

Overview of Dry-Cured & Fermented Meat Products

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Defining

What is Dry Curing?

Dry-cured meat products can be manufactured from a wide variety of raw materials which have had salt or a combination of salt and nitrate and/or nitrite applied, either to the surface of a whole muscle cut or mixed into large sized comminuted meat pieces.

No matter the application method, the added curing ingredients enter the product through diffusion (movement of molecules from an area of high concentration to an area of low concentration), while moisture leaves the product through osmosis (movement of water through a membrane from an area of low concentration to an area of high concentration), given the time and environmental conditions necessary for this process.

What is Fermentation?

Fermented products are generally more finely ground comminuted meat products including the addition of specific bacteria that consume sugars and produce acids to reduce the pH of the product. These sausages often have unique flavors, aroma, and textural characteristics that are dependent on the manufacturing process and bacterial strains used. The lower pH may also improve safety because the low pH is not favorable to some bacteria. Common examples are pepperoni and salami.

History of Dry-Curing

Through the necessity of fresh meat preservation, primitive humans developed the salting of meat (applying salt on the surface of products) and from that meat curing and drying. Meat curing is understood to have risen from unintentional nitrate inclusion as an impurity of the salts, namely potassium nitrate, applied to the surface of meats during the salting process.

Fermented & dry-cured meat products likely originated from southern European countries located near the Mediterranean Sea, where weather proved ideal for natural drying and ripening of meat without the availability of modern environmental chambers and refrigeration. It is believed that fermented & dry-cured product manufacturing began in Italy around 1730 and were adopted in northern Europe about 50 years later. Fermented & dry-cured meat product manufacturing began in America after Europeans migrated there and *brought their processing practices with them.*

Characterizing

Dry-cured and fermented products can be classified by many factors, such as

- Region or city of production
- Fermented vs. non-fermented (dry salami vs Coppa)
- pH reduction technology (fermented/acidified)
- Degree of cooking (i.e., non-heat treated, heat treated, or fully cooked)
- Smoke addition (e.g. Hungarian Salami)
- Tradition (summer sausage consumed in the summer)
- Or a combination of any of these factors and more.

The names of many of these products are tied to their regional origins.

Examples of such products include Genoa salami from Genoa, Italy, Lebanon bologna from Lebanon County, PA, and Parma ham, from Parma, Italy.



Varieties of fermented and dry-cured products evolved geographically due to climate conditions, cultural factors, and the availability of ingredients. A dry-cured pork hind leg is a good example of geographic influences on dry-cured products. Dry-cured pork hind leg varieties include prosciutto or Parma ham (Italy), country ham (USA), Westphalian or Black Forest ham (Germany), Jamon Iberico or Jamon Serrano ham (Spain), Bayonne ham (France), and York ham (England). specific bacteria that consume sugars and produce acids to reduce the pH of the product. These sausages often have unique flavors, aroma, and textural characteristics that are dependent on the manufacturing process and bacterial strains used.



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History of Fermentation

In fermented meat products, it is believed the process of fermentation began accidentally. Roman butchers are said to have mixed comminuted beef and pork with salt and spices which were placed into a room to dry. This is where organisms, likely what we know now as *Staphylococci* and *Kocuria*, were added by environmental contamination and resulted in fermentation to take place.

Later, fermentation became purposeful and done through the practice of “back slopping” or “mother batching”, which is when a portion of meat batter from one batch of fermented sausage is carried over to the next. This practice is considered the first starter culture application in fermented meat product production. Later, as production of fermented products and the understanding of the functionality of bacteria in meat products increased, starter cultures were standardized commercially with a consistent combination of bacteria and yeasts enabling creation of more predictable products and improving efficiency.

European vs USA Manufacturing Practices

European manufacturing practices of fermented and dry-cured products follow a traditional approach. There, products are fermented for a longer period (pH = 5.3 in 24-40 hours) at cooler temperatures (-21°C) to a higher ultimate pH (pH = 4.8-5.2) and are characterized by water activity. Production time for European products is typically greater than three weeks as these products are not thermally processed and, therefore, require more time to dry. In the USA, the speed of production is favored over traditional practices. Fermentation is typically faster (pH = 5.3 in less than 15 hours), occurs at higher temperatures (-38°C) and has a lower final pH (pH < 4.9). Dry-cured and fermented products in the USA are characterized by their moisture:protein ratio and are normally smoked and cooked, which reduces the drying time significantly.

The information for this paper came from the following sources:

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