

FOOD PRODUCTION : PROCESSING

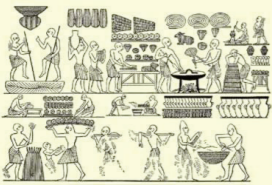
GENERAL HISTORY OF FOOD PROCESSING

TECHNICAL INVENTION

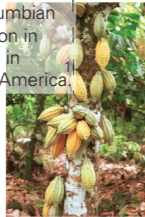
PRODUCTS AND COMPANIES



2000 BC
Egyptian and Sumerians learned the process of fermentation, baking bread, distilling beer and produce cheese.



1500 BC
The cacao tree was first cultivated by the Olmecs (the first major Pre-Columbian civilization in Mexico) in Central America.



1692
First meat packing business. John Hynchon, from Springfield (Massachusetts), began buying hogs and shipping the meat to Boston for the growing city population and the provisioning of ships.



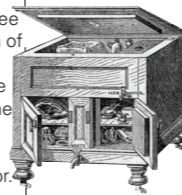
1809
In France Nicolas Appert invented a vacuum bottling technique. His solution was to put food in bottles, food could be preserved if it is heated to boiling and sealed in airtight glass jars.



1824
British inventor James Sharp patented a gas oven, which was the first somewhat successful gas oven to appear on the market.



1834
Jacob Perkins, an Anglo-American inventor a way to achieve free circulation of water in boilers. He realized the first domestic refrigerator.



1851
Dr. John Gorr, an early pioneer in the invention of the artificial manufacture of ice, refrigeration, and air conditioning, was granted the first US Patent for mechanical refrigeration.



1862
Louis Pasteur discovered pasteurization, important for the micro-biological safety of food. It consists in a process of heating food to a specific temperature for a definite length of time and then cooling it immediately.

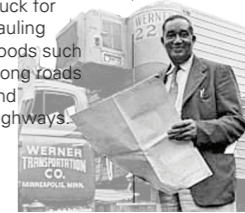


1920
Clarence Birdseye invented the technique of frozen food. While he was working in Labrador for the US government at -40° found that the fish froze almost immediately and, upon thawing, was still very fresh.

1920
Modern rail transport systems first appeared in England. These systems, which made use of the steam locomotive, were the first practical forms of mechanized land transport, and they remained the primary form of mechanized land transport for the next 100 years.³



1949
Frederick McKinley Jones patented the first refrigerated tractor trailer truck for hauling goods such as along roads and highways.



1967
Refrigerated railroad car patented by J. B. Sutherland from Detroit, Michigan. He designed an insulated car with ice bunkers in each end.



500,000 BC
Primitive men build their first cooking place, a hearth. Food was cooked by drop the embers, later stone grills were used.

500 BC
The Mediterranean population learned how to marinate and smoked food, and how to store it in brine.

1490
In Alsace, in France the first oven was built made of bricks and tile, including the flue.²



1776
In London was built the first modern food industry. It was a steam mill that grinded the grain.

1805
Oliver Evans (called "father of the refrigerator") invented the vapour compression refrigeration machine.



1893
In Great Britain the first electric toaster was produced by the company "Crompton and CO."



1946-7
In the United States Percy Spencer realized the first microwave oven.



4000 BC
In the middle East Sumerian started to produce butter, work milk. Egyptians grew grapes and produced wine.

2000 BC
Chinese invented pasta. They were made from two varieties of millet which was highly cultivated throughout Chinese history.⁴



100 BC
The first recorded sandwich was by the famous rabbi, Hillel the Elder. He started the Passover custom of sandwiching a mixture of chopped nuts, apples, spices, and wine between two matzohs to eat with bitter herbs.



1400
In Europe candles were produced for the first time by dipping fruits and berries in melted sugar.



1528
Hernan Cortes, returning from South Africa, brought the Aztec tradition of chocolate to Spain.⁵

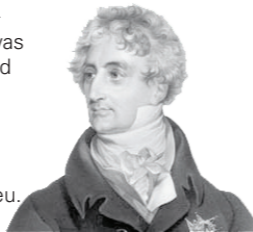
1536
The invading Spanish conquistadors "loved the Peruvians" potatoes, so they brought it back to Europe to impress royalty.

1615
Venice (Italy) received Europa's first shipment of green coffee beans from Africa.



1676
In Zurich was made the first recipe for cheese fondue, it was called "Kase mit Wein zu kochen".

1756
Mayonnaise was invented by the French chef of Duc de Richelieu.



1844
The Rochdale Society of Equitable Pioneers was considered the first successful cooperative enterprise, used as a model for modern co-ops.

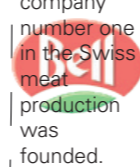
1845
Lindt started in a small pastry shop on Marktgasse in Zurich's old town. David Sprüngli and his son decided to make chocolate.

1848
John B. Curtis in USA made and sold the first commercial chewing gum called the State of Maine Pure Spruce Gum.

1867
Nestlé was founded. Vevey Henri Nestlé developed a milk-based baby food, and soon began marketing it.



1869
Bell, the company number one in the Swiss meat production was founded.



1886
Pemberton, a pharmacist, made the first syrup for Coca Cola. Initially it was sold as a medicine that cured many diseases, including morphine addiction, dyspepsia, neurasthenia, headache



1916
The American Clarence Saunders and his Piggly Wiggly stores developed the concept of self service grocery, and opened the first one in Memphis, Tennessee.

1890
In Olten founded the Swiss Association of Consumer Society. This consortium brings together unions Zurich, Grenchen, Bienne, Olten and Basel, which will be designated as co-coordinator.

1925
Migros was founded in Zürich as a private enterprise by Gottlieb Duttweiler, who had the idea of selling just six basic foodstuffs at low prices to householders who, in those days, did not have ready access to markets of any kind.

1946
Pilgrim's Pride, the chicken largest producer in the world, was founded in Pittsburg by Aubrey Pilgrim and Pat John

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1954
Gerry Thomas invented both the product and the name of Swason TV-dinner, that fulfilled two post-war trends: time-saving modern and the growing innovation of the television.



1964
The first Nutella jar was produced industrially.



1965
Aspartame was accidentally discovered by James M. Schlatter, a chemist. He was working on the production of an anti-ulcer and discovered the sweetness of the compound synthesized licking his finger that had been contaminated with aspartame.



SOURCE 1 <http://www.thenibble.com/reviews/main/chocolate/> 2 <http://inventors.about.com/od/ofamousinventions/a/oven.htm>
3 <http://totallyfreeimages.com/196442/Helensburgh-railway-station,-old-Ilwarrag-Railway,-New-South-W>
4 <http://news.discovery.com/history/ancient-chinese-dinner-archaeology.html> 5 <http://www.danielmutsu.com/hieronymus/index.blog?start=1231308059>

CHOCOLATE PROCESSING

RAW MATERIAL - CACAO BEANS



Cacao is the dried and fully fermented fatty seed of the plant *Theobroma cacao*. Roughly two-thirds of the entire world's cocoa is produced in West Africa, with 43% sourced from Côte d'Ivoire, where child labor is a common practice to obtain the product.

100 = 0.5kg
hundred

ROASTING



The cacao beans pass to the first step in flavour development at the factory: roasting. There are two approaches to roasting: roast the beans for a short time at high heat, which produces a strong chocolate flavour but eliminates any subtle, floral notes, or roast the beans for a long time at low heat, which allows the more delicate flavours to come through but sacrifices the big, chocolate flavour.

120°-160° for 5-35 minutes

WINNOWING - MILLING



The beans are put through a winnowing machine which removes the outer husks or shells, leaving behind the roasted beans, now called nibs. The nibs are ground to a thick, rich paste called chocolate liquor. This liquor is the foundation for all chocolate products, and at last begins to resemble and smell like conventional chocolate.¹⁰

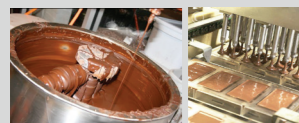
REFINING - CONCHING



The mixture travels through a series of heavy rollers which press the ingredients until the mixture is refined to a dry flake. Additional cocoa butter and a small amount of emulsifying agent are added to the flake and then mixed to make a smooth paste. Conching further develops flavour by putting chocolate through a kneading process. The conches, the machines, have heavy rollers that low back and forth through the chocolate.

conching time: 6-24 hours

TEMPERING - MOULDING



The mixture is then tempered, or passed through a heating, cooling and reheating process. Tempering allows you to solidify chocolate in a way that keeps it glossy. The mixture is then poured into moulds and cooled in a cooling chamber.

PACKAGING



Once cooled, the chocolate is demoulded, packaged for distribution and sent around the world in shops. shelf life: 2 years⁹

PASTA PROCESSING

RAW MATERIAL-DRUM WHEAT



time between planting and harvesting: 5-6 months

Wheat durum is the hardest of all wheats. Its density, combined with its high protein content and gluten strength, make durum the wheat of choice for producing pasta. The two biggest producers are Western Europe and North America.

CLEANING



Cleaners remove weed seeds, dirt and other extraneous material through machines which separate by size (separator), specific gravity (destoner and gravity table), and shape (indented cylinder). Frictional cleaning equipment (scourers) scours the surface of the kernel, removing the outermost layers of the bran.

TEMPERING



During tempering, water is added to toughen the outer bran coats for easier separation from the endosperm. Tempering also mellows the endosperm for grinding. Traditionally, durum wheat is tempered for a relatively short time.

time: 9-10hours

MILLING PROCESS



Milling is a process of grinding and separating. Grinding is done on break rolls, sizing rolls and reduction rolls. Separation is done using machines called sifters and purifiers. A durum mill has an extended break system in which grinding is relatively gradual. The endosperm is released in coarse granular form rather than as flour.

MIXING - EXTRUSION



Semolina is mixed with water to form a lumpy dough. The dough is not fully developed until it passes from the mixing chamber into the extruder. Dough is forced through various shaped dies, under very high pressures, to produce a wide range of different shapes of pasta products. The extrusion chamber is designed to draw off heat generated by the pressure and friction created during the extrusion process. To prevent the pasta from sticking together in the drying process, pasta is subject to a blast of air immediately after extrusion.

time: 20minutes⁶

DRYING - PACKAGING



time for drying: 3-8 hours
shelf life: 8-10 years

COOKING - PREPARING



Shops, supermarket and companies buy the pasta, cook it and prepare ready meal, that can be already warm, or frozen. Usually they come in an individual package. It requires very little preparation and contains all the elements for a single-serving meal for one or more person.



Nutrition Facts	
Meat balls with tomato sauce and spaghetti with olive oil. Serving size for 2 person (450g)	
Amount per Serving (100g)	
Calories	370
Cost	5.70 Fr
Expiration date	in 3 days
Packaging date	the same day
Product brand	Coop supermarket

ORANGE JUICE PROCESSING

RAW MATERIAL - ORANGES



The 85% of the world orange cultivation comes from Brazil and Florida(USA). Selection of oranges for juice is made on the basis of factors such as variety and maturity of the fruit. The fruit contains natural materials that contribute to the consistency of the juice, including water, sugar, organic acids and flavour compounds. time: 5-6 months to mature

CLEANING AND GRADING



The fruit must be inspected, graded and washed with a detergent as it passes over roller brushes. This process removes debris and dirt and reduced microbes. Oranges are then rinsed and dried.

EXTRACTION



There are 2 automated methods for juice extraction :1)The fruit is placed between two metal cups with sharpened metal tubes at their base. The upper cup mesh to express the juice as the tubes cut holes in the top and bottom of their fruit. 2)Fruits are sliced as they pass by a stationary knife and then halves are travel around the convey line where rotating reamers express the juice.

RECONSTRUCTION - PASTEURIZATION



The concentrate is dilute with water and additives are add for preservation, antioxidant, sweeteners and extra vitamin. 2 Methods for pasteurization (85°-94° for 3sec). 1)The juice passes through a tube next to a plate heat exchanger.2)Hot pasteurize juice is used to preheat incoming unpasteurized juice.

30-35% discard part of an orange

PACKING - FILLING



To ensure sterility the pasteurized juice should be filled while hot. Packing which can not stand high temperature must be filled in sterile environment. After filling, the containers are cooled as fast as possible. shelf life: 6-8months

MEAT PROCESSING

PHASE 1

time: 8 months
weight: 250 kg



The calf graze on rangeland or immature fields of grain such as green wheat pasture. They are owned in smaller groups by individual. Once cattle obtain an entry-level weight they are moved to another lot.
- 20-25 l of water a day
- reuse of manure as fertilizer

PHASE 2

time: 3-4months
weight: 350-450 kg



The calf is sold to a stock operator who grows the animal in weight, also here grass is the source of food.
- \$ 1.6/day per head
- 50 -70 l of water a

PHASE 3

time: 120-180 days
weight: 500-550 kg



Cattle live the last days of their life in feedlots. They have a really high energy diet based on corn and grain. When they weight around 550 Kg they are ready for slaughter.
- 110 - 130 l of water a day
- 45 kg feed every day
- around 38 l milk

SLAUGHTER PROCESS 1



time: 400 cattle per hour⁸

Cattle are killed using a pistol to the front of their head or applying an electric shock. Then they are hung upside down. Head, feet and skin are removed. Internal organs are separate and inspected for internal parasites and signs of disease. Carcass are subjected to intervention to reduce level of bacteria by: steam or hot water or organic acid.
- 45-50% meat
- 15% waste
- 45-50% other products

SLAUGHTER PROCESS 2



time: 12-24 hours

Carcasses are cut into halves and washed with high temperature water to reduce bacteria. It is then moved along the rails to a refrigerated room for some hours. At intervals throughout the chilling process, the carcass is sprayed with a diluted chlorine solution to kill bacteria. After the half carcasses are cut into the forequarters and the hindquarters.
- recycled products:
bones=fertilizer, skin=gelatin, fat=perfume

PACKAGING



shelf life: 70-80 days for vacuum packaging.⁷

In packaging by the boxed beef method, the cuts are put into plastic shrink bags. They are then sealed and vacuum-packed by a machine that removes the atmosphere around the beef, that prevents bacteria growth and spoilage. The packaged beef is then boxed and shipped out to shops and grocery stores.
- waste of plastic bags

COOKING - PREPARING



Meat ready meals are commercially prepared for ease of consumption. They can be sold as hot, ready-to-eat dishes, as room-temperature, shelf-stable products; or as refrigerated or frozen products that require minimal preparation (just heating).

6 http://www.freshpastamachines.co.uk/pasta_extrusion.html 7 <http://www.beefresearch.org/CMDocs/BeefResearch/Beef%20Shelf-life.pdf>
8 <http://www.ericsecho.org/investigation2.html> (By the early 1990s, the Monfort plant slaughtered as many as 400 cattle an hour)
9 Boyer, Renee , and Julie McKinney. "Food Storage Guidelines for Consumers." Virginia Cooperative Extension (2009): n. pag. Web. 7 Dec 2009.
10 Ariyoshi, Rita. "The Rarest Chocolate in the World - Surprise: It's made in Hawaii". Spirit of Aloha. Archived from the original on 2007-10-18.