EXPERIMENT 5 DETERMINATION OF WATER HOLDING CAPACITY (WHC) OF MEAT

Structure

5.1 OBJECTIVES

After conducting this experiment, you will be able to:

- explain how water is bound to/retained in the meat ; and
- predict the juiciness and texture of the processed meat.

5.2 INTRODUCTION

Many physical properties of meat such as colour, texture and firmness of raw meat, juiciness and tenderness of cooked meat are partially dependent on Water Holding Capacity (WHC). Muscle proteins are responsible for the binding of water in meat.

The water holding capacity of muscle is lowest at its ultimate pH (5.4 to 5.5). The denaturation leads to unfolding of the peptide chains and there by loosing the water binding and water holding capacity of the muscles. However, on subsequent conditioning or ageing of meat, it tends to increase.

Two methods are in common use for the estimation of water holding capacity are:

i) Press method

ii) Centrifugal method

It will be relevant for you to go for **Press method**.

5.3 EXPERIMENT

5.3.1 Principle

Water holding capacity is defined as the ability of meat to retain its own water content when subjected to external forces such as cutting, heating, grinding or pressing.

Water content of meat consists of

i) Tiny amount of tightly bound water (Protein bound water),

ii) Substantially larger amount of immobilized water, and

iii) A balance of free water accounting for 10 per cent of total water, sometimes reaching up to 15 per cent.

The bound water is estimated as the amount of water remaining in meat after it has been subjected to some kind of physical pressure. The pressure is most often produced by pressing the meat between two plates.

5.3.2 Requirements

- Meat
- Fine electrical/electronic balance
- Filter papers (two numbers)
- Glass plates.

5.3.3 Procedure

- Weigh 2 Whatman No-1 filter papers (A).
- Weigh about 500 mg of mixed meat (C).
- Place the meat sample in between two filter papers (preferably in the centre).
- Place the filter papers and meat sample on a rigid flat surface of glass plate.
- Apply pressure (40 psi) that is 2.81 kg on it for 5 minutes.
- Remove the weight, separate the meat flake from the filter papers.
- Weigh the meat flake (D).
- Dry the filter papers and record the weight (B).

5.3.4 Observations

Weight of Whatman filter papers (2 Nos) =A

Weight of filter papers after drying = B

Weight of the meat sample 500 mg = C

Weight of the meat flake = D

Amount of protein attached to the filter paper = B – A =E

Actual weight of meat flake after pressure treatment = E + D =F.

5.3.5 Calculation

$$\% \text{ WHC} = \frac{C - F}{2} \times 100$$

(Ref: Whiting, R.C and Jenkins, R.K. (1981). J. Food Science 46: 1693 to 1696)

5.3.6 Result

W.H.C of a given meat sample is .....%.

5.4 PRECAUTIONS

- The surfaces should be so that pressure is equally spread.
- The filter paper should not be wet and it should be weighed carefully.
- Properly mixed meat sample should be weighed carefully.