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## TECHNOLOGY OF MEAT PRODUCTS

CONTENTS

# 21. Methods of preservation of poultry meat

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### INTRODUCTION

- Meat is a highly perishable food.
- Susceptible to deterioration by microbial growth, chemical change and breakdown by endogenous enzymes.
- Destroying microbial growth and enzymes using heating procedures (cooking and canning), or removal of water by drying or osmotic control.
- very recently, ionising Use of chemicals to inhibit growth radiation.
- Traditionally drying in wind and sun, salting and smoking to preserve it.

*How to preserve meat*

## ***Deep freeze***

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- easiest way to preserve meat for the short term is freezing.
- meat wrapped tightly in foil or in plastic package.

## ***Salt***

- used as a means of preserving meat.
- either rubbed on meat or meat is dipped in brine.

## ***Pickle the meat***

- using vinegar and spices
- vinegar keeps parasites and bacteria away for up to six months
- spices add taste to meat.

## ***Jerky***

- popular method of preserving meat
- drying out the meat

## ***Meat preservation:***

- highly perishable due to nearly neutral pH (low acid food)
- high moisture and rich nutrients.
- good source for microbial growth
- various undesirable biochemical reactions leading to its deterioration.
- different procedures employed to stop the undesirable conditions

## ***Various preservation methods:***

1. Chilling /Refrigeration
2. Freezing

3. Curing
4. Smoking
5. Canning
6. Dehydration
7. Irradiation

### ***Chilling/Refrigeration***

- widely used method for short term storage
- slows down the microbial growth and enzymatic as well as chemical reactions.
- technique of preservation applied from ancient times
- meat was stored in natural caves where temperatures were relatively low throughout the year.
- Chilling reduces surface temperature
- enhance carcass drying resulting in reduction of microbial growth. ØCritical process in terms of meat hygiene, safety, shelf life, appearance and eating quality.
- temperature for chilling process ranges from 1°C to 4°C.
- slaughtering and meat cutting carried out under strict hygienic conditions.
- refrigeration begins with chilling of animal carcasses continues through the entire process of holding, cutting, transit, retail display and even in the consumer household before ultimate use.
- relative humidity generally kept 90%
- carcasses first held in chill coolers (15°C) to remove their body heat
- passed on to holding coolers (5°C).
- Poultry with high microbial load.
- Care taken during handling to check further microbial contamination.
- Refrigerated temperatures favor the growth of psychrophilic organisms
- Causing spoilage of meat occurs in due course of time.
- fresh meat maintains good condition for a period of 5-7 days at a refrigerated temperature of 4±1°C.

- Processed meat products are stored under refrigeration with a longer shelf life as compared to their raw ones.
- Processed products less perishable and life of poultry meat is 3-6 months under refrigerated conditions.

### **Freezing**

- best and most simple option for preserving poultry.
- process for long term preservation of meat.
- stops the microbial growth and retards the action of enzymes
- retains most of the nutritive value of meat during storage
- little loss of nutrients occur in the drip during thawing process
- Meat wrapped in suitable packaging films before freezing to prevent it from undergoing freeze burn.
- slow freezing freezes the outer water more quickly as compared to inner water resulting in formation of larger ice crystals damaging the muscle tissue.
- fast freezing, forms various small ice crystals uniformly throughout the tissue.
- drip loss during thawing is low in fast freezing
- small ice crystals also impart it a desired lighter colour as compared to slow frozen meat.

### **Types of freezers:**

Different freezers are used such as;

- Plate type freezers with temperature  $-10^{\circ}\text{C}$ .
- Blast type freezers with temperature from  $-10$  to  $-30^{\circ}\text{C}$ .

### **Curing:**

- It is a heavy salting age old practice.
- widely used method of preserving meat before the days of refrigeration.
- done for imparting specific flavor and colour development, in addition to preservative effect.
- main ingredients include sodium chloride, sodium nitrite, sodium nitrate and sugar.

**Properties of ingredients:****Sodium chloride /common salt;**

- inhibits the growth of spoilage bacteria by dehydration and alteration of osmotic pressure
- slows down the action of enzymes.
- reacts with fatty acids to enhance the flavor of the cured products.
- contributes to the tenderness of the product.

**Sodium nitrates and nitrite;**

- responsible for imparting the attractive cured meat colour and characteristic cured meat flavor.
- Nitrates and nitrites permitted levels ;500 ppm and 200 ppm respectively
- inhibit the growth of a number of bacteria especially Clostridium botulinum.
- also retard the development of rancidity.

**Sugar;**

- suppresses the harsh hardening effect of salt adds to the flavour development
- also serves as an energy source for nitrate reducing bacteria in the curing solution.
- Mainly sucrose or dextrose used for this purpose

**Smoking:**

- known to man as a preservation for a long time.
- meat is subjected to smoke house, where saw dust or hardwood are subjected to combustion at a temperature of about 300°C. ØHigh temperature desirable to minimize the production of carcinogenic compounds.
- Smoke generation accompanied by formation of numerous organic compounds (aldehydes, ketones, organic acids, phenols etc) and their condensation products.

- Aldehydes and phenols condense to form resins contribute to the colour of smoked meat products.
- Phenols act as bacteriostatic formaldehyde as bactericidal compound besides imparting characteristic smoky flavor.
- Preservation also due to surface dehydration, lowering of surface pH and antioxidant property of smoke constituents.
- Curing and smoking of meat are interrelated

### **Canning:**

- applying heat to sealed food container in order to destroy microorganisms thermal sterilization of a product held in hermetically sealed containers is achieved.
- preserves the sensory attributes such as appearance, flavor and texture to a large extent.
- have a shelf life of at least 2 years at ambient temperature.

### **Canning process is performed as;**

- Lean and clean meat taken and mixed with gravy
- prepared using condiments, tomatoes, dry spices, and salt in water
- cooked for some time so that all the ingredients get properly mixed in the water.
- mixture then precooked at 70°C for 15 minutes.
- filled in cans by leaving proper headspace.
- exhausted to remove the air from the container.
- seaming is done and then retorting or thermal processing to achieve sterility.
- At last cooling performed followed by storage at cool and dry place.

### **Dehydration:**

- oldest known method of preserving food dried and exposed to a temperature high enough to remove the moisture.
- process of removal of water from meat nutrients making them unavailable to the microorganisms.
- lowers the water activity considerably prevent the growth of spoilage organisms.

- Different drying procedures are employed such as mechanical drying, etc.
- Mechanical involves the passage of hot air with controlled humidity.
- Freeze drying satisfactory process, due to better reconstitution properties, nutritive quality and acceptability.
- Freeze drying involves removal of water from a food by sublimation keeping it under vacuum and giving a low heat treatment.
- Meat is first frozen at -40 °C.
- Then dried under vacuum for 9-12 hours at low temperature in plate heat exchangers at 1 to 1.5 mm pressure of mercury.
- Ice crystals get sublimated to water vapour no rise of temperature.

### **Irradiation:**

- Radiation is the emission and propagation of energy in the material medium.
- works by exposing meat to radiant energy destroys most but not all microorganisms.
- can destroy the microorganisms by fragmenting their DNA molecules causing ionization of inherent water within microorganisms.
- microbial destruction takes place without significantly raising the temperature of food.
- Irradiation referred as cold sterilization.
- Among radiations, alpha and beta-rays are used Gamma radiations produce desired effect only during food irradiation.
- dose of 50-100K rad enhance the shelf-life of fresh meat cuts and poultry products by 19 days dose of 4-5 Mrad can sterilize pork, poultry and fish.
- ultraviolet radiations of 2650Å are most bactericidal in nature, dose of 2 – 5 kGy extend the shelf life of poultry stored at 1-3°C by 8-14 days.

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**you can view video on Methods of preservation of meat**

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