Investment Strategies for Addressing Zoonoses

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Collaborators / Contributors across presentation

TAMU

Witsanu Attavanich, Research Assistant
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Chul Choi, former Research Assistant
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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
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

Pre Event
(Planning)

Possible Event
(Decisions)

National and Local Management Decisions

Invest in:
- Anticipate
- Preparedness
- Prevention
- Detection
- Response capability

No Event

Invest in:
- Respond
- Prevent
- Detect
- Recover

Event Present

No Local event
Recover

Actual Event
Respond
Recover
The Investment Balance Problem
A study of Tilting Factors

Ex-Ante Invest
Anticipation
Prevention
Installation
Screening

Ex-Post Fix
Detection
Response
Recovery
Investment Tilting Factors

Ex-Ante Invest
- Anticipation
- Prevention
- Installation
- Screening

Ex-Post Fix
- Detection
- Response
- Recovery

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
- 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

Basic Interrelationships: Zoonotic Disease, Health, Environment and Industry

**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

**Environmental Implications:**
- Disposed carcasses
- Wildlife effects
- Land water air quality

**Human/Environment Implications:**
- Land values
- Tourism

**Livestock/Environment Implications:**
- Reduced herds
- Altered sale prices
- Altered sale quantities
- Disease management costs
  - Sale income
  - Closed markets
  - Damaged premises
  - Closed premises
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

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.
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.

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

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

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

THIS SECTION IS CURRENTLY UNDER REVISION. NEW RESULTS FORTHCOMING.
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).
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
### District 5-S: Average Costs with and without vaccination and with alternative demand shifts

<table>
<thead>
<tr>
<th>Demand Shock</th>
<th>Without Vaccination</th>
<th>With Vaccination</th>
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<td>20% Demand shock</td>
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<td>30% Demand shock</td>
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**Demand Shock is Big factor**  
**Vaccination no great help but manages risk**

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.

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.
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