Introduction to Food Safety - Lecture 2  
Food Trends and Food Safety

Lecture Objectives

• Discuss the impact of changing food consumption on food safety.
• Describe food safety issues related to trends such as raw diets, organic foods, and local foods.
• Recognize the challenges related to a global food market.
• Explain the influence of health factors on food safety.

Changes in Food Consumption

• A number of factors have resulted in challenges for food safety including:
  • Higher demand for raw produce.
  • Higher demand for organic products.
  • Higher demand for imported goods.
  • Desire to use locally produced food items.
  • Increased recognition of food allergies.
  • Increased consumption of foods outside of the home.

Consumption of Raw Produce

• The amount of raw produce consumed in the United States has been increasing for years.
• The FDA fully supports an increase in consumption of fruits and vegetables but does not endorse raw diets.
• Many of the pathogens in raw produce are destroyed by cooking.
• Many recent recalls are due to contaminated bagged lettuce/spinach.

Raw Milk

• Recently there has been increased interest in consumption of raw milk due to claims of everything from loss of calcium to the dangerous side effects of pasteurization.
  • Neither of which is true.
• The FDA has launched a campaign to warn consumers of the risk of raw milk following several outbreaks of dangerous organisms including Listeria and E. coli 0157:H7.

Is Raw Milk Worth the Risk?

• Several families have recorded videos of severe illnesses that occurred due to consumption of raw milk (available at: http://www.realrawmilkfacts.com/real-life-stories)
• Food safety experts do NOT support the consumption of raw milk and legislation banning the sale of raw milk is in place in many states (including Florida).
**Organic – What does it Mean?**

- Organic foods are produced without antibiotics, hormones, pesticides, irradiation or bioengineering.
- Organic farmers are required to adhere to certain soil and water conservation methods and to rules about the humane treatment of animals.
- Organic foods/farms are strictly regulated by the USDA.
- Organic foods are now a billion dollar industry.

**Organic Foods – Safety Issues?**

- Organic foods are not contaminated with trace amounts of pesticides and herbicides found in other foods.
- The lack of pesticide use and other farming practices may result in foods that are higher in bacterial contamination.
- Many products are on the market that are labeled “organic” but do not meet the USDA/FDA organic guidelines.
- The price of organic foods is significantly higher.

**Organic Farming – Animal Manure**

- Animal manure is commonly used in both home and large scale organic farming.
- Chicken manure can potentially include dangerous pathogens such as Salmonella, E. coli, and Listeria.
- Many have suggested that the use of animal manure in organic farming poses a risk to the consumer.

**Organic Farming – Animal Manure**

- The FDA has proposed new guidelines concerning the use of animal manure.
- Data supports long term survival of dangerous microorganisms in soil containing manure and therefore the FDA is proposing restrictions on use of manure in farming.
- Note: this is not law and this proposal has met with strong opposition from the organic food industry.

**Lecture Note**

- Organic foods are discussed here to illustrate that some food safety issues are unique to this type of agriculture.
- Food safety applies to both organic and conventional crops and outbreaks and illnesses have occurred due to both types of foods.

**Imported Foods**

- One major concern with imported foods is the unintentional importation of a food pathogen not present in the United States.
- For example, there are a number of infections of fish that occur in Asia that we do not have in the U.S.
- The FSMA guidelines will ostensibly make imported foods much safer (discussed in Lecture 19).
Imported Foods – Old Pathogens

• A number of pathogens have been eliminated from the US food supply but still exist in other countries including:
  • Taenia saginata (beef tapeworm)
  • Taenia solium (pork tapeworm)
  • Trichinella spiralis (pork worm)
  • Etc.

• Trichinella spiralis migrates to muscle tissue once ingested:
  • Can destroy any muscle, including the heart.
  • Diagnosis is by punch biopsy in which a “chunk” of tissue is removed for microscopy.
  • Previous slide shows larvae under microscope.

How Serious are “Old” Pathogens?

• Taenia solium is a pork tapeworm.
  • When the larvae are consumed, they are relatively harmless.
  • When the eggs are consumed they migrate to the brain causing a disease known as neurocysticercosis.
  • Image shows brain destruction.

How Serious are “Old” Pathogens (contd.)

• Neurocysticercosis - Radiopaedia.org

Imported Foods – New Pathogens

• Frequently old pathogens acquire new antibiotic resistance.
• Occasionally a previously unknown pathogen is detected:
  • Mad Cow Disease
• The story of Mad Cow disease is complex and will be presented in more detail in Lecture 9.

• Cow infected with BSE the agent that causes Mad Cow Disease.
  • CNN.com

How Serious are “New” Pathogens

• So far 226 (as of 2012) people linked to the mad cow disease outbreak in the UK have died.
  • Including those persons pictured at right.
  • Cases will likely continue to increase as it can take years to recognize the disease.

Imported Pet Foods

• In 2007 14 pets died due to consumption of foods containing melamine:
  • Not approved for use in foods.
  • Likely added to falsely elevate protein content.
  • Over 150 dog, cat, and ferret foods were recalled.
  • The number of pets killed is unknown because there is no surveillance system in place for pets:
    • Likely thousands!
  • Note: most pet foods are made by the same companies who make human foods. Look closely at your pet foods, do you recognize names like Pedigree (owned by Mars) and Purina (owned by Nestlé)?
Global Food Distribution Systems

- Many companies have global distribution systems:
  - Common sources for foods
  - Common distribution sites
  - Multiple brands (see next slide)
- In other words, if a food (or an ingredient) is contaminated at its source or during processing, it could potentially spread worldwide.

Brands Owned by ConAgra (2013)

Nestle – The World’s Largest Food Company

- Nestle is the world’s largest food company with an office in every country.

Nestle Brands

- Nestle makes a variety of brands, including:
  - Nescafe
  - Nesquik
  - Nespray

Coca Cola

- Coca-Cola has a worldwide distribution system with the following noteworthy information:
  - Uses 5,000 ingredients
  - 18,000 servings sold per SECOND!
  - 1.7 Billion servings sold daily.
  - How many people would be affected before a problem is detected?

Coca-Cola and ColaLife

- On the other hand, the Coca-Cola distribution system can be used for health benefits.
  - Where little medical help exists in places such as sub-Saharan Africa, Coca-Cola is available.
  - The ColaLife campaign uses Coca-Cola’s distribution system to deliver treatments for diarrhea and micronutrients.
  - Torjesen, I. BMJ (2011);343:D5825
Locally Grown Foods

The food industry has a significant impact on the environment as a result of transport of foods over long distances:
- Trucks
- Rail
- Ships

This and the desire to support local economies has resulted in an increased interest in locally produced foods.

Picture from a farmer's market which claimed to sell only "local produce." Do you think you can grow that many products in the same environment? Typically, some of these markets claim foods purchased at grocery stores.

Locally Grown Foods

- Some (but not all) locally produced foods create a number of food safety concerns including:
  - Non-approved sources
  - Unknown handling conditions
  - Time/temp violations?
  - Cross-contamination?
  - Personal hygiene issues?

Homemade items
- Cook infected with MRSA, Hepatitis A, Salmonella?

Unknown growth conditions
- Recently articles advocating the use of poultry droppings (known to contain Campylobacter, Salmonella, etc) for compost were released for home gardeners.
- Intentionally contaminated

Locally Grown Foods

- Locally grown and sold foods frequently "fly under the radar" of the FDA/USDA/EPA and therefore do not conform to food safety regulations including:
  - FDA Food Code
  - HACCP
  - FSMA

- Potentially and quite possibly, these agencies may restrict the sale of locally grown foods without compliance to accepted food safety standards.

Example of Potential Issue with Local Foods

- In 2009 blooms of red tide (algae) caused high levels of toxin to occur in some shellfish in the Gulf of Mexico.
  - Discussed in Lecture 11
- What would happen if local harvesters were unaware of the potential risks?

Lecture Note!

- Locally grown foods are included here to illustrate how such foods create unique food safety issues.
- Studies have not demonstrated that locally grown foods result in more or less foodborne illness and this should not be taken as reason to avoid such foods.
- Note: The term locally grown is not recognized or regulated by any food agency. The next time you see a food labeled "locally grown" check the label and see if this is actually true.

Increases in Food Allergies

- As allergy testing procedures improve and media sources report on food allergies, the number of persons claiming food allergy continues to increase.
- Currently, failure to label a known allergen is the leading cause of food recalls.
- This has led to some changes in food labeling and increased awareness of product labels.
- Discussed in detail in Lecture 11.
Ingredients Label

How many items can you find on this label that may be hazardous to a consumer's health?

Food Allergy Recalls

- Food allergies as we will see in other lectures can be deadly.
- Allergens were the leading cause of recall on this FDA food recall list.

Increased Consumption of Foods Outside of the Home

- The majority of foodborne illnesses are associated with food consumed outside of the home.
- Large scale food preparations may be more vulnerable to contamination.
- Consumers may report food eaten outside of home as cause of illness more than food consumed at home.
- Illnesses are usually (and often wrongly) attributed to the last food consumed.

Health Issues and Food Safety

- The health of certain populations can increase their risk for food related illness:
  - Aging population
  - Immunodeficient individuals
  - Malnutrition
  - Lower quality foods

Aging Population

- The over 65 year old population of the United States continues to increase and there are associated food risks:
  - Decreased resistance to pathogens.
  - Decreased sense of smell and taste fail to alert to spoiled foods.
  - Increased reliance on delivery or fast foods.
  - Co-morbidities and the medications used to treat these conditions (especially heart disease, diabetes).

Immunodeficient Individuals

- Immunodeficient persons are more likely to contract serious disease or even die from pathogens found in foods.
- Recommendations include avoiding unwashed fruits and veggies, unpasteurized cheeses, and raw seafood.
Rising Food Prices

- Worldwide food prices are rising and diets are changing:
  - People living in growing economies have shifted from traditional plant-based staple foods (rice, etc.) to more expensive meat and dairy products.
  - Brazil, Russia, India, China
  - Meat and dairy products have food safety issues that differ from other foods (different pathogens, etc).

Public Health Implications of Rising Food Prices – Low Income Countries

- Countries that rely heavily on imports such as Africa are vulnerable to food insecurity when costs rise.
  - Poorer quality diets
  - Increased rates of malnutrition
  - Micronutrient deficiencies
  - All of the above increase the susceptibility to foodborne illnesses.

Public Health Implications of Rising Food Prices – Middle to High Income Countries

- Price inflation leads to consumers spending less on foods:
  - Buying cheaper, poorer quality foods.
  - Buying energy rich, nutrient poor foods.
  - Increases costs of healthy ingredients:
    - School lunch budgets must increase for meals to remain nutritious.
    - Welfare food vouchers decrease in value (cannot be used for “junk” foods).

Food Handling Hygiene

- In response to the large number of non-English speaking food handlers in the state, Florida has released a number of food safety posters, presentations, and guidelines in several languages.
  - National safety training materials are available in dozens of languages.

Consumer Behaviors Contributing to Foodborne Illness.

- Consumption of raw eggs is most common as it includes raw cookie dough, sunny-side up eggs, caesar salad dressing, etc.
- Are you guilty of any of the “bad habits”?

Lecture 2 Conclusions

- Trends in food consumption can result in new food safety challenges.
- The general guidelines for producing safe food require frequent updates in response to consumer demand for foods.
- Regulatory agencies do respond and react to changes in food consumption.