Investment Strategies for Addressing Zoonoses

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Collaborators / Contributors across presentation

TAMU

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Jianhing Mu, Research Assistant

Others

Levan Elbakidze, Idaho former TAMU Ag Eco

David Hartley, Georgetown

Holly Gaff, Old Dominion

Plus more

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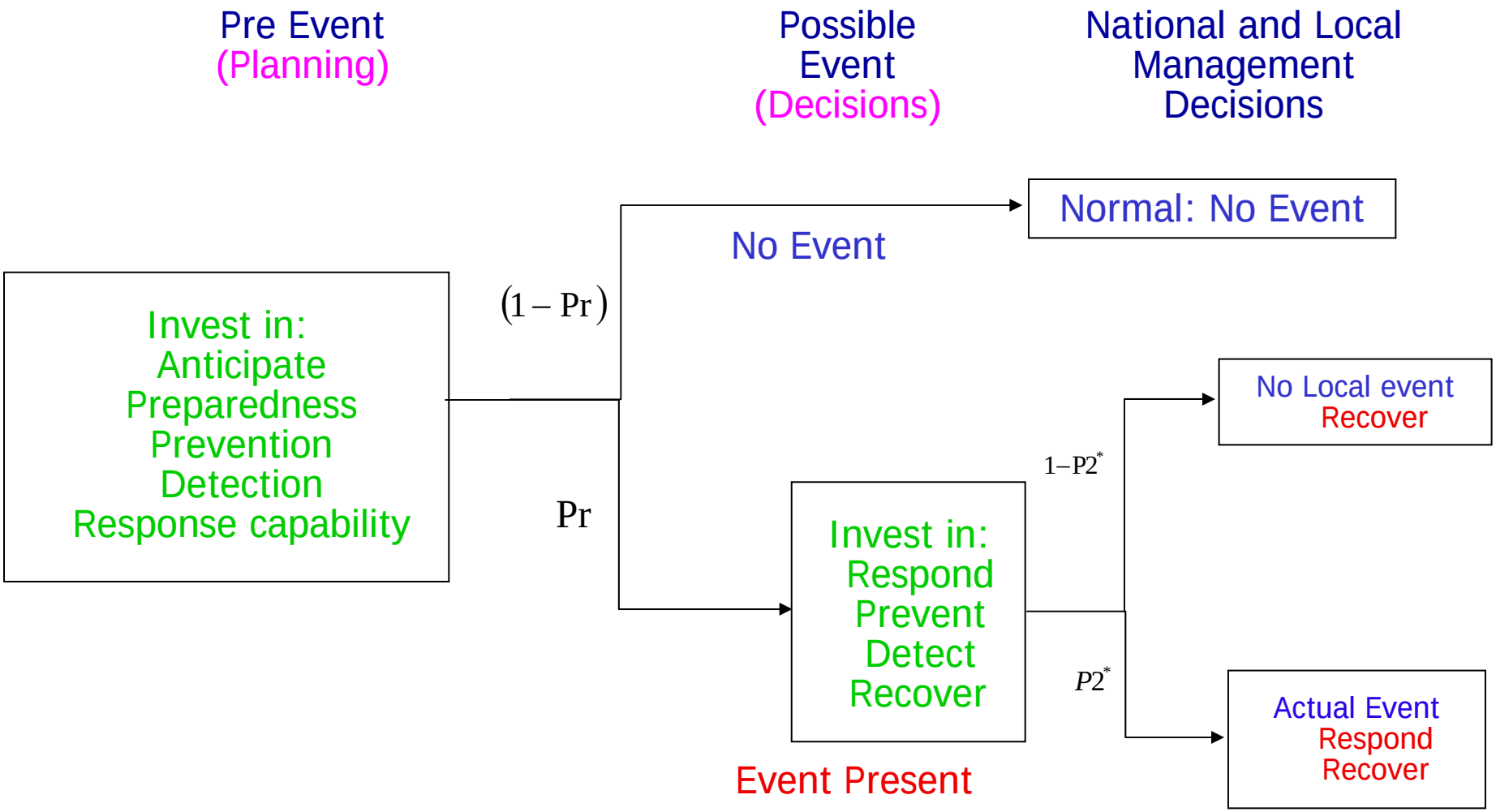
Topic of the day

A bit broader perspective than one limited to investment

In particular, from an economists' perspective

- Investment as an economic decision
- Relationship between the diseases, agricultural production systems and human health
- Damages that human disease fears and events have on demand and industry performance
- Attempts to look at optimal investment in a zoonosis context

Investment Context – Striking a Balance



The Investment Balance Problem
A study of Tilting Factors

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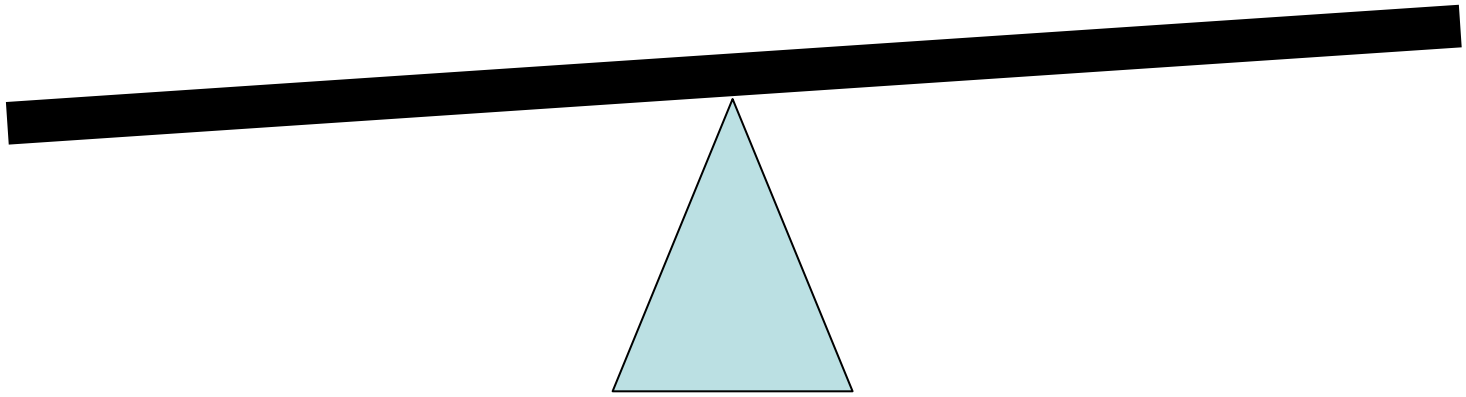
Ex-Ante Invest

Anticipation
Prevention
Installation
Screening

Ex-Post Fix

Detection
Response
Recovery



Investment Tilting Factors

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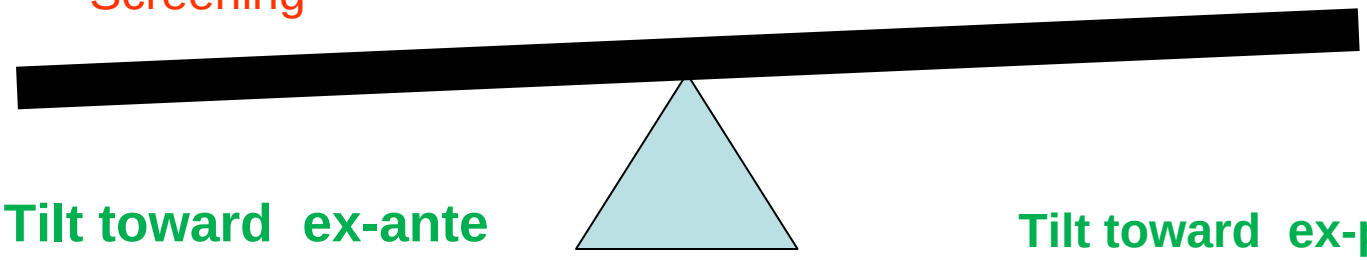

Tilt toward ex-ante

Event is more likely
Ex-ante activity has multi benefits
Ex-ante activity is more effective
Ex-ante activity is cheaper
Ex-post treatment more costly
Fast spreading disease
More valuable target
Big demand shift -- health

Tilt toward ex-post

Event is less likely
Ex-ante activity is single purpose
Ex-ante activity is less effective
Ex-ante activity is expensive
Ex-post treatment less costly
Slow spreading disease
Less valuable target
Little demand shift -- health

Source: Elbakidze, L., and B.A. McCarl, "Animal Disease Pre Event preparedness vs. Post Event response: When is it Economic to Protect?", Journal of Agricultural and Applied Economics, Volume 38 Number 2, 327-336, 2006.

Basic Interrelationships: Zoonotic Disease, Health, Environment and Industry

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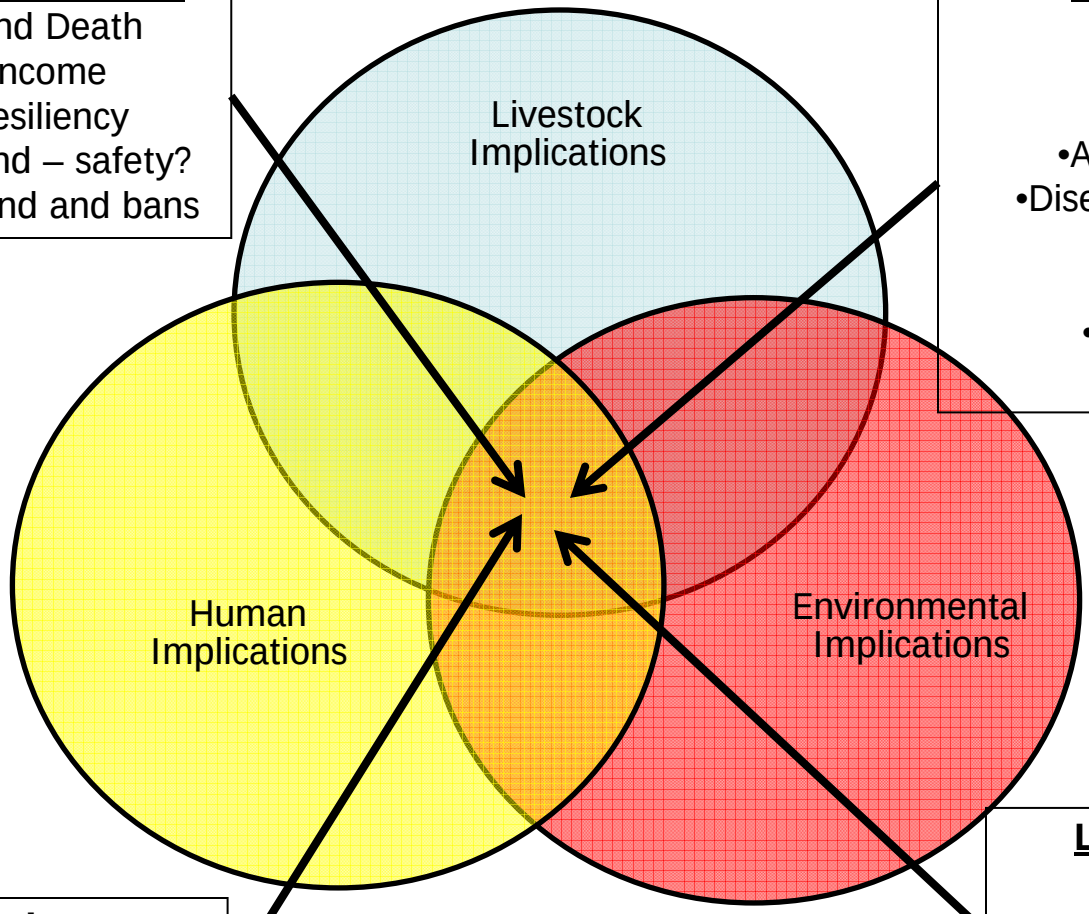
Human Implications:
- Health and Death
- Rural income
- Rural Resiliency
- Meat demand – safety?
- Trade demand and bans



Livestock Industry Implications
- Reduced herds
- Altered sale prices
- Altered sale quantities
- Disease management costs
- Sale income
- Closed markets
- Damaged premises
- Closed premises

Human/Environment Implications:
- Land values
- Tourism

Livestock/Environment Implications
- Disposed carcasses
- Wildlife effects
- Land water air quality

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What about demand?

We have been examining consequences of zoonotic diseases on demand

- **AI publicity effects on meat demand (Jianhong Mu)**
- **Swine flu name on meat demand (Witsanu Attavanich)**
- **BSE effects on meat demand (Rong Hu)**
- **Cross disease effects on meat demand (Chul Choi)**

I will cover some of this

AI Publicity Effects on Meat Demand

Looked at US meat demand implications of international AI outbreaks examining

- budget share spent on meat
- Short and long run counts of LEXIS NEXUS coverage
- Coverage on human deaths
- Occurrence of BSE events
- Meat prices

Findings

•US Consumers adjust demand in reaction to global AI information

•In the short term, poultry consumer demand went up benefiting from shrinking export market but prices went down to producers. Beef reduced price and quantity was reduced.

•In longer term, food safety concerns apparently arise with consumers reducing poultry expenditures while beef increases.

•Poultry demand shift enhanced by human death but beef unaffected.

•BSE events reduced beef demand by 0.025% while increases pork, poultry demand.

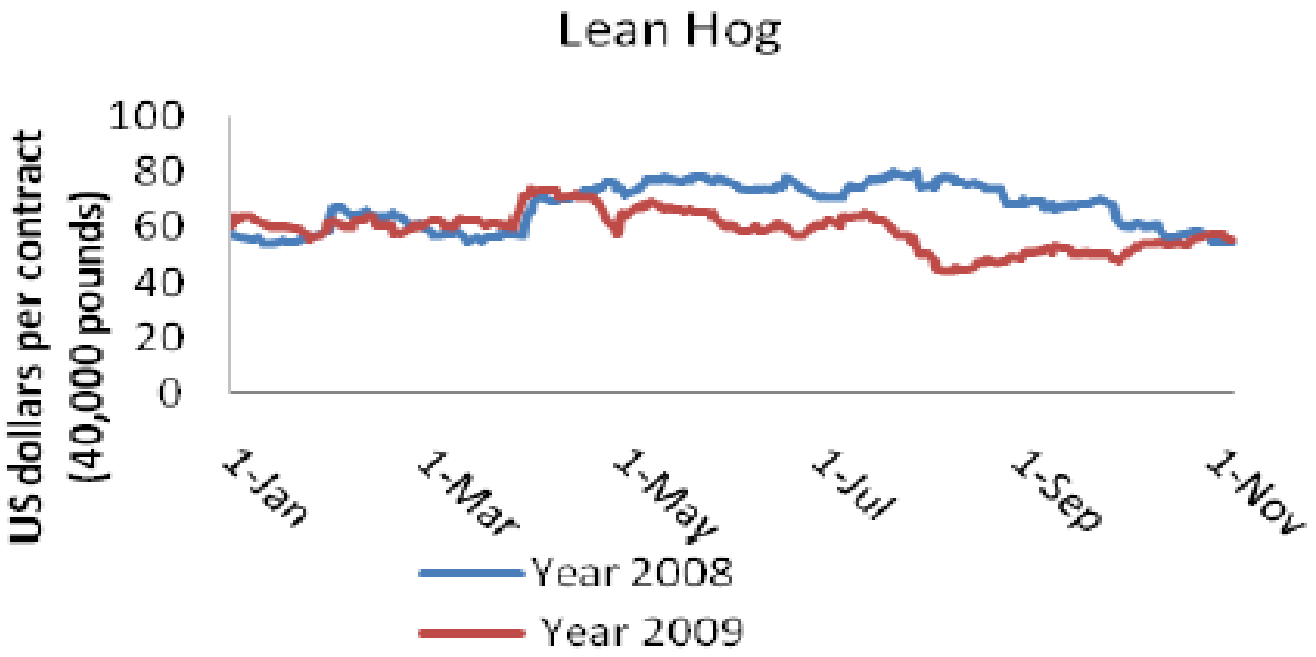
Investments

- Risk Communications

Source Mu, J.H., and B.A. McCarl, "Does Negative Information Always Hurt Meat Demand? An Examination of Avian Influenza Information Impacts on U. S Meat Demand", draft abstract for eare, 2010.

Swine Flu: Name and Meat Demand

- **In April 2009, H1N1, commonly referred to as swine flu, was reported in United States.**
- **Initial labeling and publicity regarding "swine flu" caused a downturn in domestic and international pork markets.**
- **Several pork-importing countries officially imposed bans on swine and pork products**



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Swine flu name and meat demand

- The results indicate that the media coverage related to the H1N1 (swine flu) outbreak was associated with a significant but temporary negative impact on the nearby lean hog future price.
- Prior to April 26 lean hogs futures price was generally in the neighborhood of 4.245 (log of dollars per cwt). Dropped sharply falling 4.062 by April 30.
- Impact persisted for about 3 months a welfare loss was about $167.3 million in the lean hogs market, about 2.1 percent of total April-December 2009 market value.

Source: Attavanich, W., D.A. Bessler, and B.A. McCarl, "H1N1 (Swine Flu) Media Coverage on Agricultural Commodity Markets", 2010.

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Disease, Health and Industry

We have been examining consequences of diseases and value of investments and strategies

Vulnerability-

- **RVF human and animal**
- **AI animal only**

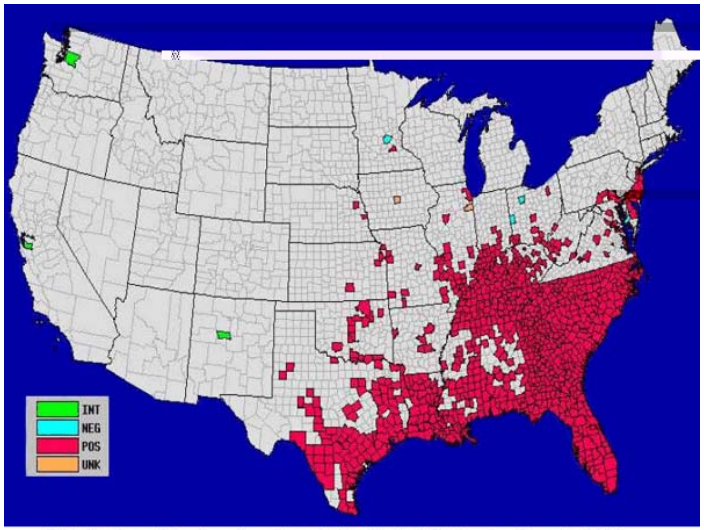
Value of Investments and interventions

- **RVF**
  - **Vaccination**
  - **Larvicide**
  - **Adulticide**
- **AI**
  - **Vaccination**

RVF: Industry Vulnerability and Intervention

- **THIS SECTION IS CURRENTLY UNDER REVISION. NEW RESULTS FORTHCOMING.**

- **SE Texas Outbreak**
- **Larvicide 5-10% effective**
- **Vaccination of beef and dairy cows**



Distribution of Aedes albopictus in the United States, by County, 2000

Map Courtesy of Centers for Disease Control www.cdc.gov

Source: Hughes-Fraire, R. Assessment of U.S. Agriculture Sector and Human Vulnerability to a Rift Valley Fever Outbreak In process Masters of Science Thesis, Department of Agricultural Economics, Texas A&M University

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RVF Human Vulnerability

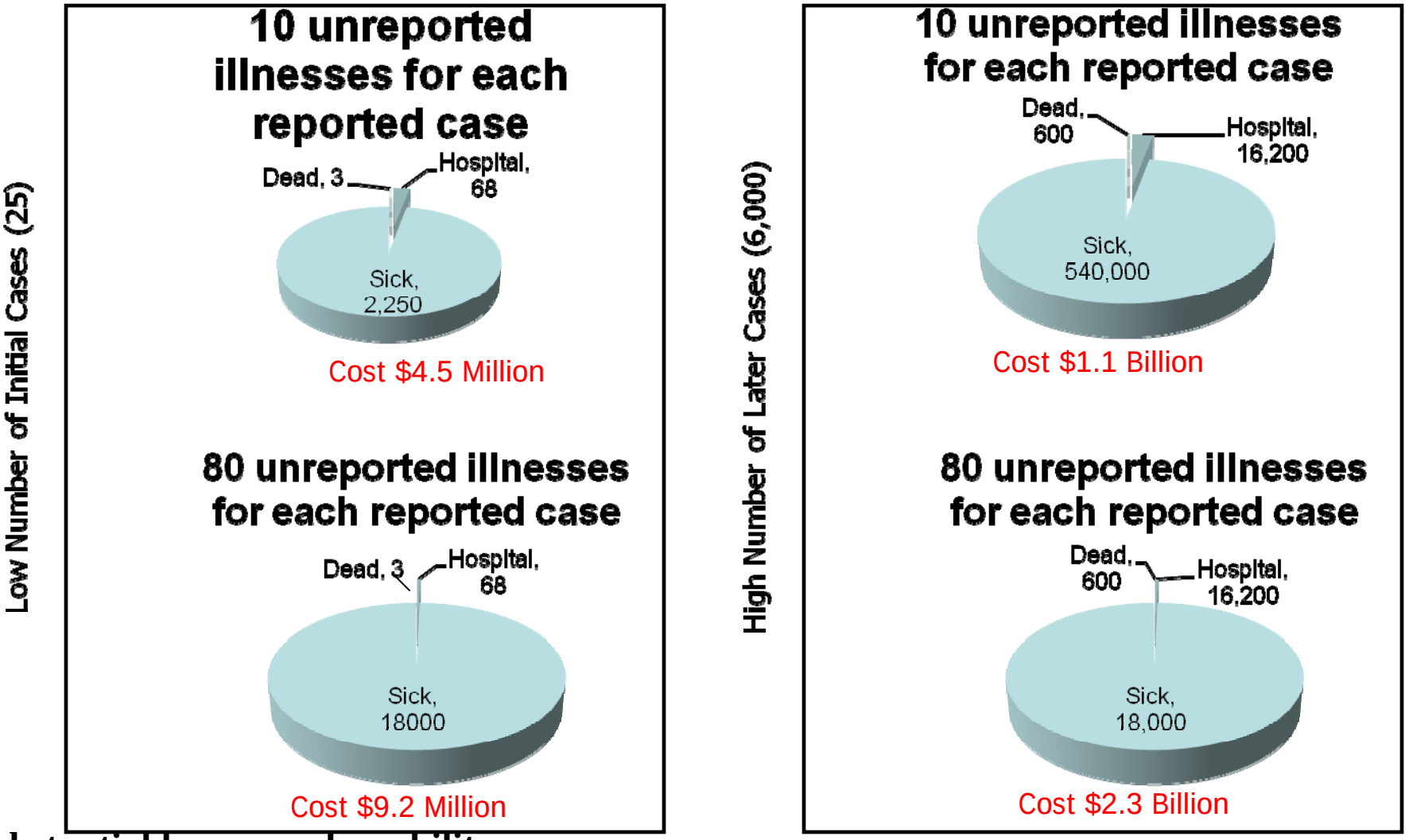
Wanted
- **Human cases of illness and death**
- **Relation to size of animal outbreak**

Quite difficult
- **No US cases**
- **US animal contact quite different from Africa**

Approach
Using costs from CDC influenza study to estimate damages from people sick, hospitalized and dead.

Using West Nile Spread rate from a New England J of Med study in New York City in 1999 as we don't know of a disease spread model for humans that we can use in US.
- **Assumed for each confirmed case, 2.7 unreported hospital cases**
- **Assumed for each confirmed case, two levels of unreported, non-hospitalized cases of sickness (10 cases and 80 cases).**
- **Assumed Two levels of severity in the number of reported human cases: 25 cases (first year) and 6,000 cases (later).**

RVF Human Vulnerability



Substantial human vulnerability

Source: Hughes-Fraire, R. Assessment of U.S. Agriculture Sector and Human Vulnerability to a Rift Valley Fever Outbreak In process Masters of Science Thesis, Department of Agricultural Economics, Texas A&M University

AI: Animal Vulnerability and Intervention

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District 5-S: Average Costs with and without vaccination and with alternative demand shifts

	Without Vaccination	With Vaccination
No Demand Shock		
Producer's cost	0.03	0.03
Consumer's cost	0.20	0.17
Mitigation cost	27.05	25.95
Total Cost	27.28	26.15
10% Demand shock		
Producer's cost	328.51	328.51
Consumer's cost	1594.86	1594.83
Mitigation cost	26.97	25.88
Total Cost	1950.34	1949.22
20% Demand shock		
Producer's cost	618.59	618.58
Consumer's cost	3015.81	3015.79
Mitigation cost	26.97	25.88
Total Cost	3661.37	3660.25
30% Demand shock		
Producer's cost	858.14	858.14
Consumer's cost	4275.63	4275.61
Mitigation cost	26.97	25.88
Total Cost	5160.74	5159.62

Demand Shock is Big factor

Vaccination no great help but manages risk

Source: Egbendewe-Mondzozo, A., L. Elbakidze and B.A. McCarl, Integrated Economic-Epidemic Analysis of Avian Influenza Mitigation Options, Texas A&M, 2010.

AI: Animal Investment

We looked at whether it is economic to invest in vaccines before outbreak.

Solved for outbreak probability threshold level.

Under deterministic contacts assumption, investment is economically optimal if the probability of AI outbreak

- 7% for outbreak in all sub-regions simultaneously
- 39% in District 8-N
- 61% in District 5-N
- 68% in District 5-S

The higher the damage the lower the outbreak probability threshold.

SourceSource: Egbendewe-Mondzozo, A., Integrated Economic-Epidemic Modeling of Avian Influenza Mitigation Options: A Case Study of an Outbreak in Texas, PhD Dissertation, Texas A&M University, December 2009.

Disposal decisions can have costly ripple effects

- **Extensive media coverage of the mass slaughter/ disposal through incineration hurt British tourism.**

  - **Estimated direct loss of tourism £4.5 to £5.4 billion;**
  - **Estimated indirect loss of £2.7 to £3.2 billion to business directly affected by tourist and leisure**

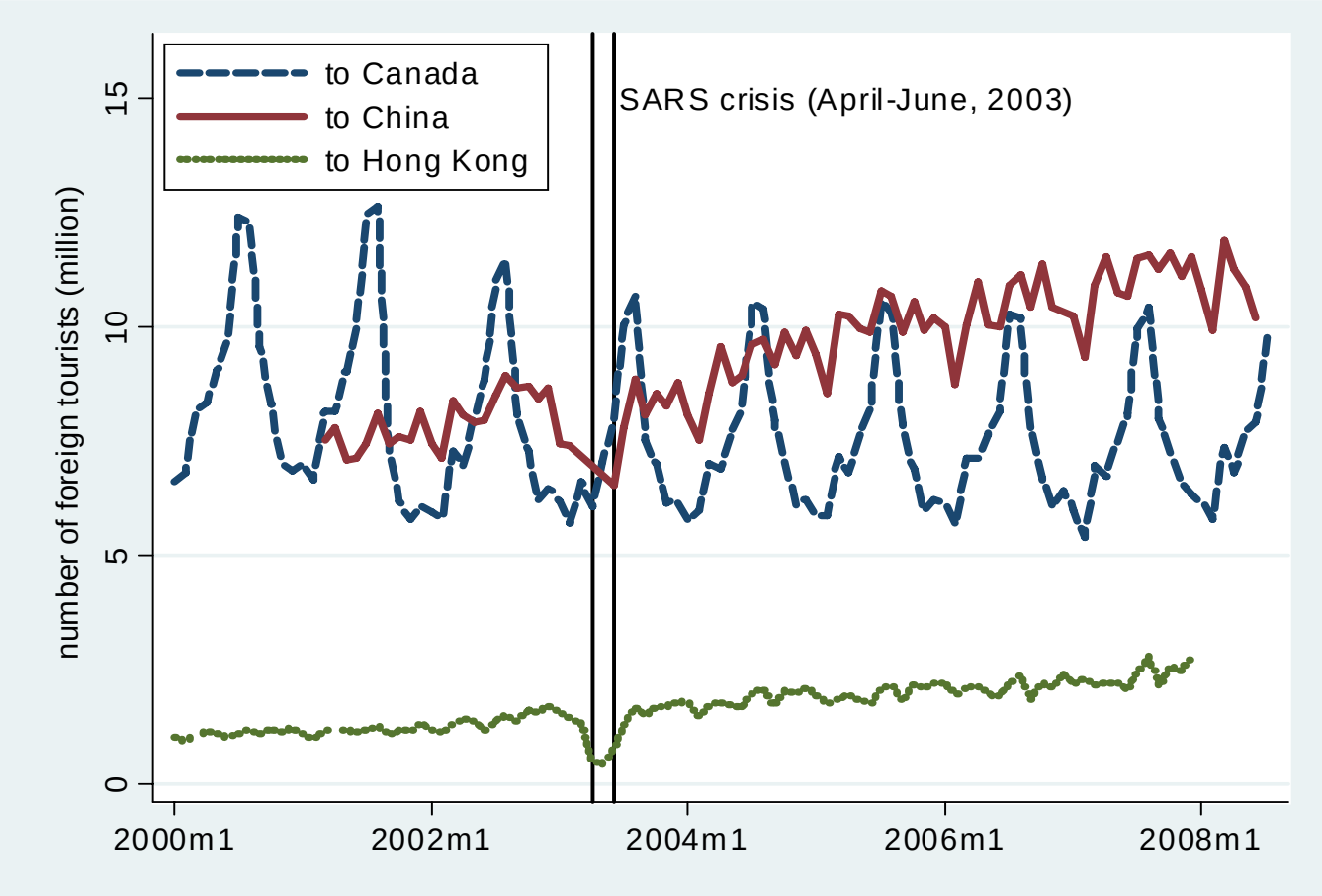
- **Far exceeded animal losses and disposal costs**

- **Suggests great need for careful planning**

Tourism Loss: SARS Crises

The SARS crises greatly deterred foreign tourist to HK and China. The impact is less severe in Canada. This can partly be explained by different crisis management.

Lesson learned: Crisis management matters when animal disease outbreak occurs.



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Summary

- Investment is uncertain balancing act
- Economic consequences in arena other than loss of animals are important.
- Human health dimension can be costly
- Human demand shift can dominate
- Demand can and does shift, government costs are large, welfare slaughter and business loss large
- Investment policies can make a difference
- Investments can be in
  - Control practice capability
  - Communication
  - Prevention, detection, recovery capability