Unit I - Topic 9

Processed Meat Products

Processed meat is considered to be any meat which has been modified in order to either improve its taste or to extend its shelf life. Methods of meat processing include salting, curing, fermentation, smoking, and/or the addition of chemical preservatives. Processed meat is usually composed of pork or beef, but also poultry, while it can also contain offal or meat by-products such as blood. Processed meat products include bacon, ham, sausages, salami, corned beef, jerky, hot dogs, lunch meat, canned meat, chicken nuggets, and meat-based sauces. Meat processing includes all the processes that change fresh meat with the exception of simple mechanical processes such as cutting, grinding or mixing.

Meat processing began as soon as people realized that cooking and salting prolongs the life of fresh meat. It is not known when this took place; however, the process of salting and sun-drying was recorded in Ancient Egypt, while using ice and snow is credited to early Romans, and canning was developed by Nicolas Appert who in 1810 received a prize for his invention from the French government.

. Sausages

Sausages are meat products that are salted & usually seasoned or spiced and are an example of comminuted meet products that are generally recognized as emulsified, stuffed, linked, smoked, and cooked meat products. Based on the product characteristics and processing methods, they are broadly divided into three categories: **fresh sausages, cured sausages and fermented sausages**. In all cases meat is communited to reduce meat and fat particle size (grinding, mincing, chopping, or flaking), mixing with ingredients, stuffing into specific casing, linking to obtain specific lengths and finally, packaging. Sausages might be of ground and emulsion type. In the ground variety of sausages discrete particles of meat are seen on the other hand, in emulsion type sausages fat is emulsified & stabilized by lean component. Sausages were developed to utilize low- quality meats such as trimmings head, shoulder & by- products of the meat. The processing of sausages is a continuous sequence of steps (Fig 23.1), which are all equally important.

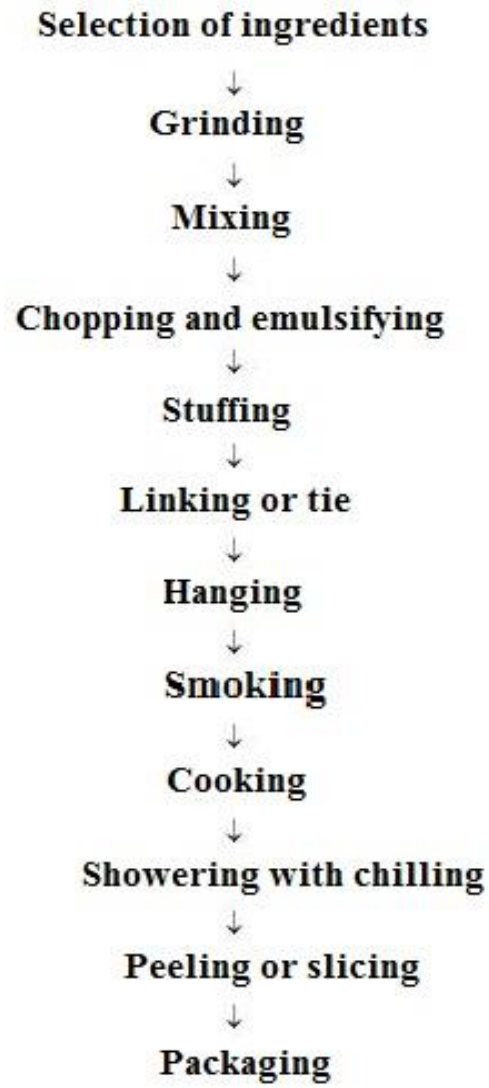

Fig. 23.1 Process flow diagram of sausages manufacture

i.�� Selection of Ingredients

Sausage ingredients include:

- Meat - based on consideration of fat/protein; moisture/protein and myoglobin concentration
- Moisture - added as ice at time of chopping in a number of fresh and smoked sausages
- Curing ingredients - salt, sodiuim nitrite and/or nitrate and sugar
- Seasonings - may include spices, such as black peper, paprika, mace and cinamon; herbs that may include thyme and savory; vegetables such as�� garlic and onion and other substances, such as flavor enhancers
- Fillers and binders - occasionally used to improve color, binding properties, slicing characteristics, altering flavor or reducing costs

- Ascorbic acid - used to improve color in smoked sausages
- Other additives - may include liquid smoke

Milk protein have been utilized as fillers, binders and extenders in cooked, comminuted meat products to reduce cook shrink and formulation cost, as well as to improve emulsifying capacity, emulsion stability, water binding, potential nutritive value and slicing characteristics. These proteins significantly increase the gel strength of meat proteins and it has been shown that there has a synergistic effect between milk proteins and salt soluble meat proteins, through covalent cross linkages.

Addition of caseinate stabilizes the meat emulsion as required in the sausage mix. It thickens the gravy during frying and prevents it running out, but excess incorporation of caseinate may result in drying up of the sausages. Further addition of water absorbent materials becomes essential when sodium caseinate concentration in sausages exceeds 5%. The greater water holding capacity, lower viscosity and lower cooking losses of sausage batters containing 2% sodium caseinate in comparison to all meat control were observed.

The coprecipitates have good potential in various meat products such as frankfurters, sausage batter and luncheon meats as meat replacers or extenders. Sausage acts as a good medium for the use of coprecipitates. The finely, dispersed dairy protein matrix in sausages also can act as a moisture binding agent, thus, developing the desirable chewy texture besides controlling shrinkage during storage and deformation while slicing. Addition of milk coprecipitate in combined boiled sausages resulted in increased pH, reduced nitroso pigments and increased residual nitrites content in the end product. It is found that both high and low calcium coprecipititates improved the emulsifying capacity, emulsion stability and water holding capacity of meat emulsion in fresh sausages at the 20% replacement level. Supplementation with dairy coprecipitates into boiled beef pork sausage batters up to 30% of meat protein yields emulsion with increased pH, enhanced water binding ability and improved adhesion properties.

ii. Grinding

Meat chunks of variable size and shape with variable fat contents are ground to form uniform cylinders of fat and lean. The screw feed in the barrel of the grinder conveys the meat & presses it in to holes of the grinder plate. The rotating blade cut the compressed meat and aids in filling the grinder plate holes.

iii. Mixing

Cylinders of fat and lean obtained by grinding are tumbled in a mixer to give a uniform distribution of fat and lean particles. This can be used for coarse ground sausages or for emulsion type sausages by utilizing a chopper or emulsifier and with suitable additions of required ingredient to obtain the desired texture & uniformity of composition.

iv. Chopping

It is often used as a means of batching the sausage mix, the mixed batch being transferred to an emulsifier or acquiring the desired texture.

v. Emulsifying

This machine combines the principle of grinding and chopping. Emulsifier machine handles large volumes of meat rapidly to produce a desired texture. Speed of handling material and high degree of disintegration of meat tissue help in obtaining desired textures. In the preparation of sausage, the protein and water of the meat mixture form a matrix than encapsulates the fat portion. In a meat emulsion the protein myosin acts as the primary emulsifying agent. The addition of salt to the product is to release the myosin from the muscle fiber. The emulsion is generally formed by mixing the meat with salt and other ingredients in a chopper, which aids in disrupting the fibers and facilitates the release of myosin.

vi. Stuffing

Sausage emulsion also known in the trade as mix sausage dough or batter is transferred to stuffers for extending the mix or emulsion into **casings**. At this point, the size and shape of the product is determined. Generally three type of stuffing devices are used.

- Piston
- Pump
- Combination of piston & pump

In the past, the casing of the sausages were made from animal casings, however this was a limiting factor for the production of sausages. Today, the casings are made of cellulosic and regenerated collagen. The limiting factor now, is the supply of meat and the cost of it. Fermented sausages are further subjected for the fermentation and maturation. Fermentation of meat constituents results in flavor development, improvement of shelf life and improved quality and food safety. Sausage batter is inoculated with the started bacteria composed of **selected lactic acid bacteria (LAB)** i.e. homofermentative lactobacilli *(Lb pentosus, Lb plantarum, Lb sake, Lb curvatus)*, pediococci (*Pediococcus acidilactici*, *Pediococcus cerevisiae*) and gram positive catalase positive cocci (GCC) i.e. non-pathogenic, coagulase-negative staphylococci (*Staphylococcus carnosus, Staphylococcus xylosus, Staphylococcus piscifermentans)* . Small manufacturers use spontaneous fermentation without adding starter culture.

vii. Linking and tying

After the emulsion is stuffed in to casings, the encased mass is tied with thread of fastened with metal clips. In the case of small sausages such as Frankfurters stuffed casing are twisted or drawn together to produces links either by hand or with mechanical devices.

Large sausages items are tied or slipped on one end with a hanging tie and suspended from a smoke stick or hook so the entire surface is free from contact with the equipment. This permits a good flow of

air around the sausage in the smoke house and prevents touch marks and spotting due to contact with adjacently hanging product.

viii. Smoking & cooking

The draped smoker picks are placed on smoke trees or trolleys with 12-18 specs per tree. The smoke house operation is essentially a specialized drying and cooking operation in which sausage emulsion is coagulated. Encased sausage at the time of introduction in to the smoke house usually has an internal temp of 60-70�F. During cooking this rises to 155 to 160�F.

ix. Chilling

After smoking and cooking the product is showered with cold water and than chilled by refrigeration chilling is frequently done with a brine solution by dipping or spraying the products. (a 6% salt brine) balanced within leaching of salt from the sausage and imbibing of water by the sausage.

x. Peeling & packaging

After properly chilling the product usually to an ultimate temp of 35 to 40�F, the cellulosic casings on frankfurter and slicing bologna are removed. This is known as the peeling operation.

HAMBURGER

- A **hamburger**, or simply **burger**, is a food consisting of fillings —usually a patty of ground meat, typically beef—placed inside a sliced bun or bread roll. Hamburgers are often served with cheese, lettuce, tomato, onion, pickles, bacon, or chilis; condiments such as ketchup, mustard, mayonnaise, relish, or a "special sauce", often a variation of Thousand Island dressing; and are frequently placed on sesame seed buns. A hamburger topped with cheese is called a cheeseburger.
- The term *burger* can also be applied to the meat patty on its own, especially in the United Kingdom, where the term *patty* is rarely used, or the term can even refer simply to ground beef. Since the term *hamburger* usually implies beef, for clarity *burger* may be prefixed with the type of meat or meat substitute used, as in **beef burger**, turkey burger, bison burger, portobello burger, or veggie burger. In Australia and New Zealand, a piece of chicken breast on a bun is known as a **chicken burger**, which would generally not be considered to be a *burger* in the United States; where it would generally be called a *chicken sandwich*, but in Australian English and New Zealand English a *sandwich* requires sliced bread (not a bun), so it would not be considered a *sandwich*.
- Hamburgers are typically sold at fast-food restaurants, diners, and specialty and high-end restaurants. There are many international and regional variations of hamburgers.

MEAT BALLS

A meatball is ground meat rolled into a ball, sometimes along with other ingredients, such as bread crumbs, minced onion, eggs, butter, and seasoning.Meatballs are cooked by frying, baking, steaming, or braising in sauce. There are many types of meatballs using different types of meats and spices. The term is sometimes extended to meatless versions based on vegetables or fish; the latter are also commonly known as fishballs.