Lecture 6

Meat Quality

Meat quality refers to the condition of meat. Meat quality refers to a combination of traits that provide for an edible product that is attractive in appearance, appetizing, nutritive and palatable after cooking. The ideal level of meat quality combines the capacity to retain a high nutritive value in the cooked form with that to excel in satisfying numerous functional roles in the fabrication and processing of acceptable products. In determining the quality of meat parameters to look out for are:-

a) Colour (Appearance)

Appearance is a very vital component that strongly affects the consumer acceptability of fresh meat. The colour of fresh meat is determined by myoglobin and haemoglobin.

Dark Firm and Dry (DFD) and Pale Soft Exudative (PSE) are meat with pale colour as well as soft watery texture. DFD meat has a high pH which is above iso-electric point of actomyosin. It has an unpleased purplish-red colour of myoglobin and thus the meat appears dark. PSE pork comes from a rapid and severe post-mortem drop in pH resulting in denaturing of sarcoplasmic and myofibrillar proteins in the muscle. Factors that affect colour are:

a) Age of the animal
b) The type of muscle involved
c) Degree of surface desiccation
d) Temperature
e) Bacterial growth

b) Texture: Meat that contains a high degree of marbling will be firmer than meat with little marbling muscles that are rough and coarse are of pork textural quality.

c) Tenderness: It is a sensation created. It is a complicated physical process, since chewing involves cutting, grinding, squeezing, shearing and tearing. Tenderness is measured by means of

a) Shear press
b) Instron which is used in measuring textural properties of frozen and freeze – dried broiled meat.
c) A sensory test which requires taste panel.

Factors affecting tenderness include;

1. Age and maturity
2. Activity: strengthen and toughen muscle – tissue

3. Nutrition:- degree of fatness, processing, pre slaughter husbandry, chilling, scalding, ageing and freezing, sex of animal

d) Flavour: This is the combined effect of food on the sense of taste, odour and mouth-feel. Hence the evaluation of flavour is subjective. Flavour is the mixed sensation of aroma and taste by which individual foods are identified.

Methods of Meat Preservation

Preservation is defined as any method of treating food to prolong the length of time in which it retains its quality and appeal. Methods of preserving meat include refrigeration, freezing, thermal processing and dehydration. Following exsanguinations the process of converting muscle to meat. It begins by subjecting the meet to degradation by chemical, physical, enzymatic and microbiological reactions. Preservation is to prevent degradation from taking effect.

1) **Cold Storage**

I. Chilling Storage:- is generally regarded to be storage at temperature not far above freezing (0^{o} c)s e.g. temperature ranging from 0^{O} C to 1.1^{o} C can chill the thickest part of carcass between 12 -21 hours which can be stored for 8 days for beef, 6 days for lamb. Temperature between 5^{o} c – 10^{o} c is limited to short period of storage.

II. Freezing:-

a) **Slow freezing:-** Involves freezing with only natural air circulation or at best with electric fans. Temperature is usually -23.3^{o} c or lower and freezing may take from 3 to 72 hours.
Large ice crystals are usually formed within the muscle fibre. Ice crystals are usually needle like which are capable of destroying muscle fibre. There is much fluid loss

b) **Quick /fast freezing:** is accomplished either by

i) Direct immersion of food in a refrigerant e.g. freezing of fish in brine.

ii) In direct contact with the refrigerant where the food or package is in contact with the passage through which the refrigerant at -17.8 - -45.6c flows or

iii) By air-blast freezing, where frigid air at -17.8 - 34.4c is blown across the materials being frozen

2. Dehydration Method:- Removal of water by

i. Sun Drying:- weather must be warm and dry. The demerit of this method is that it is subject to weather condition and is contamination from dust and sand.

ii) Hot air drying:- only applicable to cooked meat.

i. **Salting:** its diffusion in meat is by the process of osmosis. It improves the texture of meat

and contribute to the pleasant flavour and aroma of the product. It inhibits the growth of bacteria although there are some salt tolerant bacteria.

iv) **Smoking:-** It decrease the more - soluble protein (myofibrillar and sarcoplasmic) content while increasing the amount of the more - insoluble (stomach) proteins.

v) Meat curing: - is an aspect of meat preservation in which salts, sugars nitrite/ nitrate, phosphate and other curing agents are used to improve meat colour and its acceptability after slaughter

Curing Ingredient

1. **Salt** (NaCl)
2. **Sugar and corn syrup solids**:- sugar is added to curves for its moderating action on flavour and to soften the products by counteracting the harsh hardening effects of salt by preventing some of the moisture removal. Corn syrup, corn syrup solids (corn syrup from which most of the water has been removed) molasses and other natural sugar substitutes are sometimes used in place of sugar. Corn syrup consists of sugars formed by the breakdown of starch and contains dextrose maltose, higher sugars, dextrin, and polysaccharides CS is not so sweet and is less soluble than sugar.

3. Nitrate

- To stabilize the pink colour of the lean tissue
- To contribute to the characteristics flavour of cared meat
- To retard the development of rancidity
- To inhibit the growth of a number of a number of food poisoning and food and food spoilage organism e.g *Clostridia botulinum*

4. Phosphate

- To increase the water binding capacity
- Improve retention of brine.
- Improve colour and flavor retention
- Act as buffers

5. Ascorbates

- Salt of ascorbate acid are commonly used to hasten the development and stabilize the colour of cured meat by
  a) Taking part in the reduction of metmyoglobin to myoglobin
     Monosodium Glutamate (MSG)
- To enhance flavor not widely used in the industry

6. Canning: can either be sterile or pasteurized

i.) Sterile Product: are shelf- stable and need no refrigeration e.g Luncheon meats, corned beef and sandwiched spread are example of sterile products

ii.) Pasteurized Product:- Cooked ham.

Bulging cans could result to food poisoning e.g *Clostridia botulinum.* A disease condition as BOTULISM

Symptoms

1. Dizziness
2. General weakness
3. Severe headache
4. Loss of vision
5. Paralysis of throat muscle

This is because the toxins are very lethal which can kill almost immediately. In respiratory center leading to death, speech becomes impaired.