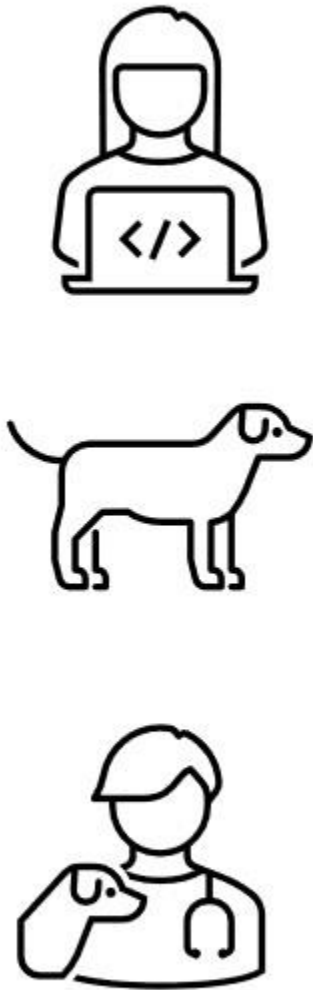




Freedom from rabies or from dog-mediated rabies: what is the difference?

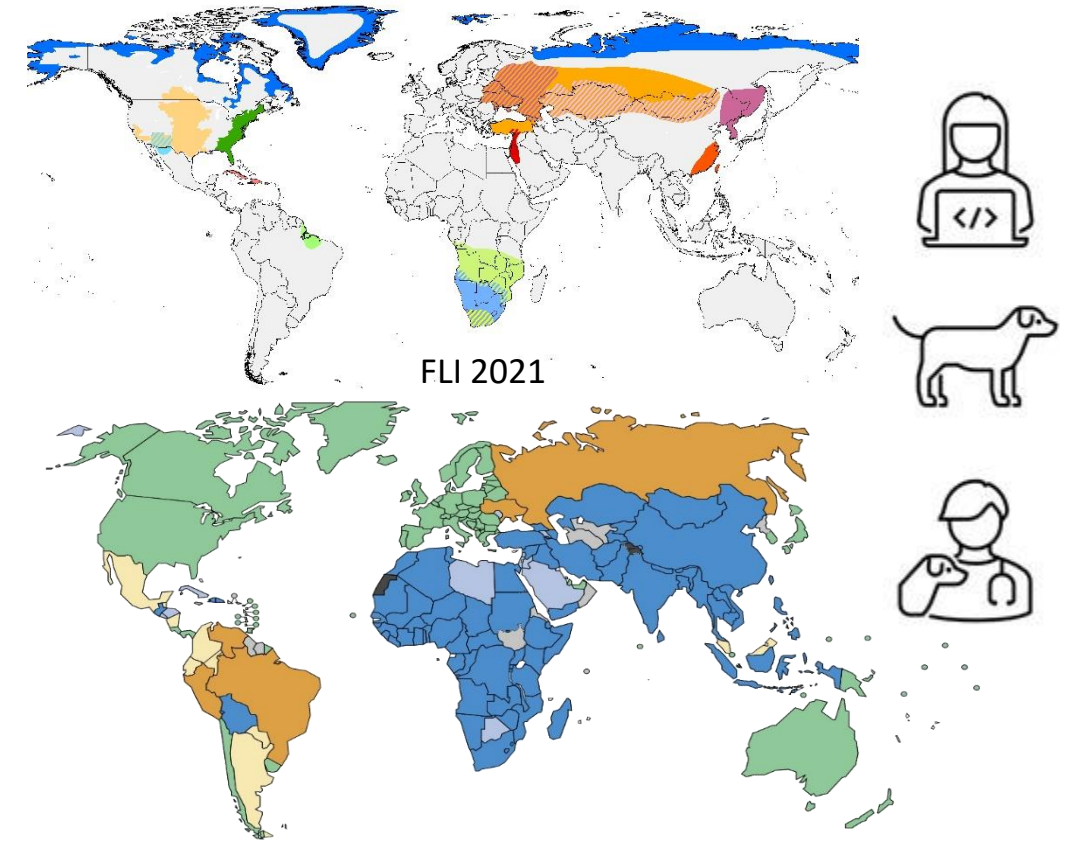
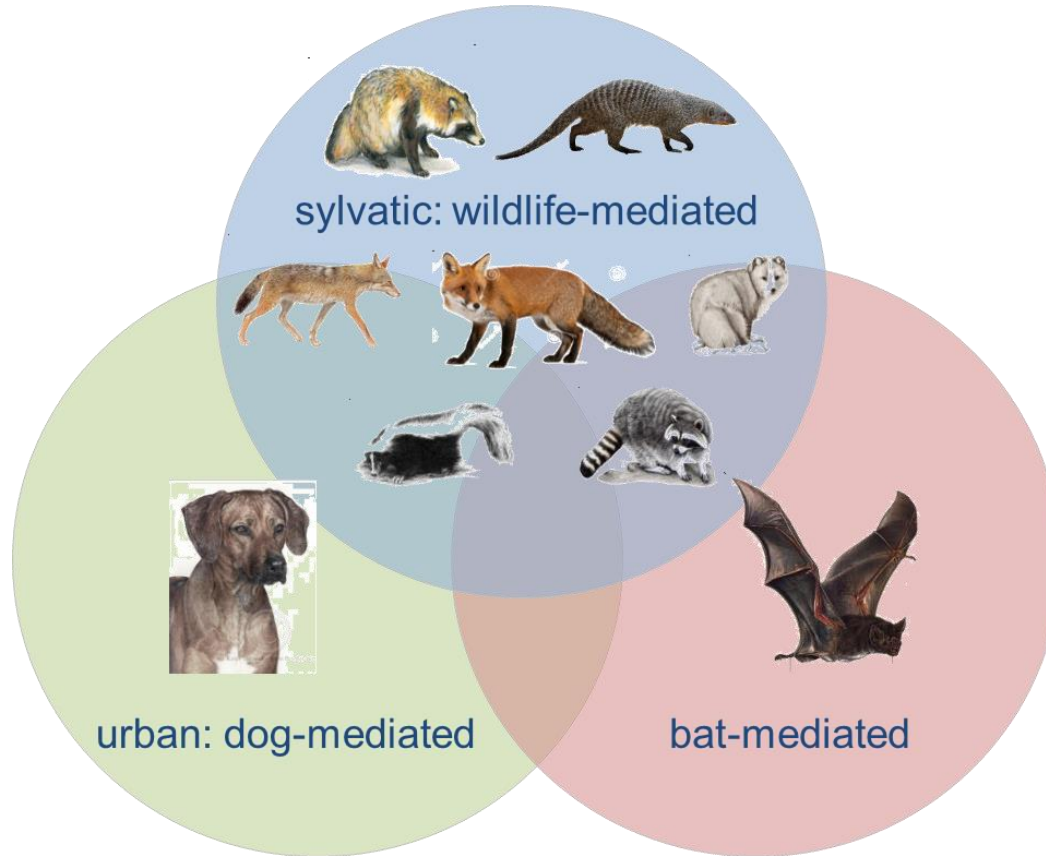
What kind of surveillance for each?

Thomas Müller
Conrad M. Freuling

OIE SEA Sub-Regional Virtual Workshop on
OIE international standards supporting self-declaration
of freedom from rabies,
and endorsement of official control programme
6-8 July 2021

Terrestrial Rabies

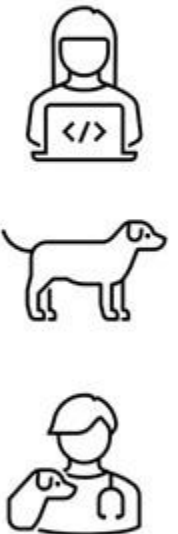
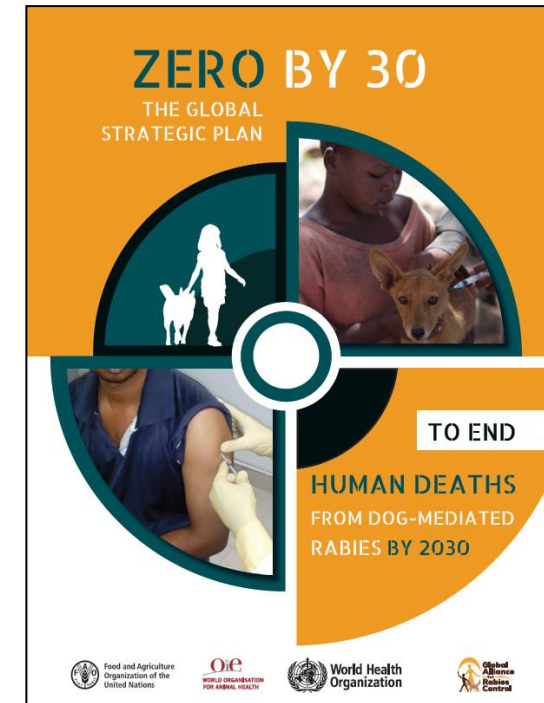
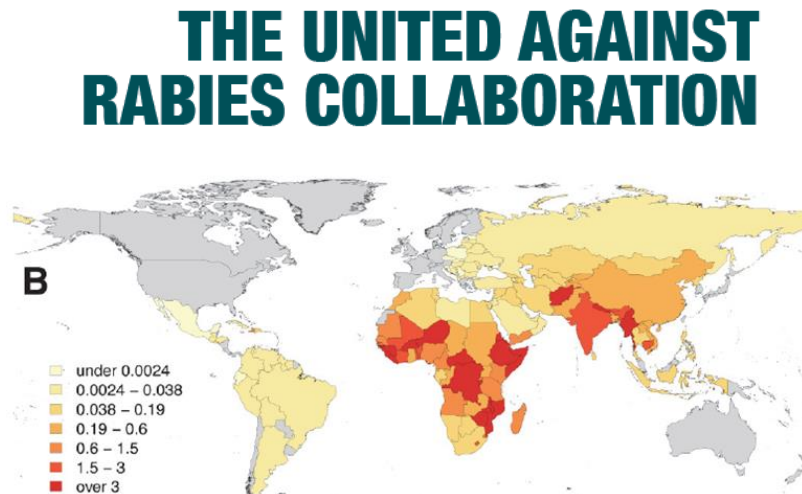
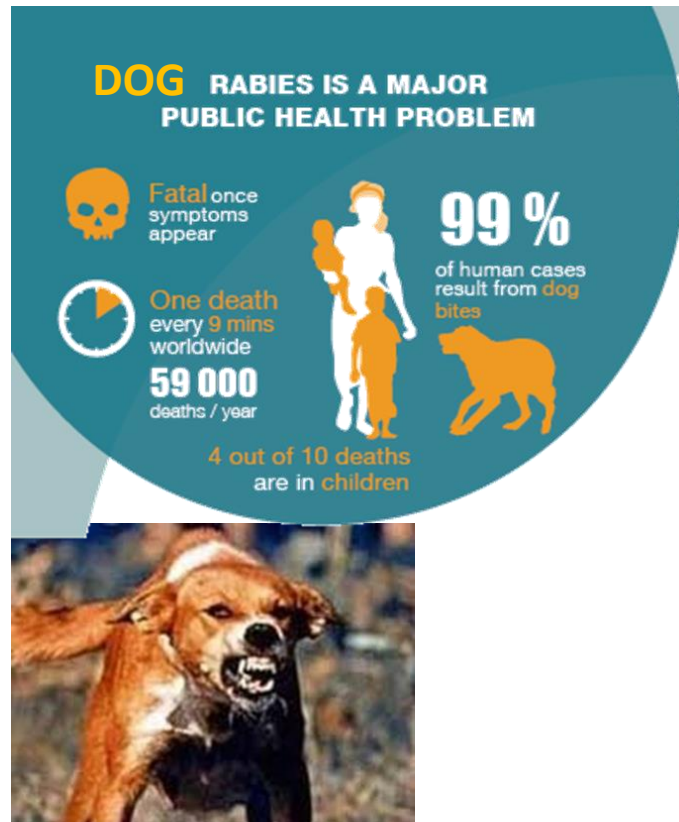
Occurrence & Interfaces



Terrestrial Rabies

Why a distinction between

infection with rabies virus & dog-mediated rabies?



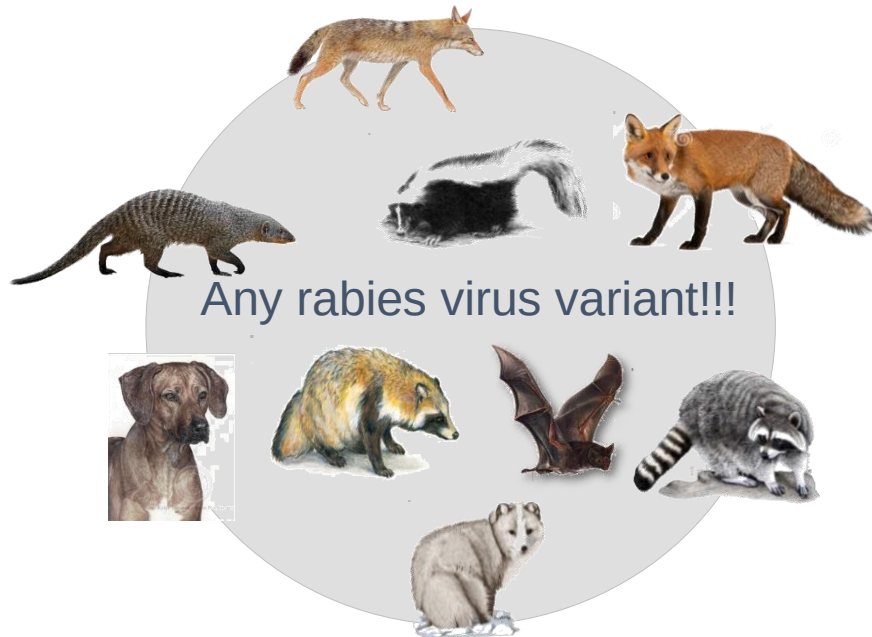
OIE Terrestrial Code

Chapter 8.14. Infection with RABV

Freedom from ...



infection with rabies virus



dog-mediated rabies

Dog rabies virus variants
only



OIE Terrestrial Code

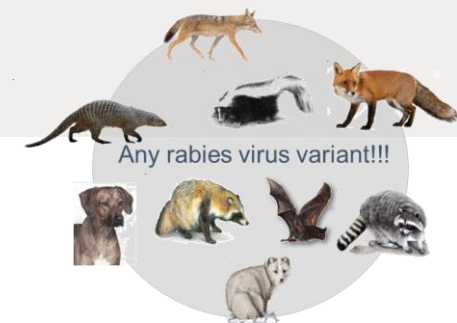
Chapter 8.14. Infection with RABV

Article 8.14.2. Freedom from infection with rabies virus

- a. it has a record of regular and prompt animal disease reporting in accordance with Chapter 1.1.;
- b. *infection* with rabies virus is a *notifiable disease* in the entire country and any change in the epidemiological situation or relevant events are reported in accordance with Chapter 1.1.;
- c. all susceptible animals showing clinical signs suggestive of rabies are subjected to appropriate field and laboratory investigations;
- d. an ongoing system of *surveillance* in accordance with Chapter 1.4. and Article 8.14.12. has been in place for the past 24 months, with a minimum requirement being an *early warning system* to ensure investigation and reporting of animals suspected of being infected;
- e. regulatory measures for the prevention of *infection* with rabies virus are implemented in accordance with the relevant recommendations in the *Terrestrial Code* including Articles 8.14.5. to 8.14.10.;
- f. no *case* of indigenously acquired *infection* with rabies virus has been confirmed during the past 24 months;
- g. if an imported *case* is confirmed outside a *quarantine station*, epidemiological investigations have ruled out the possibility of secondary *cases*.

Preventive vaccination of animals does not affect the free status.

An imported human case of rabies does not affect the free status.



Chapter 8.14. Infection with RABV

Article 8.14.4. Freedom from dog-mediated rabies

- a. it has a record of regular and prompt animal disease reporting in accordance with Chapter 1.1.;
- b. dog-mediated rabies is a *notifiable disease* in the entire country and any change in the epidemiological situation or relevant events are reported in accordance with Chapter 1.1.;
- c. an ongoing system of *surveillance* in accordance with Chapter 1.4. and Article 8.14.12. has been in place for the past 24 months, with a minimum requirement being an *early warning system* to ensure investigation and reporting of animals suspected of *infection* with rabies virus;
- d. regulatory measures for the prevention of *infection* with rabies virus are implemented in accordance with the relevant recommendations in the *Terrestrial Code* including Articles 8.14.5. to 8.14.10.;
- e. no *case* of indigenously acquired dog-mediated rabies has occurred during the past 24 months;
- f. a dog population control programme has been implemented and maintained in accordance with Chapter 7.7.

The following do not affect the status of a country or *zone* free from dog-mediated rabies:

preventive vaccination;
presence of rabies virus in *wild animals*;
imported human cases of rabies;
imported *case* outside a *quarantine station* whenever epidemiological investigations have ruled out the possibility of secondary *cases*.



Dog rabies virus variants
only



Surveillance

What is it?

Definition

- “the ongoing, systematic collection, analysis, interpretation, and timely dissemination of health-related data essential to planning, implementation, and evaluation
 - of public health practice and eradication programs
- Requires response

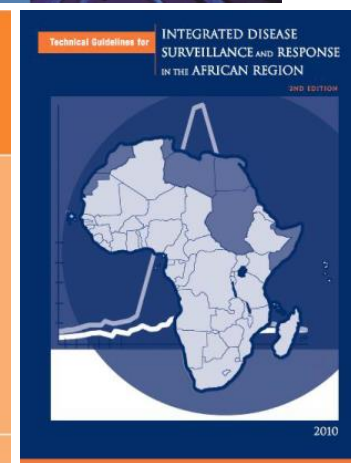
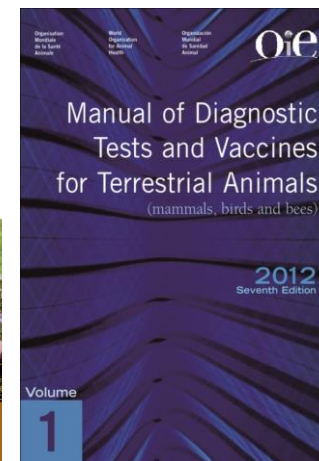
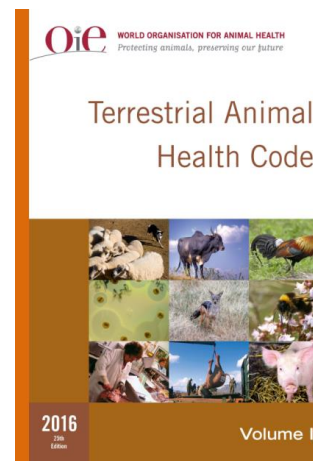


Rabies Surveillance

Translate Updates into Regional Approach

Affirm role of surveillance for disease control

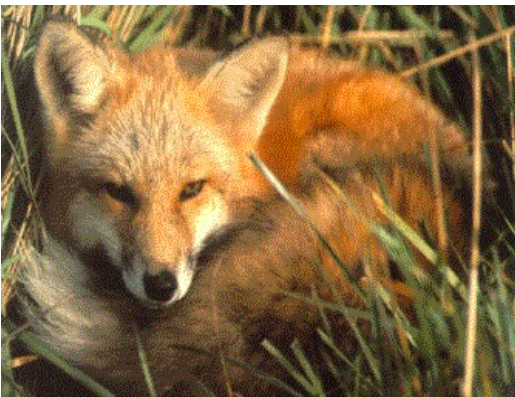
- Capacity to detect, assess, notify and report on health events
- OIE – Terrestrial Code & Manual
- WHO – IHR, IDSR
- Surveillance (routine & continuous) vs. Monitoring (intermittent)



Rabies Surveillance

As Simple as This...

Find rabies



**If it is not
there...**



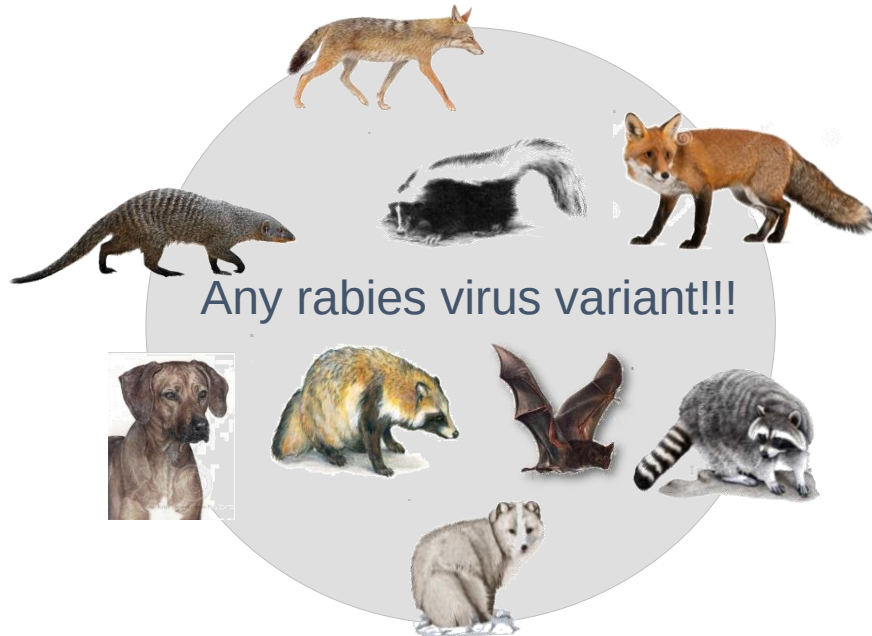
Prove it!!!



Rabies Surveillance

Requirements – *OIE Terrestrial Code*

Articles 1.4 & 8.14.12



Justify surveillance strategy

- Public awareness
- Clinical surveillance
 - Procedures for investigating suspect cases, transport of samples, recording & analysis of data
 - Recommended sampling techniques & lab tests
- Prompt reporting
- Routine epidemiological investigations
- Characterization of virus isolates



Rabies Surveillance

Critical Points

Political	Technical
▪ Legal enforcement ▪ Stated public health objectives ▪ Stage of rabies control ▪ Case definitions ▪ Responsibilities ▪ Rabies epidemiology ▪ Education of public ▪ Awareness / Vigilance	▪ Probability of detecting rabies ▪ Infrastructure and personnel ▪ Sampling ▪ Sample storage ▪ Submission and shipment of samples ▪ Diagnostic procedures to be used ▪ Necessary baseline data ▪ Analysis and dissemination of results

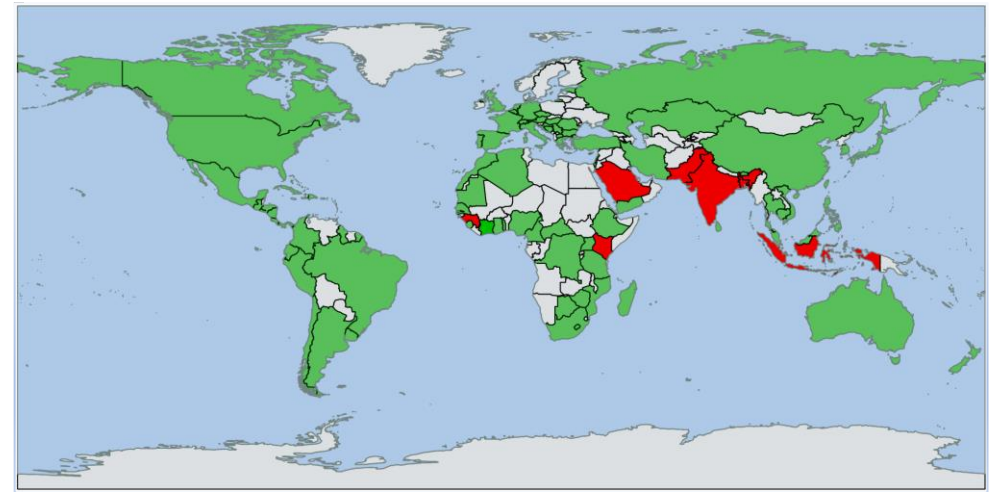


Rabies Surveillance

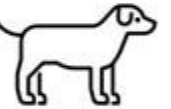
Legal Enforcement

Rabies notifiability

- both human and animal rabies
- facilitates resources and logistics
- based on standard case definitions
- Reporting protocols in place
- Utilize existing reporting system and infrastructure where possible

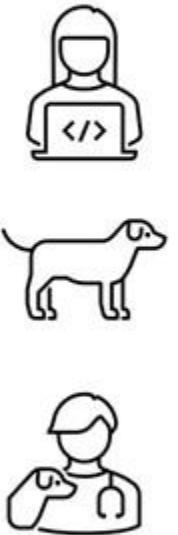
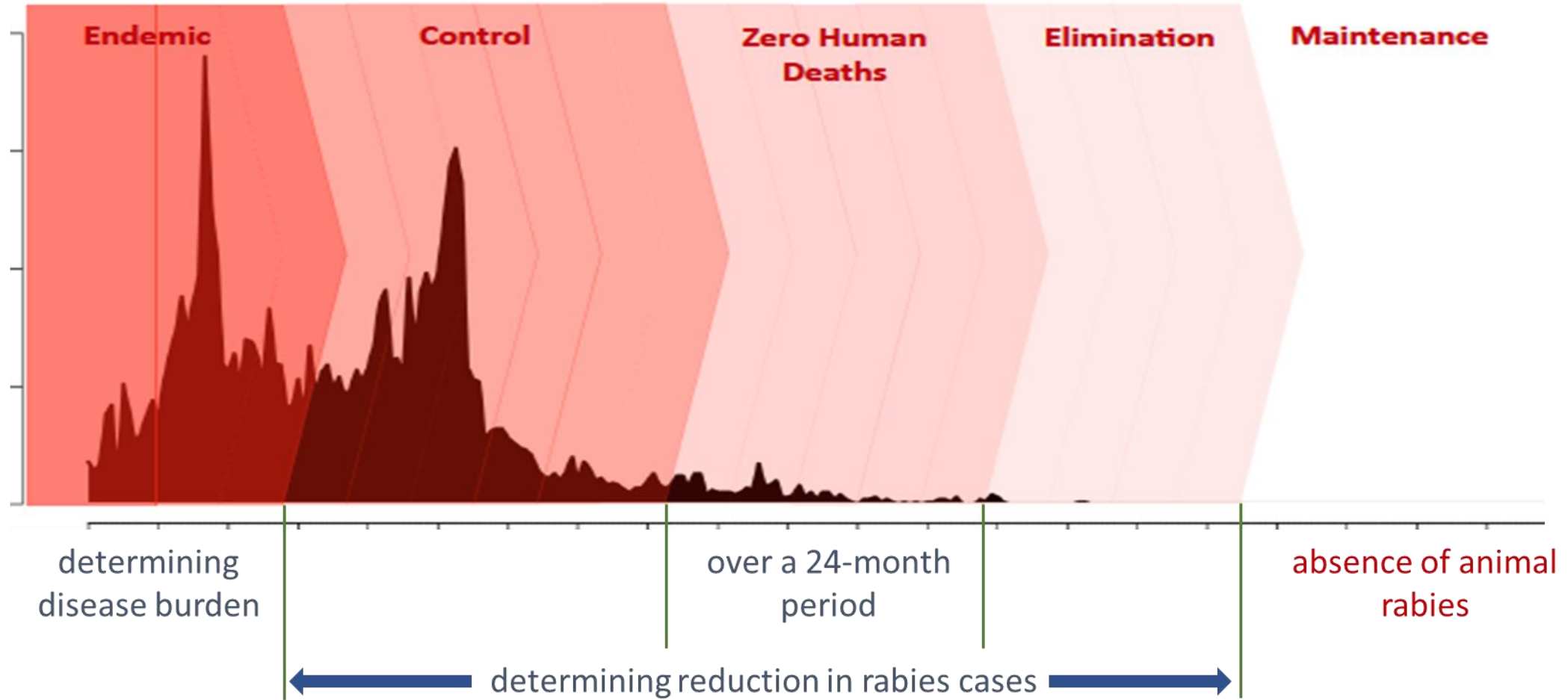


Rabies Notifiability Survey (Taylor et al., 2014)



Rabies Surveillance

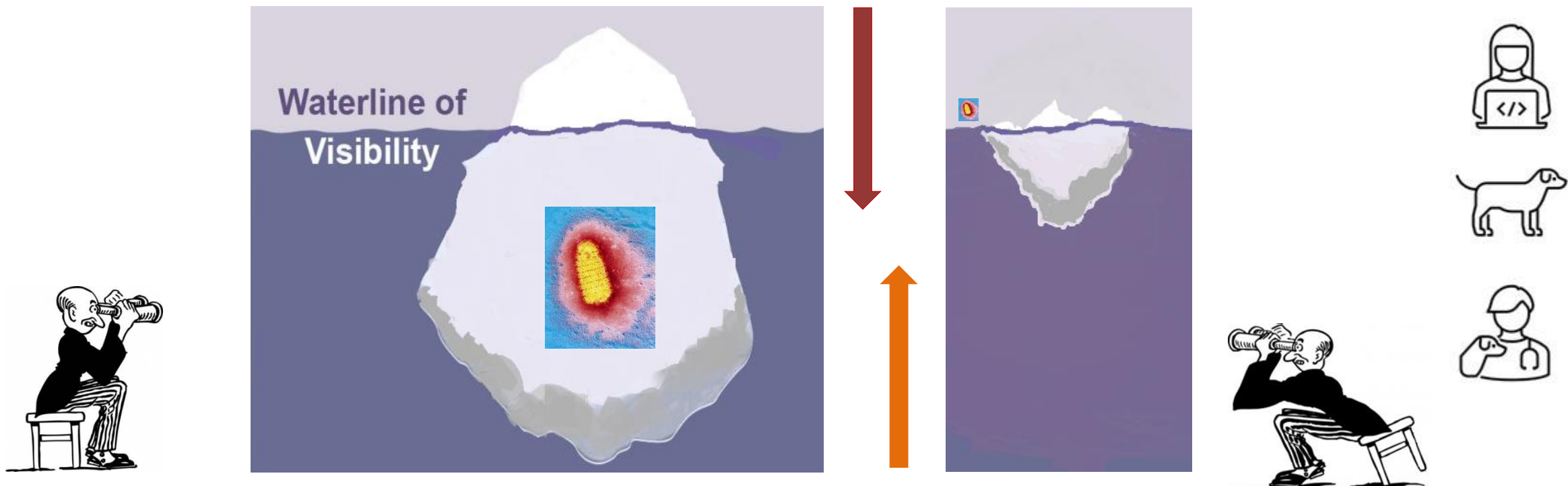
Stages of Rabies Control



Rabies Surveillance

The Art of...

“making good decisions with limited data”

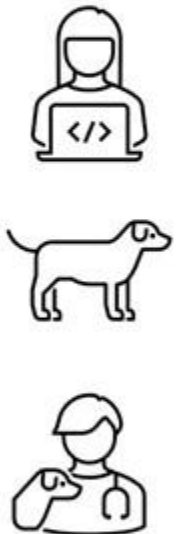
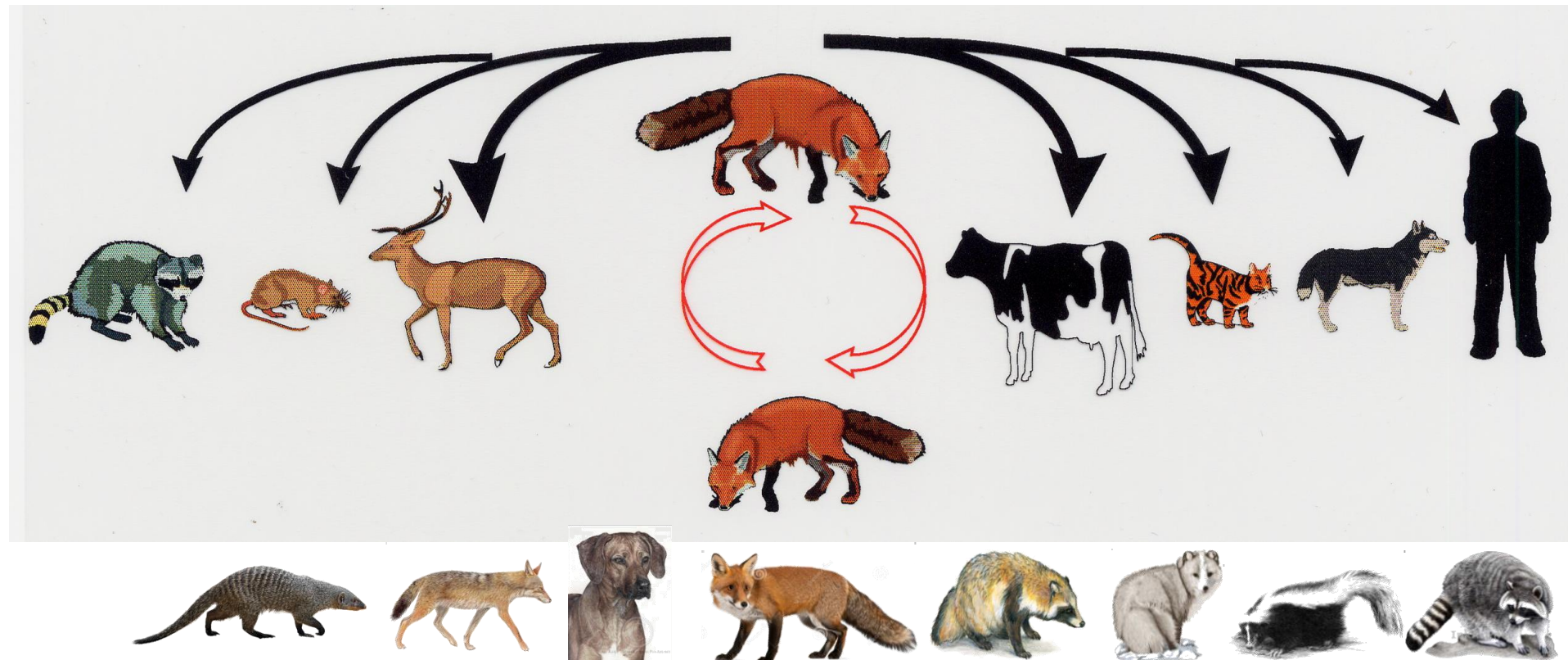


Probability of detection = a function of incidence, level of awareness & vigilance

Rabies Surveillance

Recognizing epidemiological infection cycles

potential spillover species should not be ruled out in surveillance activities



Rabies Surveillance

Which animals to focus on?

Healthy animals???

- likely to give negative results and is therefore of no value
- pathogenesis of rabies virus and clinical course in terrestrial mammals is distinctive!



Highly ineffective!

- effort per case is a multiple times higher & provides no novel information!

Rabies Surveillance

Which animals to focus on?

Rabies suspect (indicator) animals

- Clinical signs
- Abnormal behaviour
- Road kills
- Found dead
- Human exposure



Highly effective!

Rabies Surveillance

Defining a sample size?

problematic, regardless of the reservoir and spillover species

- numbers of indicator animals cannot be predetermined
- make sure that as many animals as possible will be submitted for laboratory testing



Rabies Surveillance

Integrated Bite Case Management

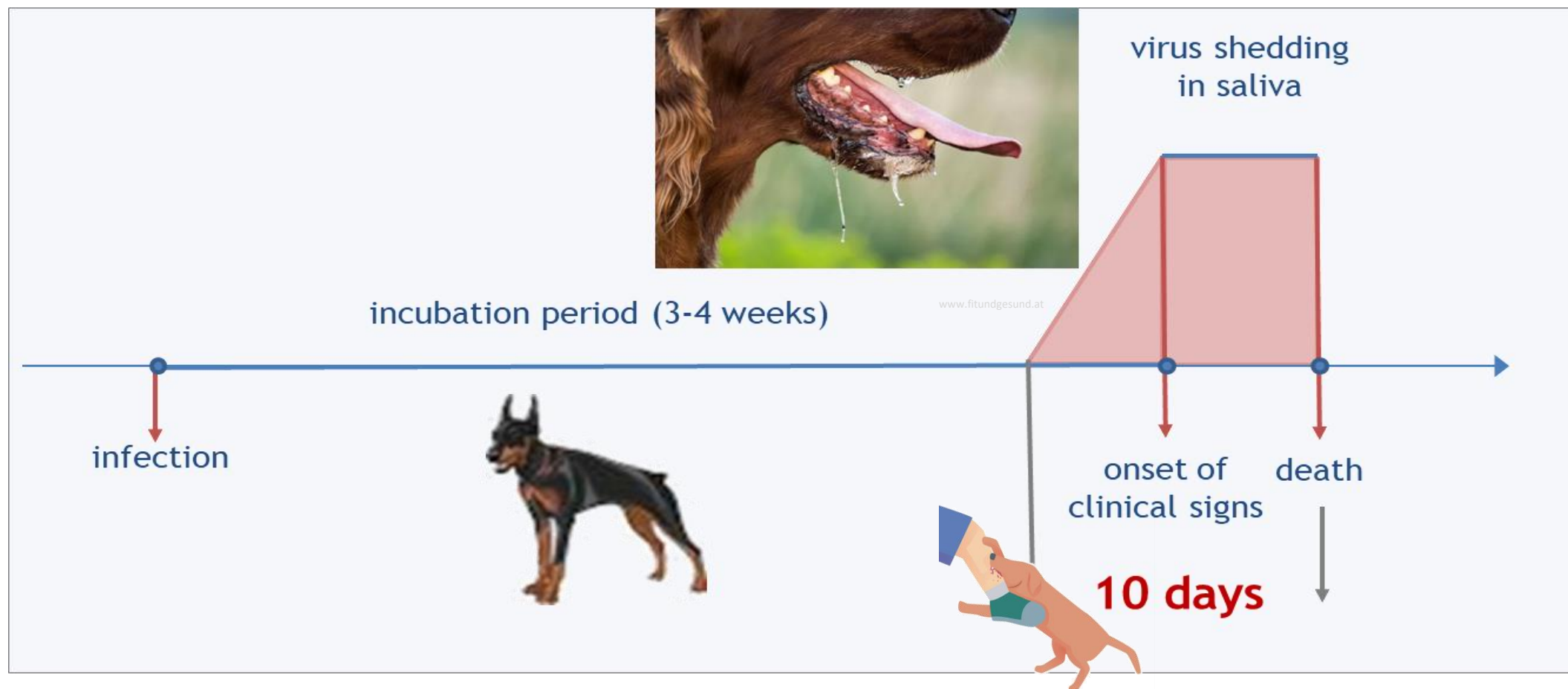
Rabies risk among bite patients and biting animals

- Links workers in public health and veterinary sectors
- Triggers multiple investigations
 - Testing or observation of animals (10 d)
 - Identification of additional exposures
- Requires prompt feedback and reporting mechanisms
- Labor intensive
- Results in more targeted application of PEP as part of a comprehensive rabies control program



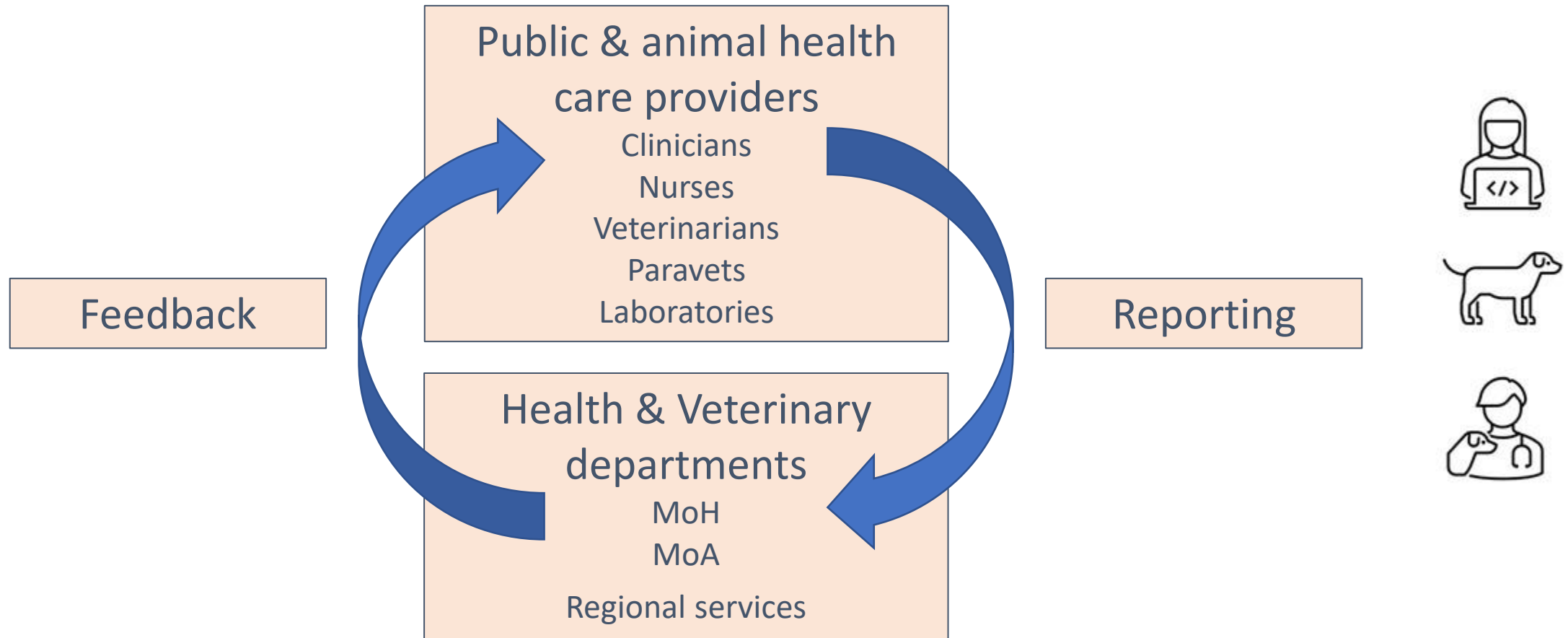
Rabies Surveillance

Meaning of the 10 day observation period



Rabies Surveillance

Responsibilities



Rabies Surveillance

Animal Case Definitions

	Animal Case Definition	Surveillance Activity
Suspect Case	An animal that presents with any clinical signs of rabies	• Notify appropriate local authorities • Collect primary animal history if available & CNS samples for laboratory diagnosis if available
Probable Case	A suspect animal • with a history of a bite by another suspect/probable/confirmed animal or • that is killed, died, or disappears within 4-5 days of observing illness.	• Record secondary information and link to primary history • Notify appropriate authorities
Confirmed Case	A suspect or probable animal that is lab-confirmed	• Notify appropriate authorities for follow-up of any human or animal exposures
Not a Case	A suspect or probable case ruled out by lab-diagnosis	• Systematically record laboratory diagnostic results and link with case record



updated WHO TRS on rabies to be published soon

Rabies Surveillance

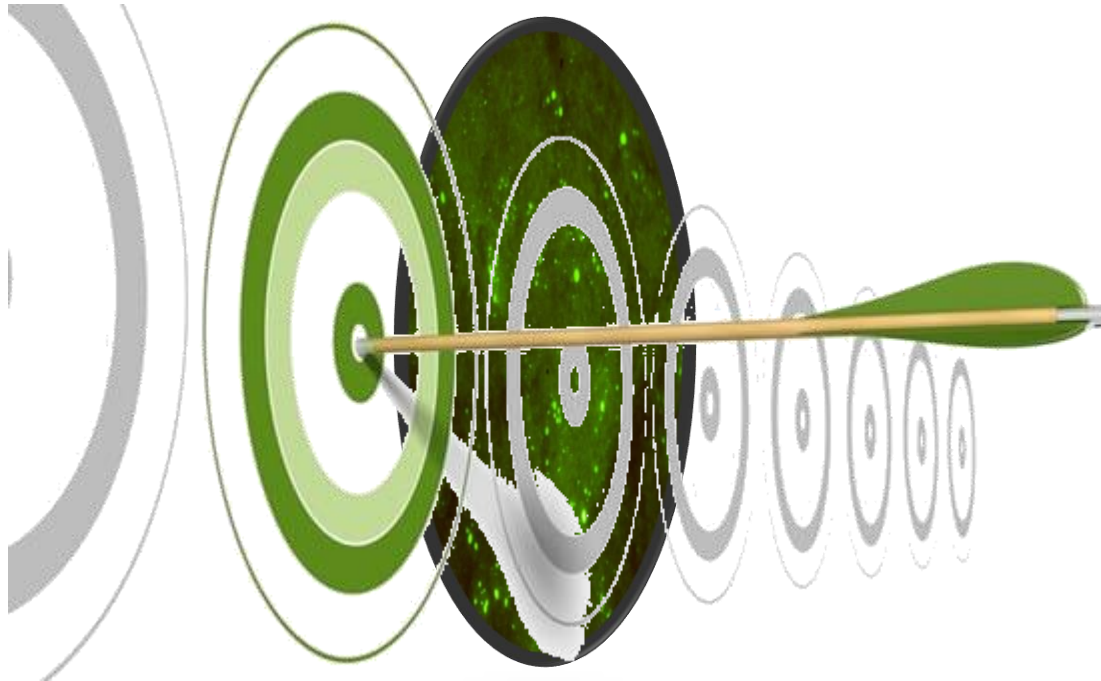
Human Case Definitions

	Human Case Definition	Surveillance Activity
Suspect Case	A person presenting with an acute, progressively worsening neurological syndrome (i.e. encephalitis) Includes any clinical signs of rabies	• Notify appropriate local authorities • Collect appropriate samples from patient • Conduct verbal autopsy to collect case history on patient
Probable Case	Reliable history of contact with a • suspect/probable/confirmed rabid animal	• Identify additional contacts of patient and/or animal involved • Notify appropriate authorities for follow-up
Confirmed Case	A lab-confirmed suspect or probable case	• Systematically record laboratory diagnostic results and link with verbal autopsy information
Not a Case	A suspect or probable case ruled out by lab-diagnosis or No known or suspected animal contact in past six months	• Notify appropriate authorities investigating case



Rabies Surveillance

Key Element - Laboratory Diagnosis



Needed for:

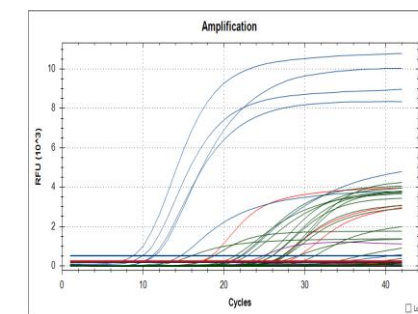
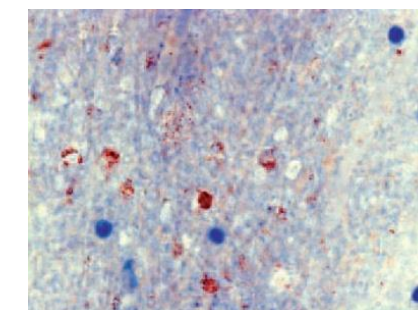
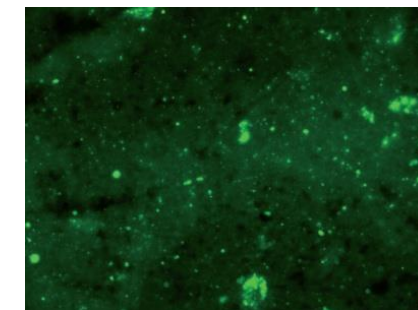
- Detection of RABV antigen or RNA
- Case confirmation
- Animal case definition
- Human case definition
- Integrated bite case management
- Timely decision on PEP



Rabies Surveillance

Laboratory Diagnosis & Tests

Method	Population freedom from Infection	Animal freedom from infection prior to movement	Contribute to eradication policies	Confirmation of clinical cases	Prevalence of infection - surveillance	Immune status individual animals or population Post vacc
Agent identification						
DFA	+++	n/a	+++	+++	+++	n/a
dRIT/RIAD	+++	n/a	+++	+++	+++	n/a
Sellers staining	+	n/a	+	+	+	n/a
Virus isolation						
RTCIT (++)	+	n/a	+++	+++	+++	n/a
MIT	n/a	n/a	+++	+++	+++	n/a
RNA detection						
RT-PCR (conventional)	+++	n/a	+++	+++	+++	n/a
RT-PCR (real-time)	+++	n/a	+++	+++	+++	n/a
Serology						
VN	+++	+++	+++	n/a	n/a	+++
ELISA	+++	++	+++	n/a	n/a	+++



updated Chapter Rabies of the OIE *Terrestrial Manual* to be published soon

Rabies Surveillance

Sampling (i)

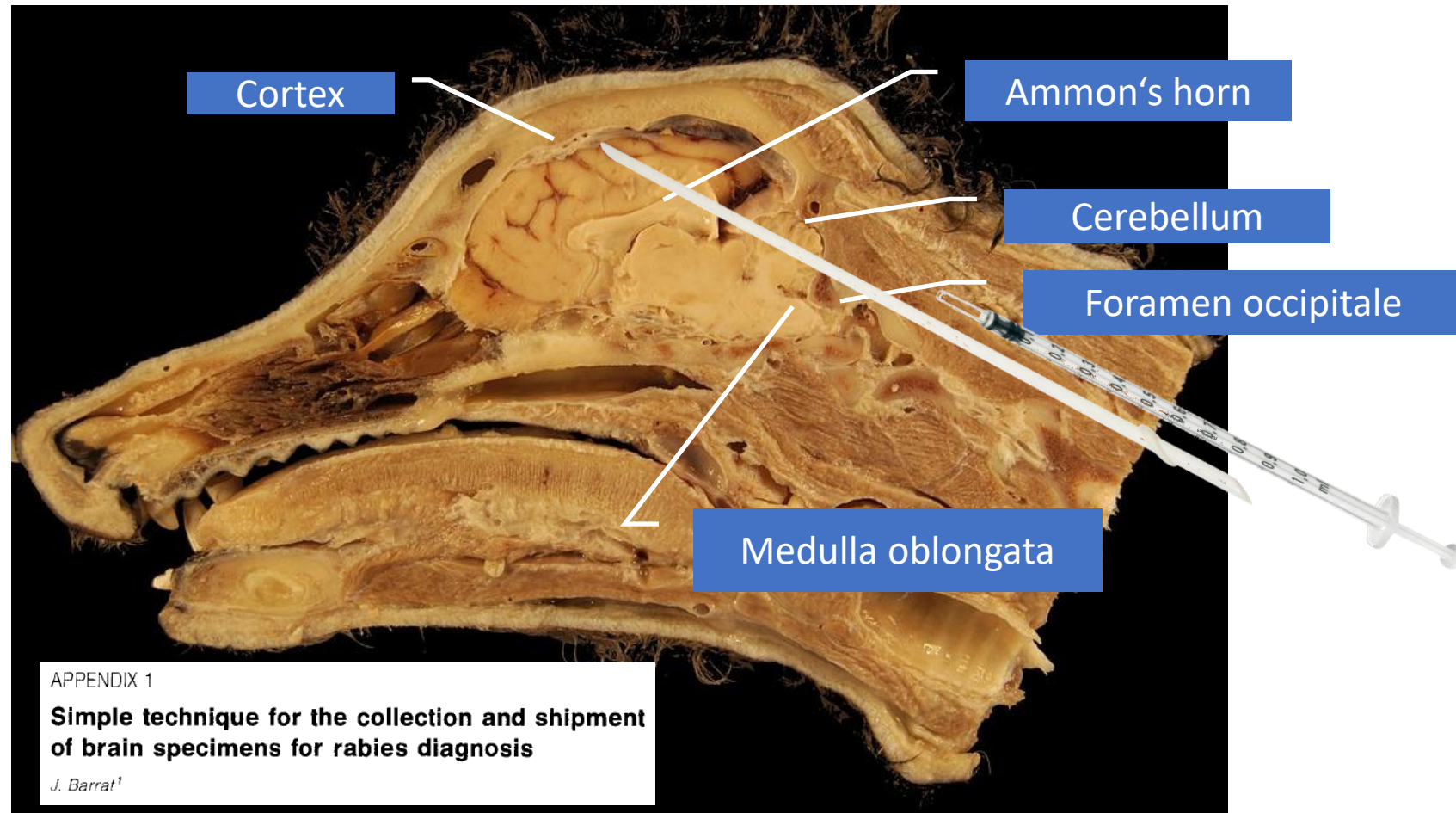
ranking		Sample	Effort	Transport	Storage	Preservation	Precautions
+	low	Carcass	+	+++	+++	+	+
++	medium	Severed head	++	++	++	+	++
+++	high	Removed brain	+++	++	++	++	+++
		Brain sample	++	++	++	++	+++



Courtesy Ad Vos

Rabies Surveillance

Sampling (ii)



Rabies Surveillance

From Sampling to Submission

Quality of samples for diagnosis

- collection points
- appropriate (cold) storage facilities
- transport equipment
 - Properly packaged (plastic bags, boxes, ...)
- Delivery to the lab without any delay (3-4 d)
- Temporary preservation of samples
 - Glycerol saline / RNA later / filter paper (FTA®)
- Submission form (minimum baseline data)



DISEASE REPORT/SAMPLE SUBMISSION FORM, VERSION 1_18/05/2017  Page 1 of 2

1. GENERAL INFORMATION
REF. NO. _____
REFERING VETERINARIAN, Dr R Hassel
STATE ☐ PRIVATE ☒ OTHER
ADDRESS, P.O. Box 90827 Windhoek
VETERINARY DISTRICT, Windhoek
TEL/CELL 0813324514 FAX _____ E-MAIL leinem@sigs.com.na

2. OWNER/ESTABLISHMENT INFORMATION
NAME _____ ESTABLISHMENT/VILLAGE NAME & No. _____
CRUSHPEN NAME _____ HERD ID No. _____ CELL/TN _____
ADDRESS _____ EMAIL _____

3. EPIDEMIOLOGICAL INFORMATION
DATE OF OBSERVATION: _____ DATE OF FIRST CASE: _____ TYPE OF OBSERVATION: (INITIAL) ☐ FOLLOW-UP ☐
FARMING SYSTEM: (COMMERCIAL) ☐ (DOMESTIC) ☐ (OTHER) _____
ANIMALS AFFECTED: (BOVINE) ☐ (EQUINE) ☐ (PORCINE) ☐ (OVINE) ☐ (CAPRINE) ☐ (AVIAN) ☐ (CANINE) ☐ (FELINE) ☐ (OTHER) _____
BODY CONDITION: (GOOD) ☐ (AVERAGE) ☐ (POOR) ☐ (ALL CATEGORIES) ☐ SEX: ALL ☐ (MALE) ☐ (FEMALE) ☐ (NEUTERED) ☐
AGE: 20-40ths ☐ 41-60ths ☐ 61-80ths ☐ 81-90ths ☐ 91-100ths ☐ 101-120ths ☐ 121-140ths ☐ 141-160ths ☐ 161-180ths ☐ 181-200ths ☐ (ALL CATEGORIES) ☐

NO OF ANIMALS AFFECTED	VACCINATION HISTORY	SOURCE OF INFECTION	ANY ANIMAL MOVEMENT
CLINICAL CASES	PRODUCT	DATE	INVESTIGATED
DEATH			☐ YES ☐ NO
AT RISK			☐ YES ☐ NO
CLAMMED			☐ YES ☐ NO
DYING			☐ YES ☐ NO
RECOVERED			☐ YES ☐ NO

4. CLINICAL SIGNS

5. POSTMORTEM REPORT

6. DIAGNOSIS
TENTATIVE DX: _____ DD's 1. _____ 2. _____ FINAL DX: _____
DX VERIFIED BY: _____ BASED ON: (TEST RESULTS) ☐ (PHYSICAL EXAMINATION) ☐ (LABORATORY) ☐ (HISTOLOGY) ☐ (OTHER) ☐

7. IMMEDIATE CONTROL MEASURES/TREATMENT/ADDITIONAL INFORMATION

8. LABORATORY SAMPLES
ANIMAL NAME/NO/ID: _____
SPECIES: CANINE ☐ FELINE ☐ BOVINE ☐ EQUINE ☐ PORCINE ☐ OVINE ☐ CAPRINE ☐ AVIAN ☐ OTHER: _____
NO: _____
TYPE: BLOOD ☐ URINE ☐ SALIVA ☐ TISSUE ☐ CARCASS ☐ SWAB ☐ OTHER: _____
SUBMITTED BY: _____ DATE: _____ TIME: _____
RECEIVED BY: _____ DATE: _____ TIME: _____
LAB NR: _____
REMARKS: _____

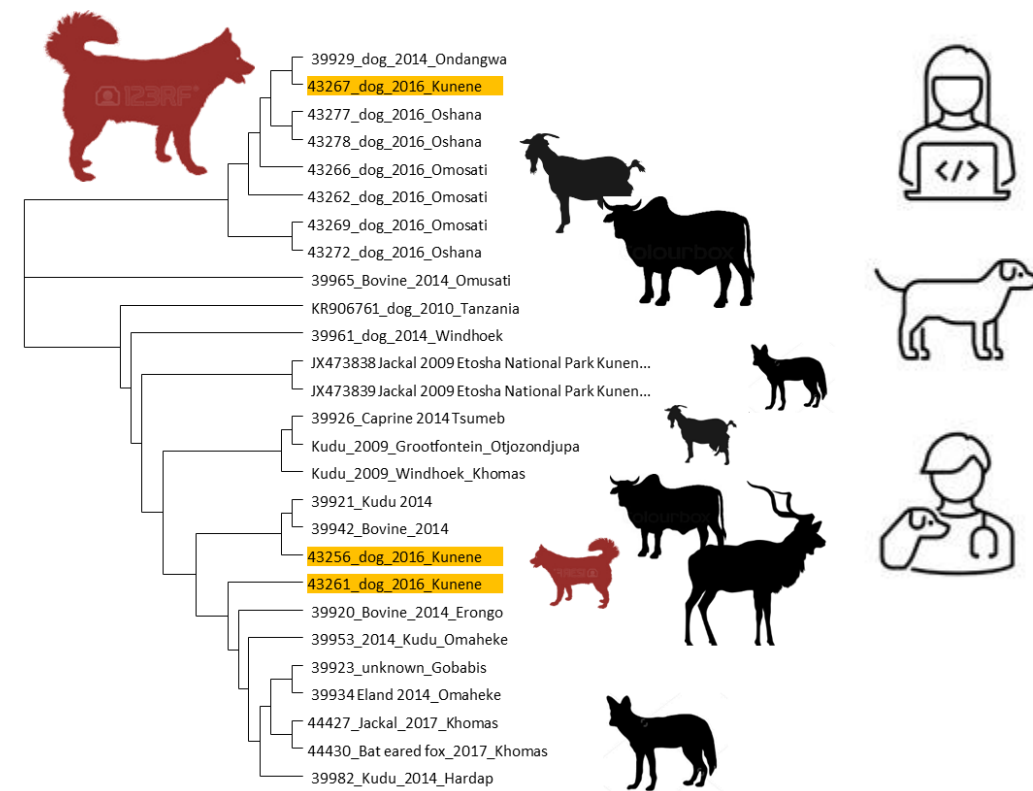


Rabies Surveillance

Virus characterization

Identify canine from wildlife-mediated rabies virus variants

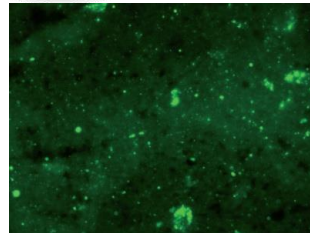
- Sequencing
 - Partial sequencing
 - Whole genome sequencing
- Discriminatory RT-PCR



Rabies Surveillance

Recognizing Dependencies

Surveillance

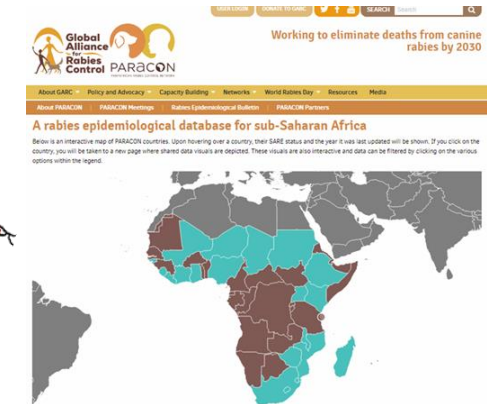
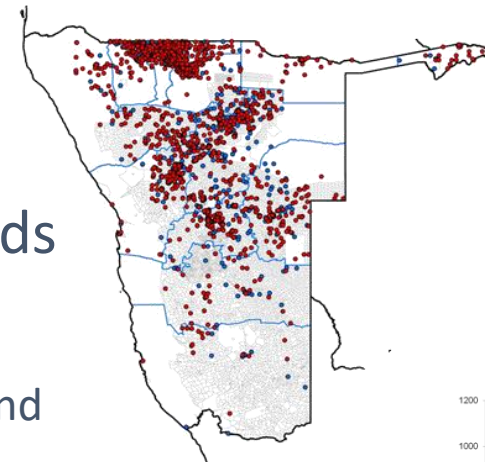


Rabies Surveillance

Analysis

Critical component of intervention programs

- Accuracy is paramount
 - Basic updates (monthly)
 - Detailed reports (annually)
- Should illustrate epidemiological trends
 - Spatio-temporal dynamics
 - Mapping of cases and non-cases to understand quality of data and gaps in surveillance
- Store, report and share data
 - DHIS 2, WHO, OIE, ...



Rabies Surveillance

Information and Learning Module

rabiesblueprint

The Blueprint for Rabies Prevention and Control has been developed by global rabies experts to serve as a guide for countries that would like to prevent human rabies by eliminating animal rabies within their borders.

It provides access to all relevant international guidelines for rabies control and prevention, together with practical information, advice and case studies on how rabies control can be achieved.

GARC
GLOBAL ALLIANCE
FOR RABIES CONTROL
rabiesalliance.org

What area of rabies are you most interested in?



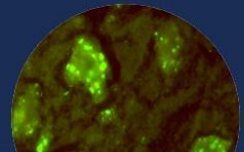
Canine rabies

Visit caninerabiesblueprint.org



Fox rabies

Visit foxrabiesblueprint.org



Rabies Surveillance

Visit rabiessurveillanceblueprint.org

Home page | Contact | Site Map

Search site SURVEILLANCE

rabiessurveillanceblueprint.org
a blueprint for the surveillance of rabies in any species

SURVEILLANCE BLUEPRINT

- Introduction
- Rabies Surveillance
- Minimum requirements for adequate rabies surveillance
- Laboratory rabies diagnosis
- Epidemiological analyses
- Reporting, dissemination and communication

LINKS

- Documents

CONTRIBUTORS

- The contributors

Home page >

Welcome to the Rabies Surveillance Blueprint

The First version of the Rabies Surveillance Blueprint is now complete

The Rabies Surveillance Blueprint has been developed by global rabies experts to serve as a guide for countries that would like to improve surveillance for rabies in any species.

The Blueprint brings together relevant information on rabies surveillance in an easily accessible format. It is not meant to replace existing material or national guidelines but rather is meant to serve as an easy to use guide to assist countries in understanding how to conduct rabies surveillance, as well as how to report and use the data generated to improve rabies control in any species.

It is divided into 6 main sections:

- Introduction
- Rabies Surveillance
- Minimum requirements for adequate rabies surveillance
- Laboratory rabies diagnosis
- Epidemiological analyses
- Reporting, dissemination and communication

These can be navigated from the left navigation bar, the Site Map tab at the top of the page or alternatively [go here](#).

PARTNER LINKS


GLOBAL ALLIANCE
FOR
RABIES CONTROL


WORLD RABIES DAY
SEPTEMBER 28

Version 1 - Last updated December 2014

Home | Contact | Site Map | Log in

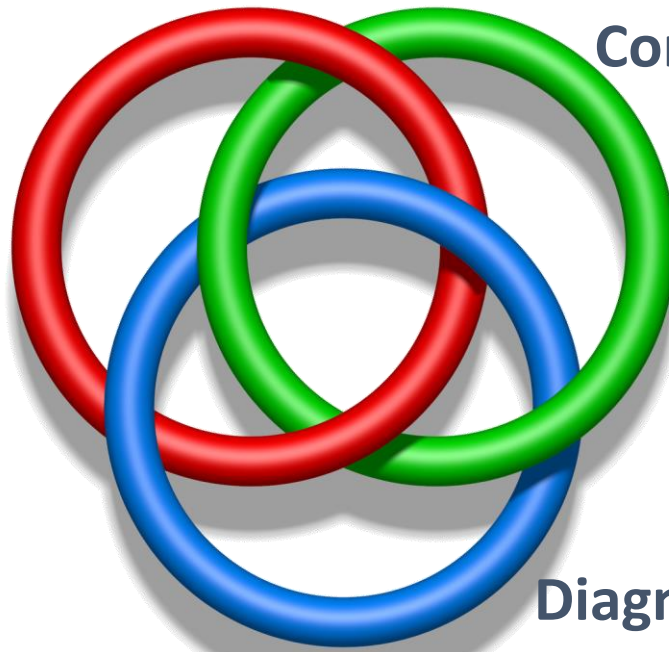


Rabies Surveillance

Understanding Importance

Surveillance

Control



Diagnosis

=

SUCCESS



Thank for your attention!



WORLD ORGANISATION FOR ANIMAL HEALTH
Protecting animals, preserving our future

OIE SEA Sub-Regional Virtual Workshop on OIE international standards supporting self-declaration of freedom from rabies, and endorsement of official control programme, 6-8 July 2021