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United States Department of Agriculture

How Agricultural and Environmental Economists Can Contribute to Assuring Safe Food

Sandra Hoffmann

USDA Economic Research Service

Australian Agricultural And Resource Economics Society

60th National Conference

Feb. 2016. Canberra, Australia

The views expressed are those of the presenter. They do not necessarily reflect the views of the Economic Research Service or USDA.



How does an environmental economist ...

- Undergraduate work agronomy/soils “minor”
- Environmental and Resource Law training
 - U. of Michigan Law School: J.D.
 - environmental law, land use law, public lands law
 - Law practice
 - pesticide regulatory law and chemical manufacture regulation
- Environmental and Resource Economics training
 - Ag. & Applied Econ., U. of Wisconsin: M.A. Lots of work on institutional economics
 - ARE, U. of California, Berkeley: Ph.D. Major field: Environment and Resource Economics. Dissertation: Policy and theory papers on environmental risk policy



get interested in food safety?

- Opportunity and need
 - Started at RFF the same day as Mike Taylor (currently Deputy Commissioner for Foods at FDA)
 - Push for fundamental risk-based reform, but few economists involved
- What's kept me interested?
 - New frontier where there are opportunities to help shape the future
 - Raises all of the challenges of other areas of environmental economics



What Are Food Safety Problems?

- Microbiological infections, parasites and bio-toxins
 - Accute
 - Chronic
- Chemical exposures
 - Contamination
 - Adulteration
- Radiological exposures
- Antibiotic resistance
- Safety of novel technologies and ingredients
 - GM foods, nanotechnology, irradiation, new food additives



Why might you want to get involved?

- Food safety has a significant impact on health
- An area of increasing interest to the public
- Food safety policy and science is in a period of major reform and development
- But, not clear what the funding is like ...





NEWS ▶ WORLD ▶ EUROPE

WHO urges fight against foodborne diseases

Published: 10:18 pm, Thursday, 3 December 2015



CBS/AP / December 3, 2015, 4:06 PM

Staggering toll from tainted food worldwide

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BERLIN -- The World Health Organization says some 420,000 people die each year from **foodborne diseases**, with young children accounting for more than a quarter of all deaths.

th agency says it estimates that about 600 million people fall ill consuming **tainted food**.

n under 5 are particularly vulnerable to serious illness, resulting in is a year.



The agency said Thursday that a comprehensive review of diseases caused by 31 types of bacteria, viruses, parasites, toxins or chemicals found the highest burden in Africa and Southeast Asia.

HEALTH PUBLIC HEALTH

30% of Foodborne Illness Deaths Happen In Children Under Age Five

Alexandra Sifferlin @acsifferlin | Dec. 3, 2015



A new WHO report finds that each year, 125,000 kids under age five die from foodborne



Global Foodborne Disease Picture

- **600 million illnesses**
- **420 thousand deaths**
- **Children 40% of burden, 9% of population**
- **Low income countries disproportionately burdened**

Global Burden of Disease (Millions of DALYs)

- Dietary risk (254)
- Unimproved water and sanitation (211)
- HIV (92)
- Air pollution (76)
- Malaria (55)
- TB (44)
- Foodborne disease (33)



Foodborne Disease also a Domestic Problem

- Australia
 - 4.1 million cases of foodborne gastroenteritis 2010
 - Cost \$1.2 billion per year
- US
 - US CDC estimates 47.8 million illnesses (1 in 6 people)
 - over 3000 deaths annually
 - Impact over \$15 billion annually
- Canada
 - 4 million (1 in 8) illnesses, 238 deaths annually



BRIEFING

A staggering 250 Queensland school principals have food poisoning after an education conference

SIMON THOMSEN MAR 4 2015, 4:39 PM

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Toxic algae responsible for paralytic shellfish poisoning could harm local businesses, scientist warns

By Selina Ross Updated 8 Oct 2015, 10:40am

More research is needed on the cause of toxic algal blooms in Tasmanian waters that could impact on shellfish businesses on the state's east coast, a prominent scientist has warned.



An algae bloom on the east coast prompted the temporary closure of commercial shellfish operators and warnings to the public not to harvest wild shellfish.

business → retail

Parents outraged as Chemist Warehouse buys into Chinese baby formula racket



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Chinese economic worries hit Australia's hot exports of infant formula

January 19, 2016

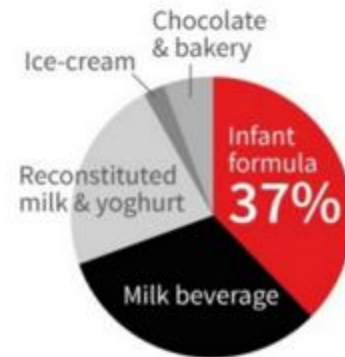
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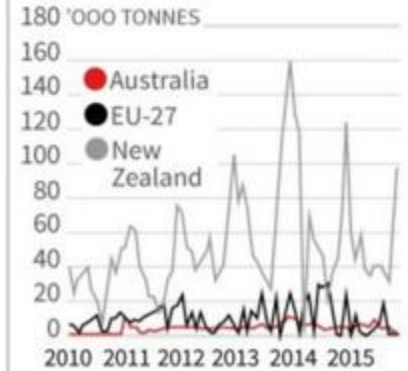
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Use of whole milk powder in China



Volume of dairy exports to China



Source: USDA, UN Comtrade and NAB Group Economics

ant formula in China should continue to remain strong.

Food Safety as a Market Failure

- Physical problem:
 - Foodborne hazards generally difficult to observe or not observable
 - Consumer
 - In market channel
 - Impacts of hazards difficult to link to exposure
- Market problems
 - Product price does not fully reflect safety attributes
 - Asymmetric information problems abound



Three major periods of policy reform

- Late 19th/early 20th Century
 - Problems: TB, fraud
 - Solutions: Visual inspection & food hygiene
- 1950s/60s
 - Post WWII chemistry (U.S. Delaney Clause 1958)
 - Codex Alimentarius (1961)
- Today



Parallels: 1900s, 1950s and 2000s

- Rapid change in economic structure of food production and distribution
 - Rapid technological change affecting the food sector
 - Rapid urbanization
 - Integration of markets
- Period of rapid scientific advance
- Institutional change lagging market changes
- Period of governmental reform and institution building
- Major food safety scandals create public pressure for change



Crises in the 1990s and 2000s

- Jack-in the Box (U.S. 1993)
- BSE (UK 1995)
- Dioxin in animal feed (Belgium 1999)
- Spinach outbreak (U.S. 2006)
- Melamine in pet food (2007)
- Chinese infant formula scandal (2008)



A convergence of major policy trends:

- Rational, science/evidence-based public administration
- Risk-based industrial process management
- Continued commitment to global integration of markets post WWII

Source: Hoffmann and Harder (2010); RNL Andrews (2006)



International Institutions: A Foundation for National and Regional Reforms

International Trade Influences

- Codex Alimentarius (1963)
- Trade Agreements
 - GATT (1947): exception for legitimate human, animal or plant health
 - Sanitary and Phytosanitary Agreement (1994)

Major National and Regional Food Laws

- FSANZ 1991
- Canadian Food Inspection Agency 1997
- HACCP (Codex standard and national regulations 1990s)
- UK Food Standards Agency 2001
- European Food Law 2002
- US Food Safety Modernization Act 2011



Reflected in public responses to recent food safety crises

International Consensus on Policy Approach

- Farm-to-table
- Preventive, not reactionary,
- Continuous improvement
- Science-based rules
- Risk-based management

Increased Role for International Cooperation

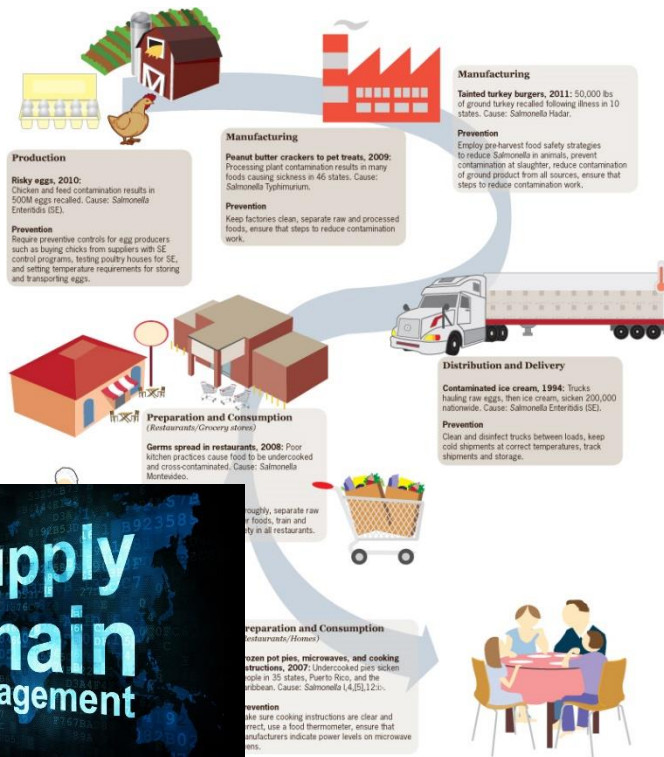
- SPS increases importance of Codex
- Increased need for coordination of public efforts, like surveillance

Common Use of Risk-based Management Tools

- GAPs, GMPs
- HACCP/preventive control systems
- Traceability and recall
- Epidemiological surveillance



Application of ideas familiar to agricultural and resource economists



Risk Assessment in the Federal Government: Managing Progress

NNAS
R NAE
CIOM



Private sector responses

- Development and promotion of HACCP (1960s)
- Vertical integration with safety management as contract terms
- Private standards at retail
- Third party certification to proprietary or public standards
- Grower association adoption of GAPs
- Investment in detection and supplier relationships
- Traceability systems



Where can agricultural and resource economists contribute?

- Policy design
- Benefits valuation
- Policy evaluation
- Risk modeling
- Risk management by firms or by government
- Integrated bio-economic modeling
- Market analysis
- Firm decision analysis
- Instrument design
- Consumer behavior



Environmental Economics

- Direct links to environmental policy (“One Health”)
 - Wildlife management
 - Irrigation water quality and produce safety
 - Pathogens as invasive species
 - Climate change and adaptation
 - Food safety as an additional impact in environmental policy
 - “Red tides” and toxogenic algae
 - Feral hogs
 - Air and water pollution in developing countries and impact on crops/livestock
- Policy mechanisms
 - Risk management and economics
 - Market failures and instrument design
 - Non-market valuation



Agricultural Production

- Impacts of food safety policy on agricultural production
 - U.S.: new federal regulation of produce farming practices
 - Irrigation water standards, GAPs
- Impact of private sector demands for safety attributes
 - Impact of adverse events on food processing or on production sectors
 - Adoption of GAPs aimed at food safety
 - Supply chain management
 - Vertical integration
 - Contracting
 - Cooperative responses through producer associations
- Food safety events as risk in financial risk management
- Driver for capital investment
 - e.g., on-farm bio-security investments



Trade

- Food safety has impact on trade
 - Drives demand (China infant formula)
 - May cause distortion in other markets (Australian infant formula retail markets)
 - Impact of outbreaks on import demand
- Effectiveness of public and private mechanisms to manage import safety
 - Integrated supply chains
 - Reliability of 3rd party certification systems



Consumer economics

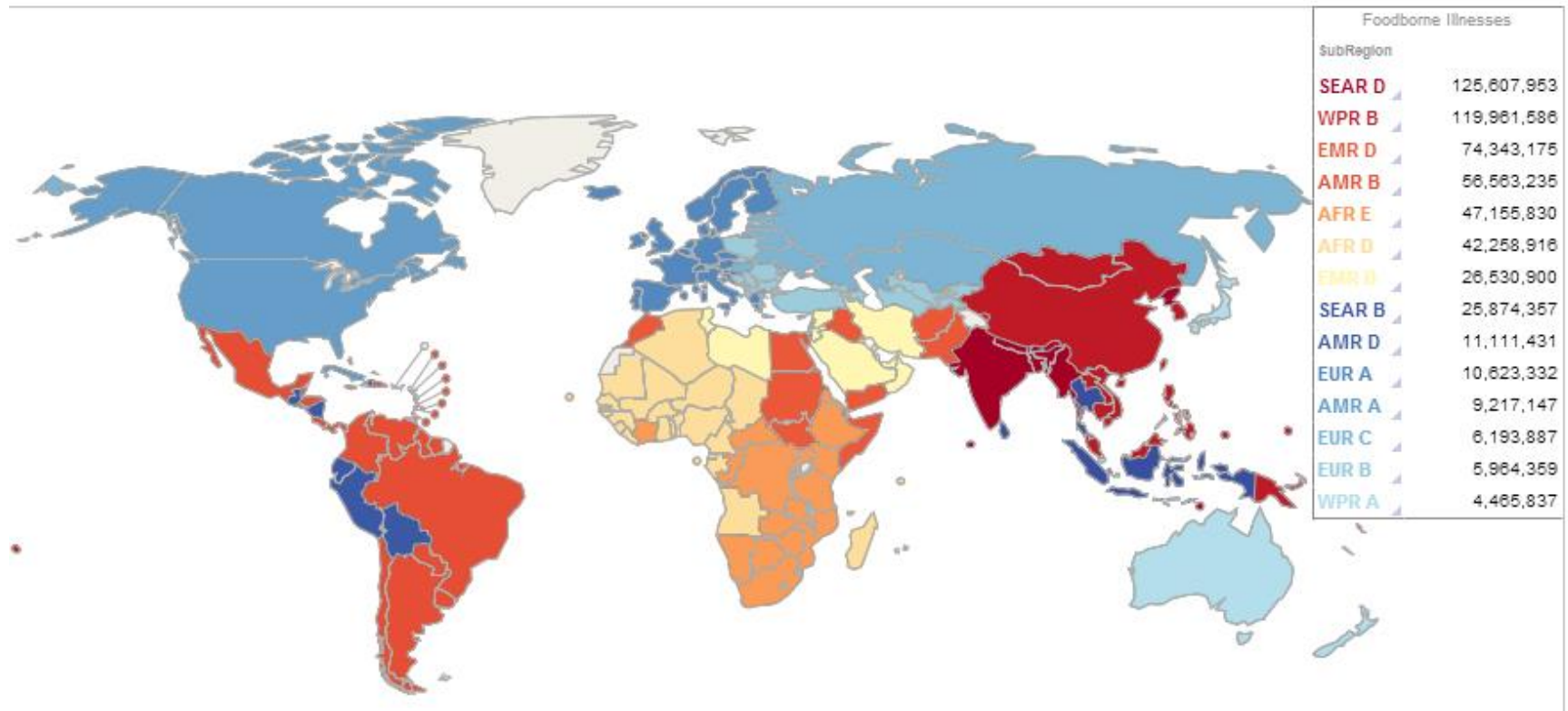
- Demand for safety attributes
 - Driver for new products or markets
- Non-market valuation
- Food safety as driving demand for substitute products
 - During crisis
 - Over time (US local markets as substitute ... marketing safety)
- Consumer behavior in preventing or producing food safety



Development Economics: Food Safety and Food Security

ata Details

WHO Estimates of the global burden of foodborne diseases



Development

- Food safety as part of food security policy
 - Food safety *is* food waste
 - Food safety and drinking water and sanitation
- Market development
 - Barrier to export growth
- Design and effectiveness of domestic food safety systems, public and private
- Adaptation and climate change



Institutional Economics/ Industrial Organization

- Influence of safety demands on structure of industry
 - Coasean “Problem of the Firm” what to do and what to contract
 - Effectiveness of alternative industrial structures in preventing foodborne illnesses
- Influence of industrial structure on production of safety
 - E.g., branded vs. unbranded products
- Public/private roles and interactions
 - What do we get from public efforts?
 - How does public policy affect private efforts? Is public policy a driver?
- Developing countries, institutional development
 - Rule of law
 - Corruption



Food safety in your research portfolio?

- A forgotten element of things you're already working on
- A new application for theory or methods you've developed
- An exciting new area to have an impact on the shape of rapidly evolving markets and institutions
- How to make it happen? Funding is always an issue
 - Partnerships with colleagues in sciences, including veterinary medicine and public health
 - As a piece of a broader proposal





United States Department of Agriculture

Thank you.

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