Information on the West and Central Africa Veterinary Laboratory Network for Avian Influenza and other transboundary diseases

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1. Context

- **6 Feb. 2006**: First report of H5N1 HPAI outbreak in Africa by Nigeria

- **Within 3 months**, disease reported by 7 other countries: Burkina Faso, Cameroon, Côte d’Ivoire, Djibouti, Egypt, Niger, Sudan

- **Challenges to HPAI early detection and response:**
  - Confusion with ND disease
  - Limited resources to support surveillance and reporting activities
  - **Limited regional capacity for AIV lab diagnosis.**
2. Problems to be addressed

- **Limited AIV laboratory** diagnosis capacity across the region
- + **Reluctance of airline companies & rapid courier/freight services** to forward samples to reference laboratories

**Time interval** ranged from **15 to 34 days** between **first H5N1 suspicions** and their laboratory **confirmation** (and then notification to OIE)

Therefore region labs capacity were compromising the:

- **Early laboratory confirmation** of A/H5N1 outbreaks
- **Isolation** of H5N1 viruses possibly circulating
- **Participation in global AIV genetic changes monitoring**
3. Lab Network Rationale and Justification

Early 2006 many initiatives were taken by development partners to strengthen veterinary diagnostic laboratories (training, provision of lab material and equipment) often regardless beneficiary lab technical level or competency and appeared not very useful to improve local AIV testing capacity.

Solution proposed to facilitate:

Modular upgrading of national labs through tailored training and technical support programmes taking into account individual lab technical capacity within the framework of a regional lab network (Cattoli, Dauphin and Seck, Garoua in Nov 2006)

& Have this upgrading taking place within the framework of a coordinated regional network for sustained outputs.
3. Lab Network Rationale and Justification (2)

Regional laboratory Network seen as essential element to:

- **Improve region’s lab capacities**, in facilitating harmonized upgrading for AI lab diagnosis, and catalysing experience and information sharing between laboratories.

- **Coordinate Regional approaches** in surveillance and response strategies to AI and other transboundary and/or emerging animal diseases.

- **Facilitate linkages with global systems** for TADs prevention and control in the context of increased globalization in trade and population movement.
4. Network Design


FAO-ECTAD Regional Office of Bamako, takes advantage of TCP/RAF/3016 for West and Central Africa to:

• Undertake On-site technical assessments of 12 out of 23 national veterinary laboratories

• Draft a 2-year project document. Proposal submitted to all 23 national laboratories for comments.
Network geographic area

- **15 countries in west Africa:** Benin, Burkina Faso, Cape Verde, Côte d’Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo.

5. Network Design Submission to and Approval by First Beneficiaries

Launching of the Laboratory Network through a Joint FAO-USDA/APHIS inception workshop

Within the framework of West & Central Africa Regional Animal Health Centre (RAHC) of Bamako (3-7 Dec 2007, Bamako, Mali).

- 40 heads of virology units and laboratory managers from 13 West African and 7 Central African countries
- 16 speakers or guests from various national, regional or international organizations (IZSVe, USDA-APHIS, NAMRU, CDC, STOP-AI ...)

Main Conclusions and Recommendations:
5. Network Design Submission to and Approval by First Beneficiaries (2)

1. **Endorsed** “West and Central Africa Subregional Laboratory Network for HPAI” **project proposal** presented by FAO-ECTAD Regional Office.

2. **Set the Network’s Objectives** to **build a sustainable framework for national laboratories’ capacity building** in AI and other TADs surveillance and control.

3. **Entrusted** FAO-ECTAD Regional Office for the **coordination of** the said **network activities**

4. **Entrusted** IZSVe of Padua (Italy) for provision of **technical support** – training, proficiency testing, expert advice etc
5. Network Design Submission to and Approval by First Beneficiaries (3)

5. Selected the network name as: “West and Central Africa Veterinary Laboratory Network for Avian Influenza and other transboundary diseases” (Acronym: RESOLAB)

6. Selected 2 Regional laboratories for regional responsibilities and leading role: LNERV of Senegal & NVRI-Vom of Nigeria

7. Agreed on Regional laboratories terms of reference

8. Endorsed the grouping of the subregion labs, on basis of technical staff capacity, suitability of facilities, operation ... and for training and technical support purposes only as follows:
5. Network Design Submission to and Approval by First Beneficiaries (4)

**Lab Grouping**

- **Group 1**: Not likely to improve their AI diagnostic capacities in the short term - Need staffing and training in basic lab procedures.

- **Group 2**: Laboratories that require upgrading to perform molecular diagnosis.

- **Group 3**: Laboratories already performing molecular diagnosis but need upgrading for better functionality.

**2 Regional laboratories selected:**

LNERV (Dakar, Senegal) & NVRI (Vom, Nigeria).
Teko Central Vet Laboratoire (Sierra Leone), 2006

Before FAO renovation project
Teko Central Vet Laboratoire (Sierra Leone), 2008

After FAO renovation project
Fendell, Liberia (2007-08)
Central Vet Lab of Abuko, Gambia
Group 3 labs: Cameroon, Cote d’Ivoire, Mali
Network’s Regional laboratories:
Dakar (Senegal) and Vom (Nigeria)
6. RESOLAB Achievements so far

- National lab physical renovation (Liberia, Sierra Leone) + mobilisation of regional expertise for operation and training (Benin, Togo, Gabon ...)

- Training
  - Regional Workshops for > 70 lab staff of 23 countries in AI/NDV conventional (Group 1) & molecular lab diagnosis (Group 2 & 3)
  - Advanced bench training at IZSVe of Padoue for 8 technicians
  - Study tour in IZSVe for a staff member of Regional Laby of Vom (Nigeria) on AIV advanced molecular diagnosis and sequencing

- Procurement of equipment, supplies and logistical support
  - Regional labs (Nigeria, Senegal): equipment and consumables
  - Group 3 laboratories: PCR reagents
  - All labs: autopsy kits, sampling material, shipping boxes, serology reagents, PPE, rapid kits

- Buffer stock of main reagents for AIV and NDV at FAO-ECTAD of Bko
6. RESOLAB Achievements (2)

- **National labs Rapid assessment**
  All 23 labs responded to questionnaires on their resources & activities
  On-site assessments carried out now in 19 labs out of 23

- **Interlaboratories Proficiency testing**

- **Reduction of HPAI lab** confirmation delay from an average of **30 days in 2006** (Niger, Nigeria, Cameroon etc) to **2 days** (Togo) and **1 day** (Nigeria) in **2008**. Thanks to **local arrangements** put in place by the lab network and to EMPRES ([http://www.empres-shipping-services.org](http://www.empres-shipping-services.org))

- **Vom Laboratory in Nigeria** offered to test, free of charge, all samples hand over at one of its borders quarantine station

- **Holding of 2 annual meetings with more and more partners etc**

- **Website** developed and including main data and information on RESOLAB, ([http://www.fao-ectad-bamako.org/](http://www.fao-ectad-bamako.org/)), collection and dissemination of technical information through e-mailing list,
Web site launched on Sept 08
6. RESOLAB Achievements (3)

- Network members inputs in technical papers


Field and laboratory findings of the first incursion of the Asian H5N1 highly pathogenic avian influenza virus in Africa

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In mid-January 2006 an outbreak of avian influenza in domestic birds was recorded in Kaduna State, Nigeria. The virus responsible for the outbreak was characterized as a highly pathogenic avian influenza H5N1 (AIchicken/Nigeria/6410/06), belonging to the Qinghai lineage. The index case occurred on a farm containing mixed avian species including free-range birds. Clinical signs and mortality were observed in chickens, geese and ostriches. The present paper describes the clinical, pathological and virological findings of this outbreak.

Highly Pathogenic Avian Influenza Virus Subtype H5N1 in Africa: A Comprehensive Phylogenetic Analysis and Molecular Characterization of Isolates

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Abstract

Highly pathogenic avian influenza virus A/H5N1 was first officially reported in Africa in early 2006. Since the first outbreak in Nigeria, this virus spread rapidly to other African countries. From its emergence to early 2008, 11 African countries experienced A/H5N1 outbreaks in poultry and human cases were also reported in three of these countries. At present, little is known of the epidemiology and molecular biology of A/H5N1 virus in Africa. We have reported on the full genome characterization of highly pathogenic avian influenza virus (H5N1) isolated in Nigeria in 2008. Genetic characterization of H5N1 isolates has been crucial in understanding the zoonotic potential of these viruses. However, the impact of these viruses on the poultry industry and human health in Africa is still not well understood. This article presents the full genome sequence of a H5N1 isolate from Nigeria and a molecular phylogenetic analysis of this isolate with other available African H5N1 isolates.

The First Specific Detection of a Highly Pathogenic Avian Influenza Virus (H5N1) in Ivory Coast

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Impacts

Full detection of avian influenza virus in an African laboratory.

Avian influenza is endemic in Ivory Coast and in West African countries, particularly in free-range poultry farms.

Surveillance has ensured that outbreaks have been contained in the infected flocks. No human case was detected in Ivory Coast.
7. Partnerships and supports

- **Donors:** USA (USAID), Canada, Sweden, France, UK through FAO
  - Co-funding overall program through FAO (staff salaries, workshop fees, supplies ...)
  - Laboratory rehabilitation (Liberia, Sierra Leone, Cote d’Ivoire)
- **USDA/APHIS**
  - Co-funding of annual coordination meetings, training
  - Procurement of Laboratory Equipment & Consumables
  - Translation of web site pages (French to English)
- **Stop-AI**
  - Co-funding of training activities
- **FVI**
  - Lab expert Training missions into Group 1 and 2 labs
- **GTZ, Sweden Cooperation**
  - Laboratory rehabilitation (Togo)
- **IZSVE Padova**
  - Technical support: training proficiency test, ref reagents supply


8. Challenges

- Improved of region’s governments support for their national laboratories in terms of funding, personnel recruitment and working ...
- Instability or lack of laboratory staffing (trainees) and thus technical focal point
- Insufficient collaborations between epidemiology and lab teams
- Formal National Governments an Regional Economic Communities Commitment to support the Network coordination activities.
9. Conclusion & Perspectives

RESOLAB: First formal veterinary laboratory Network including all in West and Central Africa countries addressing all TADs and zoonosis

**Needs identified** during the last annual meeting include:

- Improvement in **quality assurance system**
- More inter laboratories **proficiency testing** exercises
- Close cooperation between **epi and labs teams**
- Equipment & instruments **periodic maintenance**
- **Continuous training** in laboratory techniques.
- **Access to updated** information on lab diagnostic techniques
- Improvement of **communication** across the network.
9. Conclusion (2)

Network Consolidation & sustainability linked to:

- **National labs support** by their respective government and regional organization

- **Specific supports** from development partners for assistance to respond to part of the identified needs

- **Institutional arrangements** at regional level to achieve the network and its coordination activities.
9. Conclusion (3)


- Introduction of **3 distinct sub-lineages** in Africa
- Presence of **mutations** associated with **human adaptation and increased resistance to antiviral drugs.**

Raise concern for the **possible human health risk** presented by these viruses and highlight the **need for increased efforts to monitor the evolution** of H5N1 viruses across the Africa.
West & Central Africa
FAO upgrading veterinary laboratory capacity for HPAI diagnosis

The arrival of H5N1 HPAI in Africa did not catch the continent's veterinary services unawares but it did highlight their shortcomings in terms of surveillance and, in particular, disease diagnosis. Although African veterinary services have responded as best as they can to the emergency, the real presence and distribution of the H5N1 HPAI virus throughout the entire continent might have been significantly underestimated because of the weakness of surveillance and diagnostic capacity of most of them.

In line with its approach to avian influenza and other transboundary animal diseases, based on supporting local and regional initiatives as part of its global programme to prevent and control HPAI and other zoonotic diseases, FAO is actively engaged in supporting the development of veterinary laboratory networks to better monitor and diagnose animal disease, in particular avian influenza.

In 2005, through a series of Technical Cooperation Programmes (TCPs), FAO established sub-regional HPAI laboratory networks in Eastern/Southern Africa, Western and Southern Africa. Following the conclusion of the TCPs, FAO has continued to support African laboratories and, more recently, with support from the Animal Plant and Health Inspection Service (APHIS) of the US Department of Agriculture (USDA), it has