PRACTICAL MANUAL
MEAT, POULTRY & FISH PROCESSING TECHNOLOGY

B.Tech. Food Technology
Final Year, Semester VII,
DOT, SUK

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Final Year

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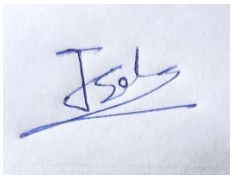


Practical No. 1

Slaughtering and dressing of poultry bird

Aim: Slaughtering and dressing of poultry birds.

Introduction: Meat is the flesh of an animal, typically a mammal or bird, as food. Meat is composed of water, protein and fat. It is edible raw, but is normally eaten after it has been cooked and seasoned or processed in variety of ways. Slaughtering is usually referring to kill domestic livestock. In general, the animals would be killing for food; however, they might also be slaughtered for other reasons such as being diseased and unsuitable for consumption. Slaughtering involves some initial cutting, opening the major body cavities to remove the entrails and offal but usually living the carcass in one piece. In other words, slaughtering means the act of killing of animals in a correct way especially for food.

Slaughtering practices and techniques are as follows:

1. The humane method and conventional technique of slaughtering
2. Traditional and Ritualistic slaughtering
    a. African Traditional Slaughtering
    b. Jewish Method
    c. Muslim Method/ Halal Method
    d. Jhatka (Sikh) Method

Principle: The objective of humane animal handling is to move animals with minimum stress to both animals and handler. Considerate handling reduces the risk to the animal of pain, injury and suffering. Unfamiliar surroundings, noisy and aggressive handling, and the proximity of unknown animals or people can cause even the calmest of animals to become difficult to handle and much more likely to cause injury to themselves, other animals or handlers. Handling, especially by unfamiliar handlers, has the potential to be a highly stressful experience for animals. By working in a quiet, calm and considerate manner, handling can be carried out efficiently, with less effort and with less likelihood of the handler or the animals becoming stressed or injured.

Requirements:
Live Bird, Utensils, Sharp Butchers Knife, washing cloth, Weighing Balance, Water, and Bone cutter, etc.

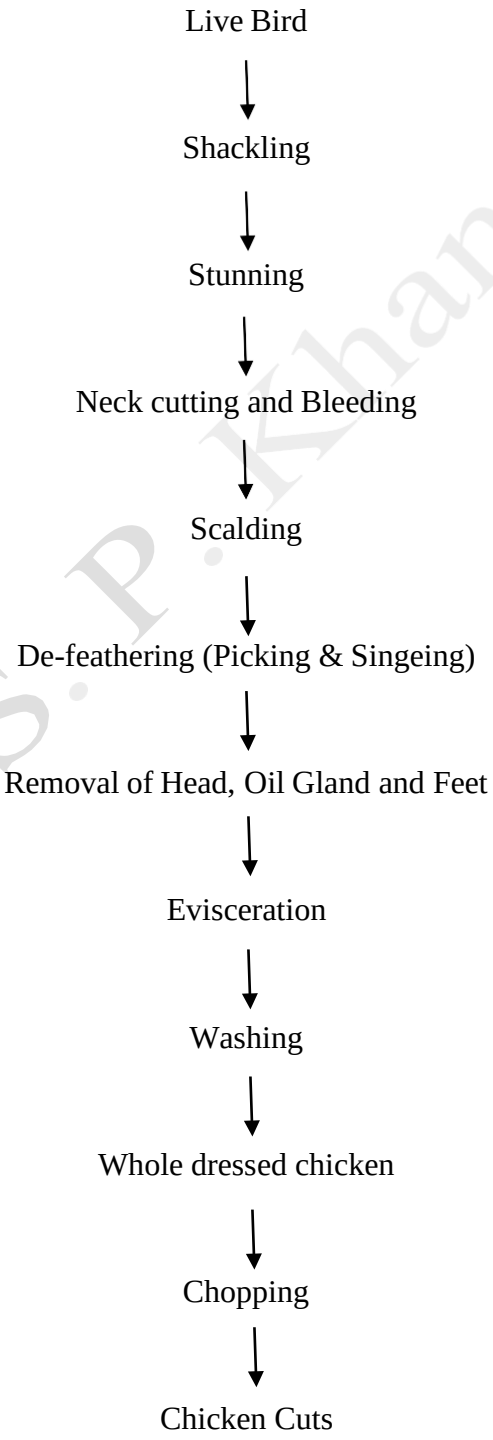
Procedure:

1. Stunning
2. Slaughtering
3. Evisceration
4. Cleaning and chilling

Halal Method for Slaughtering (Muslim Method)

- Its most popular method of Slaughtering and the laws are derived from Kuran: The Halal slaughter requires the name of Muslim god (Allah) mention at the initiation of the operation
- In this method neck of the animal is served by cutting the major blood vessels – carotid arteries, jugular vein with a sharp knife
- The animal is then hung upside down and left to bleed out completely.
- This method provides high quality meat; as it ensures complete bleeding and use of stunning in the process.

Flowchart of slaughtering method:



Observations:

a. Weight of Live bird:
b. Weight of Feathers:
c. Weight of Offals:
d. Weight of Viscera:
e. Weight of Dressed Bird:
f. Dressing %:

Calculation: Dressing % = (Carcass Weight/ Live Bird Weight) x 100

Result: Hence we studied method for slaughtering and dressing of poultry birds.

Conclusion: From this experiment we studied overcome unfamiliar handling method, slaughtering methodology and specially like Halal method to get high quality meat and less stress for birds and dressing of poultry birds.

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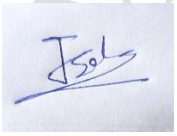


Practical No. 2

Study of Poultry meat cuts

Aim: To study the Poultry meat cuts.

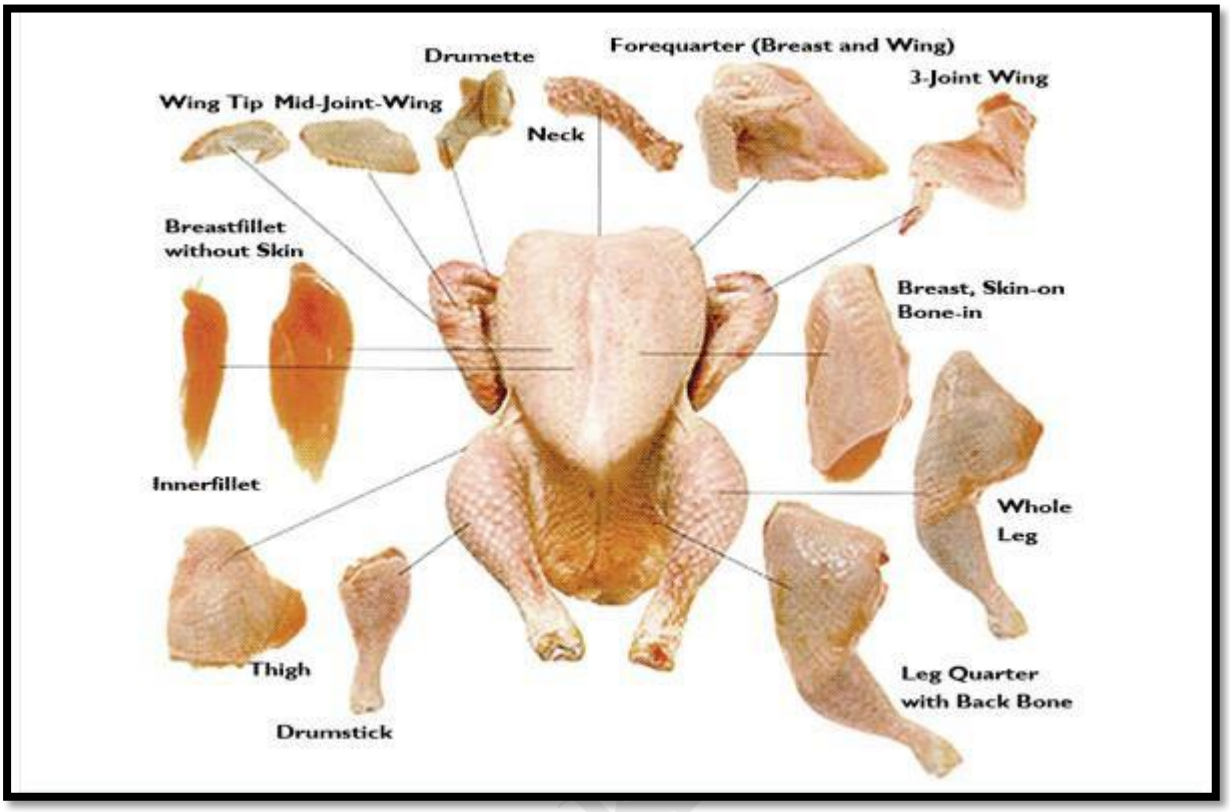
Introduction: Meat is the flesh of an animal, typically a mammal or bird, as food. Slaughtered bird or animal after dressing is cut into different parts and desired size as it affects the cooking quality. The cuts are made as per the muscles present in the body and the way meat is intended to be cooked.

Principle: To identify the meat cuts and to learn the names of wholesale and retail cuts of meat. Meat is muscle made up of fibres. These muscle fibres are held together by connective tissue such as collagen and elastin. A highly-exercised muscle, such as a shank or shoulder area, will develop much more connective tissue and coarser muscle fibres. This means they require a moist heat cooking method. If cooked with liquid, collagen breaks down at 80^{o} C (176^{o} F) into gelatine. This gelatine provides not only body to the cooking liquid but also, more importantly, moisture to the cooked meat and rich flavour. A lightly exercised muscle will contain less connective tissue and more fine muscle fibres, allowing it to be prepared using dry heat cooking methods.

The common chicken or broiler carcass is cut into several edible parts.

1. Half - Entire half of a chicken
2. Breast quarter with or without wing - Similar to the breast with ribs, but it also contains the back
3. Breast with or without ribs - Breast portion of the bird without any vertebrae, which may or may not have the wing attached
4. Boneless, skinless breast - Entire chicken breast or one half of the breast without skin or bones, sometimes referred to as the butterfly
5. Breast tenderloin - Boneless, skinless piece of breast meat
6. Wishbone - Breast portion containing the wishbone
7. Leg quarter - Drumstick, thigh, and back portion
8. Leg - Drumstick and thigh
9. Drumstick - Portion of the leg of a chicken below the knee joint
10. Thigh - Thigh of a chicken
11. Wing - Wing of a chicken
12. Drumette - Largest portion of the wing
13. Back - Backbone of a chicken
14. Edible offal's - Liver, gizzard, heart and neck

Figure 1: Poultry Cuts



Requirements: Dressed Poultry Sample, Sharp Knife, Weighing Balance

Procedure:

1. Take a dressed poultry carcass.
2. Weigh the whole carcass
3. Cut the Carcass according to the figure above.
4. Analyse the cuts carefully and note down the observations.

Observations:

a. Weight of Dressed Poultry Carcass:

b. Weight of Half - Entire half of a chicken:

c. Weight of Breast quarter with wing:

d. Weight of Breast quarter without wing:

e. Weight of Breast with ribs:

f. Weight of Breast without ribs:

g. Weight of Boneless, skinless breast (Butterfly Cut):

h. Weight of Breast tenderloin:

i. Weight of Wishbone:

j. Weight of Leg quarter:

k. Weight of Leg:

l. Weight of Drumstick:
m. Weight of Thigh:
n. Weight of Wing:
o. Weight of Drumette:
p. Weight of Back:
q. Weight of Liver:
r. Weight of Gizzard:
s. Weight of Heart:
t. Weight of Neck:

Result: Hence we have studied the poultry meat cuts.

Conclusion: In this experiment we studied various types of cuts and their specification through weight and gone through effect of temperature on muscle tissue after cooking.

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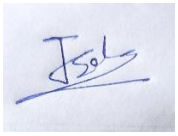

Practical No. 3

Physical quality evaluation of meat

Aim: To evaluate physical qualities of Meat.

Introduction: Meat Quality: Meat quality is normally defined by the compositional quality (lean to fat ratio) and palatability factors such as:

1. Visual appearance
2. Smell
3. Firmness
4. Juiciness
5. Tenderness and
6. Flavour

The nutritional quality of meat is objective, yet eating quality as perceived by consumer, is highly subjective.

1. **Visual Appearance**: The visual identification of quality meat is based on colour, marbling and water-holding capacity. Marbling is small streaks of fat that are found within the muscles and can be seen in the meat cut. Marbling has a beneficial effect on juiciness and flavour of meat. Meat should have a normal colour that is uniform throughout the entire cut. Beef, Lamb, and Pork should have marbling throughout the meat.
2. **Smell**: The product should have a normal smell. This will be different for each of the species (i.e. beef, pork, and chicken), but should vary only slightly within the species. Any rancid or strange smelling meat should be avoided.
3. **Firmness**: Meat should appear firm rather than soft. When handling the retail package, it should be firm, but not tough. It should give under pressure, but not actually soft.
4. **Juiciness**: Juiciness depends on the amount of water retained in a cooked meat product. Juiciness increases flavour, helps soften meat – making it easier to chew, and stimulates saliva production in the mouth. Water retention and lipid content determines juiciness. Marbling and fat around edges helps hold in water. Water losses are from evaporation and drip losses. Meat aging can increase water retention and therefore increases juiciness.
5. **Tenderness**: Tenderness has been linked to several factors, such as the animal's age, sex, or the muscle location. One important way to tenderize meat is by aging. Carcasses are aged by holding them at refrigeration temperatures for extended periods of time after slaughter and initial chilling.
6. **Flavour**: Flavour and aroma are intertwined to create the sensation the consumer has during eating. These perceptions rely on the smell through the nose and on the sensations of salty, sweet, sour and bitter on the tongue. Meat flavour is affected by type of species, diet, cooking methods and method of preservation (e.g. Smoked or cured)

Requirements: Meat Samples, Spatula, Petri Dish, and Sensory charts, etc.

Procedure:

1. Observe and analyse the meat sample for following parameters mentioned in the observation table and note down the observations.

Observations:

Parameters	Observations	Inference
Visual Appearance		
Smell		
Firmness		
Juiciness		
Tenderness		
Flavour		

Result: Hence we have evaluated physical qualities of Meat.

Conclusion: In this experiment we studied physical qualities of meat such as Visual appearance, Smell, Firmness, Juiciness, Tenderness and Flavour.

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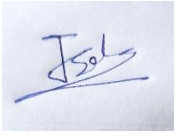

Practical No. 4

Determination of Water Holding Capacity and Drip Loss

Aim: To determine the water holding capacity and drip loss of meat sample.

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 losing 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:
i) Press method
ii) Centrifugal method

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.

Requirements: Meat samples, Weighing balance, Filter paper (Two number), Glass plates

Procedure:

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

Observation:

1. Weight of Whatman filter papers (2 in No.) (A):
2. Weight of filter papers after drying (B):
3. Weight of the meat sample 500mg (C):
4. Weight of the meat flake (D):
5. Amount of protein attached to the filter paper (B-A=E):
6. Actual weight of meat flake after pressure treatment (E+D=F):

Calculation:

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

Result: Hence we studied the water holding capacity and drip loss of meat sample.

Conclusion: In this experiment we studied the water holding capacity of meat, standard pH level for meat and two methods for determining water holding capacity (Press method and Centrifuge method).

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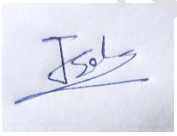

Practical No. 5

Determination of pH

Aim: To determine the pH of meat sample.

Introduction: The pH of meat is an important parameter, which signifies the functional properties and keeping quality of meat on subsequent storage. pH influences the quality of meat i.e., colour, tenderness, flavour, water binding properties and shelf life. Measurement of pH can therefore reveal the quality of meat and offers an indication, whether the meat is suitable for manufacture of good quality products.

Principle: pH is a symbol which represents the acidity or alkalinity of a substance. It is defined as a negative logarithm of H ion concentration. It ranges from 1.0 (highly acidic) to 14.0 (highly alkaline) with 7.0 being neutral. The pH of fresh meat may change due to the metabolites of bacterial action during storage. Depending upon the type of spoilage, normally the pH increases and may reach up to 8.5. The ultimate pH varies in different species and various muscles of the same carcass. The struggling of animals before slaughter results in markedly low initial pH and early passing of rigor mortis.

Requirements: pH meter, Blender, Weighing Balance, Measuring Cylinder, Measuring Pipette, Volumetric Flask(100ml), Beaker (100ml and 250ml), Funnel, Wash Bottle for distilled water, Filter paper: Whatman No. 54, Tissue paper

Chemicals: Buffer solution Tablets of pH 4, 7 and 10, Distilled water

Procedure:

Preparation of Buffer Solution:

1. Take one tablet each of different pH viz. 4, 7 and 10.
2. Powder the tablet (each tablet separately) in small quantity of distilled water.
3. Dissolve (each tablet separately) in small quantity of distilled water.
4. Transfer quantitatively and carefully to a 100 ml volumetric flask (each tablet separately).
5. Repeat the washings 3 to 4 times.
6. Make up the volume to 100 ml using a pipette.
7. Standard buffer solutions of pH 4, pH 7 and pH 10 are ready to use for standardization of pH meter.

Measurement of Meat pH:

1. Weigh accurately 10g of meat sample
2. Add 90 ml of distilled water/ de-ionized water and blend for a minute or so in a blender.
3. Standardize the pH meter after cleaning the electrodes and immersing in to distilled water.
4. Observe the thermo-compensator for buffer and sample.
5. Standardize the pH meter to buffer which is close to your sample to be analysed.

6. Wash the electrodes with distilled water and wipe the electrodes with filter paper/ tissue paper and place the electrodes in the beaker containing distilled water.
7. Insert or dip the electrodes again in to the test sample. Wait until the indicator or digital control is stable (slight fluctuation can be considered).
8. Read and record the pH (twice).
9. Wash the electrodes thoroughly with distilled water twice. Wipe off the electrodes with filter paper/ tissue paper. Then place the electrode in a beaker containing distilled.

Observation:
Record at least two reading for each sample

Sr. No.	Sample	Reading 1	Reading 2	Average pH

Calculation:

Average pH = (Reading1 +Reading2) / 2

Result: Hence we studied to evaluate pH of meat sample.

Conclusion: In this experiment we studied to determine pH level of meat which will help for storage. This also indicates the quality of meat for further process of meat product.

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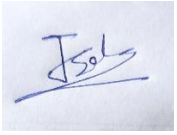

Practical No. 6

Determination of Extract Release Volume (ERV)

Aim: To determine the Extract Release Volume (ERV) of meat sample

Introduction: Extract Release Volume (ERV) is the volume of extract released by a homogenate of meat when allowed to pass through the filter paper for a given period of time. It is inversely proportional to the extent of spoilage. Extract release volume is of value in determining spoilage of meat as well as in predicting shelf life of meat. In this method meat of good microbial and good organoleptic qualities releases large volume of extract while meat of poor quality releases smaller volume. The extract release volume decreases with progress of spoilage and a less filtrate will be detected in putrid meat. As per Pearson (1967), the cut off value of ERV in fresh meats is 17 ml and above. This volume is approximately equal to log 8.5 micro-organisms per gram of meat.

Requirements: Blender, Measuring Cylinder, Volumetric Flask, 10ml Graduated pipette, Glass funnel, pH meter

Chemicals: 0.2M Potassium dihydrogen ortho phosphate, 0.2M Sodium hydroxide

Procedure:

1. Blend 15 gm of meat for two minutes with 60 ml of extraction reagent in a blender.
2. Extraction reagent with a pH 5.8 is prepared by taking 50 ml of 0.2M Potassium dihydrogen phosphate and 3.72 ml of 0.2 M Sodium hydroxide and the volume made up to 200 ml with distilled water.
3. The blended contents are quantitatively transferred to a glass funnel provided with filter paper (Whatman No. 1, 18.5cm diameter).
4. The filter paper is folded thrice so as to make 8 sectors and filtrate collected in 100ml measuring cylinder and the volume of filtrate collected in 15 minutes at a temperature of 20^{o} C is reported as ml of extract release volume of the meat sample.

Observation:

1. Weight of Sample:
2. Extract release volume (ml):

Interpretation:

Sr. No.	ERV (ml)	Meat Quality
1.	> 25ml	Good
2.	> 20ml	Incipient Spoilage
3.	< 20ml	Spoiled Meat

Result: Hence we have studied the Extract Release Volume (ERV) of meat sample.

Conclusion: From this experiment we have studied the Extract Release Volume (ERV) of meat sample which helps in determining spoilage of meat as well as in predicting shelf life of meat.

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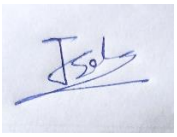

Practical No. 7

Determination of Meat Swelling Capacity (MSC)

Aim: To determine the meat swelling capacity of meat sample.

Introduction: Water holding in meat has, in the past, been rather poorly understood and has not been explained at all in structural terms. A unifying hypothesis for this phenomenon is that gains or losses of water in meat are due simply to swelling or shrinking of the myofibrils caused by expansion or shrinking of the filament lattice. Myofibrils have been observed by phase contrast microscopy, and are seen to swell quickly to about twice their original volume in salt solutions resembling those used in meat processing.

Such swelling is highly co-operative. Pyrophosphate reduces very substantially the sodium chloride concentration required for maximum swelling. In absence of pyrophosphate, swelling is accompanied by extraction of the middle of the A-band; in its presence, the A-band is completely extracted, beginning from its end. It was suppose that Cl (-) ions bind to the filaments and increase the electrostatic repulsive force between them. A crucial factor in swelling is likely to be the removal at a critical salt concentration of one or more transverse structural constraints in the myofibril (probably cross bridges, the M-line or the Z-line) allowing the filament lattice to expand. Water losses in rigor, in the Pale, Soft, Exudative (PSE) condition and on cooking may well result directly from shrinkage of the filament lattice.

Principle: This test determines the freshness of meat swelling capacity of meat increases during spoilage due to protein degradation and penetration of more amounts of water in protein matrix. A method of measuring the water binding capacity of muscle proteins with low water holding forces known as meat swelling (SW).

Requirements: Distilled Water, Centrifuge, Blender, Graduated Cylinder

Procedure:

1. Take 25 gm of Meat in 100 ml of distilled water.
2. Blend it for 2 min
3. Centrifuge 35 ml of homogenate at 2000 rpm for 15 min
4. Measure the Volume of supernatant (S)
5. Record the Volume and denote it as “S”.

Observation:

1. Weight of sample:
2. Volume of distilled water:
3. Volume of Supernatant (S):

Formula: Percent meat swelling can be determined as

$$\% \text{ swelling} = \frac{(35\text{-}S\text{-}7)}{7} 100$$

Calculation:

Result: Hence we have studied to determine the meat swelling capacity of meat sample.

Conclusion: In this experiment we studied that swelling or shrinking of the myofibrils caused by expansion or shrinking of the filament lattice which led to gains or losses of water in meat. Also, method of measuring the water binding capacity of muscle proteins with low water holding forces known as meat swelling (SW).

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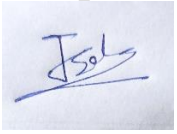

Practical No. 8

External Quality Evaluation of Egg

Aim: To evaluate external quality of egg.

Introduction: Egg Quality can be considered as both Internal Quality (focusing on egg content) and External Quality (Focusing on egg shell). Here, in this experiment we are focusing on external quality. External egg quality is determined by shell colour, cleanliness, integrity (crack, strength) and shape. Egg shells are covered with a cuticle that is a protecting layer which inhibits penetration of micro-organisms, which is lost by washing. So mostly washed eggs are oiled as to serve as an alternative protective layer. Dirt on eggs has various origins, including manure and urine and problems with large eggs or vent pecking can result in blood stains. Blood stains can also occur with high infestations with red mites within the housing. If these parasites are abundant especially on the egg belt, eggs roll over the mites resulting in typical little blood spots on the shells. Cracks are not always easily visible and although hairline cracks can be detected by candling, sometimes they can only be detected after a few days' storage.

External qualities include all the parameters that are observable with the naked eye of the consumer. Both the producer and the genetics companies are interested in increasing the number of saleable eggs produced. With this, we want to emphasize that the largest number of eggs possible must have a weight within the range required by the market and that the shell of the eggs must be clean, intact and free of any defects.

- The eggs of the white lineages must have a pure white colour.
- In the case of semi-heavy breeds, the shell of the eggs should have a uniform dark brown hue.

Requirements: Egg samples, Lamp/ Candles, Scale, Weighing balance, etc.

Procedure:

1. Observe and analyse the egg sample for following parameters mentioned and note down the observations.

1. Visual Appearance:

a. With naked eyes observe any unusual dirt, crack, manure or spots on the shell.

b. Also check the shell cuticle with dye. The cuticle plays a key role in protecting the egg against bacteria entering it. If the colour of dye remains on the surface of shell; it means the cuticle is intact. The presence of the cuticle can be determined by staining the egg, so that when it is present, the shell is stained with the dye colour. With this method, the presence of cuticle can be quantified by calculating the colour difference between the egg before and after being dyed.

Figure 1: Dark freckles on brown eggshells.

Figure 2: Cracks and visual damages

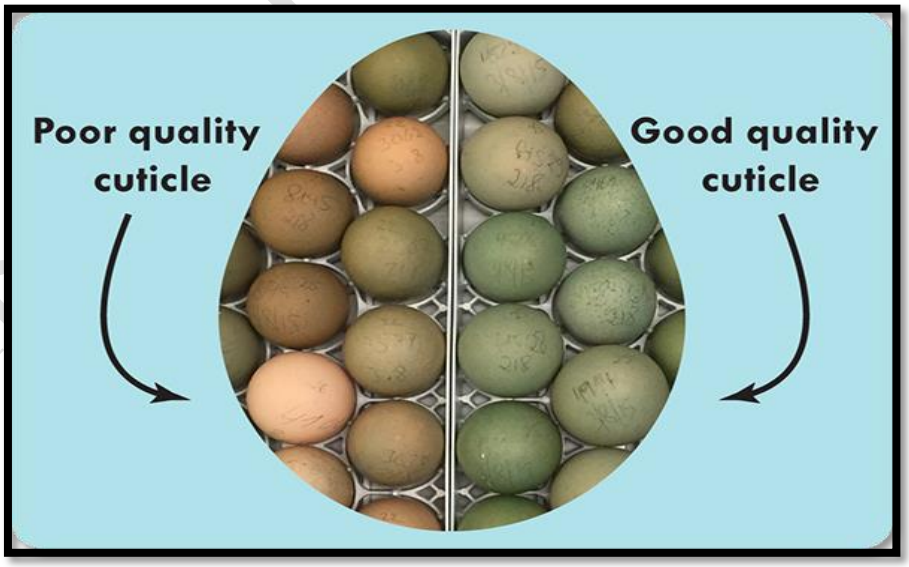

Figure 3: Cuticle Quality by dyeing of egg

1. **Colour:** With spectrophotometer technique or naked eyes observe the colour of egg samples.

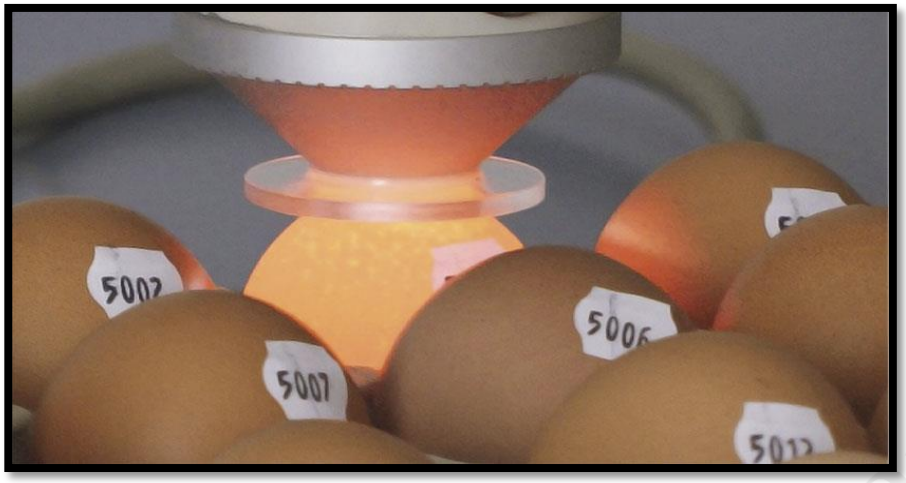

Figure 4: Spectrophotometer to measure shell colour

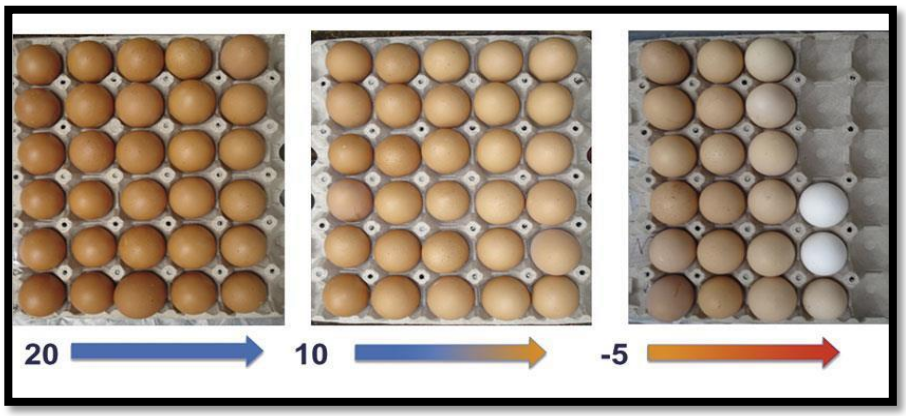

Figure 5: Color index of the shell

2. **Integrity (crack, strength):** With candling technique observe the egg sample for air cell, any blood spots or any abnormalities inside the egg without breaking it. As the quality of the egg deteriorates the size of the air cell increases due to loss of moisture through the cell especially in warm, dry atmosphere. In good quality egg, the depth of the air cell is 1/8-3/16 inches. In poor quality, the depth of the cell would be more than 3/8th of an inch.

   The quality of the egg in the shell is evaluated by candling. The egg is held against a source of strong light. Candling will reveal:

   a. A crack in the shell.
   b. The size of the air cell.
   c. The firmness of albumin.
   d. The position and mobility of yolk
   e. The possible presence of foreign substances like blood spots, moulds and developing embryo.

Figure 6: Candling technique on lamp

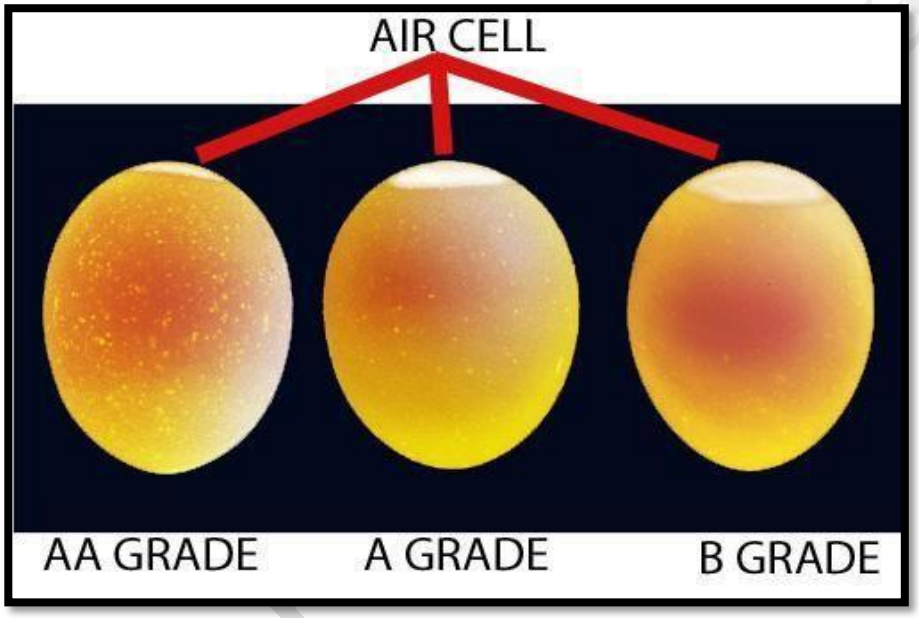

Figure 7: Air cell according Egg grades (AA, A and B)

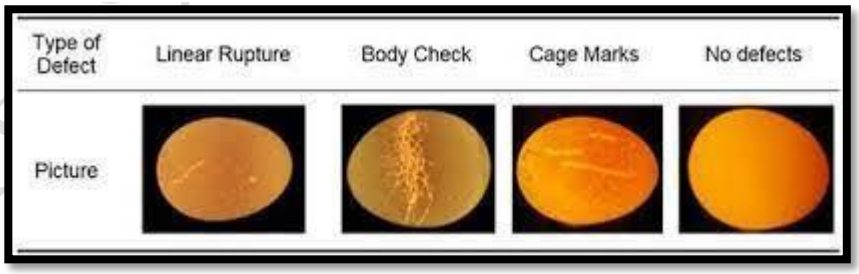

Figure 8: Type of defects seen to study integrity of egg shell in candling technique.

3. **Shape:** The shape of the egg is of commercial interest, since the consumer does not willingly accept excessively elongated or too round eggs; in addition to the possible breaks that may occur, since they do not fit correctly in the cartons when they are packaged. An index is calculated that consists of dividing the width by the length of the egg and expressing it as a percentage. In this way, eggs with an index below 72 will be extremely long and those with an index above 76 will be extremely round.

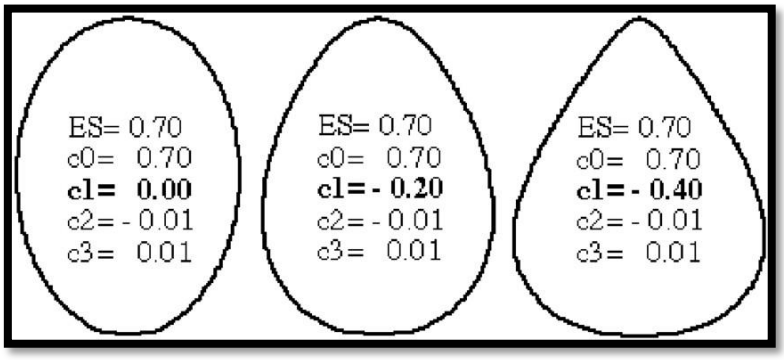

Figure 9: Different Shapes and Shape Index

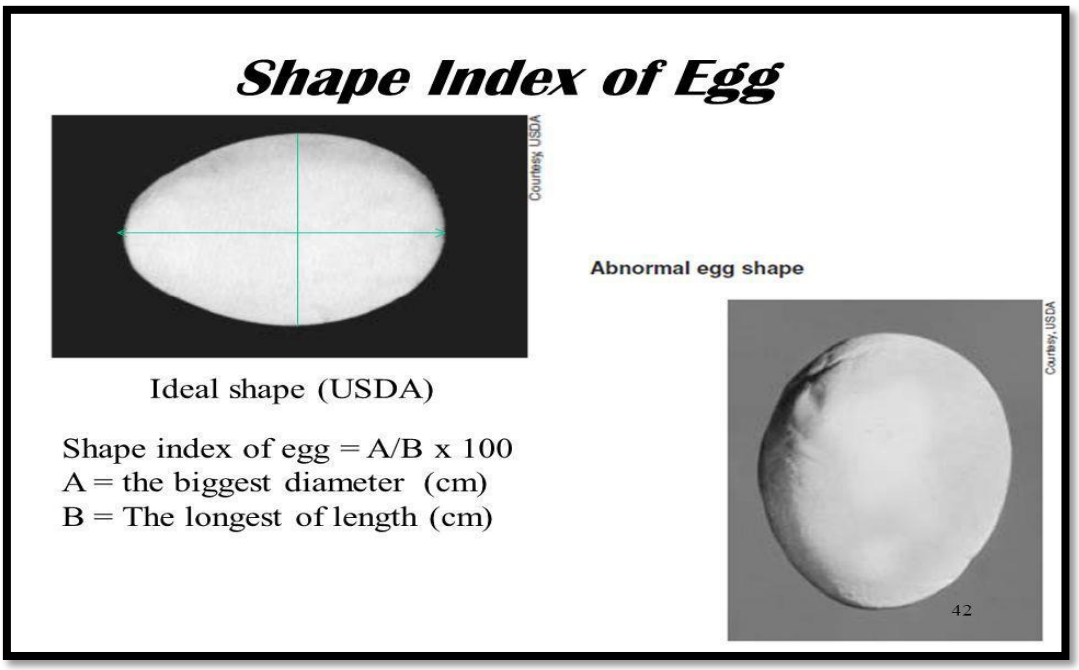

Figure 10: Shape Index of Egg

4. **Weight:** By weight we can find out the quality. The normal weight of an egg is 40-70g. The weight depends on the inheritance, stage of laying, season of laying, age, diet and health of the bird. Size does not reflect the quality. Usually small eggs contain higher proportion of yolk than large eggs. A very high egg weight can lead to shell quality problems. Weigh the egg on weighing balance.

Observation:

Parameters	Observations	Inference
Visual Appearance		
Color		

Integrity (Crack, Strength)		
Shape		
Weight		

Result: Hence we studied to evaluate external quality of egg.

Conclusion: In this experiment we studied the external quality of egg by observing and analysing different parameters such as visual appearance, colour, integrity (Crack, Strength), shape, weight.

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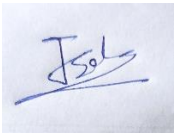

Practical No. 9

Breakout test for Internal Quality of Egg

Aim: To perform breakout test for internal quality evaluation of egg.

Introduction: Although candling is the best available method for rating unbroken eggs it may not be totally reliable. Breakout test for internal quality evaluation of egg gives a good insight. The egg is tested for air cell and quality by floating in water test. Measurement of the height of the thick white in relation to the weight of the egg gives Haughs unit. Good quality egg has 72 Haughs units and as the quality deteriorates it comes down to 30-60. Micrometre/ Vernier calliper/ graph paper can be used to measure the height of thick white. The height of the thickest portion of the white is divided by the diameter of the egg gives white index. Measurement of the height of the yolk in relation to the width of the yolk gives the yolk index. The yolk index, defined as the ratio of yolk height over yolk diameter, provides indication on the freshness of the egg. Eggs with yolk index above 0.38 are considered as extra fresh. Those ranging from 0.28 to 0.38 are fresh and those below 0.28 are considered regular.

Requirements: Egg samples, Graph paper, Scale, water, glass, etc.

Procedure:

1. **Floating in water**: If the egg sinks it is considered as good. Poor quality eggs float due to increase in size of the air cell and due to loss of moisture.
2. **Haughs Unit**: Weigh the egg (W). Pour the egg content on a graph paper. Measure the height of the thick egg white (H) with vernier calliper or scale. Calculate the Haughs Unit using the below mentioned formula.
3. **White Index**: Measure the height of thickest portion of white (H) and measure the diameter of the egg (D). Calculate the white index using the below mentioned formula.
4. **Yolk Index**: Measure the height of egg yolk (G) and measure the diameter of the egg yolk (Y). Calculate the white index using the below mentioned formula.

Observation:

1. Floating in Water (Yes/ No):
2. Weight of egg (W)
3. Height of thickest egg white portion (H)
4. Diameter of Egg (D):
5. Height of egg yolk (G):
6. Diameter of egg yolk (Y):

Calculation:

1. **Haughs Unit = $100 \times \log (H - 1.7 W^{0.37} + 7.6)$**
2. **White Index = H / D**
3. **Yolk Index = G / Y**

Result: Hence we studied to perform breakout test for internal quality evaluation of egg.

Conclusion: In this experiment we have studied different parameters such floating in water, weight of egg, height of thickest egg white portion, diameter of egg, height of egg yolk and diameter of egg yolk to calculate and determine Haughs Unit, White Index, Yolk Index, for determining internal quality of egg.

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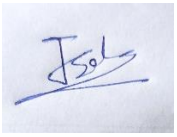

Practical No. 10

Evaluation of Freshness of Fish

Aim: To evaluate freshness of fish.

Introduction: Most often "quality" refers to the aesthetic appearance and freshness or degree of spoilage which the fish has undergone. It may also involve safety aspects such as being free from harmful bacteria, parasites or chemicals. It is important to remember that "quality" implies different things to different people and is a term which must be defined in association with an individual product type. For example, it is often thought that the best quality is found in fish which are consumed within the first few hours post mortem. However, very fresh fish which are in rigor mortis are difficult to fillet and skin and are often unsuitable for smoking. Thus, for the processor, slightly older fish which have passed through the rigor process are more desirable.

The methods for evaluation of fresh fish quality may be conveniently divided into two categories: sensory and instrumental. Since the consumer is the ultimate judge of quality, most chemical or instrumental methods must be correlated with sensory evaluation before being used in the laboratory. However, sensory methods must be performed scientifically under carefully controlled conditions so that the effects of test environment, personal bias, etc., may be reduced.

During the last 50 years many schemes have been developed for sensory analysis of **raw fish.** The first modern and detailed method was developed by Torry Research Station. The fundamental idea was that each quality parameter is independent of other parameters. Later, the assessment was modified by collecting a group of characteristic features to be expressed in a score. This gives a single numerical value to a broad range of characteristics. There are three quality levels in the EU scheme, E (Extra), A, B where E is the highest quality and below B is the level where fish is discarded for human consumption. The EU scheme is commonly accepted in the EU countries for sensory assessment.

A new method, the Quality Index Method (QIM) originally developed by the Tasmanian Food Research unit, is now used by the Lyngby Laboratory for fresh and frozen cod, herring and saithe. In the Nordic countries and Europe, it has also been developed for redfish, sardines and flounder.

Requirements: Fish samples, knives, plates, etc.

Procedure:

1. Observe and analyse the fish sample for following parameters mentioned in the observation table and note down the observations.

Observations:

Quality parameter	Character	Reference Score (ice/seawater)	Sample Score
General appearance	Skin	0 Bright, shining 1 Bright 2 Dull	
	Bloodspot on gill cover	0 None 1 Small, 10-30% 2 Big, 30-50% 3 Very big, 50-100%	
	Stiffness	0 Stiff, in *rigor mortis* 1 Elastic 2 Firm 3 Soft	
	Belly	0 Firm 1 Soft 2 Belly burst	
	Smell	0 Fresh, seaweed/metallic 1 Neutral 2 Musty/sour 3 Stale meat/rancid	
Eyes	Clarity	0 Clear 1 Cloudy	
	Shape	0 Normal 1 Plain 2 Sunken	
Gills	Colour	0 Characteristic, red 1 Faded, discoloured	
	Smell	0 Fresh, seaweed/metallic 1 Neutral 2 Sweaty/slightly rancid 3 Sour stink/stale, rancid	
Sum of scores		(min. 0 and max. 20)	

Result: Hence we studied to evaluate freshness of fish.

Conclusion: In this experiment we studied different characteristics to evaluate freshness of fish such as general appearance, eyes, gills.

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