
UNIT 4 PROCESSING AND MARKETING

Structure

- 4.0 Objectives
- 4.1 Introduction
- 4.2 Dressing of Birds
 - 4.2.1 Roadside Dressing at Shop
 - 4.2.2 Dressing at Poultry Farm
 - 4.2.3 Mechanized Poultry Processing
- 4.3 Further Processing for Value Addition
 - 4.3.1 Value Added Egg Products
 - 4.3.2 Value Added Meat Products
- 4.4 Grading, Handling and Preservation
 - 4.4.1 Grading of Eggs and Meat
 - 4.4.2 Handling of Live Birds, Eggs and Meat
 - 4.4.3 Preservation of Eggs and Meat
- 4.5 Packing, Storage and Transportation
 - 4.5.1 Packing of Eggs and Meat
 - 4.5.2 Storage of Eggs and Meat
 - 4.5.3 Transportation of Eggs, Live birds and Meat
- 4.6 Markets and Marketing Channels
 - 4.6.1 Markets for Eggs and Meat
 - 4.6.2 Marketing Channels for Eggs and Meat
- 4.7 Let Us Sum Up
- 4.8 Glossary
- 4.9 Suggested Further Reading
- 4.10 References
- 4.11 Answers to Check Your Progress

4.0 OBJECTIVES

After studying this unit, you will be able to:

- perform dressing of birds;
- explain various methods of processing of eggs and meat for value addition; and
- evaluate status of poultry marketing and different market channels for disposal of eggs and meat.

4.1 INTRODUCTION

Do you know that the rapid success in poultry production over the past three decades has led to the emergence of India as the 3rd largest egg (45 billion eggs weighing 2.6 million tonnes) and 5th largest broiler (2.1 billion broilers giving 2 million tonnes of meat) producer in the world? You will be surprised to know that in spite of such volumes of poultry production, the per capita availability of eggs and poultry meat is

still 40 eggs and 1.2 kg poultry meat per annum which is far below the world's average figures of 170 eggs and 11 kg, respectively.

Among animal proteins, the consumption of poultry egg and meat share is about 25 to 30%. The popularity of poultry egg and meat is mainly due to their relatively balanced protein quality, low price, free from religion restriction, wide availability etc. In our country, most of the eggs and meat are sold without further processing; only 10 % eggs and 30% broilers are sold as processed product. This means that the live bird sale from the farm and hand slaughter at retail poultry meat shops in the market is the predominant mode of disposal of chicken.

In this unit, you will learn about some of the processing methods of egg or meat and their marketing.

4.2 DRESSING OF BIRDS

Do you know what dressing of birds mean? The live birds be it chicken, duck, guinea fowl, quail or turkey are killed (slaughtered) manually or mechanically to remove portions which are not fit for human consumption and recover eatable (edible) portion and this process is known as preparation of ready-to-cook chicken or, popularly, “dressing of birds”.

In our country, about 80 to 85% of broilers are sold in retail markets either as live birds or dressed in front of consumers by unskilled or semi-skilled butchers; the rest 10 to 15% are dressed in numerous small semi-automatic or partially mechanized poultry processing units. It is estimated that only 5% of them are processed under hygienic conditions in modern and mechanized processing plants having 2000 to 4000 birds per hour capacity.

4.2.1 Roadside Dressing at Shop

The broiler or layer chicken are generally dressed or slaughtered at the retail meat shop by semi-skilled or unskilled butcher and this is also known as home or roadside slaughtering. Mostly, the broilers are slaughtered at the age of 6 to 8 weeks of age. Sometimes, you may also find old and culled layers slaughtered in the retail market. On consumer's demand, the meat shopkeeper or butcher selects the type of bird from a small cage or crate and starts dressing. First of all, the butcher may weigh the live bird if he is willing to sell on live body weight basis or takes weight after slaughter depending on the practice followed in the particular area. The killing is done under *halla* method by making the incision just behind the earlobe (to cut the carotid artery/jugular vein) with a sharp knife. It is important to drain as much of the blood as possible, without causing damage to the body. The feathers and skin together are removed by hand (Fig. 4.1). The head and feet (shanks) are removed by cutting from the whole carcass and discarded as “offal”. Then, horizontal cut is made in the abdomen and wind pipe (trachea), lungs, liver, gizzard, intestines are removed. These are non-edible and along with feathers, head and feet etc. constitute the offal. The meaty portion is cleaned with water and cut into different pieces of desired sizes and weighed properly. In majority of cases, the cleaned gizzard, heart and liver (giblets) are also sold to the consumers along with the chicken meat.

Though, this method of dressing is very easy, convenient and requires not much equipment and skill, the unhygienic conditions or improper quality control during the dressing of birds have made the method not acceptable as a scientific one.



Fig. 4.1: Feather removal by hands

4.2.2 Dressing at Poultry Farm

The chicken, duck and other birds are dressed at the farm and it is also called as home processing or semi-mechanized slaughtering. The birds to be slaughtered should not have access to any type of feed for about 6-8 hours before slaughtering. However, access to drinking water until catching them is advisable especially in hot climates.

You may wonder why the feed should be removed before slaughter? The simple reason for this is the feed consumed just before slaughter cannot be used by the bird for weight gain. In addition, the feed in intestines causes difficulty in removing the intestines; if it gets torn, the whole carcass becomes dirty. You can easily imagine that even weight of the birds increases; if the processor buys the birds on live weight basis, he will be paying the weight increased due to feed at the price of live weight.

The dressing procedure can be described into different stages such as killing, bleeding, scalding, plucking, evisceration, making several cut up parts etc. which are discussed below:

(i) Killing and bleeding

On reaching the slaughterhouse through convenient mode of transport, the head of the bird is positioned downward so that the blood can flow down easily. The best method and humane way to kill the birds is to cut just behind the earlobe with a sharp knife (Fig. 4.2). Bleeding starts and is allowed for 1 to 1½ minutes.



Fig. 4.2: Bleeding of bird

(ii) Scalding

The scalding means the passing of the bird through hot water after they have been

killed and blood is completely drained, so that the feathers come off more easily. You may wonder why so? You have studied in your schools that heat expands objects. You are aware that the feathers are embedded in fleshy feather follicles. When a dead bird is immersed in hot water, the feather follicles expand more than the root of the feathers inside them. Therefore, feathers become loose and can be very easily removed. Scalding can be done by immersing the killed birds in a bucket with warm water of about 60°C (140° F) for 45-60 seconds (Fig. 4.3).



Fig. 4.3: Scalding

(iii) Feather plucking

Removal of feathers is referred to as “Feather plucking or Defeathering”. Plucking should be started immediately after scalding either manually or putting the birds into revolving feather-plucking machine or feather-plucker (Fig.4.4).



Fig. 4.4: Feather-plucking machine

(iv) Singeing

After mechanical feather plucking, the left-over feathers, if any, are removed manually. There will be hair-like feathers called “Pin feathers” which cannot be removed by manual or mechanical methods. They are burnt by use of blue flame (either by gas or kerosene flame guns; preferably gas one). This process is called “Singeing”.

(v) Removal of head and shanks

Head and shanks are removed; the latter carefully by opening the joint without cutting the bone to leave a smooth curved edge. At this stage, the carcass is referred to as “New York dressed chicken”.

(vi) Evisceration

Evisceration, as the name indicates, is the removal of viscera (Fig. 4.5). The term “Viscera” means all organs in abdominal cavity. In case of poultry, there is no functional diaphragm. Therefore, viscera include all organs in the abdominal and thoracic cavities. For evisceration, the carcass is put on evisceration table, which has to be cleaned thoroughly both during and between evisceration of birds. Oesophagus, trachea and crop should be separated from the neck skin; they can be cut off or pushed gently into the abdominal cavity. The abdominal cavity can be opened by making a cut round the anus (vent), taking care not to cut the intestine. A straight cut can be made toward the tip of breast bone from the previous cut. With these cuts, abdomen can be opened and the viscera including the lungs can be removed. Care has to be exercised to avoid tearing of any of the viscera. Otherwise, not only the carcass gets contaminated but other carcasses also will be exposed to contamination. When all the contents of the cavity have been removed, the bird should be thoroughly washed with normal water.



Fig. 4.5: Evisceration

(vii) Preparation of Giblets

From the viscera, heart after removing blood, liver after trimming gall bladder and gizzard (stomach) after removing its contents along with thick membrane inside are washed thoroughly and kept separately. These portions are collectively referred to as “Giblets”.

(viii) Trussing

After the evisceration procedure has been completed, the whole carcass or dressed chicken (Fig. 4.6) should be properly tucked by pushing the neck, legs and wings inside the abdomen. The process is referred to as “Trussing”. The carcass gets a pleasing look and also the packing material will not be punctured by any projections in trussed carcasses. Further, they require less storage space.

(ix) Chilling or Ageing

The trussed carcasses are preferably brought to around 8°C as soon as possible to reduce microbial growth and also certain other changes in carcass due to stiffening after death. This is preferably done by immersing carcasses in chilled water or water

with ice for about 4 to 6 hours. During chilling, the carcasses become tender and juicy. Hence, the process is also called “Ageing”. If chilling tank is not available, a refrigerator can be used. After immersion chilling, the carcasses are drained.

(x) Packing and storage

If the carcasses are to be frozen, giblet can be wrapped in a small plastic bag and placed inside the abdomen. The birds can then be placed in a moisture-vapour proof plastic bag and frozen. This resultant product is known as dressed (Fig. 4.6) or ready-to-cook chicken.



Fig. 4.6: Dressed whole chicken

4.2.3 Mechanized Poultry Processing

The poultry processing plant is the place where the broilers and other commercial birds are dressed or slaughtered by fully mechanized machines. This is also known as mechanized slaughtering (Fig. 4.7 and 4.8). The size of plant may be of different capacities i.e. small to a large unit of 2000 to 5000 birds per hour capacity. In almost every country of the world, all steps in processing of poultry are executed by modern machinery, which, when correctly applied, results in much more hygienic product. Mechanization allows cleaning of both carcass and equipment after each step in the process (Fig. 4.9). Mechanization also helps prevent cross-contamination by micro-organisms, since it is obviously impossible to wash one’s hands after each operation during manual or semi-automatic processing. Another advantage of mechanized processing is climate controlled environment during the processing, storage and marketing. Though the investment required is high, the uniformity, quality and safety of the product more than compensates the investment in large operations.



Fig. 4.7: Shackling of birds for slaughter Fig 4.8: Mechanized slaughtering of birds



Fig. 4.9: Cutup Parts of Chicken

Check Your Progress 1

Note: a) Use the space given below for your answers.

b) Check your answers with those given at the end of the unit.

1. Write True or False

i) For proper bleeding, a cut is made just behind the earlobe.

ii) Gall bladder should not be removed.

iii) Head of bird is kept up while bleeding.

iv) Plucking means feather removal.

v) Singeing means removal of viscera.

2) Answer the following:

i) Alternate name for dressing of birds.

ii) Name the man who slaughters the birds in retail meat shop.

iii) Parts of giblets.

iv) Preferred age of broiler for dressing.

v) Temperature of water for scalding.

4.3 FURTHER PROCESSING FOR VALUE ADDITION

The rapid increase in broiler and layer production and awareness of egg and meat quality consciousness among consumers has resulted in the problem of disposal of eggs during lean season (summer months) and culled breeders and spent-hens (due to tough meat and fat content). A large number of spent-hens are disposed of at uneconomical price. In order to utilize these excess eggs, spent-hens, surplus broilers and heavy broiler parent stocks, they have to be converted into variety of ready-to-eat (fast / snack / value added) products. As many urban families do have both the couple working, Value added products are gaining popularity in our country.

The further processing of meat has many advantages like:

- Value added products meet changing consumer life-style requirements.
- Offers better utilization of different cuts and edible products.
- Facilitates incorporation of non-meat ingredients for quality and economy.
- Promotes employment, entrepreneur ventures and exports and also minimizes imports.
- Provides greater convenience to consumer through decreasing preparation time and minimizing preparation steps.
- An important avenue for efficient utilization of tough meat which results in increased demand and higher returns.
- In general, returns out of value added products are always greater than eggs and live or dressed chicken.

The disadvantages of value added products include:

- Value addition increases the cost of product.
- Requires skilled technology, attractive packing and refrigerated storage etc.

The entry of multinational fast food companies such as Kentucky Fried Chicken (KFC), McDonald, Pizza Hut, Wimpy, etc. has introduced many value added products using egg and chicken meat in Indian market.

4.3.1 Value Added Egg Products

Boosting consumption of egg and egg products in the domestic market is very vital for the sustained growth of layer industry. Apart from traditional egg preparations such as boiled egg, egg curry, omelettes, pickles, poached egg, scrambled egg etc. some commercial egg products are also having marketing potential.

In this direction, Central Avian Research Institute (CARI), Izatnagar (UP) has made concerted efforts to develop some of the value added egg products (Fig. 4.10 to 4.15). These include brined eggs, egg albumen flakes, egg albumen rings, egg crepes, egg pancakes, egg patties, egg pizza, egg rolls and pickled eggs; quail egg pickle, dried whole egg, albumen and yolk powder.

For such preparations, several ingredients such as whole wheat flour, refined vegetable oil, spices, table salt, yogurt, yeast, skim milk powder, black gram flour and vinegar are required. Equipment such as cooker, baking oven, frying pan, blender, knife, spoon, frying spoon, plate etc. can be used for preparation of value added egg products.



Fig. 4.10: Albumen Ring



Fig. 4.11: Egg Crepes



Fig. 4.12: Egg Roll



Fig. 4.13: Egg Waffles



Fig. 4.14: Pickled Quail Eggs



Fig. 4.15: Dried whole Egg, Albumen and Yolk powder

4.3.2 Value Added Meat Products

Value addition to chicken meat is carried out by organized and unorganized sectors. Poultry meat based fast food industries have great potential in India but mainly in big cities and metros. You must aim at simple and relevant technologies to result in process efficiency for achieving lower production costs and higher yields. Traditional chicken products are biryani, curries, kababs, koftas (balls), pickles, soups and tandoori (roasted), tangri-kabab and different preparations of chicken in restaurants

or hotels. The tough meat, especially from spent-hens or meat-type breeders, and old egg have to be properly utilized though different processing methods as the consumers may not like to buy and process such raw material. However, if the same are properly processed (“Further processing” or “Value addition”), they will be ready to eat and pay more!

In this direction too, CARI, Izatnagar (UP) and Indian Veterinary Research Institute (IVRI), Izatnagar (UP) have developed some of the value added poultry meat products such as chicken idlies, chicken kababs, chicken meat balls, chicken nuggets, chicken patties, chicken sausages, chicken steaks, chicken gizzard pickle, chicken gizzard snacks, chicken skin-meat cutlets, cooked chicken meat block, cooked chicken rolls, dehydrated chicken soups, egg-meat patties, intermediate moisture chicken meat, marinated chicken breast fillets, mixed chicken loaf, tandoori chicken, tandoori quail etc. (Fig. 4.16 to 4.21).



Fig. 4.16: Breast Fillets



Fig. 4.17: Chicken Loaf



Fig. 4.18: Gizzard Pickle



Fig. 4.19: Chicken Patties



Fig. 4.20: Chicken Roll



Fig. 4.21: Chicken Sausage



Fig. 4.22: Chicken Meat Balls



Fig. 4.23: Chicken Nuggets

It is very important to remember that majority of value added chicken meat products such as meat balls, nuggets, patties and sausages are made from deboned meat (meat from back, breast, leg and wing).

Check Your Progress 2

Note: a) Use the space given below for your answers.

b) Check your answers with those given at the end of the unit.

1) List out the value added egg products.

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2) Name any five value added meat products.

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3) What are the advantages of further processing?

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4.4 GRADING, HANDLING AND PRESERVATION

The production of eggs and broilers has witnessed rapid progress in our country. This has created necessity for immediate disposal of the products (eggs and live birds) from the point of producers to consumers. As the eggs and meat are highly perishable products, every effort to grade, handle and preserve them is required.

4.4.1 Grading of Eggs and Meat

Commercially, grading of egg, meat and their products is an important step to assess the quality of product. This will also help evaluate the product for its price and storage stability. Grading is universally accepted and considered useful in marketing of any product.

(i) Grading or sorting of eggs

It is best that you sort the eggs before you store, sell, or consume them. The easiest way to sort eggs is to candle them with a bright light of electric bulb. This process of candling can help eliminate cracked eggs or eggs with foreign matter inside like blood spots, meat spots etc. For this, you can hold the large end of egg between your thumb and first two fingers up to the candling light in a slanting position (Fig. 4.24). Then by turning your wrist quickly, you can see the inside of the egg. This will tell you a great deal about the albumen (white part), yolk (yellow part) and small cracks in the egg shell. Remove cracked eggs and discard them. They can be used immediately, mainly by the producer.



Fig. 4.24: Candling of Egg

(ii) Different grades of table egg

The egg quality characteristics include mainly the size or weight, shell colour, shell thickness, blood and meat spot, interior egg quality and yolk colour. The large egg size will fetch more price than the smaller eggs. The shell quality determines the

extent of handling and storage of whole egg, whereas, the shell colour will depend on consumer preference. Dark yellow coloured yolk is always preferable than the dull or light yellow coloured yolk. Brown egg shells are preferred over white colour by many consumers. The Agricultural Marketing Advisor to Government of India has laid down the Table Eggs Grading and Marking Rules, 1968 which suggests the criteria for different grades of eggs, which is also called Bureau of Indian Standards (BIS) grading (Table 4.1) and marking of Agricultural Marketing (AGMARK) seal on the container of table eggs for market purposes.

Table 4.1: Description of Egg Grades as per BIS and AGMARK Markings

Grade	Weight of one egg (g)	Weight per dozen eggs (g)	Shell	Air Cell	White	Yolk
A- Extra Large	60 and above	715 and above	Clean, unbroken, sound shape and normal	Up to 4 mm in depth, regular or better	Clear reasonably firm	Fairly well centred, free from defects, outline clear
A- Large	53-59	631-714				
A-Medium	45-52	535-630				
A- Small	38-44	456-534				
B- Extra Large	60 and above	715 and above	Clean to moderately stained, sound and slightly abnormal	8 mm in depth, may be free and slightly bubbly	Clear, may be slightly weak	May be slightly off centred, outline slightly visible
B- Large	53-59	631-714				
B - Medium	45-52	535-630				
B - Small	38-44	456-534				

(iii) Dressed broiler chicken

The dressed chicken can be graded on the basis of dressed weight with or without giblet. The dressing percentage (dressed weight divided by live weight and multiplied by 100) can be calculated mainly for research purpose and by big poultry processing units. Normally, two grades are applied for dressed chicken. **Grade 1** will contain dressed chicken free of deformities, rounded fleshy breast, well distributed fat, free of pin feathers, free of cuts and tears etc. Whereas, **Grade 2** will contain dressed chicken with slight abnormalities, curved breast, less distributed fat, pin feathers at some places, very few cuts and tears etc. The meat quality may be evaluated through sensory evaluation score card in terms of its appearance, colour, flavour, juiciness, tenderness, texture, saltiness, if required and overall acceptability. Of the dressed chickens, about 80% are sold as freshly dressed, chilled and frozen chicken with no proper grading.

4.4.2 Handling of Live Birds, Eggs and Meat

The handling of live birds, poultry eggs and poultry meat starts from the production centre (poultry farm) to the point of consumer through the market channels. To ensure egg quality in small flocks, the producers must learn to handle the eggs in proper way.

(i) Live birds

Birds selected for sacrificing should be procured during the cooler part of the day and transported in crates, preferably plastic crates (Fig. 4.25) so that they may not cause any injury or bruises unlike metallic crates. The overcrowding or overloading of birds should be avoided to a maximum extent; otherwise the breast blister is a

very common problem and this may downgrade the carcass. The dimension of one crate should be 1 m long × 1 m wide × 0.6 m height to accommodate 15-20 adult broilers. Live birds should be starved for a period of 6 to 8 hours before slaughter but sufficient quantity of drinking water should be provided. While catching the birds from the farm or crates to the processing plant, gentle handling with no cruelty is mandatory.



Fig. 4.25: Crate for carrying live birds

(ii) Layer house management

The condition of the eggs that you collect is directly related to how well the flock is managed. Keeping the layers environment clean and dry will help eggs to remain clean. A muddy outside run, dirty or damp litter and dirty nesting material will result in dirty, stained eggs. Clean-out the nest boxes and clean litter at least every two weeks. Provide one nest for every 4 to 5 hens in the flock and make sure the nests have a deep clean layer of absorbent litter to prevent breakage. It is best to collect the eggs as soon as they are laid. The longer the egg allowed to stay in the nest, the more likely it gets dirty or broken or lose interior quality. Collecting eggs once an hour between 10 am to 3 pm (or at least 2 to 3 times a day) is advisable, especially during extreme weather.

(iii) Egg cleaning and handling

Collect eggs in an easy to clean container like coated wire baskets or plastic egg flats. This will prevent stains from rusted metal and contamination from other materials which are difficult to clean and disinfect. In order to get cleaned eggs, wash eggs as soon as you collect them. This helps in reducing the contamination and loss of interior quality. Individual egg is handled very carefully while collecting from the laying cages or from the floor of layer house. Any leaking or broken egg should be discarded. While exporting, perfect cleaning of eggs is required.

(iv) Meat products

Dressed chicken and value added meat products are handled very carefully once these are moved from one place to another. While dressing the broilers, proper cleaning of ready-to-eat chicken is important. Any dust or contamination will spoil the quality of product as well as the scope of providing safe and convenient product to domestic consumers. The consignment for export will certainly require utmost care and handling of the hygienically finished meat products. Missing of any step for

maintenance of strict hygiene and sanitation during the processing of meat products will result in rejection of the product.

4.4.3 Preservation of Eggs and Meat

The preservation is a method of maintaining food at a desired level of properties or nature for their maximum benefits. The egg and chicken meat are highly perishable. This is mainly due to high water content they have. Micro-organisms utilize the nutrients available in eggs and meat in presence of water and spoil the food very rapidly. The microbial contamination during the handling, processing, storage and transportation of egg and meat products is expected in the normal course and hence, proper preservation of eggs and meat is necessary to increase the shelf-life of raw and processed poultry products.

(i) Preservation of eggs

A freshly laid egg can be assumed to have highest quality. Cleanliness and soundness of shell is the first step to assure the quality of egg to the consumers. The shell quality deficiencies are mostly related to the production practices adopted at the farm. Proper handling of eggs can considerably minimize the decline in shell quality.

Even eggs with good shell quality deteriorate because of loss of water and CO₂ from the contents through the shell pores and microbial contamination. Hence, all preservation methods for shell eggs have been designed to retard water and CO₂ loss. Following preservation methods are employed to maintain the quality of shell eggs:

(a) Oil treatment

Oil spray or coating on eggs has become very popular for short-term storage. Coating oil forms a thin film on the surface of the shell sealing the pores. It should be done as early as possible, preferably within first few hours after eggs are laid because loss of carbon dioxide (CO₂) and evaporation of moisture are more during the first few days. Egg coating oil should be colourless, odourless and conform to food grade. Coating is done by dipping the eggs in the coconut oil or special egg-coating oil developed by CFTRI, Mysore; whereas, for oil spray, the eggs are arranged in the filler flats with their broad end up and oil is sprayed to block pores which are mostly located at the broad end. It is important to drain out excess oil before packaging. Oil treatment safeguards the quality of albumen for at least 7 days because it effectively seals the shell pores.

(b) Thermo-stabilization

This preservation method involves stabilization of albumen quality by holding the eggs in a water-bath maintained at 54°C (130°F) for 15 minutes or 60°C (140°F) for 10 minutes. This process brings about coagulation of outer thin albumen just below the shell membranes, thereby blocking the escape of CO₂ and moisture. Alternatively, the eggs can be immersed in hot water at 71°C (160°F) for 2 to 3 seconds. In this quick heat treatment, the bacteria present on the surface of the shell are destroyed and a thin film of albumen just below the shell membrane is coagulated sealing the egg shell from inside.

(c) Immersion in liquids

Under rural conditions, the lime-water or water-glass immersion is most useful. In **lime-water treatment**, a litre of boiling water is added to 1 kg of quick lime and allowed to cool. Now, 5 litre of water and 250 g of table salt are added to it. The

solution is allowed to pass through a fine cloth where the mixture settles down. Eggs are dipped in the clear fluid overnight and then dried at room temperature. In this process, an additional thin film of calcium carbonate is deposited on the egg shell and seals the pores. Such eggs can be stored for a month at ambient temperature. In **water-glass treatment**, one part of sodium silicate is mixed in 10 parts of water and eggs are dipped overnight. In this process, a thin precipitate of silica is deposited on the egg shell and partially seals the pores.

(ii) Preservation of Meat

The dressed poultry is preserved in different ways. Mostly, the refrigerator or deep freezer is the ideal tool to increase the shelf life of meat. Dressed broilers can be preserved at 4°C (40°F) up to 10 days. In order to increase the shelf life of dressed chicken to 21 days at 0°C (31°F), sodium benzoate can be added @ 100 mg per kg meat. Dressed chicken can be packed and frozen at – 20°C or lower and stored for prolonged period (6 months).

It is possible to keep dressed meat up to 7 days at room temperature, if the chicken has been cured or smoked properly. The smoking enhances the meat preservation and delays fat rancidity. Poultry meat can be canned; such meat can have longer shelf-life (years).

Several other methods have also been developed like dehydration, irradiation, intermediate moisture meat etc. But, most common methods in our country are refrigeration and freezing preservation of chicken meat.

Check Your Progress 3

Note: a) Use the space given below for your answers.

b) Check your answers with those given at the end of the unit.

1) List out the methods of preservation of eggs and meat.

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2) Answer the following:

- i) How many times the eggs should be collected daily?
- ii) Name the chemical used in lime-water treatment of eggs.
- iii) Name the chemical used in water-glass treatment of eggs.
- iv) Temperature and time used in cold storage for eggs.
- v) Temperature and time used in thermo-stabilization of eggs.

3) Explain sorting of eggs.

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4.5 PACKING, STORAGE AND TRANSPORTATION

The ready-to-eat chicken or dressed chicken or egg has to be properly packed and stored before transported to the consumer. The method of packaging, storage and transportation of egg and meat has been detailed below:

4.5.1 Packing of Eggs and Meat

As you know that there is hardly any food item that does not require proper packing. Enough research is being carried out throughout the world to develop convenient and effective packing materials suitable to the nature of the product. The proper packing maintains the original texture and quality of the product while helping in handling of the product by the consumer.

(i) Packing of eggs

Only sound, clean and dry containers which are suitable for the purpose and free from any undesirable smell and insect infestation or fungal contamination have to be used. The container should be properly closed and sealed in a manner approved by the Agricultural Marketing Adviser. The eggs are packed in card board or plastic made filler flats. One filler-flat (Fig. 4.26) will contain 30 eggs kept wide end of egg on top side.



Fig. 4.26: Thirty eggs in one filler

Now-a-days, the consumer utility pack or small paper pulp pack may contain 6 to 12 eggs so that they may be carried easily. Ten filler-flats can be kept in one card board box and packed nicely with paper packings or saw dust or dry leaves or husk powder etc. The egg box should be written with proper label "Poultry Eggs Handle with Care". While loading these boxes in the vehicle for transportation, utmost care should be taken to lift them with gentle handling. The raw or processed material is packed carefully in an attractive and suitable container. The container may be marked with AGMARK and proper instructions, if any, so that the persons may follow these instructions while loading these products on different mode of transportation.

(ii) Packing of dressed broilers

Freshly dressed chickens at meat retail shops are sold to the consumers almost without any packing but, in a polybag or carry bag. On the other hand, the dressed and chilled whole broilers or their crates are packed in plastic crates, polybags, aluminium sachets, and plastic films. The packing cartons should be marked with proper instructions with nutritive value, name of the product, name of the company, batch number, quantity in g, price in Rupees and storage instruction.

4.5.2 Storage of Eggs and Meat

The production of eggs and meat is not throughout the year in our country. Poultry production is in pockets; for instance, five top poultry egg or meat producing states where you can get about 60% of total poultry production are Andhra Pradesh, Haryana, Maharashtra, Punjab and Tamil Nadu. These states together account about 30% of total human population. Hence, the surplus production of perishable products certainly need some holding time in the store house for their future disposal or consumption.

(i) Storage of eggs

After collection, the eggs should be shifted to holding room maintained at a temperature of about 15°C (59°F) and 70 to 80% relative humidity (RH) at least for 12 hours. The temperature of cold store is maintained at 4°C (32°F) and relative humidity between 80-85 per cent. The quality of shell eggs can be maintained for about 6 months in a cold storage. Date is marked on the carton so that oldest eggs are sold first.

Note: Never store eggs with materials that have an odour. Otherwise, the eggs will pick up the odours of apples, fish, onions, potatoes and other food or chemicals with distinct odours. Consumers should always keep eggs refrigerated until the eggs are used.

(ii) Storage of poultry meat

Freshly dressed chickens at the retail shops are stored for very small time. During the summer time, it may be stored in ice-box for few hours. Hygienically dressed broilers and their products are stored in refrigerated cabinets in big meat shop or food markets for longer period i.e. a week or so. The dressed meat and products may be stored in frozen state for 3 to 4 months provided there is no power failure.

4.5.3 Transportation of Eggs, Live Birds and Meat

Most of the eggs and broilers are produced in rural or semi-urban areas, whereas, the consumers are concentrated largely in urban areas. Therefore, the products have to be moved from the producing area to the point of consumption. This situation demands use of different modes of transportation. Small quantities of these perishable products are being transported either on head-load, bicycles, rickshaws, thelas, tangas, bullock carts (in villages or small towns) etc. The cars, tractor-trolleys, small vans, trucks, buses, rails, ships and aeroplanes are used to transport the major bulk of eggs, live birds, dressed meat and products. The live birds are brought from the farms in steel or plastic cages. The refrigerated or insulated vans are used now-a-days by big companies to transport the chilled poultry products to big cities.

Check Your Progress 4

Note: a) Use the space given below for your answers.

b) Check your answers with those given at the end of the unit.

1) List out the mode of transportation of eggs, live birds and meat.

.....
.....

2) Explain the following:

i) Packing of dressed broiler

.....
.....

ii) Storage of eggs

.....
.....

4.6 MARKETS AND MARKETING CHANNELS

Marketing of the product is probably the most important aspect of any business? It is one of the weakest links in the rural poultry development program, whereas, it is the strongest link in cities and metros. Presently, the market for poultry products is concentrated in peri-urban and urban areas. The overall impression of the market is that it is not well organized and there is exploitation by brokers or middlemen, reducing the margin of profit for farmers who are under threat by weather, price fluctuations and productivity.

4.6.1 Markets for Eggs and Meat

Agencies like National Egg Coordination Committee (NECC) established in 1982 and All India Broiler Farmers Marketing Cooperative Limited (BROMARK) are declaring prices for eggs and broilers based on market dynamics and have participation of farmers, which helps to solving the problem of middlemen to some extent. Broiler Coordination Committee (BCC) also declares sale price of live broilers from time to time. Infrastructure like cold storage and retail outlets will help stabilize the market in terms of price fluctuations. On the basis of area and space, markets can be classified as local markets, national markets and international markets. In villages, you may find the markets arranged on fixed day, time and place. Normally, the products are sold through direct or indirect or integrated or cooperative method.

(i) Egg markets

Like other food commodities, you can find various types of markets dealing with disposal of table eggs. The size of markets may be small to big. In district or sub-division level, wholesale markets (*Mandi*) are available where one can purchase eggs in bulk quantities. The eggs are also sold out through daily hawkers, egg-thelas, egg-trolleys, egg-kiosks, groceries-shops, hotels, restaurants and shopping-malls. The table eggs are generally marketed as they are produced without cleaning, grading and chilling and only about 5% of the total eggs produced are utilized as an ingredient for egg-based products by food and non-food industries. Most small-flock producers, base their prices on the current store prices in the area they live. However, many organized producers market their eggs as a specialty item and receive premium prices. Brown eggs and organic eggs often will bring higher prices.

(ii) Sale of broiler meat

The wholesale markets for live birds are very few in number, but one can find such markets in big cities and from there, the small shop keepers of neighbouring areas get live birds through agents or brokers or middlemen. Even today, the old system of auctioning chicken by *Kori* (20 birds per kori) without any regard to their weights and grades is in practice in some pockets of the country. The live birds are sold by count in *mandi*, but on live or dressed body weight basis by the retail poultry meat shop keeper. Of the dressed chickens, approximately 75% are sold as hot dressed, chilled or frozen whole carcass and rest 25% as raw or marinated cut-up portions, de-boned meat, fillets and further processed value added products such as burgers, kababs, nuggets, patties, samosas, sausages and soups. Even the big poultry producing companies of the country sell 40% live broilers, 55% chilled or frozen chicken; hardly 5% only is sold as value added products through their retail outlets. Among the consumers, about 30% of total population comes from urban pocket and 70% belong to rural area. In most of the places, a common market of small and big size for eggs and poultry meat is in operation. Now-a-days, many stockiest who trade poultry and its product throughout the country are available.

4.6.2 Marketing Channels for Eggs and Meat

The following are the identified marketing channels for eggs and meat in our country:

- From farm to consumer (Direct).
- The raw finished product rolls from one hand to another and then finally reaches to the end user. This means that between producer to consumer the brokers/middlemen, bulk buyers/institutional buyers/stockiest/whole sellers and retailers play vital role in marketing of raw or finished product.

Producer → Broker/Middleman → Wholesale → Retailer → Consumer

- Small or big shops, retail outlets, canteens, hotels, restaurants, refrigerated display cabinets and fast food shops are also involved as different marketing channels.
- The NECC established in 1982 has about 25000 poultry farmers as members and carries out different programmes such as market intervention, price support operations, egg promotion campaigns, consumer education, market research, rural market development and liaisons with the government on vital issues concerning the industry to declare egg price.
- Similarly, the BROMARK and BCC are also engaged in price fixation and marketing of broilers in our country.
- The quality assurance is very important in marketing channels. The AGMARK is involved in grading and maintenance of quality of egg and meat products.

Check Your Progress 5

Note: a) Use the space given below for your answers.

b) Check your answers with those given at the end of the unit.

1) Describe the marketing channels for egg and meat.

.....
.....

2) Name the agencies involved in:

- i) Fixation and marketing.
- ii) Grading and maintenance of quality of egg and meat products.

3) How broilers/birds were sold in old system?

.....
.....

4.7 LET US SUM UP

Processing of live birds into ready-to-eat chicken is called as dressing of chicken. It involves several steps such as slaughter, bleeding, scalding, feather plucking, singeing, removal of head and feet, evisceration, preparation of giblets, washing, chilling and storage. However, in most part of our country, scientific dressing of chicken is not yet in practice. Eggs and poultry meat can also be converted to several value added products. Such products have a great demand in urban areas where both couple go

for work and require ready-to-eat fast foods. Standards for grading of eggs and meat are provided by Agricultural Marketing Advisor to Government of India. However, they are yet to become popular due mainly to very low per capita consumption levels. Eggs and poultry meat are highly perishable commodities and hence, they have to be preserved carefully. Common methods of preserving eggs are oiling and cold storage, whereas, chicken meat is popularly stored in refrigerator (for short periods) or frozen. Eggs and meat also have to be properly packed before being transported or stored. There are several marketing channels in our country which are involved in making the products available from producers to the consumers.

4.8 GLOSSARY

AGMARK	: Agricultural Marketing.
Blister	: A local swelling of the skin that contains watery fluid and is caused by burning or irritation.
Broiler	: A young chicken reared for meat purpose and slaughtered at 6 to 8 weeks of age.
BROMARK	: The All India Broiler Farmers Marketing Cooperative Limited is responsible for pricing of broilers.
Carcass	: The dead body of an animal, especially one slaughtered for food.
Coagulate	: To change from a liquid into a soft semisolid mass.
Consignment	: Goods carried by a large vehicle.
Consumer	: Persons who purchase the goods for own or others consumption.
Contamination	: The act of contaminating or polluting; including (either intentionally or accidentally) unwanted substances or factors.
Cost	: This is the expenditure incurred by a firm for the development of the product.
Cruelty	: A deliberate infliction of pain and suffering.
Curing	: To preserve (meat, for example), as by salting, smoking, or aging.
Dehydration	: Excessive loss of water from the body or from an organ or body part, as from illness or fluid deprivation.
Deteriorate	: To diminish or impair in quality.
Evisceration	: Removal of the gut, heart, lungs, kidney and reproductive organs during the dressing of birds.
Giblets	: The edible viscera of the bird comprising of gizzard, heart and liver.

Irradiation	: The use or application of ionizing radiation, especially for the sterilization or preservation of food.
Market	: A place where the buyers and sellers are brought together so that the goods can be exchanged with money.
NECC	: National Egg Coordination Committee is responsible for egg price, egg promotion campaign and consumer education.
Offal	: Waste and discarded parts of the gut including head and feet usually not sold.
Perishable	: Food that will decay rapidly if not refrigerated.
Sensory	: Relating to the senses.
Shelf-life	: The length of time a product may be stored without becoming unsuitable for use or consumption.
Starved	: To suffer or die from extreme or prolonged lack of food.
Surplus	: Being more than or in excess of what is needed or required.

4.9 SUGGESTED FURTHER READING

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4.11 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

- 1)
 - i) True
 - ii) False
 - iii) False
 - iv) True
 - v) False
- 2)
 - i) Slaughtering
 - ii) Butcher
 - iii) Gizzard, heart and liver
 - iv) 6 to 8 weeks
 - v) 60° C or 140° F for approximate 1 to 1½ min

Check Your Progress 2

- 1) Value added egg products include brined eggs, egg albumen flakes, egg albumen rings, egg crepes, egg pancakes, egg patties, egg pizza, egg rolls and pickled eggs; quail egg pickle, dried whole egg, albumen and yolk powder.
- 2) Chicken idlies, chicken kababs, chicken meat balls, chicken nuggets and chicken patties.
- 3) The further processing of meat has many advantages like:
 - Value added products meet changing consumer life-style requirements.
 - Offers better utilization of different cuts and edible products.
 - Facilitates incorporation of non-meat ingredients for quality and economy.
 - Promotes employment, entrepreneur ventures and exports and also minimizes imports.
 - Provides greater convenience to consumer through decreasing preparation time and minimizing preparation steps.
 - An important avenue for efficient utilization of tough meat which results in increased demand and higher returns.

Check Your Progress 3

- 1) Eggs can be preserved by Oil treatment, thermo-stabilization and Immersion in liquid. The dressed poultry is preserved in refrigerator or deep freezer is the

ideal tool to increase the shelf life of meat. Dressed broilers can be preserved at 4°C (40°F) up to 10 days. In order to increase the shelf life of dressed chicken to 21 days at 0°C (31°F), sodium benzoate can be added @ 100 mg per kg meat. Dressed chicken can be packed and frozen at – 20°C or lower and stored for prolonged period (6 months).

- 2)
 - i) 2 to 3 times
 - ii) Lime
 - iii) Sodium silicate
 - iv) 0°C (32°F) for 21 days or 4°C (40°F) for 10 days
 - v) 54°C (130°F) for 15 minutes or 60°C (140°F) for 10 minutes
- 3) The easiest way to sort eggs is to candle them with a bright light of electric bulb. This process of candling can help eliminate cracked eggs or eggs with foreign matter inside like blood spots, meat spots etc. For this, you can hold the large end of egg between your thumb and first two fingers up to the candling light in a slanting position. Then by turning your wrist quickly, you can see the inside of the egg. This will tell you a great deal about the albumen (white part), yolk (yellow part) and small cracks in the egg shell. Remove cracked eggs and discard them. They can be used immediately, mainly by the producer.

Check Your Progress 4

- 1) Small quantities of these perishable products are being transported either on head-load, bicycles, rickshaws, thelas, tangas, bullock carts (in villages or small towns) etc. The cars, tractor-trolleys, small vans, trucks, buses, rails, ships and aeroplanes are used to transport the major bulk of eggs, live birds, dressed meat and products. The live birds are brought from the farms in steel or plastic cages. The refrigerated or insulated vans are used now-a-days by big companies to transport the chilled poultry products to big cities.
- 2)
 - i) Freshly dressed chickens at meat retail shops are sold to the consumers almost without any packing but, in a polybag or carry bag. On the other hand, the dressed and chilled whole broilers or their crates are packed in plastic crates, polybags, aluminium sachets, and plastic films. The packing cartons should be marked with proper instructions with nutritive value, name of the product, name of the company, batch number, quantity in g, price in Rupees and storage instruction.
 - ii) After collection, the eggs should be shifted to holding room maintained at a temperature of about 15°C (59°F) and 70 to 80% relative humidity (RH) at least for 12 hours. The temperature of cold store is maintained at 4°C (32°F) and relative humidity between 80-85 per cent. The quality of shell eggs can be maintained for about 6 months in a cold storage. Date is marked on the carton so that oldest eggs are sold first.

Check Your Progress 5

- 1) Marketing channels for egg and meat:
 - From farm to consumer (Direct).
 - The raw finished product rolls from one hand to another and then finally reaches to the end user. This means that between producer to consumer the brokers/middlemen, bulk buyers/ institutional buyers/stockiest/whole sellers and retailers play vital role in marketing of raw or finished product.

Producer → Broker/Middleman → Wholesale → Retailer → Consumer

Processing and Marketing

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- 2)
 - i) BROMARK and BCC
 - ii) AGMARK
 - 3) The old system of auctioning chicken is by *Kori* (20 birds per *kori*) without any regard to their weights and grades is in practice in some pockets of the country.