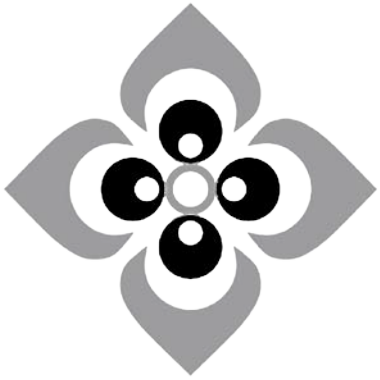

Consortium for Educational Communication

Module on

Poultry Products

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Text

Classification

Poultry birds are classified into different types depending on the fowl's ability to produce a product of commercial value, such as egg type, meat type, and dual-purpose type. Meat types are generally large in size with plenty of flesh but they are not good layers. The meat is tender. The dual-purpose type also yields meat of excellent quality alongside a good number of eggs. Each kind of poultry marketed is classified on the basis of age. Age influences tenderness and fat content and this determines the cooking method. The classification according to the Indian standards is as follows.

1. Broiler or Fryer: Chicken of 8 to 10 weeks of age of either sex, tender-meated with soft, pliable, smooth-textured skin and flexible breastbone cartilage.
2. Rooster: A young chicken, usually 3 to 5 months of age, of either sex tender-meated with soft, pliable, smooth-textured skin and flexible breastbone cartilage that may be somewhat less flexible than that of the broiler or fryer.
3. Stag: A male chicken cock, usually under 10 months of age, with coarse skin, somewhat toughened, with darkened flesh and a considerable hardening of the breastbone cartilage.
4. Stewing chicken or fowl: A mature chicken, usually more than 10 months of age, with meat less tender than that of a roaster and nonflexible breastbone tip.
5. Cock: A mature male chicken, usually over 10 months of age, with coarse skin, toughened and darkened meat, and hardened breastbone tip.

Poultry processing

Poultry is marketed in ready-to-cook form, i.e., the head, feet and entrails are removed (dressed chicken). The steps involved in the processing of poultry are briefly described as follows (Fig. 1):

a. Pre-slaughter fasting and resting: A fasting and resting period of 12-14 hours is desirable allowing a liberal supply of clean water. Birds are generally not fed for 12 hours before slaughter to ensure that their crops are empty, which helps cleaner operations. They are killed by a method that minimizes struggle.

b. Ante-mortem examination: Proper ante-mortem examination should be done by a trained person.

c. Stunning: The birds are stunned and made unconscious before bleeding. Electrical stunning is being used now a day. Hand stunning devices or automatic stunning devices may also be used for this purpose. A fowl having 2 Kg weight needs 70 volts current for 1 to 3 seconds and turkey having 6 to 9 Kg weight require 90 volts for 10 seconds.

d. Bleeding (Sticking): it is done either by cutting the jugular vein behind the jaw or by decapitation. Bird is left to bleed for 2 minutes in case of turkey and 90 seconds for poultry.

e. Plucking (Defeathering): It is the process followed for the removal of feathers. The methods used for this purpose are as follows:

Hand plucking: A force or a jerk pulls off feathers manually by hands.

Scald picking: Birds are immersed in hot water so that follicles are loosened. Different methods of scalding in poultry are:

I. Semi scalding- at a temperature of 123-130^{o}F for 90-120 seconds.

II. Sub scalding- at a temperature of 138-140^{o}F for 35-75 seconds.

III. Hard scalding- at a temperature of 160-180^{o}F for 30-60 seconds.

Sub scalding is more desirable because of easy removal of feathers and uniform skin colour is there. In case of semi scalding more hand picking is required and hard scalding may cause discolouration of skin. Hard scalding is followed mostly in waterfowl wherein feather removal is tough.

Wax picking: Wax bath is also used occasionally. It contains wax gum and fat. Temperature of bath is maintained at 132^{o}F. Poultry is immersing in molten wax and on drying, it is scrubbed off so that feathers come out with wax.

f. Singeing: With the help of flame, hairs like appendages are burnt. Carcass is singed over a blue flame for 5-10 seconds to remove hair like appendages called filoplumes.

g. Evisceration: viscera should be removed carefully. A cut is made around vent and intestines are pulled out. A cut in belly can also be given to open it up and then

visceral organs are removed. It can be left with carcass for the time being for post-mortem inspection and lungs can be removed by hand or a vacuum apparatus.

h. Chilling: Rapid chilling to 4 ± ١°C is essential to control the growth of bacteria which contaminate the flesh once the skin is broken. Cooling is also necessary from the point of view of tenderness of meat. The time of onset of rigor, its duration and the tenderness of meat once rigor has gone, are influenced by the way the bird is cooled. Muscle from poultry cooled in ice water is tendered than that held in water at higher temperatures and that cooled in air. Eviscerated and washed birds are to be promptly cooled to avoid toughening of muscle due to lowering of pH by accumulation of lactic acid. Poultry goes into and out of rigor more rapidly than other meats. A minimum of 4-5 hours from the time the chicken is slaughtered is required until it is cooked.

i. Grading: Dressed chicken is graded before it is marketed. Grading takes into consideration the condition of the bird prior to the slaughter, during evisceration and packing. Each country has set standards for grading and number grades of chicken. In India two grades are assigned to chicken, Grade 1 and Grade 2. This is based on conformation (deformations, detract from the normal appearance), meatiness, fat covering, defeathering, cuts and tears and discolourtion.

j. Packing: The graded poultry is individually packed in low-moisture and low oxygen transmission film or bags. Before sealing the packs care is taken to expel the air between the carcass and the bag. The sealed bags may be stored under refrigeration or frozen conditions. Refrigerated poultry has a shelf-life of only a few days (6-10 days). Frozen poultry at -23° to -18°C may be stored up to 9 months.

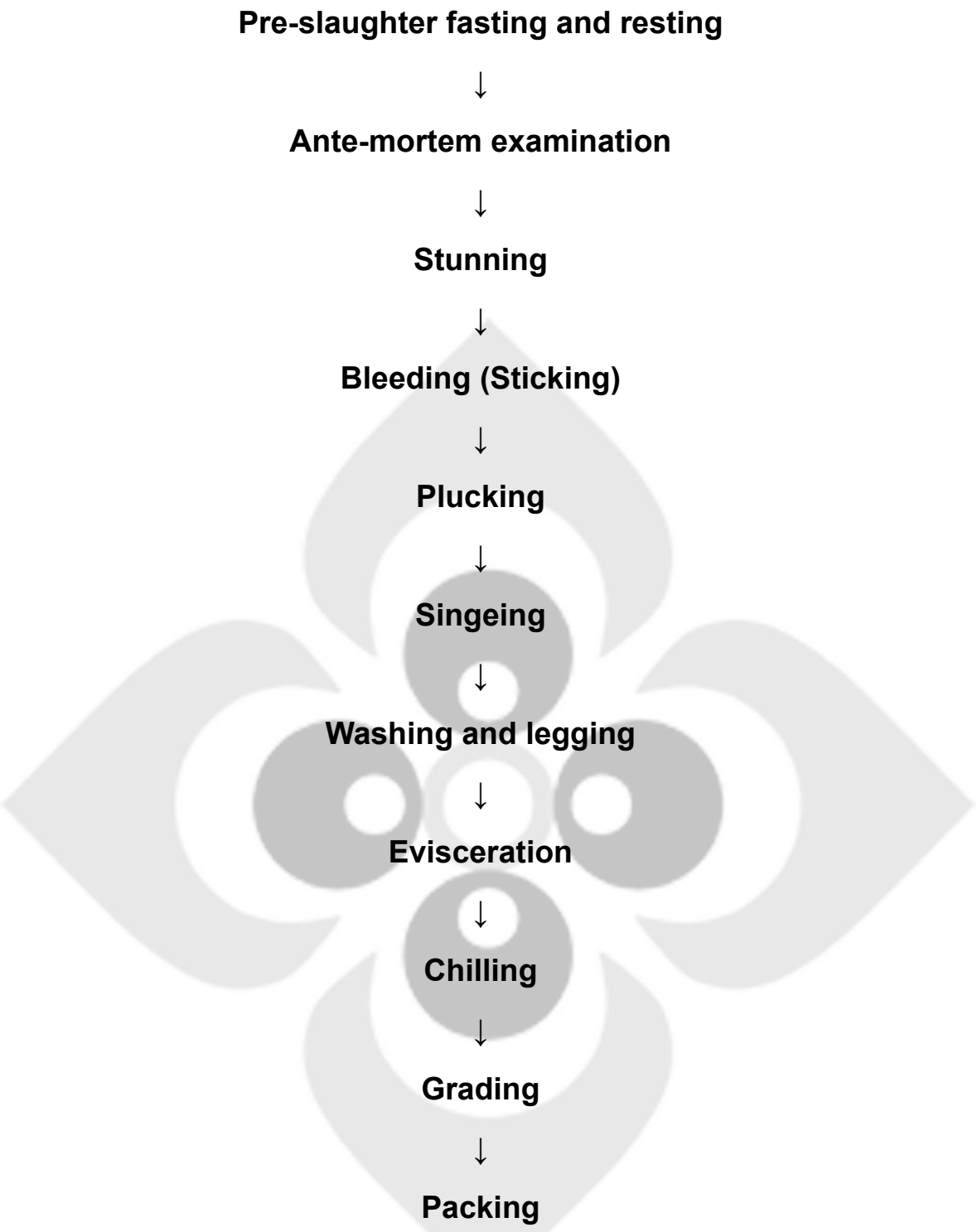

Figure 1: Slaughter techniques for poultry

Composition and nutritive value

Poultry meat has a high protein content varying from 18-25 percent and is comparable in quality and nutritive value to other meats (Table 1). It contains all the essential amino acids required for building body tissues. There is little fat on the meat of young

birds, but the fat content is influenced by age, and species of poultry. In any case, the fat content of poultry is less than half of other meats. Chicken fat is more unsaturated than the fat of red meat and this has nutritional advantages. Like other animal tissues, poultry flesh is a good source of B vitamins and minerals. The dark meat of chicken is richer in riboflavin than the light, but the light meat is richer in niacin. Because of its high protein-to-fat ratio, poultry meat is advantageous to persons who must restrict the intake of fats. The importance of poultry in a country like ours with low nutritional standards cannot be over-emphasized. Use of poultry products in our diet will help avoid malnutrition. Another advantage of poultry in our country is that it is consumed by persons who have objection to eat beef or pork.

Table 1: Chemical composition of meat of different species of poultry

Species	Water (%)	Protein (%)	Fat (%)
Turkey	67.4	20.5	08.3
Guinea fowl	65.4	20.7	10.1
Broiler	63.8	18.1	14.3
Duck	54.5	15.2	26.5
Goose	52.4	15.7	31.0

Preservation techniques of Poultry meat

Fresh meat is perishable, since it contains all the nutrients required by spoilage bacteria, the pH is not inhibitory and it has abundant free water. Storing meat after slaughter represents a challenge to meat processors, retailers and consumers. If proper storage conditions (for example, refrigeration) or other preservation methods (for example, heating, irradiation) are not used, the meat will spoil within hours or days. In areas where refrigeration is not available, poultry is marketed live and slaughtered immediately prior to consumption. In areas where refrigeration is available, modern procedures, such as use of the Hazard Analysis Critical Control Point (HACCP) system, ensure low microbial counts and consumer safety.

Heating

Heat is used by the food industry and some professions (the medical profession, for example) to inactivate microorganisms. The degree of microbial inactivation depends on the temperature and exposure time. Generally speaking, two levels of heat processing are used by the food industry. The first is pasteurization performed in temperature

range of about 60-90°C (for cooked poultry products, usually 70-75°C), designed to inactivate some of the spoilage organisms and most of the pathogenic bacteria. The shelf-life of the product is extended, but it must be refrigerated. The second level is referred to as sterilisation, where a temperature > 100°C is used to prepare so-called `commercially sterile' food products that can be stored at room temperature for an extended period (canned food, for example). This process results in the killing of all spoilage microorganisms, as well as destroying food poisoning bacteria and virtually all spores. All heat treatments will result in changes to the product in terms of texture, flavour, odour and microbial load. The extent of the changes increases with higher temperature and exposure time. The degree of microbial destruction by heat can be described by the Decimal Reduction Time (D value) for a particular heating temperature, which is the time necessary to reduce the viable count ten-fold. Overall, there is quite a large variation in the heat sensitivity of different vegetative bacteria, spores and viruses. Table 2 shows the D-values for several pathogens of concern to the poultry industry.

Table 2: D-values of different foodborne pathogens subjected to heat treatment.

Organism	Heat resistance
Bacillus cereus	$D_{100} = 2–8$ minutes
Campylobacter jejuni	$D_{55} = 60$ seconds
Clostridium botulinum spores (type A, proteolytic strain)	$D_{121} = 0.21$ seconds
Escherichia coli	$D_{71.1} = 1$ second
Listeria monocytogenes	$D_{71.1} = 3$ seconds
Staphylococcus aureus	$D_{71.1} = 4.1$ seconds

Drying

Today, commercially-dried poultry meat is used in dry soup mixes, dried foods for camping and foods carried by astronauts to outer space. The most economical way of drying is by using hot air. For this purpose, small or thin slices of meat are placed on trays and exposed to circulating, dry air. Large meat chunks are not normally dried, since surface hardening, that is, fast migration of water from the surface, can result in unacceptable products. Attention should be given to the shape of the product, since the product may shrivel and come out twisted or deformed. This is especially important for products such as turkey jerky, which is dried and later sold in flat packages. Another

area of concern is fat oxidation, which is accelerated during hot-air drying, because of the large surface area exposed to oxygen. In order to overcome this problem, antioxidants should be added. The antioxidants can include synthetic substances, such as butylated hydroxy anisole (BHA) and butylated hydroxy toluene (BHT) or, if these are not permitted or desired, natural anti-oxidants, such as rosemary oleoresin are used.

Freezing

Poultry meat for further processing is usually frozen in the form of carcasses or bone-in and bone-out portions in cartons weighing up to 25 kg. Most bulk meat, consumer portions and other poultry products are frozen in air-blast freezers. Some small, individual items, such as chicken burgers, may be frozen in cryogenic tunnels and a small amount of offal, mechanically recovered meat and other meat is frozen in plate freezers. It is not unusual for poultry meat to be frozen twice before it reaches the consumer. During industrial processing, frozen raw material is often thawed or tempered before being turned into pies, convenience meals, burgers, etc. or consumer portions, such as breast fillets. These consumer-sized portions are often refrozen before storage, distribution and sale.

Secondary cooling

Chilling is required to prevent the growth of most food borne pathogens and delay the growth of spoilage organisms. Poultry carcasses must be chilled immediately after dressing. It is critical that the average temperature of the carcass is reduced below 4^{o}C and preferably to a temperature approaching 0^{o}C during primary processing. Any subsequent handling process such as cutting, mixing or tumbling will add heat to the meat and increase its temperature. A secondary cooling operation is therefore required with all raw poultry products to reduce their temperature to approaching 0^{o}C and maintain their storage life. Rapid cooling is also required after cooking of poultry to prevent growth of any surviving microbes. Air, immersion and spray systems are the three most common methods of chilling dressed poultry.

Canning

Canning is a method of preservation in which spoilage can be averted by killing micro-organisms through heat in hermetically sealed containers. The canning operation,

which achieves `commercial sterility', is commonly accomplished by using a retort that is a large metal chamber capable of operating under pressure. The pressure is required to achieve temperatures above 100°C. Usually, a temperature of 120°C or slightly higher is used in retorts, which helps reduce the processing time required to destroy heat-resistant, spore-forming microorganisms. Poultry products that are processed in such a way include canned chicken soup, chunks of chicken meat in gravy, turkey cubes with vegetables, etc. The product is usually packed in metal cans, glass jars or flexible retort pouches, and can be stored later at room temperature. The rate of heat penetration into the product is very important. In solid foods, such as chicken rolls, heat transfer is by conduction, and for liquid or particulate foods, such as meat pieces in a chicken soup, convection currents provide a faster rate of heat transfer. Other factors that are important in determining the rate of heat transfer are the packaging material (stainless steel containers have a thermal conductivity of about 20 Wm/K compared to glass, with a value of 0.52, and polyethylene with 0.55 Wm/K). Other factors include the size and shape of the container, temperature of the process (a higher temperature difference between the food and the heating medium results in faster heat penetration) and agitation of the container.

Chemical treatments

Salting

Sodium chloride (NaCl) is one of the oldest ingredients used to preserve meat. Preservation is achieved by lowering the water activity (a_w) and hence reducing the water available for microbial growth. In addition, a high salt concentration outside a bacterial cell can interfere with its metabolism, since the salt draws water from the cell. The salt concentration within the cell is around 0.90%. When the external salt concentration is about the same, the cells experience so-called isotonic conditions. When more salt is added, the higher external concentration results in water moving out of the cell in order to maintain equilibrium (a condition known as `plasmolysis', which can inhibit growth and possibly destroy the cell). In order to make a meat product shelf-stable at ambient temperature, a concentration of 10 ± 15% salt should be used. This is much higher than the 1.0 ± 2.5% level commonly used in commercial, further-processed poultry products that are manufactured today. At such concentrations, other means of preservation, such as refrigeration, are needed to maintain product shelf-

life. For example, poultry frankfurters containing 2% salt and left at room temperature will spoil within 1 - 2 days. It should be mentioned that some microorganisms are inhibited by a salt level of only 2.0%, but the high a_w (around 0.98 ± 0.99) that results is not sufficient to inhibit most bacteria, moulds or yeasts. Another important point to remember is that salt is water-soluble and, in calculating the salt concentration needed for preservation, this should be in relation to the lean-meat part. For example, if 3% salt is added to a turkey sausage containing 30% fat, the salt concentration actually experienced by bacteria in the lean phase is 4.2%.

Phosphates

These are salts of phosphoric acid. Different types are used by the industry and the most common is sodium tripolyphosphate (TPP). Phosphates can alter the pH of the food and emulsify fat, thereby affecting microbial cell membranes and causing a salt imbalance inside the cells. The use of phosphate rinses and dips for cleaning poultry carcasses was suggested over 50 years ago. The detergent activity of phosphates, which is also utilised in laundry and dishwashing detergents, results from their hydrophilic/hydrophobic structure. In 1992, a commercial mixture of about 10% TPP and a few other ingredients was approved in the USA, for decontamination of poultry skin. The mixture is effective against some pathogens, but not all bacteria.

Acids

Different organic acids are used to inhibit microbial growth in meat products. The acids can be applied as sprays or rinses for carcasses, as marinades. Application of a lactic acid rinse to poultry carcasses has been reported as a useful means of reducing microbial loads however, not all organic acids are as effective. Marinating cut-up chicken with ingredients such as lemon juice and vinegar is inhibitory to many microorganisms and helps in extending the shelf-life of the product. Marinated poultry parts, such as chicken wings, are becoming very popular, and are sold as convenience items, requiring only grilling. The different acids used also add distinctive flavours and aromas. The antimicrobial activity of organic acids is due to both the reduction in pH, below the growth range of microorganisms, and metabolic inhibition by the undissociated acid molecules. Often, the inhibitory effect of a specific organic acid is best measured by determining titratable acidity. This simply indicates the amount of acid that is capable of reacting with a known amount of base and is a better indicator

of acid content than pH. Sorbic acid is used as a food preservative at a level of 0.2%, mainly as a fungal inhibitor. The acid works best below pH 6.0 and is generally not effective above pH 6.5. Sorbate can also be used as a spray on fermented and other sausages, in order to inhibit growth of moulds and yeasts; however, sorbate is also effective against a wide range of bacteria. In general, catalase-positive cocci are more sensitive than catalase-negative bacteria, and aerobes are more sensitive than anaerobes. The resistance of lactic acid bacteria to sorbate allows this substance to be used as a fungistat in fermented meat products, without affecting the fermentation. In addition, a combination of sorbate and nitrite can be used to control *Clostridium botulinum*, but some flavour problems, described as `chemical' notes, can arise.

Nitrite

Sodium nitrite (NaNO2) and sodium nitrate (NaNO3) are used in the curing processes for different meat products. The effects of nitrite can be divided into three categories:

1. Inhibiting the growth of food poisoning bacteria, such as *C. botulinum*, and certain spoilage organisms.

2. Stabilizing the pink colour of meat by forming the nitrosohemochrome complex.

3. Contributing to flavour development with inhibition of oxidation and formation of the so-called `warmed-over' flavour.

The main reason for adding nitrite is to inhibit the outgrowth of *C. botulinum* spores, since most meat products are not cooked to temperatures above 100°C, so that textural problems can be avoided. This allows spores to survive. The active compound derived from nitrite is nitric oxide (NO), which inhibits *C. botulinum* by interfering with iron/sulphur-containing enzymes, such as ferredoxin, and thus prevents the synthesis of adenosine triphosphate from pyruvate. The chemical degradation of sodium nitrite within an aqueous meat system is shown as:

$$NaNO_2 \longrightarrow HNO_2 + Na + H_2O$$
$$3HNO_2 \longrightarrow 2NO + HNO_3 + H_2O$$

If nitrate is used, it will be reduced first to nitrite by microorganisms present in the meat. Nitrate is also used in longer processes, for example preparation of fermented meat

products, where slow release of nitrite is required. Nitrite levels used in processed meat products are very low and usually range from 100 - 150 parts per million (ppm). Permitted usage levels are controlled by government agencies because of the potential production of nitrosamines, which are formed by the reaction between nitrite and secondary or tertiary amines under acidic conditions at high temperatures. Since some of the nitrosamines are known to be carcinogenic, the levels of added nitrite are closely monitored by the inspection agencies. In meat products that will be processed shortly after addition of nitrite, reducing agents such as ascorbate and erythorbate are used at a level of about 500 ppm to quickly convert the nitrite into nitric oxide and reduce the chance of nitrosamine formation. In certain products that will be exposed to high-temperature cooking, such as turkey bacon, which is usually fried, lower levels of nitrite are prescribed.

Smoking

Smoking has been used for centuries to preserve meat. The phenols, ketones, aldehydes and organic acids found in various kinds of wood smoke have bacteriostatic and bactericidal effects and thus can inhibit or kill microorganisms. Over 400 compounds have been isolated from wood smoke and they can be grouped into the four major groups indicated above. Phenols and organic acids contribute most to the preservative effects of smoke. Today, smoked poultry products (frankfurters and salami, for example), receive only a light application to enhance the exterior colour and provide some special flavour notes (hickory, oak-smoke flavouring). This means that the smoke is deposited on the surface of the product and may penetrate to a depth of 1 - 3 mm. The treatment provides some bacteriostatic and bactericidal capability to the surface, but none to the bulk of the product. In some applications, cold smoking is used effectively to inhibit the growth of moulds on uncooked, dry, fermented sausages in countries such as Canada, where sorbic acid (mould inhibitor) is prohibited for this purpose.

Irradiation

Using irradiation to treat poultry meat at the radurisation level can assist in reducing food borne diseases caused by bacteria such as *Salmonella* and *Campylobacter*, and levels of spoilage bacteria in the product, such as *Pseudomonas* and *Lactobacillus* spp. Doubling the shelf-life, and reducing microbial counts by 3 - 4 logs, was achieved with

a radiation dose of 2 - 5 kGy. A dose of 5 kGy more than tripled the shelf-life. Several researchers have reported that irradiating eviscerated poultry with 2.5 kGy resulted in an essentially Salmonella-free product. Gamma radiation is considered an innovative and interesting method to preserve poultry meat and also reduce microbial populations in fresh poultry and poultry products. The application of irradiation treatment in poultry must be viewed as part of an integrated quality and safety management, incorporating good manufacturing practice (GMP) and hazard analysis and critical control points (HACCP).

Poultry cooking

Raw chicken has little or no flavour, it develops during cooking. The principles of cooking poultry are basically the same as for cooking meats. The cooking method is selected on the basis of tenderness of the poultry and its fat content, both influenced mainly by the age of the bird. Moist heat methods are applied to older and tougher birds in order to make them tender and palatable. Dry heat methods are applied to young tender birds. The changes that take place during the cooking of poultry are similar to those of other meats. To obtain tender, juicy and uniformly cooked poultry, low to moderate heat is to be used. Intense heat results in the toughening of proteins, shrinkage and loss of juiciness.

Broiling

Young tender poultry is cooked by broiling, frying, baking or roasting. For broiling the bird is placed in the broiler with the skin side down. The whole bird or halves may be broiled. The broiler is placed about 10 cm from the flame or heating element and cooked at a broiling temperature of 177^{o}C till the internal temperature of the breast muscle reaches 95^{o}C (about 45-60 min). Because of the low fat content of the young birds, basting with melted fat will improve the flavour, palatability and appearance of the preparation.

Frying

This operation is used to heat the product, to change the physical characteristics of the food, develop a brown/gold colour on the surface, for example, and to inactivate microorganisms. Frying and deep-fat frying are particularly suitable for cooking low-fat, young, tender poultry and more frequently used than broiling. The halves of the birds are frequently fried. Before frying they are coated with seasoned flour or beaten

eggs and bread crumbs. They are then carefully cooked to prevent over-browning before the meat is tender. If deep-fat fried, the bird must be steamed until the stage of doneness before being dipped in flour or in egg and crumbs, and fried slowly. The time required for browning in deep fat is too short to promote thorough cooking of the meat.

Roasting

Poultry may be roasted, stuffed or unstuffed. When the whole bird is roasted, tender parts, such as the breast, may be over-cooked before the legs and thighs are cooked to the desired state. For stuffed birds, roasting should be continued till the internal temperature of the stuffing reaches 74°C. This eliminates the possibilities of bacterial food poisoning. When the poultry is roasted without stuffing, it is cooked at an oven temperature of 163°C till the internal temperature of the thigh muscle reaches 85°C.

Braising and stewing

The older tougher birds are cooked this way. Disjointed pieces of chicken are generally braised. Usually, they are first browned by frying after which water is added and the bird simmered until it is tender. For stewing, the whole bird or cut pieces are used. They are cooked in water with seasonings and vegetables till they are tender.

Processing of some convenience poultry products

Poultry meat is consumed in many forms of traditional and processed products. Convenience products do not require any preparation prior to consumption. The common traditional products are tandoori chicken, chicken seek kabab, chicken shami kabab, chicken curry, chicken kofta, chicken tikka, chicken samosa, etc. other products such as barbecue, chicken patties, chicken sausages etc. are also have a good market in Urban areas. The methods of preparation of some convenience poultry products have been described below:

Tandoori chicken

This is a well-known and popular Indian chicken dish. Broilers at 6 weeks of age are preferred for tandoori chicken because of their tender meat and ability to sustain roasting. Dressed chickens with intact skin are rubbed with 4 per cent salt along with spices and seasoning and kept for 15 minutes. After draining, the carcases are thoroughly marinated with sauce on the surface and in the interior. A marination

time of 1-2 hours is allowed. The formulation of sauce depends on the consumers preferences for taste and other sensory attributes. In general dry and ground spices along with condiments are blended with vinegar (10%) and curd (10%).

The marinated chickens are roasted in a tandoori oven under smokeless, moderate and uniform heat for 20-30 minutes depending on the temperature of the oven and size of the broilers. Care must be taken to keep the chickens away from the direct fire and avoid burning or blistering of the skin or extremities. During roasting, chickens are occasionally removed from the oven and pasted with sauce or fat with the help of a brush. The doneness of tandoori chicken is tested by twisting one of the drumsticks when it dissociates easily from the joint. By this time, it also acquires slightly smoked flavour.

Chicken Barbecue

Broilers with about 750g dressed weight are preferred for barbecuing. The dressed chickens are longitudinally halved for this purpose after removing the neck portion. The chicken halves are marinated with sauce containing spices, salt and seasonings according to the consumers taste and preferences and allowed to stay for an hour. The slides are then placed on the oven for barbecuing during which these are 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 obtained.

Chicken seekh and shami kababs

Culled or spent chicken meat can be utilized for preparing seekh kababs. Lean meat is minced through 8 mm plate of a meat grinder. Wheat flour (3%) and whole egg liquid (5%) should be incorporated as binders to provide sufficient strength to the mince. Fat, salt, dry spices and seasonings are added as per consumer preference. The mince is pasted around specially made iron bars (seekh) and cooked over moderate and uniform heat, turning the bars and basting with vegetable oil from time to time till doneness with brown colour is achieved.

In the preparation of shami kababs, meat chuncks and water soaked black gram dal are simmered in water for nearly 15 minutes before grinding. It is seasoned with salt, dry spices and condiment paste. Some people also add liquid egg to the mince. It is made into round cakes which are shallow fried with edible oil on a girdle till both the

sides are brown.

Formed (sectioned and formed, restructured) poultry products

Formed meat products may be produced by sectioning muscle pieces and combining with a ground or emulsified myofibrillar protein binder and a chilled brine. Restructured items have a smaller particle size which is reduced by grinding, flaking, dicing, chopping, slicing, or emulsifying. The particles are then mixed with an appropriate binding material and formed into a specific portion size. Sectioned products are primarily intact muscles and have a more “whole-muscle” texture than restructured items. Examples of products in this category include poultry/turkey rolls, “fillets,” poultry roasts, poultry patties, nuggets, loaf items, turkey bacon, and turkey ham. Some items may be coated with a batter-breading, precooked and packaged for reheating in the microwave, deep fat fryer, or conventional oven.