New developments in animal health surveillance
Koen Mintiens

What is animal health surveillance?
What is animal health surveillance?

To observe animal health in animal populations:
- providing information on health and disease and their determinants;
- allowing decision-makers to take disease control measures;
- considering thresholds or targets.

What is animal health surveillance?

It serves 3 purposes:
- Early-detecting of disease emergencies
- Evaluating of disease progression
- Substantiating disease absence

Effectivity criteria:
Sensitivity-Specificity-Timeliness
What is animal health surveillance?

Early-detecting of disease emergencies:
- Active clinical surveillance at weekly intervals for FMD symptoms in cattle or pigs during epidemics
- Monthly sampling of sentinel animals for serosurveillance for bluetongue

Timeliness-Sensitivity-Specificity

What is animal health surveillance?

Evaluating disease progression

Bluetongue prevalence in Belgium: winter 2007
Méroc et al. 2008

Timeliness-Sensitivity-Specificity
What is animal health surveillance?

Substantiating disease absence
- Disease is absent!!
- Provide confidence on disease absence to allow national and international trade of animals
- For example:
  - Bovine brucellosis – leucosis – tuberculosis
  - Bluetongue post-outbreak
  - Classical swine fever in wild boar

Timeliness-Sensitivity-Specificity

Surveillance in the past
### Surveillance in the Past

- **Napoleon:** ‘Observation of potential subversive people’
- **Mandatory reporting of clinical suspect of Rinderpest (19th century in Europe)**
- **Quickly expanded to other infectious diseases:**
  - Foot-and-Mouth disease
  - Classical swine fever
  - Avian Influenza
  - Rabies
  - …

### 1920s: J. T. Edwards develops attenuated rinderpest virus vaccine.
- Other vaccines soon follow to support control of other emerging animal
- Main purpose of animal health surveillance remains disease detection
Surveillance in the past

**Council directive 64/432/EEC** of 26 June 1964 on animal health problems affecting intra-Community trade in bovine animals and swine

- Imposes absence of a number of listed animal diseases
- Surveillance often based on census surveys:
  - Early-detection
  - Evaluation of progression
  - Substantiating absence

Surveillance in the past

**Veterinary epidemiology**

- 1982: Cannon and Roe: Livestock disease surveys: a field manual for veterinarians
  - Sample surveys for surveillance
  - The ‘design prevalence’ concept
- 1998: Cameron and Baldock create the Survey Toolbox
  - Uncertainty about surveillance
Surveillance in the past

The 21st Century:
- Focus on early detection and substantiating freedom
- ‘Design prevalence’ becomes accepted
- ‘Risk-based surveillance’
- Analysis of complex surveillance systems
ICAHS 2011

http://www.animalhealthsurveillance.org

- Gathered scientists and policy makers
- Exchange of new ideas
- Understanding the challenges and opportunities
- Develop solutions for future surveillance approaches

Conference resolutions:

1. Communication
   i. Better 2-way communication
   ii. Standardisation of terminology

2. Data:
   i. Valid use of existing data sources
   ii. Better access to data

3. Risk-based surveillance
   i. Acceptance of the RBS principle
   ii. Use valid risk factors for targeting surveillance
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<td><strong>4. Policy and regulation</strong></td>
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<td>i. Integrate scientifically accepted surveillance principles into regulations</td>
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<td>ii. Recognise development of surveillance guidelines</td>
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<td>iii. Recognition of the contribution of researchers to policy</td>
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<td><strong>5. Risk mitigation</strong></td>
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<td>i. Balance surveillance against other alternative risk mitigation strategies for disease management</td>
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<td><strong>6. Multidisciplinary collaboration</strong></td>
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<td>i. Recognise the role of different disciplines</td>
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<td>ii. Encourage community partnerships and public-private partnerships</td>
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<td><strong>7. Developing countries</strong></td>
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<tr>
<td>i. Strengthen the surveillance capacity of developing countries</td>
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<td>ii. Engagement in global mechanisms for surveillance policy development</td>
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8. Quality of surveillance
   i. Development of methods for evaluation of surveillance systems
   ii. Implementation of quality assurance procedures
New developments

**Epidemiological development**
Revisiting design prevalence
- Minimal expected prevalence is often unknown and therefore pragmatically defined
- New approach for estimating probability of disease freedom at zero prevalence (Mintiens et al 2005)

**Risk estimation**
- Still a lot of ‘black box’ quality
- Improved methodology (see Welby et al)
- Improved of scenario tree modelling

New developments

**Improving efficiency**
Cost-benefit
- Economical efficiency of ‘risk-based surveillance’ surveillance

**Multi-criteria**
- Animal welfare
- Political criteria
- Consider biosecurity
New developments

Communication
• Familiarisation of new developments to stakeholders and authorities
• Training

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