

Sampling strategies



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CONTENT

- WHY SAMPLING?
- SAMPLING FOR DISEASE DIAGNOSIS
- SAMPLING FOR SURVEILLANCE & MONITORING
- SEROSURVEILLANCE



WHY SAMPLING?

Intends to yield knowledge on the disease status of a population of concern (current and over time)

Information forms the basis for decision making and disease control in animal health



SAMPLING STRATEGIES

- Disease diagnosis & outbreak investigations
 - What?
- Surveillance
 - Determine disease status
 - Confirm freedom of disease
- Monitoring
 - Detect changes
- Research (analytic epidemiology)
 - Hypothesis testing (case-control and cohort studies)



Livestock Health, Management and Production

Sampling for disease diagnosis

The quality of the diagnosis is largely determined by the quality of the samples (Incorrect, inadequate, putrefied and/or unidentified samples are likely to be unsuitable for analysis)





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Sampling for disease diagnosis

- To obtain the best results, samples must be 'fit for purpose' and therefore:
 - Taken from the appropriate tissues
 - Adequate in volume
 - As fresh as possible
 - Clearly and legibly identified
 - Preserved in such a way as to avoid deterioration





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Sampling for disease diagnosis

- Transport of samples to the laboratory as fresh and fast as possible



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Selecting the samples

Animals: ideal

- Untreated animals
- Recently ill animals
- More than one affected, in contact healthy animals
- Recently dead animals



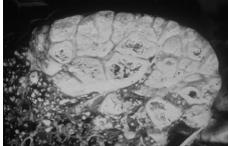
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Selecting the samples

Samples: ideal

- Appropriate to clinical signs/necropsy findings
- Fresh lesions
- Lesion edge (include healthy tissue)



Very early lesions branched foci which develop into vesicles



SELECTING THE SAMPLES

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Where history/ clinical signs/necropsy findings lead to suspect diagnosis:

- Consult the laboratory for guidance in sample collection and submission



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Disease	Specimen	Preservation & Packaging	Test Time	Comments
			(Days)	
Anthrax (<i>Bacillus anthracis</i>)	1) Examination of smears: 4 smears of blood or lesions	1) Submit smears unfixed and unstained. Wrap slides individually in tissue paper and pack between cardboard.	1) 1	Mark container: "Suspected anthrax"
	2) Culture: affected tissue	2) Sealed in metal container.	2) 7	Controlled disease
Blackquarter (quarter evil) [<i>Clostridium chauvoei</i> ; <i>C. novyi</i> (oedematiens); <i>C. septicum</i> ; <i>C. sordellii</i>]	1) Fluorescent antibody test: 6 smears from edge of lesion	1) Submit smears unfixed and unstained. Wrap slides individually in tissue paper and pack between cardboard.	1) 1	
	2) Culture: affected tissue	2) Sterile container; keep cool	2) 7-10	For culture exclude oxygen
Brucellosis:	1) Semen: whole fresh ejaculate or 3 insemination straws	1) Ejaculate in test tube; keep cool. Use original insemination straws; keep in liquid nitrogen	1) 8	PCR for species identification and vaccine strain identification
	2) Milk	2) Suitable container; keep cool	2) 8	
	3) Culture for typing must be pure and uncontaminated	3) Petri dish; keep cool	3) 8	



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Where clinical signs/necropsy findings cannot pinpoint:

- : blood
 - culture, haematology, blood biochemistry, blood smear
- Necropsy multiple tissues: brain, liver, spleen, kidney, lung
 - culture, impression smears, histopathology

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In living animals:

- Blood (fever of unknown origin)
 - Whole blood
 - Serum
- Faeces
- Swabs
- Tissue biopsies
- Other (e.g. FMD:probang)



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SELECTING THE SAMPLES

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In dead animals:

- Tissues in formalin (histopathology)
- Fluid (abdominal, thoracic, joint, urine)
- Swabs

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Sampling for surveillance & monitoring



Definitions (Paskin, 1999, FAO Animal Health Manual 8)

- **Surveillance:** “All regular activities aimed at ascertaining the health status of a given population with the aim of early detection and control of animal diseases of importance to national economies, food security and trade”
- **Monitoring:** “All activities aimed at detecting changes in the epidemiological parameters of a specified disease”

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SAMPLING STRATEGIES

Sampling for surveillance: objectives

- To permit early detection of exotic or new diseases
- To protect consumers of livestock products and owners of livestock and companion animals from zoonotic diseases
- To support trade in livestock and livestock products
- To evaluate disease control programmes
- To establish how important a disease really is – ranking of diseases

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Sampling for surveillance & monitoring

- Surveillance & monitoring
 - Descriptive epidemiology (survey-based)
 - Quantitative (quantify disease occurrence in a population, space and time)
 - Qualitative (presence of absence of disease)
 - Entire population or sample of a population



SAMPLING STRATEGIES

Sampling for surveillance & monitoring

■ The broader management aim (and the type of information, incl. level of detail required) determine the sampling strategy - Objectives

e.g.

- Is the disease present? (detection)
- Prevalence of disease (cross-sectional studies)
- Prevalence of infection vs disease
- Exposure vs infection





Sampling for surveillance & monitoring

Survey design

- Objectives
- Select the population sample (sampling method)
 - representative
- Sampling plan



SAMPLING STRATEGIES

Sampling for surveillance & monitoring

■ **Sampling plan**

Determined by

- the disease of concern
- Endemic or exotic disease**
- Nature of the disease concerned
- Diagnostic tools and performance**
- Linking of surveillance activities for different diseases





Sampling for surveillance & monitoring

The use of diagnostic tools

- Detecting clinical signs
- Detecting the infectious agent (direct detection)
 - Culture
 - Molecular detection methods
 - Immunological methods (BSE, rabies)
- Detecting markers of infection (immune response)
 - Serum antibodies/ cellular immune response





Sampling for surveillance & monitoring

The use of diagnostic tools

Determined by

- Costs
- Sensitivity and specificity
- Practicality of sample collection/stability of samples
- Suitable for high sample throughput





Sampling for surveillance & monitoring

■ Serology as a diagnostic tool

Measure of

- Exposure
- Past infection or disease and recovery
- Seroconversion (diffusion of the agent through the population, sentinel animals)
- Efficacy of vaccination programmes
- Success of eradication programmes





Sampling for surveillance & monitoring

- Serology as a diagnostic tool
 - Most used way of disease surveillance in wild animals
 - Definitive test if diagnostic performance is satisfactory
 - Screening test in combination with a confirmatory test

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