National Strategies for Controlling Avian Influenza Viruses

Indonesia

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OIE Regional Workshop on Enhancing Influenza Viruses National Surveillance Systems, Tokyo, 26-28 August 2014
Outline

- Background information
- Influenza outbreak history
- National control strategy
- National surveillance programme
- Development influenza virus monitoring
- Vaccination programme
- Lessons learn
- Future plan
# Animal Population

<table>
<thead>
<tr>
<th>No</th>
<th>Types of Animals</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Ruminant (Cattle, Buffalo Goat, Sheep)</td>
<td>45,463,000</td>
<td>49,357,000</td>
<td>47,821,000</td>
</tr>
<tr>
<td>B</td>
<td>Non Ruminant (Pig, Horse, Rabbit)</td>
<td>864,000</td>
<td>9,412,000</td>
<td>9,182,000</td>
</tr>
<tr>
<td>C</td>
<td>Poultry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Broiler chicken</td>
<td>1,177,991,000</td>
<td>1,244,402,000</td>
<td>1,344,191,000</td>
</tr>
<tr>
<td>2</td>
<td>Layer chicken</td>
<td>124,636,000</td>
<td>138,718,000</td>
<td>146,622,000</td>
</tr>
<tr>
<td>3</td>
<td>Native chicken</td>
<td>264,340,000</td>
<td>274,564,000</td>
<td>276,777,000</td>
</tr>
<tr>
<td>4</td>
<td>Duck</td>
<td>43,488,000</td>
<td>49,296,000</td>
<td>51,355,000</td>
</tr>
<tr>
<td>5</td>
<td>Quail</td>
<td>7,357,000</td>
<td>12,234,000</td>
<td>12,553,000</td>
</tr>
<tr>
<td>6</td>
<td>Pigeon</td>
<td>1,209,000</td>
<td>1,806,000</td>
<td>2,139,000</td>
</tr>
<tr>
<td></td>
<td>Total Poultry</td>
<td><strong>1,619,021,000</strong></td>
<td><strong>1,721,020,000</strong></td>
<td><strong>1,833,637,000</strong></td>
</tr>
</tbody>
</table>

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## 25 Major Animal Diseases

**Decree of Minister of Agriculture No. 4026/Kpts/OT.140/04/2013, Date 1 April 2013**

<table>
<thead>
<tr>
<th>Disease</th>
<th>Priority</th>
<th>Disease</th>
<th>Priority</th>
<th>Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthrax</td>
<td>SE</td>
<td>Jembrana</td>
<td>Campylobact.</td>
<td></td>
</tr>
<tr>
<td>Rabies</td>
<td>Nipah</td>
<td>Surra</td>
<td>Cysticercosis</td>
<td></td>
</tr>
<tr>
<td>Salmonellosis</td>
<td>IBR</td>
<td>Para TB</td>
<td>Q Fever</td>
<td></td>
</tr>
<tr>
<td>Brucellosis (B. Abortus)</td>
<td>Bovine TB</td>
<td>Toxoplasmosis</td>
<td>FMD*</td>
<td></td>
</tr>
<tr>
<td>AI</td>
<td>Leptospirosis</td>
<td>CSF/ HC</td>
<td>BSE*</td>
<td></td>
</tr>
<tr>
<td>PRRS</td>
<td>Brucellosis (B. Suis)</td>
<td>Swine Influenza</td>
<td>RVF*</td>
<td></td>
</tr>
<tr>
<td>Helminthiasis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Blue: Priority Diseases**

**Red*: Exotic Diseases
HPAI Outbreak in Backyard Poultry Yearly, 2007 - July 2014

2007: 2751
2008: 1413
2009: 2293
2010: 1502
2011: 1390
2012: 546
2013: 470
2014: 269
HPAI Outbreak in Backyard Poultry
Monthly, 2009 - July 2014
HPAI Outbreak in Backyard Poultry in 2012, by Province

- 98 provinces: Sporadic, low (1-49)
- 68 provinces: No Outbreak
- 3 provinces: Persistent, medium (50-99)
- 22 provinces: Sporadic, low (1-49)
- 9 provinces: No Outbreak
HPAI Outbreak in Backyard Poultry in 2013, by Province

- **5 provinces** Persistent, medium (50-99)
- **19 provinces** Sporadic, low (1-49)
- **9 provinces** No Outbreak
HPAI Control and Eradication Strategies to Achieve Free Status 2020 (Roadmap)

1. Bio-security
2. Vaccination
3. Depopulation
4. Movement control
5. Surveillance
6. Compartmentalization and zoning
7. Poultry market chain improvement
8. Supporting by: IEC, PPP, Legislation, management
National Surveillance Programme

Emphasizing Avian Influenza Surveillance:
– Continue risk based surveillance of poultry
– Live Bird Market Survey
– H7N9 Emergency Surveillance
– Influenza Virus Monitoring (IVM)

On going process to develop integrated National Animal Health Information System (i-SIKHNAS)
How the “iSIKHNAS” system work?

SMS report U / P

Creating case ID

Reply message from the system

Check message

Response report-R Dinas

Alert SMS to Technical staff

Response through phone or visit

Cadre
### Function in iSIKHNAS system

#### SPECIAL ACTIVITY FUNCTION

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SK</td>
<td>Animal movement permit</td>
</tr>
<tr>
<td>VSK</td>
<td>Animal movement validation</td>
</tr>
<tr>
<td>POP</td>
<td>Population</td>
</tr>
<tr>
<td>VAK</td>
<td>Vaccination report</td>
</tr>
<tr>
<td>SUR</td>
<td>Active surveillance</td>
</tr>
<tr>
<td>RP</td>
<td>Slaughter house report</td>
</tr>
<tr>
<td>IB</td>
<td>Artificial insemination</td>
</tr>
</tbody>
</table>

#### ANIMAL HEALTH REPORTS AND INVESTIGATION FUNCTIONS

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>Priority Syndrome Report</td>
</tr>
<tr>
<td>U</td>
<td>General Sign Report</td>
</tr>
<tr>
<td>R</td>
<td>Response report</td>
</tr>
<tr>
<td>PNEG</td>
<td>Negative report</td>
</tr>
<tr>
<td>PK</td>
<td>Follow up report</td>
</tr>
<tr>
<td>LAB</td>
<td>Specimen laboratory test report</td>
</tr>
<tr>
<td>OB</td>
<td>Treatment report</td>
</tr>
</tbody>
</table>
Surveillance Strategy

1. Enhancing the field animal health network’s capability to conduct passive surveillance nationally in accordance with World Animal Health Organization (OIE) standards, and strengthen the national disease reporting system

2. Enhancing the epidemiological and scientific basis of active surveillance programme to ensure they are risk based

3. Increasing the scope of laboratory capacity and optimizing the investment in laboratories by developing a network.

4. Expanding **quality assurance and accreditation** within the public sector laboratories.

5. Improving **field and laboratory linkage**

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Surveillance Influenza Virus by 8 DICs

- In 2009/2010 **Conducting Influenza Virus A/H1N1** Risk Based Surveillance by 8 DICs, collected 3,960 samples (2,804 samples for PCR and 1,156 serum) from pig population in Sumatera, Java, Bali, Kalimantan and Sulawesi. The results of laboratory testing that not found clinical signs and not found Influenza A/H1N1 novel virus.

- **Surveillance Influenza Virus A/H5N1** collected samples (Swab, serum, organ, feather, egg etc) form poultry 21,141 samples (2010), 33,829 (2011), 33,162 (2012), 41,342 (2013).

- **Surveillance Influenza Virus A/H7N9** in 2012/2013 collected environmental samples from 263 Live Bird Markets in Greater Jakarta, Surabaya, Medan: 864 samples. Result: 33,7 % Matrix (+) dan 0 % H7N9.
LBM Surveillance of H5N1 in Greater Jakarta, 2009-2013

- Decreasing prevalence of H5 subtype from 2009-2012
- In 2013, H5 prevalence increase in the same time of new clade outbreak (actually surprising peak from June/ July after the peak but coinciding with duck outbreaks during that time on Java, see map)
Overall Results LBMs Surveillance

Greater Jakarta, since 2009

7632 environmental swab samples collected
47% influenza A virus (+) and 27% H5 subtype (+)

Surabaya

Up to September 2013, 292 environmental swab samples collected with PCR result
40% influenza A virus (+) and 6% H5 subtype (+)

Medan

Up to October 2013, 295 environmental swab samples collected with PCR result
2% influenza A virus (+) and 2% H5 subtype (+)
# Result of H7 PCR Testing

Environment Sample from LBMs

<table>
<thead>
<tr>
<th>Region</th>
<th>year</th>
<th>month</th>
<th>Total Sample</th>
<th>Matrix</th>
<th>Matrix</th>
<th>H7</th>
<th>H7</th>
<th>%M+</th>
<th>%H7</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pos</td>
<td>Neg</td>
<td>Pos</td>
<td>Neg</td>
<td></td>
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<tr>
<td>JABODETABEK</td>
<td>2012</td>
<td>November</td>
<td>77</td>
<td>32</td>
<td>45</td>
<td>0</td>
<td>32</td>
<td>41,6</td>
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<tr>
<td>JABODETABEK</td>
<td>2013</td>
<td>February</td>
<td>71</td>
<td>29</td>
<td>42</td>
<td>0</td>
<td>29</td>
<td>40,8</td>
<td>0</td>
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<tr>
<td>JABODETABEK</td>
<td>2013</td>
<td>March</td>
<td>76</td>
<td>39</td>
<td>37</td>
<td>0</td>
<td>39</td>
<td>51,3</td>
<td>0</td>
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<tr>
<td>JABODETABEK</td>
<td>2013</td>
<td>April</td>
<td>102</td>
<td>46</td>
<td>56</td>
<td>0</td>
<td>46</td>
<td>45,1</td>
<td>0</td>
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<tr>
<td>JABODETABEK</td>
<td>2013</td>
<td>May</td>
<td>208</td>
<td>86</td>
<td>122</td>
<td>0</td>
<td>86</td>
<td>41,3</td>
<td>0</td>
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<tr>
<td>JABODETABEK</td>
<td></td>
<td></td>
<td>534</td>
<td>232</td>
<td>302</td>
<td>0</td>
<td>232</td>
<td>43,4</td>
<td>0</td>
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<tr>
<td>JABODETABEK</td>
<td>2013</td>
<td>March</td>
<td>74</td>
<td>1</td>
<td>73</td>
<td>0</td>
<td>1</td>
<td>1,4</td>
<td>0</td>
</tr>
<tr>
<td>JABODETABEK</td>
<td>2013</td>
<td>May</td>
<td>74</td>
<td>1</td>
<td>73</td>
<td>0</td>
<td>1</td>
<td>1,4</td>
<td>0</td>
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<tr>
<td>MEDAN Total</td>
<td>2013</td>
<td>May</td>
<td>148</td>
<td>2</td>
<td>146</td>
<td>0</td>
<td>2</td>
<td>1,4</td>
<td>0</td>
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<tr>
<td>RAWAKEPITING</td>
<td>2013</td>
<td>May</td>
<td>36</td>
<td>16</td>
<td>20</td>
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<td>16</td>
<td>44,4</td>
<td>0</td>
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<tr>
<td>SURABAYA</td>
<td>2013</td>
<td>March</td>
<td>73</td>
<td>25</td>
<td>48</td>
<td>0</td>
<td>25</td>
<td>34,2</td>
<td>0</td>
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<tr>
<td>SURABAYA</td>
<td>2013</td>
<td>April</td>
<td>73</td>
<td>16</td>
<td>57</td>
<td>0</td>
<td>16</td>
<td>21,9</td>
<td>0</td>
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<tr>
<td>SURABAYA Total</td>
<td>2013</td>
<td></td>
<td>146</td>
<td>41</td>
<td>105</td>
<td>0</td>
<td>41</td>
<td>28,1</td>
<td>0</td>
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<tr>
<td>Grand Total</td>
<td>2013</td>
<td></td>
<td>864</td>
<td>291</td>
<td>573</td>
<td>0</td>
<td>291</td>
<td>33,7</td>
<td>0</td>
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</tbody>
</table>
Proportion prevalence of Clade 2.1.3 and Clade 2.3.2.1 in LBM Greater Jakarta Nov 2012 – Oct 2013

Evidence of 2.1.3 only
Evidence of 2.3.2

Proportion 2.3.2 to total prevalence
Proportion 2.1.3 to total prevalence
IVM Online: An integrated antigenic and genetic data analysis for influenza virus monitoring in animals (start with H5N1)
Membership of the current IVM laboratory network with a description of their main role with respect to this monitoring network.
Outcomes of IVM Network:

• The most innovative aspect of the IVM network: *the formalization of an objective system to assist decision makers* following the detection of a variant or newly introduced H5N1 virus, clade 2.3.2.1;

• These lead to *the successful and timely development of an AI vaccine* (*Afluvet*) based on the characterization of a local H5N1 clade 2.3.2.1 isolate;

• Development of pre-screening and full screening protocols for antigenic characterization using standardised panels of reagents;

• Development of the web-based database and bioinformatics tools (*IVM Online*) for antigenic and genetic characterisation and visualisation;

• Updated molecular diagnostics techniques (PCR for Type A, H5N1 and H5N1 clade 2.3.2.1);

• Increased capacity of Indonesian animal health laboratories to do own antigenic and genetic characterization (standarized HI and sequencing methods for AI);

• Improved knowledge of circulating H5N1 viruses; which helped HPAI control policies, including vaccination by ensuring H5N1 vaccines remain effective in the face of field virus antigenic drift and multiple clades circulation. This may include recommendations for updated challenge and vaccine
IVM Network:

- The IVM network shows the successful implementation of coordinated and integrated monitoring system for H5N1 HPAI virus in Indonesia and help decision makers in respond with the detection of a variant or newly introduced virus into Indonesia.

- The IVM network has relevance for other countries seeking to establish national laboratory networks for the surveillance of avian influenza and other pathogens.
Evolution of H5(N1) Subtype Virus in Indonesia

Progenitor Virus

A/Gs/GD/1/96

Clade 2.1 (Genotype Z)

Clade 2.1.1

Clade 2.1.2

Clade 2.1.3 (Genotype Z)

Clade 2.1.3.1

Clade 2.1.3.2

Clade 2.1.3.3

Clade 2.3 (Genotype Z and G)

Clade 2.3.2.1 (Genotype Z or G?)

Timeline:


Legend:

- NO longer exist
- decrease in no.
- increase in no.

China

Indonesia
Genetic Mapping of H5N1 virus in Indonesia between 2008 and 2013

- 2.1.3.1: Bali, Nusa Tenggara, Sulawesi, Papua
- 2.1.3.3: Sumatera
- 2.1.3.2: Sumatera, Java, Bali, Kalimantan, Sulawesi, Nusa Tenggara
- 2.3.2.1: Sumatera, Java, Bali, Kalimantan, Sulawesi, Papua
The benefits of the IVM network approach to HPAI surveillance

- e.g. the detection of the introduction of a new clade (2.3.2.1) H5N1 virus into Indonesia

Phylogenetic analysis

An Indonesian 2.3.2.1 vaccine
Vaccination Programme

1. Since 2011: stop imported vaccines, then using national vaccine products with local H5N1 (clade 2.1.3) strain master seed. 5 National AI Vaccine Producers (1 Gov & 4 Private)

2. Outbreak of new clade 2.3.2 in December 2012, then June 2013: produce local Vaccine H5N1 (clade 2.3.2.1). All vaccines should be tested by National Veterinary Drug Assay Laboratory before registered at Ministry of Agriculture.

3. 2014: plan to produce new bivalent vaccine (clade 2.1.3. and 2.3.2) for chicken and duck. Strain isolates of master seed and challenge test recommended by results of IVM online

4. Since 2009: changed from mass vaccination to targeted vaccination strategy. 3 keys proper vaccination : (1) registered vaccine (2) programme/booster (3+2) and (3) vaccination technique
Comparison of Imported and Local H5N1 Vaccines Used
Lessons learnt (Constrains)

- In the specific case of the IVM network, such a change in process (e.g. sequencing followed by antigenic cartography) would need to be considered carefully, as the benefits of introducing new technology must be weighed up against the potential loss of data consistency and the cost.

- Lack of local government support on budget allocation, veterinary services institution, number of veterinarian.

- Lack of small scale commercial poultry farmer’s awareness in implementing minimal standard procedures of Bio-security (→ 3 zones Bio-security), Vaccination (→3 proper Vaccination), Reporting outbreak, Depopulation (→PVUK/CPVS).

- No law enforcement on movement control of poultry from infected farm into poultry market chains.
Future Plan

- Indonesia Roadmap to achieve HPAI Free Status 2020
- 3 Key principles to implement the strategies:
  1. Comprehensive → all poultry sectors and market chains
  2. Sustainability
  3. Involvement of all stakeholders
Thank you

Terima kasih