Economic Impact of Foreign Animal Diseases in North America

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US Livestock Production

The potential for impact – US Livestock production

- 2014 cash receipts from livestock = $107.7 billion
- 35 U.S. states reporting livestock populations in excess of 1 million,
- 10 states with more than 5 million animals, and
- 4 states with animal populations above 10 million (USDA - APHIS, 2015).
- Given the size of the U.S. agricultural sector a potential for an FAD outbreak like FMD, could create substantial, significant and potentially devastating effects to the U.S. economy

With the threat of a U.S. FMD outbreak causing serious economic harm, a number of studies have estimated the economic impacts from localized hypothetical U.S. *outbreaks;*

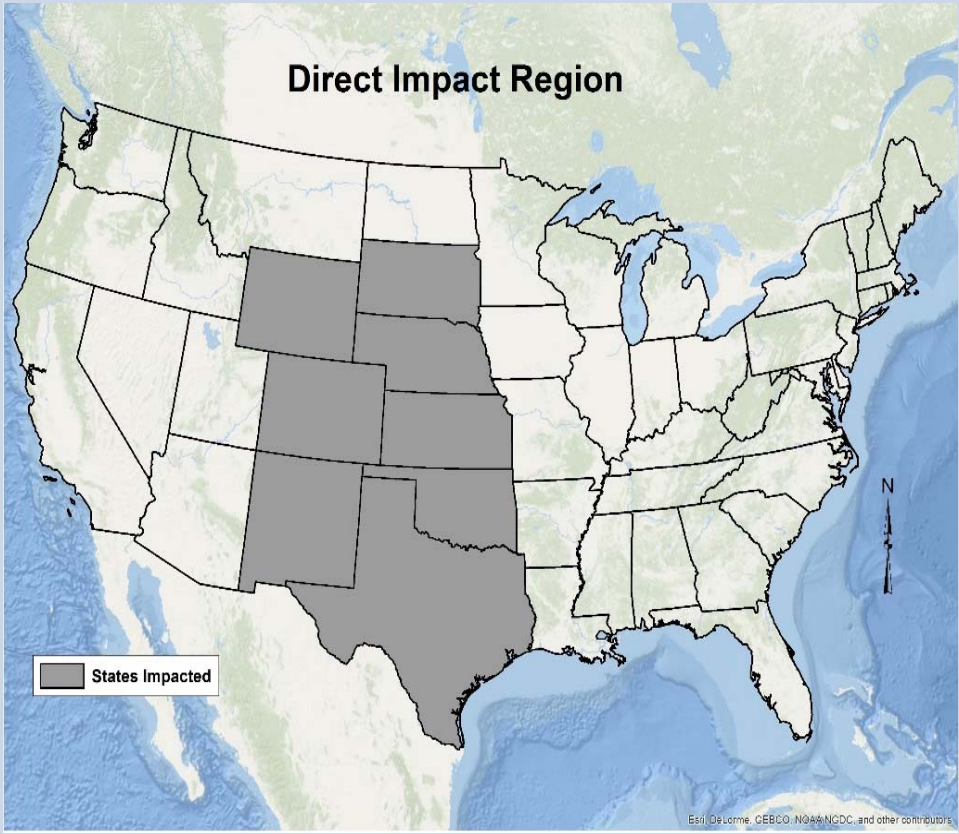
Schroeder et al. (2015), Hagerman et al. (2012), Elbakidze et al. (2009) and Pendell et al. (2007)

Foot and Mouth Disease

In a 2015 estimated that the direct economic impacts of a FMD outbreak in terms of producer and consumer losses. Estimated losses could reach an $188 billion, with government disease control and management costs of $11 billion.

It was also estimated that a high capacity emergency vaccination program could reduce consumer and producer losses to $56 billion, while holding government costs to $1 billion (Schroeder, Pendell, Sanderson, & McReynolds, 2015).

This study only considered the direct impact of losses and not the greater impact to the region and did not look at the potential for impacts to exports.



Foot and Mouth Disease

Using the information from the Schroeder et al 2015 study.

We estimated the downstream economic impacts to GDP and employment in the region of different vaccination strategies vs. no vaccination.

Over the 10 year study period, vaccinating livestock to live, saves $12 - $36 billion in GDP and 170,000 – 513,000 jobs, relative to the no vaccination scenario.

Under the vaccination to live scenario, the most savings to GDP and employment results from vaccinating 50 herds per day, with 10 herds initially infected and a vaccination zone of 50km. This scenario generates a savings of approximately $36 billion in GDP and 513,000 jobs relative to the no vaccination scenario.

Vaccination Strategies and Impacts to GDP and Employment Over a 10 yr Study Period*

Vaccination Strategy	Capacity for daily herd vaccination	Initial # of herds infected (trigger)	Vaccination zone (km)	GDP loss (billions)	Employment loss thousands)	GDP Savings vs. no vaccination (billions)	Employment Savings vs. no vaccination (thousands)
Vaccinate to live	5	10	10	$35	510	$12	176
	5	100	10	$36	516	$12	170
	50	10	10	$30	438	$17	248
Vaccinate to live	5	10	50	$17	251	$30	435
	5	100	50	$17	254	$30	432
	50	10	50	$12	172	$36	513
Vaccinate to die	1	10	10	$36	512	$12	174
	5	10	10	$38	551	$9	135
	5	100	10	$39	557	$9	129
	50	10	10	$33	477	$14	209
Vaccinate to die	1	10	50	$27	385	$21	301
	5	10	50	$20	289	$28	397
	5	100	50	$20	292	$27	393
	50	10	50	$14	205	$34	481

*Disease outbreak duration = 2 years, no vaccination = $47 billion loss in GDP & 685,000 job loss relative to control (e.g. no disease outbreak)

Livestock disease and trade flows

- How do exports of livestock commodities change with OiE reports of relevant diseases?
- Data on cattle, sheep/goat, pork, poultry exports:
  - UN Comtrade data from OECD exporters (2006-2013)
  - OiE reports of livestock disease
- What else might explain differences in export flows?
  - Importer, exporter characteristics (e.g. demand, ag land, value added)
  - Geographic proximity
  - Bilateral trade agreements
  - Cultural/historical variables (e.g. common colonial background, common language)
  - Institutions (e.g. transparency, public health expenditures)
  - Port traffic

- Trading partners might reduce imports after disease report
  - Risk of disease introduction/spread to domestic ag, public health concerns, non-tariff barrier (opportunity to protect domestic producers from imports)

Livestock disease and trade flows

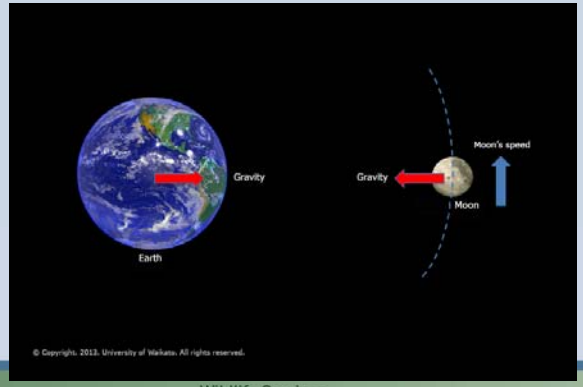
Goal: separate effect of disease reports from other factors

Complications:

- Not many examples of disease reports by OECD countries
- Many observations of 0 trade between countries
  - Could be due to any mix of previously discussed factors (including disease outbreaks)

(One of) statistical models:

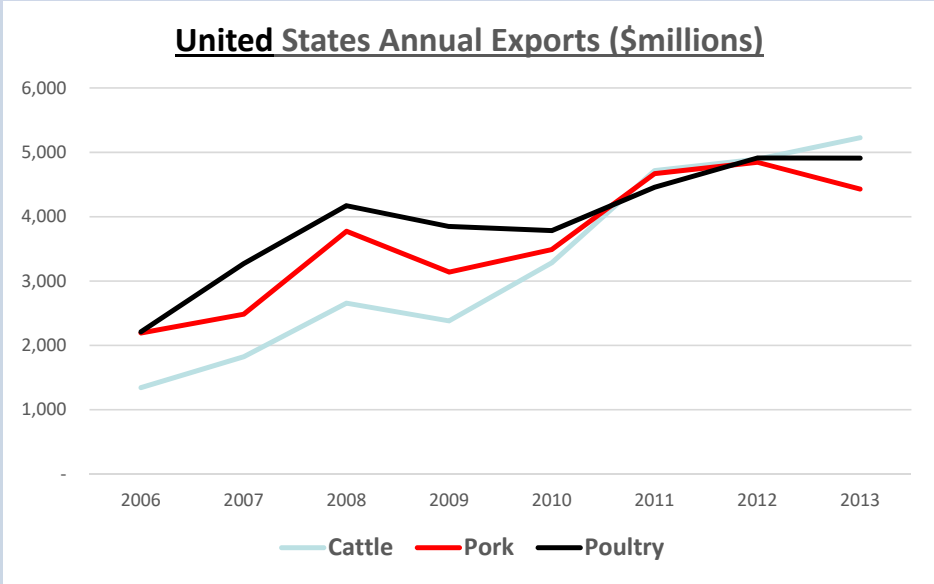
- "Gravity" is a function of size of two objects and distance between them
  - $Exports_{ijt} = f(GDP_{it}, GDP_{jt}, Distance_{ij})$
- Zero-inflated negative binomial, estimates 2 equations:
  1. Prob(EX_{ij}=0) = f(disease, other factors)
  2. Ex_{ij} = f(disease, other factors)



Livestock disease and trade flows – Preliminary Results

Estimated change in annual exports if disease reported

	Classical Swine Fever	FMD	West Nile
Cattle		-81.0%	
Pork	-70.2%	-85.7%	
Poultry			-29.6%



Conclusions

We have begun to develop a better understanding of the overall domestic and international implications of a potential FMD outbreak.

This is essential to determining the benefits and costs of different management strategies.

Management strategies should take into account the implication to the macroeconomy.

Management strategies that preserve the farm-to-fork supply chain typically tend to be better for the economy (e.g., vaccinate to live)

Questions?

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