

History

A fast forward history of meat processing

The meat industry is one of the oldest producing industries in the world

The journey of the food category we know as sausage began back in the 13th century B.C., when ancient people first began using salt to cure and preserve meat. Before any discussion of modern processing technologies and formulation variables in a following part of this article, it is useful to sidestep the future and indulge in the history of how sausage made its journey across time and around the world in this first part.

By Henk Hoogenkamp

The story of sausage is a tale of inspiration, innovation, and intestines. The cylindrical-shaped food was invented as a means to use the leftovers of an animal's primary muscle meat cuts, which were preserved in animal casings with the use of curing salts, smoking and cooking. Starting from a recipe of meat, fat and basic condiments, people developed thousands of varieties of sausage, many of them having survived from the earliest days until today.

Climate, religion, and availability of various local ingredients were important contributors to many regional recipes. Thus, sausage has become a true cultural "link" to the world of contemporary consumers, who are eating food products that have been passed on from generation to generation. An anthropological *déjà vu!*

An origin in antiquity

Some 12,000 years ago, at the end of the last ice age, domestication of animals began in the Mideast. Meat traders and butchers settled in towns and villages about 8000 years ago, with the earliest appearances of slaughterhouses in Egypt some 4,000 years ago. Archaeological records indicate that the ancient Babylonians, whose civilization began around the 18th century B.C., created a sausage by stuffing pig intestines with a meat mixture that was roasted over an open flame, making sausage one of the oldest forms of processed food in history.

The story of sausage is truly

remarkable. By 589 B.C., the Chinese had perfected a kind of semi-dried sausage called lup-cheong, contained small pieces of lamb, salt, sugar, green onions, pepper, wine and soy. In the later dynasties, lup-cheong sausage also contained pork. Since the Chinese did not really care for the acidic flavours associated with fermenting lactic acid bacteria in dry sausages, they used about 10% sugar and 2% crude salt to act as flavouring and preserving agents. After stuffing in a 25 mm casing, lup-cheong was dried over a charcoal fire for up to six hours and afterwards ripened for a week. Then it was sliced and eaten with steamed rice and stir-fried vegetables.

About 700 B.C., the Roman Empire became more sophisticated with the development of salted meats and sausage, which were needed to feed its soldiers as they travelled over hundreds of miles. Come to think of it, sausage was probably the first "fast food," ideal for long-distance distribution, rapid preparation, as well as keeping an army happy and healthy during the expansion

of the empire into Western Europe.

During the Middle Ages, most of meat trading was conducted among European countries. The first shipment of live cattle from the United States to Europe did not occur until 1868. However, international meat trade was truly transformed with the development of chilling and freezing systems. In 1875, the first shipment of chilled meat from the USA arrived in the UK.

Thousand of years ago, the Egyptian dynasties, the Babylonians, the Greeks and the Romans were eating sausage varieties that later became classic products the world over. Although exact records don't exist, the original sausages most likely were blood sausage, liver sausage and coarse-ground cooked sausage. Traditional emulsified sausage and dried, fermented sausage are more recent developments, which are considered to be of European origin.

In North America, a widespread practice was cutting up dried meat into small pieces and mixing them with dried berries and animal fat. This combination was pressed into a cake called pemmican. The way the Aztecs processed meat was also interesting. The original "machada," a form of dried beef, was crushed and shredded by stones until only fine meat fibers remained.

It is likely that preserving

whole-muscle meats preceded sausage-making. The Armenians are credited for preserving whole-muscle meats in a way that has now evolved into the famous delicacy known as pastrami. Literally translated, pastrami means "pressing," and the product is made from cured, whole-muscle mutton or beef. The evolution of pastrami began in Armenia but travelled to Turkey before becoming popular in the United States. The original word in Turkish was "basmak," which became "bastimak." From there the word evolved into pasterma and pastrima, or pressed meat. This word dates back to ancient times, when salted, whole-muscle cuts were transported on the sides of horses, literally bouncing out excess water, drying and preserving the meat.

Meat preservation by fermentation, or lowering the pH, has been done for at least 2,000 years. During ancient times, the Egyptians utilized indirect acidification. They stuffed chopped, flavored meat into animal intestines. The naturally occurring bacteria in the meat multiplied and consumed carbohydrates, producing lactic acid. Storing the sausage in a cold place, with drying and lowering the pH, produced a stable final product.

A spicy story

The evolution of spices intimately linked with the development of sausage. In fact, spice trading has flourished for many centuries, and the search for exotic spices and herbs led to the discovery of new trade routes well before the Middle Ages. Spices were highly valued and, apart from being used for flavouring and colouring or as preservatives (antioxidants), our ancestors knew about the medicinal uses of certain spices and herbs to combat a range of diseases. Actually, modern pharmacology and apothecary traces its origins to the remedies provided



Traditional sausages are coarse ground meat mixtures.

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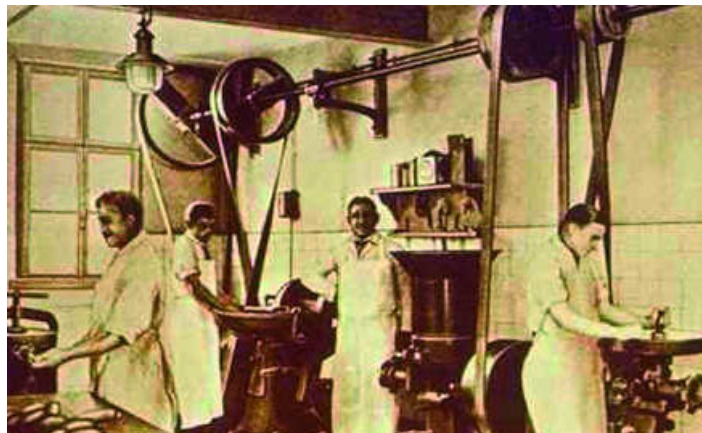
by spice plants and herbs.

With the exception of mortadella, traditional Italian sausages are coarse ground meat mixtures and known under tantalizing names such as Coppa, Genoa salami, Ciauscolo, and Sopressata. Italian sausage can be uncured, cured, cooked or fresh, using pork as the main or only source of muscle meat. Besides pepper, anise, fennel or caraway seeds are most often used for the main varieties of Italian sausage.

In broad terms, spices can be defined as dried plant products used primarily to season food. Spices and herbs are thus closely associated. Herbs are the dried leaves and stems of soft-stemmed plants. Herbaceous plants usually grow in moderate climates, whereas, spices generally are cultivated in tropical regions. For meat and poultry formulas, spices and herbs are the basis of a wide variety of seasoning blends, such as curry powder or chilli powder. Industrial seasoning blends often contain spice extracts mixed with sugar that acts as a carrier. Additionally, essential oils that are aromatic, volatile spice components, and oleoresins that are solvent extracted ground spices, bring characteristic flavour and aroma to processed meat.

Mankind has used spices and herbs in numerous applications: medicinal use, embalming preservatives, perfumes, cosmetics and in food and meat products. Documented use of spices and herbs dates back to ancient countries such as China, India, Roman, Greek, Mesopotamia and Egypt. By 600 B.C., the Arabians had organized lucrative spice trade routes from the Orient to the Middle East and Europe.

The secrets of spice-growing technology were carefully restricted to the inner circle of the Arabian traders. In 40 A.D., the Romans wrote about the culinary wonders of spices, ranging from flavour enhancement to preservation to digestive aids. With the demise of the Roman Empire, spice usage declined; a culinary resurgence did not occur until the 12th century. For example, mustard is an ancient



Technological breakthroughs, such as the introduction of steam-powered equipment in 1880 turned meat processing to an industrial size.

seasoning favoured by the Romans, who introduced it throughout the lands they conquered. Many centuries later, the British developed a method to mill mustard seed into a fine powder, and its usage increased dramatically.

Another old-time favourite is ginger. This seasoning is perhaps the world's longest continually-used ingredient, dating back to some 3,000 years before Christ. The Chinese traded this expensive product with the Greeks, who used it not only to season meat and food products, but also for medicinal purposes, like for treatment of stomach cramps. In the West, the use of spices as medicines dates back to the great Greek physician Hippocrates (460 to 370 B.C.). Perhaps the value of phytochemicals is not something uncovered by our contemporary third millennial generation after all.

The founder of Islam, Mohammed, was involved in the spice trade until his early 40's. In the 8th century, his army moved into Spain from northern Africa, not only conquering the Spanish monarchy but also influencing local cuisine by introducing novel spices and new foods. Another example of the great importance of spices can be found in writings from the 13th century, when peppercorns were temporarily used as currency because of a shortage of gold and silver.

There is no doubt that the quest for spices greatly influenced the voyages to the Far East by many famous navigators, in-

cluding Vasco da Gama, Ferdinand Magellan, Christopher Columbus and Bartholomew Diaz, who discovered the Cape of Good Hope. For these intrepid explorers, extreme endurance and hardship were intermingled with golden rewards when new spice sources and territories were found. These discoveries became the hallmark of new continents, and ultimately, for the world of meat formulations.

The wide use of spices and herbs that began in the Middle Ages actually started to decline sometime in the 17th century, when only pepper survived as the spice of the poor. During the Middle Ages, however, chefs had a rich selection of spices: nutmeg, cloves, saffron, cardamom, cinnamon and sandalwood were available for flavouring exquisite food dishes.

Excess and famine

If one wishes to understand how Europeans ate in the Middle Ages, one only needs to look at the many paintings of the Flemish artist Pieter Brueghel depicting lavish feasts. Between the years 1000 and 2000 A.D., times of plenty were followed by times of hunger. Famines, rather than golden harvests, often resulted from bad weather or prolonged wars. Then there was the interaction of city life and country life, not to mention the influence of diet in the social hierarchy. The first known cookbook, "De honesta voluptate et valetudine," was written in 1465 in Platina,

Italy, and was followed by other cookbooks elsewhere in Europe.

Peasants, merchants, clergy and nobility all had their position in the food chain. Peasants generally had to make do with a simple diet of brown bread with bran, meat leftovers – including lungs, tripe and blood sausage – eggs and vegetables. Per-capita meat consumption varied widely as a factor of geographic location with the rise and fall of regional prosperity. In times of shortage, the peasants' bread flour was often diluted with rye, lupine and even tree bark. Come to think of it, that's not a bad diet by today's standards.

Nobility and clergy, on the other hand, enjoyed all the goodies, which today's nutritionists frown upon: white flour, gingerbread, pastries, and select cuts of fatty meats, including liver and brains. Strange enough, vegetables were avoided because these were considered as food for the lower classes, with asparagus being the exception. Asparagus was believed to be good for potency and relieve from constipation. Fruits that grew close to the ground, such as strawberries were not eaten by the upper class, either. Fruits that grew "close to heaven," like apples, pears and apricots were seen as a gift from God and were always present on the dinner tables of the happy few.

During those days, it was common practice for nobility to have the most sumptuous selections of foods served at the head of the table, with lower quality courses served at the foot of the table. Although still customary in parts of China today, it was considered good etiquette for people to reach into a common pot of cooked meat with their hands in the late 17th century. The knife and fork did not make it to the dinner table as eating utensils until about 1550 and 1650, respectively.

The word "course," which actually was coined in the Middle Ages, is interesting. A course did not refer to a particular dish but rather to the amount of prepared food one servant could carry on the course from kitchen to dinner table.

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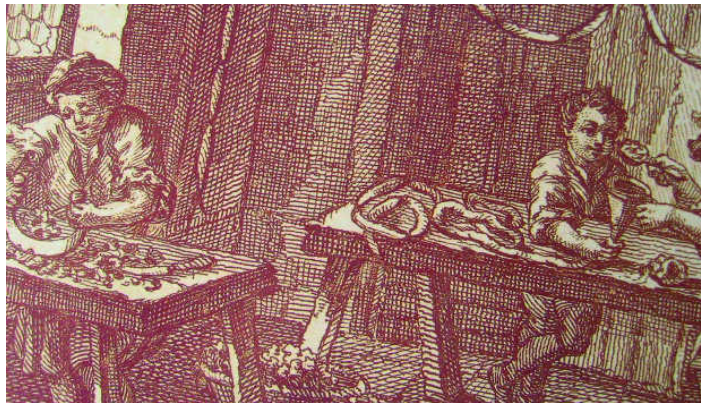
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Liquid food, either water, wine or beer, was an essential part of every meal in the Middle Ages. Beer often was flavoured with spices, such as cinnamon. There was also a major consumption of sacramental wines in convents and monasteries. The nuns and monks nearly always had choice foods available and brought to them by pheasants in the hope of return in the form of heavenly rewards.

The British, who preferred thick ales brewed from barley, also laid the groundwork for sweet dishes. The use of cane sugars preceded the use of beet sugar, which didn't become widespread until the 1750s, by almost 1,000 years. The availability of sugar and honey created new delicacies, such as nougat, marzipan and candied fruits and nuts. It is believed that the creation of confectionary emerged in Catalonia, presently north-eastern Spain. Top-notch confectioners were considered priceless, and their being host to considerable social prestige displayed their skills and arts.

Origins of European sausage

Mortadella and Bologna are uniquely associated with the Italian town of Bologna. Mortadella is derived from the Latin word "mortarium" – as in mortar – and refers to a technique used to manufacture the original sausage. In the 16th century, Cristoforo de Messisbugo re-



In the Middle Ages meat processing was very labour-intensive.

corded the first known recipe and preparation process for Mortadella. By the 17th century, the product was already well known throughout most of Western Europe. It is amazing to realize that during this time, the Salaroli Guild, whose statutes also contained by-laws to prevent adulteration, tightly regulated the quality of sausage products.

The 1730's saw the introduction of the first acidified or fermented dried sausages, known as salami, meaning "salted", in Italy. The ancient town of Salamis is associated with the origins of salami.

In 1735, the German town of Göttingen introduced a new style of dried sausage called Mettwurst. This fermented product was made from coarse-ground pork and later became known as Zervelat sausage. Other reports from that time indicate that these early products were transported in 1769 to Sweden, England, and Holland, Turkey and eventually to such places as India. Apparently, the first salami sausages were exported from Italy to Vienna in 1775.

In 1835, two Italian sausage makers settled in Hungary and started what is believed to be the first salami manufacturing plant, producing early prototypes of the legendary Hungarian salami. With regard to the method used to preserve sausages, many questions remain unanswered. It is not precisely known whether lactic acid bacteria were used by design or by chance to activate the fermentation process and thereby enhance keeping quality.

Not much was actually known

about the function of microorganisms until Louis Pasteur in 1856 revealed much of their mystery by inventing a process of heating liquids to destroy harmful or unwanted organisms. The process of pasteurization still ranks as one of the most important additions to overall food safety. In 1795, Nicolas Appert invented a way to preserve fresh foods and meats by heating and sealing them in metal or glass containers, preceded Pasteur's discovery. However, it took until 1896 before Friedrich Heine succeeded with the first production of sterilized, canned frankfurter sausage. In 1920, DuPont invented cellophane, and that breakthrough pushed much of our contemporary technological innovations and packaging advances.

The German Meat Association (DFV) was established in 1875, then the German Sausage Manufacturers Association was formed in 1900. Processed meat production was an important contributor to 19th and early 20th century economies. In fact, it was not until 1923 that the U.S. automobile industry overtook the processed meat industry in terms of dollar value.

For the meat industry, the Industrial Revolution clearly started in the early years of the 20th century. The meat industry benefited tremendously from improved physical distribution, especially railroad and highway connections, with the development of the mechanically refrigerated rail car and truck in the 1930's which allowed products to move faster and further.

It is no coincidence that the processed meat industry simultaneously developed alongside the dairy industry. There is a strong connection between these industries, as the manufacturing of margarine by processed meat companies in Western Europe dates back to 1882. That was somehow a logical development, since margarine production was possible year-round, whereas processed meat products could not be successfully produced during the hot summer months.

Before 1870, the European meat processing companies were very labour-intensive and seldom employed more than 10 workers. The introduction of steam-powered equipment in 1880 drastically changed the scene forever and from then on meat processing grew rapidly into a true industry, complete with industrial-scale machinery. Technological breakthroughs, such as the introduction of not only the bowl-chopper in 1895 but also the chilling equipment during the 1890's, accelerated the growth of processed meat production and greatly improved the quality and variety of the available products.

Fast forward innovations

- Steam-cooking cabinets replaced the cooking kettles
- Smokehouses with cold and hot-and cold-smoking capability were introduced (1963)
- Electronics allowed the introduction of automated smoking and cooking systems (1967)
- The first universal smoke-and-cook cabinets were introduced (1969)
- Co-extrusion technology (1973)
- The continuous smokehouse was introduced (1974)

Another major impact was created by the introduction of vacuum packaging in the early 1950's, which was after DuPont pioneered the flexible, oxygen-impermeable film Saran in the mid-1940's. Vacuum packaging triggered a significant increase in product quality, shelf life and convenience for the customers,



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especially for hot dogs and sliced deli meats.

Another invention that significantly impacted modern meat processing was the introduction of the sausage-clipping machine in 1957. Although the first bowlchoppers were introduced in the very early years of 1900, it was not until 1953 that wheel-emptying devices for bowlchoppers were invented, followed by the first vacuum bowlchopper in 1956. These seemingly incremental advancements collectively improved emulsified meat quality and permitted the use of innovative functional ingredients and lesser quality cuts of meats, resulting in more affordable price points.

Sausage makers in those times instinctively knew that a fresh batch of dry sausage mix would ferment more rapidly when a portion of an already fermented batch was mixed in with the new batch. The practice – called “back slopping” – is still used today, although now the infusion or inoculation is a more scientific method. In 1940, the first patent was issued for the use of lactobacillus as a starter culture in fermented sausage, but it was not until the mid-1950’s that scientists fully understood how lactic acid starter cultures performed in the fermentation process.

What’s in a name?

The word *salsus* (sausage) was coined by the Romans, the prefix “sal” being the word for salt. In different parts of the world, different names were used to identify sausage in the local language or dialect. The Chinese called their sausage *lup-cheong*. In Italy, the regional names included *lucanica*, *tomacula*, *farcimen* and *salsiccia* and *botuli* – the latter unfortunately associated with the food poisoning called botulism. The generic name “*salsiccia*” (translated “rubbed with salt”) became sausage in English, *chourica* in Portuguese, *saucisse* in French, *sisis* in Turkey and *salchicha* in Spanish.

In the Slavic language, sausage was called *kolbasar*, which means “various meats.”

This word most likely originated from Hebrew. *Kolbasar* spread throughout the region and became *kolbasa* in Russian, and *kielbasa* in Polish. It is interesting to note that the Serbo-Croatian word *kobasics* is a combination of the Hebrew and Latin names.

Many sausage names carry a reminder of home, such as *loukaniko* in Greek, *nam* in Thai, and *longaniza* in the Philippines. The German word for sausage, *Wurst*, is very famous all over the world and often used for quality products. The word itself cannot be traced so easily, however, even though documents from 1100 A.D. indicate that the Germans produced *Lebarwurst* and *Pratwurst*.

Wurst most likely developed from *Wurzel*, which means rotating or twisting around, since forming a sausage requires that the casing be twisted. Some people believe that *Wurst* may have originated from the Latin word *uert*, which evolved to *ward*, *Wurzel* and *Wurst*. Because of the strong pioneering spirit of the Germans, especially in developing emulsified meat products, it is no surprise that the word *Wurst* became regionally adapted, becoming *Virstle* in the Balkan countries, *Wuerstel* in Italy and *Worst* in Holland.

Hot dog history

Although ground meats with salt and spices are some of the world’s oldest foods, the city of Frankfurt, Germany, claims to be the birthplace of the “Frankfurter,” supposedly developed in 1484, eight years before Columbus set sail for the New World. This claim is disputed by the city of Vienna (Wien), which refers to the “Wiener” as the original hot dog. There are still conflicting theories about the most accurate time line. Some historians believe that the butcher Johan Georg Lahner from Frankfurt took his creation in 1805 to Vienna. Whatever the case, both Frankfurt and Vienna will always be associated with a product that truly has become the world’s most beloved meat prod-

uct. Who can argue with the great composers Franz Schubert and Johan Strauss, who declared the Frankfurter to be their favourite food?

With so many explanations about the origin of foods, it is advisable to preface them with an oft-repeated story about how the name “hot dog” originated, rather than simply accepting them as truth.

European immigrants bought frankfurter-style sausage and other deli sausages to the United States around the turn of the 20th century. The term hot dog, however, was coined in 1901 at New York City’s Polo Grounds and referred to the type of “Dachshund sausage” (Hund is German for dog). These red-hot sausages were sold from a pushcart, with rolls and sauerkraut. Uncertain how to spell the word *Dachshund*, a sports cartoonist simply coined the term hot dog. In 1904, the hot dog bun invented by a St. Louis baker was in-

troduced during St. Louis World’s Fair, which celebrated the centennial of the Louisiana Purchase. The world-famous Nathan’s hot dogs were first sold in 1916 at New York’s Coney Island, which nearly a century later, are not only still available but have also become the branded sponsor of the Nathan’s Famous International Hot Dog Eating Contest held every July 4th on Surf Avenue in Coney Island.

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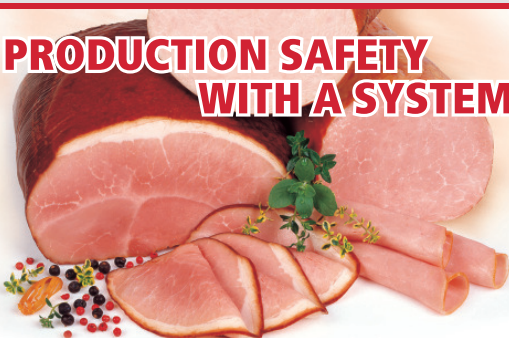
Henk W. Hoogenkamp is publicist and author, and has previously been President of DMV USA (now Friesland



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