OIE/FAO Foot-and-Mouth Disease Reference Laboratories Network

THE Pirbright INSTITUTE

Attributes of effective FMD control and vaccination

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Mombasa

WOAH Regional Meeting for East Africa

21st -23rd October 2025

UKRI Biotechnology and Biological Sciences Research Council

Pirbright receives strategic funding from

Department for Environment Food & Rural Affairs

eufmd

FAO FIAT PANIS

World Organisation for Animal Health Founded as OIE

WOAH twinning projects with WRLFMD in East Africa

- National Animal Health Diagnostic and Investigation Center (NAHDIC), Ethiopia: *September 2015-January 2019*

- Pan African Veterinary Vaccine Center of the African Union (AU-PANVAC), Ethiopia: *April 2019-November 2022*

- FMD National Laboratory, Embakasi, Kenya: *January 2023-December 2025*

Training at Pirbight and locally

Virological, serological and molecular diagnosis

Quality management systems

Epidemiological investigation

Quality control of vaccines and vaccination

Proficiency testing

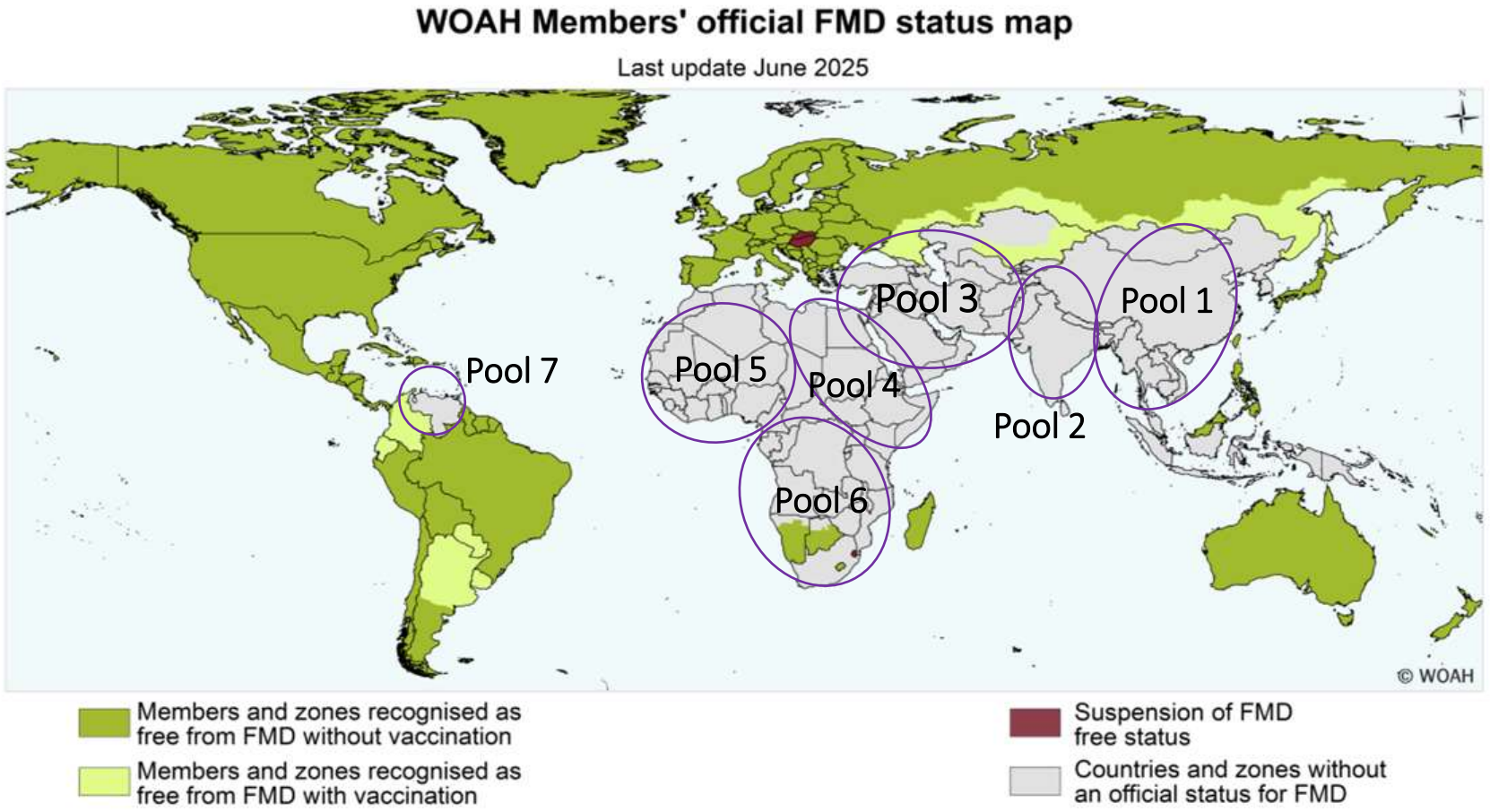
Referral diagnosis

Support for regional networking and research

Participation in Ref Lab Network Meetings

Global Overview

Many countries and regions have controlled and eradicated FMD



What distinguishes those that have and have not done so?

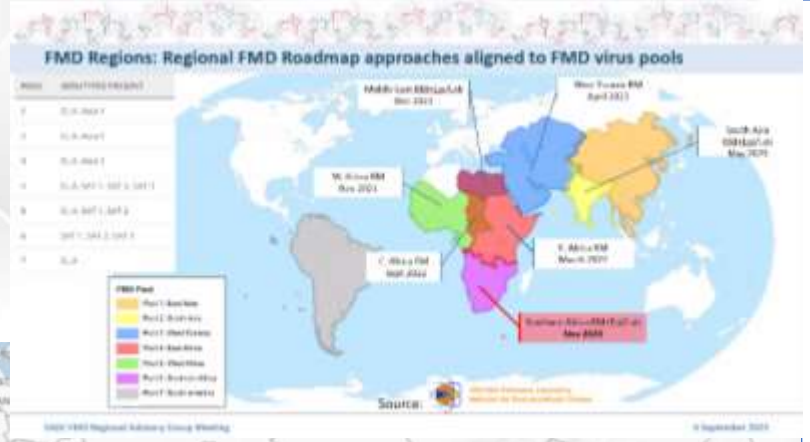
https://www.woah.org/en/disease/foot-and-mouth-disease/#ui-id-2

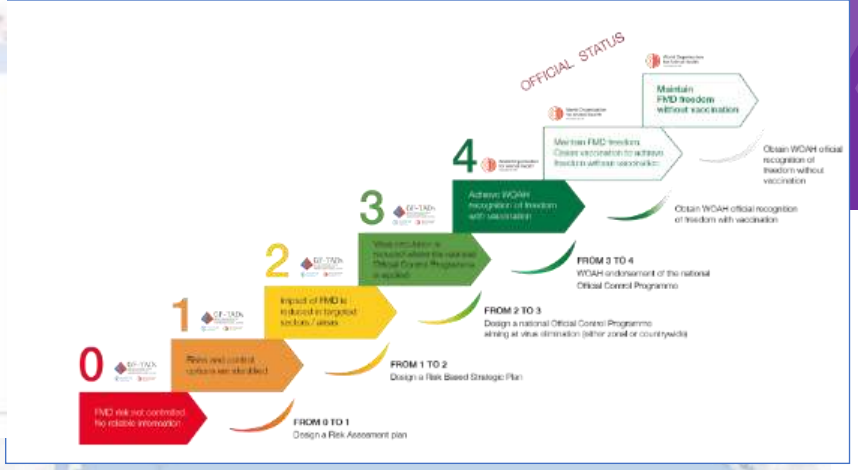
GF-TADs

GLOBAL FRAMEWORK FOR THE PROGRESSIVE CONTROL OF TRANSBOUNDARY ANIMAL DISEASES

Food and Agriculture Organization of the United Nations

World Organisation for Animal Health
Founded as OIE





Strategies and pathways already exist and already discussed

FMD-PCP Stages
https://www.gf-tads.org/fmd/progress-on-fmd-control-strategy/en/

Fundamentals of FMD control (and other contagious diseases)

- Prevalence of infection waxes and wanes naturally
  - Population immunity
  - Emergence of new strains
- New sources of infection that can be internal or external
  - National/international
  - Domestic/wildlife

- Surveillance
- Vaccination
- Biosecurity
- Movement controls
- Slaughter

Zoo-sanitary measures

- Determination

Factors governing vaccination effectiveness

Table 1. The relationship between rate of transmission in the population and vaccination coverage needed to halt virus spread ($f \times h = 1 - 1/R_0$)

Initial rate of spread (R_0)	Proportion of animals that must be vaccinated *(f)*, assuming vaccination is 100% effective *(h)*	Proportion of animals that must be vaccinated *(f)*, assuming vaccination is 75% effective *(h)*
2.5	60%	80%
4	75%	100%
5	80%	Impossible*
6.7	85%	Impossible
10	90%	Impossible
20	95%	Impossible

* Impossible to eliminate infection even by vaccinating the whole population

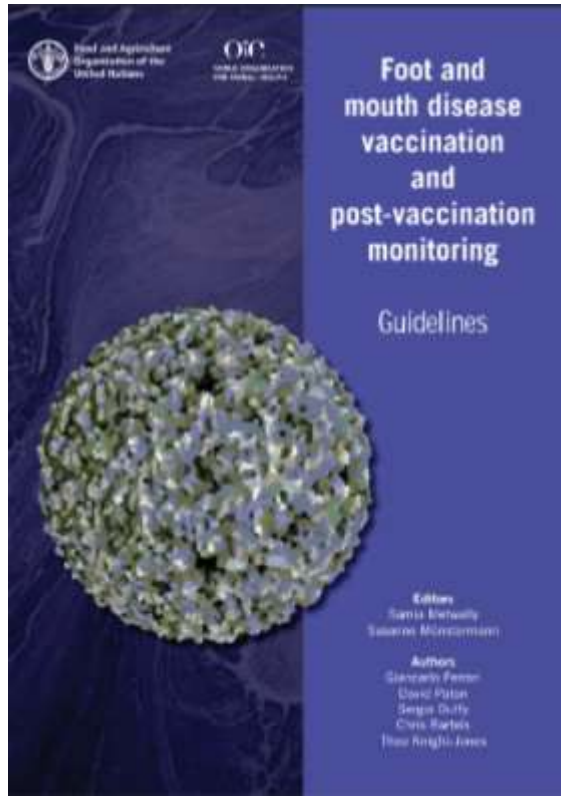
FMD vaccination and post-vaccination monitoring. Guidelines

- How rapidly the virus spreads (R0)
- How well the vaccine blocks transmission (h)
- What proportion are vaccinated (f)

Need especially good vaccines and vaccination to control FMD without complementary zoo-sanitary controls

Vaccination essentials

- Clear goals, approaches and roles
- Feasible and sustainable
- Consider dependencies
- Right vaccine quality and quantity at the right time
- Delivery mechanisms
- Monitoring and review of implementation and outcomes



Vaccination for Control versus Eradication

- Control
  - Targeted measures
  - Biosecurity importance
  - Vaccination as insurance
  - Producer led with private sector role to deliver vaccination
  - Government role to provide enabling environment (ensure vaccine quality, fund pilot schemes to show cost-benefit, promote awareness and self help)
  - Bottom-up
- Eradication
  - Mass measures
  - Government led
  - Compulsory vaccination
  - Strong surveillance and movement controls
  - Regional feasibility
  - Zonal approaches
  - Top-down

East Africa: referrals/topotypes by country

Country	Status	O			A/AFRICA		SAT 1		SAT 2			
		EA-2	EA-3	EA-4	G-I	G-IV	I	VII	IV	VII	XIII	XIV
Eritrea	PCP 1		2017			2018				2019		?
Djibouti	PCP 1_{prov}	No samples/sequences submitted for analyses										?
Sudan	PCP 2_{prov}		2020			**2022**				2017		
S. Sudan	PCP 1		2017									?
Ethiopia	PCP 1		**2022**	**2020**	2018	**2022**	2007			**2022**	2020	**2023**
Somalia	PCP 1_{prov}		2007									?
Uganda*	PCP 2	**2024**		2017	2019		2016	**2023**	2016	2017		
Kenya	PCP 2	**2023**		2010	**2023**		**2023**		**2022**			
Rwanda	PCP 2	2004										?
Burundi	PCP 1	2003			2016		1999		2016			?

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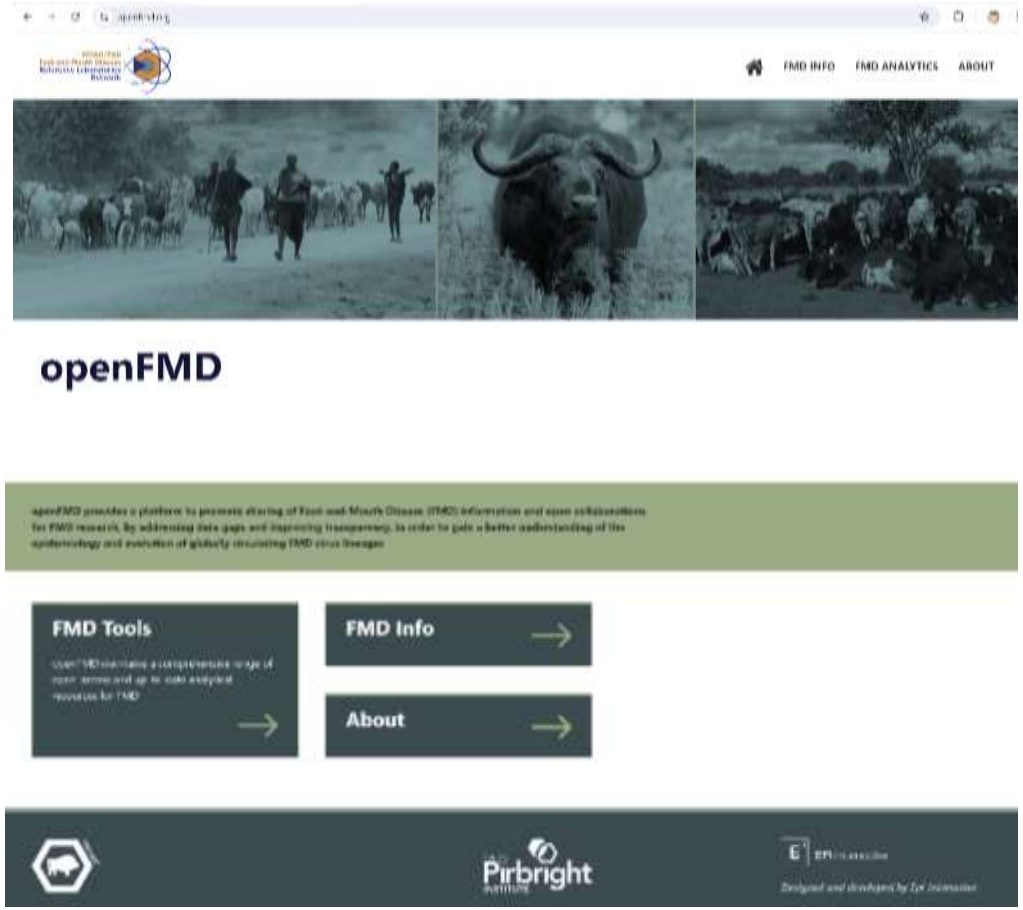
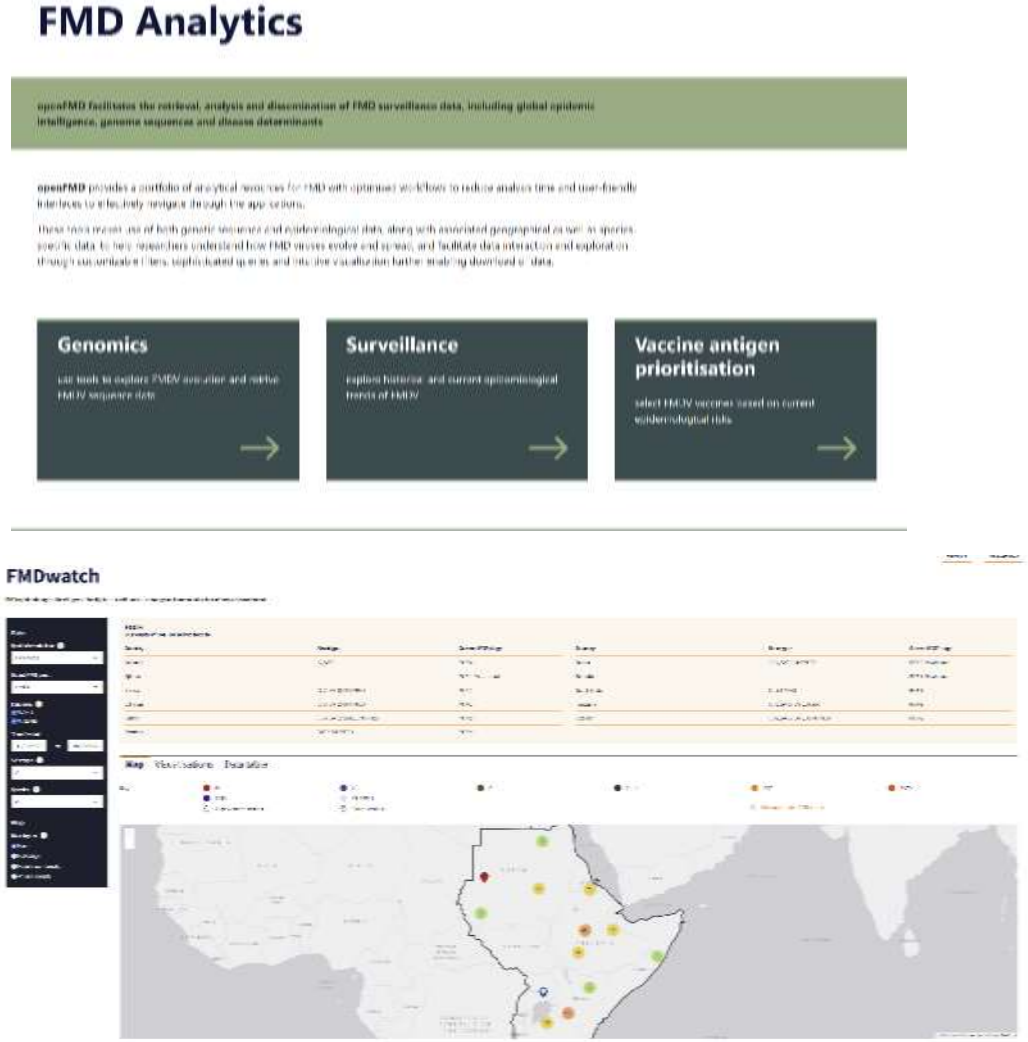
NB: Only those FMD outbreaks in domesticated species are shown (SAT 1-3 are also present in buffalo populations)
*SAT 3 detected in Uganda in Ankole cattle during 2013

GAPS

New FMD Dashboard – openFMD.org





Planning & Outbreak Management Questionnaire

- GF-TADS FMD Working Group in Rome, 19-21 June 2024
  - Identified need for a more streamlined system to collect information from countries about what they are planning and more specific information about what has been done – complementing the self-assessment tool which looks more at capacity and intent rather than implementation
- Five countries returned completed (fully or partially) completed forms
  - Planning form completed by all 5 countries
    - New initiatives (not done in last 3 years) was particularly interesting – private sector vaccination, border controls, compartments, pilot projects, cost-benefits
  - Outbreak management form largely completed by only 2 countries
    - Some confusion over what exactly required
    - Not all responses easy to understand
    - Gaps relating to outbreak investigations and vaccine recording and monitoring
- Some refinement of the forms to improve ease of use and interpretation
- Further feedback welcome