FAO/OIE/WHO Tripartite activities on disease naming and transport of samples; FAO work at regional level for networking between laboratories and at national level to further OIE PVS critical competencies

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FAO/OIE/WHO disease naming (1)

- Examples of pH1N1, H3N2v, A(H7N9)
- WHO, in consultation and collaboration with OIE and FAO has identified best practices for the interim naming of new human diseases
- Not intended to replace or interfere with the existing ICD system, but span the gap between identification of a new human disease event and assigning of a final name by ICD
- General principles of use of terms discussed and agreed upon
• Approach = minimise the unnecessary negative impact of disease names on trade, travel, tourism or animal welfare, and avoiding causing offence to any cultural, social, national, regional, professional or ethnic groups.

• WHO piloted a disease naming scenario discussion
  – Descriptive terms for clinical presentation, population affected may be useful although may change over time
  – Novel: can be useful. Will become obsolete
  – Zoonotic: no instances where identified as useful
  – Arbitrary identifier or generic term: when little information available
  – Year or any date
FAO/OIE/WHO: samples shipment

- Tripartite effort to improve the safe and prompt transfer of infectious substances and biological materials (UN3373, UN2900 and UN2814) between countries.

- The Tripartite to jointly contact the World Customs Organization (WCO) to seek an agreement for common understanding on the importance of submission of biomedical samples for their timely analysis as a public good.
Regional animal health lab networks

• Have made significant progress and achievements
• In many regions, have similar mandate, structure and governance (GF-TAD)
• Instrumental in sharing information, implementing capacity building and promoting policies
• Lab-epi networks progressing together
• Crucial engagement of the RECs
• OIE/FAO Ref Centres are key technical partners, also the linkages with global disease specific platforms/networks
• Project aimed at strengthening laboratory capacities for the diagnosis of normative diseases

• Target regions: Central Africa and S/SE Asia

• Opportunity to deeply address lab strengthening, develop innovative approaches and explore linkages between AH and PH sectors

• 4 pillars: disease testing, lab reporting, QA/biosafety, networking - thru regional approach
Scoring for each of the 108 questions (in 18 categories) and an overall score will be automatically calculated and graphics will be generated.
Details of all LMT results* for Lab Assessed

<table>
<thead>
<tr>
<th>LMT Category</th>
<th>01/10/2014 - LMT Results for Lab Assessed</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geographic location</td>
<td>88.9</td>
<td>100</td>
</tr>
<tr>
<td>Laboratory Budget</td>
<td>33.3</td>
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<tr>
<td>Basic supply</td>
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<tr>
<td>Organization</td>
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<td>100</td>
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<tr>
<td>Infrastructure</td>
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<td>100</td>
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<tr>
<td>Equipment</td>
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<td>88</td>
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<td>Staff skills + availability</td>
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<td>Available technology</td>
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<tr>
<td>Training</td>
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<td>Quality Assurance</td>
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<td>100</td>
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<tr>
<td>Biosafety/Biosecurity</td>
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<tr>
<td>Staff Security/Health</td>
<td>66.7</td>
<td>100</td>
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<tr>
<td>Communication means</td>
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<tr>
<td>National lab networking</td>
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<td>Laboratory collaboration</td>
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<td>100</td>
</tr>
<tr>
<td>Use of databases/platforms</td>
<td>83.3</td>
<td>100</td>
</tr>
<tr>
<td>Grand total (%) Lab Assessed</td>
<td>65.0</td>
<td>95</td>
</tr>
</tbody>
</table>

Major gaps:
- Sample accession (-61%)
- Communication means (-17%)
- Use of databases/platforms (-17%)

Major improvements:
- Reagent supply (+41%)
- Staff security/health (+33%)
- Basic supply (+22%)
- Equipment (+15%)
The Regional Laboratory Network

11 countries (SEA 8, SA 2, EA 1), 31 laboratories

Major Funding Resources: EPT-IDENTIFY, EU-HPED

Members:
National Veterinary Laboratories
Reference / Regional Leading labs
<table>
<thead>
<tr>
<th>LMT Category</th>
<th>2011 (%)</th>
<th>2014 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geographic location</td>
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<tr>
<td>Laboratorial Budget</td>
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<tr>
<td>Basic supply</td>
<td></td>
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<td>Organization</td>
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<tr>
<td>Reagent supply</td>
<td></td>
<td></td>
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<tr>
<td>Staff skills + availability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample accession</td>
<td></td>
<td></td>
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<tr>
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<td></td>
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<tr>
<td>Training, including IATA</td>
<td></td>
<td></td>
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<tr>
<td>Communication means</td>
<td></td>
<td></td>
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<tr>
<td>Staff Security/Health</td>
<td></td>
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<tr>
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<tr>
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<td></td>
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<tr>
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<tr>
<td>Training, including IATA</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Quality Assurance</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Grand Total (%) 2011: 77 68 66 64 63 61 59 59 58 58 57 55 54 52 50 38 36 29 25

Grand Total (%) 2014: 81 78 77 71 71 70 70 69 68 68 67 66 65 61 58 49 49 48 44 26
Regional QA program
coordinated by FAO – implemented by AAHL

Regional trainings on disease diagnosis
Proficiency testing Program
Backstopping mission
Reports and advocacy

No. of Diseases
2010 – Influenza (FluA, H5,), 1
2011 – Influenza (FluA, H5,), PRRS, CSF, 3
2012 – Influenza (FluA, H5,), PRRS, CSF, ASF, ND, Rabies, 6
2013/14 – Influenza (FluA, H5, **H7N9**), PRRS, CSF, ASF, ND, Rabies, 6
Harmonization and improvement of the regional test sensitivity to a satisfactory level

Note: PT evolves over time. Increasing PT difficulty and inclusion of newly emerged isolates was part of the ongoing improvement of laboratories’ diagnostic capability in detecting of novel virus isolates.

Courtesy of AAHL
Regional Biosafety Program

Testing of Biosafety Cabinets in ASEAN animal health labs

- 2010-11: 39
- 2012: 130
- 2013: 148
- 2014: 187

No. of tested BSCs
May 2013
The Laboratory Directors’ Forum
became the ASEAN ad-hoc laboratory focal group for animal health laboratories
Regional Laboratory networking in Sub-Saharan Africa

RESOLAB-WA

RESOLAB-CA

EARLN

LABNET

Cameroon
Central African Republic
Democratic Republic of Congo
Equatorial Guinea
Gabon
Republic of Congo
Rwanda
Tanzania
Uganda

RSLs
Laboratory networks in Africa

- Assessment and monitoring of capacities and functionality
  - Application of the same Lab Mapping Tool
- Activities
  - Regional meetings and trainings
  - QA: training, PTs and audit
  - Access to sequencing services
  - LIMS establishment
- Strategic framework and governance
  - Laboratory policy
  - Hand-over to regional coordinators
  - Signs of endorsement by RECs
### Regional overview of Vet Lab capacities based on 18 categories of FAO LMT

<table>
<thead>
<tr>
<th>LMT Category</th>
<th>Africa- 2011</th>
<th>Africa- 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L1*</td>
<td>N1*</td>
</tr>
<tr>
<td>Geographic location</td>
<td>88</td>
<td>99</td>
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<tr>
<td>Laboratory Budget</td>
<td>69</td>
<td>69</td>
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<tr>
<td>Basic supply</td>
<td>90</td>
<td>90</td>
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<tr>
<td>Organization</td>
<td>90</td>
<td>90</td>
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<tr>
<td>Infrastructure</td>
<td>57</td>
<td>40</td>
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<tr>
<td>Equipment</td>
<td>46</td>
<td>53</td>
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<tr>
<td>Reagent supply</td>
<td>58</td>
<td>77</td>
</tr>
<tr>
<td>Staff skills + availability</td>
<td>93</td>
<td>81</td>
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<tr>
<td>Sample accession</td>
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<tr>
<td>Available technology</td>
<td>61</td>
<td>54</td>
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<tr>
<td>Training, including IATA</td>
<td>81</td>
<td>61</td>
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<tr>
<td>Quality Assurance</td>
<td>87</td>
<td>83</td>
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<tr>
<td>Biosafety/Biosecurity</td>
<td>52</td>
<td>29</td>
</tr>
<tr>
<td>Staff Security/Health</td>
<td>45</td>
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<tr>
<td>Communication means</td>
<td>66</td>
<td>74</td>
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<tr>
<td>National lab networking</td>
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<tr>
<td>Laboratory collaboration</td>
<td>90</td>
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<tr>
<td>Use of databases/platforms</td>
<td>64</td>
<td>33</td>
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<tr>
<td><strong>Grand Total (%)</strong></td>
<td>69</td>
<td>64</td>
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<tr>
<td><strong>General laboratory profile (%)</strong></td>
<td>83</td>
<td>87</td>
</tr>
<tr>
<td><strong>Infrastructure, equipment, supplies (%)</strong></td>
<td>54</td>
<td>57</td>
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<tr>
<td><strong>Laboratory performance (%)</strong></td>
<td>74</td>
<td>66</td>
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<tr>
<td><strong>QA, Biosafety/Biosecurity (%)</strong></td>
<td>71</td>
<td>59</td>
</tr>
<tr>
<td><strong>Lab collaboration and networking (%)</strong></td>
<td>69</td>
<td>61</td>
</tr>
</tbody>
</table>

### Notes
- LMT Category: L1*, N1*, P1*, O1*, G1, B1, A1, E1, C1, F1, D1
- Regional Average values are rounded to the nearest whole number.
Rabies diagnostic capacities in RESOLAB-WA/CA

8/15 RESOLAB-WA laboratories
3/8 RESOLAB-CA laboratories

9/15 RESOLAB-WA laboratories
5/8 RESOLAB-CA laboratories

Courtesy of IZSVe
First ever reported rabies case to the OIE in Rep. of Congo

- **June 2013**: First reported rabies case to the OIE in Rep. of Congo
- **Aug**: Cross-sectoral Training + Rabies Seminar
- **Sept**: Rabies outbreak in Pointe-Noire (Congo)
- **Oct**: 1st Death
- **Nov**: 2nd Death
- **Dec**: 3rd sample to LNVB = Positive
- **Jan 2014**: Sequencing of the N gene
- **Sept 2014**: 2nd sample to LNVB = Positive
- **Jan 2015**: 1st sample to LNVB = Positive
Regional Support/Leading laboratories

• 3 Regional Leading Diagnostic Laboratories (RLDLs) in SE Asia and in S Asia
  - Established by ASEAN / SARC
  - Per disease and similar mandates
  - FMD, CSF, HPAI / PPR, FMD, HPAI

• 4 Regional Support laboratories (RSLs) in Africa
  - Established by the Regional networks
Support to national laboratory networks
Progression to *IVM Online*

Pre-screen HI data from DICs was stored within Excel spreadsheets. Increasing complexity of the data generated from the spreadsheets led to the development of a Web-database solution: Prescreening Tool (2011) and IVM Online (2013).
IVM-on line
Sequence Feature Variants Types (SFVT)

A SF is a functional or structural domain of a protein, e.g. antigenic sites, enzyme catalytic centers, etc. Sequence polymorphisms within each SF are annotated as Variant Types (VT). So far, about 3,897 SFs have been defined and mapped in IRD for all the proteins of influenza A virus.

New Phenotype Markers
IRD has added data about 113 new phenotype markers. Every relevant protein sequence in IRD has been annotated about whether the sequence carries a particular Phenotypic Variant Type that gives rise to a phenotypic consequence. This information is made available on the Strain/Segment/Protein Details pages and in the SFVT component. See an example here. (Posted on October 6, 2014).
Lab-epi networking
LIMS
### Disease event

**Disease Event ID:**  173557

**Reporting date:**  1/10/2004

**Observation date:**  1/10/2004

**Region:**  Suphanburi (Thailand)

**Locality:**  Suphanburi

**Lat/Long:**  14.6962 / 99.8904

**Quality of Coordinates:**  Centroid Admin1

### Location

**Admin 1 (Country):**

**Status:**  Confirmed

**Disease:**  Influenza - Avian

**Serotype:**  H5N1 HPAI

**Source:**  National authorities

### Species affected

**An Type:**  Domestic

**An Class:**  Mammal

**Species:**  dogs

**At Risk:**  1

**Cases:**  0

**Deaths:**  0

**Destroyed:**  0

**Slaughtered:**  0

### Laboratories

**Disease Tested:**  Influenza - Avian

**Species:**  dogs

**Test:**

**Sample:**

**Result:**  Positive

**Result Date:**

**Reference Laboratory:**

### Genetic Information

**Validated link(s):**  1

**Type/Subtype:**  A/H5N1

**Isolate Name:**  A/dog/Thailand-Suphanburi/KU-08/04

**Isolate Type:**

**Segments/Sequences (GenBank):**

**Key Mutations (isolate [OpenFlu]):**

### Search result

**Previously selected isolates (clear):**

- back to results  A/dog/Thailand-Suphanburi/KU-08/04

**A/dog/Thailand-Suphanburi/KU-08/04**

- **OpenFlu Isolate ID:**
- **Name and synonyms:**
- **Type/subtype:**
- **HS Clade ID:**
- **Sample collection date:**
- **Host:**
- **Location:**
- **First submission:**
- **Last update:**
- **show OpenFluDB Information**

**Authors**

**Sequence submitter:**

**Epidemiological properties**

**Empres-1 disease event ID:**  173557

**Computed annotations**

**Protein name:**

**Numbering on the reference sequence:**

**Sequence of the mutant at the specified location:**

**Potential action of the mutation:**

**Human Adaptation:**

**Name of the mutation:**

**Equivalent numbering on the hemagglutinin of type 3:**

**Numbering on the reference sequence:**

**Sequence of the mutant at the specified location:**

**HA:**

**NP:**

**PB1:**

**PB2:**

**PB2HA:**

**PB2HA/N2:**

**PB2HA/N3:**

**PB2HA/N31:**

**Sequence annotation**

**Key mutations/type**

### OpenFlu

Swiss Institute of Bioinformatics
DISEASE EVENTS - Influenza - Avian, Asia - H5N1 HPAI
DISEASE EVENTS - Influenza - Avian, Asia - H5N1 HPAI - Linked outbreaks/isolates
OUTBREAKS DATA - Influenza - Avian, Asia (H5N1 HPAI) - Clade information

Outbreaks

- Clades 1 and derived
- Clades 2.1 and derived
- Clades 2.2 and derived
- Clades 2.3.2 and derived
Conclusions

• Animal health labs have significantly improved their capacities (influenza investment)

• Many expectations - and also challenges - for laboratory collaborations at global, regional, national levels

• Great role to be played by Ref Centres

• Existing tools and network models can be used and applied elsewhere
  – eg. networking between Korea, China, Japan for influenza
Thank you for your attention

Acknowledgments to other FAO colleagues, technical, donors and partners...
Virus information

- OpenFlu (Swiss Institute of Bioinformatics)
- NCBI

Epidemiological information

- EMPRES (Global Animal Disease Information System)
- WAHID

Other sources (information tracking, FAO projects)

Peer-reviewed publications

Sequence and meta data

- Sequence and meta data
- Outbreak-isolate link

Selected virus meta data

Epi data