

Processed Foods and Food Processing

the crap we eat and how we make it

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Outline

- Processed foods
- Food processing
- Food additives

Processed Foods

Ground Beef

- Beef finely chopped in a meat grinder
- Different names, different rules....
 - Fat can be added to hamburger, but not ground beef (even though really the same thing)
- No more than 30% fat by weight is allowed in either hamburger or ground beef
- Made up of tougher meat and left-over meat
 - 17-18% of US ground beef comes from dairy cows

Ground Beef



Ground Beef

- “Food safety of ground meat issues are due to possible bacterial contamination. Undercooked Jack in the Box hamburgers contaminated in this manner were responsible for four deaths and the illness of hundreds of people in 1993.”

– Wikipedia

- Because of this, they now irradiate ground beef

Hot Dogs

- Prepared by mixing all the ingredients (meats, spices, binders and fillers) in large vats
- Rapidly moving blades grind and mix the ingredients
- This mixture is forced through tubes into casings
- Finally, they're cooked
 - Hot dogs can be eaten cold, right out of the package
- What is really in a hot dog?

Food processing

History

- Food processing has been around since prehistoric ages
 - Preserving with salt
 - Cooking
 - Roasting, smoking, steaming, or oven baking
- These were pretty much the only methods until the 1800s
- Modern food processing techniques are primarily the result of military needs

History

- 1809 - vacuum bottling
- 1810 – canning
 - Initially hazardous due to the use of lead in the cans
- 1862 – pasteurisation
- Early 20th century:
 - Spray drying
 - Freeze drying
 - Artificial sweeteners and colourants
 - Preservatives

History

- Late 20th century:
 - Dried instant soup
 - Reconstituted fruit juice
 - Self-cooking meals
- 20th century saw a rise in the pursuit of convenience (aka laziness)
- This brought about the success of frozen foods (like TV dinners)
- Still drives the food processing industry today

Canning

- Developed to store food for soldiers
- It took another 20 years for the can opener to be invented
 - Soldiers would open cans by slicing them with bayonets or by smashing them against rocks
- Initially a slow process
 - Cans were hand-made
 - Took up to six hours to cook
 - This made canned food expensive
 - Eating canned food was a status symbol

Canning

- Initially used lead soldering on the cans
 - Obviously, this is a bad idea
- Initially, cans weren't air-tight
 - This could lead to bacteria growth
 - Could get botulism
- In the 1860s, canning started becoming more prevalent and techniques improved
 - Now only took 30 minutes to cook

Canning

- Demand spiked in WWI, as armies looked for ways to feed soldiers
 - In 1917, to boost morale, started seeing the first “meals in cans” (instead of things like corned beef)
- Now use tin-coated steel
- Double-seaming allows for air-tight cans
 - Keeps bacteria out and contents in

Mechanically Separated Meat

- Paste- and batter-like meat product
- Produced by forcing beef, pork, or chicken bones (with attached edible meat) under high pressure through a sieve
- Concerns in the 80s with British beef
 - Bits of spinal cord most likely to contain BSE
 - Spinal cord and brain tissue often got mixed in
 - In 1989, UK tightened restrictions to not allow pieces of spinal cord in beef

Irradiation

- Expose food to ionising radiation
- Destroys micro-organisms, bacteria, viruses, or insects
- Sometimes called cold pasteurisation
 - This is really a misnomer
 - Probably to make it sound a bit friendlier...
- Currently permitted in 40 countries

Irradiation

- It's quite effective
 - Can remove all harmful bacteria
 - Can reduce microbial counts by several orders of magnitude
- This prolongs shelf-life
- Remember I said insects above?
 - USDA has approved irradiation as an alternative to pesticides

Irradiation

- Studies have been performed since the 1950s
- Some have demonstrated adverse effects of irradiation, but there's not constant pattern
- So irradiation, in small, controlled doses, is deemed safe by many organisations
 - UN Food and Agriculture Organisation (FAO), International Atomic Energy Agency (IAEA), World Health Organization (WHO), International Consultative Group on Food Irradiation (ICGFI), Food and Drug Administration (FDA)

Irradiation

- Some groups still maintain that the safety of irradiation hasn't been proven
- Other concerns:
 - Irradiation used to cover up poor food quality, working conditions, sanitary conditions, and food-handling techniques
 - Worker safety
 - Generally used safely
 - Have been incidences in 1975, 1982, and 1989 when serious radiological accidents occurred
- Best alternative: good agricultural practices

Food Additives

Sodium Benzoate

- Common preservative (found in all sorts of things, like Coke and Oreos)
- When combined with ascorbic acid (vitamin C), sodium benzoate can form benzene
- Benzene is a known carcinogen
- So... don't eat Oreos with orange juice!

Monosodium Glutamate

- Flavour enhancer
- Side effects
 - Burning sensation in the back of the neck, forearms and chest
 - Numbness in the back of the neck, radiating to the arms and back
 - Tingling, warmth and weakness in the face, temples, upper back, neck and arms
 - Facial pressure or tightness

Monosodium Glutamate

- Side effects
 - Chest pain
 - Headache
 - Nausea
 - Rapid heartbeat
 - Bronchospasm (difficulty breathing)
 - Drowsiness
 - Weakness
 - Sweating

Monosodium Glutamate

- Glutamic acid is an excitotoxin
- “While they agree that typical use of MSG does not spike glutamic acid to extremely high levels in adults, they are particularly concerned with potential effects in infants and young children[23] and the potential long-term neurodegenerative effects of small-to-moderate spikes on plasma excitotoxin levels”

– Wikipedia

Aspartame

- Artificial sweetener
 - Found in diet soft drinks
- 92 different symptoms reported
- 10% of aspartame converted into methanol in intestine, which is then converted into formaldehyde
 - Exposure to very low levels of methanol and formaldehyde are known to cause chronic toxicity

Aspartame

- 50% of aspartame is phenylalanine
 - Potential neurotoxin
 - Especially concerned with foetal brains
 - Could cause seizures as well
 - Aspartame causes a spike in phenylalanine blood plasma levels
- Remaining 40% converted into aspartic acid
 - In high concentration acts as an excitotoxin
 - Aspartame causes a spike in aspartate blood plasma levels

Aspartame

- Aspartame breaks down in products to form aspartylphenylalanine diketopiperazine
- Six months after aspartame is added to a soft drink, 25% will become DKP
- DKP could undergo a nitrosation process in the stomach to form a type of chemical that can cause brain tumours

Aspartame

- Dodgy FDA approval process
- Goyan, head of FDA, refused to legalise it
- In 1981, on the first day of Reagan's presidency, Goyan removed from power and replaced by Hayes
 - One year later, Hayes legalises aspartame
- The CEO of G.D. Searle & Co, the company producing aspartame, was a known Reagan supporter
 - None other than Donald Rumsfeld

Aspartame

- In 1983, Hayes under fire for accepting corporate gifts
 - Quits as head of FDA
 - Joins Searle's public relation firm as senior medical advisor
- Aspartame renamed to NutraSweet
- Monsanto purchases Searle
 - Rumsfeld receives a \$12 million bonus

Aspartame

- In 1991, stevia, aspartame's main competitor, is banned
 - Several members of FDA board quit after this
 - They were all hired at NutraSweet in higher paying jobs

Other Fun Facts

- “In modern times, the decomposition process takes a little longer than it did in the past, due to all the preservatives we consume.”

– HowStuffWorks.com

- “Hamburgers and French fries could be as addictive as heroin, scientists have claimed.”

– BBC News

Acknowledgements

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