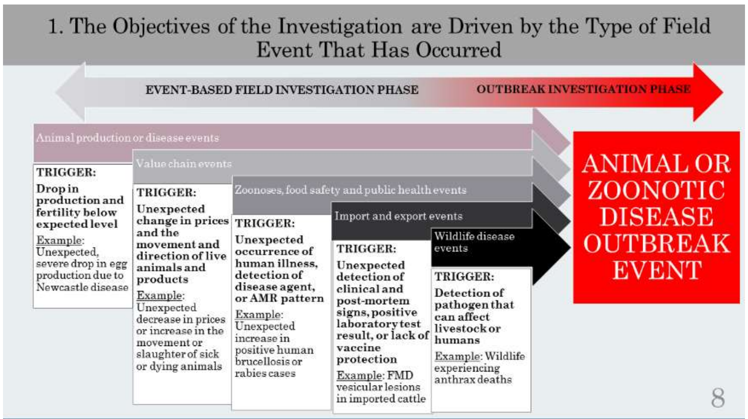

Planning Collaborative Investigations: Four-Way Linking
1. Formulate Objectives
6. Report and Share Results
2. Plan
5. Analyse Specimens/Data and Interpret Results
Data needs
Lab needs
Data
Specimens
3. Prepare
4. Collect
Instruments and Sampling Strategy
Sampling Strategy
1. Formulate Objectives
6. Report and Share Results
2. Plan
5. Analyse Specimens/Data and Interpret Results
Data needs
Lab needs
Data
Specimens
3. Prepare
4. Collect
Instruments and Sampling Strategy
Sampling Strategy
ANIMAL HEALTH FIELD AND LAB DATA
PUBLIC HEALTH FIELD AND LAB DATA
6


Planning the Laboratory and Field Investigation
1. Determine the Objectives of the Investigation
6. Report and Share Results
2. Plan Lab and Field Activities
5. Analyse Specimens/Data and Interpret Results
3. Determine Sampling Strategy
4. Collect Specimens and Data
7


1. The Objectives of the Investigation are Driven by the Type of Field Event That Has Occurred
EVENT-BASED FIELD INVESTIGATION PHASE
OUTBREAK INVESTIGATION PHASE
Animal production or disease events
Value chain events
Zoonoses, food safety and public health events
Import and export events
Wildlife disease events
TRIGGER: Drop in production and fertility below expected level
Example: Unexpected, severe drop in egg production due to Newcastle disease
TRIGGER: Unexpected change in prices and the movement and direction of live animals and products
Example: Unexpected decrease in prices or increase in the movement or slaughter of sick or dying animals
TRIGGER: Unexpected occurrence of human illness, detection of disease agent, or AMR pattern
Example: Unexpected increase in positive human brucellosis or rabies cases
TRIGGER: Unexpected detection of clinical and post-mortem signs, positive laboratory test result, or lack of vaccine protection
Example: FMD vesicular lesions in imported cattle
TRIGGER: Detection of pathogen that can affect livestock or humans
Example: Wildlife experiencing anthrax deaths
ANIMAL OR ZOONOTIC DISEASE OUTBREAK EVENT
8

1. Determine the Objectives of the Investigation

- Objectives of the Investigation:
  - Determine the presence or absence of disease
  - Determine the source of a disease
  - Determine the distribution of disease (Animal-Place-Time)
  - Determine the impact of disease

9

2. Plan Laboratory and Field Activities

Laboratory ⟺ **Field**

Laboratory

- Support the objectives of the investigation.
  - Confirm the diagnosis
  - Detect common source
  - Clinical case management (AMR)
- Select the appropriate tests and laboratory forms
- Select the appropriate number and type of samples to collect in collaboration with the national epidemiologists
- Provide and ensure that Standard Operating Procedures are in place for sample collection and submission

Field

- Prepare for field work:
  - Biosafety
  - Biosecurity
  - Transportation
  - Laboratory supplies
  - Use only validated (pre-tested) standardised data collection forms and questionnaires
  - Coordinate with farmers, laboratory, national epidemiologists and local health officials
  - Standard Operating Procedures are in place for biosafety and biosecurity
  - Not to exceed daily laboratory surge capacity

10

3. Determine Sampling Strategy

Laboratory ⟺ **Field**

Laboratory

- Prepare to collect either single or pooled samples based on proper laboratory protocol
- Laboratory confirmation
  - Use appropriate laboratory tests
- Use routine procedures
  - Standard collection and transport procedures
  - Know the biosafety level laboratory required for the test
  - Establish laboratory role in the field

Field

- Consult with an epidemiologist and the laboratory to determine the number and type of samples
- Select the appropriate animals to sample:
  - Healthy
  - Sick
  - Dead
- Collect descriptive data for the laboratory form and the epidemiology questionnaire

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4. Collect Specimens and Data

Laboratory

- Provide materials to collect samples, reagents and ice packs to maintain cold chain
- Follow written Standard Operating Procedures (SOP) for sample collection, handling and submission
- Follow written SOP for laboratory data collection
- Identify each sample with a unique sequential set of numbers that includes the farm No. and the Animal No.
  - Example: Sample 3-1

Field

- Select the appropriate number of samples from healthy, sick and dead animals based on:
  - Advice of an epidemiologist
  - Advice of a laboratory scientist
- Follow written Standard Operating Procedures (SOP) for sample collection, handling and submission
- Follow written SOP for laboratory and epidemiology data collection
- Single (mortality) versus repeated (serology) sampling
- Confirm that the number of samples do not exceed the daily surge capacity of the laboratory

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4.1 Laboratory Involvement in the Field

- Presence in the field ideal
  - Can provide timely input based on direct involvement and observation
    - Time consuming and expensive
    - Most useful in complex investigations, unusual clinical presentations or unknown pathogens
- Remote participation as part of outbreak team (more common)
  - Optimal value if involved early
  - Need to exchange appropriate and sufficient information
  - Efficient for routine investigations (known, common pathogens)

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4.2 Labelling Samples

Includes:

- Flock/herd and animal unique ID number
- Test(s) ordered
- Time and date of collection
- Sample collector's initials

Reference: Google Images

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4.3 Sample Collection

- Types of sample specimens to be collected in the field
  - Whole blood
  - Swabs
  - Tissue specimens
  - Whole carcass
- Follow Frontline ISAVET Field Training SOP: Laboratory Specimen Submission, Packaging and Shipment

Example: Malignant Catarrhal Fever (Wildlife)

Collected specimens (one or more for the following):
- Fresh tissue (lymph node, liver, spleen, kidney and lung)
- Whole blood (1-2 mL)

Erroneous results can occur through:
- Specimen mismanagement in the field
- Improper labelling of specimen in the field
- Incorrect date and time the specimen was collected
- Incorrect transport medium is used for sample collection
- Specimen is stored at the incorrect temperature and degrades the sample
- Specimen is not packaged and shipped in the correct manner

Reference: Texas A&M Veterinary Medical Diagnostic Laboratory

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4.4 Information to accompany samples…1/2

- The following information should accompany samples to the laboratory;
  - Name and address of owner of the farm/animal (s) sampled
  - Contact information (telephone and fax numbers, e-mail address) of owner
  - Geo-location (latitude and longitude, if available)
  - Animal details (species, breed, sex, age and identity of the animals sampled, and traceability number when available)
  - Herd details (numbers in herd, affected and dead)
- Case history:
  - The clinical signs and symptoms observed
  - Findings of the ante- and post-mortem examinations

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4.4 Information to accompany samples…2/2

- Disease agent suspected
- Differential diagnosis
- Tests requested
- List, type and quantity of samples submitted with transport media used
- Date samples were collected and submitted
- Any medication given to the animals, and when given
- Vaccination history describing the type of vaccines used and dates of application
- The type and standard of husbandry, including feeding and biosecurity measures
- Contacts of person to receive results


TVMDL
TVMDL Submission form

Reference: Texas A&M Veterinary Medical Diagnostic Laboratory

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4.5 Triple Packaging for Shipment

Packaging Specification Marking

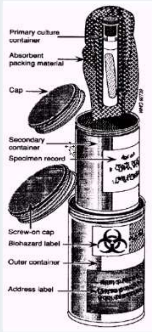
example: (u n) 4H"/Class 6.2/94 GB/2470

The packaging marking consists of:

- The United Nations packaging symbol
- Type of packaging
- The text "Class 6.2"
- The last two digits of the year of manufacture of the packaging
- State authority
- manufacturer's code

Triple packaging system

Infectious substance (BIOHAZARD) label



Prof. Matthias Niedrig, RKI

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4.6 Packing and Shipping Specimens

Four Steps to Safely Package Field Samples

Step 1: Prepare an outer package that contains secondary packaging. If specimen must remain in a refrigerated temperature, include a cold pack.

Step 2: Ensure whole blood tubes have adequate cushioning and sealed to prevent leakage. Add a layer of filler between cold packs and specimens. Package paperwork in a separate bag.

Step 3: Add additional filler to decreased empty space. Secure package with tape.

Step 4: Label the package by specimen classification

Reference: Texas A&M Veterinary Medical Diagnostic Laboratory

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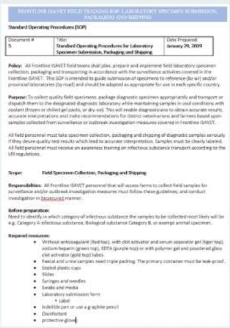
4.7 Frontline ISAVET Field SOP



Reference: Frontline ISAVET Trainee Manual

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5. Analyse Specimens/Data and Interpret Results

Laboratory

- Coordinates submissions from the field
- Lab analysis is based on epidemiological information, objectives and laboratory consultations
- Selects appropriate tests:
  - Screening
  - Confirmatory
- Applies the appropriate testing procedures
- Shares laboratory test results in a timely manner

Field

- Transfers field collection forms to create a line listing in the local area or national level as appropriate
- Initiates descriptive analysis based on Animal-Place-Time characteristics including graphic display
- Interpret findings and limitations
- Shares data with the laboratory and national epidemiologists

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Two-Way Communication with the Laboratory and the Field

- Share preliminary information early
  - Time, place and animal characteristics
  - Suspect pathogens and differential diagnoses
- Ensure on-going communication between the laboratory and the field
  - Identify focal person(s), obtain contact information
  - Generate an ID number for each source location
  - Provide regular daily updates
  - Send regular epidemiological report for input and revisions

22

6. Report and Share Results

Laboratory

Clarify:

- Provides results to the local veterinarian and national epidemiologist and as soon as possible
- Interprets the findings of the laboratory analysis
- Treats all laboratory results as sensitive information
- Reports results to only designated recipients
- Exercises caution with the media -sensitive issues (e.g. RVF)

Field

- Epidemiology debriefing should include the laboratory methods and results
- Interpret and update epidemiological results in light of the laboratory evidence
- Coordinate the final report with the laboratory and national epidemiologists based on which group will take the lead on writing and sharing the final report

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Exercise 20: Specimen Collection, Diagnostic Testing and Interpretation of Diagnostic Tests

Wet Lab Instructions:

1. Form 4 groups and complete this exercise in 1 hour and 30 minutes.
2. Describe the steps you would take with the laboratory in order to establish a disease diagnosis of Pullorum in poultry
3. Practice safe sample collection, packaging, handling, submission and testing of samples for the disease: Pullorum in poultry.
4. Interpret results and propose measure to prevent and control each of the four diseases listed above.

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In Summary…Two-Way Linking is a MUST!

1. Engage in positive interactions with laboratory specialists
2. Identify appropriate samples to collect
3. Appropriately collect, label, package and transport specimens maintaining the cold chain and reducing biosafety risks
4. Identify when and which laboratory methods to use e.g. to confirm existence of outbreak, identify causative agent, conduct phylogeny, etc.
5. Identify the need for and use of follow-up testing. e.g. antimicrobial susceptibility
6. Identify the role of the laboratory in animal health surveillance
7. Understand laboratory quality assurance principles
8. Establish two-way information sharing throughout the investigation and publish results jointly.

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Exercise 20 – Specimen Collection, Diagnostic Testing and Interpretation of Diagnostic Tests

Description of Exercise:

This exercise, is a wet lab that will be supervised by a laboratory diagnostician and two assistants and where you will discuss specimen collection, packaging shipment and diagnostic testing and interpretation for *Salmonella pullorum*. Should you have any questions over the exercise, please ask a trainer for clarification before during, and after the exercise.

Trainer Note: Pullorum was chosen since it is endemic in many countries, is not zoonotic and can be collected from poultry in many locations. Other diseases and SOPs would need to be developed if trainers want to conduct a wet lab for testing other diseases in other species.

Time: 1 hour and 30 minutes

Organisation of Group Work:

Assemble into four groups.

Wet Lab Instructions:

1. Describe the steps you would take with the laboratory in order to establish a disease diagnosis of Pullorum in poultry.
2. Discuss the information that would need to be included on the laboratory submission form from the field.
3. Practice safe sample collection, packaging, handling, submission, shipment and testing of samples for pullorum.
4. Interpret results and describe how you will report and share information that links the laboratory and the field activities.

Exercise Components and Structure:

Wet Lab Demonstration and Discussion:

Group A: Pullorum disease in poultry

1. The laboratory supervisor will review the laboratory diagnosis of pullorum disease and then a Frontline ISAVET field trainer demonstrate how to handle the chickens, select and prepare the site and then collect blood.
2. The laboratory supervisor will review a laboratory submission form and demonstrate the specific information that should be included and how to properly label and secure this information, so it does not get damaged during transport.
3. The laboratory supervisor will demonstrate how to perform, interpret and record the pullorum test and trainees will then perform, interpret and record the results of the slide agglutination test themselves.
4. The laboratory supervisor will demonstrate how to safely prepare and protect the quality of a blood sample tube for labelling, packing, handling and submission.

5. Based on the learning objectives of Lesson 14, the laboratory supervisor will ask trainees to explain how to report and share the findings of laboratory tests between laboratory and field including farmers, national epidemiologists and other stakeholders. Two trainees will be asked to volunteer to take notes to record all group discussion.

Materials, Data or Information:

1. Microsoft Word
2. Penn State video on recommended blood sample collection from chickens.
3. Standard Operating Procedure (SOP) for collection of blood from poultry
4. SOP for pullorum diagnostic testing in poultry
5. SOP for proper sampling handling, packaging and shipping.

Expected Outputs and Deliverables of Each Participant:

1. Explain the laboratory diagnosis of a specific disease (e.g. Pullorum);
2. Conduct steps of safe sample collection, packaging, handling, submission and testing of samples; and
3. Interpret results and how to report and share the findings of laboratory tests between laboratory and field including farmers, national epidemiologists and other stakeholders.

Pullorum Disease

Part 1: Diagnostic Testing for Pullorum Disease

OIE Terrestrial Manual Chapter 2.3.1

Description and importance of the disease: Pullorum disease of chickens is a bacterial infection caused by Salmonella enterica subspecies enterica serovar Gallinarum biovar Pullorum (Salmonella Pullorum). At this time the serovar is referred to as Gallinarum in some parts of the world and Pullorum in others; in this chapter the serovar will be referred to as Gallinarum or Pullorum according to the biovar under discussion as this is more meaningful from a clinical and epidemiological perspective.

In its acute form, Pullorum disease is almost exclusively a septicaemic disease of young chickens. However, the organism may also be associated with disease in turkey poults and may be carried subclinically or lead to reduced egg production and hatchability, plus a range of atypical signs in older birds. Ovarian transmission is a major route by which the organism can spread. Game birds and 'backyard' poultry flocks may act as reservoirs of infection, and wild birds may act as vectors for the organism and as such are important in the epidemiology of the disease.

Fowl typhoid in chickens and turkeys is caused by S. Gallinarum biovar Gallinarum and is more often observed in the later growing period and in mature stock. Disease is often characterised by rapid spread with high morbidity and acute or subacute mortality. Red mites may be involved in the transmission of disease and persistence in poultry houses. Clinical signs in chicks and poults include anorexia, diarrhoea, dehydration, weakness and death. In mature birds, Pullorum disease is less severe but decreased egg production, poor hatchability and some increased mortality may occur. Fowl typhoid is a more acute septicaemic condition which mainly affects mature birds and may be particularly severe in commercial laying flocks.

Identification of the agent: Samples should not be taken from birds or eggs that have recently been treated with antimicrobial drugs. Swabs or aseptically collected samples from infected tissues, or intestinal and cloacal contents should be used for diagnostic testing. Other materials that may be sampled include eggs, embryos, faecal droppings and hatcher debris, especially fluff, dust and broken eggshells and chick box linings. Samples of tissues such as caecal tonsils, liver, gall bladder and spleen from infected birds are preferable to faecal and environmental samples. Tissue samples should be inoculated into non-selective and selective enrichment broths and on selective agar medium, such as brilliant green agar, as soon as possible after collection.

In case of delay, samples should be stored at 4°C. Typical colonies can be identified by serological and biochemical tests. Molecular approaches can also be used to identify and differentiate S. Gallinarum and S. Pullorum. Final serological confirmation of suspect isolates can normally only be completed in a Salmonella Reference Typing Laboratory.

Serological tests: These are satisfactory for identifying the presence and estimating the prevalence of infection within a flock. The test used in the field is the rapid whole blood plate agglutination test. This test is unreliable in turkeys and ducks as many uninfected birds may give positive reactions. In the laboratory a serum agglutination test is used, either as a rapid plate test or
as a tube test. These can be applied as macro- or microagglutination tests, though the latter may be more likely to give false-positive results with turkey sera. Any positive reactors should be confirmed as being infected by culture at post-mortem examination. Enzyme-linked immunosorbent assays have been reported but no commercial test is available.

The use of vaccines to control S. Enteritidis or S. Gallinarum infections in chickens may cause problems in the interpretation of serological results.

Requirements for vaccines: Live and inactivated vaccines are available for fowl typhoid in some countries. The most commonly used vaccine is a commercial live vaccine derived from the stable rough strain of S. Gallinarum known as ‘9R’.

Part 2. Specimen Collection- Implications for Testing

Instructions

Please review the information on specimen collection provided below. After carefully reading the information, provide written answers for questions that follow (All Groups).

Specimen Collection

Planning for Specimen Collection

The process of collecting, storing, and transporting a clinical specimen directly affects the quality of the specimen and the ability to produce quality results from a laboratory test. Many outbreak investigations will involve the collection of animal clinical specimens from outbreak-associated cases. Laboratory confirmation of an aetiologic agent is a critical component to a successful outbreak investigation. For this reason, it is important to remember that the ability of a laboratory to successfully identify a pathogen depends on appropriate specimen collection and transportation. Communication with the laboratory before specimen collection is critical to ensure appropriate collection technique and maintenance of sample so that accurate results can be obtained.

Performing Specimen Collection

It is important to obtain an adequate amount of the specimen and handle it with care, as this may be the only opportunity to obtain a specimen during the outbreak. A sample must be collected properly in order to ensure that the pathogen or infectious agent can be recovered in a viable form for laboratory analysis. Again, communication with the laboratory is vital.

Labelling and Identification:

Ensuring that specimens are accurately labelled at collection time is absolutely essential. Misidentification of a specimen leads to misidentification of a patient, which can result in improper diagnosis and treatment.

Storage and Transportation:

Appropriate storage of specimens before and during transportation must be maintained in order to preserve the integrity of the specimen. Most specimens need to be transported in sterile containers, although containers for faeces do not need to be sterile. Specimens transported in incorrect containers (e.g. non-sterile when sterility is required) may be rejected by the laboratory. Remember, all specimen containers should be closed tightly. Laboratories may reject the specimen if it shows signs of leakage/seepage, since this could potentially expose laboratory personnel to the contents.

Packaging of clinical specimens must comply with regulations (e.g., mail and commercial) for transport of infectious material. These regulations depend upon the type of transport (like ground or air delivery) and should be determined in consultation with the laboratory and carrier prior to specimen collection. Finally, before transport, the receiving laboratory should be notified of the pending shipment so that they can prepare the facilities and workforce to handle the samples.

Guiding Questions

1. Before collecting a specimen:

    a. How do you determine what clinical and/or other samples you will need to collect?

    b. How do you determine which laboratory you will send your specimen(s) to?

    c. What logistics do you need to consider in terms of collection, packing, and transportation of the specimen?

    d. List the safe handling procedures of using the pullorum antigen in the field.

2. When is the best time to collect a specimen from sick animal (s) during a course of an outbreak?

3. Why is proper sample collection technique so important to the laboratory?

4. What pieces of information should be included when labelling/identifying a laboratory specimen?

5. If a specimen contains a particularly dangerous or infectious organism, should this be noted in the labeling and identification process? Should the laboratory be notified in advance about what type of specimens to expect?

6. True or False: Most specimens stored at room temperature are suitable (or remain suitable) for laboratory diagnostic testing. Explain.

Part 3: Interpreting and Reporting Laboratory Data

Group A: Poultry

Instructions

1. Interpret and record the test results in the following table:

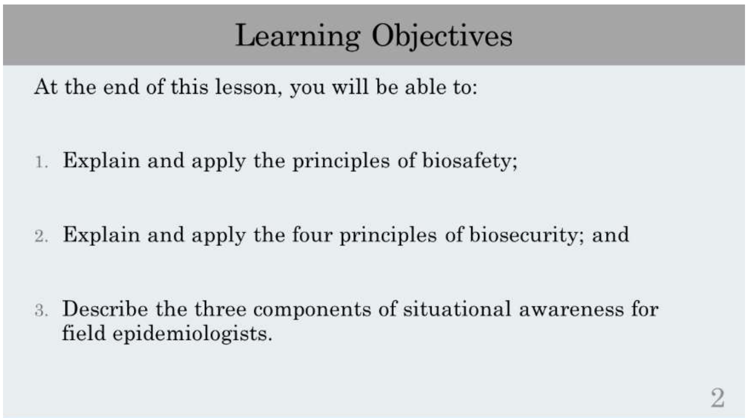
Chicken	Test Result

2. How would you interpret, report and share the results from this flock?

3. You have a flock that has 9 of 10 poultry that have tested positive in the field. None of the birds are showing clinical signs. You are suspicious that the test may be producing false positive results. What are some reasons for why the test result might be unreliable under field circumstances.

Lesson 15 – Biosafety and Biosecurity for Animal Disease Investigations

Estimated Lesson and Exercise Time	2 hours and 30 minutes
Participant Materials	ISAVET Lesson 15 Biosafety and Biosecurity for Animal Disease Investigations Participant Guide.doc
	Microsoft Word and Computer
	Pen and Pencil



What is Biosafety?

"The containment principles, technologies and practices that are implemented to prevent unintentional exposure to pathogens and toxins, or their accidental release."

Reference: WHO, Laboratory Biosafety Manual – Third Edition, http://www.who.int/csr/resources/publications/biosafety/WHO_CDS_CSR_LYO_2004_11/en/

3

What is Biosecurity?

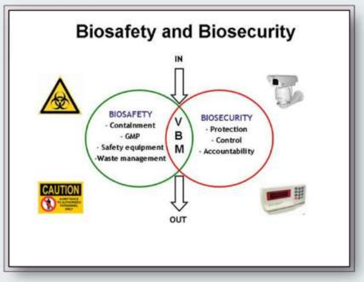
Biosecurity is defined as "Procedures or measures designed to protect the population against harmful biological or biochemical substances." (The Oxford Dictionary, 2018)

Laboratory biosecurity is defined as protection, control and accountability for valuable biological materials within laboratories in order to prevent their unauthorized access, loss, theft, misuse, diversion or intentional release." (Laboratory Biosafety Manual, 3rd Edition WHO 2004 and Biorisk Management – Laboratory Biosecurity guidance , WHO 2006)

Reference: Google images

4

Biosafety and Biosecurity are Required to Protect Ourselves and the Animals and Farmers That We Work With



Reference: Google images

5

Four Principles of Biosafety for Field Epidemiologists

1. Understand the agent
2. Understand the transmission risk
3. Manage the risk
4. Communicate the risk

6

Who Should Practice Biosafety?

1 → 2

1:
- Laboratory scientists
- Laboratory diagnosticians
- Academicians working in a laboratory setting

2:
- Field personnel who collect samples

Reference: Google images

7

Biosafety Principle 1: Understand the Agent
(Example: Chapter 3.5 of the Terrestrial Manual. OIE, 2014).

- Hazard:
  - *Bacillus anthracis*

- Pathogen and disease:
  - Anthrax is an acute bacterial disease primarily of herbivores and is transmissible to humans
  - It is caused by *B. anthracis*, a gram-positive spore-forming rod-shaped bacterium

Reference: Google images

8

Biosafety Principle 2: Understand the Transmission Risk

- Animals become infected by ingesting spores or possibly by being bitten by flies that have fed on an infected animal or carcass
- Infected animals are usually found dead
  - Death can occur within 24 hours
- To avoid environmental contamination, post-mortem examinations conducted in the field (outside of laboratory containment) of carcasses of animals suspected to have died of anthrax is discouraged
- More than 95% of human anthrax cases take the cutaneous form and result from handling infected carcasses or hides, hair, meat or bones from such carcasses

9

Biosafety Principle 3: Manage Risk

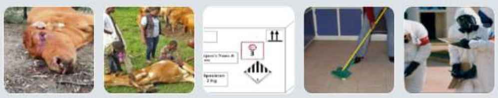
- Follow the following administrative procedures:
  - An emergency response plan
  - A communication plan with public and animal health authorities
  - A health and safety plan for personnel who may be exposed
  - A waste management plan
  - Training of field and laboratory personnel

Reference: Google images

10

Biosafety Principle 3: Manage Risk

Follow standard operating procedures (SOP)



Prohibit post-mortems in the field	Safe carcass handling storage and disposal	Follow prescribed packaging and shipping instructions	Disinfect post-mortem and laboratory areas and equipment	Wear personal protective equipment (PPE) including respiratory protection

Photos: Google Images

11

Biosafety Principle 3: Manage Risk

- Follow the following standard operating procedures (SOP) (continued):
    - Follow safe handling practices of anthrax suspect carcasses including burning and burial

Photos: Google Images

12

Biosafety Principle 3: Manage Risk

- Consider economic and environmental security risks:
    - Restrict movement of wool and hides
    - Avoid high risk contaminated soil where spores are stabile for years
    - Safely handle and inactivate microbiology laboratory liquid waste and solid waste before release
    - Be aware of the possibility of intentional misuse of contaminated waste

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Biosafety Principle 3: Manage Risk

ECONOMIC RISKS	ENVIRONMENTAL RISKS
Direct losses for farmers from reduced meat and milk	High risk contaminated soil where spores are stable for years
Restricted movement of wool and hides	Contaminated microbiology laboratory liquid waste and solid waste before release from laboratory
Healthcare costs for affected humans	Uintentional misuse of contaminated waste

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Activity Spectrum of Select Detergents and Disinfectants

(Department of Epidemic and Pandemic Alert and Response of the World Health Organization, 2007)

	BG+	BG-	Myco B	Spores	Yeast	Virus	Prions
Alcohol 70°	++	++	++	0	+	+	0
Aldehydes	+++	+++	++	+	+++	++	0
Ammonia IV	+++	+	0	0	+	+	0
Anilides	+	0	NP	NP	0	NP	0
Chlorhexidine	+++	++	0	0	+	+	0
Cl compounds	+++	+++	++	++	++	++	+[a]
Iodine (+ der.)	+++	+++	++	++	++	++	0
Hg compounds	+++	++	0	0	+	0 ou +	0
Phenols	Variable activity depending on components [b]						
Hexachlorophe	+++	+	0	0	+	0	0

[a] Bleach (6%) 60 min at 20° C; [b] discussion on efficacy of phenol on prions

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Biosafety Principle 4: Communicate Risk

- In consultation with the national animal health authority:

1. Contact the national office and request communication support
2. The national office will develop protocols including identifying responsible person(s) and develop a message to be activated in the event of a positive anthrax diagnosis, including a press release, contact lists and a questions and answers
3. Identify responsible person(s) and develop a communication message to be activated

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Example: Biosafety of HPAI

1. Understand the agent	A zoonotic orthomyxovirus found in wild birds that are low and high pathogenicity to poultry
	The virus mutates and re-assorts rapidly and constantly with 16 H and 9 N subtypes
2. Understand transmission risk	Direct: Contact with wild birds and among poultry at farms, households and markets
	Indirect: Movement of people, equipment, vehicles, cages, egg cartons among farms and markets along the value chain
3. Manage risk	Get annual influenza vaccine if you work with poultry
	Reduce exposure: Wear clean PPE at every location and shower
	Post-exposure anti-viral treatment
4.Communicate the risk	Although handling infected birds can result in human infection, cooking destroys the virus in meat and eggs
	Develop and share messages on how to prevent and control avian influenza in poultry and in humans

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Health Interventions Model

Biosecurity is part of the Health Intervention Model

Prevent Exposure
- Isolation e.g. quarantine
- Humane culling and disposal
- Cleaning and disinfection
- Surveillance

Prevent Transmission
- Isolation
- Traffic and movement control
- Humane culling and disposal
- Cleaning and disinfection
- Surveillance

Increase Host Immunity
- Herd and flock health program
- Vaccination
- Seromonitoring
- Isolation
- Surveillance

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Five Principles of Biosecurity

1. Isolation e.g. quarantine
2. Traffic and movement control
3. Cleaning and disinfection
4. Disposal of dead animals and animal waste
5. Herd and flock health

Source: USDA

19

Biosecurity Principle 1: Isolation

Ideal Isolation Scenario

Reference: Google images

20

Isolate Different Animal Species

Real Isolation Scenario

- Separation of species and production types from each other:
  - Pigs
  - Wild birds
  - Ducks
  - Fighting Cocks
  - Other animal species

Reference: Google images

21

Isolate Yourself

Establish	Establish clean and dirty areas of your vehicle, clean boots and launder clothing daily. Practice good personal hygiene!
Leave	Leave dirty personal protective equipment (PPE) behind at the site you just visited.
Visit	Visit a maximum of one farm per day and wash yourself and your belongings after each visit.
Clean vs Dirty	Once you are exposed to the disease agent, you are "dirty". You need to clean yourself and wait 24 hours to be "clean".

Reference: Google images

22

Isolate Yourself: Wear Personal Protective Equipment (PPE)

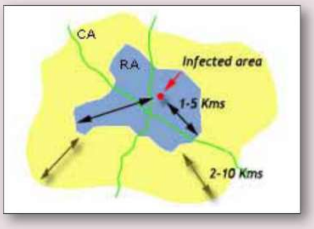
- Supplies:
  - Chemical-resistant tape
  - Blunt-nosed scissors
  - Inner and outer gloves
  - Tyvek coveralls
  - Rubber boots
  - N95 or reusable APR
  - Goggles
  - Biohazard bag
  - Supplies for tasks

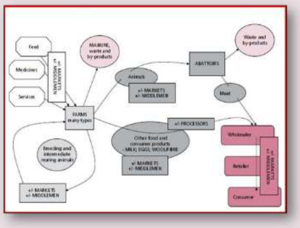
Reference: USDA

23

2. Traffic and Movement Control

Prevent and control disease transmission both locally and through the value chain





Reference: Google images, OIE

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3. Cleaning and Disinfection

- Cleaning
  - Most important step!
  - Must remove ALL faecal and organic matter
- Disinfection
  - Final Step

Reference: Google images

25

References: Disinfectants

- FAO

  MANUAL ON PROCEDURES FOR DISEASE ERADICATION BY STAMPING OUT
  http://www.fao.org/docrep/004/Y0660E/Y0660E03.htm

- OIE

  2018 © OIE - Terrestrial Animal Health Code - 10/08/2018
  CHAPTER 4.13.
  GENERAL RECOMMENDATIONS ON DISINFECTION AND DISINFECTION
  http://www.oie.int/fileadmin/Home/eng/Health_standards/tahc/current/chapitre_disinfect_disinsect.pdf

26

4. Disposal of Dead Animals and Waste

Reference: Google images

- Types include:
  - Carcasses
  - Faecal matter
  - Offal
  - Feathers
  - Hair
  - Horns
  - Contaminated feed
  - Contaminated fomites
- Dead animals and waste products are major sources of animal disease pathogens.

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Disposal of Dead Animals and Waste

Disposal Method	Advantages	Disadvantages
Burial	Rapid on-site removal of carcasses and topsoil	High water table in rainy season; depends on soil and bedrock
Burning	Rapid on-site removal	Environmental air pollution
Composting	Permits re-cycling	Specific guidelines required: wild and feral animals can poach
Alkali Digestion	Complete digestion of carcass	Expensive to construct

Each situation is different and options must be evaluated carefully to meet local conditions

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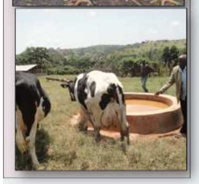
5. Flock and Herd Health



- Biosecurity includes preventive practices
1. Prevent exposure
2. Protect susceptible animals from infection
3. Prevent progression from infection to disease
4. Treat cases
   - Prevent death and disability
   - Prevent further transmission
5. Interrupt transmission
- Some activities targeted
  - Environmental; Social/behavioural; Legal; Genetics; Nutrition; Management; Veterinary care and Vaccination

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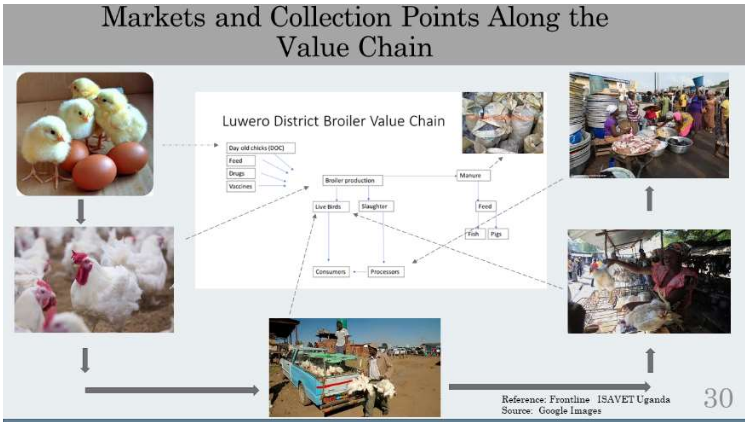
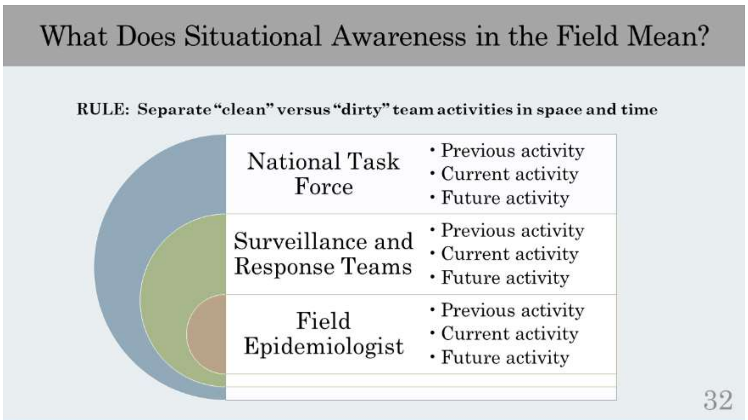

Markets and Collection Points Along the Value Chain
Luwero District Broiler Value Chain
Day old chicks (DOC)
Feed
Drugs
Vaccines
Broiler production
Manure
Live Birds
Slaughter
Feed
Fish
Pigs
Consumers
Processors
Reference: Frontline ISAVET Uganda
Source: Google Images
30


Wildlife
Managed game
Farmed game
Extensively bred livestock
Outdoor farming
Intensively bred livestock
Eur J Wildl Res (2007) 53:241–256 DOI 10.1007/s10344-007-0098-y
Source: Google Images
Wildlife as Reservoirs of Disease
How do prevent direct and indirect contact between domestic animals and wildlife?
Build barriers to restrict mixing of domestic and wild animals
Restrict feeding and watering areas and access to pasture
31


What Does Situational Awareness in the Field Mean?
RULE: Separate "clean" versus "dirty" team activities in space and time
National Task Force
Previous activity
Current activity
Future activity
Surveillance and Response Teams
Previous activity
Current activity
Future activity
Field Epidemiologist
Previous activity
Current activity
Future activity
32

Examples of Situational Awareness

Level	Sequence of Events and Interventions
1. Individual	➢ You came from a "clean" location ➢ You just entered an "infected" location ➢ You must take action to clean yourself and clothing before visiting other farms
2. Field Team	➢ Your field team is doing case finding for FMD ➢ You enter a farm with infected animals ➢ Your team is now considered "dirty" and may be assigned to culling duties or other action
3. National Task Force	➢ A positive case is discovered in the "surveillance" zone without a previous case ➢ The area is now designated as "infected" zone ➢ All teams and individuals in this "infected" zone must take interventions as noted above

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Exercise 21: Biosafety and Biosecurity for Animal Field Investigations

Instructions:

1. This exercise will take 60 minutes.
2. This exercise is divided into three parts and take 60 minutes (20 minutes each).
3. The objective is to apply the principles of biosafety, biosecurity and situational awareness.
4. Form yourselves into groups of roughly equal size.
5. Read the scenario and answer the questions for each section.
6. Groups will report their answers in 60 minutes.

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In Summary…

- Biosafety is the containment principles, technologies and practices that are implemented to prevent unintentional exposure to pathogens and toxins, or their accidental release
- Biosecurity includes procedures or measures designed to protect the population against harmful biological or biochemical substances
- Situational awareness during an investigation prevents disease transmission by the animal health surveillance and response teams by separating "clean" and "dirty" activities.

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ISAVET Contributing Universities
Partners
Contributors
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Exercise 21 – Biosafety and Biosecurity for Animal Disease Investigations

Description of Exercise:

Review the following three scenarios and answer biosafety and biosecurity questions with respect to situational awareness and decision-making. Should you have any questions over the exercise, please ask a trainer for clarification before during, and after the exercise.

Allotted Time: 60 minutes and an additional 30 minutes for plenary discussion

Organisation of Group Work:

- Form yourselves into 5 groups of roughly equal size.

Exercise Objective(s):

1. Explain the principles of biosafety.
2. Explain the four principles of biosecurity.
3. Describe three components of situational awareness for field epidemiologists.

Exercise Components and Structure:

1. Review each of the 3 scenarios (20 minutes/scenario).
2. Apply the principles of biosafety, biosecurity and situational awareness.
3. Answer the questions from each scenario within the allotted time of 20 minutes for each scenario.

Materials, Data or Information:

1. Computer
2. Microsoft Word
3. Pen or Pencil

Expected Outputs and Deliverables of Each Participant:

1. Understand decision-making processes for biosafety and biosecurity while in the field.

<u>Scenario 1</u>

You are aware of a large die-off of wild birds that has been confirmed as highly pathogenic avian influenza (HPAI) subtype H5N1 at a lake near a Community X poultry cooperative with 20,000 egg layers. You are asked to investigate the death of the some of the egg layers that has just been reported by the sublocal area officer.

A. Biosafety in the field

1. Using the 4 principles of biosafety, explain how you would how would you protect field epidemiologists investigating the poultry mortality?

    a) The agent:

    b) Disease transmission:

    c) Risk management:

    d) Risk Communication:

2. Before you leave to go to the field, give three ways you would you prepare yourself to ensure biosafety, assuming the poultry could be infected with avian influenza virus:

B. Biosecurity in the field

<u>Scenario 2</u>

You are in Community X that is experiencing pig mortality due to African Swine Fever and you learn that the pig farms in Community X sell pigs regularly to markets in nearby villages and in Town A located nearby.

1. Using the five principles of biosecurity, give one example of control measures you would take for each of the following:

   a) Isolation:

   b) Traffic and movement control:

   c) Cleaning and sanitation:

   d) Disposal of dead animals and animal waste:

   e) Herd health:

2. State one prevention measure you would take to prevent transmission of African Swine Fever virus to:

   a) Other pigs:

b) Humans working at the local markets:

a) Consumers:

C. Situational awareness in the field

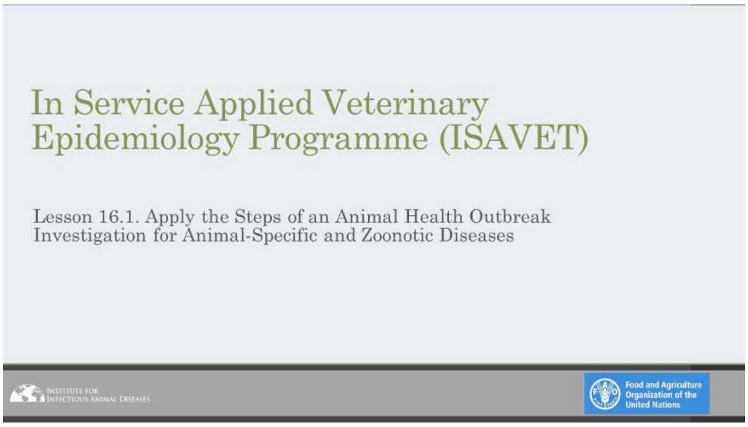
<u>**Scenario 3**</u>

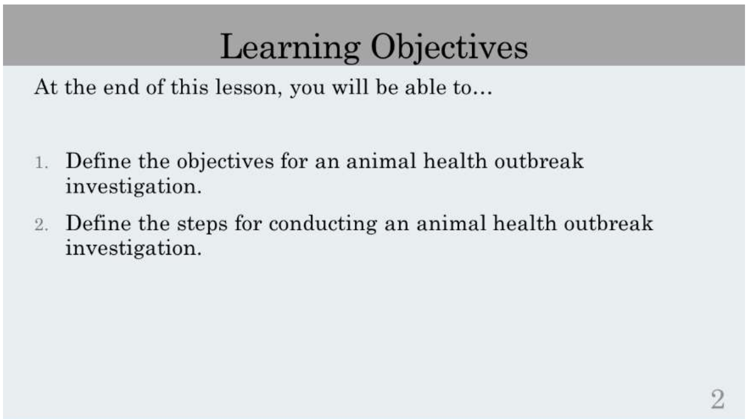
Foot and Mouth Disease outbreaks have been occuring recently in your local area. Dead and sick cattle have not yet been reported in Town A due to Foot and Mouth Disease (FMD), near to the cattle market. You are asked to lead a surveillance team to investigate beef and dairy cattle of unknown health status at the market near to Town A.

1. Before going to Town A, you recall that you have just returned from investigating Foot and Mouth Disease (FMD) positive infected cattle in Town B where cattle were sick and dying. Using your knowledge of situational awareness, what will you do next? Is it safe to conduct surveillance in the market near to Town A?

Lesson 16.1 – Apply the Steps of an Animal Health Outbreak Investigation for Animal-Specific and Zoonotic Diseases

Estimated Lesson and Exercise Time	3 hours and 30 minutes
Participant Materials	ISAVET Lesson 16.1 Apply the Steps of an Animal Health Outbreak Investigation for Animal-Specific Diseases Participant Guide.doc
	Computer and Microsoft Word
	Pen or Pencil





Field Epidemiology

"…The early investigative activities surrounding the identification of a possibly emergent disease must be carried out in the field and not the laboratory.

This is the world of shoe-leather epidemiology…"

(Murphy, 1998)

3

Outbreak Investigation

Outbreak Investigation – Field and laboratory investigations that are linked to the following events must be considered as potential outbreak events:

a. Unusual drops in milk, meat and egg production

b. Suspicion or detection of unusual high-risk antimicrobial resistance profiles in humans and animals

c. Unusual high morbidity and high mortality animal disease events

d. Zoonotic disease events linked to human and animal disease

e. Isolation of internationally reportable high impact animal diseases as defined by the World Organisation for Animal Health (OIE)

4

Objectives of an Outbreak Investigation

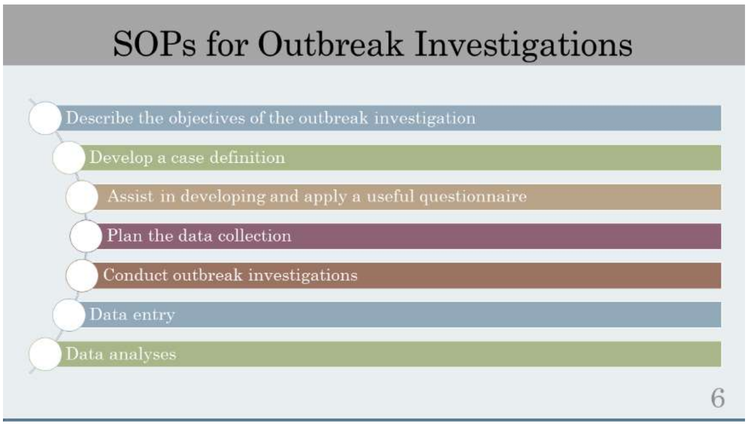
- **Determine the presence or absence of disease**
- **Determine the source of a disease**
- **Determine the distribution of disease (Animal-Place-Time)**
- **Determine the impact of disease**
- **Determine the magnitude of the outbreak**
- **Determine risk factors associated with the outbreak**
- **Propose future prevention and control measures and next steps**

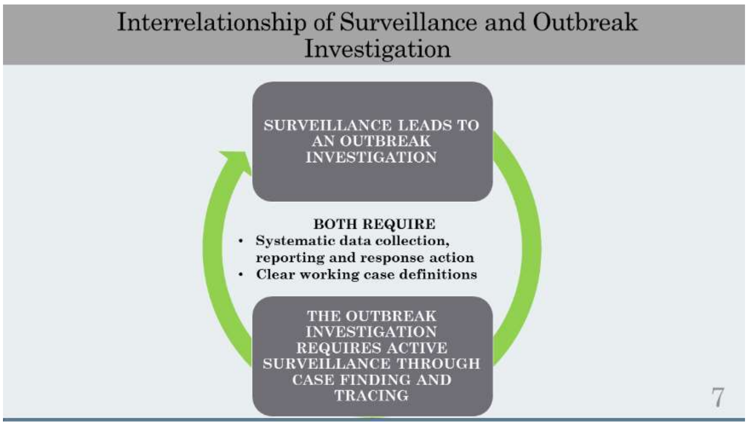
Reference: Google Images

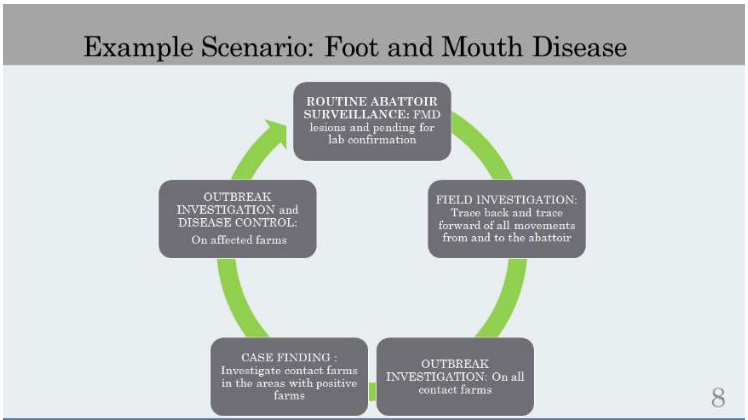
Who	What
Where	When

Reference:
U.S. CDC. Morbidity Mortality Weekly Reports, 2004.

5


SOPs for Outbreak Investigations
Describe the objectives of the outbreak investigation
Develop a case definition
Assist in developing and apply a useful questionnaire
Plan the data collection
Conduct outbreak investigations
Data entry
Data analyses
6

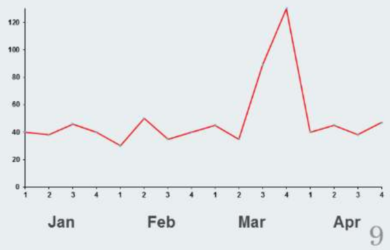

Interrelationship of Surveillance and Outbreak Investigation
SURVEILLANCE LEADS TO AN OUTBREAK INVESTIGATION
BOTH REQUIRE
• Systematic data collection, reporting and response action
• Clear working case definitions
THE OUTBREAK INVESTIGATION REQUIRES ACTIVE SURVEILLANCE THROUGH CASE FINDING AND TRACING
7


Example Scenario: Foot and Mouth Disease
ROUTINE ABATTOIR SURVEILLANCE: FMD lesions and pending for lab confirmation
FIELD INVESTIGATION: Trace back and trace forward of all movements from and to the abattoir
OUTBREAK INVESTIGATION: On all contact farms
CASE FINDING : Investigate contact farms in the areas with positive farms
OUTBREAK INVESTIGATION and DISEASE CONTROL: On affected farms
8

Examples: What Initiates an Outbreak Investigation?

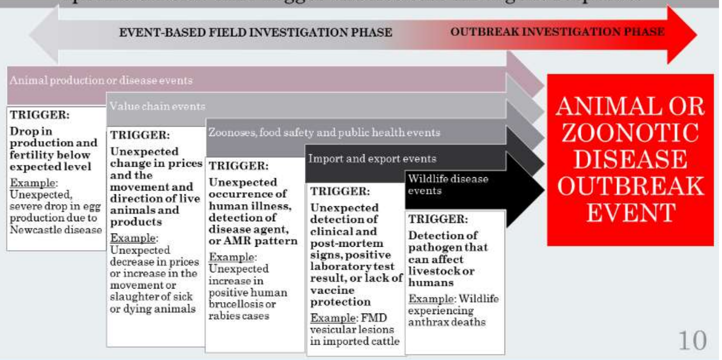
Photo: Standard media group Kenya

Cases of brucellosis in cattle in local area A by month reported, Jan - Apr 2018



9

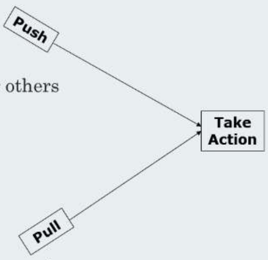
Field investigation can evolve into outbreak investigations based on specific criteria that trigger the need for an urgent response.



10

What Initiates an Outbreak Investigation?

- **Passive Reporting**
  - Most common
  - Rumors, media
  - Contact from farmers, owners, veterinarians or others
  - Laboratory
  - Political pressure
- **Active Reporting**
  - Existing disease surveillance programmes
  - Zero-reporting
    - Compulsory reporting on a regular interval which requires informants to report both positive and negative (zero) results



11

Steps of an Outbreak Investigation

(Adapted From: Mazet, UC Davis and Reingold, UCLA)

1. Verify the existence of an outbreak and the diagnosis
2. Establish working case definition(s)
3. Prepare for field work
4. Verify the diagnosis
5. Case finding and data collection
6. Describe the outbreak by Animal, Place, Time
7. Develop a hypotheses
8. Intensive follow-up including analytical studies to test the hypotheses
9. Conduct special studies (e.g. environmental, value chain)
10. Implement control measures
11. Communicate findings

12

STEP 1. Verify the Existence of an Outbreak and the Diagnosis

Reference: D. Castellan

Host
- History
- Clinical signs
- Pathology

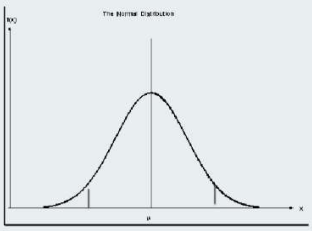
Threshold
- Production
- Morbidity
- Mortality

Diagnose Agent
- Screening test
- Gold standard test

13

1. Verify: Population Disease Thresholds

- Greater or less than "normal":
  - 2 standard deviations (SD) above or below 5-year mean value
- Production
  - Decrease in milk, meat, egg production
  - Decrease in feed and water intake
- Morbidity:
  - Daily, weekly, etc.
  - Village, farm – field data
- Mortality:
  - Daily, weekly, etc.
  - Village, farm – field data



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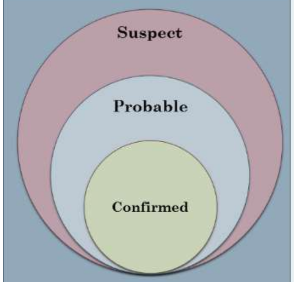
STEP 2. Establish Working Case Definition(s)



- **Classification (3-Tiers)**
  - Suspect case
  - Probable case
  - Confirmed case
- **Define Based on the Following Criteria:**
  - <u>Animals</u> at risk
  - <u>Place</u> of occurrence
  - <u>Time</u> of occurrence
  - <u>Unit of interest</u>
  - <u>Clinical signs</u>
  - <u>Lesions</u>
  - <u>Screening</u> and <u>Gold Standard Tests</u>
  - <u>Morbidity</u> & <u>Mortality</u>

15

STEP 3. Prepare for Field Work

- Local area profile information
- Resources and equipment
- Logistics
- Planning
  - Objective(s)
  - Essential data and specimens to collect
- Roles and responsibilities:
  - Epidemiologist
  - Laboratory diagnostician
  - Environmental specialist
  - Government ministries
  - Communications officer
  - Often, one person will play several roles
  - Others…

Reference: Castellan

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STEP 4. Verify the Diagnosis

- Field situation is compatible with the laboratory diagnosis
  -Proper interpretation of the case definition
- Submit additional samples to confirm
- Use an international reference laboratory for final confirmation
- Include molecular characterisation of field isolates e.g. FMD, AI

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When to Initiate Control Measures?

- An outbreak is an emergency…therefore apply control measures continuously from the first day onwards!
- Timely response can control and prevent further cases
- Must often take action with incomplete knowledge – but must take action!
- Is it a known agent?
- Review transmission routes daily
- Review spatial and temporal disease patterns daily
- Provide immediate recommendations to the farmer

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STEP 5. Case Finding and Data Collection

- **Active Case Finding – find it, don't miss it!**
  - Direct observation
  - Take samples
  - Tracing and following movement in and out of a population
  - Animals, people, equipment, etc.

Reference: Google Images

- **Systematic Data Collection**
  - Use a pretested Questionnaire
  - Develop a line listing of data collected

Reference: Regional FETPV

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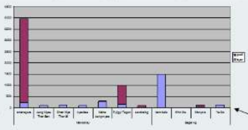
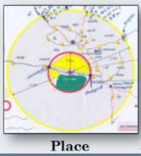
STEP 6. Describe the Outbreak (Tables, Maps, Timelines and Related Graphic Tools)

No.	Latitude	Longitude	No. Dairy Cattle	No. Sick Dairy Cattle	Lameness	Anorexia	Vesicle	Herd Vaccination	Local area	Onset
1	7.1598	20.9040	200	0	No	No	No	Yes	Northern	
2	6.9577	20.9851	46	0	No	No	No	Yes	Northern	
3	6.7556	21.0662	3	0	No	No	No	Yes	Northern	
4	6.5535	21.1473	11	0	No	No	No	No	Northern	
5	6.3514	21.2284	20	0	No	No	No	Yes	Northern	
6	6.1493	21.3095	11	0	No	No	No	No	Southern	
7	5.9472	21.3906	77	0	No	No	No	No	Southern	
8	5.7451	21.4717	10	0	No	No	No	Yes	Southern	
9	5.5430	21.5528	14	3	Yes	No	Yes	No	Southern	2-Jul-18
10	5.3409	21.6339	40	20	Yes	Yes	Yes	Yes	Southern	25-Jun-18

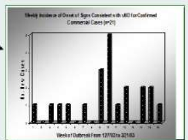


Animal



Place

References: Regional FETPV, Castellan, Frontline ISAVET



Time

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Descriptive epidemiology

- **What** events occurred:
  - Production, movement and molecular changes
- **Who** is involved (animals and humans): **Animal**
  - Individual animal/human
  - Herd
  - Flock
- **When** events occurred in time (critical time periods): **Time**
  - Onset of clinical signs
  - Movements – animals, people, equipment
  - Management changes
  - Contact with other farms, villages and markets

Essential Disease Investigation Data
Reference: Google Images

- **Where** events occurred including man-made and natural environments: **Place**

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STEP 7. Develop a Hypotheses from Data:

Hypothesis can be set to determine

- Source of pathogen
- Mode of transmission
- Factors related to the outbreak
  - Intrinsic factor i.e. age, sex, breed, health condition
  - Extrinsic factor i.e. humidity, temperature

May need to do further study such case-control study

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7. Develop a Hypotheses from Data:

(Example: Classical swine fever)

Herd Name	Location	% Morbidity		Disease Period	share boar	swill feed	trader	no vaccine
N	Dist. 4	**88**	(14/16)	April	1	0	1	1
A	Dist. 8	**7**	(1/14)	April	1	0	1	1
S	Dist. 4	**100**	(2/2)	May	1	0	0	1
W	Dist. 4	**88**	(14/16)	May	1	0	1	1
C	Dist. 4	**8**	(2/25)	May	1	0	1	0
Y-F (confirmed)	Dist.12	**8**	(5/66)	May	0	0	1	1
H *	Dist. 12	**3**	(3/84)	May	1	1	1	0
Ac	Dist. 8	**26**	(7/26)	May	1	0	1	1
So	Dist. 11	**18**	(11/60)	June	0	0	1	0
Su*	Dist. 4	**71**	(5/7)	July	1	0	1	1
Sop*	Dist. 8	**5**	(3/52)	July	0	0	1	1
					72.73%	9.09%	90.91%	72.73?

Reference: Regional FETPV

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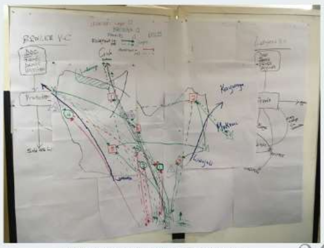
STEP 8. Conduct Intensive Follow-up Studies
STEP 9. Conduct Special Studies

- Follow-up Studies
  - Observational: cross-sectional studies or case-control studies are commonly done
- Special Studies
- Environmental
  - Wild birds, bats, water and feed
- Value Chain
  - Follow the flow into and out of each place
  - Price fluctuations



Reference: Frontline ISAVET

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STEP 10. Implement Control Measures

- Start immediately and apply continuously
- Risk communication is important
- Movement control
  - Zone <u>and</u> compartment-based
- Humane culling and disposal
- Surveillance
  - Aggressive case finding
  - Investigate value chain relationships
- Vaccination when appropriate

- Under-estimated
- Under-utilised

25

STEP 11. Report Findings

- **Methods**
  - <u>Informal</u>
    - Verbal report or briefings
    - Written briefings including recommendations
  - <u>Formal</u>
    - Publications
    - Presentations
    - After action review
- **Reasons to Report**

1. Share experience with others to improve surveillance and response systems
2. Advance our understanding of the disease

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Exercise 22: Outbreak Investigation

1. This exercise is a plenary panel discussion will take 90 minutes.
2. Following both presentations, a facilitator will guide a panel discussion directed at the following key points:
   a) Describe similarities and differences between animal health and public health outbreak investigations.
   b) Describe the strengths and weaknesses, opportunities and strengths (SWOT analysis) showing how animal health and public health agencies currently collaborate at the local level in your area.
   c) Propose follow up action you will take to support joint outbreak investigations when you return to your local area following Frontline ISAVET.

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In Summary…

- Every outbreak is unique
- Know the steps of an outbreak investigation
- Apply them flexibly
- Keep a wide perspective using a One Health approach through joint investigation with public health and wildlife health experts
- Share and report your findings with stakeholders

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ISAVET Contributing Universities

Partners

Contributors

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Lesson 16.2 – Apply the Steps of a Public Health Outbreak Investigation for Animal-Specific and Zoonotic Diseases

Estimated Lesson and Exercise Time	
Instructor Materials	ISAVET Lesson 16.2 Apply the Steps of a Public Health Outbreak Investigation for Animal-Specific Diseases.pptx
	ISAVET Lesson 16b Apply the Steps of a Public Health Outbreak Investigation for Animal-Specific Diseases Instructor Guide.doc
	Computer
	Microsoft Word
Participant Materials	ISAVET Lesson 16.2 Apply the Steps of a Public Health Outbreak Investigation for Animal-Specific Diseases Participant Guide.doc

Exercise 22 – Field Investigation and Response

Description of Exercise:

Identify key stakeholders who will need to be involved in an animal disease outbreak in your local area and at the national level. Should you have any questions, please ask a trainer for clarification.

Allotted Time: 90 minutes

Exercise Objective(s):

1. Describe the stakeholders in your local area and national level and the methods you will use to collaborate on an outbreak investigation for an animal disease event.

Exercise Components and Structure:

1. This exercise will take 90 minutes.
2. Form groups of equal size.
3. Complete the table provided to:
    a) list the local area level stakeholders;
    b) their roles and responsibilities; and
    c) how they coordinate their activities together to deal with an animal disease event in your local area and with the national level.
4. Groups will report their answers in plenary discussion.

Materials, Data or Information:

1. Computer
2. MS Word or MS PowerPoint
3. Pen or Pencil

Expected Outputs and Deliverables of Each Participant:

1. List of stakeholders.
2. Coordination mechanisms.

Coordination of Animal Disease Events at Local area and National Levels

Local area Stakeholders	Roles and Responsibilities of Local area Stakeholders	Coordination Mechanisms at Local area and National Levels

Case Study 2: Highly Pathogenic Avian Influenza

Case Study of an Outbreak Investigation: Highly Pathogenic Avian Influenza

Acknowledgements:

This scenario was originally developed by the Faculty of Veterinary Medicine, Kasetsart University and the Thailand Department of Livestock Development. The scenario for the outbreak investigation for this exercise is adapted from an outbreak situation in which only 3 households were involved. The names and places in the exercise are fictional and have been modified from their original version for teaching purposes. The views expressed in this exercise are solely those of the authors.

General Instructions:

This is a table-top outbreak investigation exercise that will take three hours to complete.

Audience: This case study is designed for Frontline In-service Applied Veterinary Epidemiology Training (ISAVET) trainees.

Level of Training: Basic level (frontline) training in epidemiology

Language: English and French

Prerequisites:

1. Enrollment in Frontline ISAVET, Week 2, Field and Outbreak Investigation.
2. Knowledge of avian influenza virus.
3. Skills in descriptive epidemiology to analyse animal-place-time components related to an outbreak investigation.

Time Required: Approximately 3 hours

Learning Objectives:

At the end of this case study, participants will follow the steps of an outbreak investigation and be able to:

1. Verify the existence of an outbreak and the diagnosis
2. Establish working case definition(s)
3. Prepare for field work
4. Verify the diagnosis
5. Case finding and data collection
6. Describe the outbreak by Animal, Place, Time
    a. Develop an epidemic curve
    b. Calculate the impact of disease – morbidity and mortality
7. Develop a hypotheses for risk factors
8. Suggest follow-up studies including analytical studies to test the hypotheses
9. Implement control measures

Part I - Background

Highly pathogenic avian influenza (HPAI) subtype H5N1 is an infectious disease which can cause high mortality rates in poultry and restricts international trade in poultry products. Outbreaks of HPAI were first reported in Africa in February 2006. The disease has been classified as a notifiable disease under national health law. Passive and active surveillance systems are in place along with control and preventive measures that include cleaning and disinfection, education, farm bio-security, compartmentalization, movement control, fighting cock identification, stamping out and compensation.

Scenario – Outbreak Investigation of Avian Influenza

Place: Village 1, Crater Subdistrict, Volcano District, Island Region

On 28 October 2010, the Volcano District Livestock Office was informed by a local livestock health inspector of high mortality from an unknown cause in poultry in Village 1, Crater subdistrict, Volcano district, Island region. The inspector asked about the symptoms the birds exhibited before they died and the owner (Mr. A) reported that the affected chickens were depressed with torticollis and had swollen heads, cyanotic wattles and combs, and respiratory dyspnea. There was also some morbidity and mortality in chickens near to Mr. A's house. The District Livestock Office therefore informed the Regional Livestock Office of the event.

Question 4.1a: In the aforementioned scenario, are Regional or National Veterinary Officers required to investigate this report of disease?

A. Yes
B. No
C. Not sure

Answer:

Question 4.1b: Is this an outbreak? Please provide any reasons to support your selection.

Answer:

Question 4.2: The district livestock officer collected and sent samples to the laboratory. It will take 24 hours before confirmatory results are available using RT-PCR. Poultry mortality was not limited in only one household and seemed to have spread. This disease event needs to be investigated, What would not be a priority objective of the disease investigation?

A. Search for the cause of the disease outbreak.
B. Identify the magnitude of outbreak.
C. Perform disease control measures to stop any spread of the disease.
D. Set up protocols for prevention of future outbreaks.

Answer:

Next, the investigator needs to specify what the ‘case definition’ is. In order to do that, the officer must go to the outbreak area to examine affected animals and collect the epidemiological information that helps to characterise this particular disease event.

Preliminary findings in the affected area:

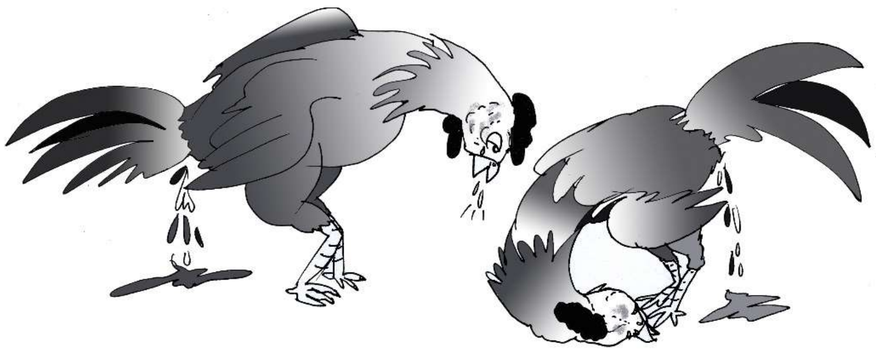
The affected area is in Village 1, Crater subdistrict, Volcano district, Island region. The villagers were predominantly crop farmers and their houses were scattered throughout the village. The poultry were mainly backyard chickens. Within a radius of 3 km from the notified case. There were 50 households with poultry, having a total of 800 chickens. The notified case was in Mr. A’s property which is 16,000 m^2 in area. Mr. A. had forty (40) backyard chickens and six (6) beef cattle. He had no activities related to cock fighting and he had not gone to the cock fighting arena. On 27 October 2017, he observed that four (4) chickens died from an unknown cause and that egg production was reduced. On 28 October 2017, there were 11 more deaths and all of the 11 dead chickens had swollen heads and cyanotic wattles and combs. Mr. A, therefore promptly notified the district veterinary officer on the same day. After the investigation team entered the affected area, they also found dead chickens at Mr. D’s house. Of 10 mature chickens, five (5) showed dyspnoea, lacrimation and swollen faces prior to their death. Some also has petechia on their shanks. Two chicks are still healthy with no signs of disease.

__Question 4.3a:__ From the information provided, what is your preliminary “case definition”?

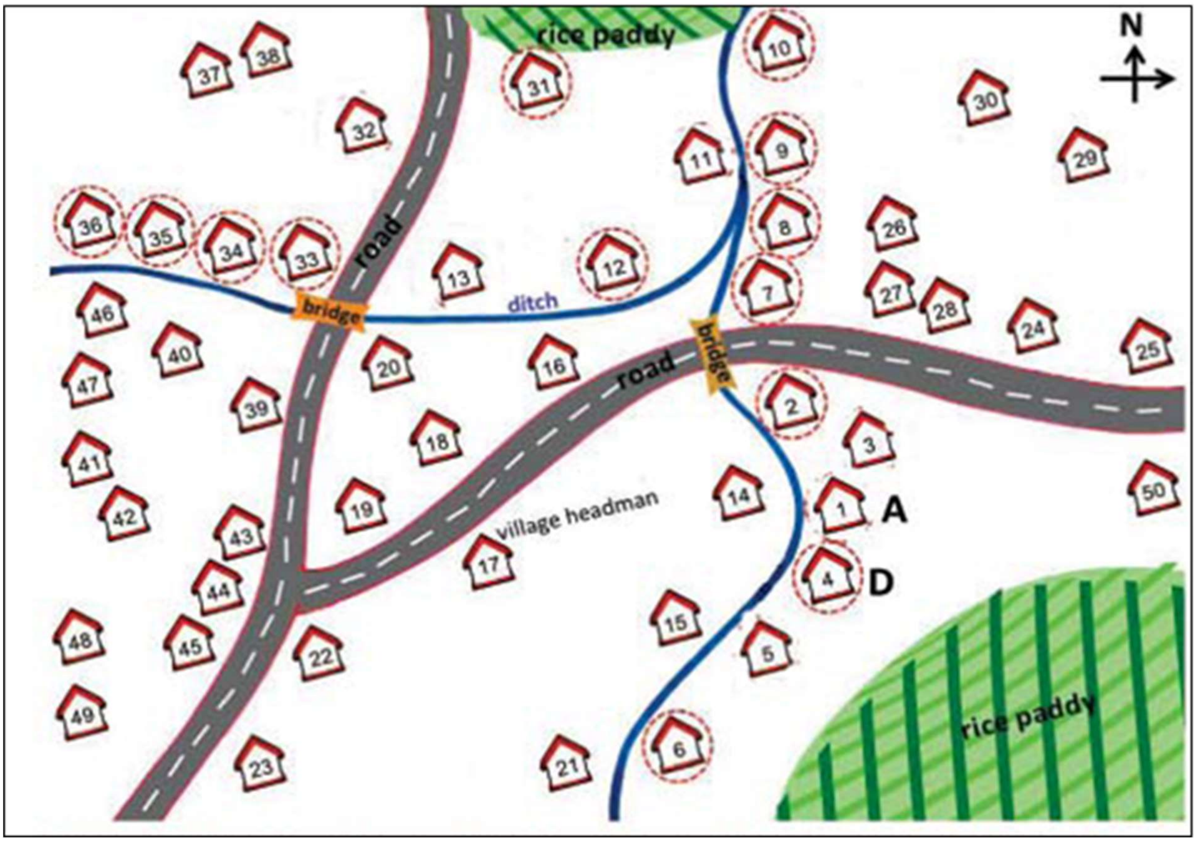
Answer:

__*Question 4.3b:*__ What poultry diseases are among your primary differential diagnoses?

Answer:



Before entering the affected area to investigate, you are called from the neighbouring district to assist. You want to get the history of recent poultry disease events and the district livestock officer from the Volcano District provided you with a map. The local livestock health care volunteer has also circled the locations of places on the map, where the cases were preliminarily reported.



Question 4.4: You want to collate the information about the outbreak that is set out on the disease investigation forms for individual households. You need to do this to obtain a better understanding of the epidemiology of the outbreak. What information do you need to collect from poultry owner?

Answer:

-

You have decided to visit all households in the affected area and investigation team was divided into 3 small sub-teams (A, B and C) after taking the clusters and locations of cases in the area into consideration.

Team A investigated the area that included house numbers 1 to 13. Team B was allocated house numbers 14 to 36, and Team C house numbers 37 to 49. The teams were instructed to enter only uninfected farms first to avoid contact with the virus and further spread.

The assumption is made from the first data collected that the incubation period is 3 days.

House No.	House Name	No. Poultry at Risk	No. Adults	No. Chicks	Respiratory symptoms	Neurological symptoms	Gastroenteric symptoms	No. sick observed	No. dead observed	Date of Onset of Clinical Signs
1	A	40	30	10	11	0	0	11	15	27/10/2010
2	B	20	10	10	0	0	5	5	5	26/10/2010
3	C	38	20	18	0	20	0	15	20	25/10/2010
4	D	12	10	2	5	0	0	0	10	28/10/2010
5	E	18	10	8	8	0	0	8	8	27/10/2010
6	F	12	12	0	6	0	6	0	12	28/10/2010
7	G	16	8	8	8	4	0	0	16	26/10/2010
8	H	22	12	10	0	10	0	10	10	19/10/2010
9	I	17	10	7	0	4	0	4	10	18/10/2010
10	J	10	2	8	2	0	0	0	10	17/10/2010
11	K	10	2	8	2	4	4	0	10	18/10/2010
12	L	16	8	8	8	4	0	0	16	18/10/2010
13	M	18	10	8	6	0	0	6	10	19/10/2010
31	EE	40	35	5	15	5	5	15	25	24/10/2010
32	FF	14	10	4	6	0	0	6	8	27/10/2010
33	GG	15	10	5	8	7	0	0	15	24/10/2010
34	HH	16	10	6	5	0	5	0	16	25/10/2010
35	II	15	5	10	5	0	0	5	5	28/10/2010
36	JJ	10	8	2	2	2	0	2	8	27/10/2010

Question 4.5: An epidemic curve can be constructed at an early stage of the investigation and before laboratory confirmation. Please draw an epidemic curve using the data presented in the previous Table (Provide graph-drawing paper) and please interpret this epidemic curve. Correct X-axis interval: 1/3 of average incubation period (assume the incubation period is 3 days).

Answer:

Question 4.6a: Calculate the total mortality rate for all affected houses for all chickens and chicks. Is the total mortality rate above the expected threshold of 5%?

Answer:

Investigations carried out within a radius of 3 km from the notified case found that there had been deaths of chickens at Mr. B's house. The house was located 300 meters away from Mr. A's house. Mr. B had 20 backyard chickens and had a retail restaurant business which involved cooking and food sales. There was a small ditch alongside his house and a pond behind. On 26 October 2010, 5 chickens with symptoms of white colored diarrhoea had died. Mr. B buried these dead chickens and did not notify the veterinary authorities.

The investigation team found that Mr. A (house number 1) usually visited the village shop belonging to Mr. B (house number 2), who had experienced chicken deaths in this backyard poultry. Mr. B told the investigation team that Mrs. EE (house number 31) had visited his shop to buy live chickens for slaughter one month before the death of Mr. B's chickens. He also reported that there had been some wild birds behind his house and that a flock of free-grazing ducks passed by the front of his house one week ago.

We decided that if we want to find the origin and cause of the outbreak we should start by investigating the first point of the outbreak, which was in Ms. J's house (House number 10). Ms. J was visited at her house and it was noticed that her house was located close to a 2 meter-wide ditch. The water passed through other neighbouring villages before going past her house. The rate at which the water flowed was rather strong through the outbreak village despite it being reduced after passing through a bifurcation. All villagers used the water from this ditch for their agricultural activities.

Ms. J did not know where her father worked. In the weekend, her father sometimes went to the cock fighting arena but he did not own any fighting cocks.

Before this outbreak, Ms. J's house had 10 backyard chickens and 2 of them showed dyspnea on 17 October 2010, and finally died. Other chickens died suddenly. The weather was rather cool at the time the chickens were affected and Ms. J disposed of all the dead chickens by throwing them into the ditch immediately after they died.

Mrs. H's house (House No. 8) used to have a flock of 1,000 free-grazing ducks which were kept for 6 months until they were sold on 21 October 2010. The ducks were apparently healthy and did not show any signs of illness or abnormalities. Because the ducks had been sold, it was not possible to test them for avian influenza related to the outbreak at Ms. J's house.

<u>Question 4.6b:</u> From the data in the Table, which would be the first household you should visit to collect some more information?

A. A's house
B. D's house
C. EE's house
D. J's house

Please provide an explanation to support your selection.

Answer:

<u>Question 4.7:</u> Please describe the outbreak in terms of animal, place and time, in words with supportive evidence. Are there any value chain components to this outbreak?

What is your hypothesis or theory about what the risk factors for this outbreak should be assessed further?

What control measure should be put into place?

	Description	Supportive Evidence and Data
Animal		
Place		
Time		
Value Chain		

Answer:

	Description	Supportive Evidence and Data

•

__Question 4.8__: From the descriptive information provided below, please __calculate the proportion of each risk factors among the HPAI confirmed positive case homes and__ summarize some possible risk factors for this outbreak.

House No.	Name	No. Poultry	Adult	Chick	Proximity to Road	Proximity to Ditch	Cock Fighting	New Introduction	Free Ducks Passing By
1	A	40	30	10	0	1	0	1	1
2	B	20	10	10	1	1	0	0	1
3	C	38	20	18	1	1	0	0	0
4	D	12	10	2	0	1	0	0	1
5	E	18	10	8	0	1	1	0	1
6	F	12	12	0	0	1	1	0	1
7	G	16	8	8	1	1	0	0	1
8	H	22	12	10	0	1	0	0	1
9	I	17	10	7	0	1	0	0	0
10	J	10	2	8	0	1	1	1	0
11	K	10	2	8	0	1	1	0	0
12	L	16	8	8	0	1	1	0	0
13	M	18	10	8	1	1	0	0	0
31	EE	40	35	5	0	0	1	0	0
32	FF	14	10	4	1	0	0	1	0
33	GG	15	10	5	1	1	1	0	0
34	HH	16	10	6	0	1	0	0	0
35	II	15	5	10	0	1	1	0	0
36	JJ	10	8	2	0	1	0	0	0
Proportion									

Answers:

Results from the laboratory were sent back on 5 November 2010. Intestinal parasites were reported and E. coli was cultured from liver samples.

On the same day, avian influenza (H5) was confirmed by real-time PCR and by egg inoculation. The virus sequences were similar to those for the virus reported in two neighbouring provinces two years before and which had high virulence for chickens.

We have decided that a cross-sectional study would be the most appropriate study design to identify associations between possible (hypothetical) risk factors and occurrence of cases of disease caused by HPAI H5 virus in household poultry.

Crude Odds Ratios with 95% confident intervals were calculated to evaluate possible risk factors for this outbreak. Note that positive cases are more likely to be located near to the drainage ditch than negative, non-affected homes in Village 1.

Factors		Cases	Not Affected	Odds Ratios	95% CI
Proximity to road	Present	6	16	O.43	0.13 - 1.4
	Not present	13	15		
Proximity to ditch	Present	17	6	35.41	6.4-196.8
	Not present	2	25		
Having fighting cock activities (include entering fighting cock arena)	Present	8	9	1.77	0.54 – 5.9
	Not present	11	22		
Introduction of new poultry	Present	3	4	1.27	0.25 – 6.4
	Not present	16	27		
Having free grazing duck walking nearby the house	Present	7	9	1.36	0.4 – 4.6
	Not present	12	21		

<u>Question 4.10</u>: Are there any special studies that you would like to do to confirm the descriptive and analytic result?

Answer:

1.

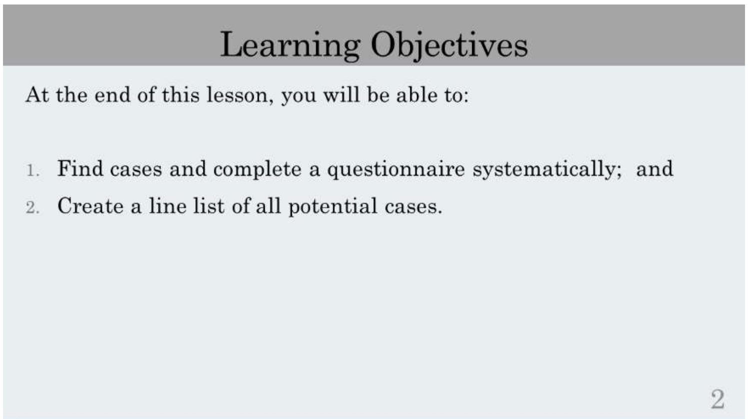
<u>Question 4.11:</u> What would be your recommendation to prevent and control the outbreak regarding to you descriptive and analytic results?

Answer:

-

Lesson 17.1 – Managing Outbreak Investigation Data: Collect Data and Create a Line Listing

Estimated Lesson and Exercise Time	1 hour and 15 minutes
Participant Materials	Frontline ISAVET Lesson 17.1 Managing Outbreak and Investigation Data: Collect Data and Create a Line Listing Participant Guide.PDF MS Excel Training Videos, on creating a line list (3.1, 3.2), and outbreak histogram (13.1, and 13.2).
	Computer and Microsoft Word
	Pen or Pencil



Data Collection and Recording During an Outbreak

Collect high quality data at all stages of the outbreak investigation

Data Sources:

- Farm observations and records
- Outbreak investigation forms
- Laboratory forms
- Community information
- Existing data
  - Passive and active surveillance data
  - Value chain data

Data Recording:

- Manual
- Electronic capture of data
  - Fit-for-purpose
  - Spreadsheet format

3

Outbreak Scenario: Classical Swine Fever (CSF)

April 15, 2018

- Sudden deaths, abortions, stillbirths, mummification in pigs on index farm in Luwero local area begins
- Symptoms: fever, anorexia, conjunctivitis, skin cyanosis, diarrhea, nervous system tremors

May 16, 2018

- Suspected deaths due to CSF reported by farmer at index farm in Luwero local area, Uganda
- Samples submitted to laboratory

May 20, 2018

- CSF confirmed by RT-PCR at national laboratory
- Initiate planning for outbreak investigation

May 25 – July 28, 2018

- Field investigation initiated
- Objectives:
  1. Confirm this is an outbreak
  2. Determine the extent and magnitude of the outbreak
- Plan:
  1. Design a questionnaire
  2. Conduct case finding and data collection

4

Case Finding

- **Develop and follow the <u>suspect case definition</u> :**
  - **Unit of Interest:** Pig Herd
  - **Animal:** Pig herd from commercial and backyard experiencing:
    - Sudden death OR
    - Abortion, stillbirth, mummification OR
    - At least 4 of the following clinical signs: fever, anorexia, conjunctivitis, skin cyanosis, diarrhea, nervous system tremors
  - **Place:** Luwero local area, Uganda
  - **Time:** April 15 – July 28, 2018
- **A <u>confirmed case of CSF</u>**
  - A suspect case that is confirmed by RT-PCR
- **Initiate Active Case Finding** – find it using the suspect case definition, **don't miss it!**

Reference: Google Images

Reference: Frontline ISAVET

5

Create a Standardised Questionnaire

- Need to have access to standard questionnaire form appropriate for the
- objectives of the investigation
- Generally forms should be available at the local area level
- Questionnaires can be modified with the input of an epidemiologist to meet the objectives of the investigation

Develop data collection tools

Create sections of an outbreak investigation form:

1. Background information on the farm/village/abattoir
2. Management and demographics
3. Potential risk factors
4. Beta (pre-) test the questionnaire before using it (if it is new)

6

Data Collection and Recording During an Outbreak Investigation

- Use your direct observations
- Take samples
- Tracing and following movement in and out of a population
- Consider movement of animals, people, equipment, etc.
- Use a pretested Questionnaire
- Collect data systematically and in a standardised way for every location
- Develop a line listing of data collected

Reference: Google Images

Location	No. Sick	Total No.	% Morbidity	Disease Period	Share boar	Swill feed
Dist. 4	14	16	88%	April	1	0
Dist. 8	1	14	7%	April	1	0
Dist. 4	2	2	100%	May	1	0
Dist. 4	14	16	88%	May	1	0
Dist. 4	2	25	8%	May	1	0
Dist.12	5	66	8%	May	0	0
Dist. 12	3	84	4%	May	1	1
Dist. 8	7	26	27%	May	1	0
Dist. 11	11	60	18%	June	0	0
Dist. 4	5	7	71%	July	1	0
Dist. 8	3	52	6%	July	0	0

Reference: Frontline ISAVET

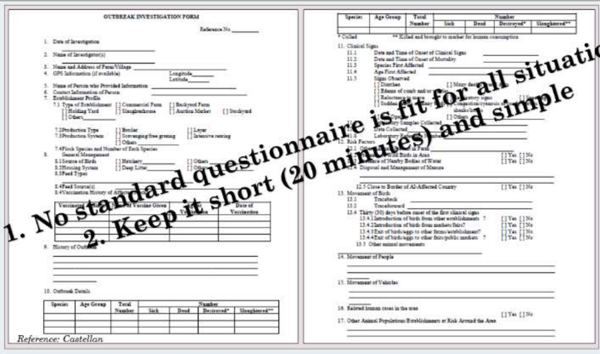
7

How to Administer the Questionnaire (Refer to SOP for Conducting Surveys and KAP Studies)

- Introduce yourself to the owner and explain the purpose of your visit
- Make sure you are interviewing the person who manages the animals
- Ask some general questions about the owner's disease concerns
- Stand or sit at the same level as the person you are interviewing and listen
- Deliver each question in the same way for each interview
- End by asking the owner if he/she has any questions, concerns or requests

8

Example Questionnaire



Reference: Castellan

9

Create a Line List By Hand

- Refer to YouTube Training Video 3.1
- Enter the variable names in order across the top row of a paper form.

Herd Name	Location	% Morbidity	Disease Period	share boar	swill feed	trader	no vaccine

- Variables collected on each location include: Herd name, location, % morbidity, disease period, sharing a boar, swill feeding, visits from traders and use of CSF vaccine
- You will enter selected data from the questionnaires used in your interviews under the titles and then input the data into Excel or share this data with the national epidemiologist

10

Create a Line List Using Excel

1. Refer to YouTube Training Video 3.2
2. Open and a blank spreadsheet in MS Excel and save with the file name: "Outbreak"
3. On the first tab (at the bottom) create a data dictionary using including each variable in the questionnaire:
   - Farm reference number
   - Location – Latitude and longitude
   - Etc.
4. Name the tab (right click > rename) "Dictionary"
5. Start a new spreadsheet and rename "Data"
6. Enter the variable names in order across the first row of the "Data spreadsheet"
7. You will enter selected data from the questionnaires used in your interviews into the "Data" spreadsheet and then merge the data with your colleagues

11

The Uses of a Line List

- To tabulate preliminary information on cases, such as demographic information, test results and exposure risks
- To rapidly summarise the outbreak in terms of animal, place and time
  - Example: The spatial and temporal distribution of affected pig farms in Luwero local area
- To determine further refine symptoms and other parameters of the case definition over time
  - Example: More precise symptoms based on frequency of occurrence
- As the investigation progresses, the line listing is the basis for analysis of the outbreak data
  - Example: Create an outbreak histogram in time

12

Example : Classical Swine Fever Line Listing

Herd Name	Location	% Morbidity	Disease Period	share boar	swill feed	trader	no vaccine
N	SDist. 4	**88** (14/16)	April	1	0	1	1
A	SDist. 8	**7** (1/14)	April	1	0	1	1
S	SDist. 4	**100** (2/2)	May	1	0	0	1
W	SDist. 4	**88** (14/16)	May	1	0	1	1
C	SDist. 4	**8** (2/25)	May	1	0	1	0
Y-F (confirmed)	SDist.12	**8** (5/66)	May	0	0	1	1
H *	SDist. 12	**3** (3/84)	May	1	1	1	0
Ac	SDist. 8	**26** (7/26)	May	1	0	1	1
So	SDist. 11	**18** (11/60)	June	0	0	1	0
Su*	SDist. 4	**71** (5/7)	July	1	0	1	1
Sop*	SDist. 8	**5** (3/52)	July	0	0	1	1
Percentage				**72.73%**	**9.09%**	**90.91%**	**72.73%**

Reference: Regional FETPV

13

Exercise 23a: Collect and Enter Data in a Line List

- Exercise 23a: 30 minutes
  - Each of you should have a questionnaire, work in pairs take turns asking questions to each other.
  - Using the data you will create a line listing generate, organise the data, assess for quality, perform calculations, display and interpret findings of the data.

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Exercise 23a – Collect and Enter Data in a Line List

Description of Exercise:
A questionnaire will be provided for individuals to role-play the field investigator and the farmer. Information gleaned will be used to develop a frequency histogram in MS. Excel. Should you have any questions over the exercise, please ask a trainer for clarification before during, and after the exercise.

Allotted Time: 30 minutes

Organisation of Group Work:
This exercise will be done independently.

Exercise Objective(s):
1. Each person will receive a questionnaire to fill in asking questions of a classmate from the villagers.
2. Develop a line listing in MS Excel. **Exercise Components and Structure:**
3. Questionnaire

MS Excel Training Videos, on creating a line list (3.1, 3.2),

Materials, Data or Information:
- MS Excel

Expected Outputs and Deliverables of Each Participant:

- Experience collecting data.
- Line listing.

OUTBREAK INVESTIGATION FORM

Farm Reference No.__________

1. Date of Investigation ____________________________________
2. Name of Investigator(s) ____________________________________
3. Name and Address of Farm/Village ____________________________________
4. GPS Information (if available)
   a. Latitude ________
   b. Longitude________
5. Name of Person who Provided Information ______________________________
6. Contact Information of Person __________________________________
7. Establishment Profile
   1.1 Type of Establishment
      [ ] Commercial Farm
      [ ] Backyard Farm
      [ ] Holding Yard
      [ ] Slaughterhouse
      [ ] Auction Market
      [ ] Stockyard
      [ ] Others____________
   1.2 Production Type
      [ ] Broiler
      [ ] Layer
   1.3 Production System
      [ ] Scavenging/free grazing
      [ ] Intensive rearing
      [ ] Others ________________
   7.4 Flock Species and Number of Each Species
8. General Management
   8.1 Source of Birds
      [ ] Hatchery____________
      [ ] Others __________
   8.2 Housing System
      [ ] Deep Litter___________
      [ ] Slatted ________________
   8.3 Feed Types ____
   8.4 Feed Source(s) ____
   8.4 Vaccination History of Affected Flocks

Vaccinated Against:	Name of Vaccine Given	Age at Vaccination	Date of Vaccination

9. History of Outbreak

____
____
____
____

10. Outbreak Details

Production Type	**Age (weeks)**	**Total Number**	**Number**			
			Morbidity	**Mortality**	Destroyed*	Slaughtered**
Meat						
Eggs						
Dual						

* Culled ** Killed and brought to market for human consumption

11. Clinical Signs

11.1 Date of Onset of Clinical Signs ____________________
11.2 Date of Onset of Mortality ____________________
11.3 Species First Affected ______________________________
11.4 Age First Affected ______________________________
11.5 Signs Observed
[ ] Diarrhea
[ ] Many deaths over 3 days
[ ] Edema of comb and/or wattles
[ ] Reluctance to move
[ ] Respiratory signs
[ ] Sneezing
[ ] Sudden deaths of many birds
[ ] Congestion/cyanosis of comb, wattles or shanks/hocks
[ ] Eye Opacity
[ ] Others ______________________
11.6 Laboratory Samples Collected________________________________
11.7 Date Collected________________________________
11.8 Laboratory Reference Number ________________________________

12. Risk Factors
12.1 Other Animals Present in Farm ________________________________
12.2 Presence of Wild Birds in Area [ ] Yes [ ] No

12.3 Presence of Nearby Bodies of Water [ ] Yes [ ] No

12.4 Disposal and Management of Manure

____

____

12.5 Close to Border of AI-Affected Country [ ] Yes [ ] No

13. Movement of Birds

13.1 Traceback ______________________________

13.2 Traceforward ______________________________

13.4 Thirty (30) days before onset of the first clinical signs

13.4.1 Introduction of birds from other establishments? [ ] Yes [ ] No

13.4.2 Introduction of birds from markets/fairs? [ ] Yes [ ] No

13.4.3 Exit of birds/eggs to other farms/establishment? [ ] Yes [ ] No

13.4.4 Exit of birds/eggs to other fairs/public markets? [ ] Yes [ ] No

13.5 Other animal movements ______________________________

14. Movement of People

____

____

15. Movement of Vehicles

____

____

16. Related human cases in the area [ ] Yes [ ] No

17. Other Animal Populations/Establishments at Risk Around the Area

____

____

18. Additional Observations/Comments Other than Indicated

____

____

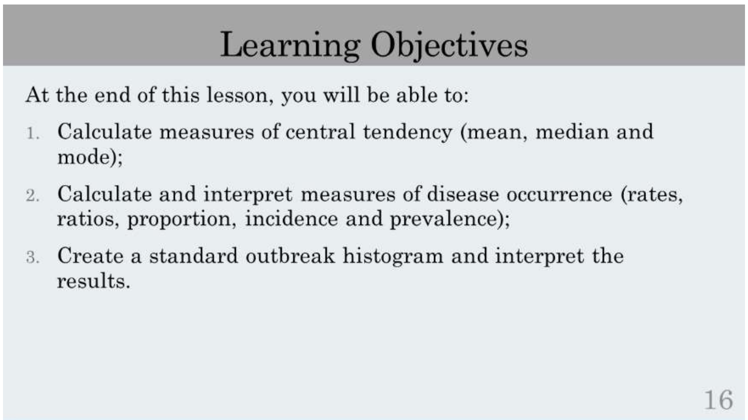
____

17. Map and Photos of the Area

Signature of Investigator: ______________________________

Lesson 17.2 – Managing Outbreak Investigation Data

Estimated Lesson and Exercise Time	1 hour
Participant Materials	Frontline ISAVET Lesson 17.2 Managing Outbreak and Investigation Data Participant Guide.PDF MS Excel Training Videos, on creating a line list (3.1, 3.2), and outbreak histogram (13.1, and 13.2).
	Computer and Microsoft Word
	Pen or Pencil



Identify Animal-Place-Time Data

Herd Name	Location	% Morbidity	Disease Period	share boar	swill feed	trader	no vaccine
N	SDist. 4	**88** (14/16)	April	1	0	1	1
A	SDist. 8	**7** (1/14)	April	1	0	1	1
S	SDist. 4	**100** (2/2)	May	1	0	0	1
W	SDist. 4	**88** (14/16)	May	1	0	1	1
C	SDist. 4	**8** (2/25)	May	1	0	1	0
Y-F (confirmed)	SDist.12	**8** (5/66)	May	0	0	1	1
H *	SDist. 12	**3** (3/84)	May	1	1	1	0
Ac	SDist. 8	**26** (7/26)	May	1	0	1	1
So	SDist. 11	**18** (11/60)	June	0	0	1	0
Su*	SDist. 4	**71** (5/7)	July	1	0	1	1
Sop*	SDist. 8	**5** (3/52)	July	0	0	1	1
Percentage		(67/368)		**72.73%**	**9.09%**	**90.91%**	**72.73%**

Reference: Regional FETPV

17

Measures of Central Tendency: By Hand

- Mean, Median, Mode, Range, Minimum, Maximum, Sum, Count

Statistic	Calculation	Morbidity
Mean	67 / 11	6.09
Standard Error	$\sqrt{\frac{1}{(n-2)}\left[\sum(y-\bar{y})^2-\frac{\left[\sum(x-\bar{x})(y-\bar{y})\right]^2}{\sum(x-\bar{x})^2}\right]}$	1.45
Median	Middle value of the 11 values is 5	5
Mode	Most common value is 14	14
Standard Deviation	$s=\sqrt{\frac{\sum(x_i-\bar{x})^2}{n-1}}$	4.81
Range	Lowest – Highest Values	13
Minimum	Lowest Value	1
Maximum	Highest Value	14
Sum	Add all Values	67
Count	No. of values	11

Reference Source for Equations: MS Excel Help Function

18

Measures of Central Tendency: Excel

- Refer to YouTube Training Video 5 for instructions
- Mean, Median, Mode, Range, Minimum, Maximum, Sum, Count

Statistic	Morbidity
Mean	6.09
Standard Error	1.45
Median	5.00
Mode	14.00
Standard Deviation	4.81
Range	13
Minimum	1
Maximum	14
Sum	67
Count	11

19

Measures of Disease Frequency: Ratio

share boar	swill feed	trader
1	0	1
1	0	1
1	0	0
1	0	1
1	0	1
0	0	1
1	1	1
1	0	1
0	0	1
1	0	1
0	0	1
8	**1**	**10**

Counts

Comparison Among Suspected Farms	Ratio
Share boar: Swill Feed	8:1
Share boar: Trader	0.8

20

Measures of Disease Frequency: Proportion (Risk)

	RISK FACTORS			
	share boar	swill feed	trader	no vaccine
Sum	8	1	10	8
Total Count	11	11	11	11
% Risk	**72.73%**	**9.09%**	**90.91%**	**72.73%**

21

Note that 46% of the 11 suspect and confirmed cases of CSF occurred in Sublocal area 4

Location
SDist. 4
SDist. 8
SDist. 4
SDist. 4
SDist. 4
SDist.12
SDist. 12
SDist. 8
SDist. 11
SDist. 4
SDist. 8

FREQUENCY DISTRIBUTION		
Location	Frequency	Risk (%)
SDist. 4	5	5/11 = **46%**
SDist. 8	3	3/11 = **27%**
SDist. 11	1	1/11 = **9%**
SDist. 12	2	2/11 = **18%**

22

Cumulative Incidence Risk: (Approximate Method)

- In real terms the risk per 1,000 pigs is 0.18 x 1000 = 180 cases per 1,000 pigs during this time period
- **Conclusion: 67 / 368 pigs at risk = 0.18 cumulative incident risk occurred between April 15 and July 31, 2018.**

Cumulative Incidence Risk		
Herd Name	**No. Sick**	**Total No.**
N	14	16
A	1	14
S	2	2
W	14	16
C	2	25
Y-F (confirmed)	5	66
H *	3	84
Ac	7	26
So	11	60
Su*	5	7
Sop*	3	52
Total Affected	**67**	**368**
Cumulative Incidence Risk	**0.18 cases**	

23

Measuring Disease Period Prevalence

- **NOTE: The denominator is reset at the beginning of each month based on the number of healthy pigs that remain.**

Animal Level Period Prevalence			
Time Period	**No. Sick**	**Population at Risk**	**Period Prevalence**
April	15	368	15/368 = **4%**
May	33	353 (368-15)	33/353 = **9%**
June	11	320 (353-33)	11/320 = **3%**
July	8	309 (320-11)	8/309 = **3%**
Total	**67**	**339**	**20%** **(67/339)**

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Crude Morbidity, Crude Mortality and Case Fatality Risk

% Morbidity	
88	(14/16)
7	(1/14)
100	(2/2)
88	(14/16)
8	(2/25)
8	(5/66)
3	(3/84)
26	(7/26)
18	(11/60)
71	(5/7)
5	(3/52)
(67/368)	

- **NOTE: No mortality was reported by farmers that were interviewed**
- **Crude morbidity risk** = # sick / total population at risk

  = 67 / 368 = 18%

- **Crude mortality risk** = # dead / total population at risk

  = 0 / 368 = 0%

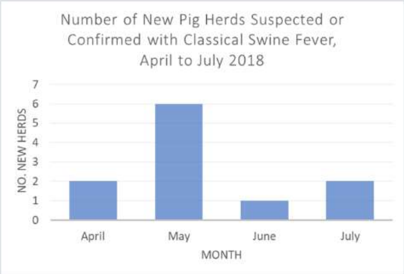
- **Case fatality risk** = # dead / # sick

  = 0 / 67 = 0%

25

Describe Disease Occurrence Over Time

- **Create an outbreak histogram**
- Plot as frequency histogram
- y-axis = number of cases in population (animal/farm) in population
- x-axis time of clinical sign observed/death
- Ideal interval of x-axis 1/4-1/3 of incubation period
  - Hours (food poisoning)
  - Days (influenza)
  - Months (rabies)



Reference: Regional FETPV

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Exercise 23b: Outbreak histogram, Measures of central tendency and disease occurrence.

- Exercise 23b: 60 minutes
- With the data provided, create an outbreak histogram, calculate measures of central tendency and measures of disease occurrence.

27

In Summary…you have learned

- Questionnaires are flexible tools to undertake investigations on a wide range of topics
- How to create
  - a line list of all potential cases using Excel or by hand
- Calculate
  - measures of central tendency (mean, median and mode);
  - and interpret measures of disease occurrence (rates, ratios, proportion, incidence and prevalence);
- To create a standard outbreak histogram and interpret the results.

28


ISAVET Contributing Universities
Partners
TEXAS A&M UNIVERSITY
TEXAS A&M AGRILIFE
Contributors
MAKERERE UNIVERSITY
E.I.S.M.V. DE DAKAR
29

Exercise 23 – Outbreak Histograms

Description of Exercise:

A questionnaire will be provided for individuals to role-play the field investigator and the farmer. Information gleaned will be used to develop a frequency histogram in MS. Excel. Should you have any questions over the exercise, please ask a trainer for clarification before during, and after the exercise.

Allotted Time: 1 hour

Organisation of Group Work:

This exercise will be done independently.

Exercise Objective(s):

1. Each person will receive a questionnaire to fill in asking questions of a classmate from the villagers.
2. Using the data provided, organise the data, assess for quality, perform calculations, display and interpret findings of the data.
3. Include: line listing, an outbreak histogram, measures of central tendency and measures of central tendency and measures of disease occurrence.

Exercise Components and Structure:

1. Questionnaire
2. MS Excel Training Videos, on creating a line list (3.1, 3.2), and outbreak histogram (13.1, and 13.2).
3. Development of a frequency histogram

Materials, Data or Information:

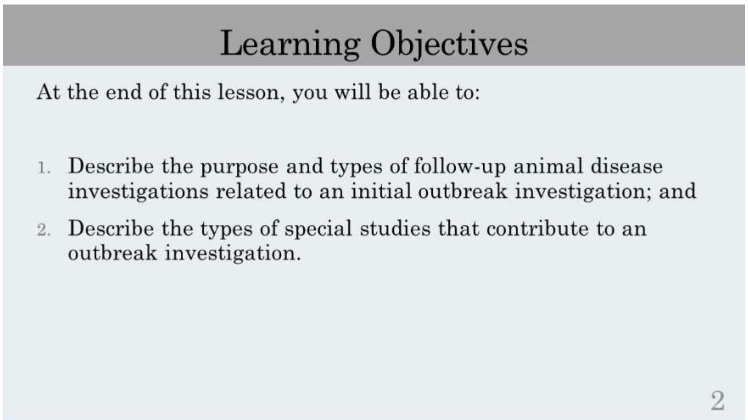
1. MS Excel

Expected Outputs and Deliverables of Each Participant:

1. Experience collecting data.
2. Line listing, an outbreak histogram, measures of disease occurrence.

Lesson 18 – Follow-up Investigations and Special Studies

Estimated Lesson and Exercise Time	1 hour and 30 minutes
Participant Materials	Frontline ISAVET Lesson 18 Follow-up Investigations and Special Studies Participant Guide Version 4.doc
	Computer and Microsoft Word
	Pen or Pencil



Purpose of Follow-Up Investigations

What is the purpose of a follow-up investigation?

1. To trace disease transmission into and from an affected location
2. To target surveillance based on high-risk points along the value chain
3. To create an updated timeline of new cases discovered
4. To perform laboratory investigations of affected and unaffected locations

3

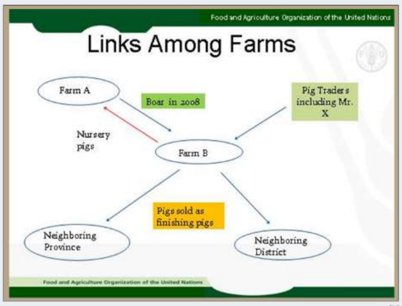
Types of Follow Up Investigations

1. Contact tracing
2. Targeted surveillance based on value chains
3. Additional case finding
4. Laboratory Investigations (two-way linking)
5. Special Studies (Wildlife, environmental, socio-economic, observational)

4

1. Contact Tracing

- Review questionnaire and line listing data to look for connections to the affected Farm B.
- Draw diagrams linking animal movement including epidemiological information about <u>animal-place-time</u>.

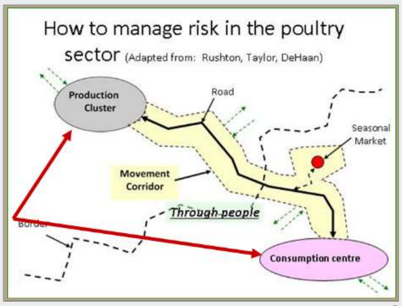


Suspected outbreaks of classical swine fever

5

2. Targeted Surveillance Along the Value Chain

- Target surveillance based on the frequency, direction and volume of movement along the value chain.
- Targeted surveillance along key risk points along the value chain includes:
  - Production centers
  - Trading channels
  - Sales yards
  - Live animal markets and slaughter facilities
- Take immediate action
  - Risk communication with stakeholders

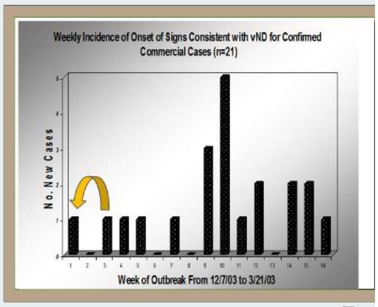


Source: Rushton, Taylor, DeHaan

6

3. Additional Case Finding

- When a case is discovered that occurred earlier than previously thought, it is important to open new lines of investigation.
- Do additional case finding related to the earlier cases discovered
- What would you do next?



Source: Castellan

7

4. Laboratory Investigations

Collect the same samples from all locations while conducting case finding

- **Confirm the presence or absence of the disease agent**
- **Identify the molecular subtype at each location and in each area e.g. ASF, HPAI, FMD**

8

5. Special Studies

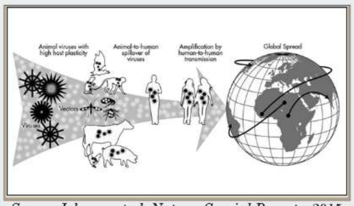
Some examples of special studies:

Wildlife studies:	Sampling wild birds, bats, deer, wildebeest, jackals, primates and hyaenas, etc. Retrospective analysis of existing surveillance data
Environmental studies:	Sampling of water, feed, soil, food products, animal wastes, agricultural chemicals Antimicrobial resistance studies
Socio-economic studies:	Economic studies assessing price fluctuations along the value chain, impact and benefit/cost analysis
Observational Studies:	Cross-sectional and case-control studies

9

Wildlife Studies

- Recall that 75% of EID originate in wildlife e.g. rabies
- Include ecological approaches based on a One Health approach that include domestic animals, humans and wildlife
- Consult with a wildlife expert for all diseases involving domestic and wild animals



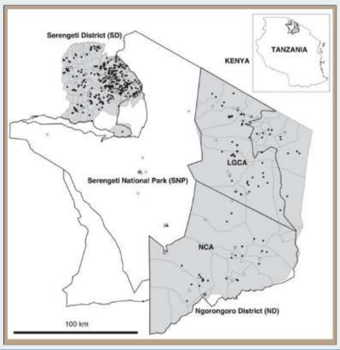
Source Johnson et al. Nature, Special Reports, 2015.

Source: Google Images

10

Example: Rabies virus variant is maintained in spotted hyaenas in the Serengeti

- Rabies is transmitted to several 'spill-over' hosts that might be considered target populations of concern, including humans (Knobel et al. 2005), endangered wildlife (Randall et al. 2006; Vial et al. 2006) and livestock



11

Environmental Studies

Environment and climate change impacts the emergence of infectious diseases

These studies measure temperature, altitude, soil type, deforestation, human density, housing, water, and feed or food sources etc.

Analysis of water, feed, soil and food products can provide useful information linking exposure sources and affected animals and people

The analysis could be bacteriological (anthrax), virological (avian influenza) or toxicological (aflatoxin)

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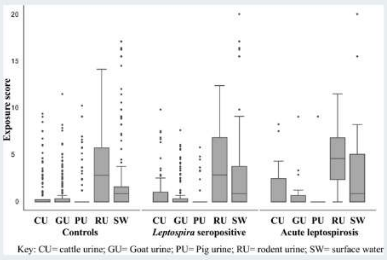
Example: Leptospirosis in Urine and Surface Water

- Leptospirosis is an important zoonotic disease that is associated with livestock and rodent urine as well as surface water contamination of rivers and streams
- All possible sources need to be sampled to determine possible sources of infection for humans.
- The graph shows the participant scores of humans exposed to animal urine and surface water, northern Tanzania, 2012–14 (N = 844).



Reference:
https://doi.org/10.1371/journal.pntd.0006372.g002

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Socio-economic Studies

Socio-economic studies can be used to measure the following:

1. Cost-benefit analysis
2. Economic impact on animal production and livelihoods
3. Price and market changes
4. Impact on import/export trade
5. Costs to humans and the environment

Cost-Benefit Analysis Example

	Solution A	Solution B	Solution C
Total Costs	€10,000	€15,000	€20,000
Total Benefits	€12,000	€19,000	€23,000
Cost-Benefit ratio	1.20	1.27	1.15

Source: Google Images

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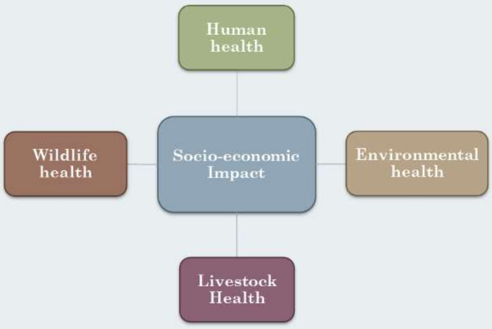
Socio-Economic Impact of Animal Diseases



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5. Follow-up Observational Studies

Collect high quality data from all locations visited while conducting case finding

- **Cross-sectional studies**
  - Most commonly done
  - Collect risk factor data at the same time we collect laboratory samples from all locations
- **Case-control studies**
  - Once we find a confirmed positive case, we compare with confirmed negative locations based on their responses to risk factor questions

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Exercise 24: Follow-Up Investigations

Instructions:

1. The exercise will take 45 minutes to complete.
2. Form into 3 groups.
3. Recommend which type of follow up investigation(s) or special studies would be useful for the following disease outbreaks.
   a) Leptospirosis in cattle, wildlife and humans
   b) Aflatoxicosis in poultry feed
   c) Trichinellosis in pigs and humans
4. Explain the objective of each investigation and study.
5. Explain the expected contribution/outcome of these investigations and special studies.

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In Summary…

- The types of follow-up animal disease investigations include:
  1. Contact tracing
  2. Targeted surveillance based on value chains
  3. Additional case finding
  4. Laboratory Investigations (two-way linking)
  5. Special Studies (Wildlife, environmental, socio- economic, observational)
- The types of special studies include:
  1. Wildlife studies
  2. Environmental studies
  3. Socio-economic studies
  4. Observational studies

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ISAVET Contributing Universities

Partners

Contributors

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Exercise 24 – Follow-up Field Investigations

Description of Exercise:

This exercise will focus on different types of follow-up investigations and making recommendations for which type of follow-up investigation(s) or special studies should be conducted for various types of disease outbreaks. Should you have any questions over the exercise, please ask a trainer for clarification before during, and after the exercise.

Allotted Time: 45 minutes

Organisation of Group Work: Form into three groups, one for each disease.

Exercise Objective(s):

1. Recommend which type of follow-up investigation(s) or special studies would be useful for the following disease outbreaks
    - Leptospirosis in cattle and humans
    - Aflatoxicosis in poultry in feed
    - Trichinellosis in pigs and humans
2. Explain the objective of each investigation and study
3. Explain the expected contribution/outcome of these investigations and special studies.
4. Choose a follow up investigation including:
    - Contact tracing investigations forward and tracing backwards
    - Targeted risk-based surveillance at high risk points along the value chain
    - When the timeline for the index case is revised through the discovery of an earlier outbreak
    - Observational studies – cross-sectional and case control
    - Other
5. Choose a special study including:
    - Wildlife studies
    - Environmental studies
    - Socio-economic studies
    - Other

Exercise Components and Structure:

1. Form into three (3) groups, one for each disease.
2. Create and complete an electronic table for each disease noted above.

Materials, Data or Information:

1. Microsoft Word and PowerPoint

Expected Outputs and Deliverables of Each Participant:

2. Recommendations with justification

1. Using Microsoft Word or PowerPoint, create and complete and electronic table for your specific groups' disease.

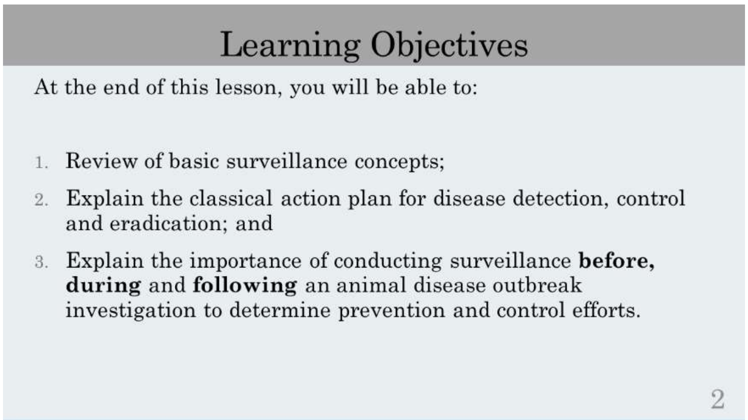
Group A: Leptospirosis in Cattle and Humans		
Type of Follow Up Investigations	**Objectives**	**Expected Outcomes**
Type of Special Studies	**Objectives**	**Expected Outcomes**

Group B: Aflatoxin in Poultry		
Type of Follow Up Investigations	**Objectives**	**Expected Outcomes**
Type of Special Studies	**Objectives**	**Expected Outcomes**

Group C: Trichinellosis in Pigs and Humans		
Type of Follow Up Investigations	**Objectives**	**Expected Outcomes**
Type of Special Studies	**Objectives**	**Expected Outcomes**

Lesson 19 – Surveillance Situation Assessment for Prevention and Control

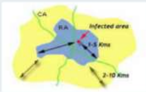
Estimated Lesson and Exercise Time	1 hour and 30 minutes
Participant Materials	Frontline ISAVET Lesson 19 Surveillance Situation Assessment for Prevention and Control Participant.PDF
	Computer and Microsoft Word
	Pen or Pencil



What is Surveillance?

- Surveillance is the systematic ongoing collection, collation and analysis of data and the timely dissemination of information to those who need to know **<u>so that action can be taken.</u>** *(OIE Terrestrial Animal Health Code, Salman)*
- Desired outcomes of animal disease surveillance:

Prevent Control Eradicate

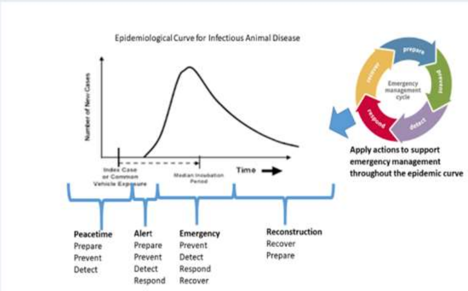


References: Google images; USDA; OIE

3

The Objective of Surveillance Throughout the Emergency Management Cycle

Prepare
Prevent
Detect
Respond
Recover



Reference: FAO, GEMP Manual

4

Classical Action Plan for Disease Detection, Control and Eradication

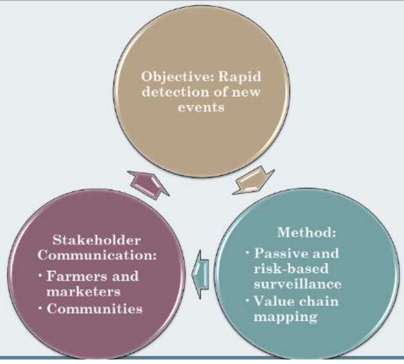
1. **Find:** Surveillance through active case finding

2. **Contain:** Investigate to prevent of spread from infected herds…… surveillance through aggressive case finding

3. **Eradicate:** Eliminate the disease……..and verify disease freedom using Surveillance tools

5

Surveillance Before an Animal Disease Outbreak



6

Critical Actions to Take Before An Outbreak

Conduct active and passive surveillance

- Ensure high sensitivity for disease detection e.g. broad case definition
- Good performance of the surveillance e.g. daily evaluation of data
- Type of surveillance suitable for the situation i.e. sentinel surveillance-vector borne disease, risk-based surveillance-diseases with clear risk factors
- Prepare to conduct zero-reporting should always be used as soon as an outbreak begins

Create Value Chain Maps

- Based on stakeholder input
- Objective: Identify high risk points in the value chain on how to prepare before an outbreak

7

Surveillance During an Animal Disease Outbreak

8

How to Conduct Surveillance During an Animal Disease Outbreak

Active case finding through tracing looking for diseased and dead animals

At Value Chain Risk Points

Reference: Regional FETPV

9

Critical Actions to Take During An Outbreak

Aggressive case finding
- Enhanced surveillance to find all possible cases as early as possible

Movement controls
- Adjust the size of infected, restricted and control areas
- Communicate and update stakeholders daily

Investigate locations in contact with suspect and confirmed cases
- Direct tracing and at high risk points along the value chain

Humane culling and disposal
- Reduce the risk of disease transmission

Daily summary of disease situation and trends
- Daily briefing and debriefing including update of zero reporting and the outbreak histogram

10

Surveillance Following an Animal Disease Outbreak

Objective:
- Estimate freedom from disease
- Maintain prevention and control efforts

Method:
- Prepare an after action report
- Case definition that is both sensitive and specific
- Grid based surveillance
- Manage risks identified during the outbreak

Stakeholder Communication:
- Government officials
- Field teams
- Farmers and marketers
- Communities

11

Critical Actions to Take Following An Outbreak

Prepare an after action report
- Apply lessons learned during the outbreak to improve prevention and control measures – Refer to local area Outbreak After Action Report SOP

Estimate freedom from disease
- Conduct grid based surveillance

Maintain prevention and control efforts
- Ensure that farmers, traders and all primary stakeholders maintain prevention and control efforts using biosecurity best practices

Case definition that is both sensitive and specific
- Detect disease early while avoiding false positives that may affect trade and movement

Manage risks identified during the outbreak
- Utilise risk factors identified to prevent future re-entry and spread of disease

Stakeholder Communication
- Communicate findings and lessons from the after action report
- Have field teams improve procedures and field practices

12

Examples: Surveillance Required Following an Animal Disease Outbreak

- **Minimum requirements for a country/region to be declared free from disease (OIE Animal Health Code)**

	No Vaccination		*Vaccination*	
DISEASE	***1st Recognition***	***After Outbreak***	***1st Recognition***	***After Outbreak***
Foot and mouth disease (FMD)	12 months	3 months (stamping out) (a)	24 months	12 months (stamping out) 24 months (no stamping out)
Classical swine fever (CSF)	24 months	6 months (stamping out)	24 months	12 months (stamping out)
African swine fever (ASF)	36 months	12 months (stamping out)		
Avian influenza (AI)	36 months	6 months (stamping out)	36 months	6 months (stamping out)

Reference: OIE

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Exercise 25: Surveillance Situation Assessment

1. This exercise will take 45 minutes.
2. Explain the use of surveillance and how it affects prevention and control efforts before, during and following an animal disease outbreak event.
   - Group 1: Your local area is located adjacent to a neighboring country that is experiencing large outbreaks of Rift Valley Fever (RVF). What are the surveillance objectives and methods you will use to detect the disease early? What actions will be taken?
   - Group 2; RVF has been found in a beef herd from your local area. What are the surveillance objectives and methods you can use to find the disease and estimate the incidence and prevalence of the disease in your local area? What actions will be taken?
   - Group 3: No new cases of RVF have been reported during the past 2 weeks. What are the surveillance objectives and methods you can use to demonstrate either control or freedom from RVF in your local area? What actions will be taken?

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In Summary…

Surveillance can be used differently before, during and animal disease outbreak…

- Before an outbreak:
  - Detect disease early and report it rapidly
- During an outbreak:
  - Aggressive case finding
  - Risk based surveillance along the value chain
  - Estimate incidence and prevalence of disease
- After an outbreak:
  - Prepare an after action report
  - Establish freedom from disease
  - Manage risk identified during outbreak investigation
  - Maintain effective surveillance

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ISAVET Contributing Universities

Partners

Contributors

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Exercise 25 – Surveillance Situation Assessment

Description of Exercise:

Explain the use of surveillance and how it affects prevention and control efforts before, during and following an animal disease outbreak event. Should you have any questions over the exercise, please ask a trainer for clarification before during, and after the exercise.

Allotted Time: 45 minutes

Organisation of Group Work:

- Work in three groups for this exercise, one per each scenario.

Exercise Objective(s):

1. Explain the surveillance objectives in the scenario
2. Explain the methods that can be used to find disease in the scenario
3. Explain what actions that will be taken in each scenario

Exercise Components and Structure:

1. Form into three groups, one for each scenario
2. Answer the questions for each scenario

Explain the use of surveillance and how it affects prevention and control efforts before, during and following an animal disease outbreak event.

Materials, Data or Information:

1. MS Word
2. Paper and pen

Expected Outputs and Deliverables of Each Participant:

1. Surveillance objectives, methods of case findings and recommended actions for control and prevention.

2. Use Microsoft word or power point to record your responses.

Scenario 1: Your local area is located adjacent to a neighboring country that is experiencing large outbreaks of Rift Valley Fever (RVF).

a.) What are the surveillance objectives and methods you will use to detect the disease early?

____

____

____

____

b.) What actions will be taken?

____

____

____

____

Scenario 2: RVF has been found in a beef herd from your local area.

a.) What are the surveillance objectives and methods you can use to find the disease and estimate the incidence and prevalence of the disease in your local area?

____

____

____

____

b.) What actions will be taken?

____

____

____

____

Scenario 3: No new cases of RVF have been reported during the past 2 weeks.

a.) What are the surveillance objectives and methods you can use to demonstrate either control or freedom from RVF in your local area?

____

____

____

____

b.) What actions will be taken?

____

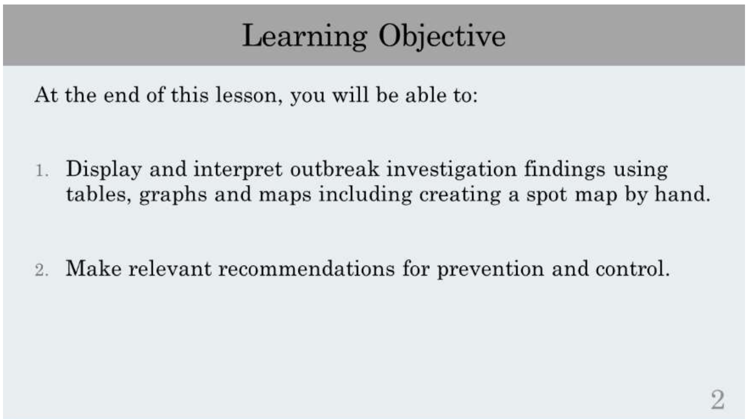
____

____

____

Lesson 20 – Display Outbreak Investigation Findings and Make Relevant Recommendations for Prevention and Control

Estimated Lesson and Exercise Time	1 hour and 30 minutes
Participant Materials	ISAVET Lesson 20 Display Outbreak Investigation Findings and Make Relevant Recommendations for Prevention and Control Participant Guide Version 4.PDF
	Computer and Microsoft Word
	Pen or Pencil



Quantitative and Qualitative Data

(Adapted from Frontline FETP)

Quantitative Data

- Measurements
- Numeric data
- Examples: age, weight, number of pigs

Qualitative Data

- Descriptions
- Non-numeric information
- Examples: disease (yes/no), sex, local area

3

Methods of Data Presentation

Outbreak investigation data is most often displayed using:

1. Tables
2. Graphs and bar charts
3. Maps
4. Timelines and other displays

4

Quantitative Data Example: Display and Interpretation of Count Data

- Confirmed cases of HPAI H5N1 have occurred during the past three months
- The number of RT-PCR samples detected each weeks 1-13 are recorded in the right hand column
- We will next make a histogram graph of the data

Week	No. New RT-PCR Positive H5N1 Samples
1	66
2	60
3	68
4	83
5	297
6	136
7	115
8	48
9	36
10	21
11	10
12	6
13	4
Total	950

5

Tables

(Adapted from Frontline FETP)

Type	Description
One-variable table (frequency distribution)	• Range of values of a single variable • Number of observations with each value
Two-variable table	• Counts shown according to 2 variables at once
Three-variable table	• Counts shown according to 3 variables at once
Composite (combination tables)	• Merging of multiple tables

6

Example: One Variable Table of Brucellosis Prevalence at Sublocal area Level (Quantitative)

Sublocal area	Prevalence
B	33%
Kam	33%
Kat	25%
Kik	31%
L	7%
M	32%
Total	**26%**

7

Example: Two Variable Table of Frequency of Animal Purchases at Sublocal area Level (Quantitative)

Purchase of new animals in selected sub-counties

Sublocal area	Rarely	Sometimes
B	3%	3%
Kam	13%	7%
Kat	17%	3%
Kik	7%	3%
L	17%	3%
M	20%	0%
Total	**77%**	**20%**

8

Example: Two Variable Table of Frequency of Animal Purchases at Sublocal area Level (Qualitative)

farmref_no	purch_freq	milk_how	wash_when
37	1	2	1
25	1	2	1
22	1	2	1
31	2	2	1
24	2	2	1
23	1	2	0

9

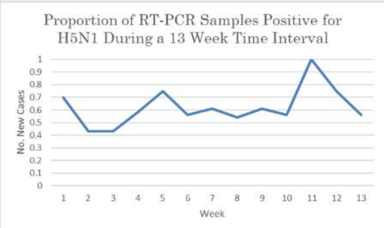
Graphs and Charts
(Adapted from Frontline FETP)

Outbreak investigation data	Line graph
	Histograms
	Bar charts

10

Line Graph to Show Trends for Proportion Positive

Week	No. Positive	No. Samples Tested	Proportion H5N1 Positive
1	66	94	0.70
2	60	140	0.43
3	68	158	0.43
4	83	143	0.58
5	297	396	0.75
6	136	243	0.56
7	115	189	0.61
8	48	89	0.54
9	36	59	0.61
10	21	38	0.56
11	10	10	1.00
12	6	8	0.75
13	4	7	0.56



Interpretation: The prevalence of H5N1 remains above 40% over the 13 week period supporting the hypothesis that the disease remains endemic.

Reference: Castellan

11

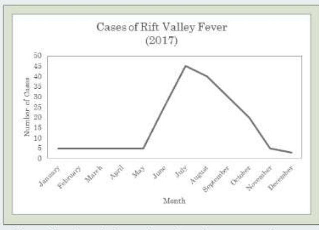
Steps to Create a Line Graph
(Adapted from Frontline FETP)

- Make x-axis longer than y-axis (best ratio 5:3)
- X-axis:
  - Match x-axis scale to intervals used during data collection
- Y-axis:
  - Always start y-axis with 0
  - Identify largest value, round up for max. Y value
  - Select reasonable interval size for y-axis
- Plot data
- Add axis labels and title — (What, where, when)
- Add comments and footnotes

12

Arithmetic Line Graph
(Adapted from Frontline FETP)

- Use for plotting rates over time
- X-axis almost always time (rarely, age)
- Y-axis:
  - Can be counts, proportions, or rates
  - Begin at 0
  - End with next round number larger than largest value needed to plot
  - Divide into equal intervals
- On either axis, the intervals should be equal
- Good for comparing two or more sets of data.

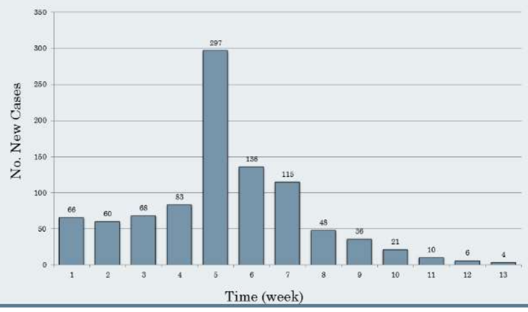


Note: National data showing the seasonal incidence of animal RVF cases between May and November in 2017.

13

Frequency Histogram: No. positive laboratory cases of HPAI by RT-PCR

What is your interpretation? Is the H5N1 outbreak under control?



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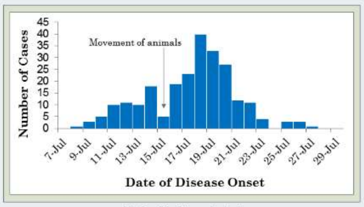
Histogram
(Adapted from Frontline FETP)

- Frequency distribution of quantitative data
- X-axis
  - Continuous, usually time (onset or diagnosis date)
- Y-axis
  - Represents frequency (number of cases)
- No spaces between adjacent columns
  - i.e., adjacent columns “touch”
- Easiest to interpret with equal class (*x*) intervals
  - In MS Excel, create “bins” to interpret new intervals
- Column height proportional to number of observations in that interval
- “Epidemic curve” in outbreak investigations



Note: National data

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Making a Histogram
(Adapted from Frontline FETP)

1. For continuous numeric data, assign equal width, non-overlapping categories
2. Count the number of times each category appears
3. Assign one bar to each category
4. Make the bar height equal to the frequency for each category
5. Include axis labels with units and a descriptive title

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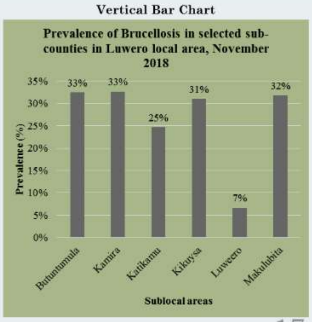
Bar Charts
(Adapted from Frontline FETP)

- Can be vertical or horizontal
- Use for variables with discrete, non-linear categories (qualitative), such as local areas
- Bars have same width
- Bars have space (“gaps”) between them, since categories are not continuous
- 4 types – simple, grouped, stacked, 100%
- Best type depends on desired emphasis

Vertical Bar Chart



Source: Frontline ISAVET

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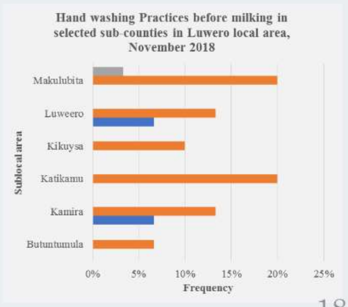
Stacked and Clustered Horizontal Bar Charts



Reference : Frontline ISAVET Uganda

18

Maps

- Describe geographic distribution of disease, services, etc.
- Types:
  - Spot or dot maps
  - Area maps
  - Others
- Symbols represent events, disease
- Size of circle can be proportionate to disease burden

KEY STEPS IN MAPPING LOCAL OUTBREAKS

1. Laminate a local map in plastic so you can add affected locations/cases
2. Collect GPS Latitude and Longitude Coordinates and record them on paper or in MS Excel
3. Add the affected locations/cases on the wall map OR
4. Enter GPS coordinates into QGIS or other freeware such as Google Maps

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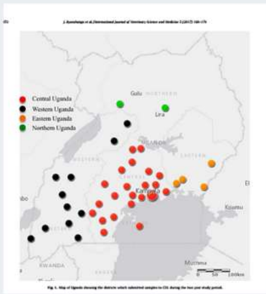
Spot or Dot Maps

- Spot map (also known as dot map)
  - Often used to show geographical location of individual cases rather than rates
  - You can draw maps by hand or using specialized spatial software showing the location of positive premises



Byaruhanga et al. / International Journal of Veterinary Science and Medicine 5 (2017) 168–174

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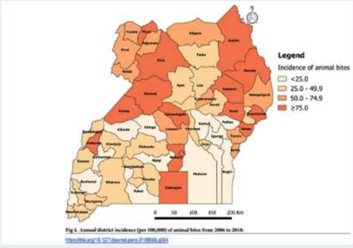
Area Maps: Chloropeth

- **Choropleth map**
  - A method of mapping to display quantitative information, such as rates, in defined jurisdictions such as provinces, regions or countries.
- **Advantages**
  They give a good visual impression of change over space
- **Disadvantages**
  - There is abrupt change at the boundaries of shaded units.
  - Usually not good for showing total values.
  - Different shades not easily distinguishable.
  - Variations within map units are hidden,



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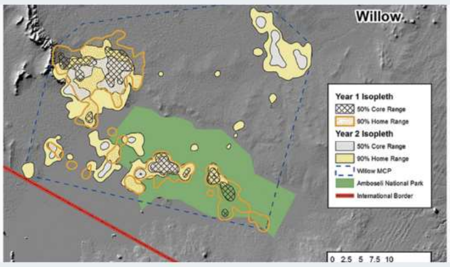
Area Maps: Isopleth

- **Isopleth map**
- A method of mapping to show gradual change over space and avoids abrupt changes which boundary lines produce on choropleth maps.
  - **Example:** MAP OF THE ELEPHANT INDIVIDUAL "WILLOW'S" ANNUAL RANGES IN THE AMBOSELI NATIONAL PARK KENYA, DURING THE TWO-YEAR TRACKING PERIOD.

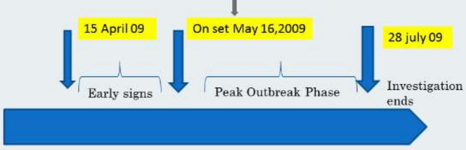


Reference: Sowers, M., Fishlock, V. & Manor, T. (2015).

22

Timeline: Qualitative Data

- Names and sublocal area location are qualitative nominal variables
- A timeline of CSF outbreak events is also qualitative display of an outbreak period with key events that can be added



Herd Name	Location
N	SDist. 4
A	SDist. 8
S	SDist. 4
W	SDist. 4
C	SDist. 4
Y-F (confirmed)	SDist.12
H *	SDist. 12
Ac	SDist. 8
So	SDist. 11
Su*	SDist. 4
Sop*	SDist. 8

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Making Recommendations

Guidelines for Making Recommendations

- Recommendations are directly based on interpretation of results obtained from data analysis
- Recommendations should follow SMART principles and be:

1. Specific – to the result of the investigation and local context
2. Measurable – based on the data that was collected
3. Achievable – based on resources and capacity available
4. Realistic – based on opportunities and limitations
5. Time-specific – based on specific timelines and milestones

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Exercise 26: Generate Graphs and Tables

1. This exercise will take 45 minutes.
2. Use the data set Spatial data rabies Table 1. Cases of animal bite injuries by region; 2001–2015 to generate graphs and tables and interpret the data.

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In Summary…

- Rationale behind the display strategy of the findings;
- How to display outbreak investigation data in a table, graph, chart or map;
- How to interpret the findings displayed in a table, graph, chart or map; and
- How to make “SMART” recommendations based directly on study results.

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Exercise 26 – Generate Tables and Graphs

Description of Exercise:

From the dataset, display findings and make relevant recommendation for prevention and control. Should you have any questions over the exercise, please ask a trainer for clarification before during, and after the exercise.

Allotted Time: 45 minutes

Organisation of Group Work:

- Work in pairs of three.

Exercise Objective(s):

1. Display data to be provided.

Exercise Components and Structure:

1. Use the data set Spatial data rabies Table 1. Cases of animal bite injuries by region; 2001–2015 to generate graphs and tables and interpret the data.

Materials, Data or Information:

1. Microsoft PowerPoint
2. Microsoft Excel

Expected Outputs and Deliverables of Each Participant:

1. Generate tables, graphs and maps.

Instructions

1. Open the spreadsheet titled, "X". Review the variables in the data dictionary. Rotate the time lines to the left side of the table.

2. Describe the measures of central tendency (Mean, Median, Mode, Range, Minimum and Maximum) for each region in the dataset.

Using the Fx function:

- Mean Fx =AVERAGE(Cell:Cell)
- Median Fx =MEDIAN(Cell:Cell)
- Mode Fx =MODE(Cell:Cell)
- Range Ex =MAX(Cell:Cell)-MIN(Cell:Cell)
- Minimum Fx = MIN(Cell:Cell)
- Maximum Fx = Max (Cell:Cell)

	Central	Eastern	Western	Northern
Mean	3816.8	3116.133	3222.933	3758.8
Standard Error	281.5967	201.2011	263.5051	301.4981
Median	4230	3078	3434	4031
Mode	#N/A	#N/A	#N/A	#N/A
Standard Deviation	1090.619	779.2485	1020.551	1167.697
Sample Variance	1189451	607228.3	1041524	1363517
Kurtosis	0.312982	-0.15366	0.651834	0.747517
Skewness	-1.10762	-0.1142	-1.2548	-0.91746
Range	3700	2918	3316	4225
Minimum	1330	1601	953	1049
Maximum	5030	4519	4269	5274
Sum	57252	46742	48344	56382
Count	15	15	15	15

3. Display the following:

Line graphs

a) Line graph for the central region
b) Add the rest of the regions to the graph. Use mean values of each region to plot the graph

Bar graph

a) Plot a bar graph for the central region
b) Add the rest of the regions to the graph (simple, grouped, stacked_

Pie charts

a. Compare the total number of dog bites per region using pie charts

Lesson 21 – One Health Panel Discussion: Multi-disciplinary Outbreak Investigation

Estimated Lesson and Exercise Time	1 hour and 30 minutes
Participant Materials	ISAVET Lesson 21 One Health Panel Discussion: Multi-disciplinary Outbreak Investigation Version 4.doc
	Computer and Microsoft Word
	Pen or Pencil
Handout Materials for Exercises	

Description of Lesson:

Animal health, human health and wildlife/environmental experts will discuss One Health implementation gaps and opportunities and interact with ISAVET trainees to demonstrate why coordination of surveillance, outbreak investigation and response is essential at the human-animal-wildlife interface in Africa, at the regional, national and local levels.

Facilitator Instructions:

The facilitator is expected to cover all questions in this exercise within the time allotted. He/she will also summarize key points made during the discussion at the end of the session.

Allotted Time: 90 minutes

Organisation:

There will be brief overviews of important One Health activities in Africa followed by questions posed by the facilitator and ISAVET trainees.

Exercise Objective(s):

A. Panelist Input (45 minutes total or 15 minutes per panelist):

1. Describe One Health activities that are underway in East or West and Central Africa.

2. Identify gaps in the implementation of One Health:

   1. in Africa;
   2. in regional level;
   3. at the national level;
   4. at the local level.

3. Describe opportunities are present to use the One Health approach:

   5. in Africa;
   6. in regional level;
   7. at the national level;
   8. at the local level.

B. **Frontline ISAVET Trainees (30 minutes)**

   1. Describe how Frontline ISAVET can contribute to One Health implementation in your local area.
   2. Describe your role as a Frontline ISAVET trainee when it comes to implementing One Health at the local level.

C. **General discussion (15 minutes)**

Exercise Components and Structure:

A. Facilitator guiding questions related to the participating countries as well as Africa as a whole:

   1. Describe One Health activities that are underway in East or West and Central Africa.

   2. Identify gaps in the implementation of One Health in Africa, in regional level, at the national level and at the local level.

   3. Describe opportunities are present to use the One Health approach in Africa, in regional level, at the national level and at the local level.

   4. Describe your role as a Frontline ISAVET trainee when it comes to implementing One Health at the local level.

B. Open the floor to questions, answers and further discussion.

Expected Outputs and Deliverables of Each Participant:

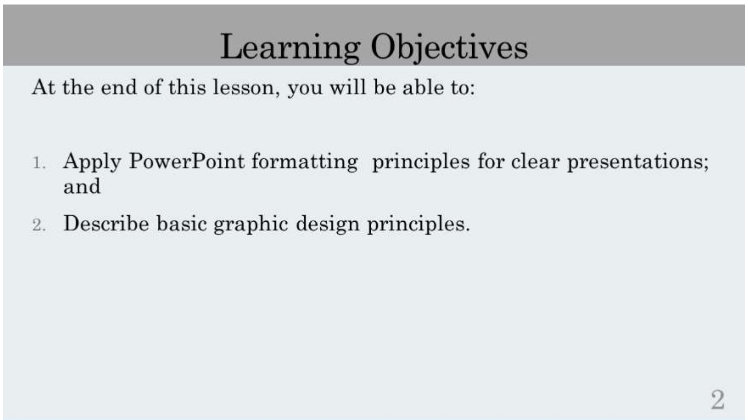
1. Active listening and participation in asking questions, providing examples related to the improved implementation of One Health in Africa.

Supplemental Resources for Facilitators:

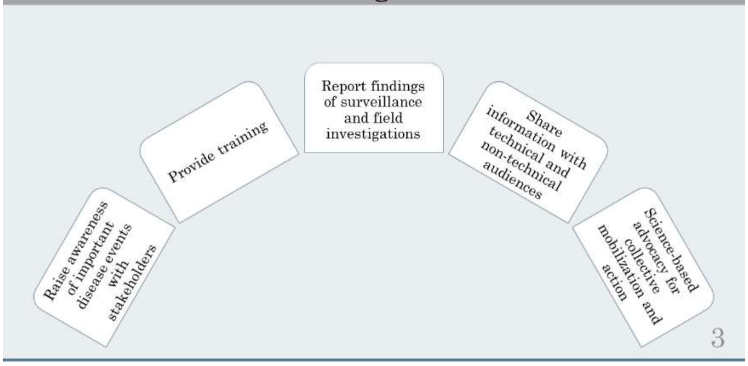
Survey results of One Health activities in Africa, at the regional, national and local levels provided by FAO regional and country team members.

Lesson 22 – Preparing MS PowerPoint Presentations

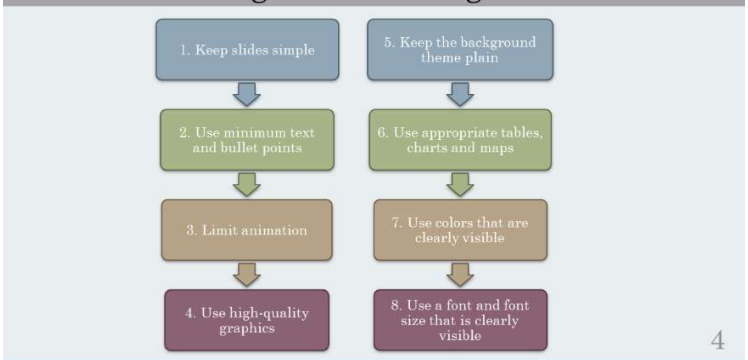
Estimated Lesson and Exercise Time	2 hours
Participant Materials	ISAVET Lesson 22 Preparing MS PowerPoint Presentations Participant Guide.PDF
	Computer and Microsoft Word
	Pen or Pencil



Reasons for Making a Presentation



Communicating Your Findings in PowerPoint



1. Keep Slides Clear, Simple and to the Point

Table A

Animal Age (Years)		
1	2	3
4	5	6
2	2	3
3	3	3
3	3	3
4	4	4
4	4	5
5	5	7

Table B

Breed/population	Code	Data set	Breed purpose	Country of origin	Source
Angus	ANGU	BI/EU	Beef	Scotland	1, 2
Belted Galloway	BGAL	BI	Beef	Scotland	2
British Shorthorn	BSHN	BI/EU	Dual purpose	England	2
Brown Swiss	BRSW	EU	Dairy	Switzerland	1, 2, 3
Charolais	CHAR	EU	Beef	France	1, 2, 3
Devon	DEVN	BI	Beef	England	2
Dexter	DXTR	BI	Dual purpose	Ireland	2
English Longhorn	ELHN	BI	Beef	England	2
Finnish Ayrshire	FAYR	BI/EU	Dairy	Scotland/Finland	2
Galloway	GALL	BI	Beef	Scotland	2
Gelbvich	GELB	EU	Dual purpose	Germany	2, 4
Guernsey	GNSY	BI/EU	Dairy	Channel Islands	1, 2
Hereford	HRFD	BI/EU	Beef	England	1, 2
Holstein	HOLS	EU	Dairy	The Netherlands	1, 2, 5
Jersey	JRSY	BI/EU	Dairy	Channel Islands	1, 2, 3

Which one is easier to read? Table A or B

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Table Components

Clear title, two variable table organised by species of animal, number of cases as well as the total number of cases with source of data.

Cases of Disease FMD in Country X by Species, October, 2018

Species	Number of Cases
Caprine	10
Ovine	30
Bovine (Beef)	25
Bovine (Dairy)	12
Porcine	30
Total	**107**

Note: National data

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2. Use Minimum Text and Bullet Points

- May 23, 2019: Laboratory report received
- May 24, 2019: local area office reports results to farmer

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3. Limit Animation

- Don't use slides transitions from one to another too often, this can be distracting
- If animation is used, use it to represent a flow diagram or cycle while providing your discussion

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Example: Surveillance Data Analysis

Limited animal to demonstrate calculation of risk proportion

Local Area A	Population at Risk (PAR)	No. Dead	Risk Proportion (No. Dead/PAR)	Production Class Risk Proportion (No. Dead/Total Dead)
Egg Layers	8,000	6,385	0.80	0.995
Broilers	250	20	0.08	0.003
Village Chickens	3,226	2	0.001	0.0003
Village Ducks	1,175	11	0.01	0.0017
Local area Total	12,651	6,418	0.51	

Reference: Frontline ISAVET

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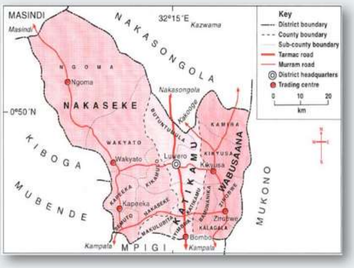
4. Use High-Quality Graphics

High Quality: Very clear with legend



Reference: Google Images

Poor quality: Unclear, no legend

Reference: Google Images

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5. Keep the Background Theme Plain

Distracting Background

Plain Background

Reference: Frontline ISAVET

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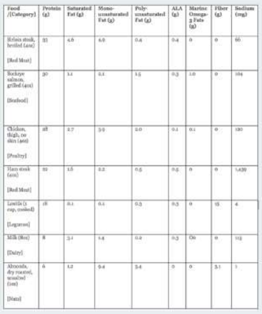
6. Use Appropriate Tables, Charts and Maps



Reference: Google Images

Which table is easier to read on a PowerPoint slide?

Create clear and legible tables that limit the amount of space and information.

Cases of Disease FMD in Country X by Species, October, 2018

Species	Number of Cases
Caprine	10
Ovine	30
Bovine (Beef)	25
Bovine (Dairy)	12
Porcine	30
Total	**107**

Reference: Frontline ISAVET

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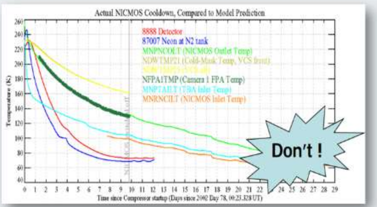
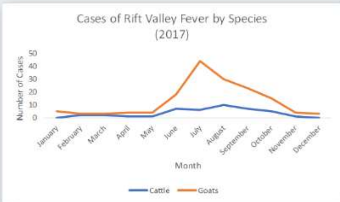
6. Use Appropriate Tables, Charts and Maps



Reference: https://www.mcgill.ca/skillsets/files/skillsets/powerpointguidelines.pdf



Reference: Frontline ISAVET

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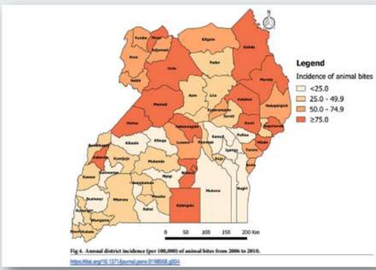
6. Use Appropriate Tables, Charts and Maps



Reference: Google Images

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7. Use colors that are clearly visible

Reference: https://www.mcgill.ca/skillsets/files/skillsets/powerpointguidelines.pdf

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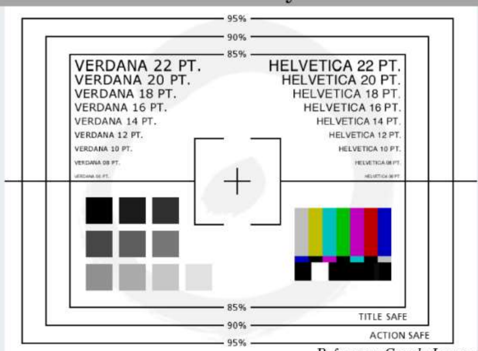
8. Use a Font Type and Font Size (24-40) that is Clearly Visible



Reference: Google Images

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Format for PowerPoint Slides

- Plan your presentation:
  - Allow 2 to 3 minutes per slide to a maximum of 30 slides
- Title slide is in large font (maximum 40 font):
  - Include title, name, organisation and meeting name, location, date
- Include an overview or objectives slide after the title slide
- Create sections with section headings
- End with a conclusion or summary slide

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Public Speaking Guidelines

Some rules of public speaking:

1. Know your subject
2. Know your audience
3. Tell the audience what the talk is about. In other words, tell the audience what you want to tell them (outline of presentation)
4. Tell them!
5. Keep slides simple and use visuals to illustrate what you are saying
6. Tell the audience what you just told them (conclusion)
7. Acknowledge all contributors and thank the audience

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Exercise 27: Developing a PowerPoint Presentation from a Report

1. This exercise will take 1 hour.
2. Work individually.
3. Complete a brief 8-slide presentation using the template and report provided.
4. Review your slides with the person sitting next to you.

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References:

- http://www.garrreynolds.com/preso-tips/design/
- https://www.mcgill.ca/skillsets/files/skillsets/powerpointguidelines.pdf

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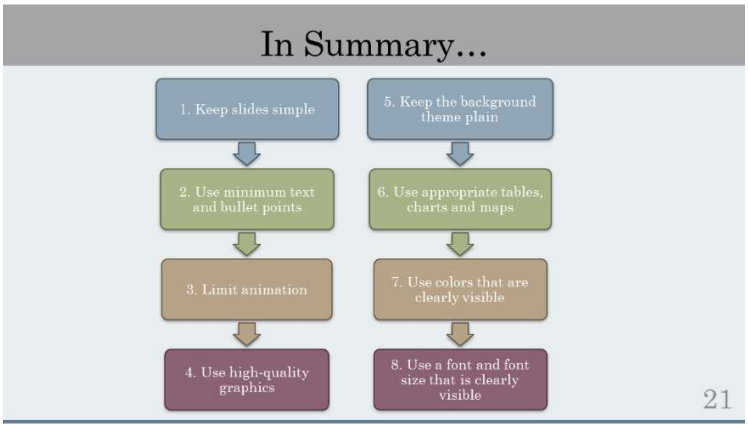
In Summary…
1. Keep slides simple
2. Use minimum text and bullet points
3. Limit animation
4. Use high-quality graphics
5. Keep the background theme plain
6. Use appropriate tables, charts and maps
7. Use colors that are clearly visible
8. Use a font and font size that is clearly visible
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Exercise 27 – Developing a PowerPoint Presentation from a Report

Description of Exercise:

Complete a brief 8-slide presentation using the template and data provided. Should you have any questions over the exercise, please ask a trainer for clarification before during, and after the exercise.

Allotted Time: 1 hour

Organisation of Group Work:

- Work individually for this exercise.

Exercise Objective(s):

1. Apply PowerPoint formatting principles for clear presentation.
2. Describe basic graphic design principles.
3. Display data clearly using tables, graphs and maps.

Exercise Components and Structure:

1. Work individually.
2. Complete a brief PowerPoint presentation from the template provided.
3. Share your presentation with the individual sitting next to you.

Materials, Data or Information:

1. MS PowerPoint Template: "Frontline ISAVET Exercise 27.ppt"
2. Report on Anthrax Outbreak investigation: "RVF Kabale outbreak_report.pdf"
3. Paper and pen

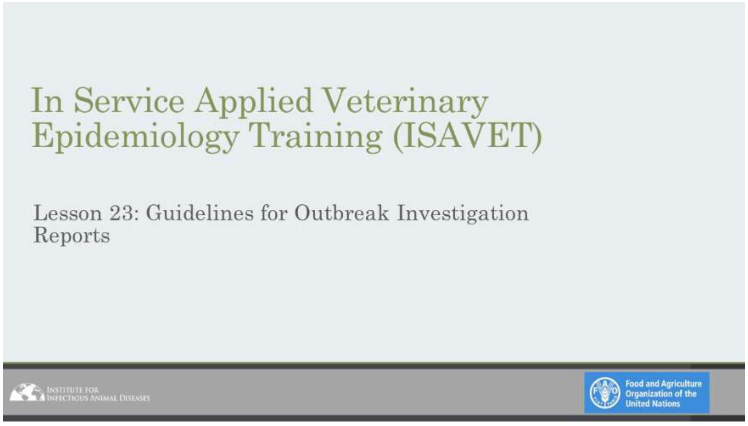
Expected Outputs and Deliverables of Each Participant:

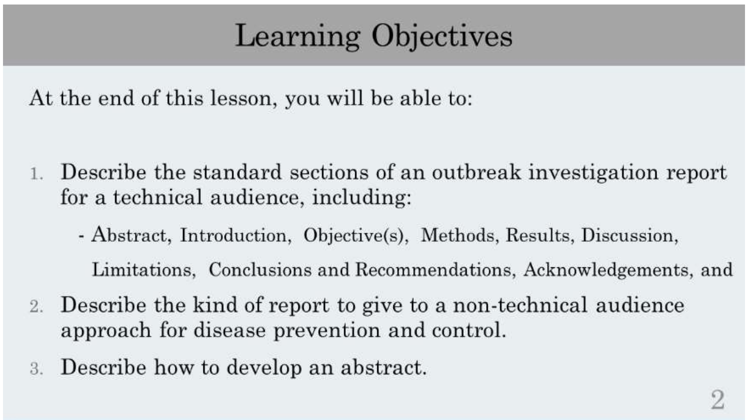
1. Complete a brief 8 slide presentation using the template and report provided.

1. Use Microsoft power point to create an 8 slide presentations based on the Rift Valley Fever Outbreak Report "RVF Kabale outbreak_report.pdf.

Lesson 23 – Guidelines for Outbreak Investigation Reports

Estimated Lesson and Exercise Time	1 hour
Participant Materials	ISAVET Lesson 23 Guidelines for Outbreak Investigation Reports Participant Guide.doc
	Computer and Microsoft Word
	Pen or Pencil





Why is it Important to Prepare an Outbreak Investigation Report?

- Inform decision makers
- Justify prevention and control measures
- Serve as a record of the outbreak and the response
- Determine the strengths and weaknesses of the outbreak investigation and the response

Reference: Adapted from https://wiki.ecdc.europa.eu/fem/w/wiki/definition-of-an-outbreak-investigation-report

3

How is an Outbreak Investigation Report Usefull?

- Identify the appropriateness of the actions carried out
- Check for errors and revise results
- Stimulate further field studies
- Prevent future outbreaks
- Inform improvements in the investigation and control of similar outbreaks in the future

Reference: Adapted from https://wiki.ecdc.europa.eu/fem/w/wiki/definition-of-an-outbreak-investigation-report

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There are two Kinds of Outbreak Investigation Reports

1. Daily Report

- In the early stage of an outbreak investigation, as you are collecting data, you need to do daily updates
- Daily debriefing of outbreak events are reviewed each day
- Informs follow up action required for the following day

2. Final Report

- Based on the daily reports
- The final report follows completion of the outbreak investigation including measures taken to demonstrate freedom from disease

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Daily Report

DAILY DISEASE OUTBREAK REPORT
DATE:
LOCATION:
FIELD EPIDEMIOLOGIST:
Daily epidemiology field activities and laboratory submissions:

Event No.	Owner Name or Number	Location (Lat/Long)	Type of Field Event 1. Investigation 2. Surveillance 3. Morbidity 4. Mortality 5. Movements 6. Other (Explain)	EPI Questionnaires Submitted (Yes/No)	No. Laboratory Samples Submitted	Final Laboratory Results (Pos/Neg)
1						
2						

Summary:

Total No. Field Visits	
Total Number EPI Questionnaires Submitted	
Total No. Laboratory Samples Collected	
Total No. Positive Laboratory Results Received	
Total No. Negative Laboratory Results Received	

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Outbreak Scenario

Twenty cattle have died in the past 5 days in Kambe local area which is a major dairy and beef raising area. The first cattle where deaths were reported is a village communal grazing herd. It is the second occurrence of increased mortality during the past 12 months. The disease has resulted in the death of young cattle under the age of 6 months of age. The lesions are compatible with Foot and Mouth Disease (FMD).

We will build an outline of an outbreak investigation report based on this scenario.

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The Structure of a Final Outbreak Investigation Report

(Reference: Adapted Regional FETPV)

1. Abstract or Executive Summary
2. Introduction
3. Objective(s)
4. Methods
5. Results
6. Discussion
7. Limitations
8. Conclusions
9. Recommendations
10. Acknowledgements

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1a. Abstract

Abstract

- Briefly describe the context of the outbreak:

1. Animal-Place-Time components
2. Laboratory diagnosis
3. Previous disease history in the area
4. Disease impact
5. Prevention and control measures taken
6. Outcomes and lessons learned
7. Recommendations for future prevention and control

OUTBREAK SCENARIO: Twenty cattle have died in the past 5 days in Kambe local area which is a major dairy and beef raising area. The first cattle where deaths were reported is a village communal grazing herd. It is the second occurrence of increased mortality during the past 12 months. The disease has resulted in the death of young cattle under the age of 6 months of age. The lesions are compatible with Foot and Mouth Disease (FMD).

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1b. Introduction

Introduction

- Briefly describe the context of the outbreak:

1. Past history of the disease (time)
2. The area(s) currently affected (place)
3. The population at risk (PAR) (animal)
4. Describe the early events at the index location
5. Explain the initial impact of the disease outbreak

OUTBREAK SCENARIO: Twenty cattle have died in the past 5 days in Kambe local area which is a major dairy and beef raising area. The first cattle where deaths were reported is a village communal grazing herd. It is the second occurrence of increased mortality during the past 12 months. The disease has resulted in the death of young cattle under the age of 6 months of age. The lesions are compatible with Foot and Mouth Disease (FMD).

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2. Objective(s)

Objective(s)

Options for objectives could include:

1. Find the source of the outbreak
2. Investigate risk factors affecting the frequency and distribution of the disease
3. Assess disease impact

In practical terms, the immediate need is to:

1. **Confirm the diagnosis of FMD**
2. **Identify risk factors for disease introduction and to contain, control and prevent further spread of the virus**

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3. Methods

Methods

Describe:
1. The population at risk
2. The investigation methods utilised
3. Specific data sources and collaborations
4. Data collection, quality control, data analysis (software) and data display
5. Explain specifically how the methods address the objective(s) of the outbreak investigation

Kambe local area contains10,000 diary and beef cattle raised on pasture. Clinical exams will be done and laboratory samples will be submitted immediately. Active case finding using a questionnaire and community participatory methods will trace animal movement and other risk factors for introduction and possible spread of FMD. 12

4. Results

Results

- Each result addresses an objective of the outbreak investigation
- Results are displayed in formats (i.e. tables, graphs and maps) that best show the data
- Include descriptive statistics: Animal-Place-Time
- Use words sparingly: let the data you have displayed speak to the audience
- Avoid explaining the meaning, only present results
- The results provide the evidence for the rest of the report

1. **Type O FMD virus confirmed is similar to the previous year**
2. **Hypothesis for introduction is recent cattle movement into Kambe local area from a neighbouring country.**
3. **A higher pproportion of confined herds have been protected from FMD outbreaks so far.**
4. **Two neighbouring local areas just reported FMD.**

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5. Discussion

Discussion

- Interpret and explain the meaning of your data
- Describe the significance of the results of the outbreak investigation data
- Compare your results with previous outbreaks and other published reports

The seroptye and molecular pattern is used to qualify the lesions, morbidity and mortality experienced and whether there is a worsening trend compared with previous outbreaks. The impact and reason for higher risk among pastured herds compared with confined herds. The challenges of the field investigation are also presented including lack of field personnel and lack of reporting. Participatory data was very useful and confirmed the questionnaire responses for possible risk factors. 14

6. Limitations

Limitations

- Clearly and briefly list the limitations of the methods, including:

1. The outbreak investigation
2. Effectiveness of the response
3. The data collected
4. The data that could not be collected
5. Sources of bias in your data

The outbreak likely began at least one month prior to the outbreak investigation. Case finding was difficult because neighbouring local areas could not assist with tracing out. Cattle dealers were not interested in providing information that might endanger their livelihood. Responses from questionnaires was somewhat limited but data collected using participatory epidemiology was complete.

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7. Conclusions

Conclusions

- Clearly and briefly state the main conclusions of your report on the data you provided
- Explain how the limitations encountered affect the results

Persistence of the same serotype means that either cattle or wildlife are acting as reservoirs for the virus. Pastured animals are also at higher risk of contact with wildlife and so this must be considered in future prevention and control programmes. There is improved data access from participatory community engagement as compared with questionnaire based interviews with individual farmers.

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9. Acknowledgements

Acknowledgements

Provide acknowledgement of key internal stakeholders in the outbreak event:

1. **Public sector**
2. **Private sector**
3. **Farmers**
4. **Communities**
5. **Collaborating agencies and partners e.g. Emergency Management, Police, Military**

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8. Making Recommendations

Making Recommendations

- The MOST IMPORTANT SECTION OF YOUR REPORT!
- Recommendations should follow SMART principles and be:
  1. Specific – to the local context
  2. Measurable – based on the data that was collected
  3. Achievable – based on resources and capacity available
  4. Realistic – based on opportunities and limitations
  5. Time-specific – based on specific timelines and milestones

- **Preventive action is required to trace cattle sold out to other farms, sales yards and abattoirs from Kambe local area during the past 30 days.**
- **Present findings of the outbreak investigation report so that farmers and marketers are aware of the impact and reasons for introduction and spread**

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Report Writing

Report Writing

- Revise…. revise…. revise….
- Be persistent and hone your writing skills until the report is clear and simple
- Acknowledge support received from all collaborators and institutions
- Prepare an abstract or "Executive Summary" of the report for those who will not likely read the whole report

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Sharing the Report with Non-technical Audiences

Sharing the Report

- Share an abstract or "Executive Summary" of the report for those who will not likely read the whole report
- Once official permission is granted, publish… publish… publish….
- Convert the report into a brief PowerPoint of brief written report to share with colleagues and farmers

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Share Lessons Learned

Share Lessons Learned

- Use your report to begin an after action review of the outbreak
- Always meet and provide feedback to the farmers who were affected by the animal disease outbreak
- Hold discussions centered on how to improve surveillance, control and prevention

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Elements of an Outbreak Investigation Report for Technical and Non-Technical Audiences

TECHNICAL AUDIENCE	NON-TECHNICAL AUDIENCE
1. Title	Use the same headings and structure with the following changes: 1. Use simple, clear language free of jargon 2. Limit the report to 2 pages in length as an executive summary of the technical report 3. Include any maps, graphs or tables that are important that describe the outbreak
2. Background	
3. Objectives of the Outbreak Investigation	
4. Methods for disease investigation	
5. Results – Extent and impact	
6. Limitations and conclusions	
7. Recommendations	
8. Acknowledgements	

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Exercise 28: Report Writing Assessment

1. This exercise will take 60 minutes to include 30 minutes to write an abstract of the report provided and 30 minutes for general discussion.
2. Write a brief abstract of 300 words maximum in 30 minutes of the outbreak investigation report provided.
   - Briefly describe the context of the outbreak:
   - Animal-Place-Time components
   - Laboratory diagnosis
   - Previous disease history in the area
   - Disease impact
   - Prevention and control measures taken
   - Outcomes and lessons learned
   - Recommendations for future prevention and control
3. The following outbreak investigation report is provided:
   - Reports on Investigation and Response To Rift Valley Fever Outbreak in Kabale local area, Uganda, March 10 – April 27, 2016 (*RVF Kabale outbreak_report.pdf*)
4. Participate in the general discussion of the abstract.

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In Summary…

- There are two kinds of outbreak investigation reports: Daily and Final Reports
- Outbreak investigation reports are important for a number of reasons:
  - Inform decision makers
  - Inform prevention and control actions
  - Document evidence of steps taken during an outbreak investigations
- For technical audience an outbreak investigation report should consist of these standard sections:
  - Introduction, Objective(s), Methods, Results, Discussion, Limitations, Conclusions and Recommendations.
- For non-technical audience, the report should consist of:
  - An abstract of the outbreak investigation report
  - Brief PowerPoint presentation to initiate discussion

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ISAVET Contributing Universities

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Contributors

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Exercise 28 – Report Writing Assessment

Description of Exercise:

Group discussion including questions to provide reports to technical and non-technical audiences. Should you have any questions over the exercise, please ask a trainer for clarification before during, and after the exercise.

Allotted Time: 1 hour

Organisation of Group Work:

Work in groups for this exercise.

Exercise Objective(s):

1. Describe the standard sections of an outbreak investigation report for a technical audience: Introduction, Objective, Methods, Results, Discussion, Limitations, Conclusion, and Recommendations
2. Describe the kind of report to give to a non-technical audience for disease control and prevention

Exercise Components and Structure:

1. Form into 3 groups
2. Review an example Outbreak Investigation Report provided

Materials, Data or Information:

1. The following Reports are provided:
    a. Reports on Investigation and Response To Rift Valley Fever Outbreak in Kabale Local area, Uganda, March 10 – April 27, 2016 (*RVF Kabale outbreak_report.pdf*)
    b. One Health Anthrax Surveillance In Arusha Local area, April 25 – May 4, 2018 (*Anthrax One Health Surveillance.pdf*)
2. Paper and pen

Expected Outputs and Deliverables of Each Participant:

1. Provide a review of an outbreak investigation report in terms of its content and

Two-outbreak investigation Reports are provided as follows:

c. Reports on Investigation and Response To Rift Valley Fever Outbreak in Kabale Local area, Uganda, March 10 – April 27, 2016 (*RVF Kabale outbreak_report.pdf*)
d. One Health Anthrax Surveillance In Arusha Local area, April 25 – May 4, 2018 (*Anthrax One Health Surveillance.pdf*)

Groups 1 + 2:

Reports on Investigation and Response To Rift Valley Fever Outbreak in Kabale Local area, Uganda, March 10 – April 27, 2016

Group 3:

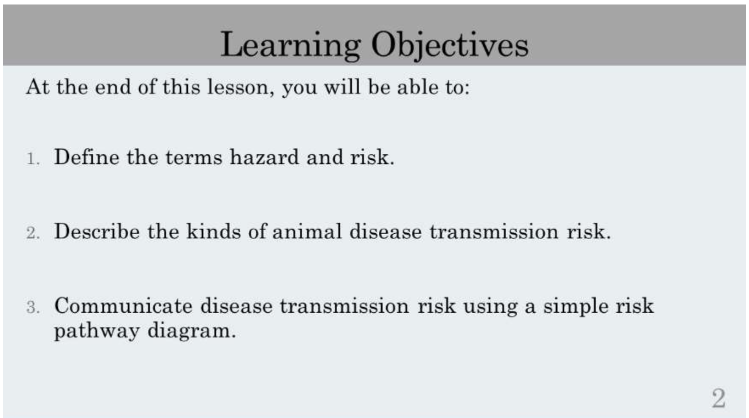
One Health Anthrax Surveillance In Arusha Local area, April 25 – May 4, 2018

1. Assess the reports provided to see if the structure and components are presented and fulfill what is expected of a standard outbreak investigation report.
    a. Introduction
    b. Objective (s)
    c. Methods
    d. Results
    e. Discussion
    f. Limitations
    g. Conclusions
    h. Recommendations

Section III: Week 3 – Preparedness, Disease Prevention and Response, Communication, Ethics, and Professionalism

Lesson 24 – Communicating Disease Transmission Risk to Diverse Audiences

Estimated Lesson and Exercise Time	2 hours
Participant Materials	ISAVET Lesson 24 Communicating Disease Transmission Risk to Diverse Audiences Participant Guide.PDF
	Computer and Microsoft Word



What is a Hazard?

HAZARD:

*means a biological, chemical or physical **agent** in, or a condition of, an…animal or …animal product with the potential to cause an adverse effect on aquatic, animal health or public health.*

Reference: Adapted, OIE. https://www.oie.int/fileadmin/Home/eng/Health_standards/aahc/2010/en_glossaire.htm. Accessed 11/09/2019

- Examples

Biological Hazards	Chemical Hazards	Physical Hazards
Highly pathogenic avian influenza virus	Botulinum toxin	Earthquakes, hurricanes, typhoons
Bacillus anthracis	Aflatoxin	Foreign bodies

3

What is Risk?

RISK

means the likelihood of the occurrence and the likely magnitude of the biological and economic consequences of an adverse event or effect to animal or human health.

We now understand that there are two ways to define Risk:

1. Probability (P) of an event occurring
2. Probability (P) of an event occurring times (x) the consequences (C) of an event

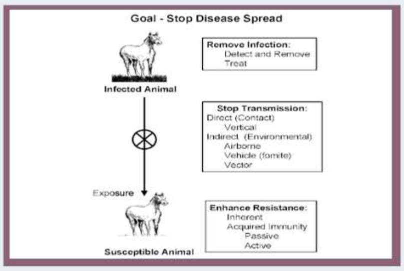
Reference: OIE. https://www.oie.int/fileadmin/Home/eng/Health_standards/aahc/2010/en_glossaire.htm. Accessed 11/09/2019

	Epidemiological Risk Definition	Risk Analysis Risk Definition
Equation	P = a / a+b (A proportion)	R = P x C (The product of a proportion and a consequence)
Example	P = Prevalence = 15/30 = 0.5	R = 0.5 x $100 = $50

4

Mechanisms of Disease Transmission

- Transmission of infectious disease agents require a susceptible host, and their ability to replicate in order to maintain the cycle of infection



Reference: Thrusfield

5

Disease Transmission

Types of transmission

- 1. Vertical transmission curs from mother to the embryo
- 2. Horizontal (lateral) transmission occurs from one infected animal to another

Direct transmission

- Requires effective contact directly with an infected host contact

Indirect transmission

- Involves an intermediate vehicle, living (vector) or inanimate (fomite)

6

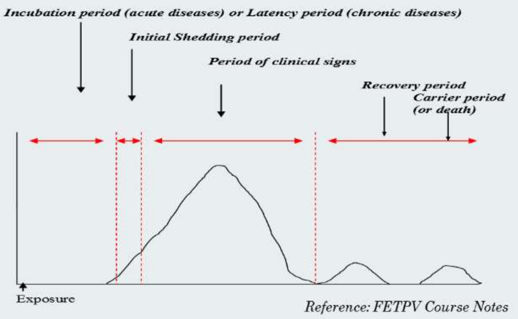
Mode of Transmission: Examples

Mode of Transmission	HPAI[1]	PPR[2]	RVF[3]
Faecal-oral	+	+	
Respiratory	+	+	+ (Blood aerosols)
Tears, saliva, nasal discharge	+	+	
Insect vector			+
Reproductive tract	+		+ (Foetus)
Milk			+/-
Meat	+		+
Eggs	+		

[1] Highly pathogenic avian influenza
[2] Peste des petits ruminants
[3] Rift Valley fever

7

Critical Time Periods for Host Infection



Reference: FETPV Course Notes

8

Disease Transmission Pathways

MOVEMENT OF DISEASE AGENTS

People and Equipment
- Transhumance - conflict zones
- Trade and Commerce – animal feed, drugs
- **Example: Cattle transporters**

Domestic Animals
- Along animal value chains
- From farm to consumer
- Across man-made boundaries
- **Example: Poultry, cattle, pig, goat market channels**

Wildlife
- Livestock-wildlife interface
- Urban rural interface
- **Example: Cattle grazing with gazelles**

Insect Vectors
- Seasonality
- Flying insects
- Ground insects
- **Example: Ticks related to Rift Valley Fever**

9

Disease Transmission Follows Trade and Human Conflict

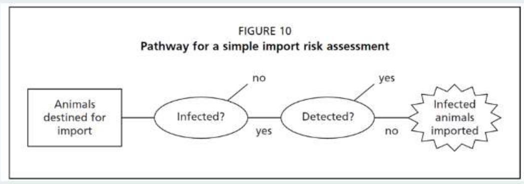
- Drivers for movement of animals and animal products:
  - Established trading routes (domestic and export trades)
  - Price differences (profit)
  - Transhumance (pastoralism) production system
  - Conflict areas

Reference: Google images

10

What is a Risk Pathway?

"A risk pathway is a series of conditions that must be met, or events that have to occur, in order for the unwanted outcome to occur. "
(FAO, 2011)



11

Communicating Disease Transmission Risk

- Veterinary field epidemiologists are not communication specialists;
- Use risk pathways to visualise how disease would likely enter, spread and impact the local populations using risk pathways

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Let's Create a Risk Pathway for Avian Influenza

1. **Hazard**
   - Family Orthomyxoviridae
   - Influenza virus A
   - Enveloped virus
     - 8 Strands of RNA
     - Code for 10 Proteins
     - 2 Surface Glycoproteins - Hemagglutinin (H1-16) and Neuraminidase (N1-9)
   - Example: H5N1
   - Affects 17 orders of birds
   - Low pathogenic or highly pathogenic types based on chicken challenge model
   - Zoonotic with varying impact on human health depending on subtype

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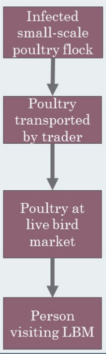
2. Risk pathway diagram for a person to become infected with virus X as a result of visiting a live bird market in geographic area Y during time period Z



Entry assessment:
Risk question:
What is the risk of viable X virus being present at least one live bird market enters into at least one geographic area Y during time period Z?

Exposure assessment:
Risk question:
What is the risk of at least one person becoming exposed to viable X virus as a result of visiting at least one live bird market in at least one geographic area Y during time period Z?

Consequence assessment:
Risk question:
What is the risk of at least one person becoming infected with viable X virus **and developing clinical disease** as a result of visiting at least one live bird market in at least one geographic area Y during time period Z?

Source: Dirk Pfeiffer

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Let's Create a Risk Pathway for PPR

1. Hazard:

- Peste des Petits Ruminants (PPR) virus – six structural proteins
- One serotype/four lineages related to Africa (I-III) and Middle East and Asia (IV)
- Morbilivirus (related to rinderpest and distemper viruses)
- **Detection:** Antigen (F protein) ELISA and RT-PCR (F and N genes) can differentiate PPR from rinderpest
- **Hosts:** Affects sheep and goats as well as some zoological animal species affected; buffaloes and pigs may be sub-clinically infected
- **Transmission:** Mainly direct through secretions, aerosols and feces; limited indirect through water and objects

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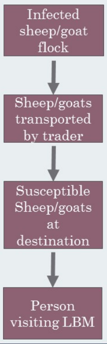
2. Risk pathway diagram for importation of PPR virus as a result of sheep and goat trade from geographic area Y during time period Z



Entry assessment:
Risk question:
What is the risk of PPR from at least one sheep or goat entering from xxxx to at least one neighbouring location from official and non-official trade in mm yyyy?

Exposure assessment:
Risk question:
What is the risk of PPR exposure from at least one imported sheep or goat for susceptible animals in at least one location if it enters in mm yyyy?

Consequence assessment:
Risk question:
What is the risk of a major outbreak of PPR in at least one destination location if at least one susceptible animal is exposed in mm yyyy?

Source: Dirk Pfeiffer

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Exercise 29: Risk Flow Diagrams

1. This exercise will take 60 minutes.
2. Form two groups.
3. Using the risk analysis principles, draw risk flow diagrams that describe:
   - The risk of Peste des Petits Ruminants (PPR) in sheep and goats; or
   - The risk of highly pathogenic avian influenza (HPAI) for poultry and humans.

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In Summary…

- Knowledge about the mode of transmission and spread of infectious diseases is the basis and essential input for designing and implementing effective risk mitigation measures;
- Understanding the socio-economic dynamics that drive movement of livestock and livestock products help to develop disease transmission pathways;
- Application of risk pathways enable us to anticipate, prevent, mitigate and effectively manage animal disease risks in a systematic fashion; and
- Risk pathways are is an integral part of risk communication that field epidemiologists are expected to undertake involving different groups of target audiences.

18

ISAVET Contributing Universities

Partners

TEXAS A&M UNIVERSITY

TEXAS A&M AGRILIFE

Contributors

MAKERERE UNIVERSITY

E.I.S.M.V. DE DAKAR

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Exercise 29 – Risk Flow Diagrams

Description of Exercise:

Develop risk flow diagrams for two infectious diseases. Should you have any questions over the exercise, please ask a trainer for clarification before during, and after the exercise.

Allotted Time: 1 hour

Organization of Group Work:

Form into two groups.

Exercise Objective(s):

1. Describe the kinds of animal disease transmission risk.
2. Describe disease transmission risk using risk analysis principles: hazard identification, risk assessment, risk communication and risk management.

Exercise Components and Structure:

Using the risk analysis principles, draw risk flow diagrams that describe:

1. The risk of peste des petits ruminants (PPR); or
2. The risk of highly pathogenic avian influenza (HPAI) for poultry and humans.

Materials, Data or Information:

1. Microsoft Word
2. Microsoft PowerPoint

Expected Outputs and Deliverables of Each Participant:

1. Two disease risk flow diagrams.

Group 1: PPR

Scenario 1: The Risk of PPR in Sheep and Goats

A pastoral flock of sheep and goat from Region X regularly travels during dry season to the nearest Region Y, which is a mid-altitude area with relatively better pasture and water availability and where sheep and goat flocks graze in communal grazing and water in common watering bodies. Develop a risk pathway for possible spread of PPR from Region X to Region Y of Country A during the dry season, which usually lasts for 2-months in Region X.

1. Create a risk pathway diagram for a sheep and goat population to become infected with PPR as a result of movement of live shoats from Region X to Region Y in Country A during the dry 2-months.

2. Develop one risk question that should be addressed for PPR when conducting the entry assessment, exposure assessment and consequence assessment.

Risk Analysis	Risk Question
Entry Assessment	
Exposure Assessment	
Consequence Assessment	

Group 2: HPAI

Scenario 2: The Risk of HPAI for Poultry and Humans

Country X was hit by H5N8 HPAI involving 3 local areas of its Region Y. As a result, the veterinary authorities imposed movement restrictions on poultry and poultry products from the affected local areas and region. Despite the restriction, poultry producers smuggle, through informal markets, broilers into a neighbouring Country Z affected by political crisis. Please develop a risk transmission pathway for the likely introduction and risk of H5N8 HPAI spread to the poultry and human population of the neighbouring country through the informal trading of broiler chickens from the infected country for a period of 1 month until the situation was discovered and stopped by cooperative efforts of authorities in both countries.

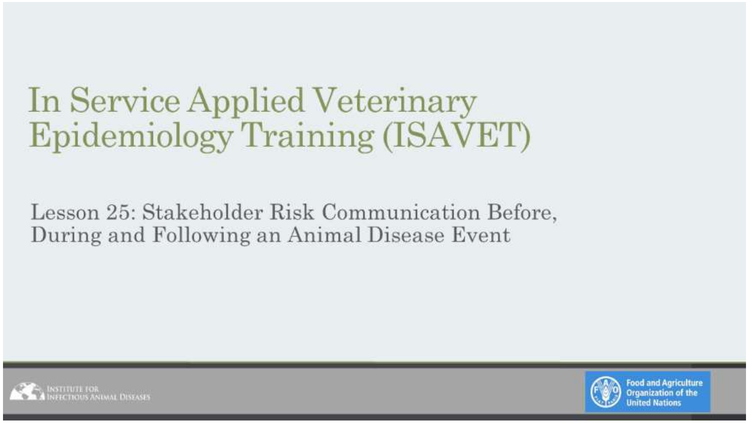
1. Create a risk pathway diagram for a poultry and human population to become infected with H5N8 as a result of informal training of broiler chickens from a HPAI infected region of Country X neighbouring Country Y during time period Z.

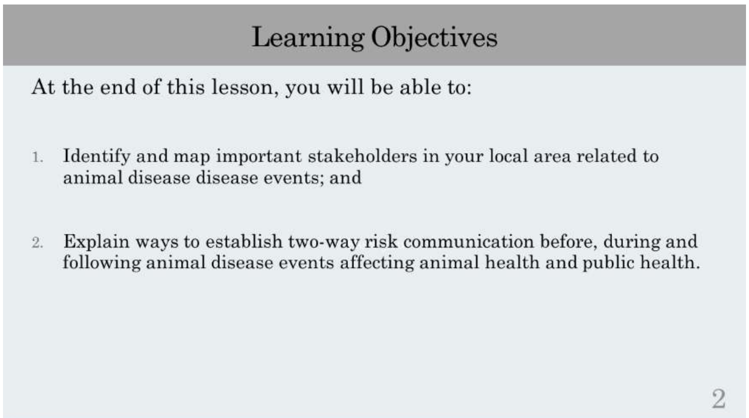
2. Develop one risk question that should be addressed for PPR when conducting the entry assessment, exposure assessment and consequence assessment.

Risk Analysis	Risk Question
Entry Assessment	
Exposure Assessment	
Consequence Assessment	

Lesson 25 – Stakeholder Risk Communication Before, During and Following an Animal Disease Event

Estimated Lesson and Exercise Time	2 hours
Participant Materials	Frontline ISAVET Lesson 25 Stakeholder Communications Before, During and Following an Animal Disease Event Participant Guide.PDF
	Computer and Microsoft Word
	Pen or Pencil





National Structure for Animal Health Communications (Example: Uganda)

Note:

1. The main stakeholders are identified
2. Most connections are two-way in direction

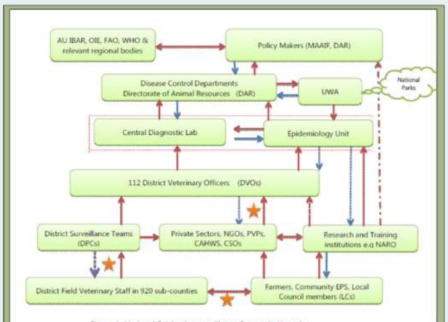


Figure 1: National Epidemio-surveillance System in Uganda

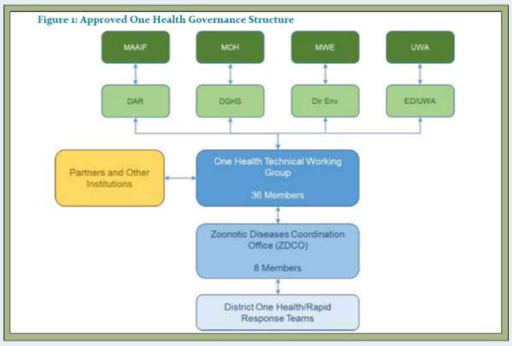
Reference: FAO

3

National One Human Communications Structure (Example: Uganda)

Functional communication is needed within the One Health Communication Structure in order to achieve One Health goals and objectives

Figure 1: Approved One Health Governance Structure



Reference: Uganda One Health Strategic Plan (2018 – 2022)

4

Animal Disease Event: Stakeholder Risk Communication (1)

Scenario: A rabies epidemic is occurring in humans and in dogs in a small village near Nairobi, Kenya

1. **What is risk communication?**

"an interactive process for exchanging information and opinions between risk evaluators, risk managers and other interested parties"

Reference: OIE, 2004 https://www.oie.int/doc/ged/D1274.PDF

2. **What is a stakeholder?**

"A stakeholder is a person, group or organisation involved in or affected by a course of action"

Reference: Adapted, Merriam Webster Dictionary

Reference: Google images

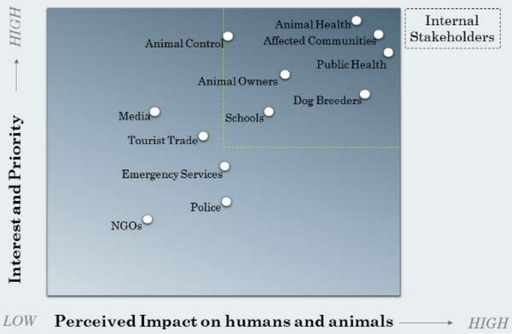
Two types of Stakeholders: Internal versus External

5

Rabies Stakeholder Mapping

Step 1: List all stakeholders involved or affected

Step 2: Assign to internal or external role



6

Animal Disease Event: Stakeholder Risk Communication

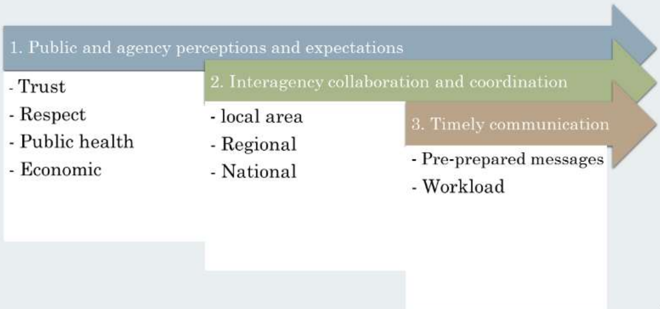
Scenario: A rabies epidemic is occurring in humans and in dogs in a small village near Nairobi, Kenya

Stakeholder	Type	Risk Communication
Affected Community, Schools	Internal: Directly affected by rabies	Awareness, prevent and control
Public Health	Internal: Responsible for human treatment	Medical services, prevent and control
Animal Health	Internal: Responsible to detect animal sources	Prevent and control rabies in dogs
Animal Owners / Control / Dog Breeders	Internal: Susceptible animals capable of spreading rabies	Early reporting
Media	External: Public awareness	Information Sharing
Tourist Trade	Internal or External: Economic impact	Information sharing
Police, emergency services, NGOs	External: Maintain civil order and public safety	Information sharing

Reference: Google images

7

Animal Disease Event: Rabies Risk Communication Challenges



8

Animal Disease Event: Best Practices for Stakeholder Risk Communication

1. Build trust with each stakeholder group
   Communicate in ways that establish, maintain or restore trust
2. Communicate early
   Develop messages in advance and adapt for sharing with the public
3. Be transparent
   Information communicated should be complete, accurate and easily understood
4. Respect concerns from the community
   Community concerns are legitimate and must be considered

9

1. Build Trust With Each Stakeholder Group

Scenario: A rabies epidemic is occurring in humans and in dogs in a small village near Nairobi, Kenya

- Community trust
  - Report only confirmed information about rabies cases and affected areas
  - Avoid creating undue fear
- To build, maintain or restore trust
  - Provide regular updates on progress or challenges requiring community support about rabies
  - Protect patient confidentiality
- Each stakeholder has different communication needs
  - Dog owners require different messages compared to livestock farmers

Reference: Google images

10

2. Communicate Early

Scenario: A rabies epidemic is occurring in humans and in dogs in a small village near Nairobi, Kenya

- The most important communication is your first communication
  - Provide timely alerts with accurate information about rabies cases in humans and animals
  - Describe what measures are being taken by public health and animal health officials
- Discuss information that is likely to be wrong with each stakeholder
  - Correct erroneous media messages immediately with correct information from public health and animal health agencies

Reference: Makerere University

11

3. Provide Transparency

Scenario: A rabies epidemic is occurring in humans and in dogs in a small village near Nairobi, Kenya

Transparent communication should

- Be candid and open: Admit errors or problems encountered
- Be understood easily: Avoid scientific terms about rabies
- Be accurate: Report only confirmed rabies cases
- Be complete: Give complete information about scope of rabies cases

Client confidentiality should be maintained

- Transparency outcome = increased trust: Rabies and many diseases can create social distancing and stigma for the affected families

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4. Respect Concerns from the Community

Scenario: A rabies epidemic is occurring in humans and in dogs in a small village near Nairobi, Kenya

- Community concerns are legitimate
  - Respect local customs when sharing information
- Rabies risk messages should be tailored for each audience:
  - Those at risk: warning
  - The community: diligence
  - Academia and researchers: accurate data is needed
  - Government officials: cooperation
  - Trade partners: Transparency
  - Media: Accurate information

Reference: Google images

13

Animal Disease Event: Developing Your Risk Communication Messages

- Creating clear and concise messages
  - Use a message map which include up to three key messages with supporting materials
  - Messages should be concise and brief
  - Messages should be understandable
  - Use positive terms. Avoid the terms “no” or “do not”

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Message Map

Map Title:
Stakeholder:
Questions or concern:
Overarching message: (Three sentences, up to 30 words at most, stated as simply as possible)

Key Message 1	Key Message 2	Key Message 3
Most important message	2nd most important message	Least important message
Supporting information	Supporting information	Supporting information
Add detail to overarching key messages (up to three statements)	Add detail to overarching key messages (up to three statements)	Add detail to overarching key messages (up to three statements)

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Message Map: During a Rabies Outbreak in Village X near Nairobi, Kenya

Map Title: Rabies In Village X, near Niarobi
Stakeholder: Dog Owners
Questions or concern: What is the risk of rabies for my dog to my family during an outbreak?
Overarching message: Rabies is a fatal disease of humans and other mammals that is transmitted through the saliva of infected animals

Key Message 1	Key Message 2	Key Message 3
Rabies is fatal disease and has been confirmed in the village	Dogs and other mammals transmit rabies virus when symptoms appear	Rabies can be prevented by regular vaccination of humans and animals
Confirmed positive cases 2 humans and 1 dog are reported	Infected persons or animals carry rabies virus from 10 days to over 12 months before signs of the disease appear	In rabies endemic countries, domestic animals and humans working with animals require vaccination.
1. Mortality in humans is 100% if not treated early 2. There is no treatment for rabies in dogs 3. Report all animal bites	1. Rabies virus is transmitted via saliva to open wounds or mucous membranes 2. Report behavior changes in animals: dumb and furious forms	1. Rabies is preventable 2. Domestic animals in rabies endemic countries require an annual vaccination

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Example: Before the LPAI H7N9 Outbreak

Map Title: Luwero Local Area Before
Stakeholder: Poultry Farmers
Questions or concern: What is LPAI H7N9 and why should we be prepared?
Overarching message: 1. AI infects domestic and wild birds; 2) Humans can become infected; 3) Good farm biosecurity measures prevent infection.

Key Message 1	Key Message 2	Key Message 3
LPAI H7N9 is an influenza virus that may become established.	**LPAI H7N9 poses a serious threat to human health.**	**Good market biosecurity measures can prevent infection**
- The virus has been detected in a neighboring country. - Brisk cross-border trade increases the chances of infected birds entering the country.	- LPAI H7N9 poses a serious public health threat because infected poultry can pass the virus to human beings and cause serious disease and death.	- The country has a good chance of preventing or mitigating the effects of an incursion by systematically planning and preparing its response.
- LPAI H7N9 spreads rapidly among chicken ducks without causing sickness - Fear of LPAI H7N9 can cause panic and reducing demand for poultry, causing economic losses to the poultry industry.	- Market managers should be trained to explain the facts about LPAI H7N9 to vendors, traders, suppliers, transporters and slaughterers.	- Key poultry markets and collection points with poultry should be closed once or twice a month for cleaning and disinfection.

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Example: During the LPAI H7N9 Outbreak

Map Title: Luwero Local Area During
Stakeholder: Market Managers, Vendors, Farmers
Questions or concern: How can you prevent LPAI H7N9 from spreading?
Overarching message: Effective market management and disinfection are the key to controlling LPAI H7N9

Key Message 1	Key Message 2	Key Message 3
LPAI H7N9 is disseminated through infected markets	**Prevention begins in poultry markets**	**Report flu-like symptoms immediately.**
- In infected areas, LPAI H7N9 have been found in samples collected from poultry and the environment from wholesale and retail bird markets.	- Poultry markets have been identified as the locus of new infections, since birds from distant areas arrive there. - Cooperation of market managers is essential	- Since LPAI H7N9 causes no symptoms in birds, the first sign of LPAI H7N9 infection is usually a human infection.
- Poultry markets must be closed cleaned and disinfected. - Market managers must be updated about the LPAI H7N9 threat, the government's contingency plan, and enhanced surveillance plan.	- Infected birds look 100% normal. - All exposed birds will be culled from infected markets, and the market closed and disinfected. - Humane culling and immediate disposal will be done.	- The first sign of LPAI H7N9 is a human infection. - With early treatment, LPAI H7N9 can be cured. - Seek immediate treatment for anyone with flu-like symptoms.

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Example: After the LPAI H7N9 Outbreak

Map Title: Luwero Local Area After
Stakeholder: Market Managers, Vendors, Farmers
Questions or concern: How can markets be kept safe in future?
Overarching message: Farm and market hygiene and best practices in poultry farming are key to preventing future outbreaks

Key Message 1	Key Message 2	
Culling is necessary to stop the outbreak	**Preventing future infections begins with following best practices at farms and markets**	
- Culling is a humane activity. - Farmers are compensated adequately and can restart their activities.	- Farm hygiene plays a key role in preventing future infections. - This includes separation of species, hygiene, and prompt reporting of unexplained illnesses and deaths	
- Infected markets will be re-opened for business after a period of disinfection and closure - Farmers will be adequately compensated and can resume their livelihoods	- LPAI H7N9 can evolve into HPAI H7N9 - Keep animal species separates to minimize a new virus jumping species - Report any unexplained deaths or illness immediately	

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Exercise 30: Stakeholder Communication Before, During and Following an Animal Disease Event

1. This exercise will take 90 minutes.
2. Map internal and external stakeholders in your Local Area using the mapping diagram illustrated in this lesson.
3. Divide into groups of five participants.
   - Group A: African swine fever
   - Group B: Brucellosis
   - Group C: Avian influenza
   - Group D: Rift Valley fever
   - Group E: Peste des petits ruminants
4. Each group will develop three message maps for one stakeholder group
   - Communication before an outbreak
   - During an outbreak
   - After an outbreak
5. Have one person from each group describe their stakeholder maps and message maps.

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In Summary…

- Internal and external stakeholder mapping is required before you develop risk communication messages.
- Message maps are powerful tools to provide critical messages to different stakeholders during different stages of an animal outbreak event.
  - Communication before an animal disease event
  - Communication during an animal disease event
  - Communication after an animal disease event

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ISAVET Contributing Universities

Partners

Contributors

22

Exercise 30 – Stakeholder Communication Before, During and Following an Animal Disease Event

Description of Exercise:

Develop a message map for a specific disease and identify a list of important stakeholders in your local area for communication of your messages. Should you have any questions over the exercise, please ask a trainer for clarification before during, and after the exercise.

Allotted Time: 1 hour and 30 minutes

Organisation of Group Work:

Divide into group of five participants -

- Group A: African swine fever
- Group B: Brucellosis
- Group C: Avian influenza
- Group D: Rift Valley fever
- Group E: Peste des petits ruminants

Exercise Objective(s):

1. Make a list of important stakeholders in your local area under the categories noted in the lecture.
2. Explain how communication differs before, during and following animal disease events.

Exercise Components and Structure:

1. Each group should develop three message maps for each stakeholder group.
2. Each message map should be tailored for each disease regarding communication before an outbreak, during an outbreak, and after an outbreak.
3. Have one person from each group describe their message maps to the entire group.

Materials, Data or Information:

1. MS Word
2. MS PowerPoint

Expected Outputs and Deliverables of Each Participant:

Inventory of local area stakeholders

1.Identify a list of important stakeholders in your local area

Category	**Group or Name**
Government personnel	
External audiences	
Collaborators and partners	

NGOs	
Media	

2. For your group, develop your message map over communication of your specific assigned disease topic before an outbreak.

Message Map Title:____
Stakeholder:____
Questions of concern:_____________________________________
Overarching message:______________________________________

Key Message 1	Key Message 2	Key Message 3
Supporting information	**Supporting Information**	**Supporting Information**
1.1:	2.1:	3.1:
1.2:	2.2:	3.2:
1.3:	2.3:	3.3:

3. For your group, develop your message map over communication of your specific assigned disease topic during an outbreak.

Message Map Title:______________________________
Stakeholder:______________________________
Questions of concern:______________________________
Overarching message:______________________________

Key Message 1	**Key Message 2**	**Key Message 3**
Supporting information	**Supporting Information**	**Supporting Information**
1.1: ____________ ____________ ____________	2.1: ____________ ____________ ____________	3.1: ____________ ____________ ____________
1.2: ____________ ____________ ____________	2.2: ____________ ____________ ____________	3.2: ____________ ____________ ____________
1.3: ____________ ____________ ____________	2.3: ____________ ____________ ____________	3.3: ____________ ____________ ____________

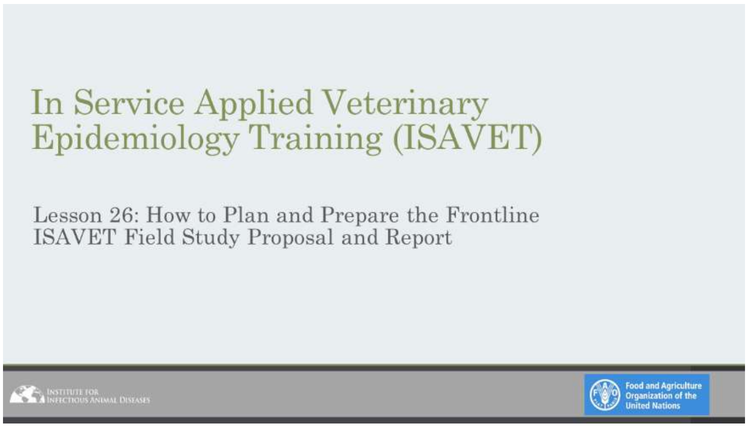
4. For your group, develop your message map over communication of your specific assigned disease topic <u>after an outbreak.</u>

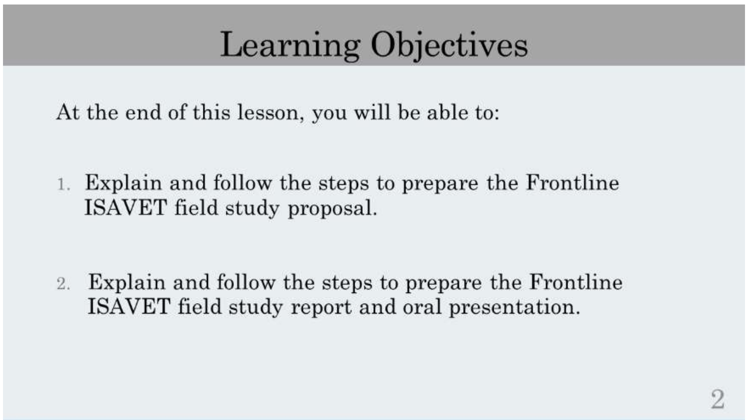
Message Map Title:____
Stakeholder:____
Questions of concern:____
Overarching message:____

Key Message 1	**Key Message 2**	**Key Message 3**
Supporting information	**Supporting Information**	**Supporting Information**
1.1:	2.1:	3.1:
1.2:	2.2:	3.2:
1.3:	2.3:	3.3:

Lesson 26 – How to Plan and Prepare the Frontline ISAVET Field Study Proposal and Report

Estimated Lesson and Exercise Time	2 hours
Participant Materials	ISAVET Lesson 26 Written and Oral Reports for Technical and Non-technical Audiences Participant Guide Version 4.PDF
	Computer and Microsoft Word
	Pen or Pencil





Learning Through Providing Service

Curriculum
- Technical emphasis in surveillance and field investigation

Clear Learning Objectives
- Lessons
- At the end of this lesson…

Classroom exercises
- Computer
- Team work

Field training
- Application of skills to meet local area needs

Field study
- Mentorship
- Application of skills to meet local area needs

3

Expected Field Products for Frontline ISAVET

Frontline ISAVET Field Products	Frontline ISAVET Training Course	Post-Training In-Country Field Work												
	4 Weeks	1	2	3	4	5	6	7	8	9	10	11	12	Expected Output
1. Weekly Surveillance Reports (10)														10 Weekly surveillance reports
2. Data Quality Audits (3)														3 Data quality audits
3. Brief Field Study (1)														Brief Field Study (Max 10 pages)
Finalize the detailed project proposal														Project proposal
Conduct required field visits														Data validation
Gather and prepare data from laboratory and/or field sources														Useful high quality data for further analysis
Compile descriptive data														Results of descriptive data analysis
Conduct descriptive analysis of data														Finalize data analysis
Report findings														Prepare oral and written Reports

4

Guidelines for Selection of a Field Study Topic

Topic
- High importance and impact in the local area

Duration
- Study must be completed in 3 months

Location
- Local area in your country

Scope of Work
- Must Include Data Management:
  - Data Collection
  - Data Quality
  - Data Analysis
  - Reporting

5

Frontline ISAVET Field Study Development
(Refer to Frontline ISAVET Trainee Project Status Checklist)

6

Steps for Preparing the Frontline ISAVET Field Study Proposal

1. **Select a field study topic that meets the local needs!**
   - Enter the topic on your Frontline ISAVET application form prior to the training.
   - Consult with your work supervisor
   - Contact both your academic and institutional mentors

7

Steps for Preparing the Frontline ISAVET Field Study Proposal

2. **Initiate your first draft with your academic and field mentors**
   - Share the proposed topic for your field study
   - Discuss your overall objective
   - Discuss the type of study that is most appropriate
   - Initiate your first draft and bring it to Frontline ISAVET training

8

Examples of Field Project Activities

Possible field activities can include **one** of the following:

- **Secondary data analyses of existing local area field data or laboratory data**
- **Report of a surveillance investigation**
- **Report of a field (case) or an outbreak investigation**
- **Develop a new or improve the existing local surveillance data collection and reporting**
- **Analyses of the existing surveillance data in the local area**
- **A disease survey or KAP (Knowledge, Attitudes, Practices) study**

Selection of the field activities should be based on local priorities, feasibility, practicality and availability of funds.

9

Steps for Preparing the Frontline ISAVET Field Study Proposal

3. **Complete your draft study proposal prior to training**

- Complete a first draft of the Project Proposal for Frontline ISAVET Field Activities Template with input from your mentors
- Bring your first draft to Frontline ISAVET training

10

Steps for Preparing the Frontline ISAVET Field Study Proposal

4. **Refine your proposal with input from trainers and mentors**

- Attend an appointment to discuss your field project proposal with a Frontline ISAVET trainer
- Continue to refine the proposal and share each new draft with your mentors in your country

11

Frontline ISAVET Project Management and Work Plan

ACTIVITIES	TIMELINE				OUTPUT
	Month 1 – Frontline ISAVET Training	Month 2	Month 3	Month 4	
1. Finalize the detailed project proposal					Project proposal
2. Conduct required field visits					Data validation
3. Gather and prepare data from laboratory and/or field sources					Useful high quality data for further analysis
4. Compile descriptive data					Results of descriptive data analysis
5. Conduct descriptive analysis of data					Finalize data analysis
6. Report findings					Prepare oral and written Reports

12

Steps for Preparing the Frontline ISAVET Field Study Proposal

5. **Finalise your proposal the first week following training**

- When you return home, discuss your field project proposal with both of your mentors and supervisor
- Complete your project proposal within one week upon your arrival home

13

Steps for Preparing the Frontline ISAVET Field Study Proposal

6. **Implement your field study**

- Finalise your project field study work plan
- Initiate data collection, quality control, analysis, display, conclusions and recommendations
- Meet weekly to update and consult with your supervisor and mentors

14

Steps for Preparing the Frontline ISAVET Field Study Proposal

7. **A. Prepare your written report**

- Objective: Share clearly and simply what you have learned with your audience
- Expectation:
  - Write…re-write…re-write…until is meets the standards for publication
- Share each draft with your mentors and trainers to improve it over time
- Use feedback to further improve your skills in field epidemiology

15

Frontline ISAVET Field Report Structure

Length: 10 Pages Maximum

Sections	Title Page
	Abstract
	Objectives
	Methods
	Results
	Conclusions and Limitations
	Recommendations
	References
	Acknowledgements

16

The Report Demonstrates Application of Technical Skills from the Frontline ISAVET Course

- **Definitions: Case definition and Unit of interest**
- **Data collection**
- **Data quality**
- **Descriptive analysis – animal, place, time**
- **Data display – tables, graphs, maps**
- **Data interpretation**
- **Making recommendations for action**
- **Reporting and communicating findings**
- **Monitoring and evaluation (M&E)**
- **One Health – multi-disciplinary, multi-sectoral coordination**

17

Steps for Preparing the Frontline ISAVET Field Study Proposal

7. **B. Prepare your and oral presentation**

- Aim for 20 minutes in duration or 20 slides maximum
- Follow guidelines in Lesson 22 for preparing PowerPoint Presentations

18

Preparation of Oral Presentations:

Prepare a 20-minute oral presentation using MS PowerPoint© consisting of a maximum of 20 slides

SECTION	NO. SLIDES
Title Page	1
Background	2
Key Issue of Importance	1
Objectives	1
Methods	4
Results	5
Conclusions and Limitations	3
Recommendations	2
Acknowledgements	1
TOTAL	20

19

Delivery of Oral Presentation at the Post-Training Workshop

- Refer to Lesson 24 for guidance on preparing a PowerPoint presentation for further details
- Review the mentor and trainer review forms for the a) written report and b) oral presentation to understand how you will be evaluated
- Share your presentation with your mentors 2 to 3 weeks in advance of the post-training workshop
- Rehearse your presentation ahead of time with your mentors
- Be prepared in advance for questions from participants and have your mentors ask you questions that you can anticipate
- Apply recommendations from trainers and mentors to improve your written report and oral presentation within 1 to 2 weeks following the post-training workshop

20

Guidelines for Sharing Technical Information with a Non-Technical Audience

1. Don't assume anything
2. Don't try to do too much in a brief time
3. Level the playing field and avoid technical jargon
4. Link data directly to conclusions and recommendations
5. Engage the audience based on their needs
6. Ask for feedback

21

Exercise 31: Complete the Frontline ISAVET Trainee Project Status Checklist

1. This exercise will take 60 minutes.
2. Complete the Frontline ISAVET Trainee Project Status Checklist with a trainer or mentor.
3. Take action to complete the next steps for your project proposal.

22

References

- Blostein D . Technical writing and oral presentations.
  http://research.cs.queensu.ca/home/blostein/TechnicalCommunication.pdf
  Accessed 09/17/2019
- Dianna Booher (2008). Presenting Technical Information to Nontechnical Audiences
- Hannah Richardson (2017). The Fundamental Principles of Report Writing

23


ISAVET Contributing Universities
Partners
TEXAS A&M
UNIVERSITY
TEXAS A&M
AGRILIFE
Contributors
MAKERERE UNIVERSITY
E.I.S.M.V. DE DAKAR
24

Exercise 31 – Frontline ISAVET Trainee Project Status Checklist

Description of Exercise:

Develop the introduction and objectives section for a technical report in MS Word and MS PowerPoint. Should you have any questions over the exercise, please ask a trainer for clarification before, during, and after the exercise.

Allotted Time: 60 minutes

Organisation of Group Work:

Work individually or in pairs.

Exercise Objective(s):

1. Complete the Frontline ISAVET Trainee Project Status Checklist with a trainer or mentor.
2. Take action to complete the next steps for your project proposal.

Exercise Components and Structure:

1. The trainer will introduce the objectives of the exercise and hand out a copy of the Frontline ISAVET Trainee Project Status Checklist (see below).
2. Complete the Frontline ISAVET Trainee Project Status Checklist with a trainer or mentor.
3. Take action to complete the next steps for your project proposal.
4. Complete the Frontline ISAVET Trainee Project Status Checklist with a trainer or mentor.

Take action to complete the next steps for your project proposal.

Materials, Data or Information:

1. MS Word
2. MS PowerPoint

Expected Outputs and Deliverables of Each Participant:

1. Update of the status of the project proposal.
2. An action plan to complete the project proposal.

Frontline ISAVET Trainee Project Status Checklist

Trainee Name:
Country:
Date Survey Conducted with Trainee:

Project Input	Status	Date	Follow up Action Required
Project Proposal Period			
1. The subject of the ISAVET in-country project is selected by the trainee and the work supervisor prior to attending the training	☐ Not initiated ☐ Initiated but not finalised ☐ Finalised ☐ Unsure		
2. The ISAVET trainee has been contacted by the academic mentor	☐ Yes ☐ No ☐ Unsure		
3. The ISAVET trainee has been contacted by the institutional mentor	☐ Yes ☐ No ☐ Unsure		
4. The ISAVET trainee is familiar with the ISAVET project protocol	☐ Yes ☐ No ☐ Unsure		
5. The ISAVET trainee has developed <u>a first draft</u> of their project proposal according to the project protocol	☐ Not initiated ☐ Initiated but not finalised ☐ Finalised ☐ Unsure		
6. A first draft of the project proposal has been sent to the both academic and institutional mentors and feedback has been received by the trainee	☐ Not yet sent to both mentors ☐ Sent to both mentors but no feedback received by trainee ☐ Trainee has received feedback from only one mentor ☐ Trainee has received feedback from both mentors ☐ Unsure		
7. The trainee would like inputs from the ISAVET trainers before the end of the training course	☐ Yes ☐ No ☐ Unsure		
Project Completion Period			

Project Input	Status	Date	Follow up Action Required
8. The trainee has completed the collection of all data required to achieve the objectives of the project.	☐ Yes ☐ No ☐ Partially completed ☐ Unsure		
9. The trainee has produced at least one draft report of the project in MS Word according to the format provided by Frontline ISAVET.	☐ Yes ☐ No ☐ Partially completed ☐ Unsure		
10. A draft report from the trainee has been reviewed by both mentors or a trainer, and the trainee has received feedback.	☐ Not yet sent to both mentors ☐ Sent to both mentors but no feedback received by trainee ☐ Trainee has received feedback from only one mentor ☐ Trainee has received feedback from both mentors ☐ Trainee has received feedback from at least one trainer ☐ Unsure		
11. The trainee has produced at least one draft report of the project in MS PowerPoint (20 slides maximum) according to the format provided by Frontline ISAVET.	☐ Yes ☐ No ☐ Partially completed ☐ Unsure		
12. The trainee would like inputs from the ISAVET trainers before presenting the final report and PowerPoint presentation at the follow up report meeting.	☐ Yes ☐ No ☐ Unsure		

1. Create a draft introduction and objectives statement for East Coast Fever using the information provided.

   Introduction:

   Objectives Statement:

2. Create a draft introduction and objectives statement for Brucellosis using the information provided.

   Introduction:

   Objectives Statement:

Lesson 27 – FACE – Ethical Decision-Making Framework

Estimated Lesson and Exercise Time	2 hours and 30 minutes
Participant Materials	Frontline ISAVET Lesson 27 FACE – Ethical Decision-Making Framework.PDF
	Computer and Microsoft Word
	Pen or Pencil

Learning Objectives

At the end of this lesson, you will be able to:

- Describe the role of ethics in veterinary practice.
- Recognize common ethical issues in veterinary practice.
- Apply an approach to making ethical decisions in your work.
- Understand that ethics often is not about a single "right" answer, but about balancing competing moral and ethical claims.

2

3

BBC

The snipers trained to protect rhinos

7 February 2016

In Kenya's Borana nature reserve, drastic new measures are being taken to protect vulnerable rhinos from poachers who kill the animals for their horns.

"We lost 17 from a population of 90," says Borana's Michael Dyer. "We were outgunned and outwitted, so we had to up our game." Dyer recruited a former Special Forces instructor from the British army to train a hand-picked militia of local men, then gave them to right to use lethal force by enrolling them as Kenya police reservists.

The teams monitor 102 rhinos, but when they spot poachers, they don't arrest them. They don't even invite them to lay down their arms. Instead, they kill them - 19 so far, in split-second ambushes during which their victims probably never knew what hit them.

http://www.bbc.com/news/magazine-35503077

4

Protecting the Rhinos

- Is this intervention ethical?
- Why or why not?
- What are your assumptions?
- Whose interests are at stake?

5

What is Meant by "Ethics"?

- Living in accordance with our values.
- The goal of ethical deliberation is not absolute certainty but reliability in our behavior, choices, and character.
  Joan Halifax (*Living on the Edge,* 2018)
- The hardest ethical decisions are not about "right" vs. "wrong"—they are about "right" vs. "right," or balancing competing ethical claims
  Rushworth Kidder (*How Good People Make Tough Choices,* 1955)

6

What is Meant by "Professional Ethics"?

- Codes for professionals that guide decisions and conduct
- Veterinarians have ethical obligations to:
  - Patients (animals)
  - Clients (humans who have the animals)
  - The health and safety of the public

Image: https://commons.wikimedia.org/wiki/File:Veterinary_Outreach_Hawaye_Kebele_Ethiopia.jpg

7

Dealing with Conflicting Interests

Patients (animals)

Clients (animal owners)

Public health and safety

Have there been times when you felt the needs of these groups were in conflict?

Images:
Cow: https://www.independent.co.uk/life-style/food-and-drink/cows-beef-farming-reverse-climate-change-global-warming-a8202121.html
Goat farmer: http://www.ipsnews.net/2016/11/climate-change-a-goat-farmers-gain/
Public health: https://medium.com/the-dish/two-public-health-grads-walk-into-a-startup-27a5bfbf50fd

8

Blue Local Area Scenario

Imagine that you are the local area veterinarian for Blue local area. A local farmer named Isaac has requested permission to move his herd of cattle out of Blue local area in order to go to better grazing grounds in the neighboring Green local area. Before Isaac's request is approved, you need to certify that you have examined the animals and that the herd is healthy enough to travel.

You travel to Isaac's farm on the western boundary of Blue local area. When you arrive, Isaac says that he is very glad to see you today because he plans to move his herd next week, and he needs the certificate as soon as possible. He explains that his cousin is a private veterinarian, and she was able to take blood samples from 20 of Isaac's cows. Isaac shows you the lab results that he says were taken by his cousin, and they indicate that none of the animals tested positive for brucellosis. You know his cousin from past work experiences, and you like her and respect her work. When you ask Isaac if his cousin came to draw blood samples from the cows or if he brought her the blood samples, he hesitates to answer. He finally says that he brought the blood samples to her, but only to save time because he needs to move his herd very soon.

10

Photo from Wikimedia Commons: https://commons.wikimedia.org/wiki/File:Cow_female_black_white.jpg

Blue Local Area Scenario

What would you do?

Let's look at how ethical principles can guide decision-making.

Photo from Wikimedia Commons: https://commons.wikimedia.org/wiki/File:Cow_female_black_white.jpg

11

Four Principles

Will this action provide benefits? [Beneficence]	Will this action cause harm? [Nonmaleficence]
Does this action respect the animals, your clients, and the general public? [Autonomy and Respect]	Is this action fair to the persons and animals involved? [Justice]

From Beauchamp & Childress (2012). Principles of Biomedical Ethics, 7th ed. New York: Oxford University Press.

12

Other Ethical Frameworks

- The four principles are a common way to approach ethical challenges because they are easy to remember and are relevant for many ethical dilemmas. However, there are other ethical approaches that are not based on the four principles.
- Ethics of Care
  - Taking care of others is a moral action.
  - The ethical course of action depends on the specific context and the relationships involved.
- Ubuntu
  - A term and concept in Bantu languages (Southern Africa).
  - Emphasis on interconnectedness of individuals and the community.

13

Beneficence: "Doing Good"

- In general, we all agree that it is good to be kind and to do good.
- In some circumstances, doing good for one person (or animal) may harm another.
- In some circumstances, doing good may not be possible.

In the Blue Local Area:

What does it mean to "do good" for the people and animals involved in the Blue Local Area scenario?

What is a way you could do good for Isaac?

For his animals?

For other community members or animals?

14

Nonmaleficence: "Do No Harm"

- Hippocratic oath
  - "I will use treatment to help the sick according to my ability and judgment, but I will never use it to injure or wrong them."
  - Oath of Bourgelat (veterinary version) – "First, do no harm."
- Are there situations where in order to achieve a greater good, you have to do harm?
- Harm can be intentional or unintentional.

In the Blue Local Area:

If you make Isaac wait to move the herd until you retest the animals, could this harm him or his animals? How?

If you do not retest the animals, could this harm other animals or people? How?

15

Autonomy and Respect

- Respect for animal patients, human clients and the general public. Allowing people to pursue their own desires is a form of respect.
- Are there situations in which it is difficult to act with respect for the needs of all involved?

In the Blue Local Area:

You want to respect Isaac's wish to move his herd, but you also have a responsibility to protect animal health and public health.

Which of these responsibilities is more important?

16

Justice: Fairness to All

- How do you balance fairness to the animal patient, the human client and the public?
- In a situation where the client's well-being and the public's health may be in opposition, we must ask what justice and fairness demand.

In the Blue Local Area:

Is it fair to ask Isaac to wait to move his herd when they have already been tested?

Is it fair to the public to use the herd's test results when you haven't verified them?

What conflicts of interest do you have in this case? If you didn't know Isaac, would your actions be different?

17

Four Principles

- What do you think about these principles?
- How might you use them in your work?
- Other questions or comments?

18

Common Ethical Challenges in Veterinary Practice

- Situations characterized by **fear, threat, and mistrust**, such as an infectious disease outbreak
- **Divided loyalties** between patients, clients, and public health and safety **(conflict of interest)**
- **Moral Distress:** when you realize you are causing harm or violating your core principles, but you can't avoid it

19

Law and Veterinary Ethics

- Does your country have a veterinary association?
- Does the veterinary law in your country have bylaws or regulations related to ethical behavior?
- If you do have these laws, how much are they enforced? What challenges are there with enforcement?
- Are there mechanisms for reporting and discussing ethical issues?

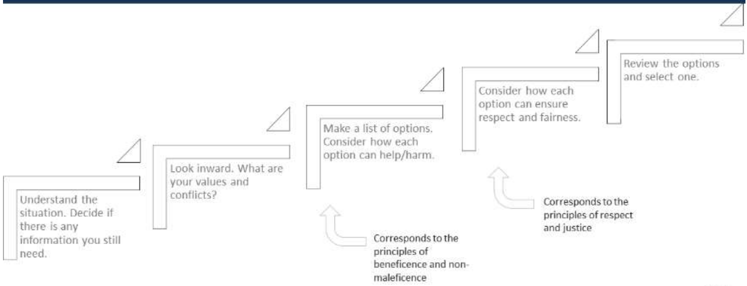
20

Ethical Decision-Making in Global Health: A Proposed Approach

Let's look at a framework you can use when faced with an ethical dilemma.

23

Ethical Decision-Making in Global Health: A Proposed Approach



24

Scenario about Conflicts of Interest: Dilemmas for government veterinarians who also conduct private practice

25

A Scenario about Conflicts of Interest: Dilemmas for government veterinarians who also conduct private practice

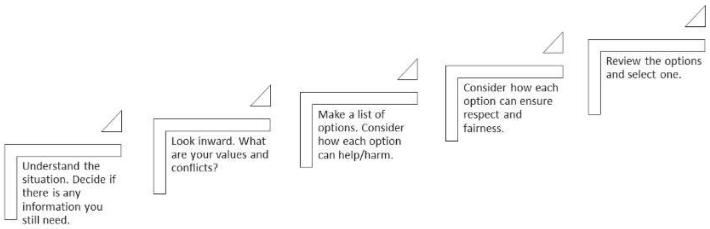
You are sub-county Veterinary Officer in Local Area A, in East Africa. You receive an urgent call from a rural pastoralist farmer seeking your help for one of his prize cows, which is high-value (Friesian pedigree). You quickly cancel your meetings for the day and drive to meet him. When you arrive, you find that the cow is recumbent, in advanced stages of pregnancy, with a ruptured amniotic sac, active uterine contractions, and severe vaginal prolapse with indications of dystocia. The animal has been showing signs of discomfort and restlessness for more than 6 hours. There are no other competent veterinary surgeons to handle the case in the area – the nearest being 75 km away.

The situation is an emergency. The government pays your (modest) salary and expects you to be responsible for animal health, but doesn't provide supplies or materials to handle surgical and clinical cases except for special assignments on rare occasions. You happen to have the necessary supplies in your vehicle and are willing to use them in your capacity as a private veterinarian, but you must charge the farmer US $40 for your time and materials (in part because you need the money to keep your two oldest children enrolled in school), which the farmer considers a lot of money.

Being an experienced Veterinary Officer, you know that African trypanosomiasis, which is a priority reportable zoonotic disease in your country, is associated with uterine or vaginal prolapse. The health regulations of your country require you to report any clinically suspect case of trypanosomiasis to the Local Area Veterinary Officer (DVO), and collect appropriate samples to send to the Local Area veterinary laboratory or a certified private laboratory. The government laboratory services are free. The government lab test results tend to take longer, but they are reliably reported to the national health authorities. In contrast, the certified private laboratory charges for tests; results are obtained much more quickly, but reporting positive results to the government authorities, as required by law, is less reliable. In either case, the farmer must pay the cost of specimen collection.

26

Ethical Decision-Making in Global Health: A Proposed Approach



27

In Summary…

- Veterinarians face a variety of ethical challenges in their day-to-day work.
- Professional codes of ethics for veterinarians describe responsibilities to three major stakeholders: patients (animals), clients, and the public.
- The interests – and ethical claims – of these three groups may sometimes be in tension or in conflict with each other.
- Four principles of bioethics can be useful in weighing ethical claims of different groups. These principles are: beneficence; non-maleficence; autonomy (respect); and justice (fairness).
- The 5-step approach to ethical decision-making can help the veterinarian to analyze ethical dilemmas, identify where additional information is needed, and weigh different courses of action.

28

Acknowledgements

- Food and Agriculture Organization (FAO) of the United Nations contributors:
  - Caryl Lockhart, FAO Rome
  - Sam Okuthe, FAO Uganda
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  - Heather Simmons
- The Task Force for Global Health contributors:
  - David Addiss, Focus Area for Compassion and Ethics (FACE)
  - Angela Hilmers, Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET)
  - Jessica Hill, Focus Area for Compassion and Ethics (FACE)
  - Emma Cooke, Emory University School of Medicine

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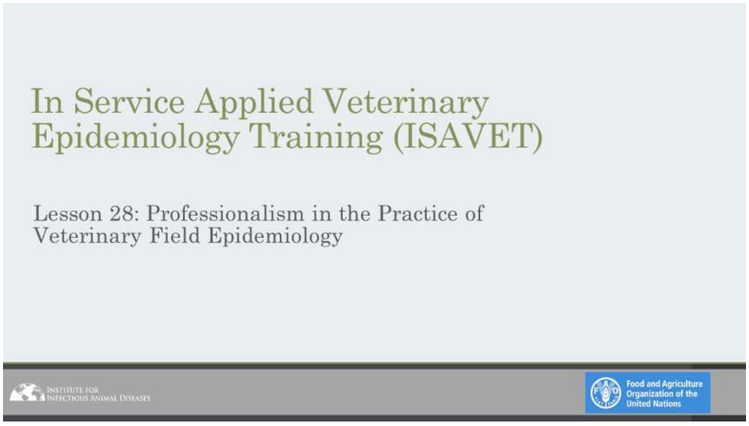
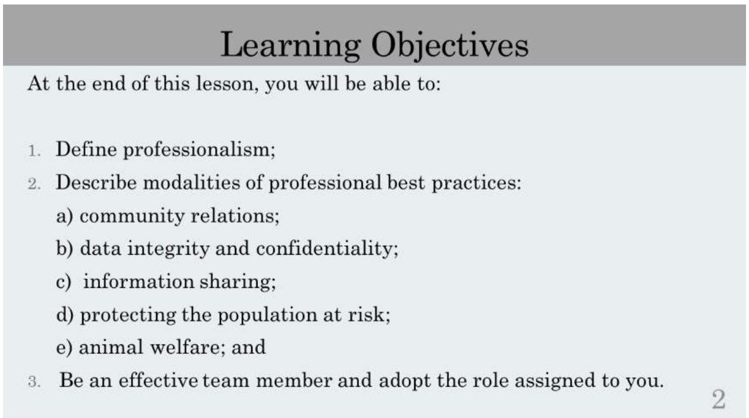
Case Study 3: Practical Ethics for Veterinarians

Your instructor will provide an additional resource after group discussions conclude.

Lesson 28 – Professionalism in the Practice of Veterinary Field Epidemiology

Estimated Lesson and Exercise Time	2 hours
Participant Materials	Frontline ISAVET Lesson 28 Professionalism in the Practice of Veterinary Field Epidemiology Participant GuidePDF
	Computer and Microsoft Word





1.Professionalism

1 → 2

1: Professionalism is about the competence expected of a certain profession.

2: Professionalism for frontline veterinarians includes how you conduct your field duties and how interact with important stakeholders.

Reference: Google Images

3

Veterinary Statutory Bodies

Type	Role	Example
Professional associations	Oversee the quality and competence of veterinarians in a country (OIE)	American Veterinary Medical Association promotes continuing education and accredits Veterinary Colleges
Professional regulatory body	Assure legal compliance with veterinary legislation and regulations	California Veterinary Medical Board issues veterinary licenses based on qualifications and enforces standards of professional conduct

4

Objectives of Veterinary Statutory Bodies

- To promote and safeguard the interests, welfare, terms and conditions of service for veterinary professionals.
- Enhance recognition of their crucial role in promoting animal health, food safety, animal welfare and public health.
- Encourage members to maintain the honor, dignity, independence, integrity, tradition of the profession, professional standards, discipline, conduct and etiquette.

Reference: Google Images

5

Professionalism in Frontline Veterinary Field Epidemiology

- Frontline Veterinary Field Epidemiology embraces the One Health approach:
  - **It means communicating, collaborating, cooperating and working together to achieve better health for humans, animals and the environment.**
- The health of people is connected to the health of animals and the environment.

References: Google Images

6

a) Community Relations for Frontline Veterinarians

- Establish & maintain a mutually beneficial relationships with communities and important stakeholders.
  - Work with the leaders to enlist community and stakeholder support
- Foster two way communication among frontline veterinarians, the community and important stakeholders.
  - Communicate risk regularly with communities and stakeholders (see Lesson 24 for details)
- Utilise community support & cooperation in order to better prevent and control the disease.
  - Cultivate trust with key informants and leaders who can assist with case finding
- Inform the community and important stakeholders of you role to investigate, identify the cause of the problem, provide interventions to stop transmission and protect the population at risk.
  - Enlist community leaders and stakeholders to take part in disease prevention and control activities

Reference: Google Images

7

Relationship Building

Relationship Building Ingredients
- Transparency
- Trust
- Commitment
- Social bonding
- Adaptation

Meeting Expectations
- Professionalism

Good Community Relations
- Cooperation
- Collaboration
- Engagement
- Synergy
- Positive reference
- Word of mouth

8

Best Practices for Community Relations

1. Recognition of cultural institutions and elders or opinion leaders
2. Collaboration with local leaders and institutions
3. Dress appropriately for the community of interest
4. Determine correct language for community of interest
5. Avoid mannerisms that are disruptive or destructive
6. Show respect to the community members

9

b) Best Practices for Data Integrity and Confidentiality

Capture data
Use a reliable means and ensure accuracy

Don't falsify data
Hold daily team meetings to cross check completeness

Data storage
Store appropriately to avoid loss

Restrict access to the data
Encourage confidentiality

Reference: Google Images

10

c) Best Practices for Information Sharing

1. Share information with those who need it
2. Release to media only information meant for them
3. Only release information that is cleared by the team leader
4. Appoint one spokesperson for each field investigation
5. Provide regular updates to the general public
6. Package information in different forms to suit different audiences

11

d) and e) Best Practices For Protecting the Population at Risk & Ensuring Animal Welfare

Maintain biosafety and biosecurity during investigations
- Use correct disinfection or change PPE between farms

Minimise pain, discomfort and/or injury to animals
- Use appropriate restraint and handling methods
- Practice humane euthanasia when required

Access to food and water
- Affected animals health during an investigation

Avoid overcrowding
- Discomfort and distress to animals during an investigation

12

Humane Euthanasia and Disposal

- Humane euthanasia is a standard every local veterinarian must practice
  - "Do no Harm!"
  - Standards for each species of animal are available but sometimes difficult maintain under field conditions – DO YOUR BEST!
  - Promotes goodwill with animal owners and the community
  - Prevent negative publicity in the media and on the internet!
- Immediate, proper disposal method is a professional duty to stop further disease transmission
  - Know the advantages and disadvantages of each disposal method
  - Example: Burial is challenging in the rainy season when the water table is high

References: Google Images

13

3. Be an Effective Team Member

- Teamwork is required for all field epidemiology and emergency preparedness and response activities during complex, animal and public health field events.
  - Examples: Sample and data collection, applying control measures
- Apply your skills within a multisectoral and multidisciplinary team under a One Health approach.
  - Example: Surveillance Rapid Response Teams
- Know your assigned role, listen and follow instructions from the team leader and provide input when required.
  - Example: Conduct animal disease case finding in coordination with public health colleagues
- A coordinated team effort requires effective risk communication to support decision making and coordination of a field investigation.
  - Example: Discovery of human leptospirosis cases leads to an animal disease field investigation

14

Exercise 32: Professionalism During Veterinary Field Investigations

1. This exercise should take 90 minutes.
2. Form into six (6) groups
3. List and describe best practices for veterinary field epidemiologists in your local area for the following issues and add to this list:
4. List of additional best practices:
   - Build rapport with the community leaders as soon as possible.
   - Recognise the socio-cultural setting of the affected community.
   - Community using a language that is well understood.
   - The team should dress appropriately.
   - Respect privacy of the community members.
   - Cross cultural skills so as interpret the cultural practices appropriately and respect the culture of the affected community. Don't despise the important aspects of the community.

15

In Summary…

1. If the veterinary field epidemiologists-community relations are not handled well, it can lead to suspicion, mistrust, lack of transparency and accountability leading to sabotage of the field investigations by the community members.
2. This would undermine the overall success thus hindering appropriate intervention.
3. To sum it up, for successful veterinary field epidemiology investigations good relations that provide mutual benefits and foster interdependence between the team and the community members is required.

16

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Exercise 32 – Professionalism During Veterinary Field Investigations

Description of Exercise:

List and describe best practices for veterinary field epidemiologists in your country. Should you have any questions over the exercise, please ask a trainer for clarification before during, and after the exercise.

Allotted Time: 90 minutes

Organisation of Group Work:

Form into six (6) groups.

Exercise Objective(s):

1. Define professionalism.
2. Describe modalities of professional best practices: Community relations; data integrity and confidentiality; information sharing; protecting the population at risk and animal welfare.
3. Be an effective team member and adopt the role assigned to you.

Exercise Components and Structure:

1. List and describe best practices for veterinary field epidemiologists in your country for the following issues and add to this list:
   - List of additional best practices:
   - Build rapport with the community leaders as soon as possible.
   - Recognise the socio-cultural setting of the affected community.
   - Community using a language that is well understood.
   - The team should dress appropriately.
   - Respect privacy of the community members.
   - Cross cultural skills so as interpret the cultural practices appropriately and respect the culture of the affected community. Don't despise the important aspects of the community.

Materials, Data or Information:

1. Microsoft Word
2. Microsoft PowerPoint

Expected Outputs and Deliverables of Each Participant:

1. List and description of best practices for field epidemiologists.

List and describe best practices for the following:

- **Community relations**

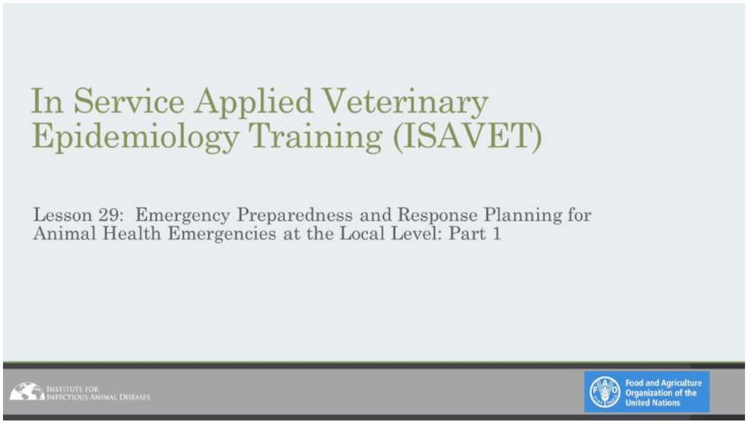
- **Data integrity and confidentiality**

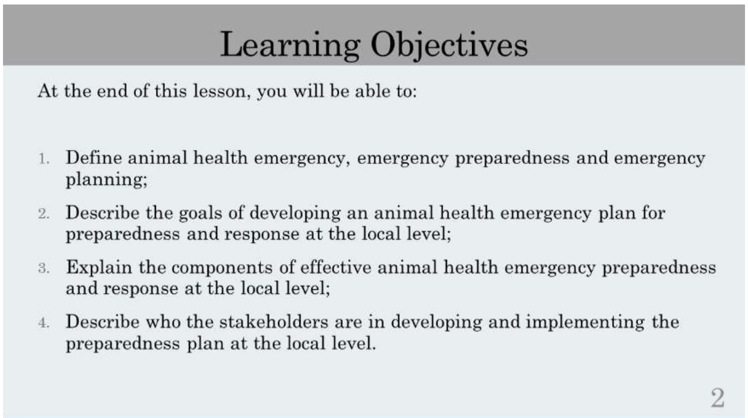
- **Information sharing**

- **Protection of the population at risk and animal welfare**

Lesson 29 – Emergency Preparedness and Response Planning for Animal Health Emergencies at the Local Level: Part 1

Estimated Lesson and Exercise Time	3 hours
Participant Materials	Frontline ISAVET Lesson 29 Emergency Preparedness and Response Planning for Animal Health Emergencies at the Local Level: Part 1 Participant Guide.PDF
	Computer and Microsoft Word
	Pen or Pencil





Definition of Animal Disease Emergency
(OIE, 2018)

- Transboundary animal disease (TAD), defined as an epidemic;
- Disease which is highly contagious or transmissible;
- The potential for very rapid spread, irrespective of national borders;
- Cause serious socio-economic and possibly public health consequences.

3

Definitions (OIE, 2018): Emergency Preparedness and Emergency Response

PREPAREDNESS

- Is based on an emergency preparedness plan
- The plan outlines what a government **needs to do** before an outbreak of a disease happens in order to be prepared (i.e. getting ready).

RESPONSE

- Is based on a contingency plan:
- The response plan details what a government **will do** in the event of an incursion of a disease, from the point when a suspect case is reported (i.e. responding).

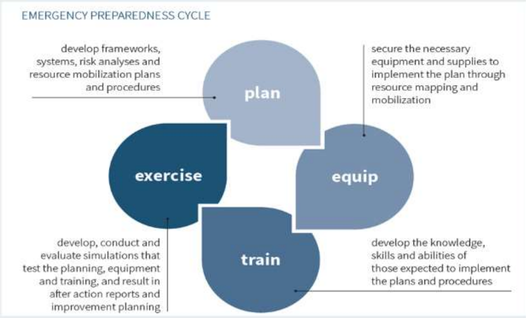
4

Goals of an Animal Health Emergency Plan
(Adapted: FAO, GEMP)

Reduce the impact of animal health emergencies, whether caused by natural occurrence, accidental or deliberate introduction, by enhancing … [local]… preparedness and response capacity.

5

Components of effective animal health emergency preparedness at the local level



Reference: FAO, GRAP

6

1. Plan

- 1a. Develop a plan with internal governmental stakeholders including national, regional and local levels
- 1b. Include existing national legal authority and contingency plan
- 1c. Develop a plan with external stakeholders to prepare for effective intersectoral emergency response
- 1d. Develop communication and coordination plans for zoonoses, animal diseases and AMR
- 1e. A financial plan is required to mobilise funding in the event of an emergency

7

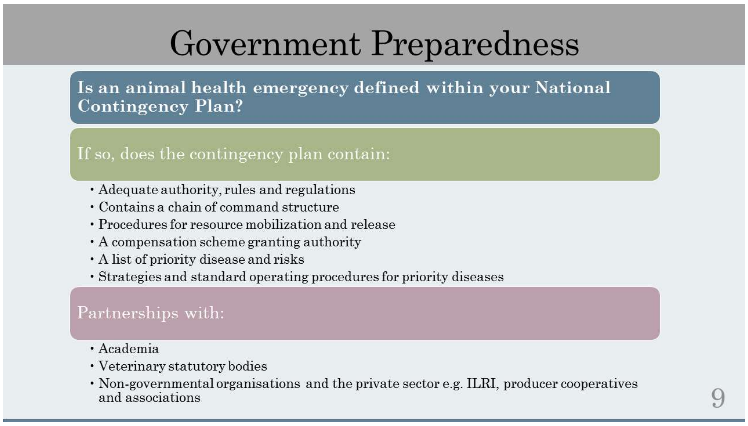
Animal Health Emergency Preparedness is a Partnership at Every Level!

Planning depends on partnerships coordinated by the Government

Define roles and expectations for:

- **Government**
  - Internal
    - National
    - District (Local)
    - Sub-district
  - **Private Sector**
    - Understand and acknowledge their importance!
  - **Academia**
  - **National planning** provides structure for district participants during an outbreak

8


Government Preparedness
Is an animal health emergency defined within your National Contingency Plan?
If so, does the contingency plan contain:
• Adequate authority, rules and regulations
• Contains a chain of command structure
• Procedures for resource mobilization and release
• A compensation scheme granting authority
• A list of priority disease and risks
• Strategies and standard operating procedures for priority diseases
Partnerships with:
• Academia
• Veterinary statutory bodies
• Non-governmental organisations and the private sector e.g. ILRI, producer cooperatives and associations
9


Internal Government Planning and Preparedness
National Plan
• Chain of Command
• Response Strategies
• Coordination
• Resources
• Logistics
• Communications
District/local implementation
• Local task force established
• Establish quarantines and movement controls
• Humane culling and disposal
• Direct surveillance teams
• Establish vaccination protocols
• Report findings to national level
• Liaison with local authorities
• Provide outreach to farmers
Staff training
• Participate in outbreaks in other locations
• Review of disease and response specifics
• Response teams
• Exercises
• Table top
• Field exercises
10


External Stakeholders Planning and Preparedness
National Disaster Management Authorities
• Animal Health
• Public Health
• Wildlife
• National Emergency Management Agency
Livestock Industry Groups
Veterinary Statutory Bodies
Non-governmental Organisations (NGOs)
Local Farmers
Livestock Market Participants – owners, traders, vendors, public
Laboratories – government, academic, private
11

2. Equip

- 2a. Identify human resources sufficient for case finding, surveillance, movement control, humane culling and disposal, etc.
- 2b. Identify equipment and materials required to support all field and laboratory needs
- 2c. Prepare training material and standard operating procedures (SOP) for field work
- 2d. Be prepared for how to mobilise human equipment and material resources for effective emergency response

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2. Equip: Examples

Human Resources
- Skills Inventory
- Cross-utilization
- Team rosters

Equipment
- Transportation
- Laboratory
- Vaccination
- Movement control
- Signs
- Disposal

Materials
- PPE
- Communication messages
- Supplies – disinfectant
- Humane culling
- District plan

13

3. Train

- 3a. Conduct a skills inventory of all personnel. e.g. epidemiology, field operations, laboratory, communication, etc.
- 3b. Establish field teams and train them together so that each person understands their role and responsibilities
- 3c. Provide regular field and bench training updates
- 3d. Practice standard operating procedures (SOP) for field work

14

3. Train: Examples

Human Resources
- Skills inventory of personnel
- Cross-utilization
- Team rosters

Training Models
- Train as a team
- Participate in regular outbreaks
- Train and update regularly
- Table top
- Field simulation
- Joint animal health public health field training

Materials
- Contingency plan
- Training curriculum and materials
- Standard operating procedures (SOP)

15

4. Exercise

4a. Organise field teams according to disease surveillance, disease diagnosis and disease control functions

4b. Provide as many opportunities as possible for staff to participate in outbreaks in neighbouring districts

4c. Conduct short regular tabletop and field exercises based on each components of the emergency response plan

16

4. Exercise: Examples

Planning
- A simulation exercise is a test of how the contingency plan works in the real world, at the local level
- Establish a simulation exercise planning committee
- Include public and private sectors

Organisation
- Plan 3-6 months in advance of conducting formal field simulation training exercises
- Review the contingency plan
- Establish realistic goals and deliverables for the exercise

Evaluation
- Evaluate how to improve the simulation exercise
- Evaluate the outcome of the simulation exercise and update the contingency plan accordingly
- Update training curriculum and materials and standard operating procedures (SOP)

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Exercise 33: District Level Planning Matrix

1. This exercise will take 120 minutes.
2. Divide into two groups of roughly equal size.
3. Groups should elect a leader to facilitate discussion.
4. Groups should elect a scribe to record information.
5. Check and record the emergency preparedness elements that you can achieve in your local area to achieve the following:
   - PLAN
   - EQUIP
   - TRAIN
   - EXERCISE
6. Discussion will follow related to implementation and inclusion in existing plans when the students return home.

18

In Summary…

- This module introduces preparedness planning concepts for animal health emergencies with a focus on district implementation;
- Local veterinary offices need to plan, equip, train and exercise to prepare for emergencies;
- Use the output from Exercise 33 to further improve your local area emergency preparedness.

19

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TEXAS A&M AGRILIFE

Contributors

MAKERERE UNIVERSITY

E.I.S.M.V. DE DAKAR

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Exercise 33 – Local Area Level Planning Matrix

Description of Exercise:

Develop a local-level planning matrix in preparation for an animal disease outbreak. Use avian influenza as the disease. Should you have any questions over the exercise, please ask a trainer for clarification.

Allotted Time: 120 minutes

Organisation of Group Work:

Form yourselves into groups of roughly equal size.

Exercise Objective(s):

1. Check and record the emergency preparedness elements that you can achieve in your local area.

Exercise Components and Structure:

1. Check and record the emergency preparedness elements that you can achieve in your local area to achieve the following:

   - PLAN
   - EQUIP
   - TRAIN
   - EXERCISE

2. Develop a local level planning matrix.

Materials, Data or Information:

1. Flip chart
2. Markers
3. Computer

Expected Outputs and Deliverables of Each Participant:

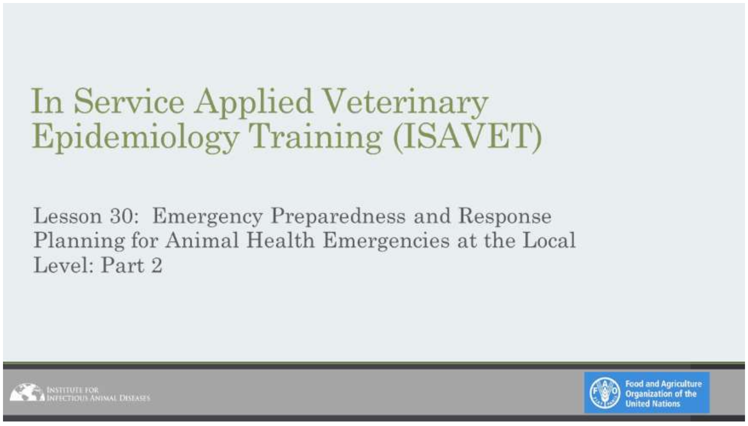
1. Complete matrix of local preparedness.

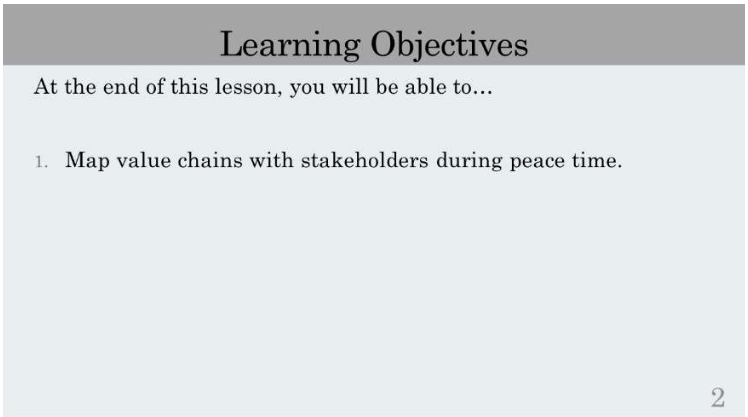
Local Preparedness Matrix

Preparedness Step	**Details of Local Preparedness**
1. Plan	▪
2. Equip	▪
3. Train	▪
4. Exercise	▪

Lesson 30 – Emergency Preparedness and Response Planning for Animal Health Emergencies at the Local Level: Part 2

Estimated Lesson and Exercise Time	3 hours
Participant Materials	ISAVET Lesson 30 Emergency Preparedness and Response Planning for Animal Health Emergencies at the Local Level - Part 2 Participant Guide.doc
	Computer and Microsoft Word
	Pen or Pencil





Value Chain Maps are part of Preparing for an Emergency Emergency

Value Chain mapping is an important part of emergency preparedness:

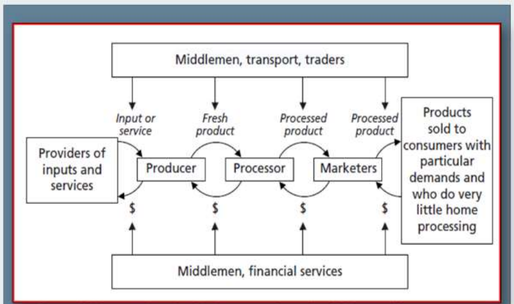
1. It informs risk based surveillance
2. It informs rapid field response for prevention and control of disease transmission through marketing channels

Reference: FAO, GRAP

3

What are Animal Value Chains?

- Value chains are the marketing channels for movement of animals, animal products and animal by products
- Value chains include inputs, processes and outputs

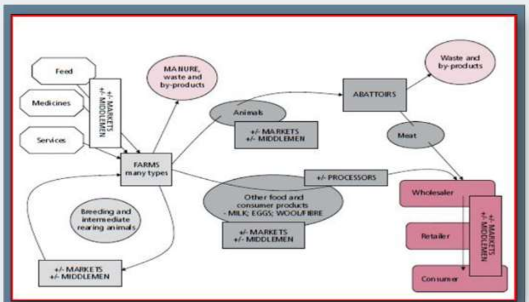


Source: FAO 2011 – A value chain approach to animal disease risk management

4

What are Animal Value Chains?

INPUTS > PROCESSES > OUTPUTS

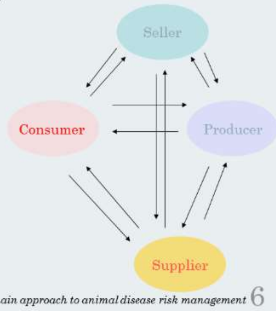


Source: FAO 2011 – A value chain approach to animal disease risk management

5

The Livestock Sector

- Who are involved in livestock value chains?
- Initial thoughts:
  - People who eat – consumers
  - People who own and produce – producers
  - People who supply – suppliers
  - People who sell – sellers
  - People who buy – consumers
- Each player has a unique motivation for their actions within the value chains.
  - Profit: Producers, sellers and Suppliers
  - Nourishment: Consumers



Source: FAO 2011 – A value chain approach to animal disease risk management 6

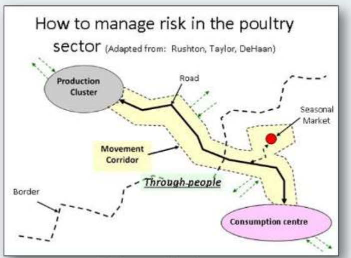
Value Chains Operate Both Inside and Outside of the Local Area

- Food is produced through a chain of processes for each type of animal production system-
  - Farm production
  - Transport
  - Marketing
  - Consumption
- Each type of livestock production system is composed of the following:
  - Inputs
  - Processes
  - Outputs
  - People who influence the movement of animal products

7

Value Chains Operate Across Border Lines

- Animal products move from production areas to consumption areas.
- Movement occurs through movement corridors which contain market points along the way.
- Animal traders and marketers are key players that control the system.



Reference: Rushton

8

Benefits of District Value Chain Mapping

Risk Assessment	Disease Prevention	Disease Control
• Assess risk points before conducting surveillance	• Conduct risk-based surveillance with limited human and material resources	• Act quickly and anticipate where disease can be spreading in advance

9

How do we Develop an Understanding of Value Chains at the Local Level?

- Value chain mapping is the first step to developing a preventive strategy for early disease detection based on the trading behaviour of farmers, middlemen and marketers.
- Build value chain maps in peace time (before there are outbreaks.
- Bring together the local stakeholders:
  - Producers
  - Suppliers
  - Sellers
  - Consumers

10

Steps in Developing a District Value Chain Map

1. Select an animal production system to map
Dairy, beef, sheep, goat, pigs and/or poultry

2. Assemble the risk mapping team
Farmers, breeders, district veterinarians, traders, marketers and suppliers

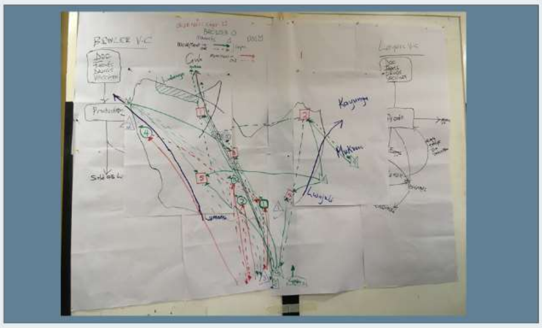
3. Discuss the objectives and benefits of value chain mapping
Targeted risk-based surveillance and early detection

4. Draw a district map
Show boundaries, roads, rivers, lakes and railways

5. Build the map layers and nodes
Location of breeders, producers, processors, markets, feed and medication sources

11

Example: Value Chain Map of Poultry Value Chain



Reference: Frontline ISAVET

12

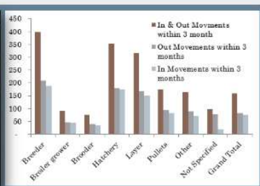
Outcomes From Value Chain Mapping

- Link risk-based surveillance to available resources:
  - Human resources
  - Laboratory resources
  - Financial resources
- Develop risk-based criteria for prevention and control:
  - Identify high-risk nodes for surveillance
  - Establish the basis for descriptive value chain analysis
  - Establish the basis for advanced studies such as social network analysis

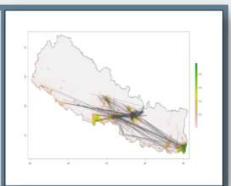
13

Value Chain Outputs

1. **Value Chain Map**



2. **Descriptive Data**



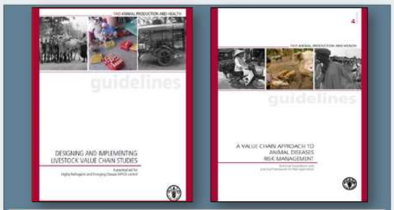
3. **Risk Map**

Reference: FAO, 2014

14

FAO Value Chain Studies

- Guidelines on designing livestock value chain studies for disease risk assessment and control purposes
  - Acknowledgement: Jan Hinrichs



http://www.fao.org/docrep/015/i2583e/i2583e00.pdf

15

Exercise 34: Preparedness

- This exercise should take 120 minutes.
- Participate in the Value Chain Workshop demonstration.
- Local veterinarians, farmers, dealers and market owners will develop a value chain map for a local area animal production system (cattle, sheep, goats, poultry, etc.).

16

In Summary…

- Value chain mapping should be conducted as part of preparedness activities BEFORE an outbreak occurs
- Value chain mapping at the district level offers the following benefits:
  - *Risk Assessment:* Assess risk points before conducting surveillance
  - *Disease Prevention:* Conduct risk-based surveillance with limited human and material resources
  - *Disease Control:* Act quickly and anticipate where disease can be spreading in advance

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18

Exercise 34 - Preparedness

Description of Exercise:

Develop a local-level value chain may in preparation for an animal disease outbreak. Should you have any questions over the exercise, please ask a trainer for clarification.

Allotted Time: 120 minutes

Organisation of Group Work:

Participate in the value chain workshop.

Exercise Objective(s):

1. Local veterinarians, farmers, dealers and market owners will develop a value chain map for a local production system with assistance of the local veterinarians using the following method.

Exercise Components and Structure:

1. Develop a value chain map.

Materials, Data or Information:

1. Flip chart
2. Markers
3. Computer

Expected Outputs and Deliverables of Each Participant:

1.Experience of doing value chain mapping in preparation for animal disease outbreak events.

The process for developing local value chain maps for each animal production system is as follows:

1. **Select an animal production system to map**

2. **Assemble the risk mapping team**

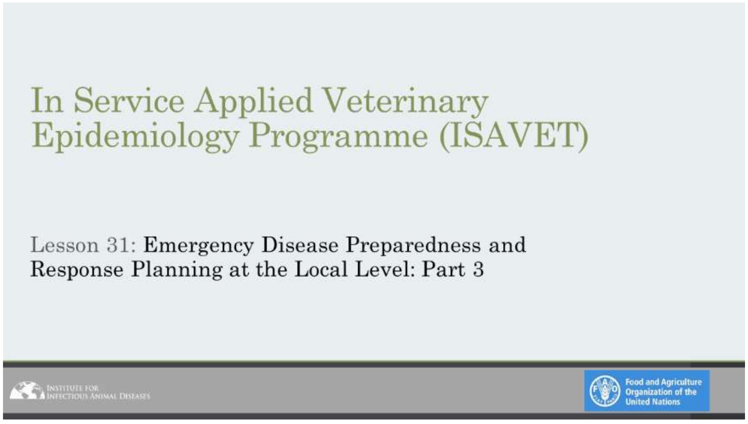
3. **Discuss the objectives and benefits of value chain mapping**

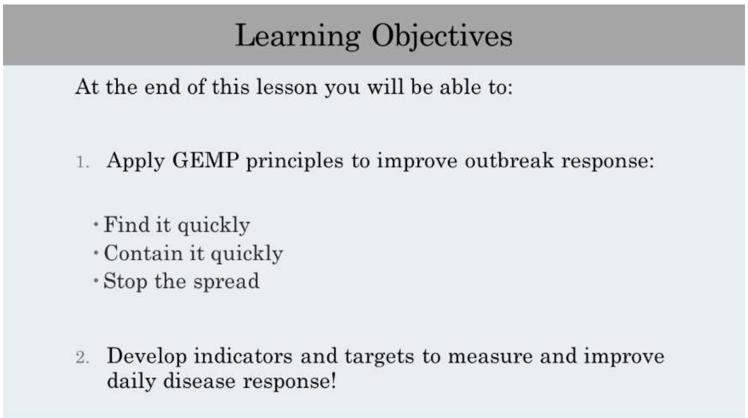
4. **Draw a local map using a large piece of white paper that is taped to the wall**

5. **Build the map layers and nodes**

Lesson 31 – Emergency Preparedness and Response Planning at the Local Level: Part 3

Estimated Lesson and Exercise Time	3 hours
Participant Materials	ISAVET Lesson 30 Emergency Preparedness and Response Planning at the Local Level - Part 3 Participant Guide.doc
	Computer and Microsoft Word
	Pen or Pencil





Health Intervention Model for Disease Prevention and Control

(Adapted: FAO, 2006)

Prevent Exposure
- Humane culling
- Quarantine
- Biosecurity
- Surveillance

Prevent Transmission
- Movement control
- Biosecurity
- Surveillance

Enhance Host Immunity
- Vaccination
- Biosecurity
- Surveillance
- Seromonitoring

Compensation, Communication, Public-Private Collaboration

3

Scenario

- There has been an outbreak of foot and mouth disease (FMD) in your area that has affected many diary and beef farms. You live in a cattle exporting country.
- Assume that the official policy is humane culling of affected animals.

1. How will you begin to assess the size (magnitude) of this outbreak?
2. How will you measure progress?

ANSWERS
1.1 Aggressive case finding and calculate morbidity, mortality and specific rates and risks
1.2 Value chain approach to assess high risk nodes within your area and outside of it
1.3 Daily zero reporting from the sublocal areas
2.1 We need to develop indicators and targets to measure trends and progress daily
2.2 Take action if disease incidence increases

4

Scenario

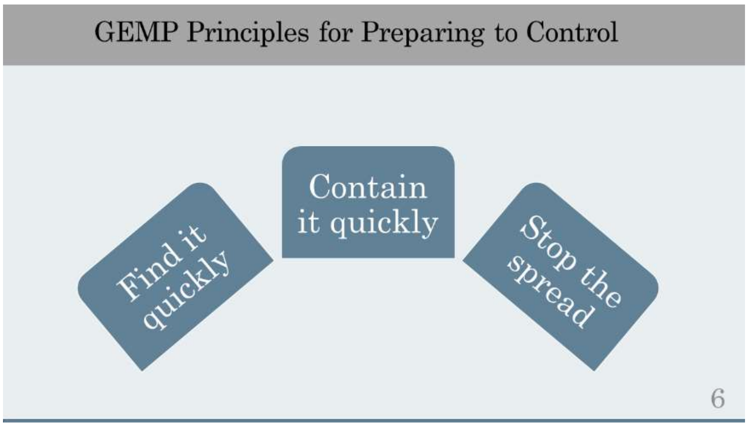
ANSWERS
3.1 Aggressive case finding
3.2 Value chain approach
3.3 Daily zero reporting from the subdistricts

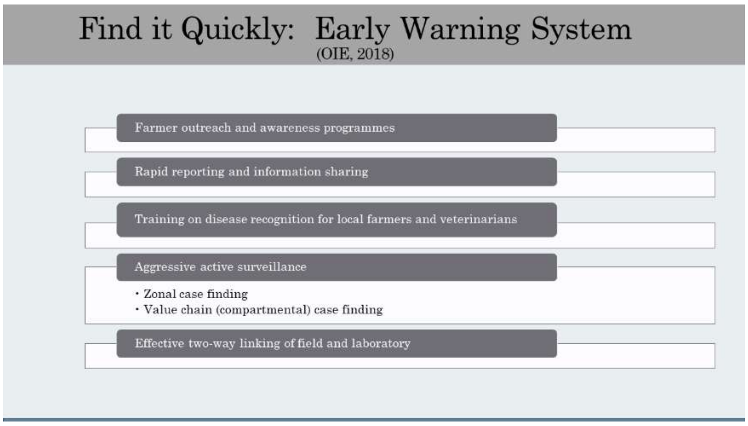
4.1 Collect and analyse information daily
4.2 We need to develop indicators and targets to measure trends and progress daily
4.3 Take action when the trends are not positive

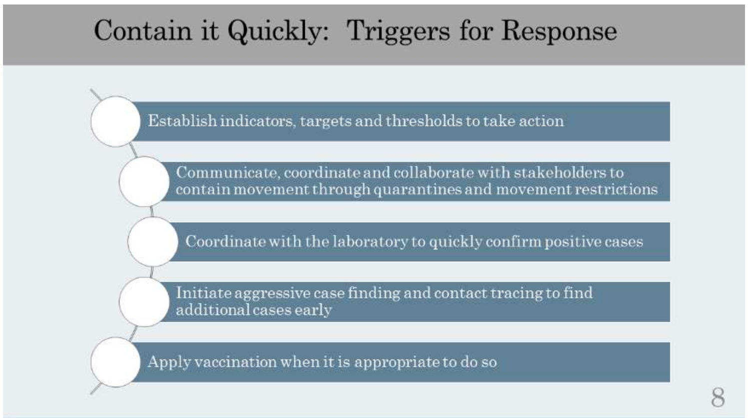
- The outbreak of foot and mouth disease continues and farmers want to know how many cattle are affected and where they are located.

3. How will you determine the geographical extent of culling that may be required?
4. How will you measure progress?

5


GEMP Principles for Preparing to Control
Find it quickly
Contain it quickly
Stop the spread
6


Find it Quickly: Early Warning System
(OIE, 2018)
Farmer outreach and awareness programmes
Rapid reporting and information sharing
Training on disease recognition for local farmers and veterinarians
Aggressive active surveillance
• Zonal case finding
• Value chain (compartmental) case finding
Effective two-way linking of field and laboratory


Contain it Quickly: Triggers for Response
Establish indicators, targets and thresholds to take action
Communicate, coordinate and collaborate with stakeholders to contain movement through quarantines and movement restrictions
Coordinate with the laboratory to quickly confirm positive cases
Initiate aggressive case finding and contact tracing to find additional cases early
Apply vaccination when it is appropriate to do so
8

Stop the Spread: Control and Verify

Humane Culling and Safe Disposal

Reduce and contain virus transmission from affected sites

Quarantine

Prevent movement from suspect and confirmed cases until action is taken

Biosecurity

Train farmers and veterinarians to follow "Biosecurity Best Practices"

Active Surveillance - Verify

Look in the local area and along the value chain to confirm control

9

Find it Quickly: Daily Outbreak Report Metrics

Subdistrict Name	Ratio of positive to negative suspect or confirmed cases	% of suspect or confirmed positive cases detected by active surveillance	No. days from onset of clinical signs to farmer reporting (days)	No. of surveillance events reported today
Subdistrict A				
Subdistrict B				
Subdistrict C				
Subdistrict D				
Subdistrict E				
Subdistrict F				
Subdistrict G				
Subdistrict H				
Total	:	%		

10

Contain it Quickly: Daily Outbreak Report Metrics

Subdistrict Name	No. days from reporting to quarantine	No. days from reporting to culling confirmed cases	No. days from culling to burial or burning	No. days from burial to cleaning and disinfection
Subdistrict A				
Subdistrict B				
Subdistrict C				
Subdistrict D				
Subdistrict E				
Subdistrict F				
Subdistrict G				
Subdistrict H				
Total				

11

Stop the Spread: Daily Outbreak Report Metrics

Subdistrict Name	No. of affected premises today (daily incidence)	Ratio of affected premises today versus previous day	Point prevalence today	Weekly prevalence estimate
Subdistrict A				
Subdistrict B				
Subdistrict C				
Subdistrict D				
Subdistrict E				
Subdistrict F				
Subdistrict G				
Subdistrict H				
Total				

12

Daily Surveillance Reports by Animal-Place-Time

Animal							
Species or Type	Class	Total No. at Risk	No. Sick	No. Dead	Disease(S) Suspected (S), Probable (P) or Confirmed (C)	Notes: (Age groups, breed and sex most affected, etc)	Active (A) Passive (P)

Place				Time			
Region	Subdistrict Name	GPS Coordinates (Latitude)	GPS Coordinates (Longitude)	Date of Visit	Date Symptoms First Observed	Date of First Death	Date of Laboratory Submission

13

How do we measure the effectiveness of disease control at the district level?

1. Define indicators and targets
2. Take daily action

14

Indicators and Targets
(Adapted, Frontline FETP)

Indicator

- Statement to measure achievement of an activity objective
- Example: Is disease investigation done on time?

Target

- Desired level of achievement
- Example: 80% of disease outbreak investigations are done within 4 hours of reporting

15

Surveillance Indicators You can use in Your Local Area

District Response	District and Laboratory Response	Completeness of Subdistrict Reporting	Use of Active Surveillance

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What Are Some Surveillance Indicators in Your Local Area?

District Response	District and Laboratory Response	Completeness of Subdistrict Reporting	Use of Active Surveillance
Time to respond to farmer request for field investigation	Time from sample collection to laboratory reporting	Percentage of daily reports received from subdistrict offices	% of surveillance samples collected actively each day
Percentage of district field investigations with a complete report	Time from laboratory report received by district until farmer notification	Percentage of complete disease data from each subdistrict	Number of secondary field investigations generated from a primary field investigation

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Exercise 35

1. Form into four groups
2. Develop indicators and targets to measure the effectiveness of disease control using the template provided in the next slide
3. Propose any changes or modifications that would be useful in your district

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Appropriate Indicators for Your Local Area: Group into country teams and fill in the cells

District Response	Target	District and Laboratory Response	Target	Completeness of Subdistrict Reporting	Target	Use of Active Surveillance	Target
Time to respond to farmer request for field investigation		Time from sample collection to laboratory reporting		Percentage of daily reports received from subdistrict offices		% of surveillance samples collected actively daily	
Percentage of district field investigations with a complete report		Time from laboratory report received by district until farmer notification		Percentage of complete disease data from each subdistrict		Percentage of secondary field investigations generated from a primary field investigation	

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In Summary…

- Apply GEMP principles to improve outbreak response:

  1. Find it quickly
  2. Contain it quickly
  3. Stop the spread

- Develop indicators and targets to measure and improve daily disease response!

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Contributors
MAKERERE UNIVERSITY
E.I.S.M.V. DE DAKAR
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Exercise 35 – Develop Indicators and Targets to Measure the Effectiveness of Disease Response and Control

Description of Exercise:
Prepare to measure and improve disease outbreak response in your local area

Time: 120 minutes
- Group work: 60 minutes
- Group reports and discussion: 60 minutes

Organization:
The lesson includes theory from FAO GEMP principles, a scenario exercise and a metrics exercise.

Exercise Objective(s):
1. Explain the health interventions model.
2. Explain specific principles that are used to prepare for and improve disease response following an outbreak.

Exercise Components and Structure:
- Form into four groups
- Develop indicators and targets to measure the effectiveness of disease control using the template provided in the next slide
- Propose any changes or modifications that would be useful in your local area
- Deliver group reports and participate in plenary discussion

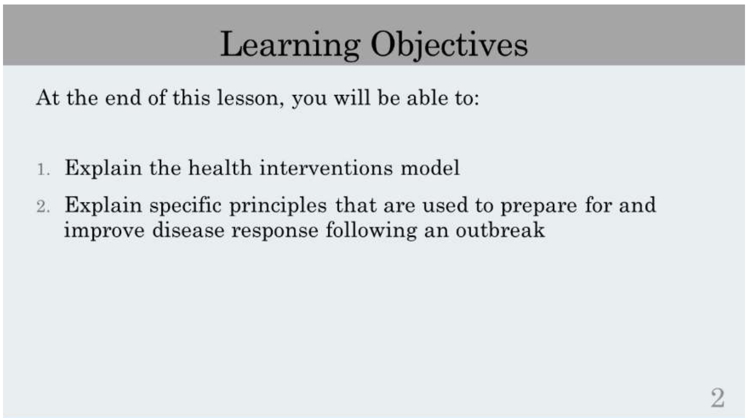
District Response	Target	District and Laboratory Response	Target	Completeness of Subdistrict Reporting	Target	Use of Active Surveillance	Target
Time to respond to farmer request for field investigation		Time from sample collection to laboratory reporting		Percentage of daily reports received from subdistrict offices		% of surveillance samples collected actively daily	
Percentage of district field investigations with a complete report		Time from laboratory report received by district until farmer notification		Percentage of complete disease data from each subdistrict		Percentage of secondary field investigations generated from a primary field investigation	

Expected Outputs and Deliverables of Each Participant:

1. Active listening and participation in asking questions, providing targets related to response indicators to improve outbreak response.
2. Justify your indicators and target values you have chosen.

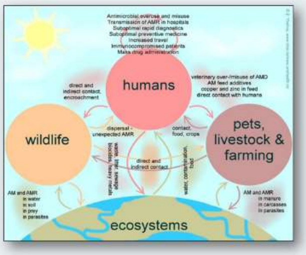
Lesson 32 – Characteristics of a Functional Disease Prevention and Control Programme at the Local Level

Estimated Lesson and Exercise Time	3 hours
Participant Materials	ISAVET Lesson 30 Emergency Preparedness and Response Planning at the Local Level - Part 3 Participant Guide.doc
	Computer and Microsoft Word
	Pen or Pencil



Current Challenges

- Population growth, consumerism and increasing protein demand
- Increasing global trade and animal movement
- Urban encroachment and land use
- Livestock intensification
- Spill over of disease at the animal-human-wildlife and environmental interface
- Antimicrobial use and resistance
- Climate change



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Role of Frontline Veterinarians for the Prevention and Control of Animal Diseases

Promote animal health
- Veterinary extension
- Animal production

Prevent disease introduction
- Rapid detection
- Protect susceptible populations

Contain and control disease
- Surveillance
- Field investigation

4

Responsibilities of Frontline Veterinarians for the Prevention and Control of Animal Diseases

1. Veterinary extension
2. Partnerships
3. Communication
4. Biosecurity
5. Movement control
6. Humane culling
7. Safe disposal
8. Compensation
9. Vaccination and sero-monitoring
10. Disease surveillance and investigation

5

Veterinary Extension: Setting the Stage for Cooperation and Collaboration

Benefits of Veterinary Extension Services	
	Provides preventive health promotion services to farmers to improve production
	Entry point to ensure cooperation and collaboration with farmers
	Creates positive relationships based on mutual benefit
	Measures baseline production levels and permits data collection
	Improve efficiency, profits and the adoption of prevention practices
	Positive working relationship is crucial for effective prevention and control of disease

Source: Google images

6

What Extension Activities Would be Useful in Your Local Area?

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Public-Private Partnership (PPP)

- Mutual benefit for both public and private sectors including:
  1. **Product and export certification programmes**
     - Compartmentalisation
     - Food safety quality assurance programmes
  2. **Vaccination programmes**
     - FMD, PPR, Rabies, Anthrax
- PPP are often developed through extension training and education programmes at the local level

PPP Public Private Partnership Africa

Source: Google images

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Communication

Communication channels important at the local level

Vertical Communication:
- Chain of command (regular timetable)
- Laboratory and district communication

Horizontal Communication:
- Public-private sectors (farmers, producer associations)
- Animal-human-environmental interface
- Office of emergency services
- Research and education institutions

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Veterinary Biosecurity

- Personal protective actions and equipment
  - Hand hygiene
  - Disinfectants and sterilants
  - Personal protective equipment
  - Prevention of bites and other animal-related injuries
- Protective actions during veterinary procedures
  - Examination of animals
  - Post mortem investigations
  - Diagnostic specimen handling
- Environmental infection control
  - Cleaning and disinfection of equipment
  - Veterinary waste disposal

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Biosecurity for Veterinarians

Question for Veterinarian	Yes	No
1. The veterinarian does not own or manage his/her own poultry flock. **[essential]**		
2. The veterinarian only visits a maximum of one poultry farm each day. **[essential]**		
3. The veterinarian wears clean, dedicated clothing and footwear for each farm visit. **[essential]**		
4. The veterinarian does not visit farms or poultry markets outside of the poultry production zone (PPZ) on the same day that he/she is visiting farms within the PPZ. **[essential]**		
5. The veterinarian does not visit farms with different poultry species on the same day. **[essential]**		
6. The veterinarian does not buy or sell poultry or poultry products. **[essential]**		
7. The veterinarian attended at least one biosecurity training course in the previous year.		
8. The veterinarian has delivered biosecurity training to farmers in the previous year.		
9. Is it true that biosecurity principles include isolation, traffic control, cleaning and disinfection and waste disposal?		
10. On each farm visit: the veterinarian removes rings and watches; does not use his/her mobile phone.		
11. The veterinarian always visits younger poultry first, before visiting older poultry.		
12. The veterinarian maintains separate "clean" and "dirty" areas in his/her vehicle.		
13. The veterinarian washes his/her hands and feet and removes protective clothing after leaving a poultry house and before entering his/her vehicle.		
14. Dirty clothing and footwear are placed in sealed bags and stored in the "dirty" area of the vehicle until they are washed at home.		
15. The veterinarian cleans and disinfects all equipment before leaving the poultry farm.		
16. The veterinarian cleans and disinfects the outside of his vehicle following each farm call.		
17. The veterinarian signs the farmer's visitor logbook during each visit.		
18. The veterinarian changes into clean footwear when they enter the farm block.		
19. The veterinarian carries a pail, brush and disinfectant in his vehicle.		
20. The veterinarian parks his vehicle outside of the poultry farm before entering the farm.		
Subtotals:		

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Movement Control

- Critical during an outbreak event but may also be used preventively before and following an outbreak
- The modes of transmission of disease vary and disease spread due to the movement of live animals and animal products can be controlled by movement restrictions
- Such movement restrictions need to be well-supported by legislation
- Livestock keepers should understand the need for restrictions
- Difficult to implement in pastoral areas and in areas where borders and boundaries are porous
- For this reason, risk-based surveillance along the value chains that cross these boundaries is absolutely critical

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Quarantine

- Is an official extension of the biosecurity principle of isolation
- Quarantining of infected or potentially infected farms or areas
- Restrictions are placed on the movement of susceptible species animals into or out of the quarantined area until infection is considered to have been removed
- Restrictions may also be placed on the movement of people, potentially contaminated animal products and other materials
- Enforcement require appropriate legal framework

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Humane Culling and Safe Disposal

- Prevention includes safe culling to rapidly remove sources of infectious materials
- For most animal disease emergencies, some degree of culling is likely to be necessary
- Include animal wastes and feathers
- Involves cleansing and disinfection of properties
- Culling must be carried out in a humane manner
- Method used varies from situation to situation

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Compensation

- A compensation policy is needed for killing of animals or the destruction of property
- Should be seen as mostly an incentive to encourage rapid reporting of disease
- Not as compensation for all losses
- Inadequate or too generous can encourage behaviours that are damaging to the control efforts
- Poor compensation might encourage owners to hide or move their animals to avoid culling
- Generous compensation encourage risky behavior

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Vaccination and Seromonitoring

- The objective of vaccination should be specified in the vaccination policy (prevention, control or eradication)
- Seromonitoring before and following vaccination is important to define prior exposure and immune response, respectively
- The vaccination policy includes the following measures
  - Preventive vaccination
  - Emergency vaccination
  - Routine vaccination
- Vaccination in the face of an outbreak is a difficult, resource intensive and expensive task
- The properties of the vaccines must be well-understood
- It is rare that vaccination alone will eradicate infection

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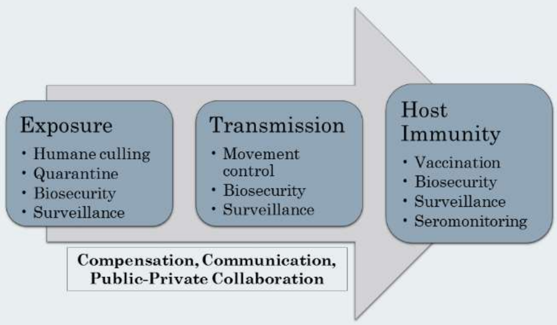
Animal Disease Prevention and Control Strategies

(Adapted: FAO, 2006)



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Surveillance Before an Animal Disease Outbreak

- Goal: detect and respond to suspicious disease events as rapidly as possible.
- Surveillance options include:
  - Targeted surveillance at markets and abattoirs
  - Risk-based surveillance along value chains
  - Passive surveillance from farmers and sub-district offices
  - Active surveillance and surveys
  - Other

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Surveillance and Outbreak Investigation

Surveillance ⟺ **Outbreak Investigation**

Surveillance

- *Systematic ongoing collection of health and disease data that requires Reporting and a Response ACTION*
- *Requires clear case definition*

Outbreak Investigation

- *Systematic method to investigate suspected disease events including Reporting and a Response ACTION*
- *Requires clear case definition*

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Exercise 36

- List the roles, responsibilities and time dedicated to:

1. Health promotion/extension;
2. Disease prevention;
3. Disease control.

- Provide suggestions for improving each of these activities in your district

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Exercise 36: District Preparedness

- Summarise the roles and responsibilities of stakeholders in your district related to preparedness and response to animal disease emergencies.

Expected Output: Profile of district veterinary activities and suggestions for improvement.

Stakeholder	Area	Role	Responsibility	Suggestion for improvement
	Extension			
	Prevention			
	Control			

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In Summary…

Roles and responsibilities of veterinarian:

- Health promotion (Extension)
- Disease prevention and control
  - Surveillance
  - Biosecurity
  - Quarantine
  - Movement control
  - Humane culling
  - Vaccination and seromonitoring

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Exercise 36 – Roles, Responsibilities and Time Dedicated to: Health Promotion/Extension, Disease Prevention and Disease Control at the Local Level.

Description of Exercise:
The roles and responsibilities of frontline veterinarians and various stakeholders in health promotion as well as disease prevention and control described, implementation gaps and opportunities for enhancing this collaboration will be discussed with ISAVET trainees.

Time: 2 hours

Organization:

There will be a lecture on Characteristic of a Functional Disease Prevention and Control Programme at Local area Level followed by questions posed by the facilitator and ISAVET trainees.

Exercise Objective(s):

1. Explain the roles and responsibilities of frontline veterinarians and various stakeholders in health promotion as well as disease prevention and control.

Exercise Components and Structure:

C. Facilitator guiding questions related to the participating countries to identify the role and responsibilities of the various stakeholders in extension, disease prevention and control efforts in their respective countries. These includes:

- List the roles, responsibilities and time dedicated to:

    1. Health promotion extension:
    2. Disease prevention;
    3. Disease control.
    4. Provide suggestions for improvement of each activities in your local area

D. Open the floor to questions, answers and further discussion

Expected Outputs and Deliverables of Each Participant:

1. Active listening and participation in asking questions, providing examples related to the role and responsibilities of the various stakeholders at local area with regard to extension, disease prevention and control at the local area level.

Section IV: Week 4 – Field Work Training

Lesson 33 – Local Area Profile to Prepare for Field Training

Lesson 34 – Disease Profile to Prepare for Field Training

Lesson 35 – Role of Wildlife Related to the Priority Disease

Lesson 36 – Preparing for Field Work

This Manual provides the curricular contents of the Frontline In-Service Applied Veterinary Epidemiology Training (ISAVET) programme. The intended audience of the Manual are participants in Frontline (ISAVET) at national-level. The manual will serve as an FAO Global resource for National capacity development of Veterinary Services to detect and respond to emerging infectious animal diseases including transboundary animal diseases and zoonotic diseases.