

Food Myths: Getting Informed About the Food We Eat and the Assumed Risks

December 10, 2017

Dan Engeljohn, PhD
Food Safety Expert, Retired

Overview

With test your knowledge opportunities

1. Understanding the origin of U.S. food safety programs
2. Learning what the public health agencies do and how they track foodborne illness
3. Introducing Food Science/Microbiology for context about food safety guidance
4. Shedding light on consumer-driven labeling and why many labels don't fully meet expectations
5. Answering your questions

Pre-Quiz #1

Test your knowledge

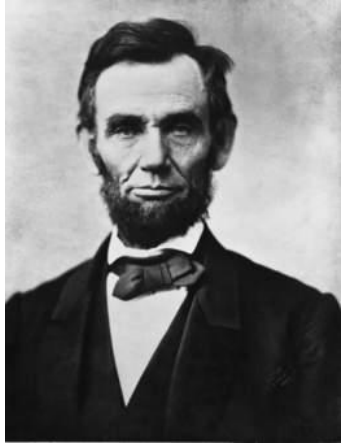
1. Which president was the first to recognize a need to address widespread food poisoning in the food supply?
 - a) Lincoln (Abraham)
 - b) Roosevelt (Franklin)
 - c) Roosevelt (Theodore)

2. Which book/author inspired the national food inspection system now authorized by the Federal Meat Inspection Act?
 - a) *American Chamber of Horrors*, 1936, Ruth deForest Lamb
 - b) *The Jungle*, 1906, Upton Sinclair
 - c) *The Value of Believing in Yourself: The Story of Louis Pasteur*, 1977, by Spencer Johnson

3. Which food presents the highest risk for *Salmonella* infection, based on a recent study of foodborne outbreaks?
 - a) Fruit
 - b) Poultry
 - c) Seed vegetables (e.g., tomatoes)

Origin of U.S. Food Regulations

Initial focus on product deception and foreign trade



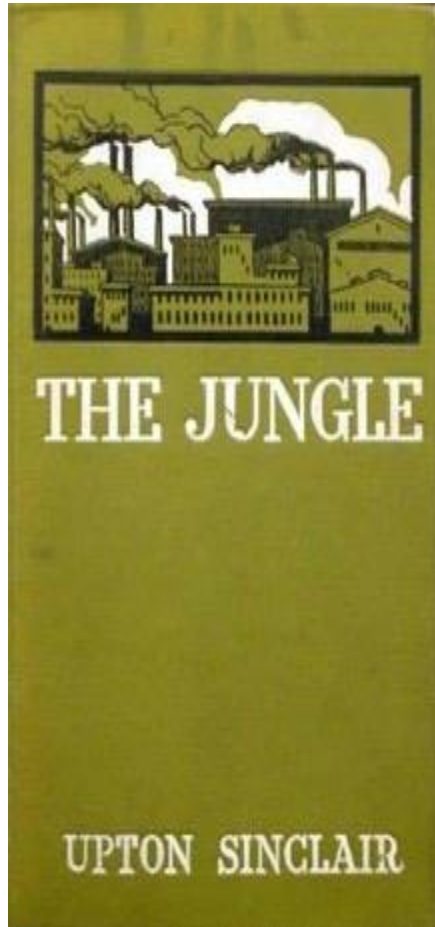
- 1862
 - President Abraham Lincoln established USDA and appointed a chemist to raise public awareness about food poisoning
 - Over-the-counter nostrums, particularly milk whitened with chalk dust, preserved fruit and vegetables colored with copper sulfate, and bread permeated with saw dust
 - No laws or regulations issued



- 1890
 - President Benjamin Harrison signed the first law requiring inspection of live animals and meat products solely for export
 - Inspection was for animal disease control and protecting agriculture – not public health

A Novel Spurred the Original U.S. Food Regulations

Borne out of abject failure by government and industry



- 1906
 - This novel portrayed the harsh conditions of immigrants in the Chicago meatpacking industry
 - **It was the filthy conditions described in horrific detail that caused a public furor and moved government to action**
 - The author urged President Theodore Roosevelt to require inspectors
 - That same year, the Federal Meat Inspection Act was enacted by Congress
 - First national prohibition of uninspected, adulterated or misbranded meat products, and ensured healthy animals were processed under sanitary conditions
 - Gave USDA authority to inspect and to issue food standards for meat
 - Laws were later added for poultry (1926), exotic species (1946), and processed egg products (1970)
- 1938
 - FDA given authority to issue standards for all other foods

Now, What Is Needed For Consumer Protection?

Deaths – and lots of them!

- The food industry has extraordinary influence over Congress
 - If the industry doesn't want food policies to issues, they don't issue
 - Failure by USDA/FSIS to declare *Salmonella* an adulterant in Chicken Kiev – Small business concern
 - If the food industry wants food policy to spur increased trade or to impede competition, they issue
 - Food Safety Modernization Act (e.g., Peanut Corporation of America) – costly recalls
 - Catfish mandatory inspection regulations – protect domestic market
- Exception to industry blockage
 - The regulatory agencies are able to issue new policies when multiple deaths occur, particularly if children are affected, and industry fails to respond
 - HACCP regulations issued following the 1993 Jack In The Box *Escherichia coli* O157:H7 outbreak
 - 732 people infected and 4 children died

U.S. Regulatory Public Health Agencies – USDA & FDA

Two very different programs; one more consumer friendly

- Any food containing at least 2 % cooked meat, poultry, or processed egg
 - **Meat**: Beef (including veal), catfish, equine (including horse and mule), lamb, and pork
 - Pepperoni pizza (but not cheese pizza)
 - **Poultry**: Chicken, duck, goose, guinea, ratite, squab, and turkey
 - **Processed egg**: Pasteurized dried, frozen, or liquid product from whole eggs, whites, and yolks (but not shell eggs)
- Inspectors, including public health veterinarians, in every facility daily, each shift
 - ~9,600 personnel assigned to ~6,000 facilities nationwide
 - \$1B annual funding
- Pre-market approval of all labels
- Mark of inspection applied
 - More consumer friendly



U.S. Regulatory Public Health Agencies (continued)

Two very different programs; one more *industry* friendly

- All food except those regulated by USDA/FSIS
- Consumer safety officers assigned to conduct audits – not inspections
 - Generally, a visit by FDA is as a consequence of illness/death linked to a specific facility
 - Most facilities never see FDA presence
 - ~5,000 personnel covering ~100,000+ facilities
 - \$450B annual funding
- No mark of inspection
- Focus is on setting standards and aggressive enforcement penalties for non-compliance after production
 - More industry friendly



Tidbits On Food - #1

Knowing Too Much Can Help Liven Up A Dinner Party

- What qualifies as meat...
 - ...I'd like an all-pork corndog please, but how can I be sure?
 - Look at the ingredient statement
 - Be sure it says "pork" and that it does not say pork food product such as mechanically separated pork or pork variety (offal) meat, including heart or tongue
- Ground chicken...
 - ...I'd like mine without skin and bone; what does the label need to say?
 - Be sure the label says "Ground Chicken **Meat**"
 - Such product will have only ground muscle
 - If labeled "Ground Chicken"
 - Such product will have muscle and accompanying natural proportions of skin and bone (bone solids can't exceed 1 %)

Tidbits On Food - #2

Knowing Too Much Can Help Liven Up A Dinner Party

- Ground horse burger...
 - ...I'd like fries with that ...can I order the combo at a restaurant?
 - No, as long as the annual congressional appropriation for USDA/FSIS has a clause preventing funds being spent on the inspection of horses at slaughter
 - It also is illegal to import horse meat for human consumption even if the horses were inspected and slaughtered in Canada or Mexico
 - In the U.S., there is extreme public opposition to equine slaughter for human consumption
 - Type of drugs used and the approval process, and with animal welfare
 - Less public furor over the >110,00 wild horses on public lands with insufficient food and that starve to death each year
- Tainted product...
 - ...why do USDA and FDA often have to twist a manufacturer's arm to remove harmful product from the grocer's shelf?
 - Industry is for-profit and views any negative publicity as harmful to their brand; some corporations are especially reluctant to quickly recall product
 - In recent times, USDA/FSIS began issuing press releases naming the manufacturer and their refusal to remove product...product ultimately gets removed

U.S. Non-Regulatory Public Health Agency

Critical Partner in Identifying Where to Focus Limited Resources



- Conducts surveillance for human illness
- Investigates/coordinates national disease outbreaks and response
- Estimates the burden of illness caused by infectious agents
- Since 1995, maintains the PulseNet database
 - DNA fingerprint patterns from pathogen sources
 - Stool samples from ill humans
 - Animal tissue samples at slaughter and processing
 - Environment
 - Food at processing and retail

Burden of Foodborne Disease

Major cost to society – much of which is totally preventable

- Most current estimate identified by CDC in 2011
 - Factors out foreign travel cases
 - 31 pathogens causing foodborne illness/hospitalizations/death
 - **1 in 6 Americans affected annually***
 - 48 million people get sick
 - 128,000 hospitalizations
 - 3,000 deaths
 - 14 common pathogens
 - Costing \$14.1 billion in health care
 - 5 pathogens causing >90 % of the burden
 - *Campylobacter* spp.
 - *Listeria monocytogenes*
 - Norovirus
 - *Salmonella* spp.
 - *Toxoplasma gondii*

*In 2010, WHO estimated **1 in 10** illnesses worldwide with **420,000 deaths**

Tidbits On Food - #3

Knowing Too Much Can Help Liven Up A Dinner Party

- Tracking foodborne disease...
 - How does the government calculate the 1 in 6 estimate?
 1. An ill person (usually with diarrhea – possibly bloody, upset stomach, fever, vomiting) goes to doctor
 2. Doctor collects a stool sample and analyzes it for pathogens
 3. Results get reported to the State public health office and CDC
 4. A State or CDC epidemiologist calls the ill person/family and conducts an extensive investigation for possible sources/cause
 - Questions center on what was eaten within the past 2 weeks, and where
 5. Results get recorded and tracked
 6. If 2 or more cases are reported in close proximity in time, an outbreak is identified and a more thorough investigation is undertaken
 7. Multipliers for under-reporting/under-diagnosis are added to the 31 pathogen lab confirmed cases and then compared against the population total from the most current U.S. census to get the 1 in 6 estimate
 - For *Campylobacter* - x30.3
 - (e.g., 43,696 lab confirmed X 30.3 multiplier = 1,322,137 total cases)
 - For *Escherichia coli* O157:H7 - x26.1
 - For *Listeria monocytogenes* - x2.1
 - For *Salmonella* - x29.3

Pathogen/Food Contributors to Foodborne Illness

Actual Outbreaks Assessed

In 2015, a CDC/FDA/USDA a precedent-setting study issued

- 74 % of ***Campylobacter***
 - Dairy (66 %) – e.g., raw milk and cheese from raw milk
 - Chicken (8 %)
- 82 % of ***Escherichia coli O157:H7***
 - Beef (46 %)
 - Vegetable row crops (36 %) – e.g., leafy vegetables
- 81 % of ***Listeria monocytogenes****
 - Fruits (50 %)
 - Dairy (31 %) – e.g., soft cheeses
- 77 % of ***Salmonella***
 - Seed vegetables (18 %) – e.g., tomatoes
 - Eggs (12 %)
 - Fruits (12 %)
 - Chicken (10 %)
 - Beef (9 %)
 - Sprouts (8 %)
 - Pork (8 %)

* *Listeria monocytogenes* has the highest death rate of the common pathogens of public health concern

Pre-Quiz #2

Test your knowledge

4. Shelf-life guidance for most foods is premised upon the presence of which type of microorganism in the food?
 - a) Pathogens from the environment where food is processed
 - b) Pathogens from human and animal sources associated with illness
 - c) Spoilage organisms that do not cause harm but may be present

5. Rapid growth of pathogens (a doubling of numbers) can occur how frequently when the food is temperature abused?
 - a) Every 20 minutes
 - b) Every 60 minutes
 - c) Every 90 minutes

6. Ground beef is safe at which temperature/time combination?
 - a) 140 °F with no rest time
 - b) 155 °F with no rest time
 - c) 160 °F with no rest time

Food Safety

Brief lesson on food science/microbiology

Microorganisms are ubiquitous in the environment and can rapidly multiply in numbers when at a conducive temperature/time and in the presence of available nutrients

- **Microorganisms:**
 - “Good bugs”
 - Spoilage – “yuk” factor due to off odors/flavor but not foodborne disease
 - Competitive with bad bugs – present at higher numbers and multiply faster
 - Basis for shelf-life guidance
 - Provide characteristic flavoring and tenderization (e.g., yeast in bread, *Lactobacillus acidophilus* in yogurt, mold on aged cheese and meat)
 - “Bad bugs”
 - Harmful – cause foodborne disease (referred to as pathogens)
 - Invisible - can’t taste, smell, or see
 - Present in extremely small numbers compared to good bugs
 - Require only a few cells in a serving of food to cause illness or death

Tidbits On Food - #4

Knowing Too Much Can Help Liven Up A Dinner Party

- Get dirty...we live in too clean a microbial environment...
 - Competitive exclusion is important in food safety
 - You want lots of good bugs in your digestive tract, on your hands, and on the food you consume; otherwise, the bad bugs will take over
 - Get your hands dirty, eat more products with good bugs (yogurt, fermented meat, or aged cheese), possibly consider licking a door knob once a week(???)
 - But, don't abuse the "5 second rule"... if you can't clean or cut away surfaces of food accidentally touching the floor, don't eat it
- Don't automatically throw out food that is beyond its expiration...
 - Expiration dates on food are for quality – **NOT SAFETY**
 - Food loss and waste is estimated at roughly 30-40 % of the food supply
 - Government and industry are encouraging use of "best if used by" labeling
 - Get free, helpful guidance on maximizing storage life of foods at the USDA ***FoodKeeper*** app (go to iTunes and Google Play app store)

Food Safety

Brief lesson on microbiology (continued)

Microorganisms are ubiquitous in the environment and can rapidly multiply in numbers when at a conducive temperature/time and in the presence of available nutrients

- **Environment:**

- Soil – most microorganisms live in dirt, including where food is grown or animals graze
- Air – most microorganisms readily circulate in aerosolized moisture droplets
 - *Listeria monocytogenes* is especially capable of circulating inside the refrigerator **(Keep your refrigerated foods covered!)**
- Intestinal tract material – healthy appearing animals, whether domesticated pets, food animals, or wild animals, and humans carry the good and bad bugs
 - Feces can contaminate the water or ground where food is grown, as well as the hands of food handlers
 - Vomit can widely spread pathogens in aerosolized droplets, particularly the “cruise ship sickness” Norovirus
- Food contact surfaces – insanitary equipment and utensils (including hands) can serve as a source of contamination
- Food handling/processing area – whether a slaughterhouse where the digestive tract is being removed in a non-sterile manner, a fruit/vegetable picking/washing/cutting operation, or home kitchen, contaminants can be inadvertently and easily spread

Tidbits On Food - #5

Knowing Too Much Can Help Liven Up A Dinner Party

- The grocery cart is hazardous...
 - Shoppers often put raw packaged meat/poultry/seafood and unpackaged fruits/vegetables directly in the shopping cart and on the conveyor belt on top of ready-to-eat items
 - Always put raw packaged meat/poultry/seafood and unpackaged fruits/vegetables into the plastic bags located near the shelved items
 - I recommend opening the plastic bag before picking up these food items and then inserting them without directly touching
 - Make sure that the checkout person doesn't remove the plastic bag
 - Put these raw products separate from ready-to-eat products in the cart, on the conveyor belt, and in the shopper bags
- Your refrigerator is just as hazardous as the grocery cart...
 - Handle your refrigerator like your grocery cart – keep the raw items separate from ready-to-eat items, covered, and leak-proof
 - Don't put the raw items on an upper shelf above ready-to-eat items
 - Be sure to place a cover on left-overs and unused items

Food Safety

Brief lesson on microbiology (continued)

Microorganisms are ubiquitous in the environment and can rapidly multiply in numbers when at a conducive temperature/time and in the presence of available nutrients

- **Multiply** means grow:
 - Most microorganisms are living cells that divide and grow in number
 - Rapid growth, a doubling in number, can occur every 20 minutes
 - Most all pathogens multiply between 40 °F and 140 °F
 - **Importantly**, *Listeria monocytogenes* uniquely grows well between 40 °F and 50 °F – the temperature inside most refrigerators!!!
 - Set your refrigerator temperature to below 40 °F, and don't overstuff it, open/shut the door often, or leave the door ajar
 - **Also, importantly**, *Clostridium perfringens* (a spore-former), can produce a toxin between 90 °F and 140 °F
 - Be sure to cool hot items quickly (within 1 hour) to below 90 °F
 - For large quantities of hot items, including sauces, broth, and soup, place into small containers and be sure to stir often while chilling
 - Be sure to keep hot items above 140 °F
 - Beware of the many hours-old rotisserie chicken at the grocery if it is not hot
 - Beware of steam table (buffet) items in which you don't see steam or heat being effectively maintained – the buffet could become a pathogen-incubator!!!

Tidbits On Food - #6

Knowing Too Much Can Help Liven Up A Dinner Party

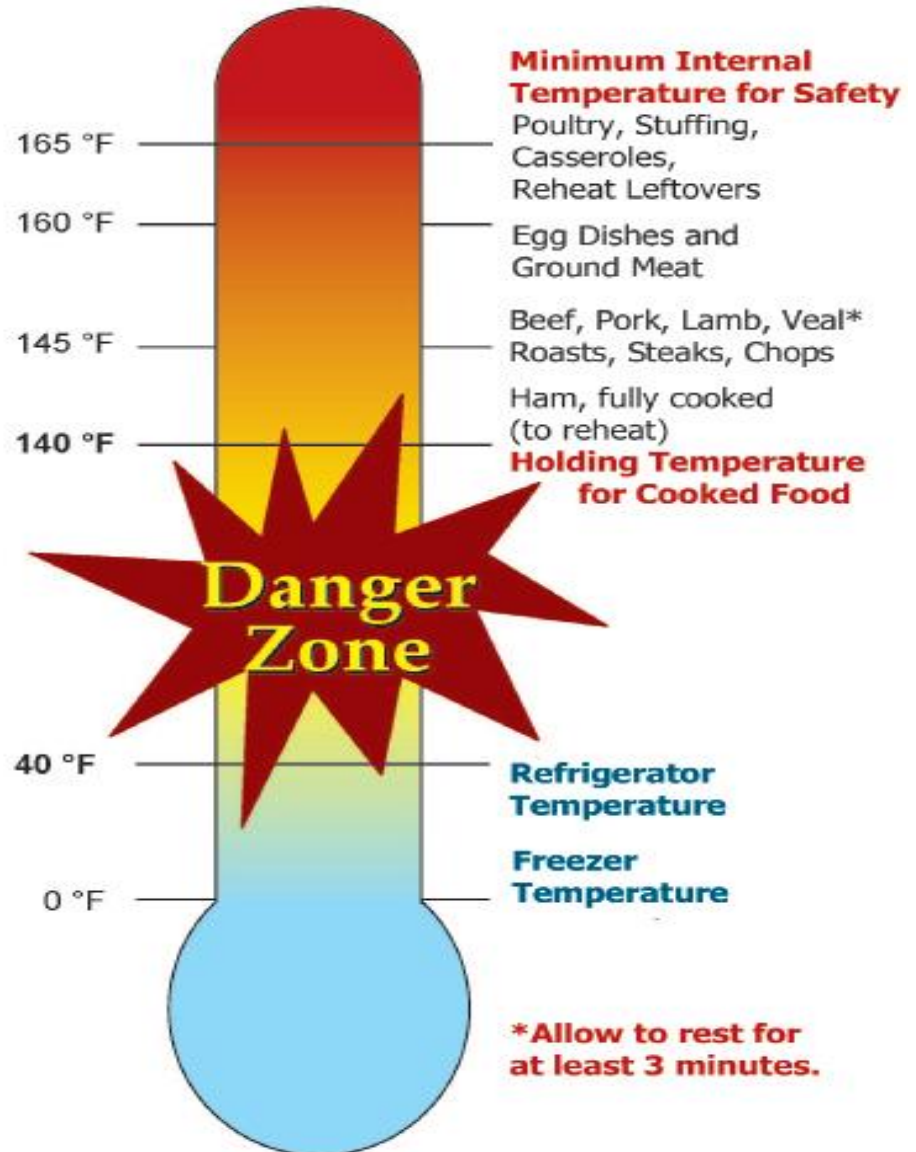
- Why are eggs in the grocery refrigerated but the eggs at the farmers market or local farmer typically are not – what's the deal?
 - On rare occasions, the ovary of some hens become infected with *Salmonella* Enteritidis
 - This bad bug is deposited in the egg white, which lacks nutrients for growth
 - Over time, the egg white membrane thins and the bad bug contacts the nutrient-dense yolk and begins to rapidly grow
 - Refrigeration of the egg at 45 °F within 36 hours after lay prevents growth
 - Buy refrigerated eggs and be sure to store them in the refrigerator
 - When cooking a table (shell) egg, be sure the white is cooked firm
 - Farmer's market or local farm eggs often are not refrigerated because of their misunderstanding about egg safety
 - Don't buy unrefrigerated eggs!
 - Of note, virtually no other country in the world requires eggs to be refrigerated; their public health data reflects a higher incidence of illnesses
 - If you must use liquid egg in a recipe that calls for nominal or no cooking, use the liquid pasteurized egg product available at the grocery – it is safe and ready-to-eat

Food Safety

Brief lesson on microbiology (continued)

Microorganisms are ubiquitous in the environment and can rapidly multiply in numbers when at a conducive temperature/time and in the presence of available nutrients

- **Temperature/time** must be addressed before, during, and after handling food for consumption:
 - The “Danger Zone” is real!
 - Although microorganisms multiply between 40 °F and 140 °F, they also die in a predictable manner
 - Destruction occurs above 140 °F
 - Always verify the internal safety of food by use of a food thermometer



Tidbits On Food - #7

Knowing Too Much Can Help Liven Up A Dinner Party

- Can I prepare moist, cooked meat that's safe?
 - Yes, but you have to know how to do it; it's not magic!
 - Cooking to a lower temperature for a longer time – termed “rest time” -- equates in safety to a higher temperature for a shorter time
 - A beef/lamb/pork cut of meat (chop, steak, or roast) cooked to the same recommended safe temperature for ground meat (i.e., 160 °F), results in a “well” degree of doneness and will be dry
 - To get a more moist but safe cut of meat (e.g., “medium rare” degree of doneness), cook the cut to 145 °F and let rest 3 minutes before serving
 - In thick cuts of meat (greater than 1 inch), removing the cut from heat at 5 °F – 10 °F before the desired internal end temperature is safe because the internal temperature will continue to rise during the 3 minute rest time
 - For pork lovers, *Trichinella spiralis no longer* is a likely contaminant in commercially raised pork; thus, you don't have to overcook it to kill the parasitic worms like grandma used to do!
 - You still should cook your ground meat to 160 °F, or order it well done
 - Ground meat has a higher likelihood of having pathogens spread throughout whereas the cuts generally have contamination only on the surface where the heat more directly kills the pathogens (NOTE: Tenderized cuts of meat are more likely to have contamination spread internally and should be cooked to a higher temperature than their counterparts)
 - Cooking in the presence of moisture creates steam that is more destructive to microorganisms than cooking in a dry environment

Tidbits On Food - #8

Knowing Too Much Can Help Liven Up A Dinner Party

- Why can't I rely on color of cooked meat for safety?
 - The chemistry of red meat from beef, lamb, or pork is adversely affected by light and air (oxygen), which causes red meat color to turn brown – the same color as cooked meat!
 - More than one child's death has occurred because the parent thought the hamburger patty on the plate waiting to be grilled had been cooked when, in fact, it was still raw
 - Also, once a package of red meat is opened and exposed to air (even if in the refrigerator), the exposed meat will turn brown – still, it is perfectly safe to use
 - Unfortunately, the chemistry of red meat also is affected by added ingredients, including smoke, causing the color to turn pink/red
 - No matter how much you cook the meat, the meat will look undercooked or have raw appearing portions
 - Solution -- use a food thermometer to verify the safe internal temperature of all cooked meat!

Tidbits On Food - #9

Knowing Too Much Can Help Liven Up A Dinner Party

- Why can't I rely on color of cooked poultry for safety?
 - Cooked poultry may retain a pink/bloody coloring along with a rubbery texture even when the safe internal temperature of 165 °F for poultry is attained
 - Letting the pink/bloody colored cooked poultry rest before serving may help with any coloring/texture concerns; however, cooking to a higher temperature also will alleviate the concern and can still result in a moist product
 - Use a food thermometer to verify the safe internal temperature of cooked poultry!

Food Safety

Brief lesson on microbiology (continued)

Microorganisms are ubiquitous in the environment and can rapidly multiply in numbers when at a conducive temperature/time and in the presence of available nutrients

- ***Available nutrients:***

- Just because moisture may be present in food, not all moisture is readily accessible to microorganisms for their survival
 - Water activity (a_w) is the food technologist term for available moisture
 - Most foods have water activity above 0.95, sufficient to support growth
 - Water activity can be reduced to a point to inhibit growth either by drying or adding salt or sugar to bind the water molecules (i.e., preservation)
- Acidity of the food also affects microbial growth
 - Microorganisms grow best at a neutral pH (6.5 – 7.0); most do not grow well at an acidic pH of 4.6 or below
 - Acidic conditions destroy the protein structure of the microorganisms
 - Vinegar and citric acid, such as from lemons and limes, effectively lower pH of foods
- Properly cleaned surfaces, including counter tops and hands, are absent of nutrients for microorganism growth
 - Soap, combined with running water and vigorous rubbing, causes microorganisms to loosen their grip and rinse away
 - Proper cleaning means rubbing your hands together in soap for at least 20 seconds; practice, practice, practice...

Tidbits On Food - #10

Knowing Too Much Can Help Liven Up A Dinner Party

- Why should my retired mother or my pregnant sister purchase the pre-sliced/packaged deli meats and **not** the freshly sliced meats?
 - The pre-sliced/packaged deli meats are inspected; the deli slicing is not!
 - The retail deli environment is the optimal bad bug hangout
 - The slicers may not be thoroughly cleaned between each use, especially if ready-to-eat and raw foods are both handled
 - The temperature of the deli meat and deli cases are not well monitored and maintained to limit growth of bad bugs
 - The deli area has a lot of moisture in the air, coolers, and on the floor
 - Importantly, adverse illness and death have been scientifically demonstrated to be significantly higher when freshly sliced products are purchased in lieu of the inspected, pre-sliced/packaged products
 - Importantly, people that are 63 years and older also are scientifically demonstrated to have immune systems that are less effective in warding off *Listeria monocytogenes*, and infected pregnant woman usually abort

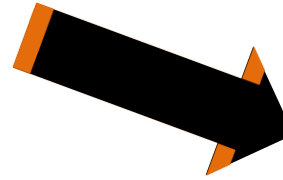
Tidbits On Food - #11

Knowing Too Much Can Help Liven Up A Dinner Party

- How do I put all this food science/microbiology together and use it in my everyday life to be food safe?

- Remember these 4 key food safety steps:

- **Separate** – don't cross-contaminate
- **Chill** – refrigerate promptly
- **Cook** – cook to the right temperature
- **Clean** – wash hands and surfaces often



Tidbits On Food - #12

Knowing Too Much Can Help Liven Up A Dinner Party

- Food product labeling seems rather non-transparent even though it is supposed to be truthful and not misleading
 - What does “Wynqz” mean?
 - Since a product labeled as a “wing” must contain the white muscle from a poultry wing, and most Buffalo Wing appetizers purchased at restaurants typically are not made solely from wing material, “Wynqz” was devised
 - Denotes a product in the shape of a wing or a bite-size appetizer
 - The ingredient statement must say what “white” meat (with/without skin) is used
 - NOTE: Restaurant menus are not regulated like product labels

Tidbits On Food - #13

Knowing Too Much Can Help Liven Up A Dinner Party

- Food product labeling (continued)...
 - What does “***organic***” mean?
 - Product was produced without excluded methods (e.g., genetic engineering, irradiation, or sewage sludge)
 - Product was produced using allowed substances
 - NOTE: The “allowed” list is 19 printed pages, and the list of “yet to be reviewed and approved” is many, many more pages...
 - Production is overseen by a USDA National Organic Program-authorized certifying agent, for a fee
 - Importantly, organic product is not safer than the non-organic counterpart

Tidbits On Food - #14

Knowing Too Much Can Help Liven Up A Dinner Party

- Food product labeling (continued)...
 - What does “natural” mean?
 - A product containing no artificial ingredient or added color and is only minimally processed
 - Minimal processing means that the product was processed in a manner that does not fundamentally alter the product, and the processing is something that typically can be performed in the home
 - In reality, the term is used on virtually all product and consumers have expressed that they want the term to mean many things other than minimal processing and no artificial ingredients
 - Most of the things consumers have said they think the term means, cannot be enforced or verified, and there are no uniform standards established
 - Examples: “Produced with sustainable farming,” “raised outdoors,” “grass fed”

Tidbits On Food - #15

Knowing Too Much Can Help Liven Up A Dinner Party

- Food product labeling (continued)...
 - What does “***fat free***” mean?
 - Generally, most nutrient content claims are considered truthful even if there is a trivial or negligible amount of the designated nutrient present
 - By regulation, a fat free meat product must contain less than 0.5 grams of fat per labeled serving

Tidbits On Food - #16

Knowing Too Much Can Help Liven Up A Dinner Party

- Food product labeling (continued)...
 - What does “**Non-GMO**” mean?
 - The technical terminology is “non-genetically modified organisms”
 - GMO food products are created in a laboratory using genetic modification techniques
 - The U.S. government has concluded that peer-reviewed scientific studies show GMO products are as safe as their non-GMO counterparts, and their use has reduced worldwide application of pesticides
 - Still, there is worldwide consumer skepticism about the safety of GMO products
 - Much of the skepticism centers on industry being the primary advocate for the technology
 - Governments have accepted the technology as a viable solution to world hunger and food security

Post-Quiz – What You Should Have Learned Today

Test your knowledge

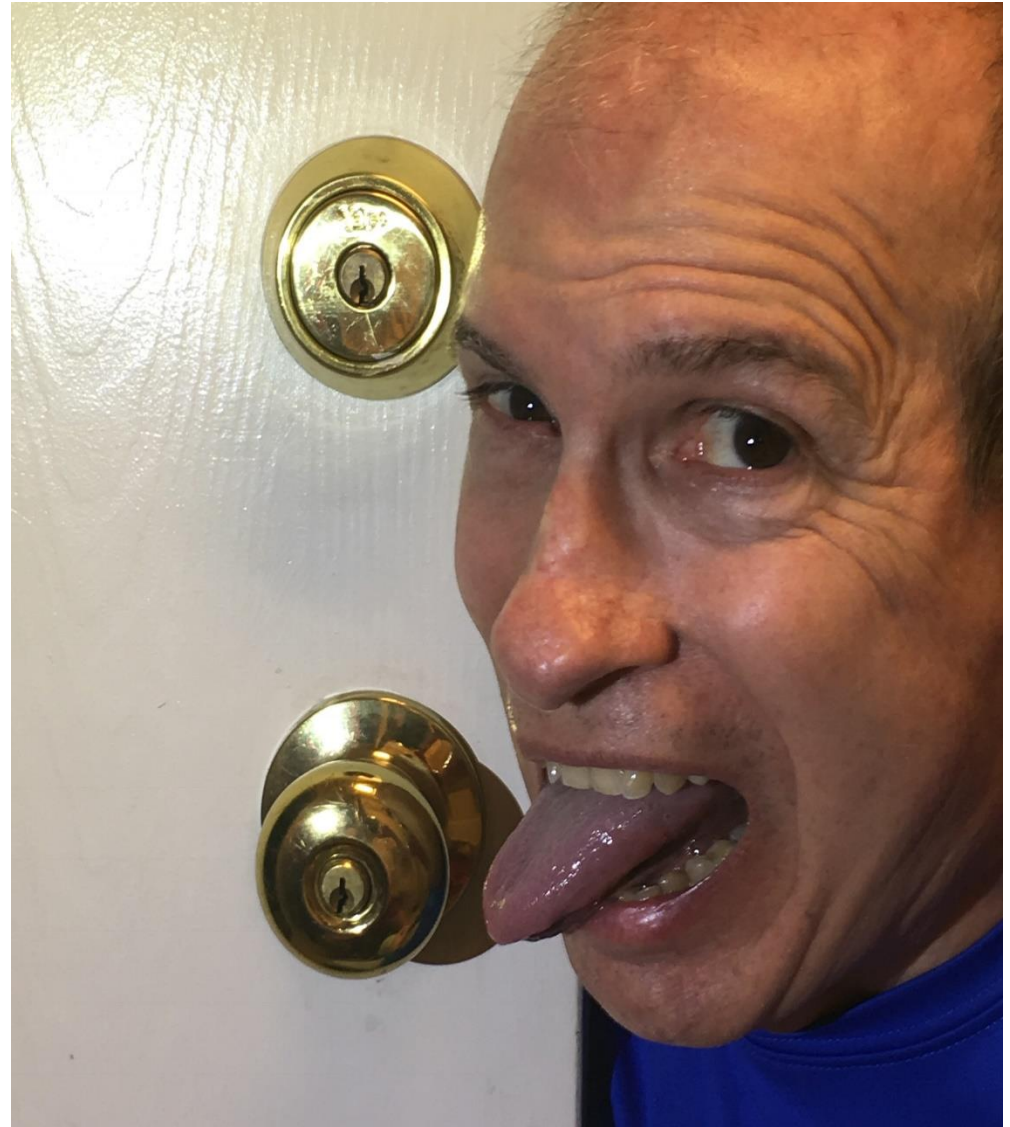
1. Which president was the first to recognize a need to address widespread food poisoning in the food supply?
2. Which book/author inspired the national food inspection system now authorized by the Federal Meat Inspection Act?
3. Which food presents the highest risk for *Salmonella* infection, based on a recent study of prior foodborne outbreaks?
4. Shelf-life guidance for most foods is premised upon the presence of which type of microorganism in the food?
5. Rapid growth of pathogens (a doubling of numbers) can occur how frequently when the food is temperature abused?
6. Ground beef is safe at which temperature/time combination?

Tidbits On Food - #17

Knowing Too Much Can Liven Up A Dinner Party

Remember...

- Be food safe
- Stay informed
- Add a little dirt in your life!



Your Questions...

My Answers...

Thank you!