
EXPERIMENT 3 DETERMINATION OF TOTAL LIPID CONTENT OF A TISSUE

Structure

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3.0 OBJECTIVES

After going through this experiment, you will be able to:

- estimate the total lipids in any meat sample or meat product;
- determine nutritive value of meat in terms of energy;
- predict storage status of meat samples; and
- forecast the clinical significance in relation to consumption of that meat.

3.1 INTRODUCTION

Fat or oil present in any food is the source of energy. The oils and fats are insoluble in water and soluble in some organic solvents. Extraction of meat sample with ether provides the information about essential fatty acids and non-specific source of energy. It gives information about the nutritive value of meat. Rancid foods are objectionable and fat portion of foods is most unstable. Storing high fat, especially with greater unsaturation, is a problem and chemical changes during storage may result in undesirable substances such as amines.

Total lipid content is estimated by extraction with fat soluble solvents. It consists of glycerides of fatty acids, free fatty acids, cholesterol, lecithin, chlorophyll, alkali substances, volatile oils, resins, carotenoids, fat soluble vitamins etc.

3.2 EXPERIMENT

3.2.1 Principle

Fats and oils are soluble in organic solvents like ether, methanol, hexane, isopropanol etc. but other constituents are not. Hence, the fat present in the meat sample is dissolved into the solvent and afterwards solvent is removed by evaporation distillation (Boiling point of solvent is much less than that of oils/fat).

3.2.2 Requirements

- Soxhlet apparatus
- Hot air oven
- Extraction filter paper thimble
- Analytical balance (Least count 0.001 g)
- Sample grinder
- Organic solvent (Hexane, Isopropanol or diethyl ether), acetone
- Non-adsorbent cotton

3.2.3 Procedure

1. Thoroughly wash the boiling flasks and rinse with commercial grade acetone to remove any residual oil/fat.
2. Dry the flasks by placing in hot air oven for 3-4 hours.
3. Weigh the flasks and label them.
4. Weigh the extraction filter paper thimbles (in duplicate) and label them.
5. Transfer 2-5 g samples in pre-weighed thimbles and determine their accurate weight.
6. Plugged these thimbles with non-adsorbent cotton and place them straight in the Soxhlet extraction tube.
7. Fill the extraction tubes with solvent sufficient enough so that the siphon system starts working.
8. Now fix the Soxhlet assembly properly and switch on the heaters.
9. As soon as the initiation of boiling is indicated, start the water connected to condensers and allow the extraction for 8 hours.
10. After 8 hours switch off the heaters and allow cooling.
11. The solvent is evaporated using vacuum oven at 50°C or a water bath and then flasks with oil are weighed.

3.2.4 Observation

Parameters	Sample Number		
	1	2	3
Weight of empty flask (w1)			
Weight of empty thimble (w2)			
Weight of thimble + sample (w3)			
Weight of flask + oil (w4)			

3.2.5 Calculation

Total lipid (fat/oil) content is calculated by using the following formula.

$$\% \text{ Fat / oil (w.b.)} = \frac{(w4 - w1)}{(w3 - w2)} \times 100$$

3.2.6 Result

Calculate lipid content using above formula. Take the average of three values and report the results.

Total lipid content of the meat sample isg/100g

3.3 PRECAUTIONS

- The water supply should not stop during the experiment. If so, the heaters should be put off.
- Take care that solvent should not come in contact with any heated surface as it is highly inflammable.