

Popular Article

Methods of Tenderization of Meat

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Tenderization of meat is method of making meat softer that is easy to cut or chew. There are various methods of tenderization

a. Low temperature tenderization

- When meat is stored at temperature between 0 - 3 °C, all changes that normally take place at higher temperature are reduced in rate.
- The action of bacteria is retarded, while proteolytic enzymes of the muscle fiber remain active and bring about desirable changes in meat
- There is marked increase in its flavour, tenderness and juiciness.
- A procedure recommended for commercial tenderization of meat is

Cooling of the dressed carcass for 1-2 days at -0.5 to 3 °C



Holding of the sides or quarters for 10-12 days at 2 - 3 °C



Holding of quarters at ambient temperature or at 4.5 - 7 °C for 24 hours before cutting or removal for retail sale

b. High temperature tenderization

Use of high temperature has been found to tenderize meat in three distinct phases -

- Up to 65 °C due to proteolytic action on myofibrils
- 70-100 °C due to destruction of interstitial collagen with little loss of myofibrillar strength
- Above 100 °C due to breakdown of both collagen and myofibrils due to chemical hydrolysis

c. Mechanical tenderization

- Increase in tenderness of meat can be achieved by exerting pressure (100 Mpa for 2-4 min.) on pre-rigor muscle.
- Application of pressure on muscle leads to disruption of myofibrillar filaments and severing of strands of connective tissue, which causes desirable changes in meat structure.

d. Tender stretch method

- Stretching of muscle tends to produce a tenderizing effect on carcass with no or little alteration in their appearance. It is of two types

1. *Achilles tendon method* - Carcass is hung by means of a hook/gambrel inserted behind the Achilles tendon (Figure 2), the weight of suspending carcass exerts pressure on the musculature making it tender.

2. *Pelvic suspension method* - Carcass is suspended vertically by inserting a 'S' shaped hook in obturator foramen or pelvic girdle. This method exerts tension in the major muscles of thigh leading to stretching of muscles which when cooked are found to be more tender than Achilles tendon technique.

e. Electrical tenderization

- It is used in order to avoid the cold toughening of muscles resulting from too rapid cooling of lamb carcasses.
- Electricity is passed through carcass immediately after slaughter, the current leads the muscles to contract and thereby utilize glycogen, ATP, creatinine and pH to fall.
- A series of contractions are affected thereby accelerating the onset of rigor.
- Electrical stimulation is passed through two electrodes - one live which is in contact with carcass (neck muscle) and the other earthed through hook in the hock. A current of 700 volts is applied which is pulsed at the rate of 25 pulses per second for 1.5 minutes about 30 minutes after the slaughter.

f. Chemical tenderization

- Treatment of muscles with low concentrations of salts (sodium chloride and phosphates) or weak acids (acetic acid, lactic acid and citric acid) is widely prevalent practice of meat tenderization.

g. Enzymatic tenderization

- A variety of enzymes originating from fruits, bacteria and fungi have been used in addition to trypsin from the pancreas to cause tenderization of meats.

- Bacterial and fungal enzymes include protease 15, rhozyme, hydralase D and fungal amylase. On the other hand plant enzymes used are papain (papaya), ficin (fig) and bromelin (pineapple).

- The enzymes can be applied in two ways:

1. *Directly in powder form or in solution*

- ✓ The method is most effective on thin steaks or cuts.

- ✓ Disadvantage- Lack of uniform action, discoloration and surface mushiness or granulation

2. *Injected form*

- ✓ Enzyme solution is injected into jugular vein which gets distributed uniformly throughout the body via vascular system.

- ✓ The amount of enzyme solution used varies between 300-500 ml and the dose is carefully controlled according to breed, age, sex and weight of an animal.

- ✓ After injection, the animal must be slaughtered within 10-15 minutes.

Disadvantage of tenderization

Overtenderizing of some organs like heart, liver and tongue, and anaphylactic shock in some animals after injection.