

## PROCESSED MEATS AND THEIR CURRENT IMPORTANCE IN INDIAN MEAT INDUSTRY

*George T. Oommen, Aneesh Antony and S. Kantharaj  
Centre of Excellence in Meat Science & Technology  
College of Veterinary & Animal Sciences, Mannuthy, Thrissur*

### Present Status

In India, most of the meat is consumed fresh before the onset of rigor mortis. Less than 5% of the meat produced is converted to value added meat products. The demand for processed meat is increasing remarkably in recent years because of urbanization, increased purchasing power of consumers, higher literacy, health consciousness, employed families seeking ready-to-cook/eat meat foods, changed food habits and customs, etc. Different types of meat products, viz., sausages, hamburger, bacon, ham, barbecue, patties, loaves, nuggets, luncheon meat, pizza, corned beef, minced meat, cutlet, etc., have secured popularity among the consumers. Traditional indigenous processed meat products, viz., meat curry, kofta, different types of kabab, tikka, tandoori, kurma, biryani, pickle, etc., are quite common in the country. Many restaurants have lucrative business only with meat fast food items and delicatessens. Kerala has a congenial environment for the development of the industry with the highest meat consumption rate and meat consumers. If the meat industry has to run in profit, besides the sale of fresh meat, value added processed meats are to be manufactured and all the slaughterhouse byproducts are to be utilized, all without causing environmental pollution.

A sound knowledge of the characteristics and qualities of meat and nonmeat ingredients, processing techniques and principles, hygiene and sanitation, food safety principles, manufacturing, commercial and legal controls is essential for the commercial manufacturing of processed meats.

### Reasons for Making Meat Products

A major purpose of converting meat into meat products is to modify or upgrade less noble cuts of meat (mainly forequarter) with edible fat and connective tissue and to make the flavour and texture more acceptable to consumers. The technical problems that must be dealt with in improving the acceptability of such meat are: to remove bones, to make the connective tissues less objectionable, to present the available fat in more acceptable form and to leave flavour and nutritive value unimpaired or improved.

### Processing Principles and Techniques

The processing of meat refers to the procedures like mincing, chopping, pounding, dicing, cubing, emulsifying, flaking and forming, tumbling and massaging, tenderizing, marination, stuffing, cooking, curing, restructuring, etc., that are applied to fresh meat once it has been reduced to portions of various size. During processing, meat may be changed by the addition of a

number of ingredients, by the application of processing procedures and mechanical action and by packaging by different methods and in containers.

When meat is processed to make meat products 4 factors are to be attended to. They are: 1) Moisture retention: the moisture content of the lean meat and the liquids added to the recipe should be retained to an optimum during manufacturing process, stages of distribution, storage and eventual cooking by the consumer.

2) Fat retention: The natural fat content of meat and extra fat incorporated should be retained to a maximum or optimum extent throughout. 3) Connective tissue: Tough connective tissues difficult and unpleasant to chew are found in older animals and beef flank/diaphragm has to be moist cooked for softening. If moist cooking is not intended, connective tissue must be comminuted to produce small fragments. 4) Cohesion: The product should retain its physical integrity. Binding of cut surfaces of lean meat is stronger if there is meat fluid on one or both surfaces and if the mixture is heated to 65°C or higher.

### Ingredients

The primary ingredient in processed meats is lean meat. Salt adds flavour, restricts microbial growth and interacts with lean meat proteins to give increased water retention, yield, increased meat binding, cohesion, increased fat binding, emulsifying capacity and textural changes. Water is often added as an important carrier of ionic contents. Phosphates increase the water holding capacity and reduce cooking loss. Nitrites impart cured meat colour, flavour, acts as antioxidant, improves flavour and prevents the germination of clostridial spores. Ascorbates and erythorbates act as reducing agents and cure accelerators. Textured soy proteins, wheat gluten, sodium caseinate, blood plasma and rusk are used as extenders. Seasonings improve the flavour, shelf life and appearance.

### Cooking

In gastronomic terms meat is 'rare' if cooked to an internal temperature of 60°C, 'medium' at 70°C and 'well done' if cooked at 80°C. The primary effects of cooking - meat is made more tender, colour changes, flavour and aroma develops. Secondary effects - comminuted or fabricated products bind together on heating. Cured meat colour gets fixed. Meat cooking methods and temperatures:

Dry air (roasting, baking)	up to 200°C
Water (stewing, braising)	up to 100°C

Water under pressure	100-125°C
Moist or saturated air (steaming)	up to 100°C
Moist or saturated air under pressure (retorting) 100-1250C	
Fat or oil (frying)	150-190°C
Metal	up to 200°C
Radiation	
Grilling	depends on condition, usually 200°C.
Microwave	Temp.depends on power. Not usually above 100°C.

Heat transfer is fair in dry air, good in stewing and pressure-cooking and very good in all other methods. The method of cooking is chosen based on the type of meat and its connective tissue content. Moist cooking is advised for meat rich in connective tissue (meat from older animals and locomotory muscles).

### Comminuted Meat Products

Grinding or mincing meat to various particle sizes produces many products. Comminution Processes include dicing, flaking, chopping, mincing (chopping) and milling. Comminuted meat products are mixed with other ingredients during milling and bowl chopping.

Hamburger is in the form of flat patties. It is meat-with-cereal product with 80% minimum meat content or with 100% meat alone. Fat should not be more than 40%.

Meat balls are similar products formed into small balls.

Reformed meats are products made by comminuting meat and reforming it to a structure and shape (cubes) resembling unaltered meat. They are intended to present meat with high connective tissue content in a more attractive form.

Sausages are comminuted meat products seasoned and stuffed into natural or artificial casings. They are either cured, cooked or smoked. Sausages are classified into fresh sausages (pork sausage, beef sausage,thuringer, etc.) emulsion sausages (frankfurters) and fermented dried sausages (salami). The main equipment for raw and dry sausage production consists of the mincer and /or bowl chopper, vacuum mixer, stuffer and smokehouse. Natural casings are made from submucosal layer of cattle, buffalo, pig and sheep/goat gastrointestinal tract, while artificial ones are from regenerated collagen, cellulose, and co-extruded collagen.

### Corned beef is comminuted cured beef in cans.

Luncheon meat is a canned product usually prepared from pork along with cereals. It contains not less than 80% pork including pork fat, which should not exceed 30%in the final product. Added water- 3% and cereals 7% of the total formulation. Lean pork and pork fat are ground through meat mincer and chopped with slushed ice, salt and nitrite followed by refined wheat flour, condiments and spices. The batter maintained at 40C is canned and is shelf stable for 2 years.

Meat Patty is one of the most popular comminuted product and is generally used as filling for burger roll or sandwich. Some consumers prefer to consume it with tomato sauce or chutney. It has very high demand in all cities, especially where floating population is more. These are partially or completely emulsion based products containing less than 30% fat and are moulded manually or mechanically. Lean minced meat is mixed with fat, table salt, textured soy protein, condiments and spices.

Meat Cutlet is another favourite cooked, coarsely minced, seasoned and moulded and breaded ready to consume meat product. Unlike in patty, meat is cooked first and then minced. This is mixed with the sautéed seasonings spices and potato (binder and filler) and moulded. Moulded cutlet is breaded with rusk or breadcrumbs after dipping in egg white. Before consumption it is low fat fried till golden brown. Avoid post processing contamination as in any other ready to eat meat products.

Meat loaves are ready to eat comminuted meat products prepared from coarse ground meat or meat emulsion or combination of both. The meat mix or batter is tightly filled in aluminium or steel loaf pans (rectangular, cubical or cylindrical). It is cooked in hot water maintained at 800C or steam without pressure or broiled in oven at 1650C for 2-3 h. It is cooked to an internal temperature of 700 C, chilled to 40C and packed whole or sliced to desired thickness.

Meat Nuggets are prepared by cutting cooked and cooled rectangular or cubical shape meat loaves into approximately 4cm x 1.5 cm x 1.5 cm pieces. It is packed in pouches and stored at 40C for a week. It is low fat fried before serving.

Tandoori Chicken: Dressed broiler chicken with skin is rubbed with salt, spices and seasonings and kept for 15 min. After draining, the chicken is marinated with sauce for 1-2 h. The marinated chickens are roasted in a tandoori oven under smokeless, moderate and uniform heat for 30 min depending on the size of the bird and temperature of the oven. During roasting, chickens are occasionally smeared with sauce or fat with a brush. Twisting one of the drumsticks when it dissociates easily from the joint tests the doneness of tandoori chicken.

Chicken Barbecue Small broilers are preferred for this. They are longitudinally halved and marinated with barbecue sauce and allowed to stay for 1 h. The halves are placed in the oven or over hearth and periodically turned and basted with sauce with the help of a brush to avoid drying. The cooking should proceed slowly at moderate temperature so that tender, golden brown and slightly smoked flavoured barbecue is prepared.

Chicken Seekh and Shami Kabab are comminuted meat products. Therefore, culled or spent chicken can be used. Minced chicken is mixed with plain flour, fat salt, dry spices, seasonings and whole egg. The batter is pasted around special iron bars called seekh and cooked over moderate and uniform

(Continued on Page 41.....)