Surveillance, scenario tree models and claim of disease freedom at the national level

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Outline

- New trends in OIE surveillance standards
- Quantitative approaches to confirm “freedom” of diseases
- Context of surveillance
The OIE definition of surveillance

- Surveillance means the systematic ongoing collection, collation, and analysis of information related to animal health and the timely dissemination of information to those who need to know so that action can be taken.

- In general, surveillance is aimed at:
  - demonstrating the absence of disease,
  - determining the occurrence or distribution of disease,
  - while also detecting as early as possible exotic or emerging diseases.
Types of surveillance

<table>
<thead>
<tr>
<th>Type of surveillance</th>
<th>Examples</th>
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</thead>
<tbody>
<tr>
<td>Measuring disease occurrence of diseases known to occur in Canada</td>
<td>Wildbird surveys for Avian Influenza</td>
</tr>
<tr>
<td>Baseline</td>
<td>Detecting increased occurrence (early warning)</td>
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<tr>
<td>Detecting decreased occurrence (part of disease control)</td>
<td>TB, BSE, CWD</td>
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<td>Determine presence/absence of diseases (FAD surveillance)</td>
<td>Confirm freedom</td>
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<td>CanNAISS</td>
<td>CanSwineSurv</td>
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<td>CanNAISS</td>
<td>Bovine sero survey</td>
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<td>CanNAISS</td>
<td>Trichinella in meat (Food safety)</td>
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<tr>
<td>Early warning (new emerging diseases)</td>
<td>Wildbird surveys for Avian Influenza and West Nile</td>
</tr>
</tbody>
</table>
GATT / SPS 1994

OIE 1924
- Reporting

WTO
- Standards
- Trade negotiations/disputes

United Nations
- WHO
- FAO

Codex Alimentarius
The international scene before 1994

- The veterinary authorities protected the zoosanitary status of the country
- Risk avoidance – zero risk – if in doubt keep it out
- This was seen as (often unnecessary) “political” trade barriers but from a veterinary stand point it is an easy solution
1994 marks the beginning of change

- The GATT (General Agreement on Tariffs and Taxes) Uruguay round was signed April 15, 1994
  - Established the World Trade Organization (WTO) and
  - A major output was the Sanitary and Phytosanitary agreement (SPS agreement)
The SPS agreement (1994)

- Aims to facilitate trade and protect human, animal or plant life or health.
- Dictates that sanitary measures must be *scientifically based* and not more restrictive than necessary
- Recommends the use of international standards from the World Organization for Animal Health (*OIE*)
- Stresses that more restrictive measures than those in the international standards must be justified through *risk analysis*
Surveillance to confirm freedom over the last 25 years

- **Qualitative approach** to claim freedom (prior to 1994)
  - The veterinary authorities stated the zoosanitary status
  - Survey(s) to support the claim were rare

- **1st quantitative approach** – (1994 to ?) adapting to SPS – science based
  - OIE set standards for surveys to confirm freedom
  - Principles
    - if two countries conducted the “same” survey they were equally likely to be free
    - One-shoe-fits-all
  - (Proportional) random sampling, high diagnostic sensitivity (prescribed tests etc.), inflexible sample sizes
Surveillance to confirm freedom
new challenges

- **2nd quantitative approach** – modern (2007)
  - New trend in OIE standards to confirm freedom
  - Veterinary Authorities
    - Justify design based on epidemiology, disease, history etc.
    - Latitude to choose design prevalence, sampling method(s) and diagnostic test(s)

- Calculate surveillance system sensitivity, probability of freedom
  - Combine surveillance data
    - Historical surveillance data
    - Multiple current data sources

- Provide plan and context
  - Description of veterinary infrastructure, laboratory capacity, industry, production methods etc.
ESS examples

Canadian Bovine Surveillance

- Targeted testing (Brucella)
- Ongoing sentinel testing in BC (Bluetongue)
- Ongoing sampling

Canadian Swine Surveillance

- Data mining (Trichinella meat)
- Data mining (Pseudorabies)
- Ongoing sampling

Canadian NAI Surveillance System

- Data mining (export companies)
- Ongoing surveillance
Freedom & risk before and after 1994

Freedom in a geographical region (country)

Zero risk

Freedom in a population (Notifiable Avian Influenza in poultry)

Acceptable low level (prevalence)

1994
Responsibility & documentation

❖ To justify
  ➢ design based, design prevalence, sampling method(s) and diagnostic test(s)

❖ We provide the context of surveillance in a comprehensive report including descriptions of
  ➢ Disease epidemiology in Canada
  ➢ Industry, production methods, population etc.
  ➢ Veterinary infrastructure & diagnostic capacity
  ➢ Laws, regulations, jurisdiction
  ➢ Design and organization of surveillance activities
  ➢ Stakeholder involvement
  ➢ Surveillance results
Transparency

❖ Epidemiologic analysis - scenario trees
   ➢ Combine surveillance data
   ➢ Calculate surveillance system sensitivity & probability of freedom
   ➢ Presentation of models is challenging but critical for validation

❖ Standardized presentation of surveillance results*
   ➢ (1) definitions to describe the objective of the model,
   ➢ (2) initial time period,
   ➢ (3) input parameters,
   ➢ (4) data,
   ➢ (5) model settings & structure
   ➢ (6) outputs,
   ➢ (7) validation

*Vanderstichel, Christensen, Stryhn, Hurnik. 2013. Standards for reporting surveillance information in freedom from infection models by example of Trichinella in Canadian market hogs. PVM (Accepted March 2013).
Conclusion

❖ New trends in OIE surveillance standards
  ➢ New responsibilities, new demands on transparency and documentation

❖ 1st and 2nd quantitative approach to confirm “freedom”
  ➢ Canada applies both approaches

❖ The context of surveillance
  ➢ Is needed to meet OIE and document surveillance including scenario tree models
  ➢ Comprehensive reports
Claim of freedom

- Epi-analysis (scenario tree models)
- Diagnostic testing & data
- Context
Merci! / Thank you!

Questions?