



Food and Agriculture Organization
of the United Nations

FAO Support for Avian Influenza disease control, prevention, and response



Nick Lyons, Animal Health Officer, Global Surveillance Coordinator

Angelique Angot, Laboratory Specialist,

Animal Production and Health Division, Food and Agriculture Organization of United Nations, Rome, Italy

FAO's Focus on animal health for agrifood & livestock systems



Improving Animal Health for Sustainable Agrifood and Livestock Transformation and One Health Implementation



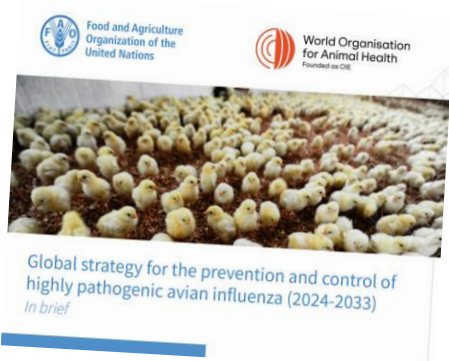
Global animal disease control and eradication programmes

Improving the Prevention, Preparedness and Emergency Response at all levels

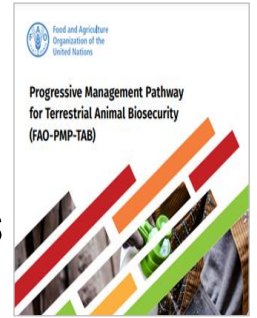
Building capacity of national laboratories; Reference Centres, OFFLU, Regional Support Lab, and Regional lab networks

Improving the accessibility & quality of vaccines and animal health workforce development

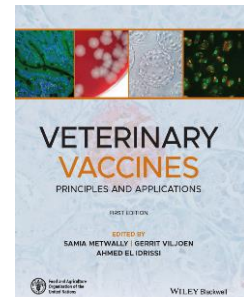
Strengthening One Health implementation for Pandemic & AMR prevention



EMPRES
ECTAD
GLEWS+
GF-TADs



- Enhancing nat'l diagnostic capacity including through 6 FAO Reference Centres for animal influenza
- 150+ labs supported through FAO ECTAD and FAO/IAEA VETLAB



Joint FAO/IAEA Centre
Nuclear Techniques in Food and Agriculture





Global Policy support, Risk Monitoring and Forecasting

- Global HPAI consultation- May 2023
- Regional consultations and regional strategies
- Disease Intelligence – internal risk monitoring with monthly global AIV situation and Sub-Saharan HPAI updates
- FAO Reference labs support to virus characterization, and monitoring virus evolution
- Mapping hotspots of domestic-wild bird interfaces and avian influenza forecasting tool
- Technical Guidance and risk assessments



Animal health

Areas of work Our programmes Animal diseases **Situation updates** FAO Reference Centres News and Events Resources



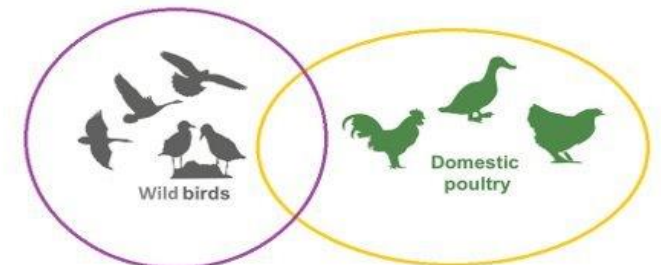
Global Avian Influenza Viruses with Zoonotic Potential situation update

26 September 2024, 08:30 hours; Rome

Next issue: 24 Oct. 2024

Overview

<https://www.fao.org/animal-health/situation-updates/global-aiv-with-zoonotic-potential/en>

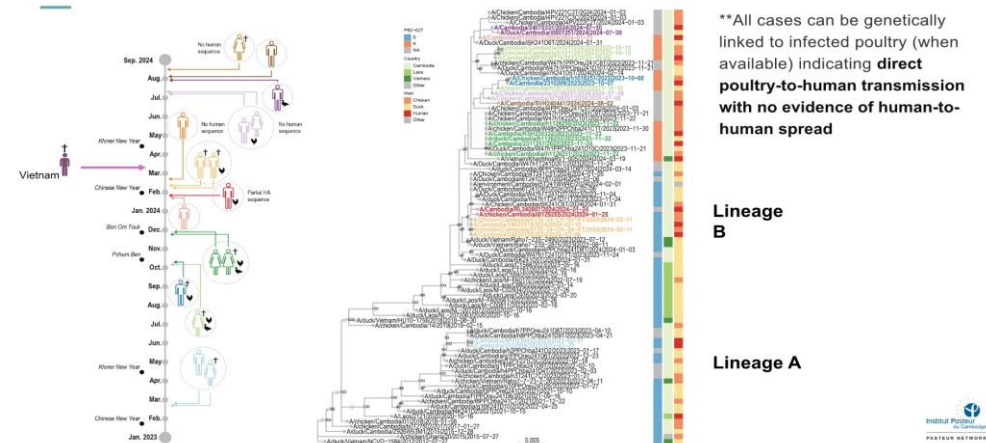


FAO Regional and Country Support- operationalizing at scale

- In 2023, FAO supported
 - Risk-based surveillance in over 20 countries supported
 - Investigation/response to more than 60 AI outbreaks
 - Development of SOPs, guidelines, technical guidance or other tools related to risk reduction, surveillance, and/or outbreak response for poultry diseases.
- Disease outbreak response support
 - Provision of laboratory reagents, consumables and PPE through stockpile project
 - Emergency response missions and GEMP trainings
- Response to reassortant virus event in Asia through the FAO Regional office for Asia and the Pacific (RAP)
 - Rapid response teams, One Health Control, enhanced surveillance



Human A/H5 cases in the Greater Mekong Subregion 2023-2024





FAO Actions to Support Members on Influenza A

Capacity Development on HPAI and HPAI vaccination

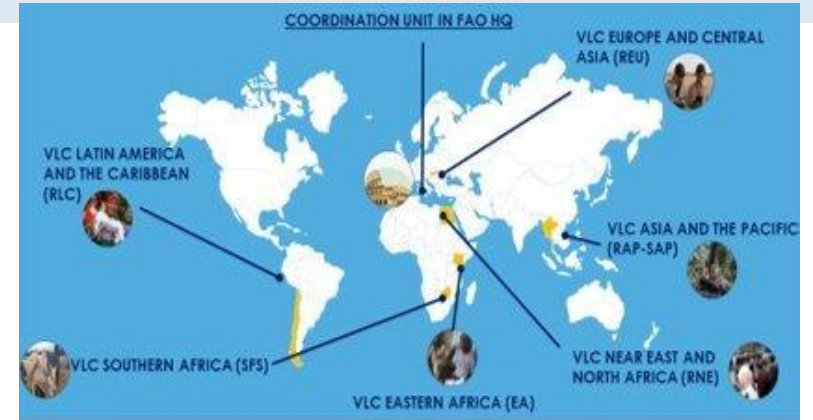


Virtual Learning Centers

- Open access courses
- Vaccine stewardship
- Webinars on HPAI vaccination
- AI preparedness in multiple languages
- >3 100 people have completed these courses since March 2022



<https://virtual-learning-center.fao.org/>



OFFLU Avian Influenza Matching (AIM) for Poultry Vaccines



An Introduction to Avian Influenza



Start



FAO Global Consultation on HPAI in Rome (May-2023)

Key recommendations to address HPAI:

- **Improving Prevention and Control:**
 - Evaluate and implement changes in poultry farming and value chains that are socially accepted to enhance **biosecurity** across the entire supply chain.
- **Advancing Vaccination Efforts:**
 - Enhance existing vaccination protocols for poultry and investigate the potential for vaccinating wild birds.
- **Enhancing Stakeholder Collaboration:**
 - Empower **private sector** entities and community groups involved in poultry production.
 - Foster stronger **partnerships** between the sectors of wildlife conservation and environmental management.
- **Implementing a One Health Approach:**
 - Integrate human, animal, and environmental health strategies to create a comprehensive response to HPAI challenges.



FAO Global Support to Policy: Global strategy for the prevention and control of high pathogenic avian influenza (2024-2033)

Vision

A world with effective HPAI prevention and control along poultry value chains that supports protection of humans, other domestic animals, wildlife and the environment, and aligns with the sustainable transformation of agrifood systems

Prevent

- HPAI epizootics, panzootics and negative impacts on biodiversity through multisectoral early detection and control

Protect

- poultry value chains, livelihoods, and the health of humans, ecosystems, and other animal species from HPAI impacts

Transform

- poultry value chains to improve resilience to HPAI threat



Global strategy for the prevention and control of highly pathogenic avian influenza (2024-2033)
In brief

KEY ELEMENTS OF THE REVISED GLOBAL STRATEGY

- It provides high-level strategic direction for global and regional coordination to support the development and/or revision of national and regional action plans for HPAI prevention and control. It is not intended to be prescriptive or binding.
- It emphasizes the need for a One Health approach and puts a focus on poultry value chains and measures that can significantly reduce the burden of HPAI.

BACKGROUND

The Food and Agriculture Organization of the United Nations (FAO) and World Organization for Animal Health (WOAH), under the Global Framework for the Progressive Control of Transboundary Animal Diseases (GF-TADs), have collaboratively drafted a revised ten-year global strategy for the prevention and control of highly pathogenic avian influenza (HPAI) in response to the continued intercontinental spread and changes in the circulating HPAI virus (H5 goose/Guangdong (G/G) lineage, especially 2.3.4.4b clade). This replaces the strategy published in 2007 in response to the initial emergence of the H5N1 Gs/GD lineage in Asia.

The revised strategy emphasizes a systems approach to contextualize the threat of HPAI against the backdrop of other global concerns and work towards long-term transformative change in the poultry sector. There is a strong focus on the One Health approach to ensure integrated collaboration with public health, wildlife and environmental sectors to prevent, protect and transform poultry value chains against HPAI. It encourages the use of established and innovative means of protecting poultry value chains to reduce the burden of infections and losses. The revised strategy provides a framework

➤ Next step – regional engagement and development of national HPAI action plans

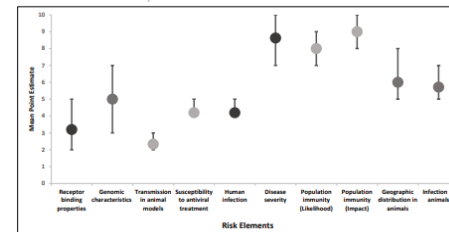


Collaborations with WHO & WOAHA at the Global Level

– Disease intelligence and Assessing pandemic risk

- Information sharing for preparedness – GLEWS+/EIOS
- Periodic coordination call - FAO, WHO, WOAHA and OFFLU
- Risk assessments and joint statements publication
- Participation in WHO's TIPRA (Tool for Influenza Pandemic Risk Assessment) - **H5N1 Genotype B3.13 ongoing**
- Joint technical guidance for policy planning
- Enhancing genetic data sharing - WHO GISRS (Global Influenza Surveillance and Response System)
- Pandemic preparedness through OFFLU support to WHO Vaccine Composition Meetings (VCM)

Tool for Influenza Pandemic Risk Assessment (TIPRA)



Joint FAO/WHO/WOAH preliminary assessment of recent influenza A(H5N1) viruses

25 April 2024

Background
During 2020, highly pathogenic avian influenza (HPAI) A(H5N1) clade 2.3.4.4b viruses arose from previously circulating influenza A(H5Nx) viruses and spread predominantly via migratory birds to many parts of Africa, Asia and Europe. The epidemic has led to unprecedented numbers of deaths in wild birds and caused a zoonotic pandemic poultry. In late 2021, these viruses crossed to North America and subsequently South America in October 2022. Additionally, globally, there have been increased detections of A(H5N1) viruses in non-avian species including wild terrestrial and marine mammals and, more recently, the detection of an outbreak in a mixed farm in Spain. From 2020 to date, six human cases of influenza A(H5N1) belonging to the 2.3.4.4b clade were reported to WHO.

Infections in animals
As an influenza A(H5N1) virus, especially those of clade 2.3.4.4b, continues to diversify genetically and spread geographically, since 2022, a broader range of wild bird species have been infected globally which has led to numerous ecological consequences and caused mass die-offs in some species. The attention with wild mammals is also increasing, with some species suffering significant mortality events.

Additionally, ongoing outbreaks in wild and migratory bird and poultry led to multiple separate incursions into wild carnivores and scavenging animals, domestic cats and dogs, and aquatic mammals in a number of countries. Spillover of clade 2.3.4.4b viruses from birds to mammals in the Americas and Europe have often resulted in mixed infections with other viral agents in some mammals. In 2024, A(H5N1) viruses have been detected in neonatal goats in a single premises shared with poultry, and in dairy cattle in the USA.

21 December 2022



Rapid Risk Assessment

Assessment of risk associated with recent influenza A(H5N1) clade 2.3.4.4b viruses


Background
During 2020, highly pathogenic avian influenza (HPAI) A(H5N1) clade 2.3.4.4b viruses arose from previously circulating A(H5Nx) viruses and spread predominantly via migratory birds to many parts of Africa, Asia and Europe. The zoonotic has led to unprecedented numbers of deaths in wild birds and caused outbreaks in domestic poultry. In late 2021, these viruses crossed to North America and subsequently South America in the autumn of 2022. Additionally, there has been an increased spill over to non-avian species including wild terrestrial and marine mammals and, more recently, the detection of an outbreak in a mixed farm in Spain. From 2020 to date, six human cases of influenza A(H5N1) belonging to the 2.3.4.4b clade were reported to WHO.

The majority of the influenza A(H5N1) HPAI characterized genetically since 2020 related to these outbreaks are belonging to the 2.3.4.4b clade. This risk assessment focuses on the most recent A(H5N1) viruses belonging to the 2.3.4.4b clade.

Understanding of the virus

Human infections with influenza A(H5N1) 2.3.4.4b viruses

Since the beginning of 2020, detections in humans of influenza A(H5N1) clade 2.3.4.4b viruses have been reported to WHO from the following countries: China (one case)[1], Spain (two cases)[2], the United Kingdom of Great Britain and Northern Ireland (one case)[3], the United States of America (USA) (one case)[4], and Viet Nam (one case)[1]. All four human cases reported in Europe and North America were asymptomatic or mild, with only fatigue reported for the case detected in the USA. The case detected in China resulted in a fatality while the case in Viet Nam had severe symptoms but recovered. All human cases had exposure to infected poultry either through




OFFLU AVIAN DATA PACKAGE
FOR THE VCM
September 2022 to February 2023

SCOPE
In this document we present a summary of H5, H7 and H9 and Avian Influenza A virus events reported from 1st September 2022 to 1st February 2023



FAO Actions on emerging issues: influenza A(H5N1) recent events

FAO is attentively monitoring the situation:

- Periodic calls with WHO, WOA and OFFLU
- Publication of EMPRES Watch 
- Tripartite joint assessment on influenza A(H5N1) with focus on cattle ([April](#) and [August](#) 2024)
- FAO Food Safety recommendations on pasteurization ([link](#))
- FAO's Recommendations for Surveillance of Influenza A (H5N1) in Cattle *to be published soon*



Food and Agriculture Organization of the United Nations

empres watch 



Food and Agriculture Organization of the United Nations



World Health Organization



World Organisation for Animal Health
Founded as OIE

Updated joint FAO/WHO/WOAH assessment of recent influenza A(H5N1) virus events in animals and people

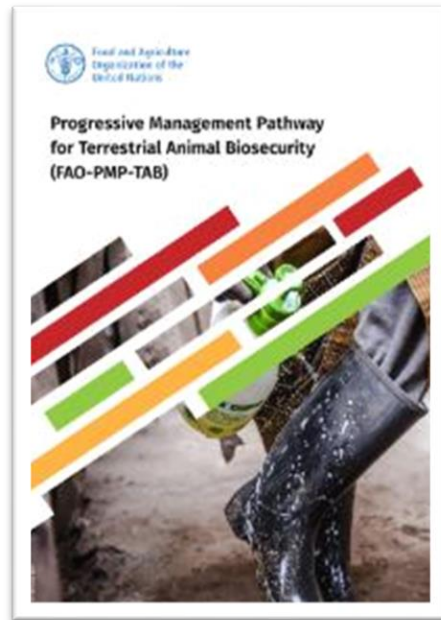
Assessment based on data as of 18 July 2024

14 August 2024



PMP-TAB: Progressive Management Pathway for Terrestrial Animal Biosecurity

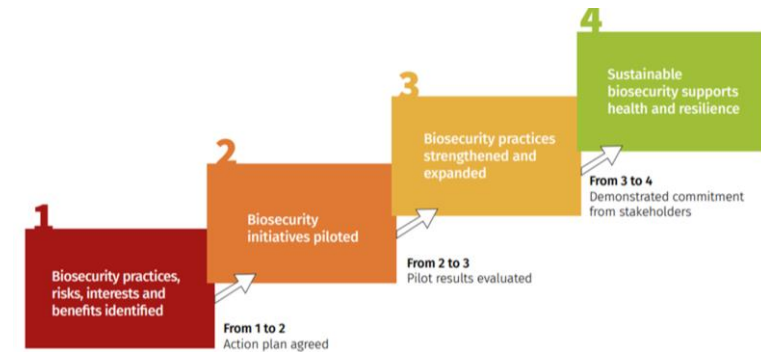
FAO adopted a more **strategic and systematic approach** to support countries in strengthening biosecurity along livestock value chains and the human-animal-plant-environment interface through the PMP-TAB



Bottom-up

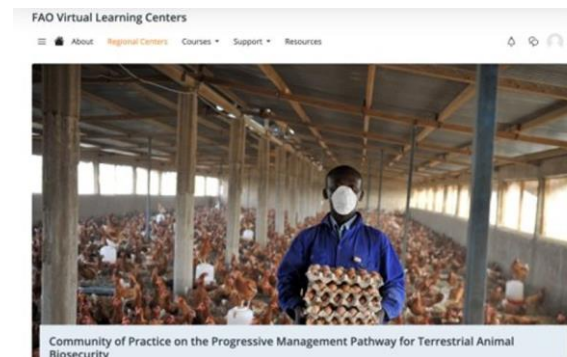


Progressive



A **process**, not a scoring tool

<https://www.fao.org/documents/card/en/c/cc5771en>



Supported by a
Community of Practice






PMP-TAB pilots are on-going, with some of them supporting the poultry value chain





Building surveillance in countries: Laboratory capacity

 Capacity building for sustainable and reliable functioning of animal health laboratories in Member States for improved national capacities to *prevent, detect and respond* to confirmed animal infectious disease events:



Basic and high-level diagnostic testing to enable rapid and reliable diagnosis of transboundary and priority zoonotic diseases.



Provide support for decision making by the Animal & One Health surveillance systems through sharing and application of reliable laboratory data

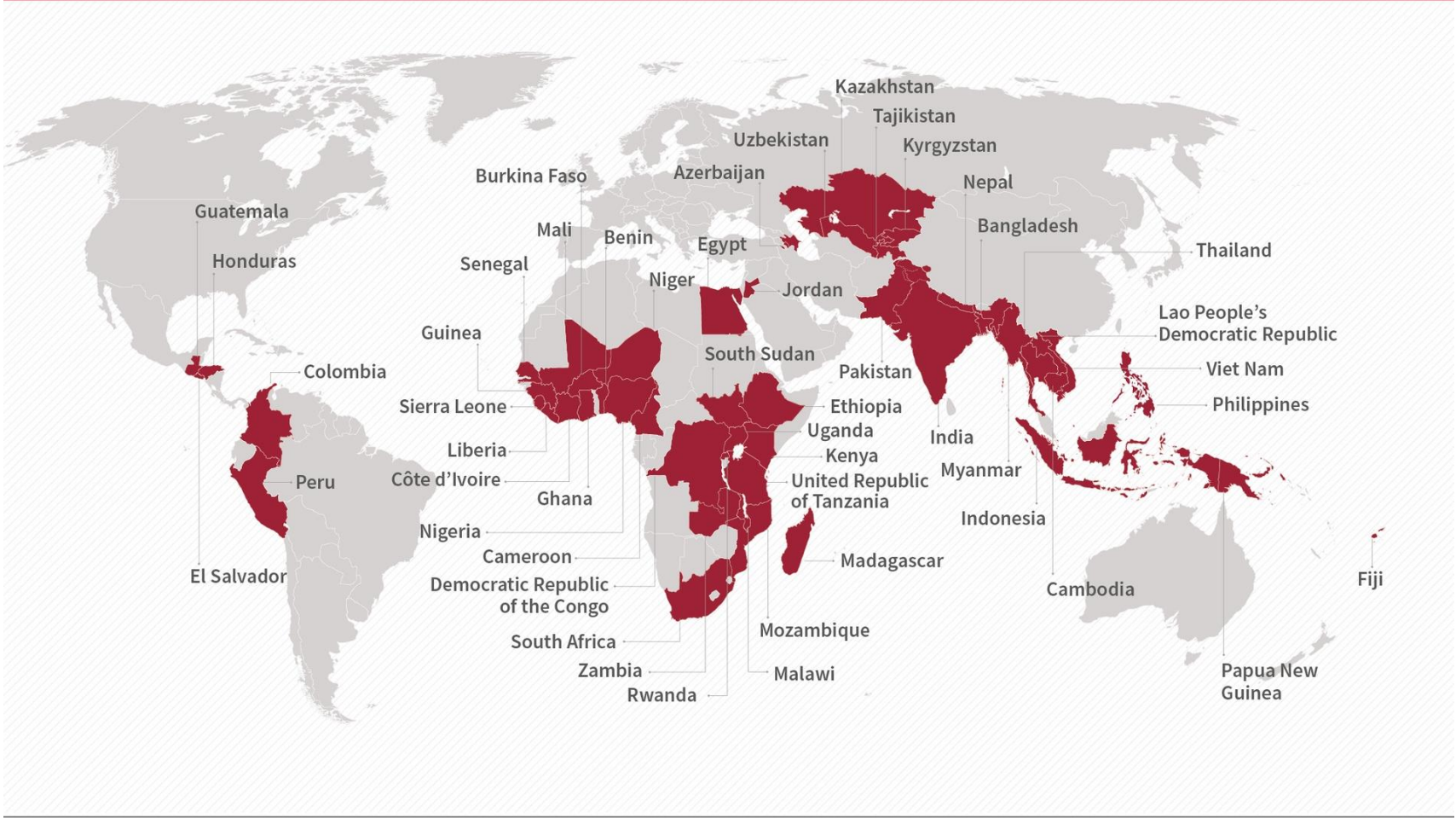


Increase connection and collaboration amongst national and subnational laboratories as well as with regional and international communities.



EXPANDING LAB SUPPORT ACROSS THE WORLD

Countries currently supported by FAO through ECTAD



Source: United Nations. 2022. Map of the World. [Cited 28 September 2023]. <https://www.un.org/geospatial/content/map-world>. The final boundary between the Sudan and South Sudan has not yet been determined. Final status of the Abyei area is not yet determined. The dotted line represents, approximately, the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties.

RENOVATION OF LAB FACILITIES

In several CVLs and regional
laboratories in Africa



PROCUREMENT OF LABORATORY ITEMS



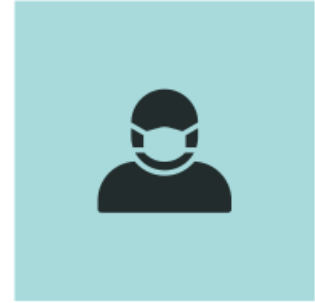
Laboratory reagents and consumables

Reagents for diagnostic analyses
(DFA, RT-PCR)



Equipment

PCR machines, ELISA readers, Fluorescent
microscopes, etc..

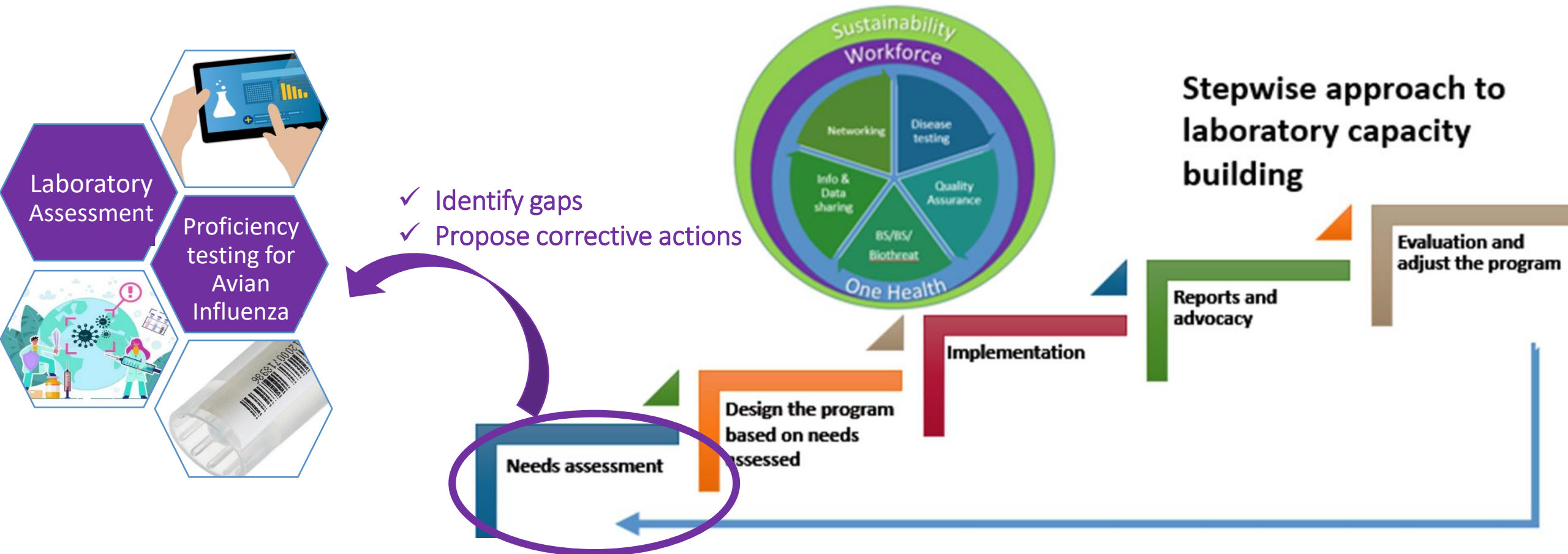


Field consumables and PPEs

Personal protective equipment, sample
collection and necropsy materials, and field
testing kits for on-site investigations



Laboratories evaluations: assessment for action





OBJECTIVES OF THE PROFICIENCY TESTING

EVALUATE

Lab proficiency in diagnostic technics
Lab Quality Management System

GAPS/STRENGTHS IDENTIFICATION

ACTIONS

Proposed corrective actions

MEASURE PROGRESS



Regular AI/ND PTs - since 2008

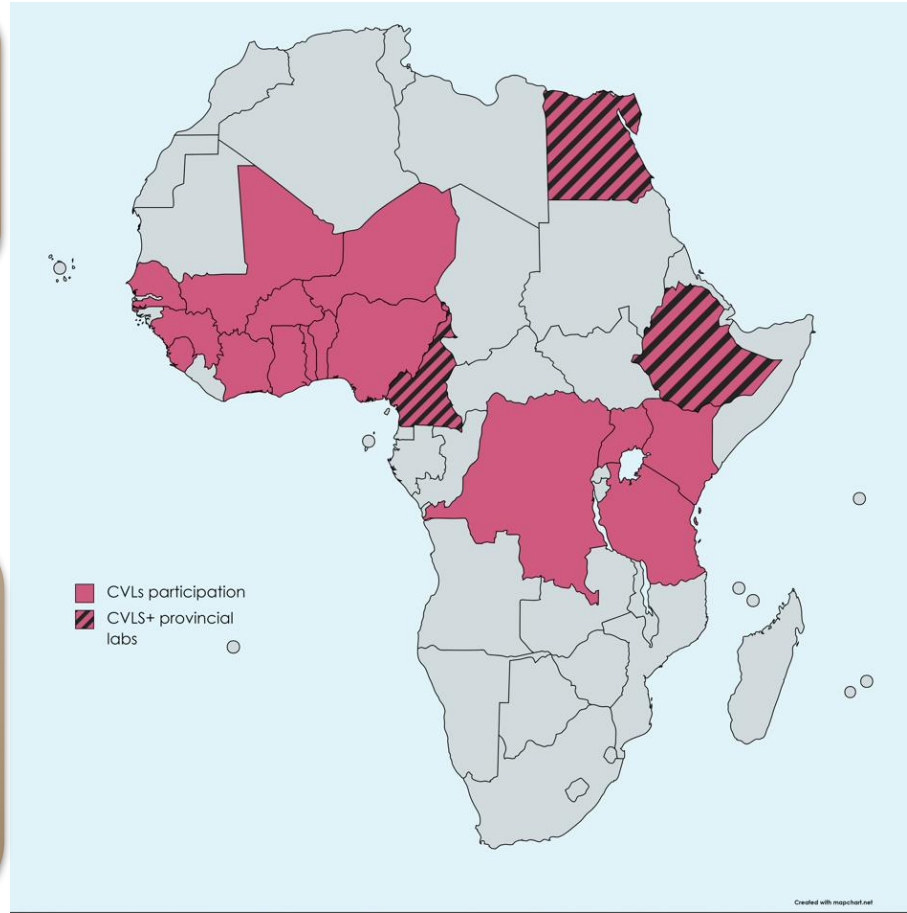


FAO reference Centers for Animal Influenza/NDV
 WOA and National Reference Laboratory for Avian influenza (IZSVe- Italy)



WOAH recommended Protocols:

- Serology (IH and or ELISA tests)
- Molecular testing (conv RT-PCR and/or Real-time RT-PCR)



PTs AI in 2008, CVLs

PT 2022: CVLs and provincial/district labs participation



PTs results in Africa

Evaluate the
proficiency on
diagnostic technics
AI-H5

Table 14. Statistical analysis of molecular detection of AIV-H5 by real-time RT-PCR.

Sample		Laboratory code															
ID code	Type	L01	L03	L05	L06	L12	L13	L15	L17	L20	L22	L25	L26	L28	L29	L30	L33
M01	Negative	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
M02	H7N7	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
M03	PPMV-1	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
M04	H9N2	N	N	P	N	N	N	N	N	N	N	N	N	N	N	N	N
M05	H5N8	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
M06	H7N7	N	N	N	N	N	N	P	N	N	N	N	N	N	N	N	N
M07	H5N8	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
M08	Negative	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
M09	H5N1	P	N	P	P	P	P	P	P	P	P	P	P	P	P	P	P
M10	APMV-1	N	P	N	N	N	N	N	N	N	N	N	N	N	N	N	N
M11	H5N5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
M12	H5N6	P	P	P	P	P	P	P	P	P	P	P	P	P	N	P	P
Se (%)**		100	80	100	100	100	100	100	100	100	100	100	100	100	80	100	100
Sp (%)**		100	85.71	85.71	100	100	100	85.71	100	100	100	100	100	100	100	100	100
Concordance (%)*		100	83.33	91.67	100	100	100	91.67	100	100	100	100	100	100	91.67	100	100
Kappa		1.00	0.66	0.83	1.00	1.00	1.00	0.83	1.00	1.00	1.00	1.00	1.00	1.00	0.82	1.00	1.00
p-value		0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

P = Positive; N = Negative; Se = Sensitivity; Sp = Specificity
 In **black**: correct specification; in **red**: result different from the target value
 In light blue data referring to the individual laboratory and in light orange data deriving from the overall evaluation of the results given per sample
 * Percentage of reported results in agreement with the assigned target value per total number of expected results
 ** Percentage assessed as (*) on the following expected results:
 Five (5) AIV-H5Nx positives and seven (7) AIV-H5Nx negatives

Evaluate the
proficiency on
diagnostic
technics AI-N1

Table 18. Statistical analysis of molecular detection of AIV-N1 by real-time RT-PCR.

Sample		Laboratory code														
ID code	Type	L03	L05	L06	L12	L13	L15	L17	L20	L25	L26	L28	L29	L33		
M01	Negative	N	N	N	N	N	N	N	N	N	N	N	N	N		
M02	H7N7	N	N	N	N	N	N	N	N	N	N	N	N	N		
M03	PPMV-1	N	N	N	N	N	N	N	N	N	N	N	N	N		
M04	H9N2	N	N	N	N	N	N	N	N	N	N	N	N	N		
M05	H5N8	N	N	N	N	N	N	N	N	N	N	N	N	N		
M06	H7N7	N	N	N	N	N	N	N	N	N	N	N	N	N		
M07	H5N8	N	N	N	N	N	N	N	N	N	N	N	N	N		
M08	Negative	N	N	N	N	N	N	N	N	N	N	N	N	N		
M09	H5N1	P	P	P	P	P	P	P	P	P	P	P	P	P		
M10	APMV-1	P	N	N	N	N	N	N	N	N	N	N	N	N		
M11	H5N5	N	N	N	N	P	N	N	N	N	N	N	N	N		
M12	H5N6	N	N	N	N	P	N	N	N	N	N	N	N	N		
Se (%)**		100	100	100	100	100	100	100	100	100	100	100	100	100		
Sp (%)**		90.91	100	100	100	81.82	100	100	100	100	100	100	100	100		
Concordance (%)*		91.67	100	100	100	83.33	100	100	100	100	100	100	100	100		
Kappa		0.63	1.00	1.00	1.00	0.43	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
p-value		0.01	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		

P = Positive; N = Negative; Se = Sensitivity; Sp = Specificity
 In **black**: correct specification; in **red**: result different from the target value
 In light blue data referring to the individual laboratory and in light orange data deriving from the overall evaluation of the results given per sample
 * Percentage of reported results in agreement with the assigned target value per total number of expected results
 ** Percentage assessed as (*) on the following expected results:
 One (1) AIV-H5Nx1 positive and eleven (11) AIV-H5Nx1 negatives

Activities implemented after PT results

Laboratory interviews:

2. Identify gaps

- Evaluation of the results obtained
- Interview with the participating labs and discuss root cause
- Agree on the main gaps identified

3. Propose corrective actions

- Agree on the main actions and plan for next steps

Comments from IZSVe	Comments from FAO	Comments from the lab
Excellent skills in molecular testing: 3 FN, the IZSVe recommend to test these samples again.	Were the samples retested?	Due to high diagnostic activity in the lab, the staff has not had the chance to test the samples yet.
Issues with the use of inadequate molecular diagnostic reagent kits	FAO online service available to assist with primer and probes supply	Problem in the supply of the appropriate diagnostic kits (amplification kits, extraction kits....). For this reason, the change of kits is often done according to what is available. The last of couple of years, the lab managed to always analyse the samples. The same is applicable to primers and probes. To place order, the authorization of the Chief executive so that purchases can be performed.
All positive samples were detected by molecular testing, main problem is the presence of 5 FP (1 for M gene and 4 for AIV-N1)	<ul style="list-style-type: none"> - Contamination of kits or equipment (like pipettes). - Specificity of the protocol used to be assessed <p>Action: The panel should be retested for M gene and AIV-N1 protocols</p>	<ul style="list-style-type: none"> • probable source of contamination: centrifuge • Protocol use for N1 detection: duplex for H5N1 • CT value of the false positive results + amplification plots: to be provided by the laboratory by 12/03/2021 • H5N1 used as positive control <p>Action: 1) decontamination the PCR room + equipment (SOPs to be shared with the lab – (through regional BS/BS network via the whatsapp group) 2) Study of the data and have a following discussion on the contamination 3) re-test the samples.</p>
Is this exercise relevant for your needs? Scope of the test, techniques used for the test, disease		The lab would request the PT AI/NDV and Rabies for the next year Action : FAO ECTAD country to insert these activities in the WP



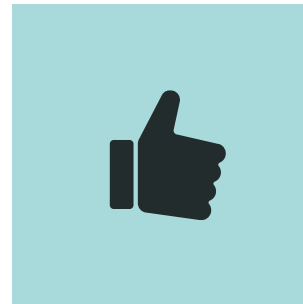
SUSTAINABILITY



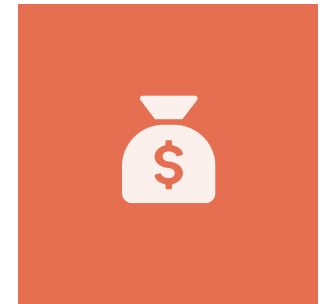
IMPROVEMENT



RAPIDE DETECTION



**RESULTS CONFIRMED BY
REF LABS**



**ADVOCACY FOR FUND
RAISING**



Disease testing - based on gaps and prioritization



Lab items
availability

- Technical, operational and logistics assistance and follow up of procurement process for lab equipment, reagents
- Access to reference reagents and primers/probes for all targeted countries through establishment of long term procurement mechanisms (LTA)
- Reagents monitoring informatics system in the laboratory (module in the LIMS SILAB)
- Immediate shipment of laboratory items (including temperature controlled) in case of emergency/outbreaks to priority countries.



Workforce
development

- Training curriculum (online, on-site), Regional (ToT) and National levels
- Mentorship, remote assistance
- Participation to yearly international PTs



Technical
assistance

- Provision of diagnostic algorithms and protocols for core tests
- Provision of access to confirmatory testing and sequencing by WOA/FAO Ref labs
- Plan troubleshooting mission
- Guidelines (& Mobile app) for field sample collection, preservation and transport
- Development & implementation of LIMS (SILAB) for harmonized lab diagnostic processes and sample tracking in a country and a region.

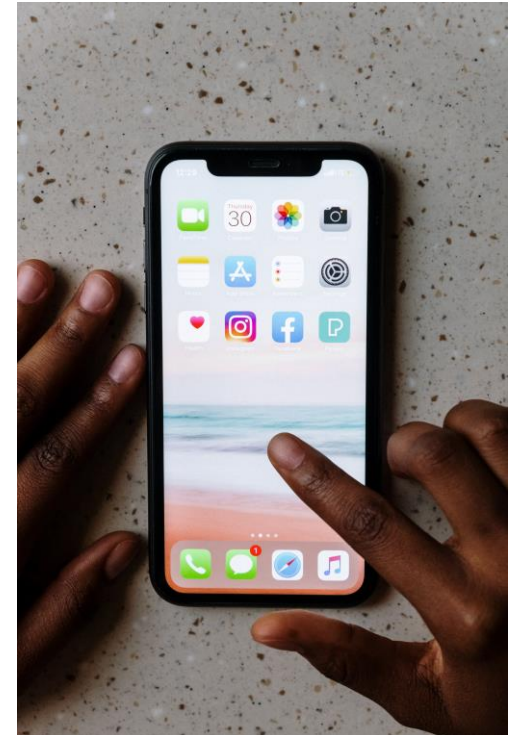
Diagnostic capacity improved



Development of a sampling manual and its mobile application

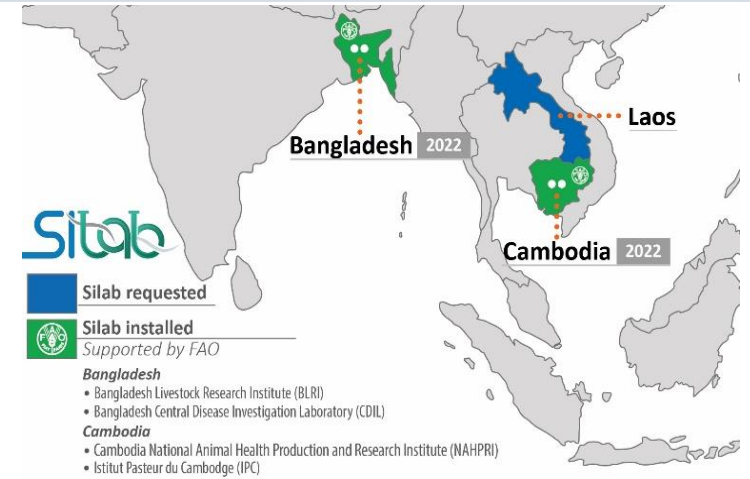
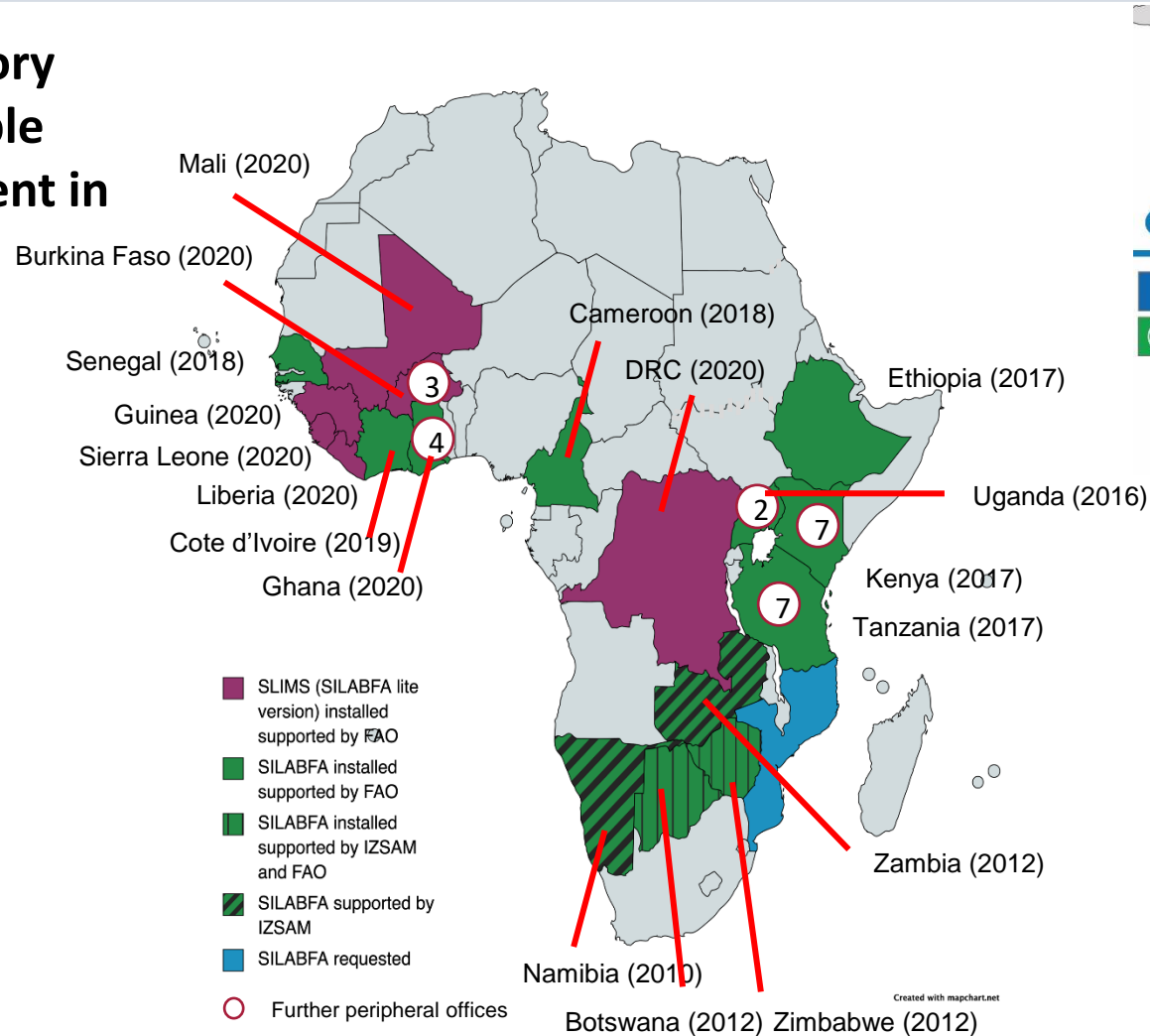
Currently being adapted from a manual developed by a FAO Reference Centre for animal diseases and Laboratory IT systems. The aim is to improve the safety of sampling activities and samples quality

- Should suit field condition
- Fast access to simple sampling instruction and recommendation
- Will be available in En and Fr
- Paper version and electronic version (mobile app)
- Friendly user application under development
- Pilot testing in the coming months



Laboratory Information Management System : LIMS SILAB-FA

Standardization of laboratory diagnostic processes, sample traceability and management in veterinary laboratories:

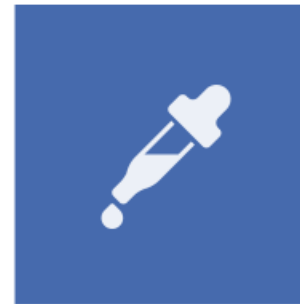


- ✓ FAO ref center for LIMS (Teramo)
- ✓ Modular approach
- ✓ Interoperability
- ✓ 18 countries Africa
- ✓ 2 countries in Asia
- ✓ In 67 laboratories

ADDRESSING ELECTRICITY SUPPLY CHALLENGES WITH FREEZE- DRIED KITS



Cost saving (i.e. single tube reaction)



Friendly for the end-user

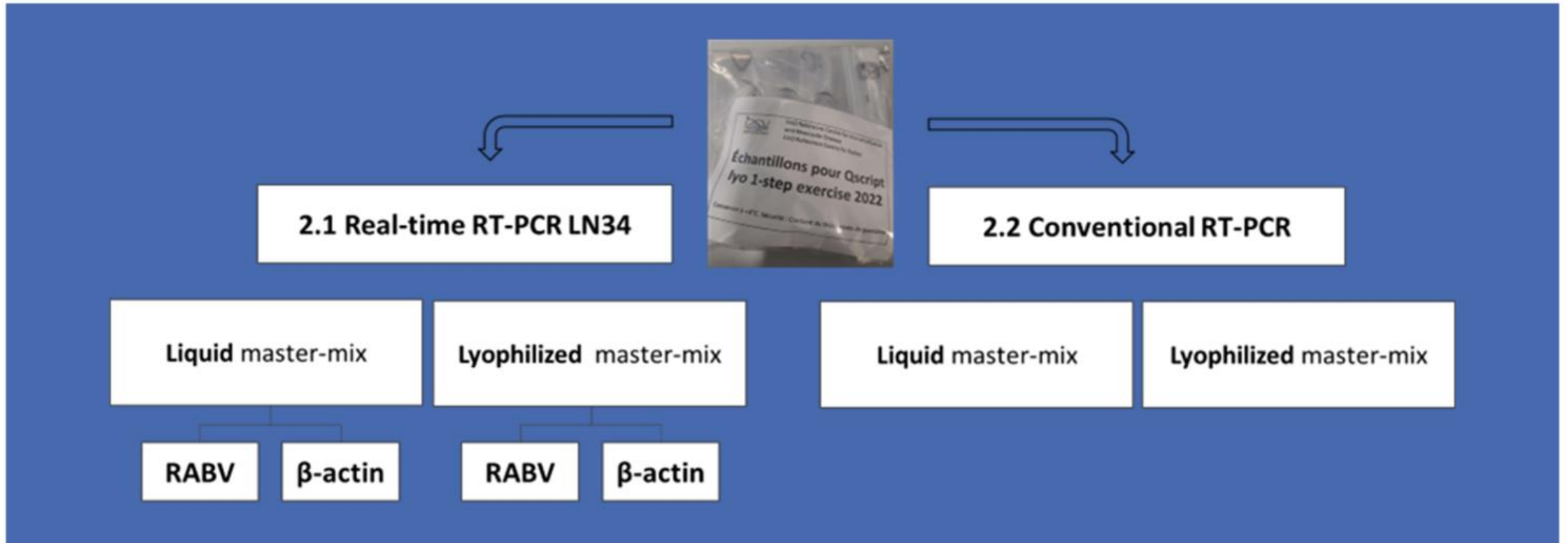


Acceptable performance



Temperature stability:

- Optimal at +4°C
- Ok 30°C for 10 days
- Room temperature (@ 20°C) for 9 months



LYOPHILIZED FORMAT SUCCESSFULLY IMPLEMENTED IN 4 CVLS IN SUB-SAHARAN AFRICA THANKS TO AN INTER-LABORATORY REPRODUCIBILITY TEST



INTER-REGIONAL WORKSHOP ON BIOSAFETY/BIOSECURITY FOR VETERINARY LABORATORIES –EASTERN AND SOUTHERN AFRICA and WEST AND CENTRAL AFRICA

Intercontinental Hotel, Lusaka, Zambia
15 to 19 July 2024

CONCEPT NOTE AND AGENDA



Regional programs on BS/BIS in Africa





Food and Agriculture
Organization of the
United Nations

SUSTAINABLE
DEVELOPMENT
GOALS

Thank you for attention!



Laboratory Team, HQ, WCA, EA, Asia

Food and Agriculture Organisation