Food and Agriculture Organization of the United Nations

SUSTAINABLE DEVELOPMENT GOALS

FAO's activities on Vector Borne Diseases

Few examples

Ludovic Plee – **Claudia Pittiglio**

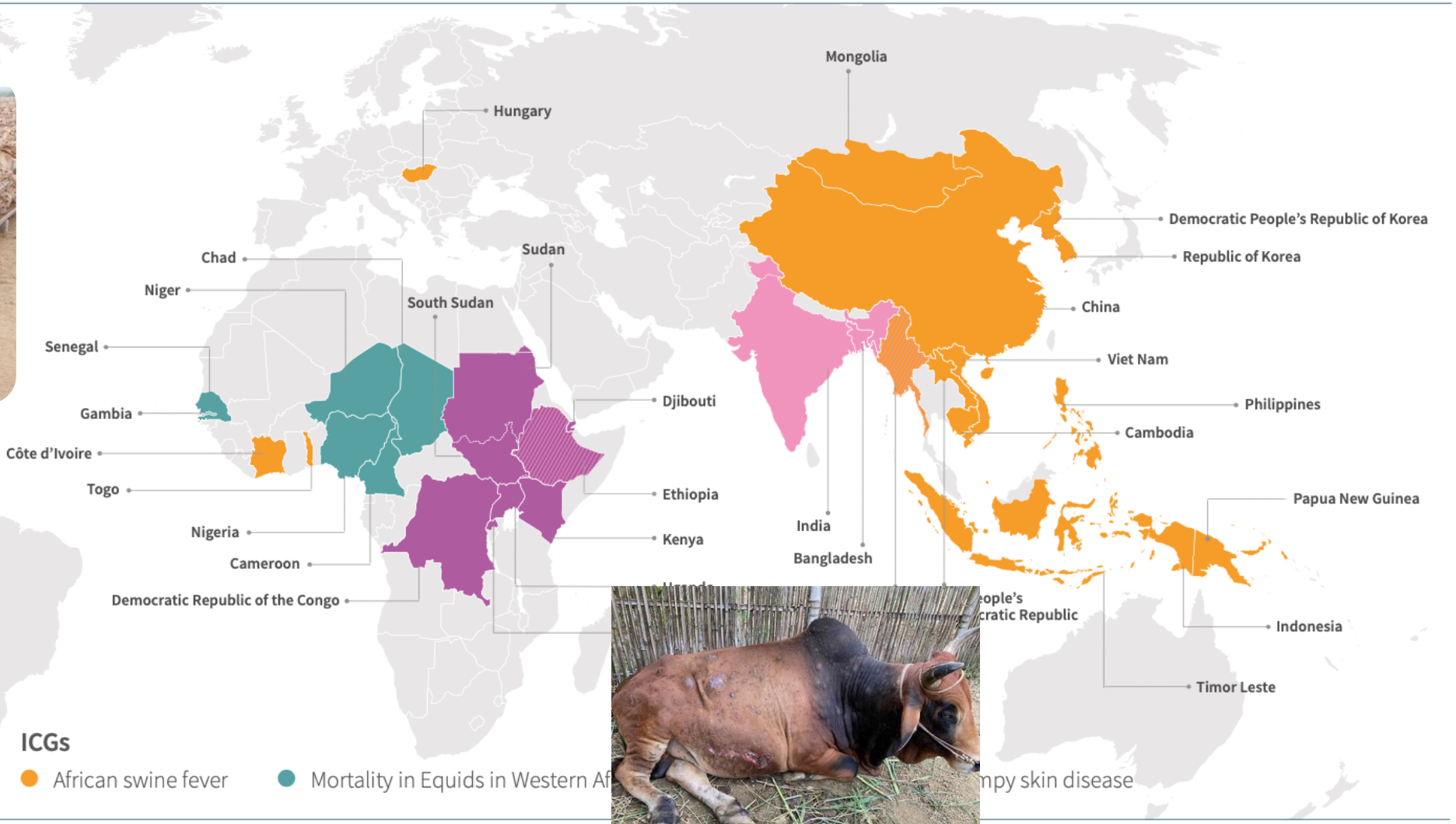
Animal Health Officer (EMC-AH Manager) *Ecologist and Risk Modeler (NSAH/ECTAD)*

(with the contribution from Daniel BeltranAlcrudo and Eran Raizman, FAO REUT)

Food and Agriculture Organization of the United Nations

SUSTAINABLE DEVELOPMENT GOALS

FAO EMC-AH's INCIDENT COORDINATION GROUPS – focus on LSD and RVF



Source: Emergency Management Centre for Animal Health, March 2020

FAO EMC-AH Mission on RVF in Djbouti (Nov 2019)

19 18 Nov. 2019

Mission report

Negligible risk of introduction of RVF from DRLQ to importing countries

- **Mission report sent** to importing countries immediately (Saudi Arabia, Egypt)
- **Lifting of temporary suspension** by Saudi Arabia
- **Revision of SOP** by DRLQ: All live animals tested against RVF before export & positive animals removed/culled from export
- **Increased trade** of live animals from most East African countries via DRLQ to Middle/Near East region ⇔ **737 000 heads of cattle (0.4%), sheep + goats (88.3%) and camels (11.3%)** exported in **2019** ⇨ **+800 000 heads** to be exported in **2020**.
- **Increased confidence** of importing countries as to DRLQ technical capacity confirmed by FAO, an independent third party

FAO EMC-AH remote support to Myanmar on LSD (June 2020)

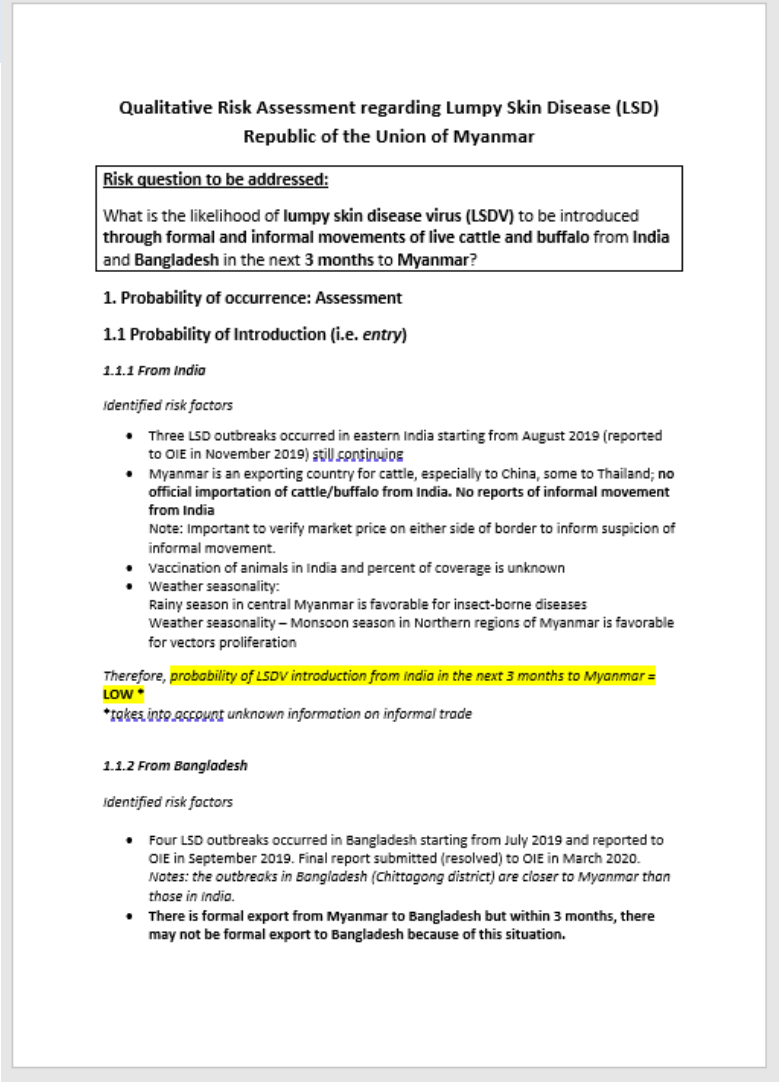
- Workshop addressed the Risk question:
  - *What is the likelihood of LSD to be introduced through formal and informal movements of live cattle and buffalo from India and Bangladesh in the next three months to Myanmar?*
- Draft report was prepared within the workshop

QRA found:

- Consequence of LSD for Myanmar is HIGH
  - Impact on farming communities
  - Impact on international trade

First ever Risk Assessment that LBVD staff delivered to DG/CVO → LBVD in-house risk assessment capacity built

Mitigation measures discussed



Qualitative Risk Assessment regarding Lumpy Skin Disease (LSD)
Republic of the Union of Myanmar

Risk question to be addressed:

What is the likelihood of **lumpy skin disease virus (LSDV)** to be introduced **through formal and informal movements of live cattle and buffalo** from **India** and **Bangladesh** in the next **3 months** to **Myanmar**?

1. Probability of occurrence: Assessment

1.1 Probability of Introduction (i.e. *entry*)

1.1.1 From India

Identified risk factors

- Three LSD outbreaks occurred in eastern India starting from August 2019 (reported to OIE in November 2019) still continuing
- Myanmar is an exporting country for cattle, especially to China, some to Thailand; **no official importation of cattle/buffalo from India. No reports of informal movement from India**
  Note: Important to verify market price on either side of border to inform suspicion of informal movement.
- Vaccination of animals in India and percent of coverage is unknown
- Weather seasonality:
  Rainy season in central Myanmar is favorable for insect-borne diseases
  Weather seasonality – Monsoon season in Northern regions of Myanmar is favorable for vectors proliferation

Therefore, probability of LSDV introduction from India in the next 3 months to Myanmar = **LOW** *

**takes into account unknown information on informal trade*

1.1.2 From Bangladesh

Identified risk factors

- Four LSD outbreaks occurred in Bangladesh starting from July 2019 and reported to OIE in September 2019. Final report submitted (resolved) to OIE in March 2020.
  Notes: the outbreaks in Bangladesh (Chittagong district) are closer to Myanmar than those in India.
- **There is formal export from Myanmar to Bangladesh but within 3 months, there may not be formal export to Bangladesh because of this situation.**

JOINT FAO/OIE/WHO mission in Mauritania (15 to 20 November 2020)

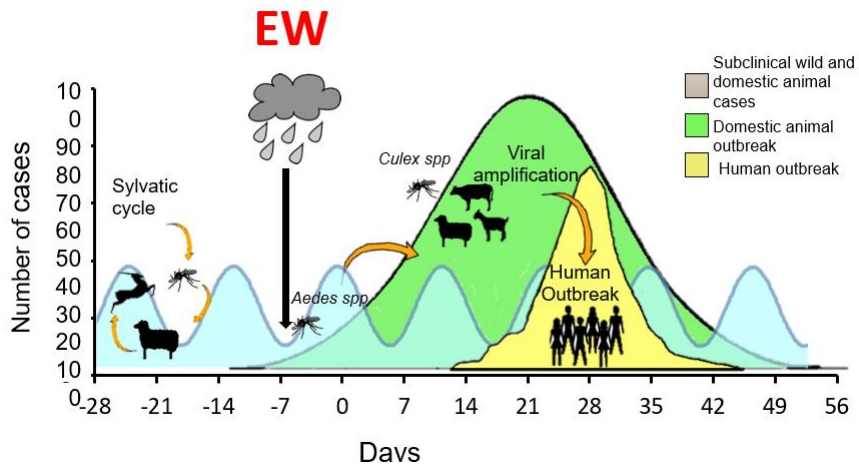
Main recommendations :

- Legal framework on RVF
- Emergency funding
- Support to REMEMA
- ***Prediction capacities to be developed***
- Better coordination (pharmacist, private sector, army,…) and between MDR and MH (fevers)
- Vaccination strategy to be considered

TOWARDS A SUSTAINABLE APPROACH

RVF monitoring, risk modelling, forecasting and mapping at FAO

- Increased FAO expertise in **RVF risk modelling** & **forecasting**, **prevention**, **early warning**, **detection** and **control** through:
- Calibration of a **dynamic model** developed by NASA (Anyamba 2009)
- **Transition** from a desktop to **cloud-based platform** (GEE)
- **Interoperability** of FAO geospatial data
- **Increased** spatial and temporal resolution of the **RVF risk maps** (updated on **monthly** basis at **250 m)**
- **Integration** of the dynamic model with **expert knowledge** (e.g., FAO-ILRI DSF) on RVF eco-epidemiology

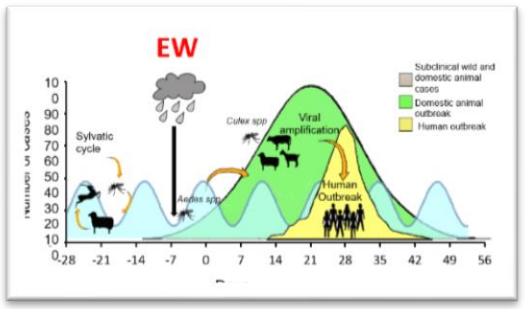


http://www.fao.org/3/ca5511en/ca5511en.pdf

FAO web-based RVF Decision Support Tool (DST)

Irish-funded project (2019-2020): RVF Early Warning – Decision Support Tool

Epi knowledge



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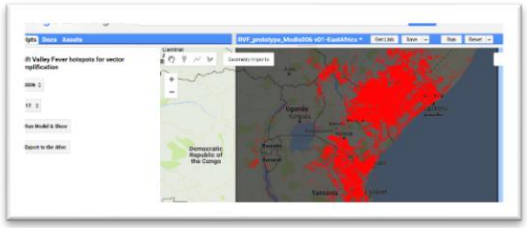
Risk Modeling



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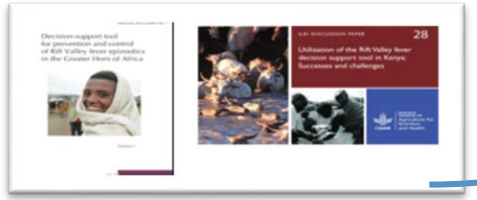
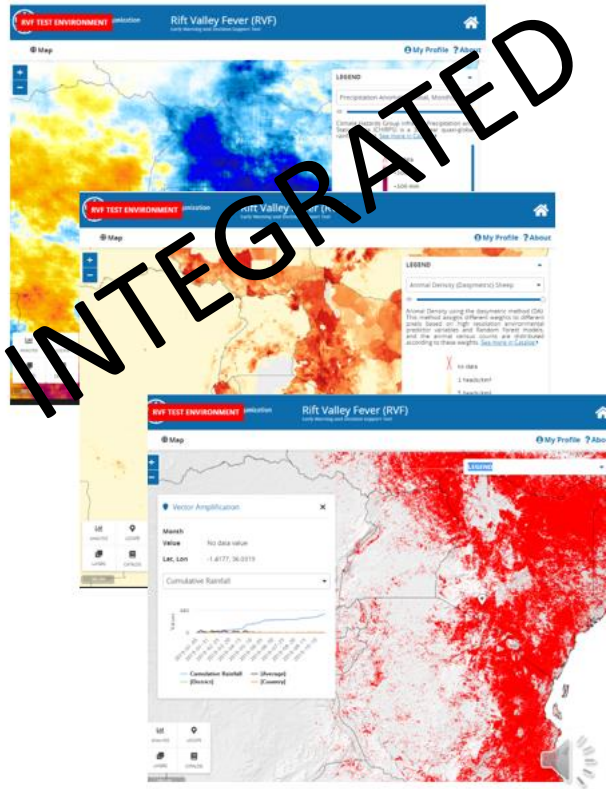
Exp. Knowledge



RVF DST



- Monitoring
- Analysis of trends
- Forecasting
- Evaluation
- Printed friendly report

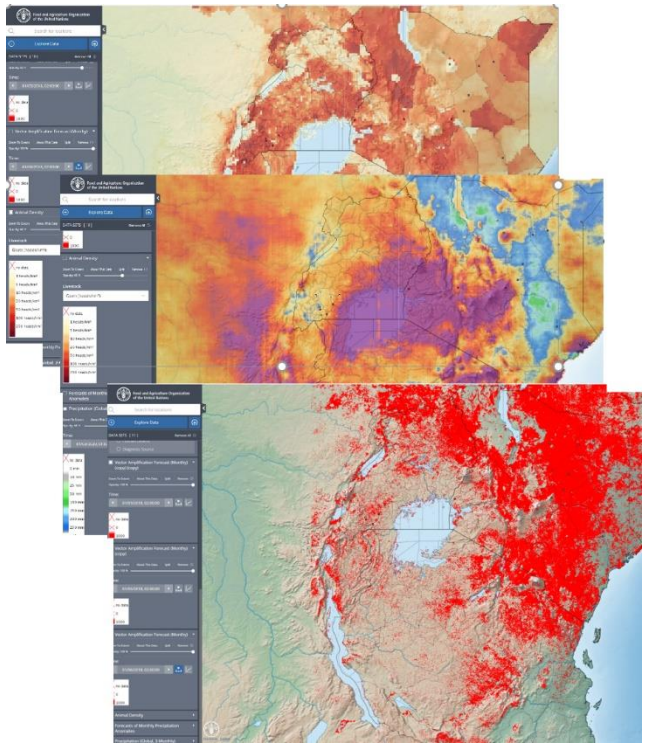
- Inform decision making
- Enhance response
- Build EW & forecasting capacity in the region

Rift Valley fever (RVF) - Decision Support Tool (DST)

- **Integrates** near real-time RVF **risk maps** with relevant **geospatial products, expert knowledge, risk assessment** and **categorization, recommended actions** to guide appropriate **response** to RVF at country level

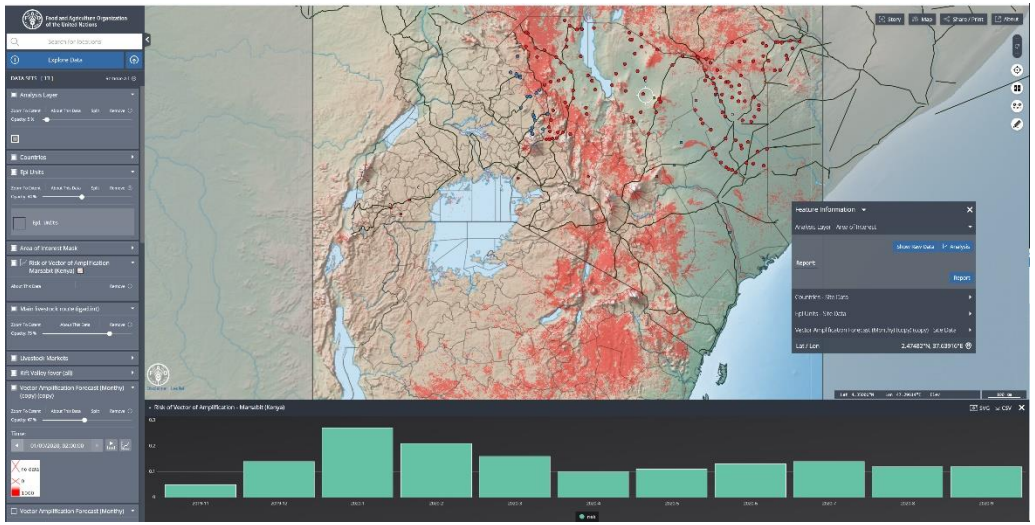
- **OH guideline document for RVF Preparedness, response and contingency plans for the target countries**

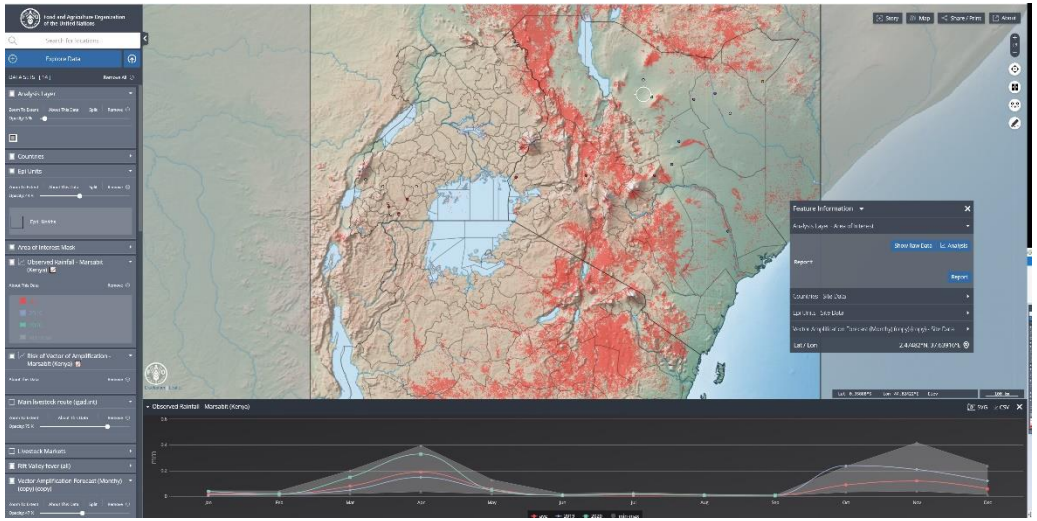
- Pilot countries: **Kenya, Uganda, Tanzania** (interest from other countries)



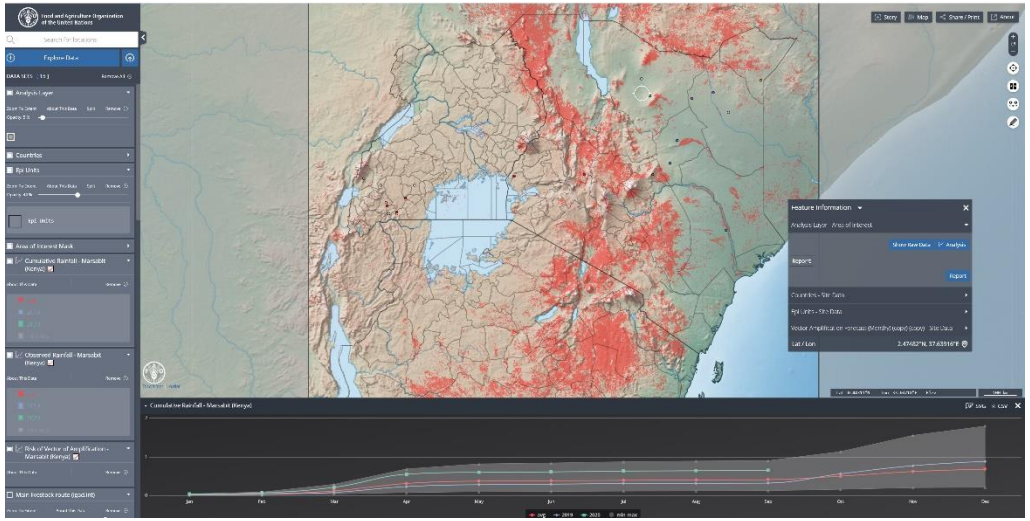
Food and Agriculture Organization of the United Nations

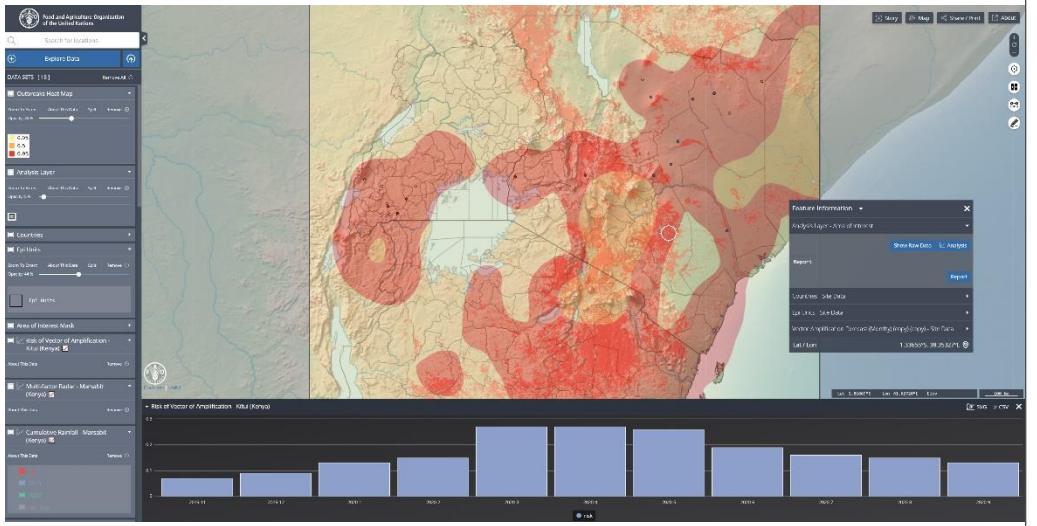
SUSTAINABLE DEVELOPMENT GOALS

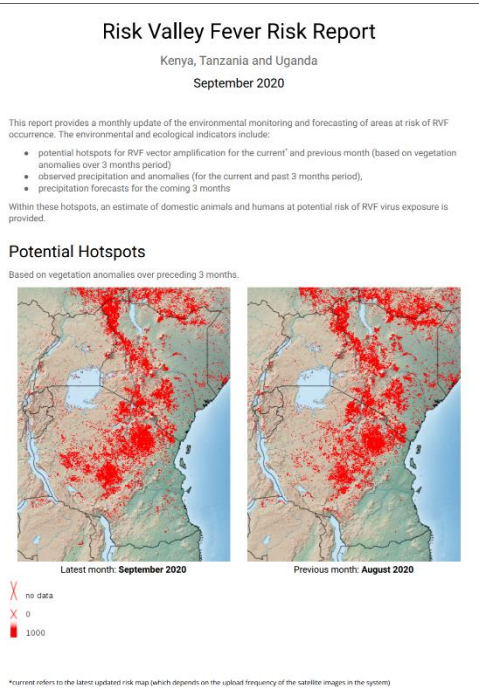




- RVF outbreaks
- RVF risk maps
- Rainfall anomalies
- Livestock
- Roads
- Protected areas
- Markets
- Livestock routes
- Soil
- Water bodies







Risk Valley Fever Risk Report

Kenya, Tanzania and Uganda

September 2020

This report provides a monthly update of the environmental monitoring and forecasting of areas at risk of RVF occurrence. The environmental and ecological indicators include:

- potential hotspots for RVF vector amplification for the current* and previous month (based on vegetation anomalies over 3 months period)
- observed precipitation and anomalies (for the current and past 3 months period),
- precipitation forecasts for the coming 3 months

Within these hotspots, an estimate of domestic animals and humans at potential risk of RVF virus exposure is provided.

Potential Hotspots

Based on vegetation anomalies over preceding 3 months.

Latest month: **September 2020**

Previous month: **August 2020**

no data

0

1000

*current refers to the latest updated risk map (which depends on the upload frequency of the satellite images in the system)

Joint FAO-NASA RA **(Feb 2018)**

Food and Agriculture Organization of the United Nations

Animal Production and Health Division

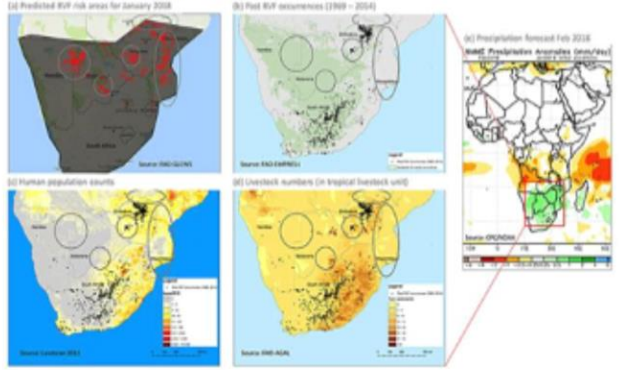
Southern African countries at risk of Rift Valley fever (RVF)

According to a climate monitoring system available at the National Aeronautics and Space Administration (NASA) and FAO, southern Africa has experienced heavy rains during the last weeks that may result in suitable environmental conditions for the emergence of the Rift Valley fever (RVF).

Based on the risk maps prepared by FAO in consultation with NASA for the period October-December 2017, **major potential hotspots of RVF vector amplification are located in north-western Namibia, south-eastern Botswana, south-western and northern Zimbabwe and wide areas in Mozambique.** The enclosed risk maps are generated from remotely-sensed data on precipitation and vegetation anomalies relevant for the RVF vector amplification.

Considering that precipitation forecasts for February and March 2018 predict above-normal rainfall in the region, **FAO advises that the veterinary services and livestock farmers' communities remain vigilant on the potential occurrence of RVF outbreaks in human and/or animal populations.**

Map 1: (a) Predicted RVF risk areas are shown in red and highlighted by grey circles. Past RVF occurrences (black dots) between 1969-2014 overlaid on (b) the vector suitability areas (green); (c) the human population counts and (d) the livestock numbers (in tropical livestock unit). (e) Predicted precipitation anomalies for February 2018. Above-normal rainfall is shown from green to blue, while below-normal rainfall is shown from yellow to red.



May 2018: RVF reported in South Africa

FAO Risk Assessment **(April 2018)**

Food and Agriculture Organization of the United Nations

Agriculture and Consumer Protection Department

Animal Production and Health Division

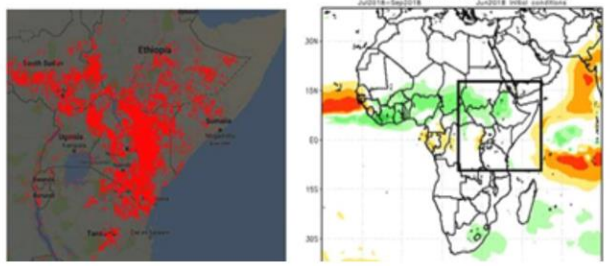
Rift valley fever (RVF) Alert for East African countries

After a period of abnormal, heavy rainfall and floods in the Eastern African region, an outbreak of Rift Valley fever (RVF) was first reported in humans in Kenya; later it was confirmed that the disease was present in animals. These outbreaks are ongoing and pose a threat to the whole Eastern African region. Although, the upcoming season from July onwards will be unsuitable for the vector populations in most of the Eastern African region (except for Ethiopia, South Sudan, and southern Sudan), the potential spread of the disease through animal movements and informal trade routes within and outside of Kenya is likely to occur. Therefore, FAO advises the veterinary services and livestock farmers' communities in the region to remain vigilant to the potential occurrence and spread of RVF in humans and/or animals. In particular, the risk of RVF spread is considered to be very high in Kenya and moderate in Djibouti, Eritrea, Ethiopia, Rwanda, Somalia, South Sudan, Sudan, Uganda, and United Republic of Tanzania. In addition, given the current and predicted above average precipitation forecasts for the period June-September 2018, southern Sudan and western Ethiopia may be also characterized by suitable environmental conditions for RVF vector amplification.

The outbreak in Kenya is not the first RVF re-emergence in the region: during the past seven months, RVF infections have been reported in Uganda (November 2017) and South Sudan (December 2017). Informal cross-border movement of livestock, conflicts, and lack of veterinary services can facilitate the spread of RVF within the affected countries in East Africa.

Map 1: (a) Predicted RVF risk areas for May 2018 (shown in red) and (b) predicted precipitation anomalies for the period July-September 2018. Above-normal rainfall is shown from green to blue, while below-normal rainfall is shown from yellow to red

(a) Predicted RVF risk areas for vector amplification (May 2018) (b) Precipitation forecast June – September 2018



June 2018: RVF reported in Kenya

FAO-IGAD alert **(July 2020)**

Food and Agriculture Organization of the United Nations

The precipitation forecasts for **July -September 2020**, which coincide mostly with the rainy season in Sudan, Ethiopia, South Sudan as well as the dry season in the United Republic of Tanzania, Kenya and Somalia, predict **above-average rains** for the whole region, particularly in northwestern **Kenya**, eastern **Uganda**, eastern **South Sudan** and southwestern **Ethiopia**. This suggests that the region will continue to remain under threat. The potential risk of RVF for July 2020 is still **high** for the region, particularly for **Tanzania, Kenya, Uganda, South Sudan, Somalia** and **Ethiopia**.

In particular, the analysis of change detection of the risk between June and July 2020 highlighted the following:

- An area of about **54 000 km²** still **remains at high risk** of RVF occurrence due to persistent suitability of habitat and climate for vector breeding and development;
- New areas are projected to become suitable for vectors with an overall increase of the risk areas of about 15%;
- About 30% of the area previously found at risk (potential for June 2020) is now at **low risk** of vector **amplification**.

The largest increase in risk areas for July 2020 is expected to occur in Tanzania (28% increased), Ethiopia (23% increase), Somalia (15% increased), South Sudan (10% increased) and Kenya (9% increased).

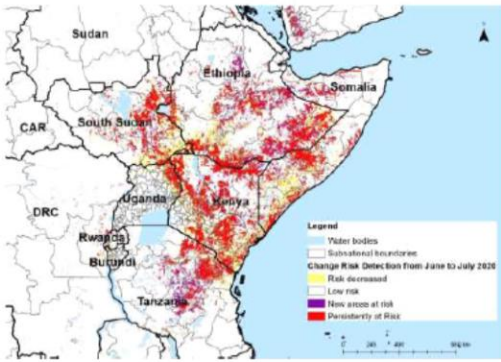


Figure 1: Areas at risk for vector amplification from June to July 2020 (source: FAO RVF Monitoring, Early Warning and Decision Support Tool)

September 2020: RVF suspected in Sudan

Example of actions in 2018/2019

- Kenya – 2018 – timely action with minimal socio-economic and PH impact
- An alert message issued in mid October 2019, well before the RVF outbreak in Uganda (Dec 2019)
- FAO/EMC Incident Coordination Group (ICG) activated → Response Mission in Uganda
- Use of risk maps produced to target field activities in Uganda and conduct RRA
- This prompted the neighboring Rwanda to conduct a national vaccination campaign (67% of livestock)
- SS → use the risk maps to monitor the situation on the ground
- **Joint FAO-IGAD alert messages (mid-May 2020; mid-July 2020)**
- **The overall effect is improved state of vigilance and preparedness**

Moving forward

i. Rolling out

a. Capacity building

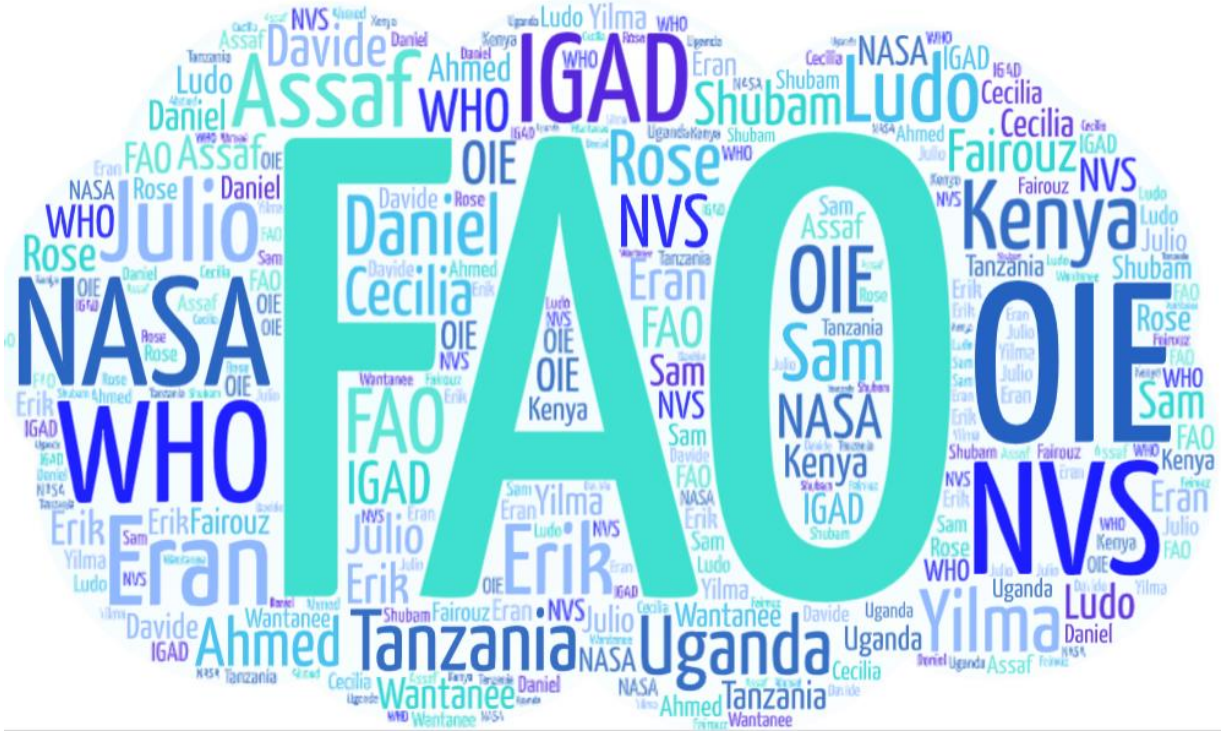
ii. Refinement

a. Feedback
b. Parameters – changing epidemiology
c. “Policy and legal frameworks”
d. Include risk of spread/MCDA

iii. Scaling up … to other

a. Countries, and
b. Vector-borne diseases

Acknowledgements



Rialtas na hÉireann
Government of Ireland

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European Commission
Vmerge
Emerging viral vector-borne diseases

Food and Agriculture Organization
of the United Nations



FAO initiatives and tools on LSD

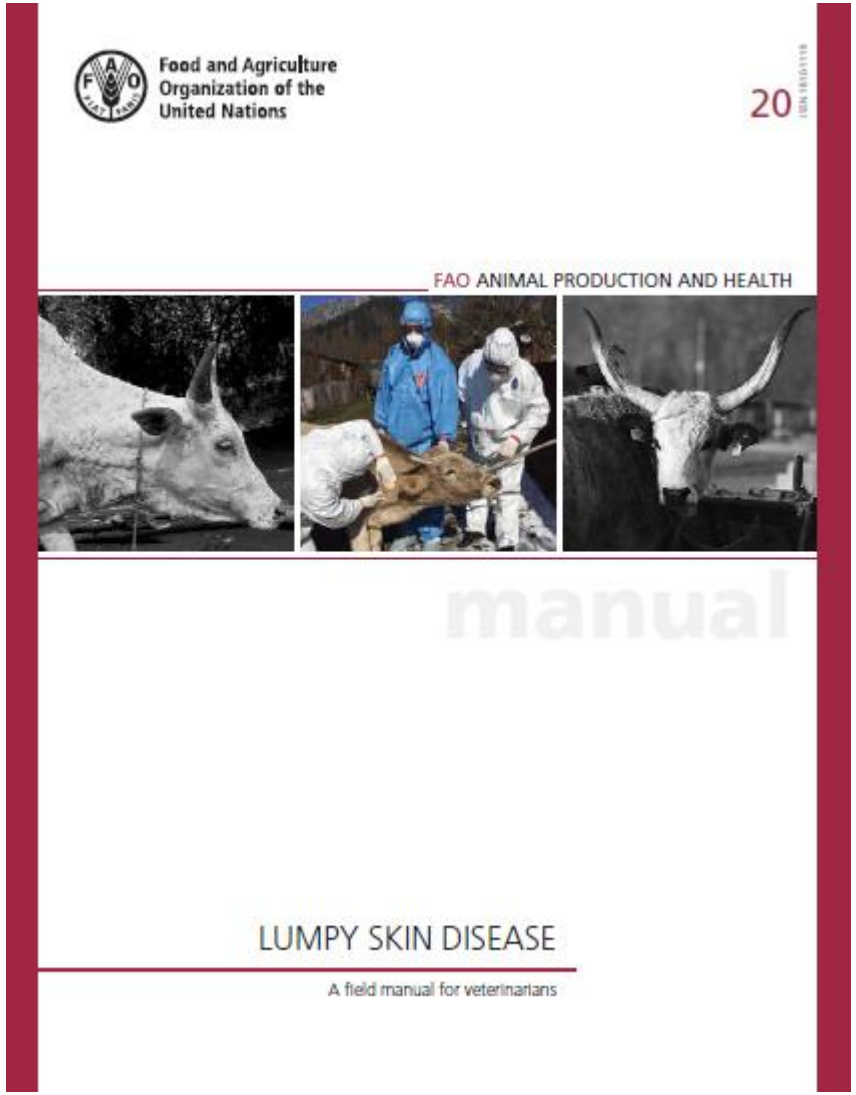
Publications

Lumpy skin disease field manual

- For private and official vets, paravets and lab diagnosticians;
- Contents: Basic epi, clinical recognition, sampling and shipping, and basic management options;
- In multiple languages

Guidance documents

- Template for **LSD Contingency Plan**
- LSD **Emergency Vaccination Plan**
- LSD **Surveillance and Early Detection** Guide
- **Risk assessment** questions
- **Preventive measures**



Awareness materials

60-second video

- to increase awareness on the early detection and notification of LSD (and BT), and improve on-farm biosecurity
- Multiple languages

Repository of Leaflets and posters on LSD:

- Editable
- Multiple languages (including Arabic)
- A version for farmers and a version for vets

Trainings for field vets

Online training

- 4-week tutored course
- Webinars, discussion forum, final test
- Certification process
- English for Europe & Asia (April 2020
- Russian course (Oct 2020)
- **700 participants from 56 countries**
- Planned for Asia and Southern Africa in early 2021

Training of trainer – Cascade trainings

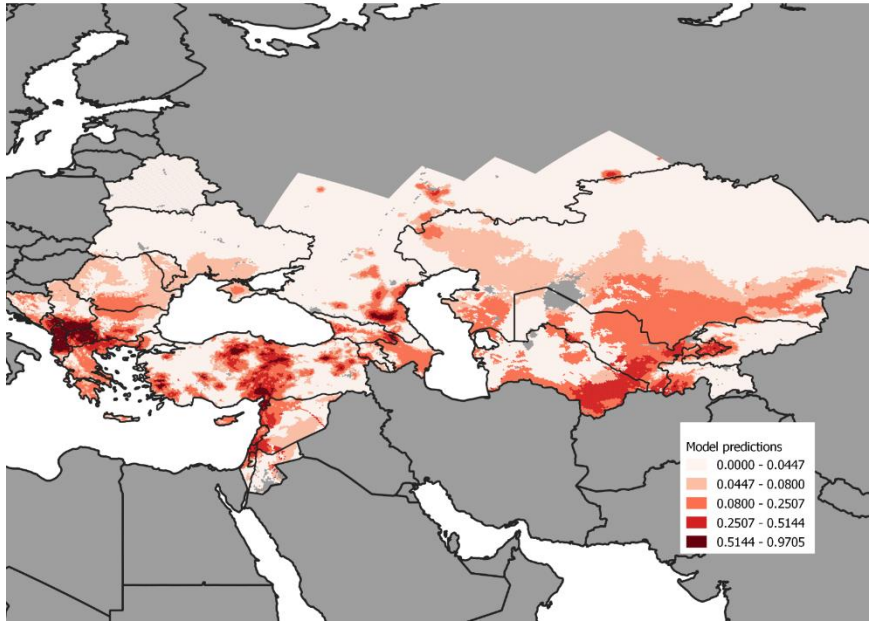
- Implemented in 4 countries (Macedonia, Ukraine, Moldova and Belarus)
- Standardized materials (PPTs, guidelines, tests)

MODULES
Introduction to LSD (Module 1)
Clinical diagnosis (Module 2)
Sampling and Laboratory Diagnosis (Module 3)
Epidemiology and outbreak Investigation (Module 4)
Monitoring and surveillance(Module 5)
Control and eradication (Module 6)

Tools for the vet services

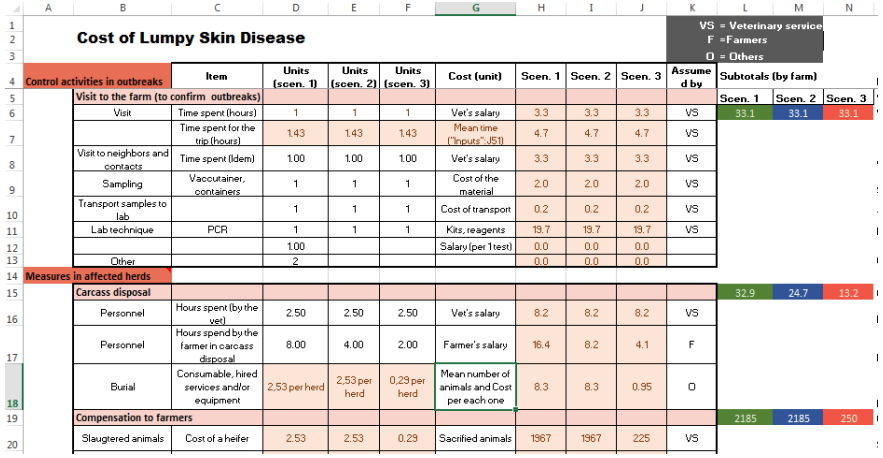
Regional risk assessment

- Predict LSD risk in unaffected areas
- For preparedness, e.g. design surveillance and awareness systems, vaccination, etc.



Cost assessment tool

- Cost of LSD, control measures & trade
- Validated in 6 countries



Cost of Lumpy Skin Disease

VS = Veterinary service
F =Farmers
O = Others

Control activities in outbreaks	Item	Units (scen. 1)	Units (scen. 2)	Units (scen. 3)	Cost (unit)	Scen. 1	Scen. 2	Scen. 3	Assumed by	Subtotals (by farm) Scen. 1	Scen. 2	Scen. 3
Visit to the farm (to confirm outbreaks)												
Visit	Time spent (hours)	1	1	1	Vet's salary	3.3	3.3	3.3	VS	33.1	33.1	33.1
	Time spent for the trip (hours)	1.43	1.43	1.43	Mean time ("Inputs"-J51)	4.7	4.7	4.7	VS			
Visit to neighbors and contacts	Time spent (Idem)	1.00	1.00	1.00	Vet's salary	3.3	3.3	3.3	VS			
Sampling	Vaccutainer, containers	1	1	1	Cost of the material	2.0	2.0	2.0	VS			
Transport samples to lab		1	1	1	Cost of transport	0.2	0.2	0.2	VS			
Lab technique	PCR	1	1	1	Kits, reagents	13.7	13.7	13.7	VS			
		1.00			Salary (per 1 test)	0.0	0.0	0.0				
	Other	2				0.0	0.0	0.0				
Measures in affected herds												
Carcass disposal										32.9	24.7	13.2
Personnel	Hours spent (by the vet)	2.50	2.50	2.50	Vet's salary	8.2	8.2	8.2	VS			
Personnel	Hours spend by the farmer in carcass disposal	8.00	4.00	2.00	Farmer's salary	16.4	8.2	4.1	F			
Burial	Consumable, hired services and/or equipment	2.53 per herd	2.53 per herd	0.29 per herd	Mean number of animals and Cost per each one	8.3	8.3	0.95	O			
Compensation to farmers										2185	2185	250
Slaugtered animals	Cost of a heifer	2.53	2.53	0.29	Sacrified animals	1967	1967	225	VS			

Mailing list

- Regular email updates on LSD events, publications and tools by FAO
- Open for anyone to subscribe: Just email daniel.beltranalcrudo@fao.org

Food and Agriculture Organization of the United Nations

SUSTAINABLE DEVELOPMENT GOALS

Thank You

Protecting people, animals, and the environment every day

Drawings: FAO/Chiara Caproni