Preservation of Meat

Meat preservation became essential for transportation of meat for long distances without spoiling of texture, color and nutritional value are the development and rapid growth of super markets . Traditional methods of meat preservation such as drying, smoking, brining, fermentation, refrigeration and canning have been replaced by new preservation techniques such as chemical, bio-preservative and non-thermal techniques . preservation methods are to inhibit the microbial spoilage and also to minimize the oxidation and enzymatic spoilage. Current meat preservation methods are broadly categorized into three methods

(a) controlling temperature

(b) controlling water activity

(c) use of chemical or bio-preservatives .

A combination of these preservation techniques can be used to diminish the process of spoilage .The preservation of food has several objectives .

1. To control foodborne infections and intoxications

2. To ensure the safety of food from microbes

3. To prevent the spoilage of food

4. To extend the shelf life of food

5. To enhance the keeping quality of food

6. To reduce financial losses

Chilling/refrigeration:

This is the most widely used method of preservation for short term storage of meat as chilling/refrigeration slows or limit the spoilage rate at temperature below the optimal range can inhibit the microbial growth , enzymatic as well as chemical reactions. Storage of fresh meat is done at a refrigeration temperature of 2 to 5°C. Chilling is critical for meat hygiene, safety, shelf life, appearance and nutritional quality .Carcasses are first hanged in chilled coolers (15°C) to remove their body heat, and are then passed on to holding coolers (5°C). It is essential to maintain proper spacing between carcasses so

as to allow throughout air circulation. It is employed by two methods: (a) immersion chilling, in which the product is immersed in chilled (4°C) water and (b) air chilling, in which the carcasses are misted with water in a room with circulating chilled air .The relative humidity is generally kept at 90% in order to avoid excessive shrinkage due to loss of moisture. The refrigerated storage life of meat is influenced by species of origin, initial microbial load, packaging and temperature as well as humidity condition during storage. poultry starts with comparatively high microbial load. Irrespective of species of origin, maximum care should be taken during handling of meat in order to check further microbial contamination. Refrigerated temperature favors the growth of psychrophilic organisms causing spoilage of meat in due course of time. Generally, fresh meat remains in good condition for a period of 5-7 days if kept at refrigerated temperature of 4 ± 1°C. Cold-shortening and toughening may result from ultra-rapid chilling of pre-rigor meat .It is emphasized that the processed meat should be stored under refrigerated condition till they are finally consumed. The well preserved meat has enhanced shelf life as compared to fresh meat.

Freezing:

Freezing is an ideal method of keeping the original characteristics of fresh meat. Meat contains about 50-75% by weight water, depending on the species, and the process of freezing converts most of water into ice . It stops the microbial load and retards the action of enzymes.

The most significant advantage of freezing is the retention of most of the nutritive value of meat during storage, with a very little loss of nutrients occurring in the drip during thawing process. It is important to wrap fresh meat in suitable packaging film before freezing otherwise meat undergoes freeze burn. This abnormal condition occurs due to progressive surface dehydration resulting in the concentration of meat pigments on the surface. The quality of frozen meat is also influenced by its freezing rate. In slow freezing, there is formation of large ice crystals, which may cause physical damage to muscular tissue, giving it distorted appearance in the frozen state. In fast freezing, numerous small ice crystals are formed uniformly throughout the meat tissue. The freezing rate is increased with decreases in temperature, almost 98% of water freezes at -20°C and complete crystal formation occurs at -65°C.Thus, problem of muscle fiber shrinkage and distorted appearance is not there in meat tissue. The drip losses during thawing are considerably low as water freezes within the muscle fiber itself. Numerous small

ice crystals on the surface of the fast frozen meat are also important as they give a desirable light color as compared to slow frozen meat. Microbial growth stops at -12°C and total inhibition of the cellular metabolism in animal tissues occurs below -18°C . However, enzymatic reactions, oxidative rancidity and ice crystallization will still play an important part in spoilage . During freezing, about 60% of the viable microbial population dies but the remaining population gradually increases during frozen storage .

Fermentation.

Fermentation is a simple low-tech and inexpensive method of preservation of foods that can be practiced at ambient temperatures. fermentation is a process in which chemical changes in an organic substrate are brought about through the action of enzymes liberated by microorganisms. During fermentation, microorganisms liberate lactic acid, volatile acids (such as acetic acid), antibiotics and bacteriocins that inhibit the growth of undesirable microorganisms and bring preservative effect in foods. Microorganisms responsible for fermentation are lactic acid bacteria (LAB),certain molds and yeasts. LAB are one of the major groups of microorganisms responsible for fermentation of meat and meat products and for making silage of offals from fish, poultry and animals. The unique character of LAB is the production of lactic acid during fermentation.

Fermentation process in meat and meat products.

Physical, microbiological and biochemical changes take place during fermentation process. These are-

(1) lactic acid production resulting in lowering of pH

(2) decrease in water activity (aw),

(3) inhibition of spoilage and pathogenic microorganisms,

(4) proteolytic enzymes breakdown muscle proteins (myofibrillar and sarcoplasmic proteins), salt soluble myofibrillar proteins gelify and provide firm consistency to the product and improve texture,

(5) development of aroma compounds and (6) improvements in colour and nutritive value.