

DEPARTMENT OF LIVESTOCK PRODUCTS TECHNOLOGY

TOPIC:-STRUCTURE, COMPOSITION & NUTRITIVE VALUE OF MEAT

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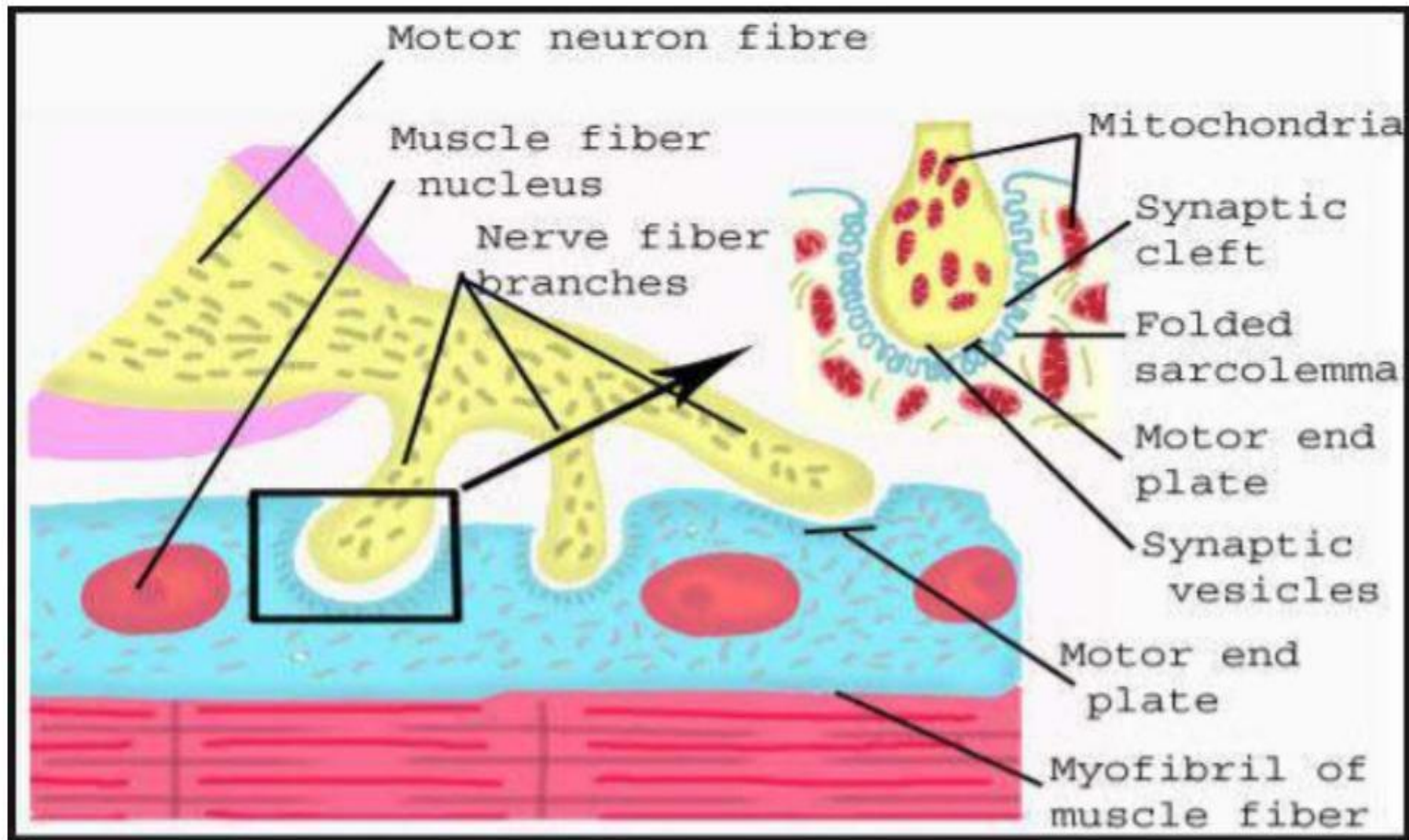
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STRUCTURE OF MEAT

- ▶ Meat is the post rigor aspect of the muscle and most abundant constituent of the carcass i.e,35-65% of carcass weight.
- ▶ Meat is primarily composed of skeletal muscle and additional cardiac and smooth muscles.
- ▶ A meat animal possess more than 300 muscles which may vary in shape and size.
- ▶ **SKELETAL MUSCLES:-**
- ▶ These muscles are also known as striated muscles.
- ▶ Muscles are made up of individual cells called as muscle fibres that are made up of myofibrils which in turn are made up of myofilaments.

▶ **MUSCLE FIBRES/MYOFIBRES:-**

- ▶ These are muscle cells that are long,unbranched,thread like multinucleated and taper slightly at both ends.
- ▶ Red, intermediate & white muscle fibre.
- ▶ **Organelles of the muscle fibre:-**
- ▶ The cytoplasm of the muscle is known as sarcoplasm.
- ▶ Mitochondria are more in number at the periphery of the fibre and at motor end plates.
- ▶ The ER is well developed and is called SARCOPLASMIC RETICULUM.

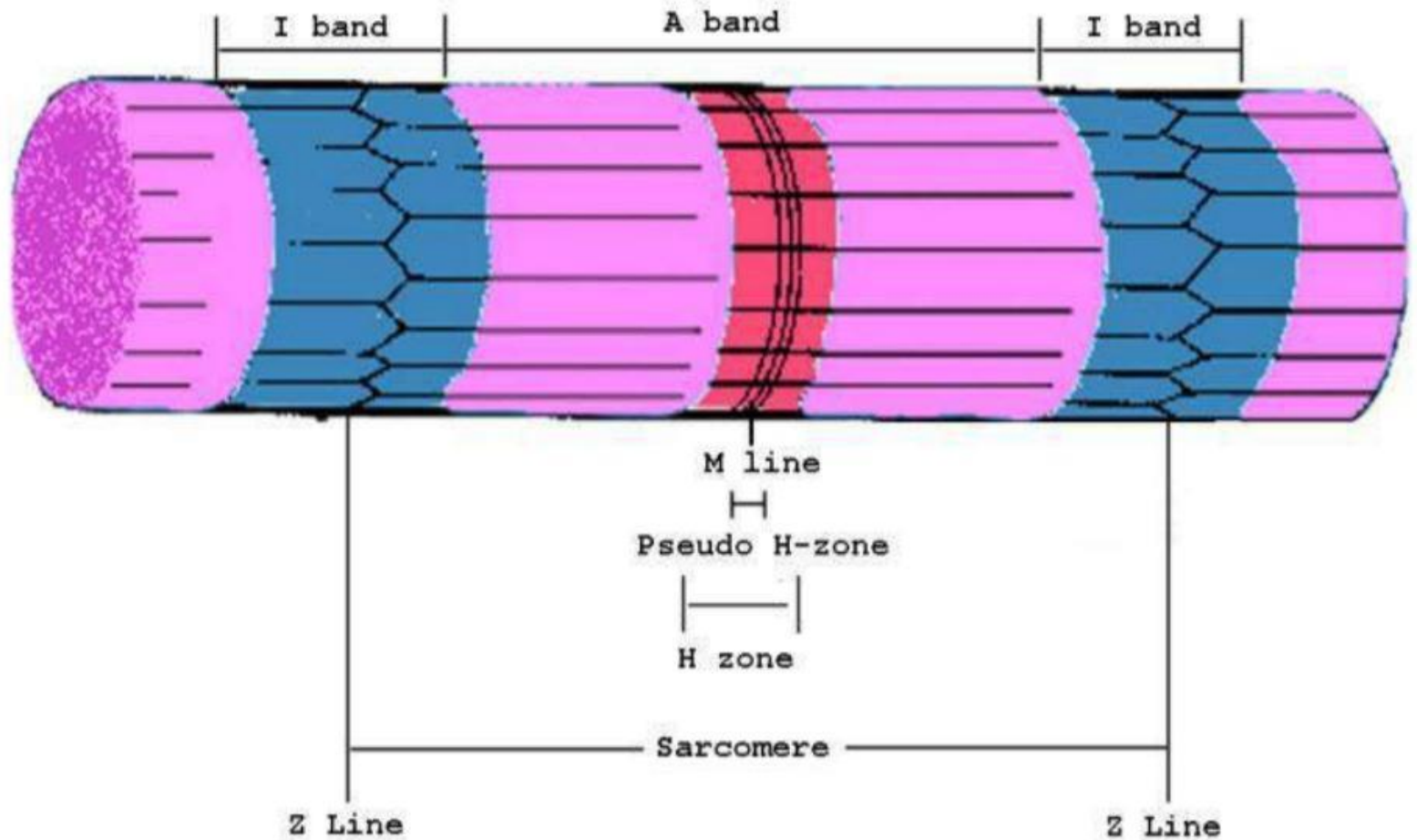


▶ **MYOFIBRILS:-**

- ▶ They appear as alternating light & dark bands.
- ▶ These are made up of myofilaments i.e, thick and thin filament composed of myosin and actin respectively.

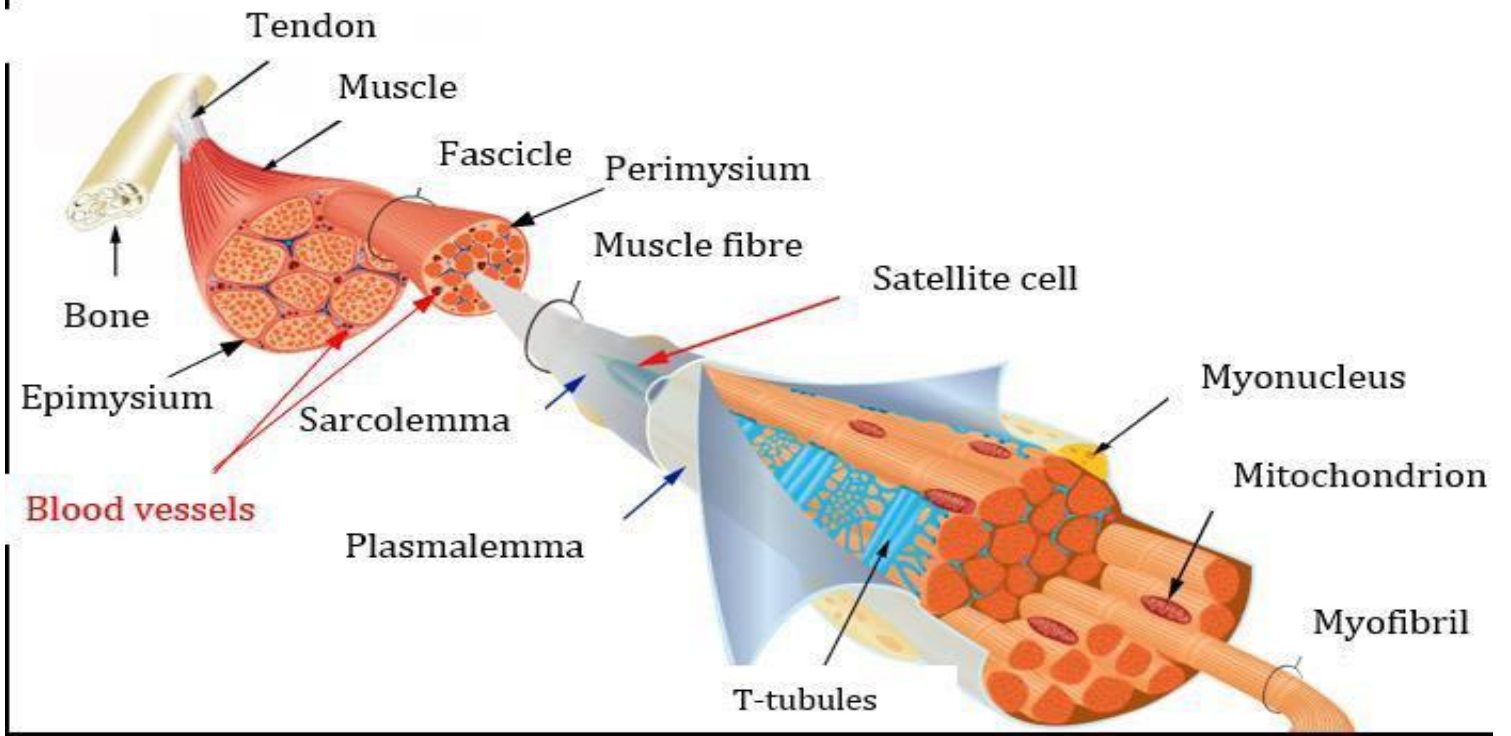
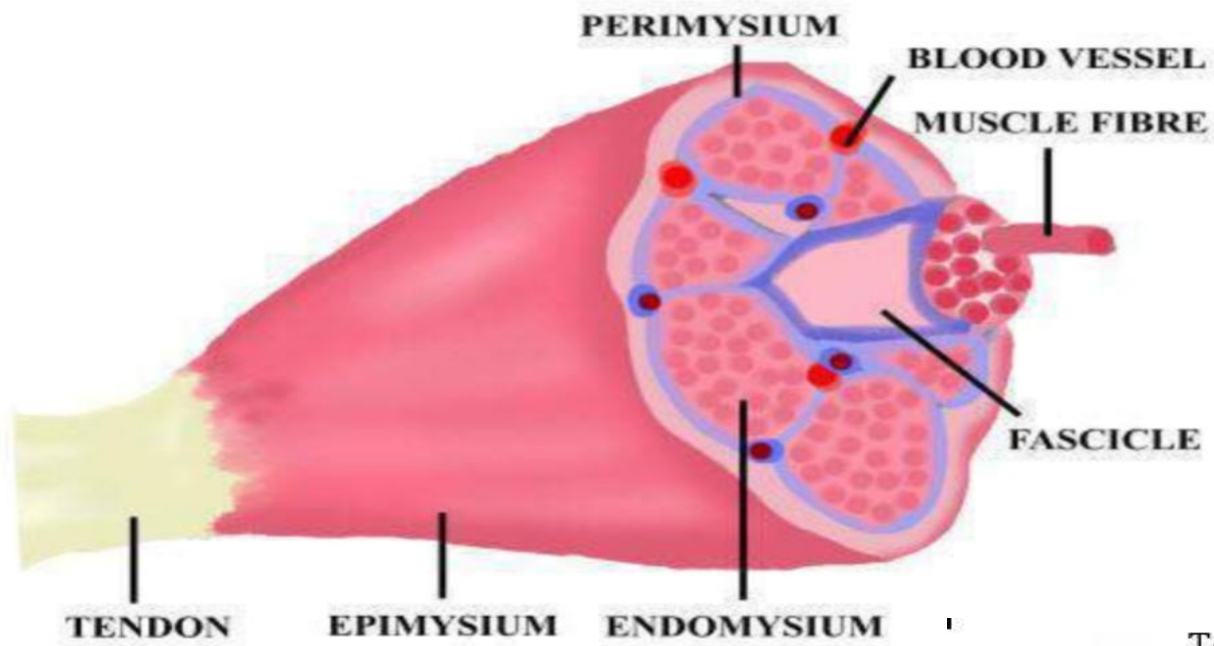
▶ **SARCOMERE:-**

- ▶ The portion of myofibril between 2 adjacent Z-lines is called a Sarcomere.
- ▶ It is the functional unit of myofibril.



▶ **Connective tissue of muscle:-**

- ▶ Epimysium is the outermost layer of every muscle.
- ▶ Perimysium which emerges from the epimysium , penetrate & divide the muscle into bundles by combining muscle fibres & cover these muscle fibre bundles all together as a unit.
- ▶ Endomysium covers the each individual muscle fibres.
- ▶ The connective tissue acts as channel for passage of blood vessels and nerve fibres.





▶ **SMOOTH MUSCLES:-**

- ▶ These muscles are found in GIT tract, blood vessels, lymphatics & skin.
- ▶ They are involuntary in nature.
- ▶ The myofibrils of these muscles are homogenous.
- ▶ There are no Z or M lines.

▶ **CARDIAC MUSCLES:-**

- ▶ These are also involuntary and found in the heart.
- ▶ They are branched & irregular in shape.
- ▶ The myofibrils have striations similar to skeletal muscles.
- ▶ The intercalated discs are present at the position of Z- lines.

COMPOSITION OF MEAT

S.NO.	COMPONENT	%(WET BASIS)
1.	Water	75%
2.	Protein	19%
	a) Myofibrillar proteins:- Myosin Actin Tropomyosin Troponins (C,I,T)	11.5%
	b) Sarcoplasmic proteins (Myoglobin)	5.5%
	c) Stroma/connective tissue proteins (collagen, elastin, reticulin)	2.0%

S.NO	COMPONENT		%(WET BASIS)
3.	LIPIDS	Neutral lipid Phospholipid	2.5%
4.	CARBOHYDRATES	Glycogen Lactic acid Glucose	2.5%
5.	MISCELLANEOUS		2.3%
6.	VITAMINS		Minute quantities

▶ **WATER:-**

- ▶ 70% of fresh water is located in myofibrils.
- ▶ Increased water holding capacity is associated with juiciness and tenderness of meat.

▶ **PROTEINS:-**

- ▶ **i)** Myofibrillar proteins-soluble in dilute salt solution
- ▶ **ii)** Sarcoplasmic proteins-soluble in water or very dilute salt solution
- ▶ **iii)** Stroma/connective tissue proteins:-Almost insoluble tissue protein

▶ **Note:-**

Myofibrillar proteins contribute to 95% of water holding capacity & 75% of emulsifying capacity & to tenderness of meat.



Filet Mignon
~8-20 mg/g



Pork Shoulder
~2-4 mg/g



Pork tenderloin
~1-3 mg/g



Dark Meat Chicken
~1-4 mg/g



White Meat Chicken
~0.5 mg/g



▶ **LIPIDS:-**

▶ It is the major component of carcass of meat animal.

▶ (i) NEUTRAL LIPIDS-Palmitic & stearic acid-saturated

▶ -Oleic, linoleic, linolenic-unsaturated

▶ (ii) PHOSPHOLIPIDS-Contribute to flavour and shelf stability of meat

▶ **CARBOHYDRATES:-**

▶ Immediately after slaughter usually a small amount of glycogen is present.

▶ It is used up during rigor motis and attains ultimate pH of muscle.

▶ **VITAMINS**

▶ Pork has 5-10 times more vitamin-B1 than beef.

▶ Folic acid and vitamin B12 is higher in beef & mutton.

NUTRITIVE VALUE OF MEAT

- ▶ **MEAT PROTIENS**
- ▶ **MEAT FATS**
- ▶ **MINERALS**
- ▶ **VITAMINS**

PROTIENS

Table 2.3: Essential amino acids as percentage of crude protein in fresh meats

Amino acid	Lamb	Pork	Beef
Lysine	7.6	7.8	8.4
Methionine	2.3	2.5	2.3
Cystine	1.3	1.3	1.4
Tryptophan	1.3	1.4	1.1
Leucine	7.4	7.5	8.4
Isoleucine	4.8	4.9	5.1
Phenylalanine	3.9	4.1	4.0
Valine	5.0	5.0	5.7

FATS

Table 2.4: Occurrence of fatty acids as percentage of total meat fat

Fatty acid	Lamb	Pork	Beef
Palmitic acid (C 16)	25	28	29
Stearic acid (C 18)	25	13	20
Palmitoleic acid (C 16: 1)	–	3	2
Oleic acid (C 18:1)	39	6	42

► MINERALS & VITAMINS:-.

Table 2.5: Mineral and vitamin contents of raw meat (mg/100g meat)

Mineral/vitamin	Lamb	Pork	Beef
Sodium	75	70	65
Potassium	295	285	<u>355</u>
Magnesium	15	18	18
Iron	1.2	2.3	2.8
Calcium	10	9	11
Phosphorus	147	<u>175</u>	171
Thiamine	0.15	<u>0.76</u>	0.06
Riboflavin	0.20	0.18	0.13
Niacin	4.7	4.1	3.6



REF:-Meat & Meat Products Technology, BD Sharma
Photos ,Tables from Google & book

THANK YOU!