

2

Food Safety from Farm to Table

What does it means?
Edna Negrón, PhD, CFSP, CFS
edna.negron1@upr.edu

Topics discussed

- Challenges In the Food System Today
- Agencies involved in Food Safety
- Food Safety from Farm to Table, what does it means.



Food Safety Regulations

Learning Objectives

- What roles do federal, state, and local jurisdictions play in monitoring food safety?
- What is involved in a food inspection?
- What are the types of food recalls?
- How does food labeling work?

Challenges in Food Safety

- Increasing burden of foodborne illness and new and emerging foodborne hazards;
- Rapidly changing technologies in food production, processing and marketing;
- Developing science-based food control systems with a focus on consumer protection;
- International food trade and need for harmonization of food safety and quality standards;
- Changes in lifestyles, including rapid urbanization; and
- Growing consumer awareness of food safety and quality issues and increasing demand for more and better information in the labels.

Challenges...

- In the last five years, food imports have doubled, with more than 240,000 establishments in 200 countries and territories selling products to the United States each year.
- Today, between 10 and 15 percent of all food consumed each year by U.S. households is imported. In some food categories, more of what we consume is imported than produced domestically—60 percent of fruits and vegetables and 80 percent of seafood, for example, come from abroad.

Concerns and challenges

- Modernization- new food processing technology, packaging and distribution.
- Increase in convenience products.
- Increase in consumption of fresh produce.
 - Five a day campaign means more people are eating fresh produce
- Lack of knowledge in safe food handling

Challenges and Concerns

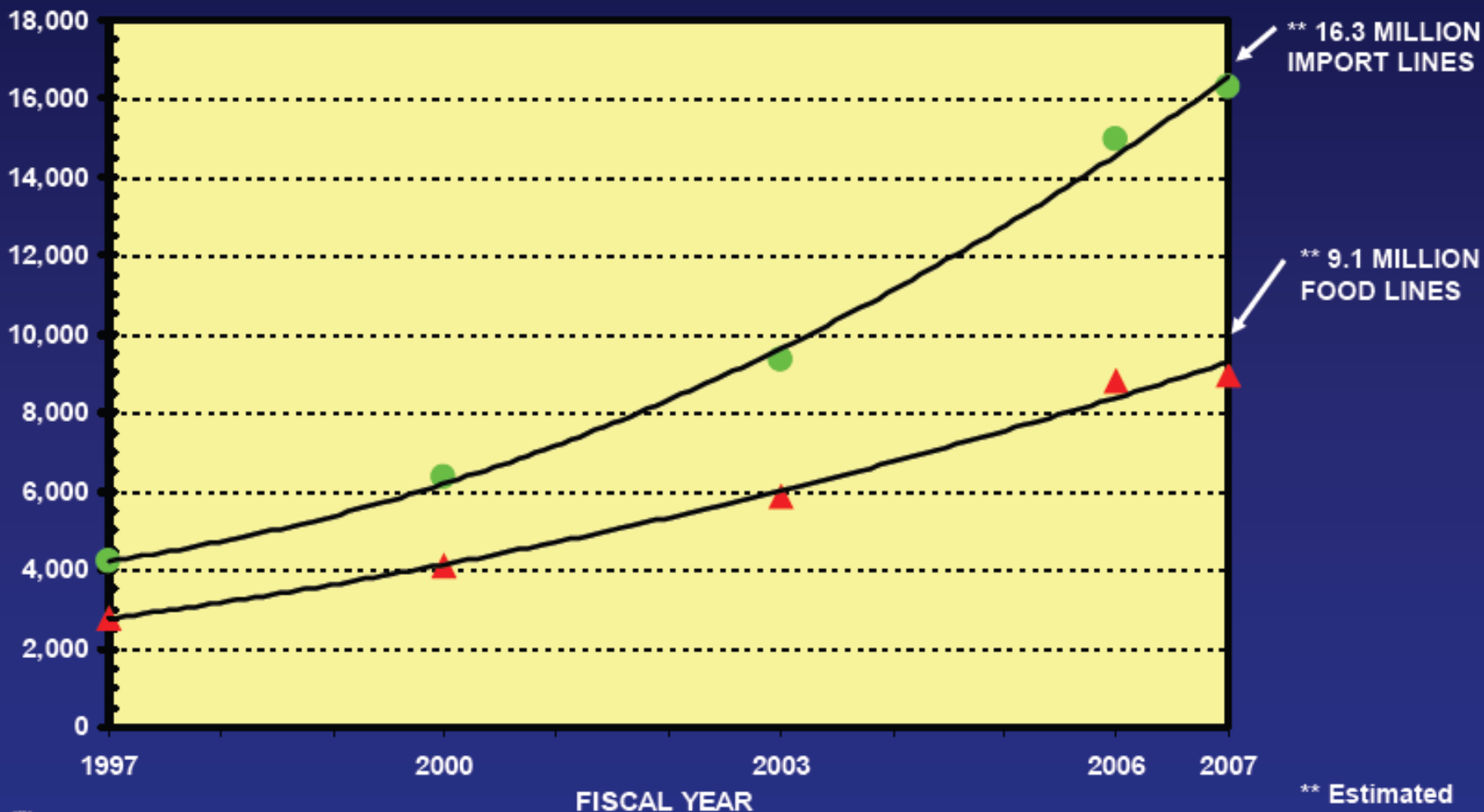
- Better medical reports
- Emergent pathogens
- Consumer demands
- Cultural diversity

Strategic Plan ...Healthy People

- Reduce infections caused by food
- Reduce numbers of outbreaks
- Improve the food handlers practices
- Improve the methods used for food preparation

Changes and Challenges

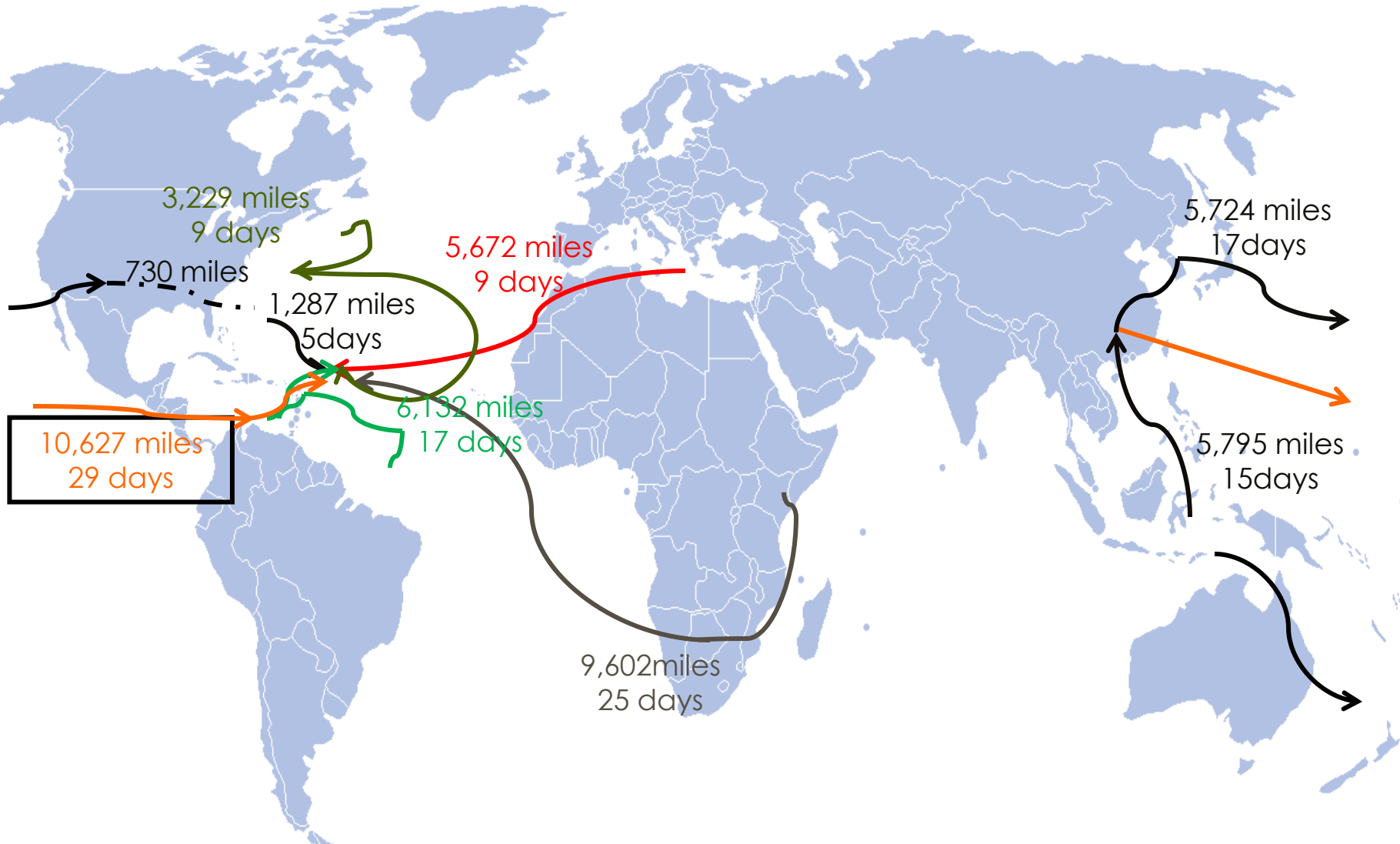
Global Food Supply



● **IMPORT LINES (000)**
▲ **FOOD LINES (000)**
— **Poly. (IMPORT LINES (000))**
— **Poly. (FOOD LINES (000))**



How far our food supply travels





Food comes from many places and travel many miles before reaching your table

* copy of 2013 Domestic Food Defense Awareness Workshop

The Well-Traveled Salad. Do You Know Where Your Food Has Been?

As consumers, many of us fail to recognize that even our domestic and local food supplies are part of a global network. The daily activity of consuming food directly links our health as humans to the health of crops and produce, food animals, and the environments in which they are produced.

LETTUCE

Canada, China, Dominican Republic, Mexico, Peru, USA



CROUTONS

Argentina, Australia, Brazil, Canada, China, France, India, Mexico, Netherlands, Poland, Russia, Switzerland, Uruguay, USA, Vietnam



CUCUMBERS

Canada, Honduras, India, Mexico, Spain, USA



FETA CHEESE

Canada, Denmark, Egypt, Germany, Greece, Israel, Italy, Turkey, UK, USA



VINAIGRETTE

Argentina, Brazil, Canada, China, France, Germany, Greece, India, Indonesia, Italy, Mexico, Morocco, Peru, Portugal, Spain, Thailand, Tunisia, Turkey, USA, Vietnam



OLIVES

Greece, Israel, Mexico, Spain, USA



SPROUTS

Argentina, Australia, Bangladesh, Canada, China, Egypt, France, India, Morocco, Nepal, Pakistan, South Africa, Spain, Turkey, USA



MANDARIN ORANGES

Israel, Mexico, Morocco, South Africa, Spain



A "One Health" approach to food safety—bringing together expertise and resources from the clinical, veterinary, public health, and ecology communities—has the potential to reveal the sources, pathways, and factors driving the outbreaks of foodborne illness and possibly prevent them from occurring in the first place.

NOTE: Countries are listed in alphabetical order and may be subject of export.

10 deadliest outbreaks in US history

- **1903 - 232 Typhoid fever in Ithaca, NY**
 - 82 Deaths, 29 Cornell Univ. students
 - Cause Raw milk
- **1911 Boston -70 Streptococcus in raw milk**
 - 48 died, 2,000 sick
- **1919 – Canned ripe olives – C. bot.**
 - 19 died
- **Raw milk**
 - 1922 Portland Oregon, 22 deaths, 487 illness

10 deadliest outbreaks in US history

- **Raw oysters**

- 1924-1925 NY City Typhoid Fever
- killed 150, 1500 sick

- **Mexican Cheese**

- 1985, LA California
- 28 deaths, 20 miscarriages, 142 infected

- **Frankfurters**

- 1998 – 24 states
- 21 deaths more than 100 hospitalized

- **Deli Meats**

- 2002 US, 3 states
- 8 deaths, 3 miscarriages

10 deadliest outbreaks in US history

- **Peanut butter and paste**

- 2008-2009 States
- 9 deaths, 714 infected

- **Bagged spinach**

- 2006 US, 22 states
- 5 deaths and 238 sick

- **Cantaloupes**

- 2011 US , 28 states
- 33 died, one miscarriage, 147 sick



Five of the
United States
most costly
food recalls
include:

1. Peanuts:

- The FDA linked a deadly Salmonella outbreak to a peanut plant in Georgia. All products containing peanuts produced by this plant were affected.
- **Cause:** Raw and roasted peanuts not sorted correctly during processing
 - • Recall Scope: 3,200 products
 - • Illnesses: 691
 - • Deaths: 9
 - • Cost: \$1 billion

2. Tomatoes:

- A rare form of Salmonella broke out in produce and the CDC and FDA initially pointed to tomatoes as the culprit, leading farmers to destroy tomato crops and consumers to avoid tomatoes or tomato products.
- **Cause:** The culprit turned out not to be tomatoes, but jalapeno peppers that had been handled and sorted in an unsanitary manner at a plant in Mexico.
- **Recall Scope:** All fresh and processed jalapeno and Serrano peppers distributed over a two-month period in 14 states. Exact total not available.
 - • Illnesses: 1,251
 - • Deaths: 2
 - • Cost: \$250 million

3. Peanut Butter:

- Peter Pan peanut butter manufacturer ConAgra, engaged in a massive 100 percent recall when its product was linked to Salmonella outbreaks.
- **Cause:** Broken sprinklers and rain leaking through the roof at a single plant introduced moisture and bacteria into the product.
- **Plex Online** White Paper | page www.plex.com | 1.888.454.PLEX
- **Recall Scope:** 325 million pounds of Peter Pan and Wal-Mart peanut butter, plus 99,953 cases of peanut-butter-based toppings
 - Illnesses: 492
 - Deaths: 7
 - Cost: \$148 million

4. Meat: An undercover video depicted employees of Westland/Hallmark mistreating sick cows, and an investigation ignited fears that the animals carried mad cow disease.

- **Cause:** Cows had been sick prior to slaughter; increasing the risk that the meat carried mad cow disease (no mad cow disease was ever actually reported).
- **Recall Scope:** 143 million pounds of beef
- • Illnesses: None
- • Deaths: None
- • Cost: \$117 million

5. Pet Food: Menu Foods, a manufacturer of canned and packaged wet pet foods, recalled its products and incurred extensive lawsuit damages when consumers tied the cause of pet illnesses and deaths to their products.

- **Cause:** An industrial chemical originating from a supplier in China contaminated the wheat-gluten in the food, causing kidney failure in pets.
- **Recall Scope:** 60 million cans and packages
 - • Illnesses: 471
 - • Deaths: 104
 - • Cost: \$74 million

Recalls & Alerts

- A food recall occurs when there is reason to believe that a food may cause consumers to become ill. A food manufacturer or distributor initiates the recall to take foods off the market. In some situations, food recalls are requested by government agencies (USDA or FDA).

Some reasons for recalling food include:

- Discovery of an organism in a product which may make consumers sick
- Discovery of a potential allergen in a product
- Mislabeling or misbranding of food. For example, a food may contain an allergen, such as nuts or eggs, but those ingredients do not appear on the label.

How Safe is our Food?

CDC Estimates

- 48 Million people (1 in 6 Americans) get sick,
- 128,000 are hospitalized, and
- 3,000 die each year from foodborne diseases, according to recent data from the Centers for Disease Control and Prevention.
- This is a significant public health burden that is largely preventable.



How safe is our food?

- The global incidence of foodborne disease is difficult to estimate, but it has been reported that in 2005 alone 1.8 million people died from diarrheal diseases. A great proportion of these cases can be attributed to contamination of food and drinking water. Additionally, diarrhea is a major cause of malnutrition in infants and young children.

What is foodborne illness (FBI)?

- Foodborne illnesses are defined as diseases, usually either infectious or toxic in nature, caused by agents that enter the body through the ingestion of food. Every person is at risk of foodborne illness.
- Foodborne disease outbreak means the occurrence of two or more cases of a similar illness resulting from the ingestion of a common food.

What is foodborne illness (FBI)?

- Immune-compromised individuals more susceptible
 - Infants and children, older individuals, those on chemotherapy
- Foodborne illness is not just a stomach ache—it can cause life-long chronic disease
 - Arthritis, kidney failure

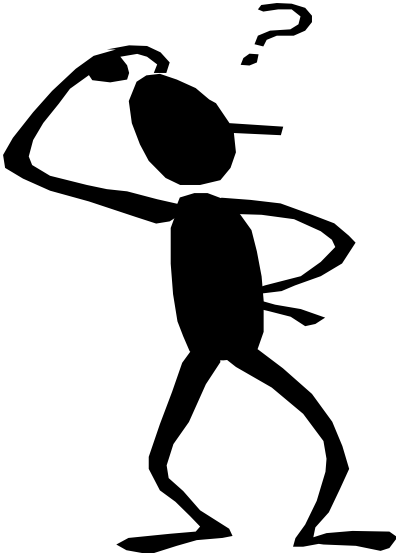
Today's challenge...

- What must be done to increase the safe food production system to prevent intentional or non intentional contamination and reduce food waste in order to feed the increasing population without increasing the net use of land and water?
- How can increase local production and reduce import products?
- How can we organize and integrated Agriculture Production System to be able to increase local food production and reduce importation?
- How can we promote the interdisciplinary effort: Government, Academia and Industry to help improve a Safe Food Supply?

Food Safety: From the Farm to the Table

- Food production is a complex process
 - The final objective of the food industry and the agencies that regulate them is to assure that the food that reach the consumer is safe.
 - We know that in any point of the food chain hazards can gain access.

How can we prevent foodborne illness?



We have to establish safety programs in all areas concerning the food system.



Federal
Agencies

Agencies regulating Food Safety

- The Federal Food, Drug, and Cosmetic Act (FFDCA) provides FDA with the authority to determine the safety, wholesomeness, and accurate labeling of food.
- The Federal Meat Inspection Act (FMIA) and the Poultry Products Inspection Act (PPIA) and the Egg Products Inspection Act (EPIA) provides FSIS with the authority to regulate establishments that process meat, poultry, and eggs, determine their safety, wholesomeness, and accurate labeling of such products.

Food and Drug Administration

- Regulates the processing, manufacturing, and interstate sale of all food items, except for meat, poultry, and egg products
- The Food, Drug and Cosmetic Act of 1938 is the primary law protecting the U.S. food supply. This law was passed to assure that foods are safe, pure, wholesome, and produced under sanitary conditions.

Federal Law of Food, Drugs and Cosmetic states that.....

- Only pure, wholesome, safe food produced under acceptable sanitary conditions can be offered to the consumer.
- Food that is adulterated, defective, insecure, dirty, in contact with unsanitary conditions, dishonest presentations, assertions, false designs, drawings or faulty information will be confiscated.

Food is considered adulterated if contains...

- Poisonous substances
- Toxic substances
- Unsanitary or non hygienic conditions
- Dirty, rotten, decomposed food
- If the animal was death before been slaughtered
- Additive and colorants (unapproved or higher levels than approved, FDA)
- Pesticides residue (unapproved or above approved levels by EPA)
- Container interaction
- Radiation over the approved dose
- Presence of *E. coli* O157:H7 in meats
- Presence of *Listeria monocytogenes* in ready to eat food (RTE)

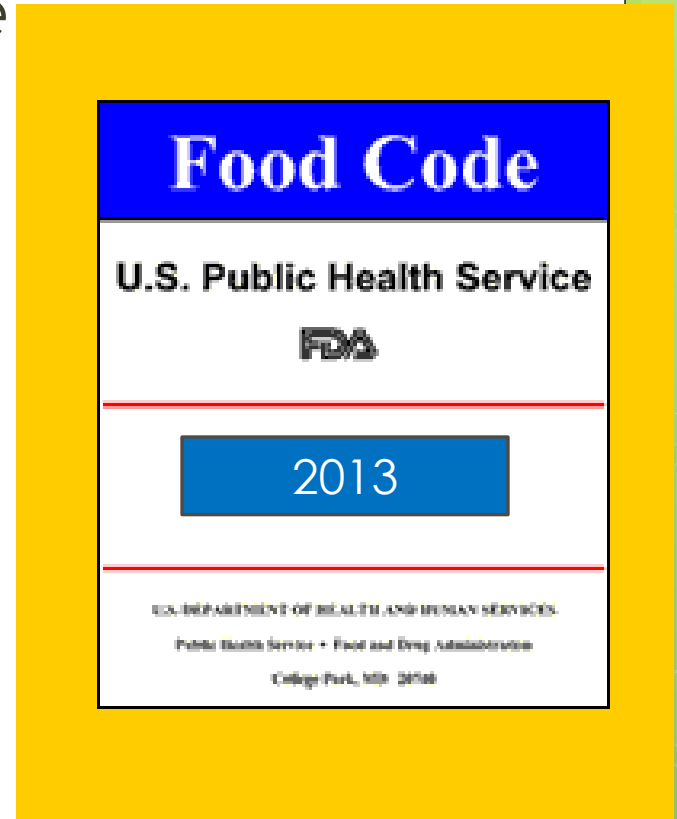
Guidance and Rules

- Sanitary Transportation of Human and Animal Food Proposed Rule
 - Docket Number: FDA-2013-N-0013
- Focused Mitigation Strategies to Protect Food Against Intentional Adulteration Proposed Rule
 - Docket Number: FDA-2013-N-1425
- Current Good Manufacturing Practice and Hazard Analysis and Risk-Based Preventive Controls for Food for Animals Proposed Rule
 - Docket Number: FDA-2011-N-0922N-0238

- Current Good Manufacturing Practice and Hazard Analysis and Risk-Based Preventive Controls for Human Food Proposed Rule
 - Docket Number: FDA-2011-N-0920
- Draft Guidance: New Dietary Ingredient Notifications and Related Issues for Industry
 - Docket Number: FDA-2011-D-0376
- Fish and Fishery Products Hazards and Controls Guidance Guidance for Industry
 - Docket Number: FDA- 2011-D-0287
- Preventive Controls for Registered Human Food and Animal Food/Feed Facilities Notice; Request for Comments
 - Docket Number: FDA-2011-

FDA - Food and Drug Administration

- Publishes the *FDA Food Code* guidelines
- Sets standards for quality, labeling, and safety of food and food additives at retail establishments .



Food Laws

- The Nutrition Labeling and Education Act of 1993 provides information on specific nutritional guidelines and defines what needs to be on a nutrition label. This label provides information on protein, fat, carbohydrate, vitamin and mineral content which helps consumers to make good choices when selecting foods.
- To keep update with new information visit: <http://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/LabelingNutrition/ucm385663.htm>

Food Labeling

Meltaway/French Mint Combo 5 1/2 oz.

Nutrition Facts

Serving Size: 42.0g, 5 pieces

Serving Per Container: 4

Amount Per Serving

Calories 248 Calories from Fat 150

% Daily Value*

Total Fat 17g 26%

 Saturated Fat 10g 50%

Cholesterol Less than 5mg 0%

Sodium 50mg 2%

Total Carbohydrate 22g 7%

 Dietary Fibers 1g 4%

 Sugars 20g

Protein 2g

Vitamin A 0% Vitamin C 0%

Calcium 6% Iron 2%

* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories	2,000	2,500
Total Fat	Less than	65g	60g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

19361

Food labeling laws have been created to ensure the safety of the consumer, and fair and accurate representation of the product, ingredients, and nutritional value.

- Nutritional labels
- Safe food-handling label.

Nutritional label

Product Dating Labels



Product dating labels can help customers understand the time limit to purchase or use the product at its best quality.

Federal Agencies - USDA

U. S. Department of Agriculture

- Responsible for inspection of
 - Meats
 - Poultry
 - Processed meat and poultry products
 - Meat and poultry processing facilities
- Voluntary grading services for meat, poultry, eggs, dairy products, fruits and vegetables.

Food Laws

- The Federal Meat Inspection Act of 1906 provides for the mandatory inspection of animals, slaughtering conditions, and meat-processing facilities. This law helps to assure that meat and products containing meat are clean, wholesome, free from disease, and properly represented.

Food Laws

- The Federal Poultry Products Inspection Act of 1957 provides for the mandatory inspection of poultry, slaughtering conditions, and poultry-processing facilities. This law helps to assure that poultry and products containing poultry are clean, wholesome, free from disease, and properly represented.

Food Laws

- The Egg Products Inspection Act of 1970 authorizes the Food Safety and Inspection Service of USDA to inspect facilities that process egg products. This Act also assures proper restriction and disposal of eggs that are unfit for human consumption.

Federal Agencies - USDC

U.S. Department of Commerce

- Voluntary grading standards for fishery products
- National Marine Fisheries Service (NMFS)
voluntary inspection of
 - Fishery products
 - Fishery processors.

Federal Agencies - EPA & CDC

EPA - Environmental Protection Agency

- Regulates environmental pollution
- Regulates the use of toxic substances.

CDC - Centers for Disease Control & Prevention

- Works to prevent and control diseases
- Supports foodborne disease investigations
- Tracks outbreaks of foodborne diseases.

Federal Agencies - OSHA & FTC

OSHA - Occupational Safety & Health Administration

- Enforces health and safety standards in the workplace.

FTC - Federal Trade Commission

- Enforces laws regarding marketing practices and national advertising of food and other products.

The Food Industry

The Food Industry is made up of companies that:

- Produce food
- Manufacture food
- Transport food
- Distribute food.



The food industry

Food Safety, From the Farm to the Table implies that... There are control procedures in each step in the chain

- Biosecurity and production of meat, poultry, and fish
 - From the farm to the slaughter house
 - From the fishing area to fish industry
- GAP - Production of horticulture products
 - From the farm, harvest, and subsequent handling
- Further processing, fresh cuts, prepared foods
- Transportation
- Post processing
- Wholesale/retail distribution
- Food Service
- Consumer

Hazard Analysis and Critical Control Points (HACCP)

- HACCP is a systematic approach for the identification, evaluation, and control of the food safety hazards.
- The principal goal of HACCP system is hazard prevention.

What is HACCP objective?

- Is a system that provides a way to identify and control biological, chemical, and physical hazards through-out the foods flow during the operation, based on the application of the seven principles, in order to establish control measures.

Food Safety: From the Farm to the Table

- The HACCP Law established the commitment with food safety, and regulatory agencies and other food industry organizations must study and educate every segment or step of the food chain, this is
 - **From the Farm...to the Table**

HACCP for Fish and Seafood Products

- 21 CFR parts 123 and 1240 – HACCP for fish and seafood products
- HACCP is mandatory for all plants that process fish and seafood products for human consumption, Dec. 18, 1995

HACCP Regulations

HACCP for Meat and Poultry

- July, 96 - HACCP is mandatory for all plants under USDA/FSIS inspection
 - SSOP: January/1997
 - Big plants: January/1998
 - Small plants: January/1999
 - Very small plants: January/2000

HACCP Juices 21 CFR Part 120

- HACCP and 5-log pathogens reduction
- Final Rule January 2001
- All industries that produce juice need to have a HACCP plan.

HACCP at retail

- Hazard
- Analysis
- Critical
- Control
- Point



Retail food stores can control the flow of food by setting up a food safety management program that includes the HACCP system.

Foundations...

- Only safe food can enter commerce, or be traded.
- The government is in charge to watch over compliance of the regulations.
- Manufacturers, distributors, importers have the responsibility to comply with the regulation and can be sue.
- The regulatory processes are transparent and accessible to the public.

Food Safety: From the Farm to the Table

- Although the Agencies traditionally have worked in slaughterhouses and further processing, the commitment of the farm to the table means that the agencies will work to improve Food Safety in **all** steps of the food system.

HACCP in the farm...

- Prevention programs that include...but they are not limited to:
 - Good Agricultural Practices compatible with HACCP (GAP)
 - Good Handling Practices (GHP)
 - Biosecurity
 - Quality Assurance
 - Cleaning and Sanitation
 - Residue Control Program
 - Integrated Pest Management
 - Employee Hygiene



FIGURE 1. CDC investigator examines a calf at farm A — Pennsylvania, 2000



HACCP – required (SSOP's), GMP foundations

- Meat, poultry, and eggs products industry
- Fish and seafood industry
- Juice processing industry

HACCP – Food Code/Distribution & Distribution Center/Supermarkets/Food Service

- Prevent cross contamination from raw and fresh food to ready to eat that does not need to be cooked.
- Prevent chemical and physical contamination.
- Prevent temperature abuse that allow the growth of bacteria and the production of toxins.



Separate,
Clean,
Chill,
Cook

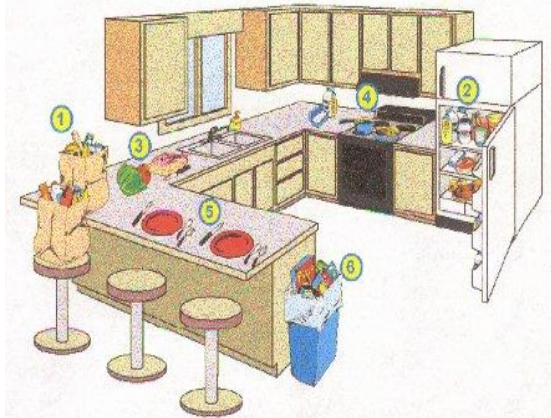
HACCP – Food Code/Distribution & Distribution Center/Supermarkets/Food Services

- Receiving
- Storage
- Defrost
- Preparation
- Cooking
- Hot holding
- Cooling
- Reheat
- Leftover Handling
- Cleaning and Sanitation
- Hand washing and employee hygiene

CRITICAL CONTROL POINT OR
CONTROL POINTS

HACCP -- In the kitchen

- Critical Control Points in the kitchen
 - Selection
 - Cold storage
 - Preparation
 - Cooking
 - Cleaning
 - Leftover Handling



Food safety is our responsibility

University

Educate and Research

Government

Agroindustry

- **Establish laws, regulations, and Performance Standards**

- **Enforce compliance**

Consumer

- **Apply good practices and**
- **Compliance with laws**

Follow package instructions in safe food handling

Goals

- Safe food supply
- Well trained and motivated employees.
- Supervision – get to the beginning of the problem
- Inspection to determine possible risks
- Prevent foodborne diseases
- Always offer food products that fulfill quality requirements to the customer

Safe Food and Safe Environment



Ensuring safe food and safe environment for employees and customers requires ongoing training and continuous monitoring.

Role of the Government and Benefits of Food Safety Certification

Why Get Certified?

- Certifications may be required
- Demonstrate knowledge of food safety guidelines which can help prevent foodborne illness
- Keep current on industry Best Practices and the FDA Food Code.

Topics include

- Food Safety Regulations
- Food Code 2013
- Hazards to Food Safety
- Preventing foodborne illness
- The Food Flow
- Facilities, Equipment and Utensils
- Cleaning and Sanitizing Operations

Topics include

- Environmental Sanitation and Maintenance
- Accident Prevention and Crisis Management
- Education and Training
- Food Safety Management Program
- Food Defense

GAP...FSMA...

HACCP...Education

- **Prevention** is the best way to reduce the risk of foodborne illnesses and guarantee food safety.

From the farm.....to the table

Remember....
What you produce today
can be consumed by your
family tomorrow

Food Safety is everyone responsibility is YOUR
responsibility