Produce Food Safety

Challenges in Implementing Improved Practices
Food Security

“when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life”

World Food Summit, 1996
Addressing Food Sufficiency

With current global trends in diets and population, **60% MORE FOOD** will be needed in 2050.

- Increase food production
- Decrease food losses

Source: Alexandratos and Bruinima, 2012
Food Losses

ALMOST A BILLION PEOPLE are going hungry, while we waste
1/3 OF THE FOOD WE PRODUCE.

About a third of all food produced is lost in the food supply chain.

Most food losses in low-income countries occur at storage, transport and processing levels.

Most food losses in high-income countries occur at retail and consumer levels.

Source: FAO, 2013

Big Facts ccafs.cgiar.org/bigfacts
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# Pathogens, spoilage, and toxins

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Estimated Burden (annual)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tomato Spotted Wilt</td>
<td>$1.4 billion (US only)</td>
</tr>
<tr>
<td>Post-harvest degradation</td>
<td>50% loss in some crops</td>
</tr>
<tr>
<td>Mycotoxins</td>
<td></td>
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<tr>
<td>Crop losses</td>
<td>$2.6/$23 million (aflatoxins in peanuts, US)</td>
</tr>
<tr>
<td>Product losses</td>
<td>$1.5-$5 billion (North America)</td>
</tr>
<tr>
<td>Human health</td>
<td>40% of all disability-adjusted life years (DALYs)</td>
</tr>
<tr>
<td>Noroviruses</td>
<td>50% of vegetable-related illnesses (USA)</td>
</tr>
</tbody>
</table>

Schmale III and Munkvold, The American Phytopathological Society, 2014
## Burden of Foodborne Illnesses

<table>
<thead>
<tr>
<th>Scale</th>
<th>Illnesses</th>
<th>Hospitalizations</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global</td>
<td>4 Billion</td>
<td></td>
<td>2.2 Million</td>
</tr>
<tr>
<td>US</td>
<td>48 Million</td>
<td>128,000</td>
<td>3000</td>
</tr>
</tbody>
</table>
Disability Adjusted Life-years
Diarrheal Disease Ranks
Salmonellosis Estimates

- 93.8 million cases annually/globally, 80.3 million foodborne
- 155,000 deaths
Food Safety Capacity Building

1. Food Safety Assessment
   1. Needs
   2. Capacity
   3. Prioritization

2. Communications-Outreach

3. Evaluation
Food Safety Specific Projects

• Hort IL
  – Nigeria
  – Central and South America
  – Central America

• Subsequent
  – Africa Rising-Tanzania
  – FDA-Guatemala
  – Global Food Safety Partnership (gfsp.org)
  – Low-mechanization Amish farmer studies
Needs

• What are the primary food safety concerns?
  – In-country public health monitoring
  – Third party assessments
    • Foreign Ag Services
    • WHO/FAO
    • NGOs
  – Research
    • Public Health
    • Food Contamination
Capacity

• What can realistically be achieved given the availability of resources and human capital available?
Prioritization

- Which interventions are predicted to:
  - Be most likely to be adopted
  - Sustainable
  - What is the impact on contamination?
  - What is the impact on health?
Nigeria

**E. coli on tomatoes**

![Image of a market with tomatoes and farmers]

- **E. coli (Log10 MPN/g)**
  - **Field**
  - **Market**

### Locations
- **Kano**
- **Kaduna**
- **Katsina**
Putting Knowledge to Work

Spheres of Influence

Researchers

Puttiing Knowledge to Work

Sphere of Impact

Holderness, 2003
Un jeune homme et sa blonde

- Relevance
- Understandable
- From trusted source
- Preferred medium
Communication Keys

• Goal to change behavior
• Theory of planned behavior

Diagram:
- Behavioral attitude
- Subjective norms
- Perceived behavioral control
- Intention
- Behavior

Sections:
- Relevance
- Route
- Content
- Trust
Knowledge Transfer Pathway

Information

Experts
- Outbreaks
- Research
  - laboratory
  - clinic
  - field
- Published literature

Other Stakeholders
- Other researchers
- Policy makers
- Processors
- Producers
- Public
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“One cannot seek knowledge about an innovation until he or she knows it exists.” Everett Rogers, 1963
Mental Models: the feline brain
Farmers Mental Models

• Interview 40 small-stakeholder farmers in Latin America
  – Awareness of chemical residues
  – Ignorance of microbial threats
  – Information sources
    • Friends and family
    • Chemical representatives
    • Concern about availability of information
Central America

OSU

Zamorano
Central America

Zamorano
Evaluation

• Knowledge v. behavior change?
• Behavior change v. impact?
• Impact v. influence?
• Sustainability?
Food Safety

Nutrition

Production

Post-harvest

Food Security
Jeffrey LeJeune
The Ohio State University

July 24, 2014, Washington D.C.
Horticulture Innovation Lab Postharvest Forum