FAQs

1. What are the carcass components?

Muscle, fat and bone are the three carcass components of slaughtered animal. Muscle is the most important and constitutes majority of the carcass weight. Fat deposits and sometimes bones are often processed and marketed along with muscle.

2. Mention briefly nutritional quality of meat.

Moisture, protein, lipid, ash and carbohydrate are meat components and these components vary in meats from different animal species considerably. Accumulation of lipid is the most influential on this variation. On an average most meats contain about 18 % protein (including essential amino acids), 5 % lipid (including essential fatty acids), 1 % ash (primarily potassium, phosphorus, sodium, chloride, magnesium, calcium and iron), 1 % carbohydrate (primarily glycogen antemortem and lactic acid postmortem) and the rest 75% as moisture. Digestibility of meat proteins is over 90% as against about 65 % in the case of plant proteins. Meat also provides many vitamins and all B - vitamins.

3. Explain how meat texture is defined by the consumer.

The overall impression of texture by the meat consumer involves three aspects:

i. The initial ease of penetration of meat by teeth,

ii. The ease with which the meat breaks into fragments and

iii. The amount of residue remaining after chewing.

4. Define pH and ultimate pH of muscle.

Acidity of muscle is measured by pH. The pH is defined as the logarithm (to the base 10) of the reciprocal of the hydrogen ion concentration, which is mathematically expressed as $pH = \log_{10} 1 / (H^+) = - \log_{10} (H^+)$. The initial pH of fresh muscle is near neutral ($pH \sim 7$) and begins to decline due to glycolysis postmortem and production of lactic acid until it reaches 5.3. This pH is referred to as ultimate pH.

5. What is rigor mortis?

After death of the animal there is a discontinuation of blood supply to muscle and anaerobiosis sets in. The most obvious physical change is the loss of extensibility in muscle. This loss of extensibility of muscle is called as *Rigor mortis*.

6. What is cold contraction of muscle?

Rapid chilling of carcasses / muscles soon after slaughter results into contraction of muscles from sheep, goat, buffalo *etc*. This cold contraction produces pronounced toughening in meat. The meat so toughened cannot be improved further by aging or cooking. Toughening due to cold contraction on rapid chilling can be overcome by postmortem conditioning of carcasses. The carcass conditioning technique involves suspending the carcass through pelvis instead of conventional Achilles tendon and holding initially at temperature of 20 - 25 °C for 6 - 8 hours followed by chilling at 2- 4 °C for 16 - 18 hours.

7. What are consumers perceptions of meat quality?

The prime meat quality parameters for the consumers are its color, flavor and texture (tenderness and juiciness). The distribution of fat inside the muscle (intra - muscular fat) is referred to as marbling and is important characteristic of quality in meat producing animals. The degree of marbling depends on maturity of the animal and feeding practice. Marbling should be moderate to give proper taste and flavor. Too little marbling gives dry and flavorless meat product. Too much marbling lowers the eating quality of meat as consumers prefer lean meat. Marbling also imparts juiciness to meat.

8. Give a brief account of meat flavor.

Raw meat has a serum - like or blood - like bland flavor. During conversion of muscle to meat, the flavor components become more intense and distinctive, *i.e.*, flavor becomes richer and deeper as the meat passes into rigor. There is a gradual loss in flavor during storage and occurs even in frozen condition possibly due to the loss of highly volatile substances. Such losses are unavoidable. Undesirable flavor may arise due to microbial growth, chemical deterioration and tainting by extraneous agents. On heating / cooking, the flavor is altered to produce compounds that impart delicious flavor of cooked meat.

Feeding of different plants affects meat flavor. Sheep fed with lucerne, white clover and sweet glycine results in sharp odor. Ryegrass, panic grass, green grass and kikuya grass produce strong meat odor. Rape grass feeding causes sickly odor.

9. What are the characteristics of pale, soft and exudative (PSE) muscles?

The characteristics of PSE muscles are:

i. Muscle is light or pale in color, soft, watery, lean and has open structure. Pale color results from light colored precipitates of sarcoplasimc proteins masking the usual red color.

ii. Muscle exudate renders meat unattractive and accumulates as excess fluid in prepackaged fresh chops and roasts.
iii. PSE condition occurs normally in pork and occasionally in beef.
iv. Open structure allows taking up of curing salts more readily.
v. Due to rapid drop in pH, it retards microbial growth and hence incidence of spoilage is less.
vi. PSE condition results from an extremely rapid rate of glycolysis postmortem, especially in stress susceptible pig, while muscle temperature is still high. Rapid fall in pH results in precipitation of sarcoplasmic proteins on the myofibrils.
vii. Glycogen content is much lower and lactate concentration much higher (even double) in PSE than in normal muscle.
viii. Adenosinetriphosphate (ATP) and creatine phosphate (CP) concentrations are also lower and in 1 hour virtually depleted.
ix. Time taken for completion of rigor is greatly reduced in PSE muscle.
x. PSE muscle protein is more easily soluble in salt solution and its collagen is more heat labile.

10. What are the characteristics of dry, firm and dark (DFD) muscles?

The characteristics of DFD muscles are:

i. Muscle is dark in color, firm in texture and dry to touch.
ii. DFD is associated with low glycogen reserves and low reducing sugar levels at the time of slaughter.
iii. Meat feels sticky to touch and has closed structure and high pH.
iv. Muscle does not absorb curing salts readily and hence more susceptible to bacterial spoilage.
v. Absence of glucose at the surface of DFD meat allows the spoilage microflora to attack, degrade amino acids and form odorous compounds earlier in spoilage process.
vi. DFD meat has objectionable soapy taste.
vii. Incidence of DFD can be reduced by minimizing stress during marketing of live animals and during slaughter.
viii. Practices such as feeding, resting, avoiding mixing of strange animals and other good management practices avoid stress and increase the glycogen reserves reduce DFD incidence.
ix. DFD meat protin is less soluble in salt solution and its collagen is less heat labile.

11. Define water holding capacity of meat?

The ability of muscle to hold fast its own water as well as added water is referred to as water holding capacity of muscle. Muscle proteins are water holders in meat. Hydration of meat is closely related to juiciness quality of meat, which influences significantly the tenderness and

taste quality of meat. This sensory perception relates to water holding capacity of meat. Drip loss, thawing loss, cooking loss and expressible juice measure water holding capacity of meat or juiciness quality of meat.

12. What is meat emulsion and emulsifying capacity of meat?

Oil does not mix with water because of interfacial tension between the two layers. The chemical compound that can reduce the interfacial tension and helps mixing the oil and water is called emulsifier. Proteins are natural emulsifiers because they contain hydrophilic and hydrophobic (lipophilic) amino acids. An emulsion is a heterogeneous system consisting of atleast one immiscible liquid intimately dispersed in another in the form of droplets of diameter less than 0.1 µm. Emulsifying capacity of meat is defined as ml oil emulsified per 100 g soluble proteins.

13. What are the characteristics of water – in - oil emulsion?

The characteristics of water – in – oil are:

i. Water droplets are dispersed in oil.
ii. Oil is continuous phase.
iii. Do not conduct electrical current due to the insulating properties of discontinuous nature of the water phase.
iv. Tend to be oily and grainy.
v. Favored by hydrophobic (Lipophilic) emulsifiers.
vi. Stabilized by magnesium and calcium soaps

14. What are the characteristics of oil – in - water emulsion?

The characteristics of oil – in – water are:

i. Oil droplets are dispersed in to water.
ii. Water is continuous phase.
iii. Conduct electrical current due to transmission through the continuous water phase.
iv. Emulsions are creamy.
v. Favored by hydrophilic emulsifiers.
vi. Stabilized by sodium soaps.

15. What is the principle behind the estimation of protein in muscle?

The muscle protein contains 16 % nitrogen. Nitrogen content is estimated in muscle. A known quantity of muscle is heated strongly with concentrated sulfuric acid to convert all muscle nitrogen in to ammonium sulfate. The solution containing ammonium sulfate is mixed with

strong alkali (sodium hydroxide) solution and heated to release ammonia gas which is steam flushed. Ammonia released is collected in standard solution of acid and excess acid is back titrated to measure amount of ammonia released. From the quantity of ammonia, the nitrogen content is calculated.The protein content is determined by multiplying nitrogen content by the factor 6.25 (100 / 16).