

# **An overview of FMD Epidemiology, Diagnostic and Surveillance in Ethiopia: Challenges and progress**

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**Workshop on FMD Epidemiology, Surveillance, and  
Diagnostics to Strengthen Control Efforts in Eastern Africa**

21<sup>st</sup> - 23<sup>rd</sup> October 2025, Mombasa, Kenya



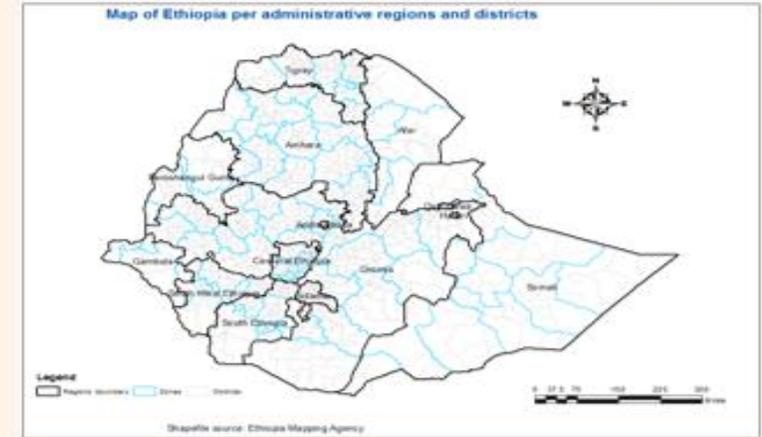
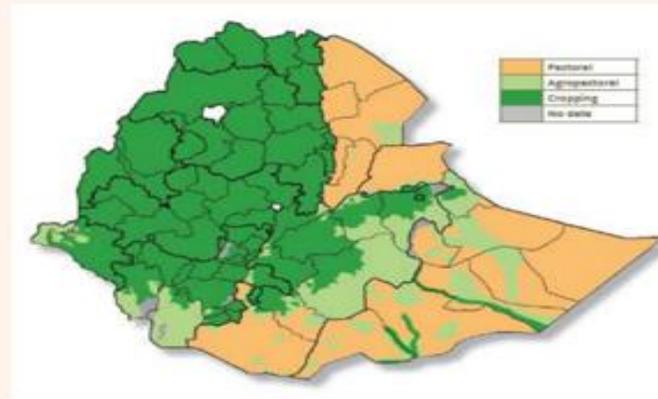


# Introduction

## Geography & Demographics

- Located in the Horn of Africa
- The second most populous country in Africa - Total population: over 120 million
- Predominantly rural: Above 70% of the population lives in rural areas

**Land area:** 1.1 million km<sup>2</sup> with diverse agroecological zones





## Production system

### Crop-livestock

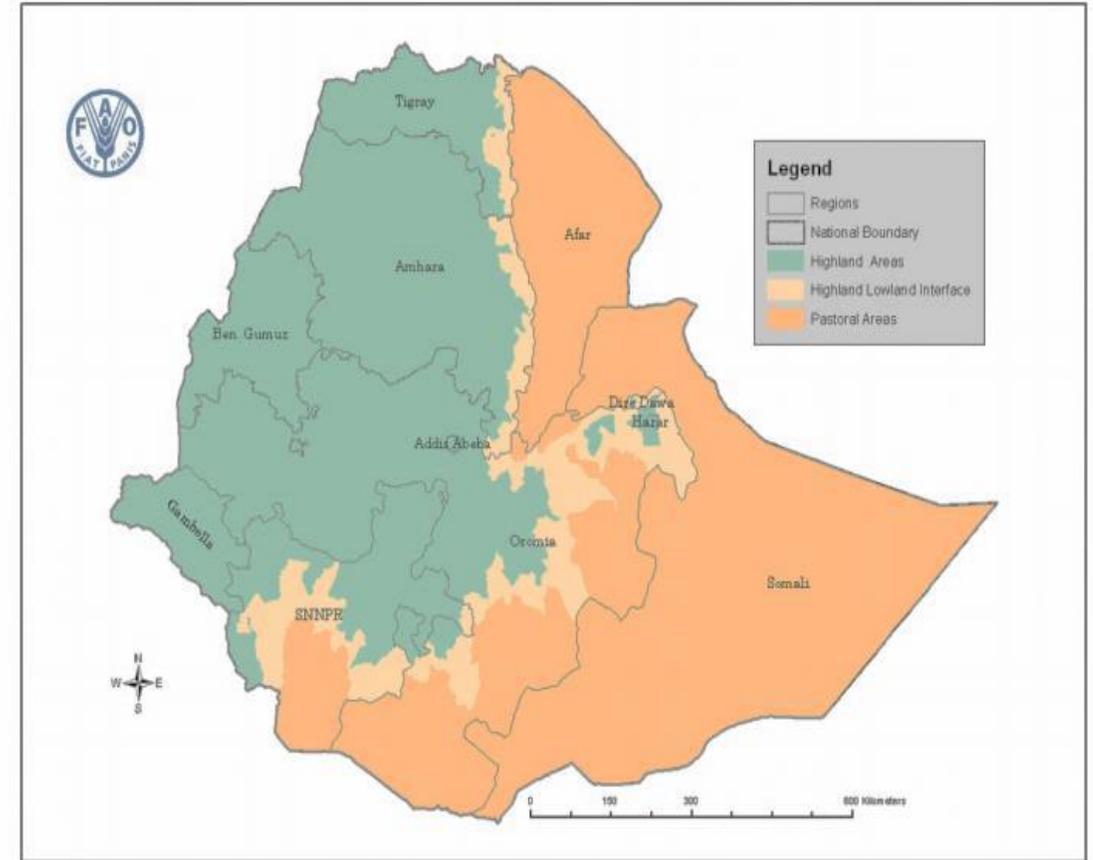
- 40% of the land area of the country
- Integration of crops and livestock is high
- 75% of cattle, 50% of sheep and 30% - goats

### Pastoral system

- 60% of the land area of the country
- LS are the main livelihood means (> 50% HH revenue)
- 90% of animals for export originate
- 25% of the cattle,, 50% of the sheep, 70% of the goat

### Specialized that is intensive

- Feedlots
- Intensive Dairy and commercial poultry



FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA  
CENTRAL STATISTICAL AGENCY  
AGRICULTURAL SAMPLE SURVEY  
2020/21 [2013 E.C.]  
VOLUME II  
REPORT ON  
LIVESTOCK AND LIVESTOCK CHARACTERISTICS  
(PRIVATE PEASANT HOLDINGS)



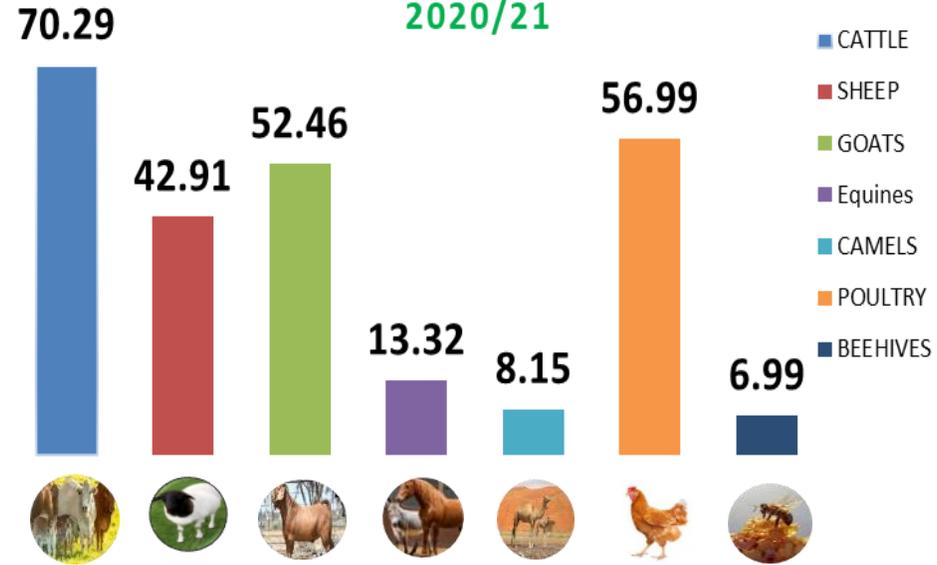
ADDIS ABABA  
MARCH 2021

589 STATISTICAL BULLETIN 589

### Livestock critically contributes to

- Livelihoods and Resilience: A primary source of income, food, traction, energy, and fertilizer
- Food Security & Nutrition
- Plays a key role in poverty reduction, economic transformation, and climate resilience

### LIVESTOCK POPULATION IN MILLIONS, CSA 2020/21



### Livestock contribute

- 17%-19% to the national GDP and
- 45% to the agricultural GDP



**GDP** - Livestock contributes 17% -19 % to Ethiopia's total GDP and 45% to the Agricultural GDP.

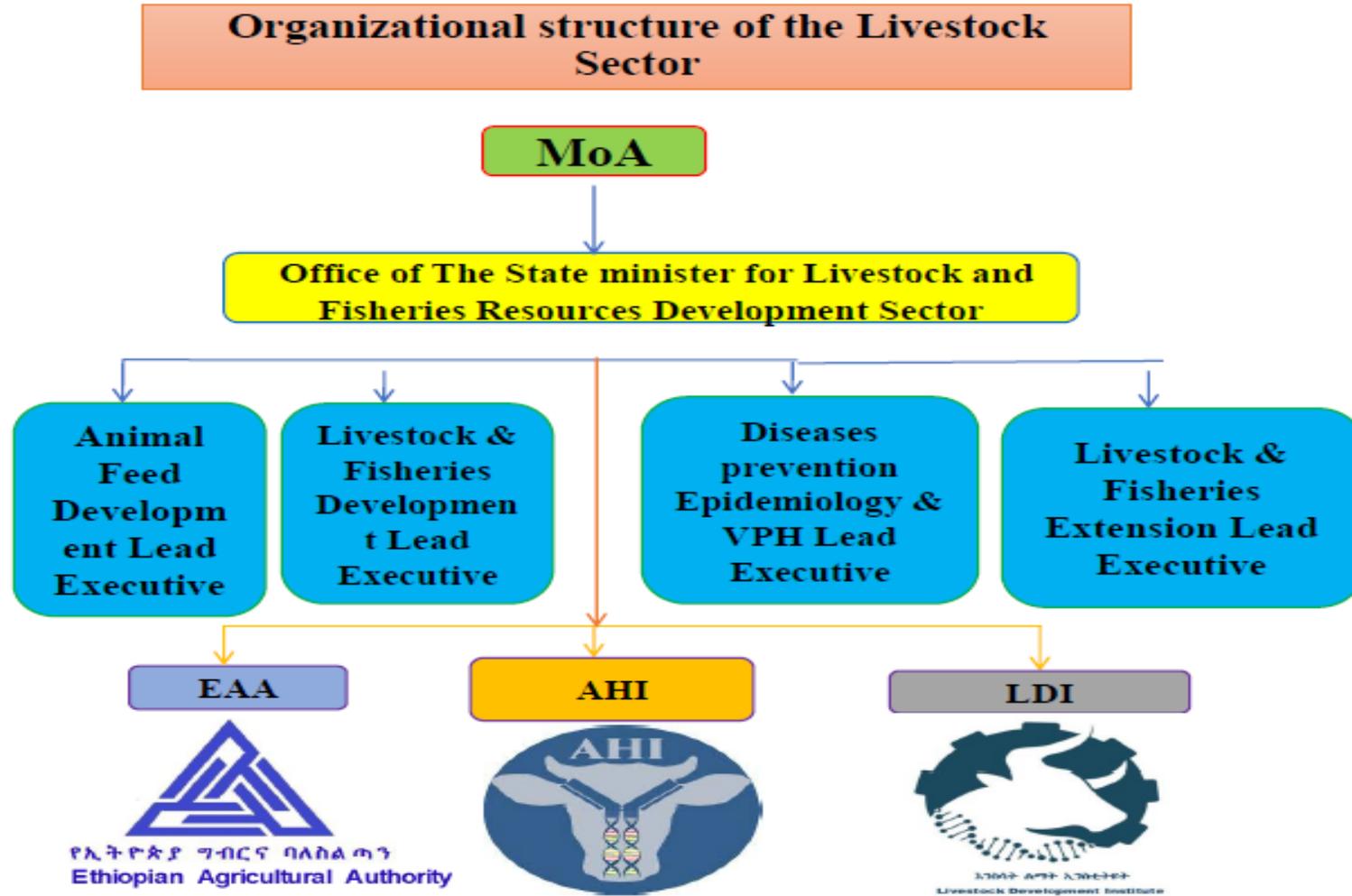


**Food Security** - Livestock plays a vital role in ensuring food security for the nation's population.



**Job Creation** - The sector accounts for 30% of job creation, providing livelihoods for many Ethiopians.





## **Introduction...cont.**

### **Veterinary lab in Ethiopia**

- The veterinary laboratories in Ethiopia are organized at national and subnational levels.
- Animal Health Institute is the national referral laboratory with the role of surveillance, investigation, research activities.
- The subnational laboratories are mandated to conduct surveillance, diagnostic and investigation activities in order to detect and understand disease epidemiology in their operational areas.

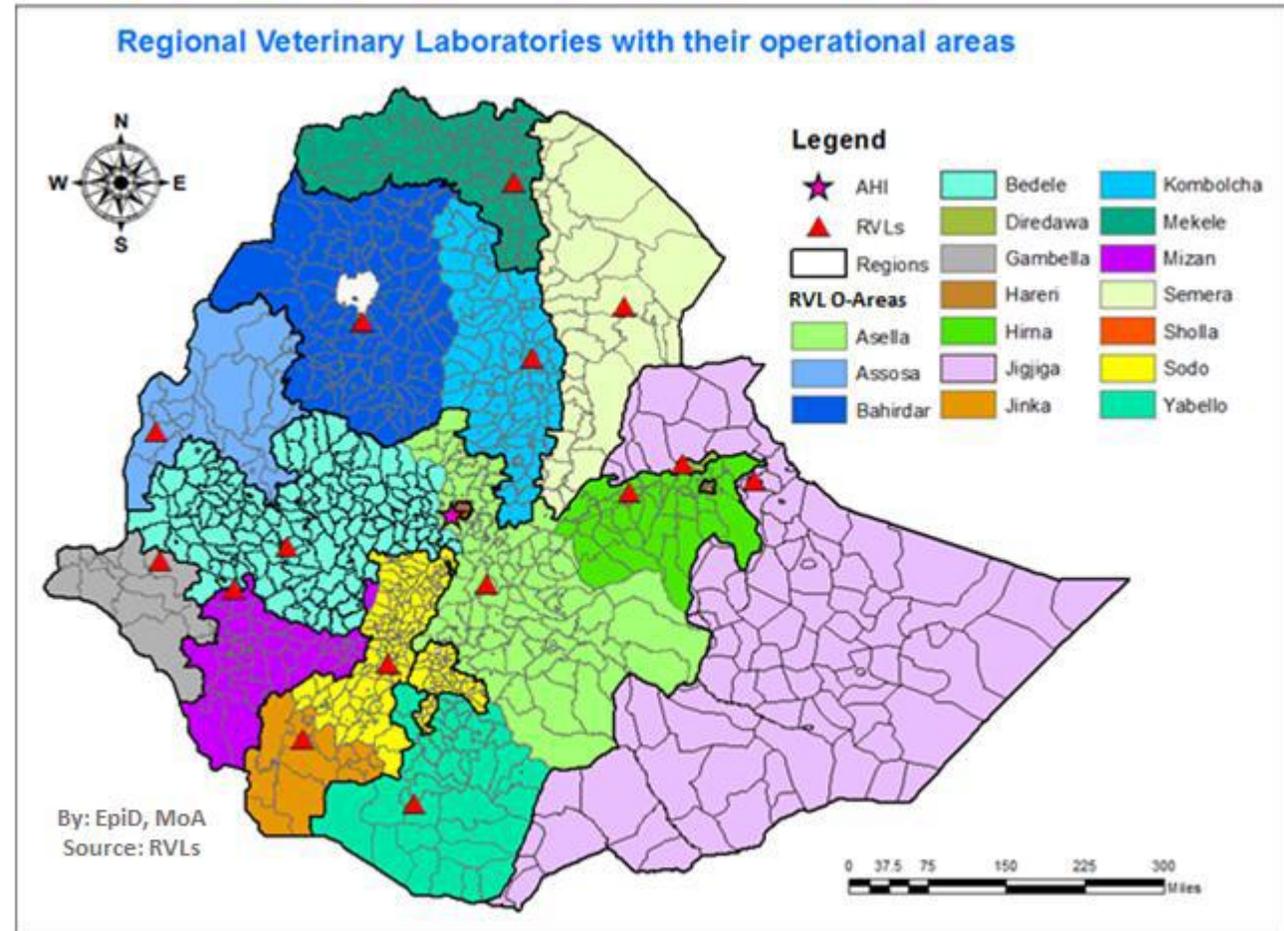
## Introduction...cont.

- One referral and 17 regional veterinary laboratories are operating in different parts of the country
- Their role is mainly on diagnostic and surveillance unlike AHI which conducts referral and advanced level tests.

## National and Sub national Veterinary Laboratories in Ethiopia

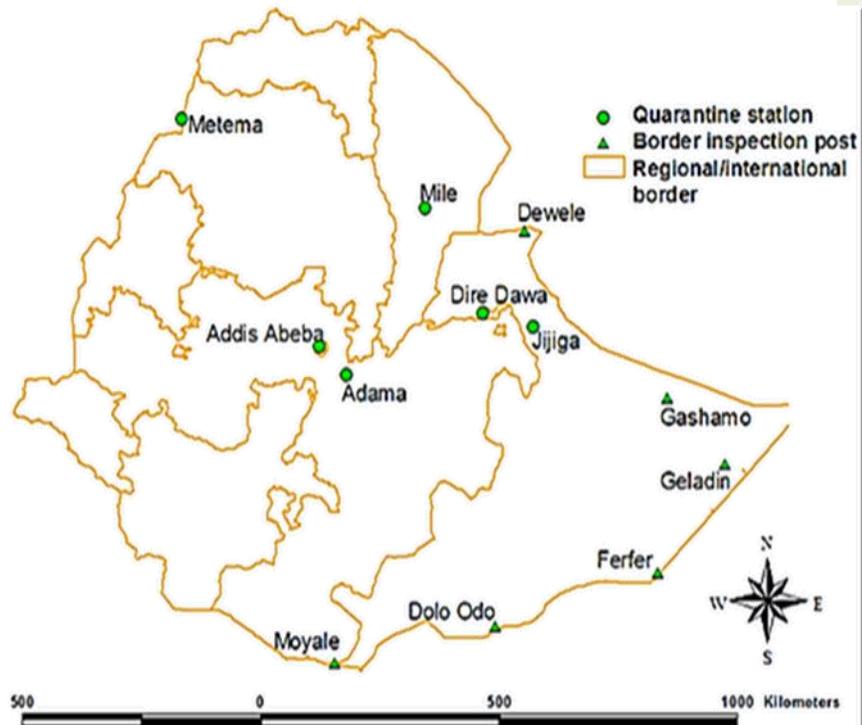
### Veterinary Laboratories in Ethiopia

- ✚ One central/National laboratory/(AHI): ISO 17025 certified
- ✚ Sixteen (16) Sub-national Laboratories
- ✚ Vaccine production Lab (1) - ISO
- ✚ 9001-2008 certified, ISO 17025 certified for lab test, and
- ✚ One Quality control lab



## Quarantine, checkpoints and border inspections

A total of 12 Quarantine, checkpoints and border inspections are established and actively working with the aim of :



- Preventing the introduction and spread of transboundary and zoonotic diseases that threaten animal and public health.
- Ensuring compliance with national and international regulations, supporting safe trade, and facilitating early detection and control of outbreaks.
- Protect the domestic livestock sector by reducing illegal movement and safeguarding food security.

## FMD Situation in Ethiopia

- FMD is endemic in many countries like Asia, Middle East, Africa and some parts of South America
- Seven(7) immunogenically distinct serotypes of FMDV;
- (O, A, C, SAT 1, SAT 2, SAT 3, and Asia 1) and numerous evolving variants showing a spectrum of antigenic diversity
- Six serotypes (O, A, C, SAT-1, SAT-2, SAT- 3) were identified in Africa
- The first identified serotypes of FMD in Ethiopia was in 1957, these were FMD virus serotype O, A and C
- FMD virus outbreaks have been reported from almost all regional states in the country.
- It is usually assumed that FMD has less impact at the farm level in extensive production systems Ethiopia is now endemic for FMD virus serotype O, A, SAT2 and SAT1 serotypes
- Serotype C was last isolated in 1984 which now expected to be extinct



## FMD Situation,.....con't

- The outbreaks of FMD have been reported from almost all regional states in the country. In Ethiopia, it is usually assumed that FMD has less impact at the farm level in extensive production systems
- Four serotypes (O, A, SAT 1, and SAT 2) are endemic in Ethiopia, with serotype O being the most dominant and widespread, whereas, Serotype C was last isolated in 1984 and now expected to be extinct
- The economic impact of FMD on the national and international trade of livestock and livestock products is so huge which should significantly surpass the direct economic impact estimations.





## FMD Situation,.....con't

### Circulating Virus,

- Serotype O (EA3 and EA4 topotype) is mostly encountered in all most all parts of the country
- Serotype O and A are frequently encountered in most outbreaks investigated and cover wider areas of the country.
- SAT 1 was only recovered by antigen detection ELISA. We have not able to sequence this serotype since 2007 which was in Southern part of the country, Bench Maji zone.
- Serotype C has not been detected in Ethiopia since 1982
- Since its first identification in 1957, the outbreaks caused by serotype O, A, and SAT2 have been frequently reported. SAT2 reemerged after a relative absence of 16 years in 2015





## FMD Situation,.....con't

In Ethiopia, FMD is a notifiable disease that has been reported since 1957

- The seroprevalence of FMD in Ethiopia ranges from 5.6 to 72.1% in cattle and from 4 to 11% in small ruminants
- The epidemiology and evolution of FMD virus strains circulating in Ethiopia are poorly understood, limiting the effectiveness of control and prevention measures
- FMD outbreaks occur frequently across the country, with higher frequency and intensity during the dry season



## Surveillance and Diagnostic

### National Animal Disease Surveillance System (NADSS)

- A structured system for **collection, storage, analysis and dissemination** of animal health information for effective prevention and control of diseases
  - involves all actors from grass root (Kebele) to national level
  - **Mainly relies on passive surveillance**
    - Disease reporting
- **NADSS has two components:**
- **ADNIS-** for real time disease notification of disease
  - **DOVAR-II** – Monthly Disease occurrence and Vaccination activity report



## Surveillance cont....(NADSS)

### Purpose

- Avail accurate, timely and reliable data for decision making and planning

### Objectives

- Early disease detection)
- Monitor disease trends
- Facilitate the control of disease
- Support claims for freedom
- Provide data for use in risk analysis
- Substantiate the rationale for sanitary measures/Export/

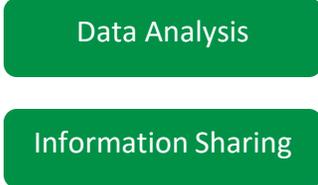
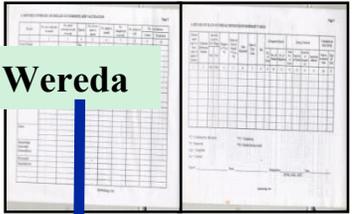
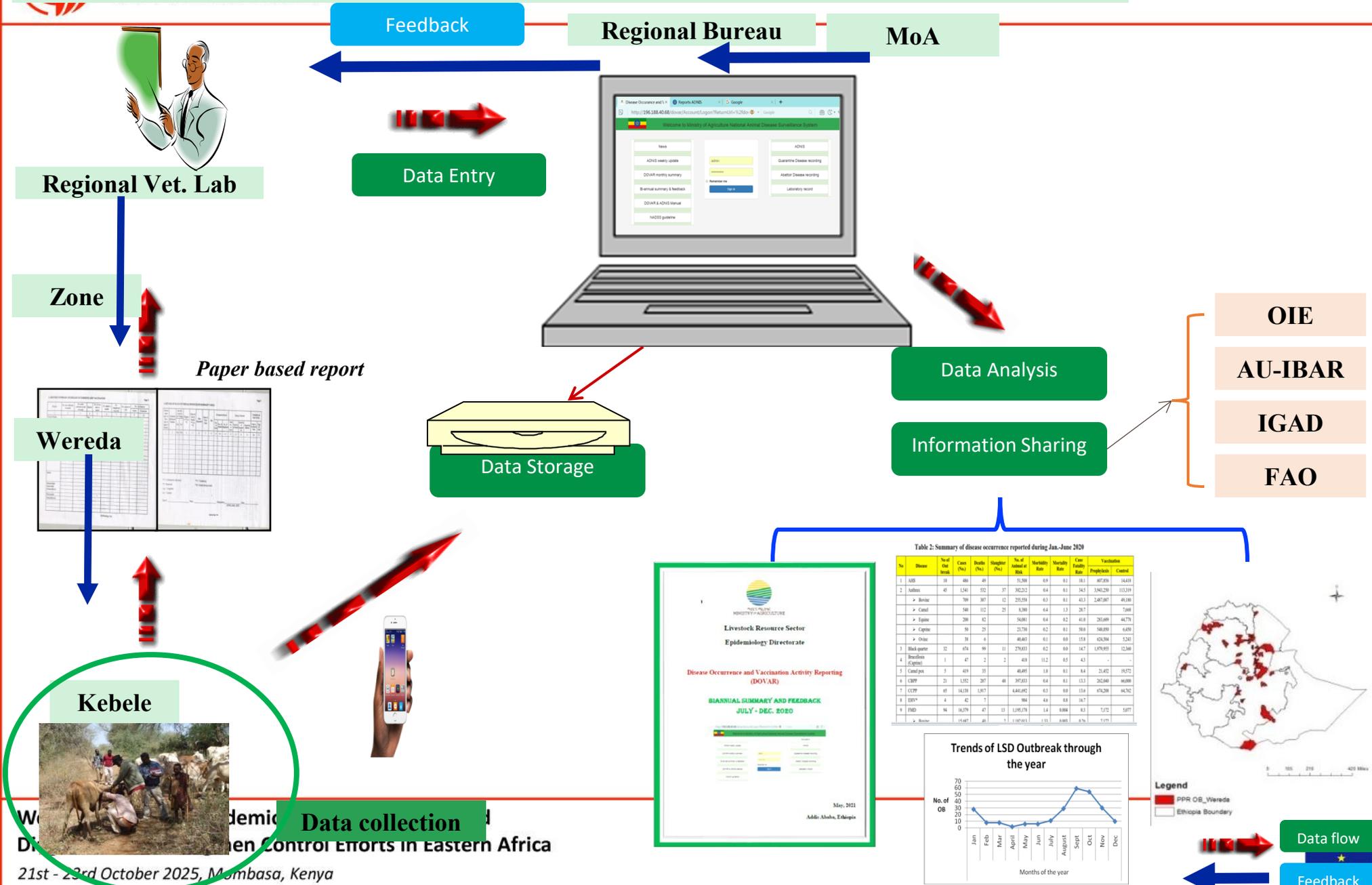
## Surveillance cont....(NADSS)

### Stakeholders and information flow

- The main actors of Surveillance at national level are:
  - [MoA-Epidemiology Dept.](#)
  - [AHI](#) : AHI is mandated for Animal Health Research, Diagnostics, Capacity building and advisory services for livestock producers and animal health professionals.

# NADSS Stakeholders and information flow

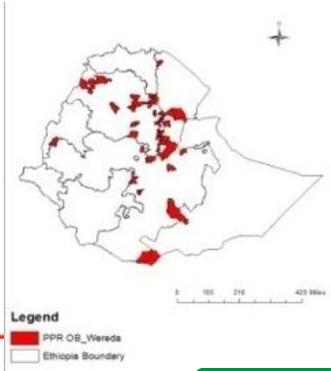
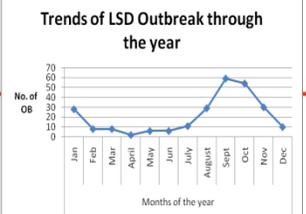
Missing components



- OIE
- AU-IBAR
- IGAD
- FAO

Table 2: Summary of disease occurrence reported during Jan.-June 2020

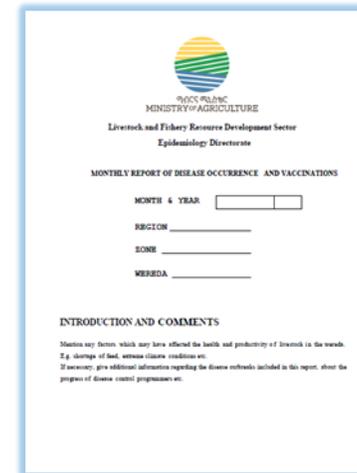
No.	Disease	Not Out Break	Cases (%)	Deaths (%)	Straggle (%)	No. of Infected Animals	Morbidity Rate	Mortality Rate	Case Fatality Rate	Yield/ha	Production	Control
1	ASIS	39	486	49		55,586	0.9	0.1	10.1	407,836	14,418	
2	Adhans	45	1,541	152	37	302,212	0.4	0.1	34.5	3,942,250	113,319	
	↳ Bovine	799	307	12	255,559	0.3	0.1	43.3	2,407,007	49,180		
	↳ Camel	548	112	25	8,386	0.4	1.3	20.7		7,668		
	↳ Equine	206	82		54,081	0.4	0.2	41.8	28,099	44,771		
	↳ Caprine	59	25		23,739	0.2	0.1	58.8	54,099	6,476		
	↳ Ovine	39	6		40,403	0.1	0.0	15.8	426,594	5,240		
3	Blad gorse	32	676	99	11	279,033	0.2	0.0	14.7	1,070,959	22,989	
4	Brucella (Caprine)	1	47	2	2	468	11.2	0.5	4.3			
5	Camel pox	3	409	35		40,495	1.0	0.1	8.4	23,452	10,572	
6	CDPP	21	1,152	207	48	397,033	0.4	0.1	13.3	20,249	46,889	
7	CCPP	40	14,138	1,077		4,441,492	0.3	0.0	13.9	474,208	14,762	
8	EDM*	4	42	7		964	4.8	0.9	16.7			
9	FMD	84	16,779	47	13	1,198,178	1.4	0.004	0.3	7,172	5,977	
	↳ Bovine	14,087	40	7	1,197,013	1.33	0.001	0.76	7,171			



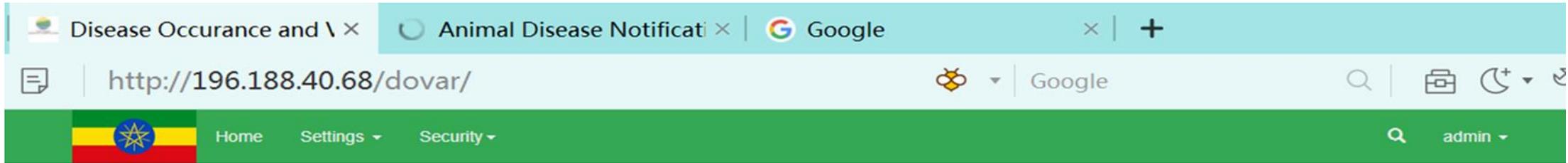
## Surveillance cont....(NADSS)

### DOVAR-II

- DOVAR-II is an improved version of the former MS access (DOVAR-I started since 1991)
- A web-based system used for management of disease data(since 2016)
- It has data entry, system administration, data retrieval & report management module

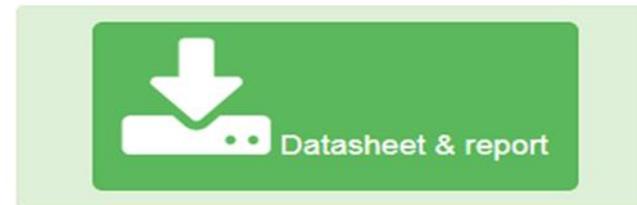


## Surveillance cont....(NADSS)



WELCOME TO MINISTRY OF AGRICULTURE !!

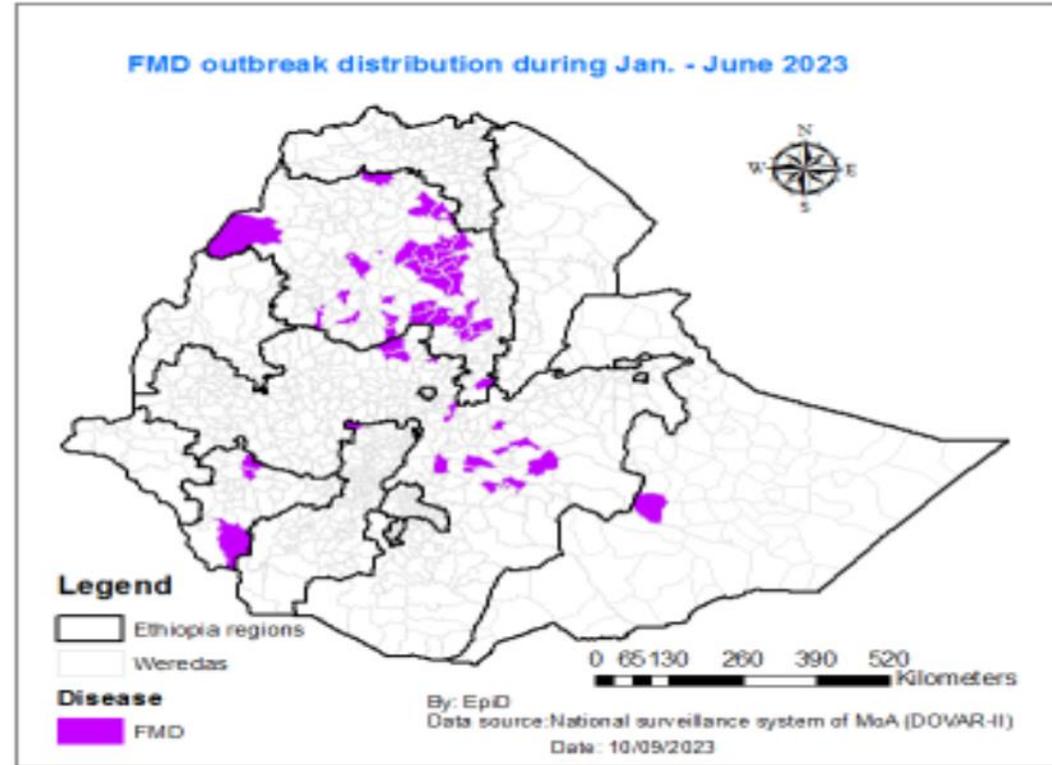
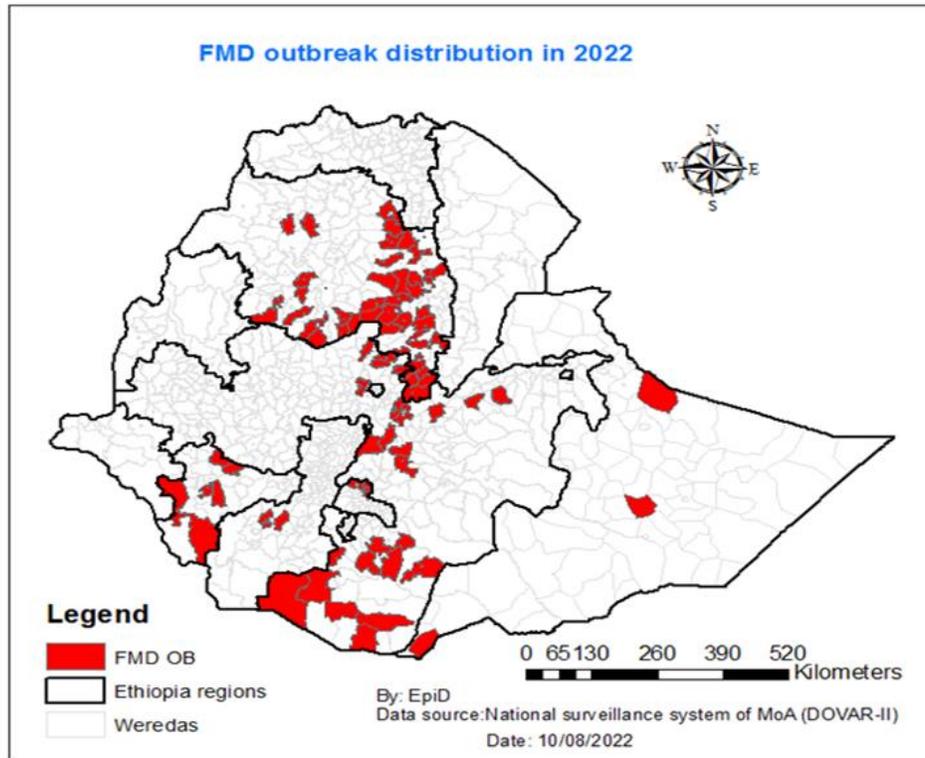
### Disease Outbreak and vaccination Activity Reporting System II



## Spatial Distributions of FMD Outbreaks in Ethiopia

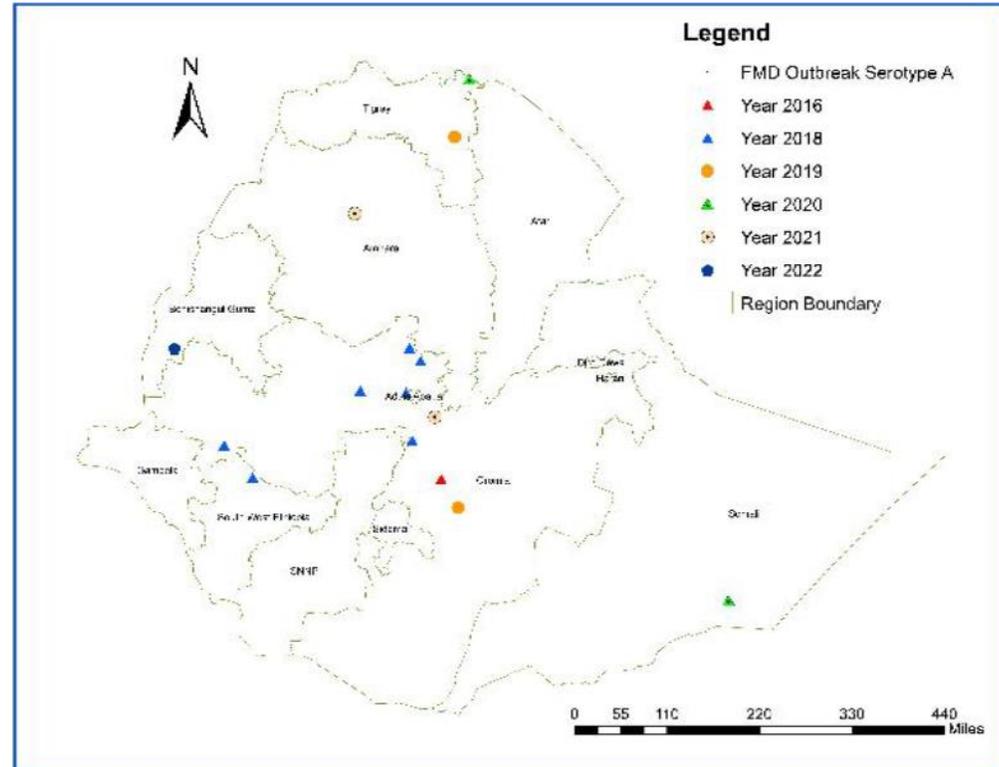
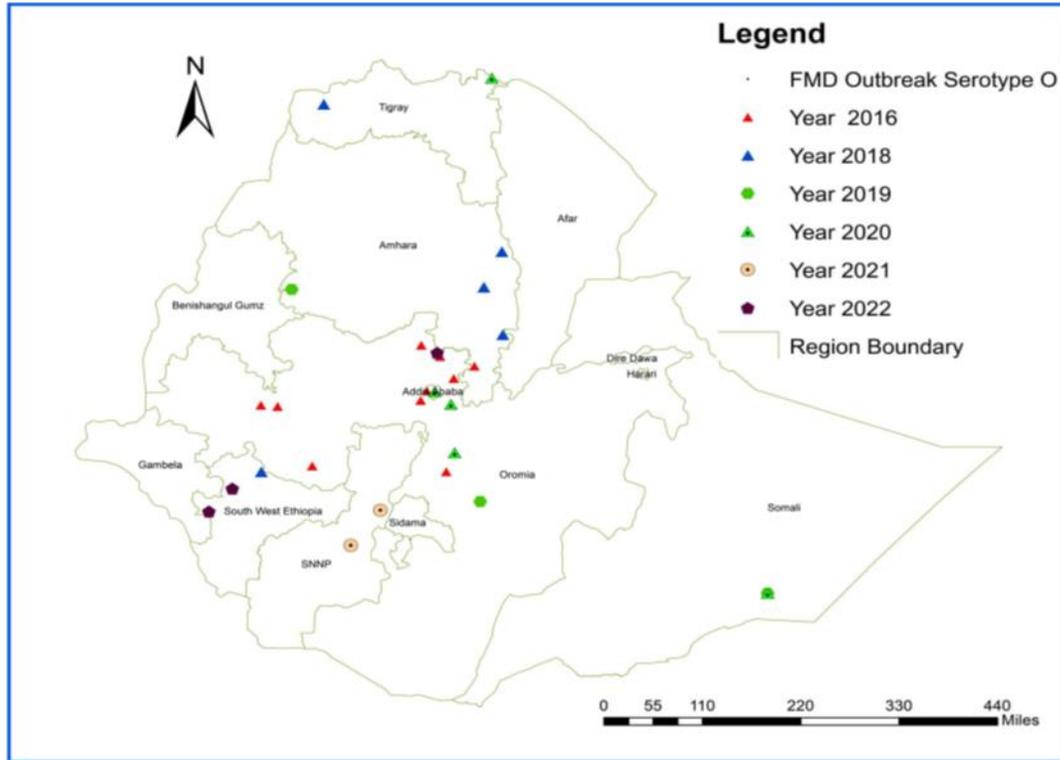
- The FMD outbreaks in Ethiopia showed a concentration in the central and northern parts of the country
- The pastoral areas in the eastern, southern, and western regions had fewer reported incidents, could be due less access to veterinary services, in need of enhanced surveillance for more reliable reporting of outbreaks
- The distribution of the FMD virus is shown in the figure 1 blow

# Spatial Distributions of FMD Outbreaks in Ethiopia



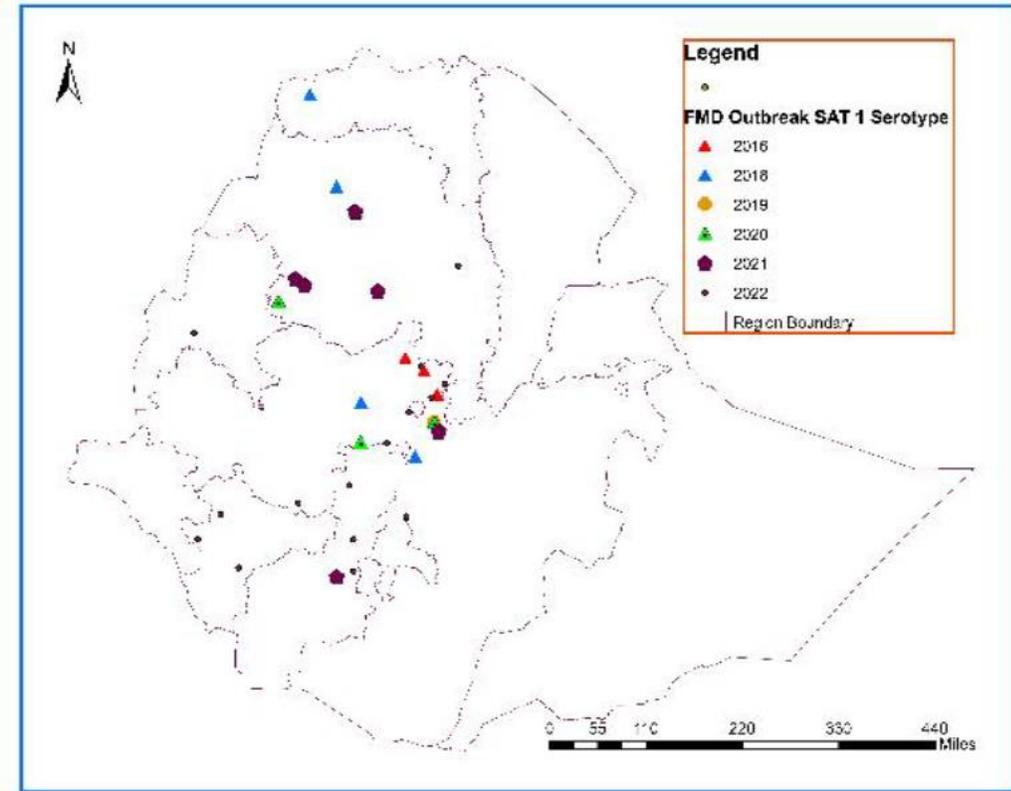
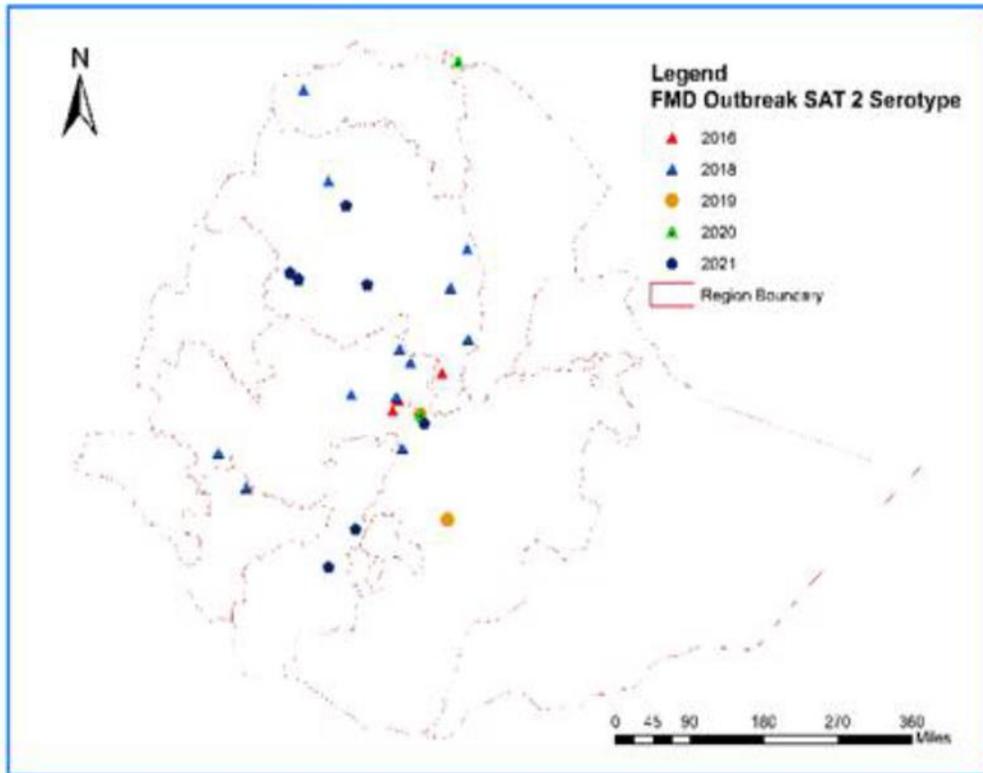
Data source: National Surveillance system of MOA (DOVAR-II,2022)

# Spatial Distributions of FMD Outbreaks in Ethiopia



Data source: Animal Health Institute(AHI), Ethiopia

# Spatial Distributions of FMD Outbreaks in Ethiopia



Data source: Animal Health Institute(AHI), Ethiopia

# Outbreaks Reported by DOVAR

**2024**

Reported Suspected OB 91 and confirmed 26 by Laboratory(AHI)

**2025**

Reported Suspected OB 139 and confirmed 11 by Laboratory(AHI) still underway

## Surveillance and Diagnosis

**Table1:Detection of FMD virus from 2015 to 2025**

Types of Sample	No. of sample tested	No. Positive for FMD Virus/Antibody	No. Negative for FMD Virus/Antibody	Percentage of detection
Serum	405	122	283	30
Probang	126	36	90	28.6
Swab	682	111	571	16.3
Tissue	1506	244	1242	16.2
Whole blood	26	12	14	46.2
<b>Total</b>	<b>2745</b>	<b>528</b>	<b>2200</b>	<b>19.23</b>



## Surveillance and Diagnosis

**Table2:FMD virus antigen or antibody detected in samples collected from different Regions from 2015 to 2025 for FMD outbreak**

Region	Genome detected	Negative	Positive FMD antibody	SAT 1	SAT 2	A	O	Total
Addis Ababa		30	5		1	8	5	49
Afar		150						150
Amhara		128	3	12	17	2	29	191
Benishangul Gumuz		101			2		1	104
Oromia	55	1345	24	23	58	50	57	1612
South Ethiopia Reg		257	76	10	25		17	385
Somali		27				3	5	35
Tigray		120			6	6	11	143
<b>Total</b>		<b>2158</b>	<b>108</b>	<b>45</b>	<b>109</b>	<b>66</b>	<b>125</b>	<b>2669</b>



## Recent study on Economic loss due to FMD in Ethiopian Cattle indicates

- Losses resulting from an average outbreak were estimated to be **USD 2300 (USD 1400–USD 3300)**, while national annual losses were estimated to be **USD 0.9 Mil. (USD 0.2 Mil. – USD 2.3 Mil.)**
- Nationally, these losses were significantly less than previously estimated in the literature, with currently estimated losses more accurately reflecting the economic burden of FMD in Ethiopian cattle over the past decade.
- The relatively small estimated losses **suggest that control efforts based on widespread vaccination in countries with primarily extensive cattle production systems, such as Ethiopia, are unlikely to be economically sound.**
- Sensitivity analyses suggested losses would be far greater in intensive systems, and that certainty surrounding incidence rates is paramount to the formulation of economically sound animal health policy in regions with endemic FMD.

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### Economic losses due to foot-and-mouth disease (FMD) in Ethiopian cattle

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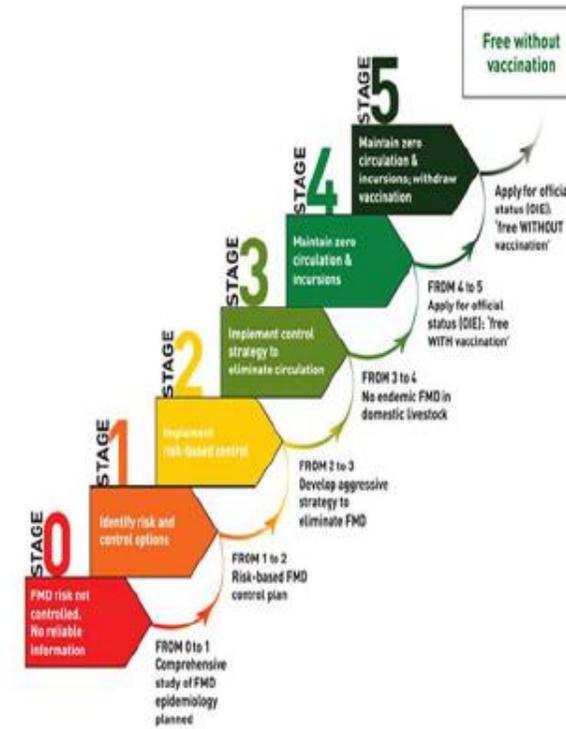
Foot-and-mouth disease  
FMD  
Ethiopia

#### ABSTRACT

Ethiopia's cattle population is among the largest in Africa and is burdened by frequent foot-and-mouth disease (FMD) outbreaks. FMD is caused by several distinct and highly contagious viral strains that can result in acute disease in cattle, causing losses in productivity and impeding international trade. This economic simulation study

# Progress on FMD Control Efforts in Ethiopia

- ⇒ Development of specific documents
  - National FMD surveillance plan
  - Biosecurity plan
- ⇒ Pre-feasibility study on enhancing meat export
- ⇒ Training guide





# Progress on FMD Control Efforts in Ethiopia

- **Establish DFZs:** Create disease-free zones in three strategic regions and secure international SPS certification.(Borana, south Omo and Fafan)
- **Digital Traceability:** Implement a comprehensive digital system for animal identification and traceability (**ET-LITS**) to comply with export market requirements.
- **Genetic Improvement:** Develop community-based breeding nuclei, ranches, and regional Artificial Insemination (AI) centers to produce and disseminate superior breeding stock.
- **Supply Chain, Market and Infrastructure:** Develop commercial livestock farms, organize producers into cooperatives, and strengthen linkages with meat and live animal exporters.
- **Feed and Water:** Ensure a reliable and sustainable supply of feed and water through improved forage development and conservation practices.



Strategic Plan for Establishing Disease-Free Zones to  
Modernize Ethiopia's Livestock Sector and Meat Exports

(2025-2030)

October 2025





## Key interventions

- Integrated epidemiological mapping and livestock movement analysis
- Strengthen integrated surveillance (passive and active)
- Laboratory capacity, diagnostic and referral network enhancement
- Movement control and checkpoints/controlled pathways
- Quarantine, ring control and rapid containment capacity
- Vaccination (tailored to the diseases)





## Planned Vaccination coverage for the year 2025-2030

*Table 9: Vaccination Coverage for FMD, CBPP, CCPP and PPR (2018-2022)*

Year	Coverage	Cattle pop	Sheep pop	Goat pop	Total pop	FMD doses	CBPP doses	CCPP doses	PPR doses	Total vaccine doses
2018	80%	7,271,502	6,899,246	13,372,117	27,542,865	11,634,403	5,817,202	11,387,618	16,217,090	45,056,313
2019	90%	8,396,149	7,033,745	13,722,516	29,152,410	15,113,068	7,556,534	13,053,639	18,680,635	54,403,876
2020	90%	9,694,739	7,170,867	14,082,097	30,947,703	8,725,265	8,725,265	13,390,974	19,127,668	49,969,172
2021	90%	11,194,176	7,310,661	14,451,100	32,955,937	10,074,758	10,074,758	13,737,056	19,585,585	53,472,158
2022	90%	12,925,523	7,453,181	14,829,772	35,208,476	11,632,971	11,632,971	14,092,113	20,054,658	57,412,712





## Challenges for FMD Prevention and Control

- Weak active disease surveillance, outbreak investigation and monitoring to identify circulating viruses and efficacy of vaccination campaign
- FMD vaccine quality and quantity is problem
- Early detection identification of FMD outbreaks (serotype identification) and Identification of lineage FMD virus are problem like SAT viruses, especially SAT1
- Limited understanding of the role of wildlife and small ruminants in FMD transmission and spread
- Availability and affordability of purified quality vaccine against FMD maters
- unavailability and affordability of penside rapid test kit
- Absence of Regional; Continental and Global Integration Towards FMD Prevention and Control Measures





**Thank you**  
**Asanthe sana**  
**Merci**

