COMPREHENSIVE AND INTEGRATED SURVEILLANCE AND POTENTIAL NEW APPROACHES

KATHY ORLOSKI, DVM, MS
EPIDEMIOLOGIST
SURVEILLANCE DESIGN AND ANALYSIS
CENTER FOR EPIDEMIOLOGY AND ANIMAL HEALTH
VETERINARY SERVICES
U.S. DEPARTMENT OF AGRICULTURE
MARCH 15, 2017
Overview

Key features of disease surveillance

Planning successful surveillance

◦ Key components
◦ Proposed activities from draft cattle CIS plan
What is surveillance?

- Obtain sample and information about animal
- Laboratory testing
- IT infrastructure - data entry, management
- Analyzed regularly
- Analysis triggers action, decision-making
- Results to stakeholders
- Evaluation of the surveillance
Planning successful surveillance – some key components

1. Well-defined purpose and objectives
2. Define population, risk factors
3. Reliable information
4. Efficient and sustainable
5. Diagnostic tests
6. Information flow, data management and analysis
Today’s discussion

1. Key surveillance components

2. Proposed activities from draft Cattle CIS Plan
   ◦ Seeking stakeholder input
   ◦ Proposals depend on budget, staffing
Key questions

What are the at-risk populations?

How can VS become more efficient using existing cattle health information?
1. Well-defined purpose and objectives

“Detect domestic program diseases rapidly to facilitate disease eradication.”

Define what is being counted

Draft Cattle CIS Strategic Plan

◦ Evaluate existing programs
  ◦ BSE, brucellosis, and bovine TB
  ◦ Efficiencies, cost-effectiveness
2. Define the population under surveillance

Strategic sampling to optimize disease detection

◦ Which animals more likely to show signs of disease?
◦ Can we identify animal groups at highest risk to sample?

Draft Cattle CIS Strategic Plan

◦ Continue to develop the U.S. Animal Movement Model
3. Reliable information

Individual animal ID to trace past movements
- 28 bovine TB cases in cull cows, 10 years
- 3 of 28 - could not trace to herd of origin
- ~90,000 carcasses sampled/tested to find the 28
- Expend resources – cannot take action

Draft Cattle CIS Strategic Plan
- Continue implementation of Animal Disease Traceability rule
4. Efficient and sustainable

Maximize efficiency and logistics
- Use existing surveillance
- Places of animal congregation
- Does not negatively impact business practices

Draft Cattle CIS Strategic Plan
- Use blood samples from existing surveillance (brucellosis)
  - Bluetongue pilot project
  - Explore testing for other diseases
- Integrate surveillance activities across livestock species
5. Diagnostic tests

Are diagnostic tests available?

Is test performance well characterized?
  ◦ Critical to surveillance planning

VS/CEAH expertise –
test performance characteristics
used in surveillance planning
## Surveillance Planning
Swine and Trichina Example

<table>
<thead>
<tr>
<th>Surveillance Model</th>
<th>Diagnostic Test Sensitivity (How good is the test at detecting infected animals)</th>
<th>Sample Size Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard model</td>
<td>Low sensitivity</td>
<td>17,500,000</td>
</tr>
<tr>
<td></td>
<td>Higher sensitivity</td>
<td>5,500,000</td>
</tr>
<tr>
<td>Risk-based model</td>
<td>Low sensitivity</td>
<td>4,250,000</td>
</tr>
<tr>
<td></td>
<td>Higher sensitivity</td>
<td>2,000,000</td>
</tr>
</tbody>
</table>
## Surveillance Planning
### Swine and Trichina Example

<table>
<thead>
<tr>
<th>Surveillance Model</th>
<th>Diagnostic Test Sensitivity</th>
<th>Number of Samples Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard model</td>
<td>Low sensitivity</td>
<td>17,500,000</td>
</tr>
<tr>
<td></td>
<td><strong>Higher sensitivity</strong></td>
<td><strong>5,500,000</strong></td>
</tr>
<tr>
<td>Risk-based (Targeted)</td>
<td>Low sensitivity</td>
<td>4,250,000</td>
</tr>
<tr>
<td></td>
<td><strong>Higher sensitivity</strong></td>
<td><strong>2,000,000</strong></td>
</tr>
</tbody>
</table>

How well does the test detect infected animals?
## Surveillance Planning
### Swine and Trichina Example

<table>
<thead>
<tr>
<th>Surveillance Model</th>
<th>Diagnostic Test Sensitivity</th>
<th>Number of Samples Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard model</td>
<td>Low sensitivity</td>
<td>17,500,000</td>
</tr>
<tr>
<td></td>
<td>Higher sensitivity</td>
<td>5,500,000</td>
</tr>
<tr>
<td>Risk-based (Targeted)</td>
<td>Low sensitivity</td>
<td>4,250,000</td>
</tr>
<tr>
<td></td>
<td>Higher sensitivity</td>
<td>2,000,000</td>
</tr>
</tbody>
</table>
6. Information flow, data management and analysis

Collecting, managing, and analyzing data from diverse systems
- Infrastructure critical
- Significant challenges and expense, do not underestimate

VS priority to improve surveillance information management
In summary

- As surveillance activities are developed for emerging and transboundary diseases,

- ....consider key surveillance components
  - Define the purpose, objectives
  - Identify the population, risk factors
  - Reliable information
  - Efficient and sustainable
  - Diagnostic test performance characteristics
  - Information management
In Summary

Proposed Cattle CIS activities

- Evaluate program disease surveillance
- U.S. Animal Movement Model development
- Animal Disease Traceability rule – ongoing implementation
- New uses for existing surveillance samples
- Integrate surveillance activities across species
- VS priority to improve information management