

FOOD SAFETY PAST AND PRESENT



Food of animal origin is very important to human health. It is very important to many of the biological systems in the human body. This discussion will involve food safety issues regarding meat animal products. Food safety is defined as the "relative certainty that no harm or injury will result when a food is prepared properly and consumed in a reasonable manner." Meat for sale must be inspected for wholesomeness by state meat inspection (sale within the state) or Federal Meat Inspection (sold interstate

or foreign commerce). The Wholesome Meat Act of 1967 mandated that all meat offered for sale must be inspected for wholesomeness.

Three types of food contamination prevail—microbial, physical and chemical. Sixty-six percent of food illness is caused by bacteria, 5% by parasites and 5% by viruses. Therefore, the discussion will center on microbial food safety concerns.

The history of food safety dates back to 1659 when bacteria were found in milk. Two hundred years later bacteria were enumerated in milk. Technology to evaluate bacterial contamination has improved as time passed and today it is outstanding. In the early 1900's much food spoilage occurred until refrigeration was developed. Very little concern was noted regarding food-borne illnesses. In the 1950's and 1960's antibiotics were used as antimicrobial compounds. Such uses created many problems: resistant bacteria, allergic reactions by human, and over usage. Recording of foodborne illnesses was very poor until the late 1980's and came to detail recordings in the 1990's. Presently, 76 million cases of foodborne

illnesses occur annually causing about 325,000 hospitalizations and 3000 to 5000 deaths annually. The following are factors which contributed foodborne disease outbreaks:

- 12% Food from unsafe sources
- 63% Improper storage temperature
- 28% Poor personal hygiene
- 23% Contaminated equipment
- 21% Inadequate cooking

These figures do not total 100% because many overlap.

In this presentation, five slogans will be discussed which can be used to reduce foodborne disease:

1. Life begins at 40- not age of 40 but storage below 40 degrees for perishable products. Very few of the pathogenic bacteria will multiply at temperature below 40 degrees. If a perishable meat product is exposed to temperature between 60 and 120° F for two hours or more, one bacterial cell can multiply to 1 billion in 8 hours.
2. When in doubt—throw it out. Odor of a food product is an indication of spoilage; therefore, throw it out. However, sometimes odor is absent but if it does not look good, throw it

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3. Take a minute to see what's in it—this refers allergic reaction to the protein in the following: milk, seafoods, soy, eggs, peanuts, tree nuts. There are over 11 million cases of food allergies per year with 300,000 individuals require emergency treatment and about 150 people die yearly. Products containing allergenic components must be labeled and any food additive containing an allergen must be stored and handled separately.
4. Realize you must sanitize—sanitizing cutting boards and cutting utensils is necessary to reduce microbial cross contamination, especially cooked meat items with uncooked food items. Wooden cutting boards that are scored with groves should not be used because they are difficult to sanitize.
5. FATTOM—an acronym to consider food type, acidity of the food, temperature required for storage, time of storage, oxygen requirement and moisture content. Consideration for required storage temperature and moisture content help greatly in reducing microbial contamination of food items.

The nine major pathogenic bacteria that are of concern for meat items are as follows:

Pathogen	On-set of time disease after consumption
Bacillus cereus	8-16 hrs
*Staphylococcus aureus	1-6 hrs
Salmonella species	6-48 hrs
*Clostridium botulinum	12-36 hrs
* Clostridium perfringens	8-22 hrs
Campylobacter jejuni	2-5 days
Listeria Monocytogenes	1 day to 3 weeks
Yersinia enterocolitica	4 – 7 days
Escherichia coli 0157:H7	24-72 hrs.

Those pathogens listed that possess an asterisk are toxin producing bacteria. Toxins produced are not broken down by heat of cooking or by digestive enzymes. These cause food poisoning.

There are three types of foodborne illness:

- *Infection* - caused by eating food that contains disease causing bacteria. Example: Salmonella.
- *Intoxication* - caused by eating food that contains a Toxin(s) produced by a pathogenic bacteria. Example: Staphylococcus aureus.
- *Toxin - mediated infection* - Caused by eating a food that contains a pathogen that produces a toxin once inside the human digestive system. Example: E. coli 0157:H7.

With the outbreaks of E. coli 0157:H7 in the Northwest US in the 1990's congress passed the Sanitation Standard Operating Procedure in 1996 commonly called SSOP. This act required each meat plant to develop an SSOP program for clothing requirements and sanitation for workers involved in production of meat products. Also, this act requires a program for post-operation and pre-operation cleaning and sanitizing of production rooms.

The Federal inspector is mandated to review sanitation records and observe pre-operational sanitation of equipment, walls and floors. Out of compliance could result in shut down of operation.

Furthermore, congress passed the Hazard Analysis and Critical Control Point Program Act (HACCP) in 1977. This act mandated that each product produced in the plant must have a HACCP program. The program must possess a flow diagram of the product as it is being manufactured. Therefore, each step in the flow diagram that is considered a hazard must have a critical procedure to eliminate the potential hazard. This HACCP program required a large amount of record keeping and review by the FSIS personnel. If the critical control procedure is not successful,

the product cannot be sold and either it will be condemned or re-worked.

Even though the HACCP program is extensive and time consuming, it has been successful in reducing Campylobacter disease, by 28%, Salmonella by 17 % and E. coli 0157:H7 by 42%.

The HACCP program requires:

1. Carcass sanitizing both pre-and post-chilling.
2. 24 hours post-harvest selected carcass must be swabbed on the surface to test for pathogen contamination.
3. No carcass can be fabricated if surface temperature is above 40°F.
4. Ground beef is sampled weekly and sent to FSIS lab for testing for E. coli and Salmonella. Product produced for that day must be held until results are received.
5. Ready to eat product such as lunch meat must be tested for Listeria contamination.
6. Cooked product such as cured bacon and ham must be cooked to 140°F for 12 minutes internal temperature. That product after cooking must be chilling from 130° to 40°F in 16 hours.
7. A recall program must be in effect. Each package of product produced per day must have a code number on it. Therefore, if a foodborne illness occurs from that product, the product can be recalled.
8. Each product produced must possess an approved label on it which has been approved the USDA FSIS in Washington, D.C. Also, each package of a product must have the inspection stamp on it which identifies the plant that has produced the product and a safe handling label.

With the advanced technology for chemical and microbial analyses for food product, production of safe food is much more accomplishable today. The use of "high pressure liquid chromatography" to analyze food product for antibiotic and/ or pesticide residues is one of the interventions which helps to produce safe food. Furthermore, the technology provided by a "Polymerase chain reaction" machine provides very rapid detection for microbial contamination and provides a quick procedure to determine cross contamination of different meat species especially in ground products.

Nutritional labeling has provided the consumer with detailed information about serving size and the percentage of each compared to the recommended daily intake for a 2000 calorie diet. Most consumers are interested in knowing how much of the following are in a serving: total calories, calories from fat, grams of fat, grams of saturated fatty acids, presence of trans fatty acids, milligrams of cholesterol and sodium. These are compared to a percentage basis on recommended daily intake for a 2000 calorie diet.

There are new recommended cooking temperatures: 145°F for whole meat, 160 degrees F for ground meats and 165°F for poultry. Recommended temperature for pork, game meat, restructured meat and sea food and injected meat 165°F internal for 15 seconds. It is advisable for each home to possess a meat thermometer. Our studies show only about 50% of the households have a meat thermometer.

The US has the safest food in the world. If one adheres to the following slogans, we can further reduce foodborne illnesses:

- Remember life begins at 40
- When in doubt throw it out
- Take a minute to see what is in it
- Realize you must sanitize
- Beware of cross contamination of cooked products with raw products

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