

Lecture 3

Categories of Heat-Treated Preserves

Pasteurized products

This requires only slight thermal treatment. Temperatures reached in the product centre are in the range of 82°C and below 100°C ("pasteurization"). The F-value cannot be determined, remaining almost at zero.

Inactivated: most vegetative micro-organisms

Not inactivated: spores of *Bacillus* and *Clostridium*

Storage required: uninterrupted cold chain (2–4°C), up to six months

Cooked preserves

This refers to thermal treatment only with boiling water (no pressure cooker).

Temperature reached in the product centre is up to 100°C. Low F-value.

Inactivated: all vegetative micro-organisms

Not inactivated: spores of *Bacillus* and *Clostridium*

Storage required: not higher than 10°C for one year. Spores will not grow under these conditions.

"Three-quarter" preserves

This refers to thermal treatment in pressure cooker. Temperatures reached in the product centre are between 108 and 112°C. F-value 0.6 to 0.8.

Inactivated: all vegetative micro-organisms, spores of *Bacillus*

Not inactivated: spores of *Clostridium*

Storage required: not higher than 15°C for one year. Spores of *Clostridium* will not grow under these conditions.

"Full" preserves stable under temperate conditions

This is Intensive thermal treatment in pressure cooker. Temperature reached in the product centre is about 121°C. F-value 4 to 6 ("sterilized product").

Inactivated: all micro-organisms except thermophilic spores

Storage required: ambient temperature (for one year), but not tropical conditions (40°C or more).

"Full" preserves stable under tropical conditions

Very intensive thermal treatment, with a long period of 121°C or higher in the product centre. F-value of 12 and more.

Inactivated: all micro-organisms including thermophilic spores

Storage required: ambient temperature even under tropical conditions (up to four years).

Shelf-stable preserves

This group of preserves is different from those mentioned previously, since preservation is achieved not only by thermal treatment, but also by utilizing other means to prevent microbiological growth such as nitrite, low water activity and/or low pH. This combined effect has the advantage of a fully shelf-stable product under all ambient conditions without undergoing intensive thermal treatment (less than 100°C) and without major losses in organoleptic quality.

Factors Affecting the Shelf-Life of Meat and Meat Products

Though meat handling, storage and consumption may differ from one place to another, the factors limiting the shelf-life of these products are the same.

There are *endogenous* factors, such as:

- pH-value or the degree of acidity of the product;
- a_w value or the amount of moisture available in the product; and *exogenous* factors, such as:
- oxygen (from the air);
- micro-organisms;
- temperature;
- light; and
- evaporation and desiccation.

Pre - Slaughter Handling of Different Farm Animals

What is pre-slaughtering handling?

It is the way in which an animal is treated before being killed and after and this affects the post-mortem changes and the quality of meat.

N.B. in other words how the preparation made prior to few hours to slaughtering affects the farm animals and quality of meat produced. We want to discuss what happens when an animal is being moved farm to the slaughtering pen.

When animals are moved to unfamiliar surroundings, they may become excited, fatigue, overheated or chilled. All these conditions result from response within the animal body caused by various factors in the new environment. Hence referring to such reactions of animals under those conditions it is often noted that such animals are expressing stress.

The term stress is an expression referring to the physiological adjustments, such as the changes in heat rate, respiration rate, body temperature, and blood pressure that occur during the exposure of the animal to adverse conditions. Such conditions called STRESSORS. occur when the environment becomes uncomfortable or hazardous to the animal e.g Temperature, humidity, light, sound and space.

Physiological Responses during Stress

Naturally the animal body has a store of many natural defences against adverse conditions and those defences attempt to maintain those internal conditions that enable the animal to continue its life process (Homeostasis).

The adjustments in metabolism that occur during periods of stress are aided by the release of certain hormones. Hormones of importance are EPINEPHRINE and NOREPINEPHRIN from the adrenal medulla, ADRENAL STEROIDS from the adrenal cortex and THYROID HORMONES from thyroid glands.

The adrenal hormone provides stress resistance.

Epinephrine helps break down the glycogen that is stored in the liver and muscle as well as the fat that is stored in several locations in the body in order to provide a ready sense of energy.

EPINEPHRINE and NOREPINEPHRINE helps to maintain proper blood circulation by their influence on the heart and blood vessels hormones from the adrenal cortex are also effective in reinforcing the ability of the tissues to respond during stress. Thyroid hormones increase metabolic rate and thereby provide increased available energy to the animal.

Factor That Causes or Contribute to Stress

1. Environment Factors e.g. temperature, humidity, light, sand and space.
2. Transportation of the animals: it is during transit that most death losses and tissue bruising occurs also muscle tissue shrinkage and reduction of weight of the dressed carcass can result from severe live weight in the marketing process, due to loss of gastro-intestinal tract contents.
3. Overcrowding
4. Poor ventilation
5. Mixing of unfamiliar animals
6. Physical discomfort
7. Excessive noise
8. Loading and Unloading animals by means of steep ramp or steps.

Remedy

1. Holding livestock in a stocky and prior to slaughter provides opportunity for resting and feeding. In addition it helps to improve the ability of the animal to withstand later handling, this in cow can influence the level of energy stored in the muscle.
2. Animals should not be manhandled. The use of sticks and whops should be discouraged.
3. Different social group of animals should not be mixed together, overcrowding should be avoided.
4. Animals should not be slaughtered immediately on arrival from long treks but should be rested in Lairage for at least 24hours.
5. Diseased animals should not be slaughtered.