

GF-TADs Foot and Mouth Disease Risk Assessment Training Workshop

19 - 21 September 2023 Johannesburg, South Africa



Ministry of Agriculture, Ethiopia



Daniel Gizaw
nebiyudan@gmail.com
+251911388562





Outlines



- Introduction
- FMD situation In Ethiopia
- Surveillance
- vaccination, control measures, monitoring and reporting, opportunities,
- challenges or gaps
- Acknowledgements

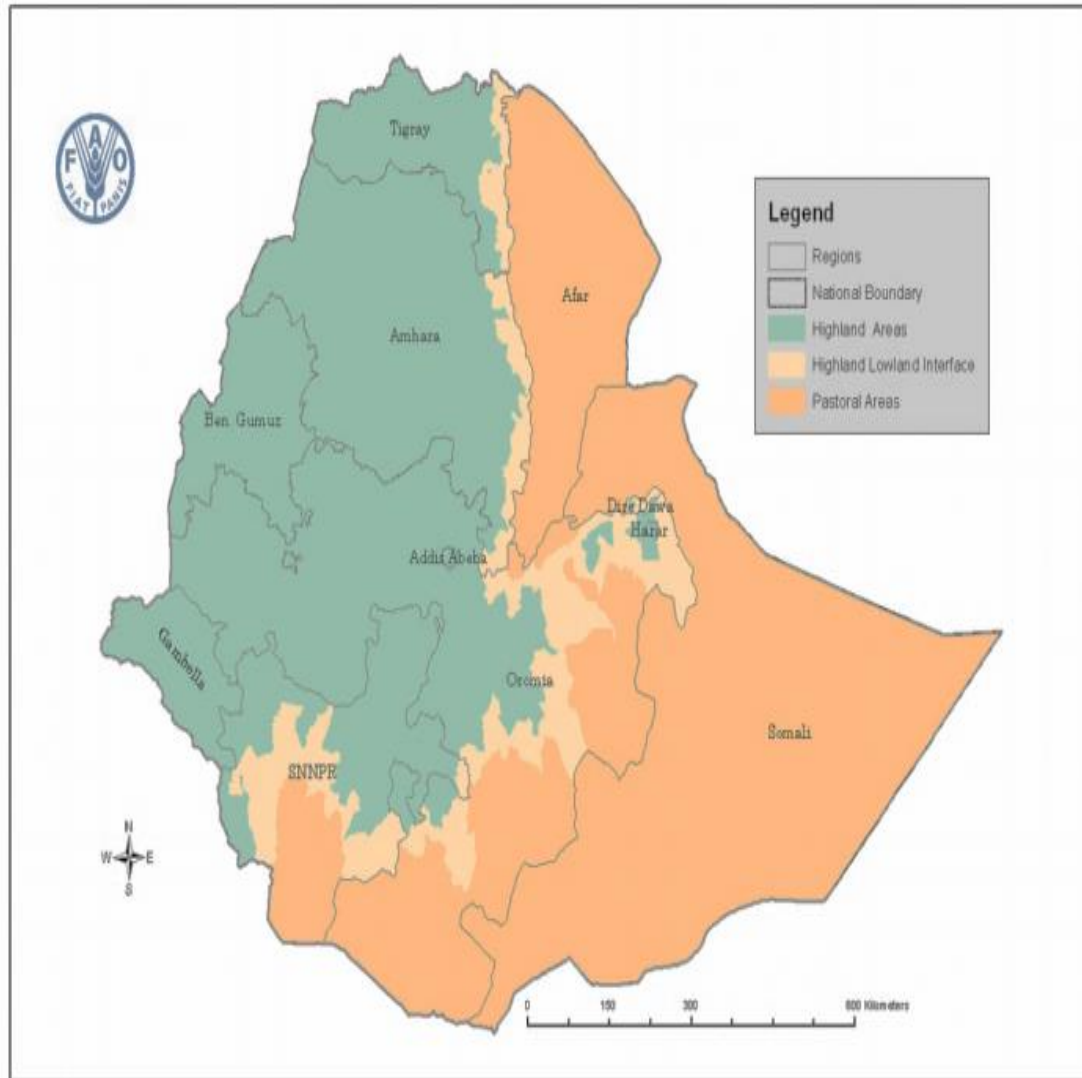
Introduction

- Animal Health Institute (AHI) was established by joining National Animal Health Diagnostic and Investigation Center (NAHDIC) and National Institute for Control and Eradication of Tsetse Fly and trypanosomosis in October 2021.
- AHI is mandated for Animal Health Research, Diagnostics , Capacity building and advisory services for livestock producers and animal health professionals.

Introduction

- Ethiopia endowed with 65 million cattle, 40 million sheep, 51 million goats, 8 million camels and 49 million chickens in 2020 (CSA, 2020).
- The Production system in Ethiopia broadly dived in to
 1. Extensive system
 2. intensive system
- Where the extensive system further dived into the **crop-livestock mixed** system and **pastoral system**.
- There is a small portion of **intensive** dairy and **feedlot** in highland areas of the country (Endalew and Ayalew, 2016).

Production systems



Crop-livestock

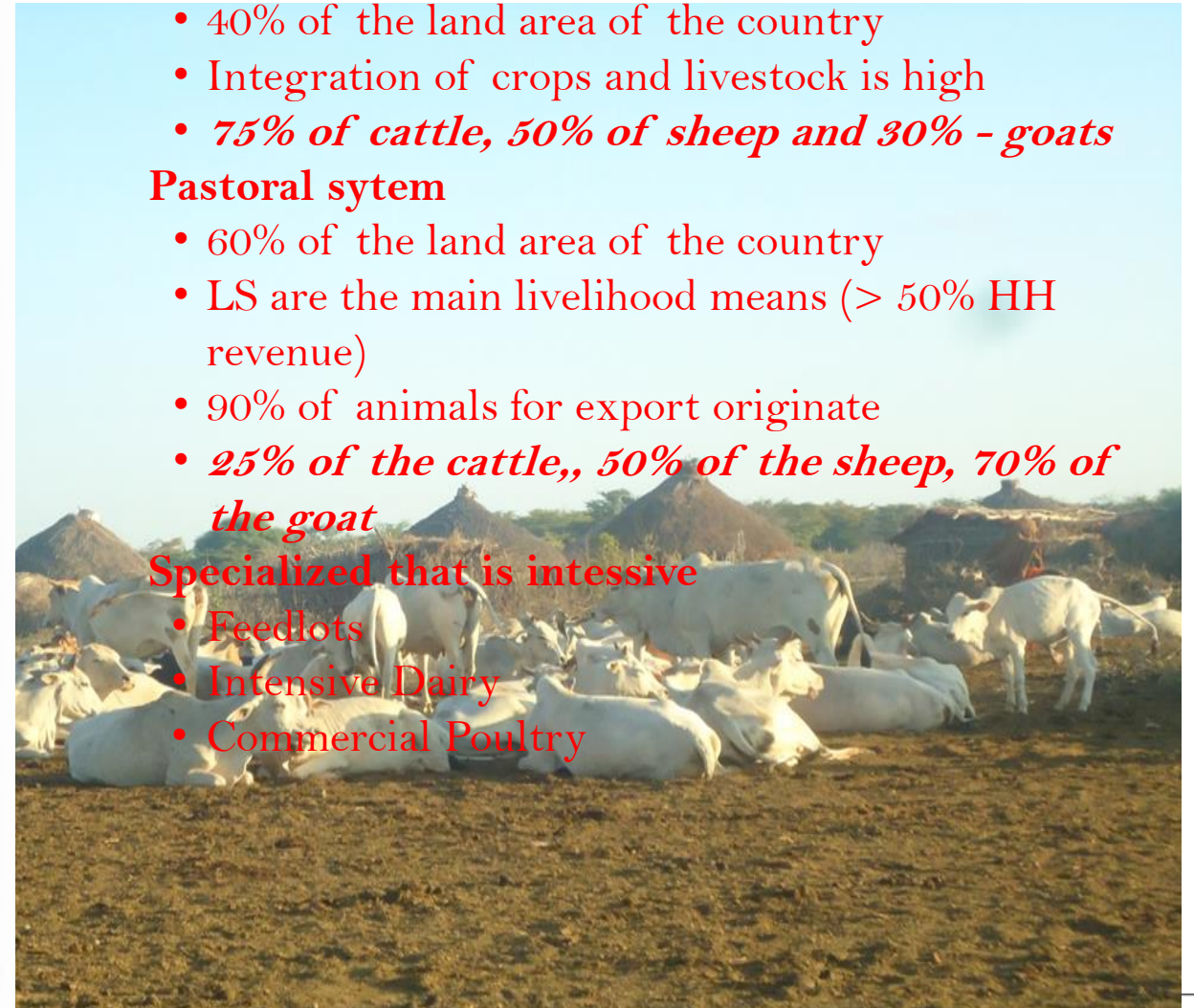
- 40% of the land area of the country
- Integration of crops and livestock is high
- **75% of cattle, 50% of sheep and 30% - goats**

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**

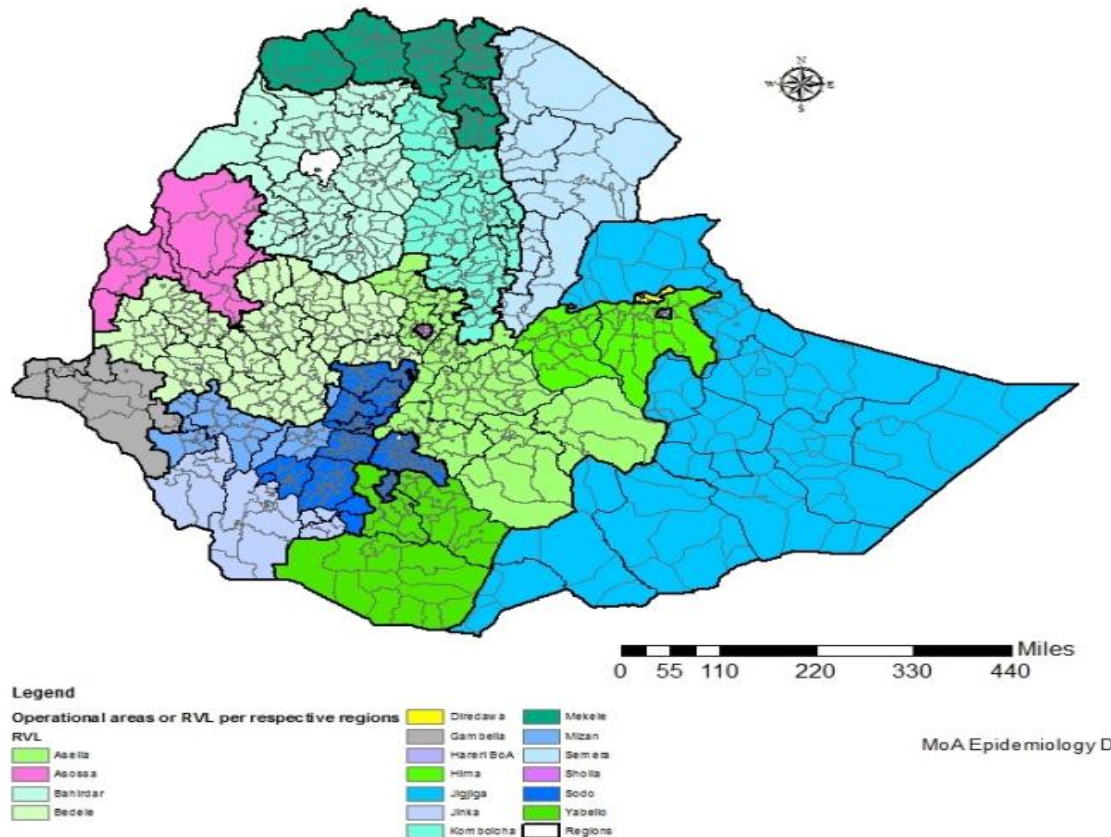
Specialized that is intensive

- Feedlots
- Intensive Dairy
- Commercial Poultry



Regional Veterinary Laboratories in Ethiopia including AHI

Operational Areas of Regional Laboratories



- **Central lab – AHI (1) – ISO 17025 certified**
- **Regional lab (16)**
- **Vaccine production (1) - ISO 9001-2008 certified, ISO 17025 certified for lab test**
- **Quality control lab**

FMD situation in Ethiopia

- 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 (Jemberu et al., 2014).
- 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 (Paton et al 2021).

FMD.....

- FMD is a major obstacle to the development of agriculture because of its adverse effects on livestock production and export trade.
- The most direct economic impact of FMD is the loss or reduced efficiency of production, which reduces farmers' incomes.
- At the national level, FMD slows economic growth by severely limiting trade opportunities.
- At the local level, FMD reduces Pastoralists' income and food availability for consumption

FMD situation in Ethiopia

There are many FMD virus strains circulated

- Serotype O (EA3 and EA4 topotype) is mostly encountered in all most all areas of the country.
- Serotype A (Topotype: AFRICA, Genotype/strain: GI-GVII).
- 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.

FMD situation in Ethiopia

- SAT2 reemerged after a relative absence of 16 years in 2015.
- SAT 2 (Topotype: XIV, XIII and Genotype/strain: Alx12), SAT 2 are mostly in the Southern, central and northern part of the country.
- The viral protein sequence revealed lineages VII (Alx-12), Lib-12 and XIII. Only one, SAT2 lineage, described once in a time within Ethiopia.
- These were topotype XIII virus in 2009-2010, The VII/Alx-12 lineage in 2014-2015 and the VII/Lib-12 lineage in 2018 (Gizaw et al., 2020).

FMD situation in Ethiopia

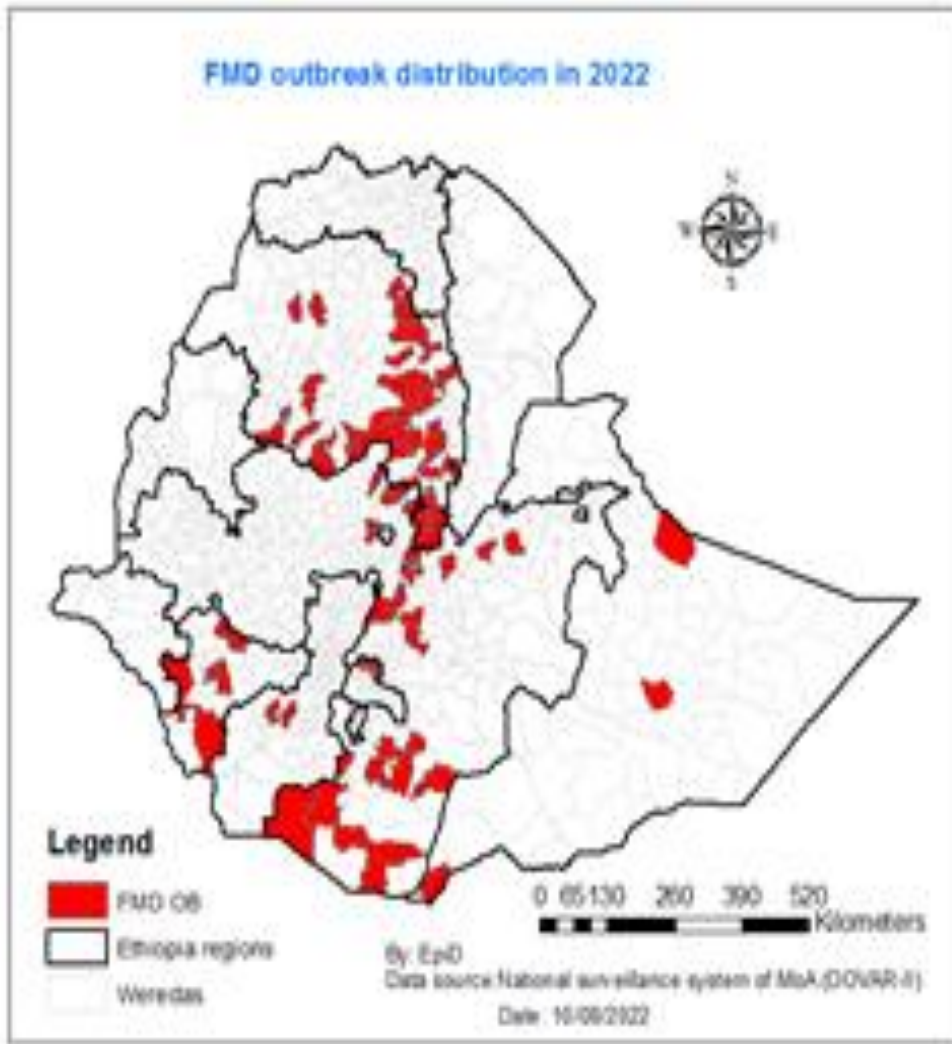
- SAT2 – topotype XIV reported in Ethiopia 2022 is now progressed to north ward to middle east
- The virus topotype distributions linked to livestock movements and diversity in ecosystems and the adaptation of pastoralists to seasonal trends.
- Cross-border movements of animals are also important for FMD circulation with large numbers of animals moving from neighboring Sudan, Kenya, Somalia, and Djibouti to Ethiopia and vice-versa.
- Do this virus moves South direction ? While phylogenetic analysis showed different from those lineage in Kenya , Tanzania And Uganda

FMD virus detection from 2015 to 2023

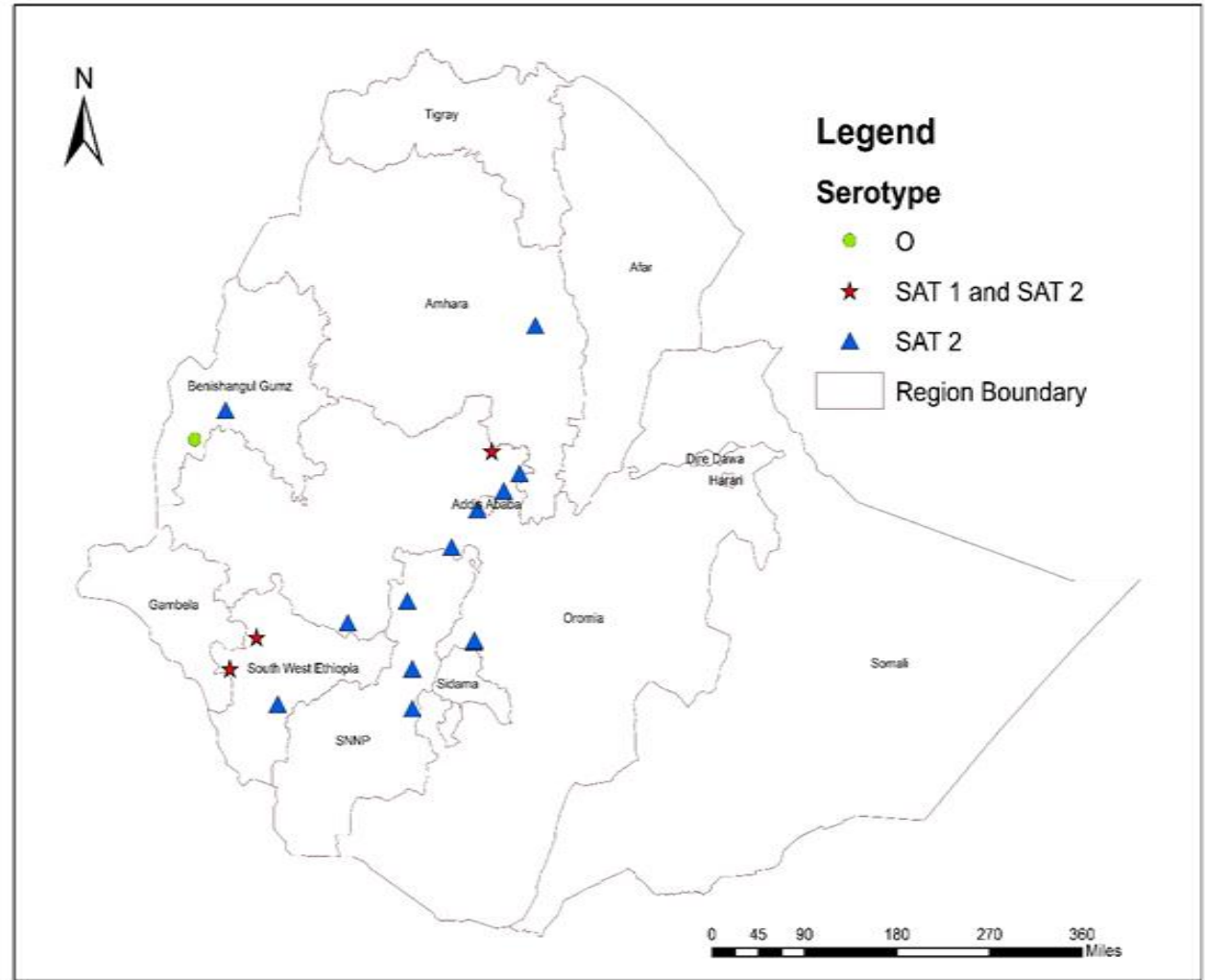
Sample Type tested	No. of samples Tested	Negative for FMD Virus /Antibody	No. samples Positive for FMD virus or antibody	Percentage Of detection
Serum	363	255	108	29.8
Probang	126	90	36	28.6
Swab	682	571	111	16.3
Tissue	1455	1228	227	15.6
Whool Blood	26	14	12	46.2
Total	2652	2158	494	18.6

FMD virus antigen or antibody detected in samples collected from different Regions from 2015 to 2023 for FMD outbreak investigation

Region	Genome detected	Negative	Positive FMD antibody	SAT1	SAT2	serotype A	serotype O	Total
Addis Ababa		30	5		1		5	41
Afar		150						150
Amhara		128	3	12	17	2	29	191
Benshangul		101			2		1	104
Gumuz								
Oromia	55	1345	24	23	58	47	51	1603
SNNPR		257	76	10	25		17	385
Somali		27				3	5	35
Tigray		120			6	6	11	143
Total	55	2158	108	45	109	58	119	2652

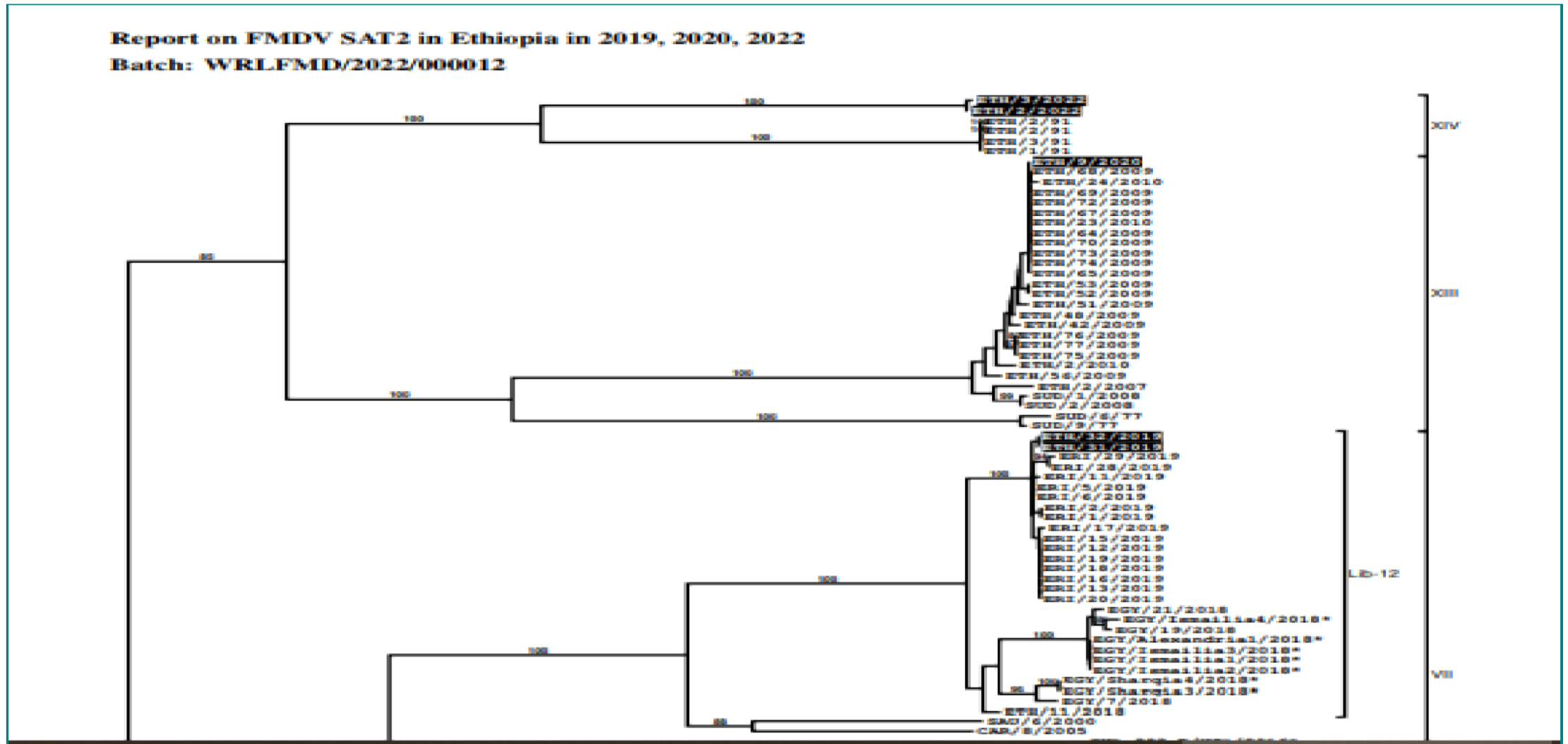


FMD outbreak in Ethiopia 2022

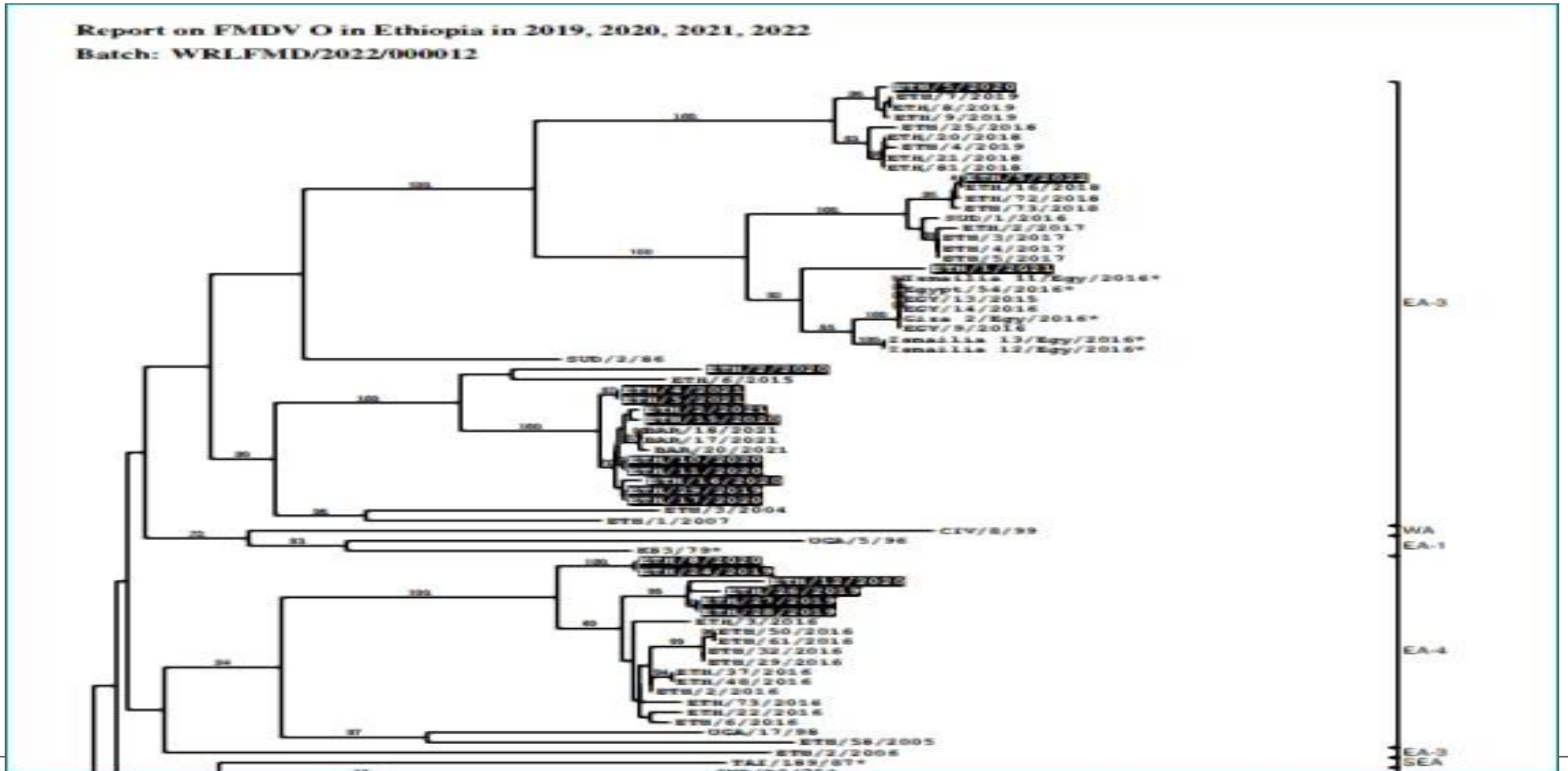


FMD outbreak confirmed in 2022

Phylogenetic trees FMD Virus SAT2 in Ethiopia 2019-2022



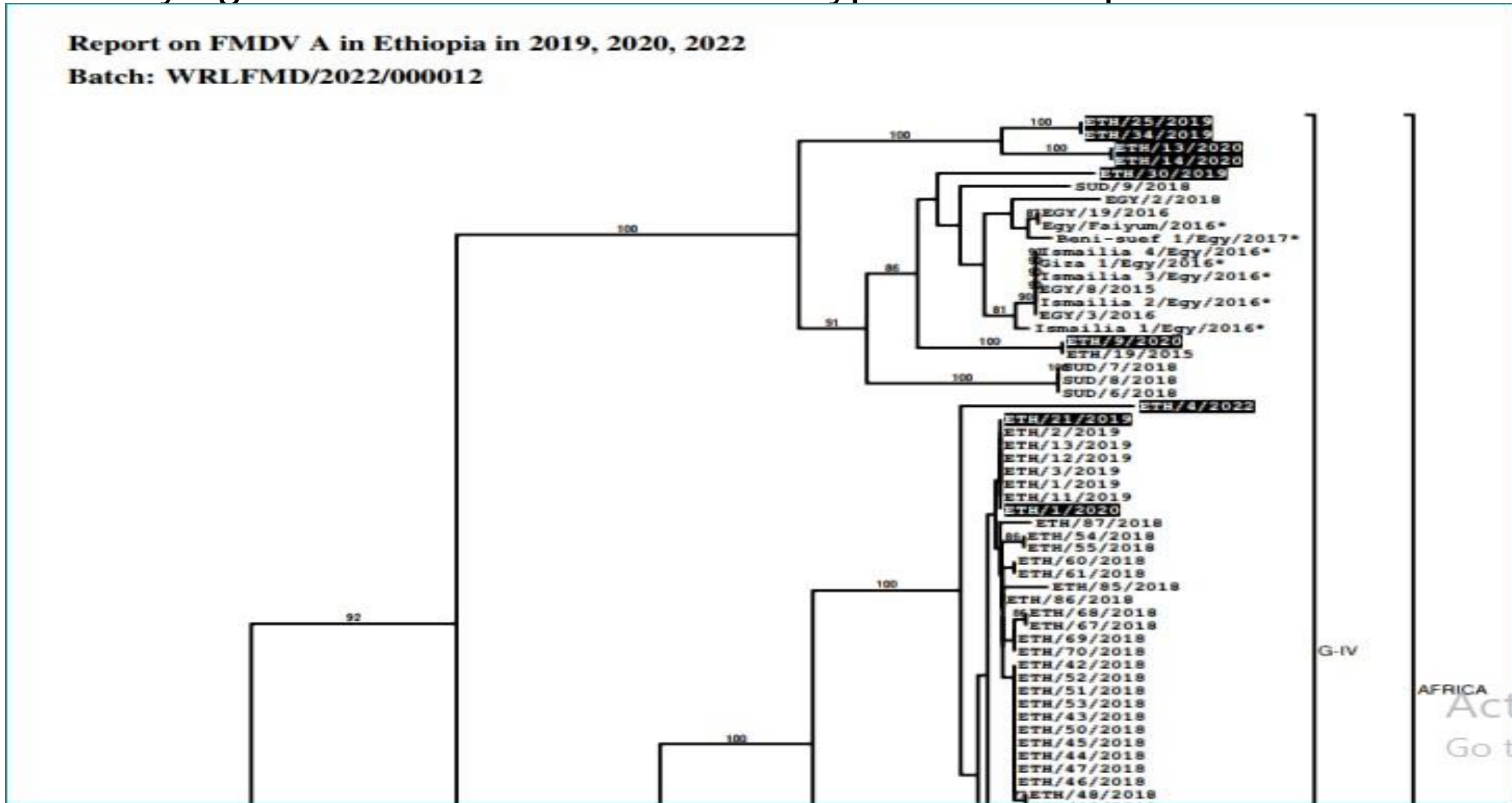
Phylogenetic trees FMD Virus Serotype O SAT2 in Ethiopia 2019-2022



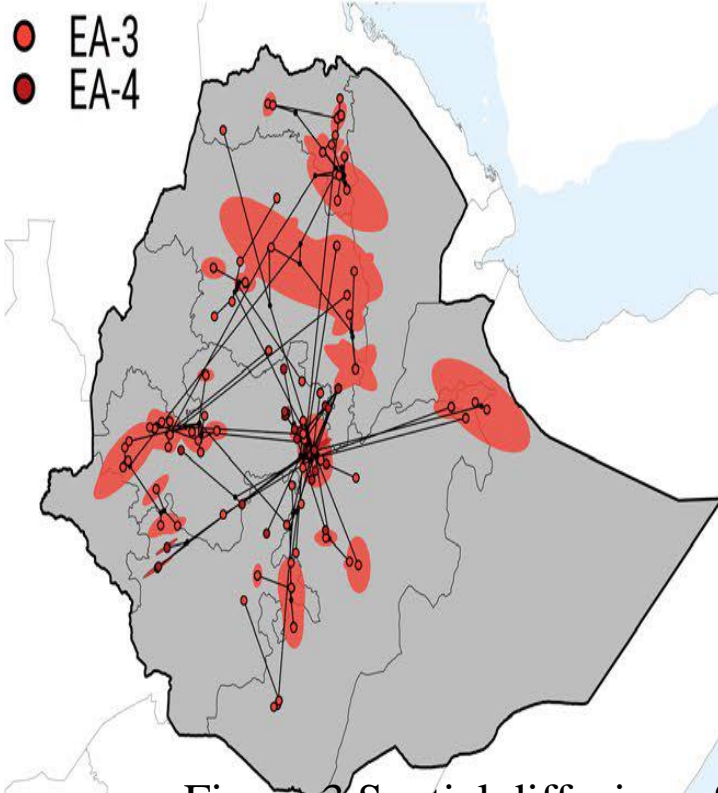
Phylogenetic trees FMD Virus Serotype A in Ethiopia 2019-2022

Report on FMDV A in Ethiopia in 2019, 2020, 2022

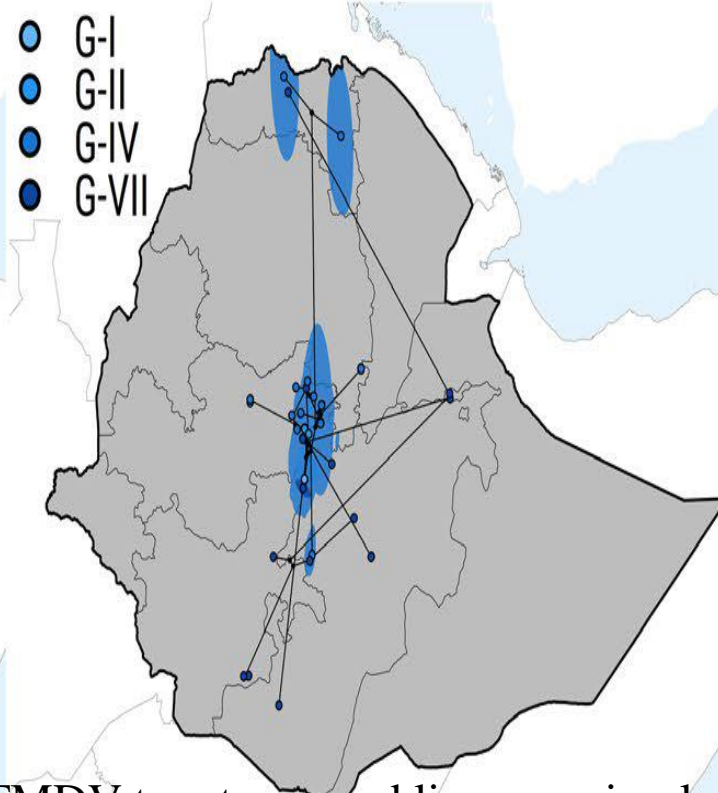
Batch: WRLFMD/2022/000012



Serotype 0



Serotype A



Serotype SAT2

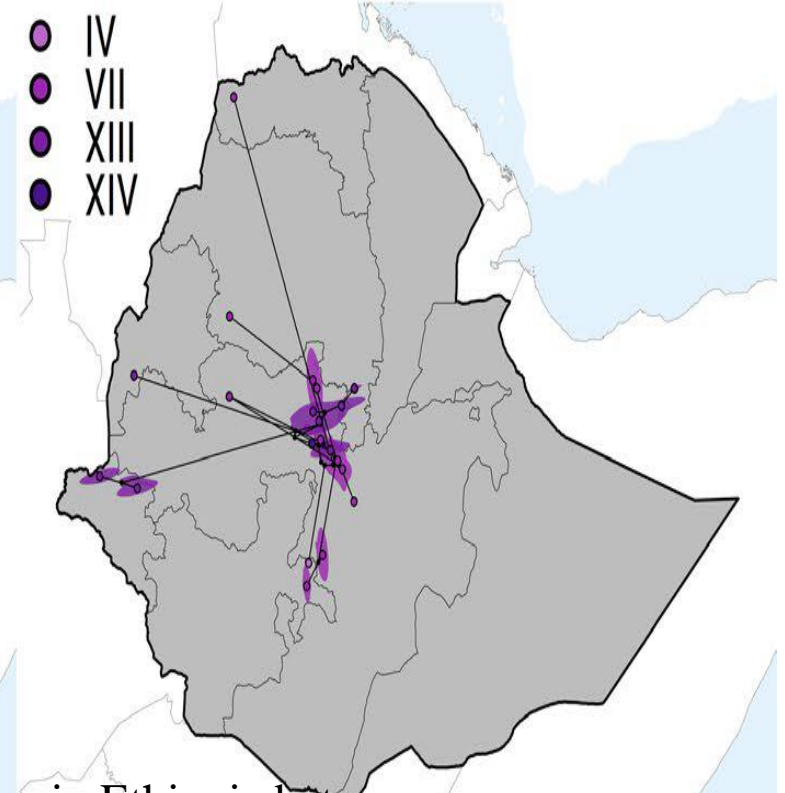


Figure 3 Spatial diffusion of FMDV topotypes and lineages circulating in Ethiopia between 2008 and 2019 (Gizaw et al 2020)

FMDV Lineage

- O/EA-3
- O/EA-4
- A/G-I
- A/G-II
- A/G-IV
- A/G-VII
- SAT2/IV
- SAT2/VII
- SAT2/XIII
- SAT2/XIV

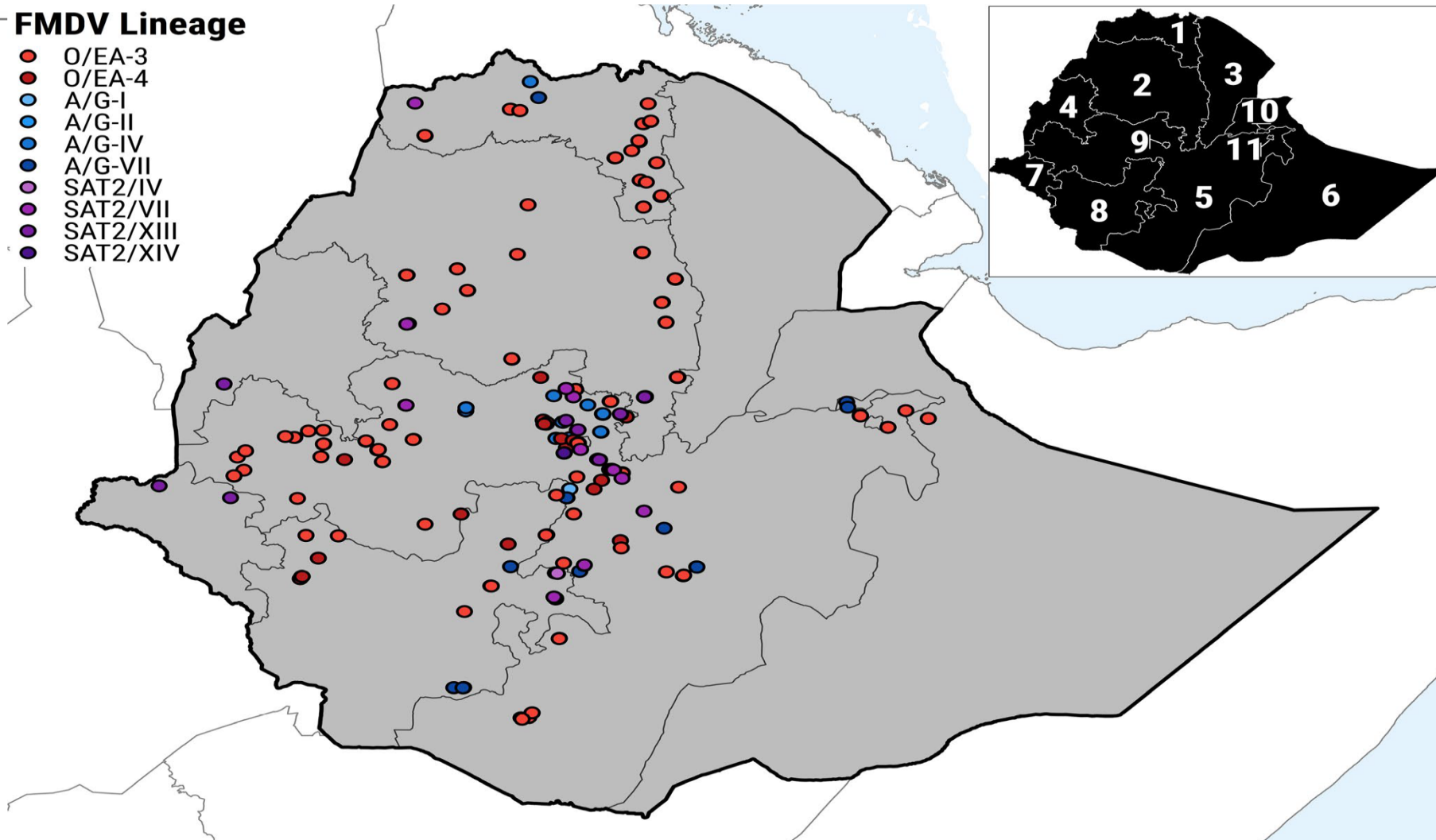


Figure Geographic distribution of FMDV isolates collected in Ethiopia between 2008 and 2019 (Gizaw et al., 2020).

FMD surveillance in Ethiopia

- The surveillance of FMD conducted livestock. The collection of samples were covered 2016 where all regional states were included by the project surveillance of trade sensitive Disease (STSD) which include foot and mouth diseases other TADS,
- The year latter on to up to 2023 specific areas of the country where included in the testing of FMD antibody detection. So the sampling periods covered 2016 to 2023.

seroprevalence of FMD virus antibody in livestock in 2016 to 2023

Region	No of samples	No positive	Percentage positive
Afar	159	30	18.9
Amhara	2913	426	14.6
Benshangul	795	170	21.4
Gambella	236	134	56.8
Oromia	9662	2287	23.7
SNNPR	3504	898	25.6
Somali	2090	325	15.6
Tigray	340	71	20.9
TOTAL	19699	4341	22.0

Vaccination, control measures, monitoring and reporting, opportunities

- Ethiopia is currently in PCP-FMD stage 1. A Risk-Based Strategic Plan (RBSP) for FMD control has been submitted to the GF-TADs FMD Working Group in November 2018
- The main approach for control and prevention of FMD disease is through vaccination and movement control.
- The type of FMD vaccine intended to be delivered in those demarked needs to contain all FMD serotypes circulating in the area and surrounding

Vaccination, control measures, monitoring and reporting, opportunities

- Currently Ethiopia produces crude FMD vaccines and the annual vaccine production at National Veterinary Institute (NVI) does not exceed half million doses a year.
- While anticipated control program need over 3 million dose a year
- In 2022 only 184295 dose of FMD used both for Prophylaxis and Prevention
- Outbreak reporting is being done utilizing DOVAR-II and ADNIS systems for monthly disease report and real time outbreak notification respectively.
- The 2022 national DOVAR completeness was 71.3% in which 7,303 reports were received out of the total expected 10,348 (MOA, 2023)

Cont.....

- ❖ FMD is a major constraint to **trade, internationally, regionally** and sometimes even within countries. Improved FMD control is expected to open new opportunities for Ethiopia's producers and industries by increasing the export of live animals, meat and leather goods.
- ❖ The livestock producer and pastoralists are in support of control of FMD through vaccination

Cont.....

- ❖ There good opportunity existence of Regional and international cooperation to create a platform in which Ethiopia and its neighbours can mutually benefit by aligning and collaborating on the implementation of a regional FMD control plan.
- ❖ The control of FMD in Ethiopia benefits trade partners in limiting FMD virus circulation at its source.

Proposed geographic focus will require coverage of 2.5 MN cattle total, including around 60 feedlots, 4 Abattoirs and 2 Quarantines



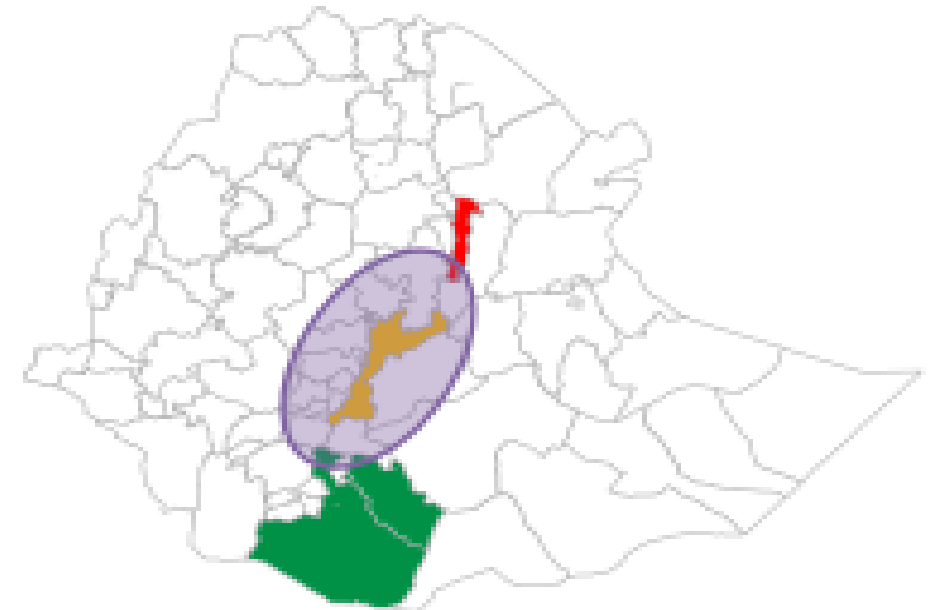
Proposed to cover 2.5 M cattle in export sourcing areas and 1 M cattle in milk shed

Focus Areas	Qty.	Cattle nos.	Area (in sq. km)
Identified Epi units in Borena, Guji & Liben	-	2,000,000	64,000 or less
Key export markets	4 markets	-	4
Feedlots	60 feedlots	120,000	500
Quarantine	2 Quarantine	160,000	628
Abattoirs	4 Abattoirs	60,000	500
Milk shed	-	1,000,000	As applicable

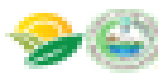
Not part of the control program- will not be provided vaccine subsidy but vaccines made available for farmers to buy

- Animals within 10 km radius of feedlots, abattoirs and quarantines are considered in the above table, for implementation of control plan

Focusing on these prioritized areas will lead to effective implementation of control plan



- Export areas- Borena, Guji and Liben
- Feedlots and Abattoirs area
- Quarantine area (Mile, Jigjiga)
- Milk shed in Addis- Shashemene-Hawasa



Major gaps to control FMD in Ethiopia

- ❖ Weak active disease surveillance, outbreak investigation and monitoring to identify circulating viruses and efficacy of vaccination campaign
- ❖ Early detection identification of FMD outbreaks (serotype identification) and Identification of lineage FMD virus are problem like , SAT viruses especially SAT1
- ❖ Constraint in understanding of FMD in wild life and their importance in the epidemiology of the disease some strains of FMD reemerged after long

Conti...

- Weak cross- border coordination and harmonization of disease control activities
- Limited understanding of the role of wildlife and small ruminants in FMD transmission and spread
- Low level of understanding of the epidemiological situation and its socio-economic impact
- Limited infrastructure for cold chain maintenance
- FMD vaccine quality and quantity is problem, since National veterinary institute produce half a million doses of vaccine a year which far below what country wants.

Major gaps to control FMD in Ethiopia

- ❖ National FMD control strategy (2017) which aim to control FMD in export sourcing areas of southern Ethiopia was not implanted duet lack budget.
- ❖ Diagnostic test for FMD are high cost and non of them produced in the country

Acknowledgments

- ✓ AHI staff
- ✓ Ministry of Agriculture
- ✓ WORL Reference laboratory for FMD The Pirbright, Institute
- ✓ World Organization Animal Health (WOAH), Sub regional representative



Thank very much for your attention