Risk assessment of introduction of HPAI to commercial farms in Thailand

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- Tippawan Parakamawong
Outline

• Poultry sectors
• Risk question
• Model pathway
• Assumption
• Conclusion
Closed housing, EVAP.

high level of biosecurity

T. Songserm’s
Open housing  (meat-typed and laying poultry)

T. Songserm's
Free grazing ducks in rice fields after harvest

Songserm *et al.*
Gilbert *et al.*
Backyard poultry
Risk questions

- What is the annual risk of introducing HPAI H5N1 infection into a commercial farm?
Model pathway

RELEASE ASSESSMENT

Parent stock

Hatchery

Day-old chick

Buffer zone (intensive surveillance)

Broiler farm

eggs

animals

human

equipment

air

food

Feed, water
Probability assessed (DOC route)

- Probability egg from PS is contaminated
- Probability egg becomes contaminated during transportation to hatchery
- Probability of low biosecurity at hatchery
- Probability DOC becomes contaminated during transportation

Risk estimates:
Annual probability of Introducing infection to a farm from DOC
Model parameters and assumptions

• Probability egg is contaminated from PS
  – Prevalence of disease in the PS
  – The frequency of surveillance testing of the PS
  – The surveillance test performance (Se, Sp)
  – Proportion of animals test in each PS
- Probability that a random egg becomes contaminated during transport
  - The prevalence of infection in the locations where it is transported
  - The probability of an effective contact
  - The number of contacts during transportation
  - Average time of transportation
• Probability of low biosecurity at hatchery
  – Probability of biosecurity failure at hatchery
Distribution for Prob. That at least 1 DOP get infected...

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>1.20471E-07</td>
</tr>
<tr>
<td>Maximum</td>
<td>7.80003E-06</td>
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<tr>
<td>Mean</td>
<td>1.45282E-06</td>
</tr>
<tr>
<td>Std Dev</td>
<td>1.0376E-06</td>
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</tbody>
</table>

Regression Sensitivity for Cell G123

- Prevalence of disease in the PS farm: 0.811
- Sensitivity of surveillance test: -0.395
- Prob. Of DOP get infected from vehicles: 0.234

Expected number of DOP infected prior entering a farm a year: 0.01318
Model pathway

RELEASE ASSESSMENT

Parent stock

eggs

Hatchery

Day-old chick

Buffer zone (intensive surveillance)

Broiler farm

animals

Feed, water

human

equipment

air

food
Probability assessed (others)

- Probability a factor is contaminated
- Probability the factor follow biosecurity system
- Effectiveness of the biosecurity system
- Risk estimates: Annual probability of Introducing infection to a farm from a factor
Risk mitigation (compartmentalization)

- General (location, layout, housing system)
- Farm management
- Feed management
- Worker management
- Poultry health management
- Pest control
- Water source management
- Biosecurity practice in emergency situation
ศูนย์
ความปลอดภัยทางสุขภาพระดับชาติ
การดำเนินงานในเนื้อ/เนื้อเป็ดเพื่อเข้าสู่ระบบ
Compartmentalisation
Distribution for Prob. that H5N1 expose to the farm (exc...)

Values in 10^-3

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Value</th>
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<tbody>
<tr>
<td>Minimum</td>
<td>0.001177544</td>
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<tr>
<td>Maximum</td>
<td>0.005650592</td>
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<tr>
<td>Mean</td>
<td>0.002626077</td>
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<tr>
<td>Std Dev</td>
<td>0.000705836</td>
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Regression Sensitivity for Cell H326

<table>
<thead>
<tr>
<th>Name</th>
<th>Regr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevalence of H5N1 carried by husk</td>
<td>0.628</td>
</tr>
<tr>
<td>Prevalence of H5N1 carried by water</td>
<td>0.570</td>
</tr>
<tr>
<td>Prevalence of H5N1 carried by birds</td>
<td>0.362</td>
</tr>
<tr>
<td>Prob. Big trees cut</td>
<td>-0.271</td>
</tr>
</tbody>
</table>
Distribution for Total prob. that H5N1 expose to the far...

Values in 10^-3

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>0.001178018</td>
</tr>
<tr>
<td>Maximum</td>
<td>0.005651669</td>
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<tr>
<td>Mean</td>
<td>0.002627529</td>
</tr>
<tr>
<td>Std Dev</td>
<td>0.000705861</td>
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</tbody>
</table>

Regression Sensitivity for Cell H329

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<tr>
<th>Name</th>
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<tbody>
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<td>0.362</td>
</tr>
<tr>
<td>Prob. Big trees cut / ChickenSec1</td>
<td>-0.271</td>
</tr>
</tbody>
</table>
Conclusion

- Under current situation, the probability of introducing the virus into a farm is very low.
- Husk is considered the most influencing factor to the model.
Acknowledgments

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Dr. Wantanee Kalpravidh
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