Farm Foundation: September 23-24, 2010

Zoonoses-Understanding the Animal Agriculture & Human Health Connection

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USDA-APHIS-WS
National Wildlife Research Center
Apply scientific expertise to resolve human-wildlife conflicts while maintaining the quality of the environment shared with wildlife.

**Agriculture & Resource Protection**
- Aviation Safety
- Feedlots & Dairies
- Sunflower & Rice
- Timber & Horticulture
- Pacific Rim Biosecurity
- Livestock

**Technology Development**
- Contraceptives
- Chemistry
- Genetics
- Toxicology

**Wildlife Diseases**
- Cattle Fever Tick
- Pseudorabies
- Rabies
- bovine TB
- Influenzas
- Bacteria
- CWD

**Invasive Species**
Challenges
Challenges
Challenges
Challenges
Challenges
Challenges

Protecting People
Protecting Agriculture
Protecting Wildlife
Challenges
Challenge: Are all diseases created equal?

- West Nile Virus
- White Nose Syndrome
- Monkey Pox Virus
- HPAI
- FMD

Economic Impact vs. Strategic Value

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Protecting People | Protecting Agriculture | Protecting Wildlife
Key Challenges

1. Funding
2. Silos
3. Conflicting Authorities
4. Diffuse Effort
5. Lack of Coordinated Management Plans
6. Challenges to Available Tools
7. Knowledge
1. Estimate key parameters
2. Link data across scales
3. Identify & evaluate control measures
Lessons Learned: West Nile Virus

CDC Federal Database
ArboNet

WNV 2003 - Birds

Weekly Updated Surveillance Maps
USGS

State Public Health

Human Cases
Equine Cases
Mosquito Data
Sentinel Birds
Dead Wild Birds

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Wildlife Services
National Wildlife Research Center

Protecting People | Protecting Agriculture | Protecting Wildlife
Conceptual Model of Risk Paths from Birds to Farms

Clark & Hall 2006
### Parameterization: Which wildlife species are good models?

<table>
<thead>
<tr>
<th>Functional Group/Species</th>
<th>No.</th>
<th>%AI positive</th>
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<tbody>
<tr>
<td>Dabbling duck (12 species)</td>
<td>39198</td>
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<tr>
<td>American green-winged teal</td>
<td>5802</td>
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<tr>
<td>Blue-winged teal</td>
<td>3349</td>
<td>15.3</td>
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<td>Mallard</td>
<td>14041</td>
<td>16.4</td>
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<td>Northern pintail</td>
<td>3228</td>
<td>16.7</td>
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<td>Wood duck</td>
<td>3317</td>
<td>3.5</td>
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<tr>
<td>Dark geese (4 species)</td>
<td>5795</td>
<td>2.5</td>
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<tr>
<td>Canada goose</td>
<td>5183</td>
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<tr>
<td>All Species (109 species)</td>
<td>56497</td>
<td>9.9</td>
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</tbody>
</table>

Webb et al 2010
Parameterization: Which wildlife species are good models?

Halvorson et al 1985
Animal Movement

- Where are the populations?
- Where did they come from?
- Where are they likely to go?

How few places do we need to monitor? → Where do we put a detection network?

Webb et al 2010
Animal Movement: where do they go?

Webb et al 2010
What areas are we concerned with?

Small broiler operations

Small turkey operations

Large broiler operations

Large turkey operations

Webb et al 2010
Excluding wild birds as a recent risk path for the H1N1 outbreak

Piaggio et al 2010
Interconnectivity of feedlots through pigeons
Management on a Continental Scale
**Problems**
- Resistance
- Residues
- Non-target hazards
- Humaneness Standards

**Risks**
- Lost Efficacy
- Lost Registration
- Lost Public Support

**Assets**
- NWRC Projects
  - Chemistry
  - Infertility
  - FC Rodents
  - Hilo Invasives
  - EEVB
  - Economics
  - Registration
- Collaborators
  - WS-operations
  - Universities
  - Industry
  - Agencies
  - NGOs

**Expertise**
- Toxicology
- Pharmacology
- Immunology
- Rodent Ecology
- Population modeling
- Spatial modeling
- Costs-Valuations
- Regulatory
- Technology Transfer

**Products/Methods**

**Adjuvants for Anti-coagulants**
- New Rodenticides
- Reproductive inhibitors
- New delivery methods
- Management Methods

**Goals:**
- Protect Agriculture
- Protect Health
- Increase Productivity
- Reduce Non-targets
- Protect Animal Welfare

**United States Department of Agriculture**
**Animal and Plant Health Inspection Service**
Status of Wildlife Service Chemical Products

<table>
<thead>
<tr>
<th>Research</th>
<th>Authorization</th>
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<tbody>
<tr>
<td>Idea</td>
<td>Registration Studies</td>
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<tr>
<td>Pilot Studies</td>
<td>Registration Submission</td>
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<td>Lab Efficacy Studies</td>
<td>Registration Approval</td>
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<tr>
<td>Field Efficacy Studies</td>
<td>Product</td>
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<td>Management Business Decision: Go-No Go</td>
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<tr>
<td>Finalize Formulation</td>
<td>Partnering: Confidentiality, CRADA, Patents, Transfer, Licensing</td>
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### Products
- Alpha Chloralose
- CPTH Amendment
- Sodium Nitrite
- DiazaCon
- Theobromine Caffeine

### Other Oral Contraceptives
- Other Oral Contraceptives
- Sodium Nitrite
- Theobromine Caffeine

### Chemicals and Ingredients
- Brodifacoum
- Diphacinone
- DRC1339 (2)
- DRC1080
- Zinc Phosphide (3)
- Sodium Cyanide
- Strychnine (4)
- Gas Cartridge
- M44 (2)
- Acetaminophen
- Corn oil
- GonaCon
- Propiopromazine HCL
- Cinnamon, clove, anise oil
- Measurol

- Facilitated
  - Nicarbazin
  - MethylAnthranilate
  - Anthraquinone

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If the only tool you have is a hammer, you tend to see every problem as a nail
---Abraham Maslow