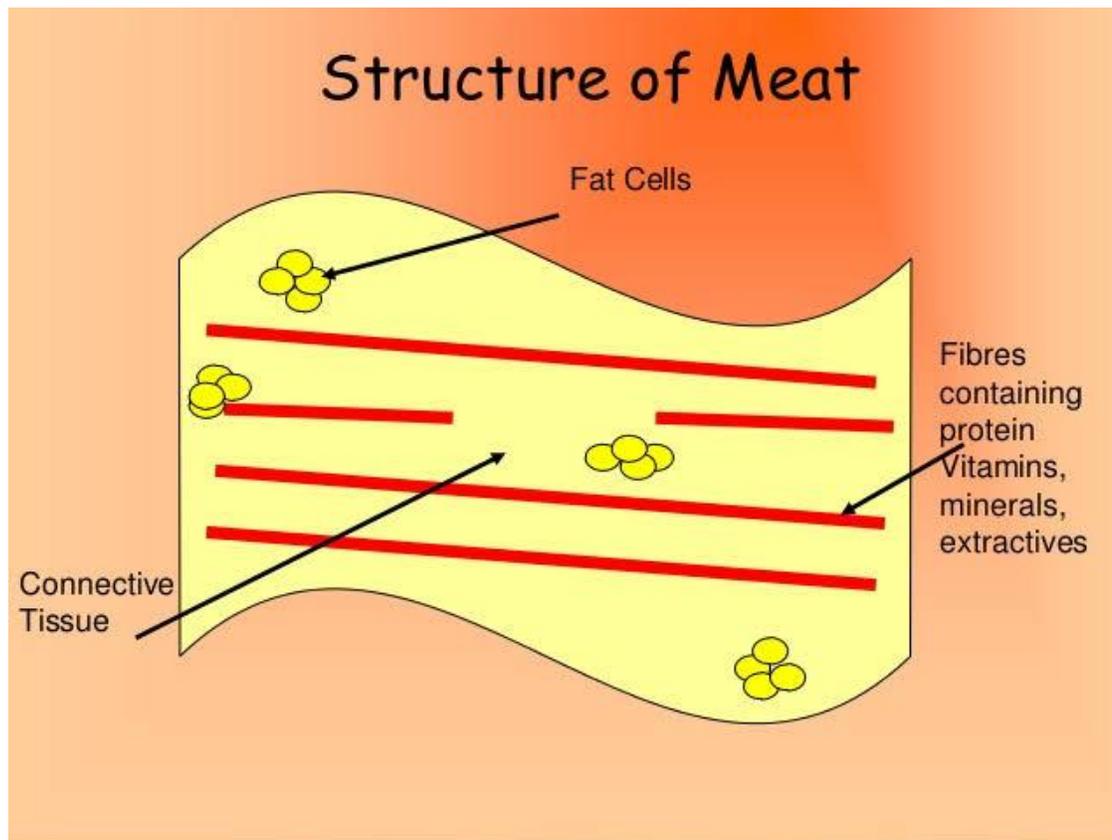


MEAT

This is the fresh of cattle, sheep, goats, pigs, rabbits, etc.



Meat is made of bundles of long muscle fibres which contain proteins, mineral salts, vitamins and extractives (juices). Each fibre is surrounded by a wall of a tough connective tissue. In the connective tissue are layers of fat with varying thickness. The bundles of fibre are held together with collagen another form of connective tissue which also encases the muscle to the bone.

Connective tissue

This is a fibrous protein which is insoluble in cold water, it is of two (2) kinds i.e. collagen the tissue itself and elastin (forms a silver-skin) which is the wall of the muscles.

They are both proteins and insoluble in cold water but collagen changes to gelatin when subjected to moist heat. Gelatin dissolves in water and this makes meat tender.

Choice of meat

- Buy meat from a butcher who sells fresh and well hang meat
- Buy meat from a hygienic and well ventilated shop
- Choose the most suitable meat for the cooking method to be used
- Choose meat with a small proportion of bone, fat and gristle (hard substance that is unpleasant to eat)
- The flesh should be firm and elastic to touch

- The red colour of meat is determined by a protein called myoglobin which is red (the more the myoglobin the darker the meat) thus the colour of meat should be good for the type of meat i.e.
 - (i) Beef should be red/brown with cream or pale yellow fat
 - (ii) Mutton (meat from mature sheep) should be light red or pink with white hard fat.
 - (iii) Pork should be pink with soft white fat
 - (iv) Veal (meat from a calf) should be pink with white fat
- Meat should have a fresh smell
- Buy only the quantity of meat that can be used in a day unless you've a fridge
- The butcher should chop the bones for you since at home the knife may not manage chopping the bones
- It should be moist but not dripping.

Choice of poultry

- This should be pink/white with dark meat on the wings and legs
- It should be plump and springy to the touch
- It should have a fresh smell
- Bones and beaks should be palatable
- The legs should be smooth

Factors that affect the tenderness of meat

1. Age

Meat from an old animal is generally tough this is because, it has a greater amount of connective tissue with larger muscle fibres and more gristles.

A young animal has short, fine fibres with less connective tissue holding them together and little gristles.

2. Activity

When a muscle is very active, the fibres become longer and thicker and the connective tissue builds up to hold them together. When a muscle is rarely used, the fibres stay short and little connective tissue is present. This explains why in the same animal, the neck and leg meat is always tough compared to meat from other parts.

N.B: the tougher the meat tissue is the stronger the flavor.

3. Hanging

Correct hanging can do much to improve the tenderness of meat. After slaughtering, the protein myosin sets in Rigormortis (making the meat very tough). Gradually muscle glycogen is converted into lactic acid (glycolysis) which softens the meat, assisted by protein splitting enzymes present in meat.

Before slaughter, it's essential that the animals are rested and they should not struggle during slaughter as this will use up the stores of glycogen present, making the meat tough and reducing on its keeping quality.

4. Size of the piece

Large pieces are hard compared to the small pieces this is because large pieces have long connective muscles compared to the (short) small ones.

5. The breed

Local breeds have tough meat compared to exotic breeds. This because the local breeds move long distances in search for food and water whereas the exotic breeds are provided for in a process under zero grazing

How to tenderize meat?

Meat is always hard thus the need to make it tender before cooking, and this can be done through the following methods;

1. Pound/Beat it gently with a meat mallet or rolling pin.

The purpose is to break the tough muscle fibers that hold the meat together. Breaking these fibres down will result into tenderizing the meat.

2. Marinate your meat

Do this for two (2) hours or overnight to tenderize it. The acids used to marinade help to break down the collagen between the muscle fibers, turning it to soft gelatin. Marinating also adds flavour and moisture to meat, helping to keep it juicy.

3. Wrapping meat with pawpaw leaves

Papaya leaves have an enzyme called papain. It's this enzyme that will make the meat tender by partially digesting it. Other enzymes like Bromeline from pineapples can be used.

4. Painting meat with lemon juice or vinegar

This is done before cooking meat or the acids or tomatoes may be added to the cooking liquid. The acids or tomatoes will convert the collagen to gelatin which is soluble hence making meat tender.

5. Use of commercial tenderizer

These are bought from shops and they are put into meat before cooking or during cooking and can make the meat tender

6. Use the appropriate cooking method

Tender cuts of meat can be broiled or grilled; very tough cuts of meat need to be stewed or braised. Braising involves cooking the meat for a very long time in a liquid like broth, water or wine, which adds moisture

7. Freezing

When meat is frozen, the water molecules form crystals between the fibres of meat, this breaks the connective tissue rendering meat soft after thawing

Nutritive value of meat

1. Protein

Meat is rich in high biological value proteins. The main protein is myosin but albumin and globin are also present and the connective tissue contains the proteins collagen and elastin.

2. Fat

All meat even the leanest cuts contain some fats. The amount of fat present in meat depends partly on the animal (chicken for instance, contains relatively little fat) and partly on the type of cut.

3. Carbohydrates

There are no CH₂O_s in meat because the glycogen in the liver and muscles is changed to lactic acid after slaughter.

4. Vitamins

Meat is a good source of vitamin B group (niacin, thiamin, riboflavin)

The liver is rich in vitamin A and suet contains little quantities of vitamin D but not in meat

Vitamin C is lacking in meat but available in little quantities in live animals.

5. Mineral elements

Meat contains iron, mostly in the liver and kidney. There are small amounts of sulphur in most meat and offal's are rich in phosphorus. *Calcium* is lacking in all meat.

6. Water

Most meat is about 60 -70% water, although the proportion in fatty cuts is less.

7. Extractives

These are natural flavourings present in the tissue of meat. They dissolve into the cooking liquid or fat and give meat its characteristic succulent flavor. Extractives stimulate the flow of digestive juice and are said to increase the metabolic rate.

Methods of cooking meat

The objective of cooking meat is to remove the raw appearance and make it safe for consumption without over coagulating the protein, losing the minerals, vitamins and extractives. Meat can be cooked by a variety of methods, such as:

1. Roasting:

This is good for good quality tender thick cuts.

2. Boiling;

This is good for salted meat.

3. Grilling and frying;

This is suitable for thinly cut pieces of good quality meat.

4. Stewing;

This is suitable for cheap/inferior quality meat which require long slow cooking to make them tender.

5. Barbequing, etc.

Reasons for cooking meat

- To make it tender and digestible
- To allow it develop a good flavor
- To make it more palatable by changing its red haemoglobin to brown, a colour that pleases the eyes and the plate
- To kill the bacteria in meat thus to make it safe for consumption

Principles underlying the cooking of meat

➤ Coagulation of protein by heat

The protein myosin and albumin begin to harden at 63⁰C and become solid at 71⁰C. The surface of the meat is sealed and the juices are retained.

➤ Simmering and boiling points of water

Simmering point is about 96⁰C slightly lower than the boiling point at 100⁰C. Once the protein has coagulated, the meat should be allowed to complete cooking at simmering point otherwise it toughens. If meat is boiled rapidly for long, meat may fall into shreds (disintegrate).

➤ Conversion of connective tissue.

Moist heat will lead to the conversion of the connective tissue into a soluble form.

➤ Flavor development

Raw meat is unpalatable and unappealing to the eyes. But while cooking, its characteristic rich flavor develops due to the release of extractives.

During cooking of meat, protein coagulates and it's made pleasant to eat. Digestibility of meat depends on;

- (i) Degree of toughness;
When meat is tough, it will be hard to digest than when it's tender
- (ii) The amount of fat present;
Fats slow down digestion, thus if meat has a lot of fat, it will be hard to digest.
- (iii) Flavour;
If meat developed good flavor during cooking then its digestion will be easy this is because flavours are responsible for quick release of the digestive juices and increase metabolic rate.

Other factors that affect meat digestibility include;

- Health status of the individual eating meat
- The chewing factor

Effects of heat on meat

- (i) The protein coagulates and the meat becomes firmer.
- (ii) The elastin in the muscle fibre contracts and the meat shrinks. The shrinkage is due to tenderizing and shortening of elastin.
- (iii) The fat melts and penetrates into lean meat during cooking thus increasing the energy value of meat.
- (iv) Collagen changes to soluble gelatin upon moist cooking.
- (v) The colour of meat changes from red to brown due to the *oxymyoglobin* being converted to *haemochrome*.
- (vi) The bacteria and parasites are destroyed at high temperature and decomposition is delayed.
- (vii) The extractives are released giving meat a characteristic flavor.
- (viii) The fat soluble vitamins remain stable but the B group vitamins and mineral salts are leached into the cooking (water) liquid, thus the cooking liquid should be served with the meat.
- (ix) Meat becomes tender and digestible.

The general rules for cooking meat

- Wipe the meat with a clean cloth carefully
- Trim off the fat, gristle and remove bones if necessary. Use the meat scraps and bones to make stock
- Cut meat into cubes if it is to be stewed
- Wash properly all the internal parts of the meat
- Frozen meat should be allowed to thaw completely before being used in any dish

The value of meat in the diet

- Meat is a concentrated source of nutrients
- It forms the core of a meal this because it's a first class protein
- Provides an important addition of a variety of flavours in the diet. Left over gravies, and meat stock are often be used to supplement the vegetable soups and sauces.
- Leftover meat can be used to make attractive and satisfying rechauffee dishes
- It can be cooked in a variety of ways.
- Meat is satisfying this is due to the fat, it takes a long time to be digested.
- Offals are a concentrated food sauce and yet they are quite cheap
- The fat on meat increases the energy value in a diet.

OFFALS (Giblets)

These can be defined as the edible internal organs of an animal.

Offals should be hanged and should be eaten fresh. Offals are cheaper than carcass meat. When buying offals, buy those that are firm with a pleasant smell.

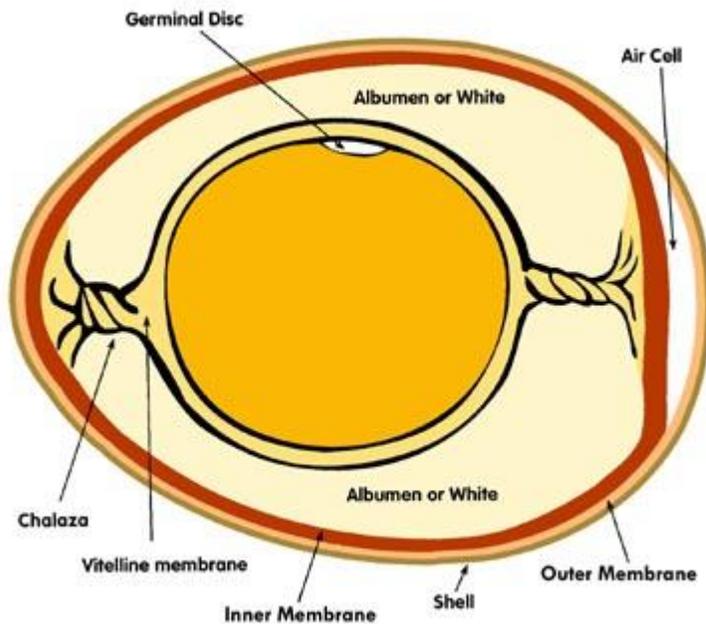
Nutritive value of offals.

- The energy value: - this is lower than that of meat; this is because their fat content is lower compared to meat. Liver has some CH₂O_s in form of glycogen.
- Protein: - offals contain proteins of a high biological value and if well cooked, the proteins are readily available for absorption.
- Vitamins:-
 - Vitamin B₃ is very high in the liver and the kidney
 - Vitamin B₁₂ and folacin are very high in the liver
 - Vitamin A (in form of retinal) is also high in the liver
- Mineral elements
 - Iron is found richly in the heart, kidney and the liver
 - There are no dietary fibres and calcium in offals.

N.B: Offals should be eaten the day they are purchased and should not be kept for more than 24 hours in a fridge.

EGGS

Structure:



An egg is basically made up of three main parts i.e.

- | | | |
|-------|-----------|-----|
| (i) | Shell | 11% |
| (ii) | Egg white | 58% |
| (iii) | Egg yolk | 31% |

Shell

About 11% of the egg is the shell and it is used for protecting the inner parts of the egg. The shell has tiny pores thus can allow bacteria, air and strong smell to enter the egg. The shell is basically calcium carbonate (CaCO_3) and can be white or brown depending on the breed of the bird and what it feeds on.

The egg white (Albumen)

This is about 58% of the egg and has two visible layers i.e. the thin white and the thick white.

88.5% of the egg white is water, 10.5% protein and the rest is the vitamin B group and a mineral salts.

The main proteins in the egg white are:

- (i) Ovalbumin
- (ii) Mucin

Egg yolk

This is about 31% of the egg and it is supported by the chalazae.

16% of the yolk is a protein, 32% fat, 50% water and the rest are fat soluble vitamins and mineral elements.

The colour of the yolk is dependent on the diet of the bird but this does not change its nutritional composition.

The main proteins in the yolk are;

- (i) Vitellin
- (ii) livetin and
- (iii) Globulin.

Nutritive value of eggs

- The energy value of 662K joules (1.4K.c) per 100g is provided in the yolk by the fat.
- They contain proteins of a high biological value
- They contain vitamins such as B group in the egg white and fat soluble vitamins in the yolk.
- They contain mineral elements such as calcium in the shell, sulphur in the white, and iron, phosphorus and calcium in the yolk.
- They contain water of about 80%

It is important to note that eggs do not provide carbohydrates, dietary fibre and vitamin C thus, they should be served with foods that provide the nutrients they lack to balance them.

Digestibility of eggs

Eggs cooked by almost any method are digestible. Light boiled eggs are more digested than the hard boiled, fried and raw eggs take longer to leave the stomach. In the intestines the egg nutrients seem to be completely absorbed.

Points to consider when buying eggs

- The shell of a fresh egg is rough. Bad eggs have smooth shells.
- A fresh egg sinks in a brine solution (saline solution)
- Choose eggs with clean, uncracked shells
- A fresh egg has a small air space and the egg appears slightly transparent.
- A fresh egg has a pleasant clean smell
- When broken on to a saucer, a stale egg will have a flat yolk and a watery vomit.
- When the eggs are candled (passed in front of a strong light), will show no defect in them i.e. Will be slightly translucent with no dark specks

Storage of eggs

- Eggs should be stored in a cool dry place e.g. in a larder.

- Eggs should be kept away from strong smelling foods; this is because the smell can enter the egg through its porous shell.
- They should not be washed since washing destroys the cuticle that protects the egg.
- They should be stored with their rough end upper most

N.B: as the egg gets older several changes take place.

- Water moves from the white into the yolk
- The thick white becomes thinner
- The yolk membrane weakens
- The size of the air space increases making it buoyant
- Moisture is lost through the shell
- The bad smell of hydrogen sulphide is produced
- Bacteria enters the egg through the shell
- Eventually the egg decomposes.

Uses of eggs in cookery

- As a main dish – instead of meat or fish etc., eggs can be used in a combination with other foods to make a balanced meal.
- As a thickening agent – eggs are used to thicken soup and sauces, etc. This is because they coagulate on heating e.g. eggs are used as a thickening agent when making custard sauce.
- As a binding agent – the coagulating properties of an egg gives cohesiveness to a mixture with dry ingredients which help ingredients to cling to one another e.g. croquettes (small amount of mashed potatoes or fish), rissoles (small flat mass or ball of meat) icing etc.
- As a coating agent – beaten eggs form a protective cover for fried foods. This is because eggs quickly harden on heating.
- Used to enrich dishes – this is done by mixing eggs with other ingredients e.g. in puddings and cakes.
- As a leavening agent – when eggs are whisked, air is trapped and when the whisked eggs are mixed with other ingredients (flour) and baked, the trapped air will expand causing the raising of the mixture e.g. spongy cakes, puffed omelet, etc.
- As a glazing agent – when eggs are lightly beaten and brushed on pastry or scones, give a golden brown gloss to the finished dish.
- As a garnish – hard boiled eggs and yolk can be used to make dishes (salads) more appealing.
- As an emulsifying agent – egg yolk contains lecithin which is an emulsifier and enables oil and water to mix and form an emulsion without separating e.g. when making mayonnaise and cake mixtures.

- As food for invalids – This is because they are easily digested and they provide the essential nutrients
- Frosting – when beaten egg white is brushed over pastry in sweet dishes five minutes before the end of cooking time gives a frosted appearance to the finished dish.
- Used in the making of individual dishes e.g. scrambled eggs, omelets, stuffed eggs, etc.
- Used in the making of drinks such as egg flip, egg nog, etc.
- As clarifying agent – egg whites or shells are used to clarify stocks in the making of clear soups.

Heat effects on eggs

- The protein in the egg white coagulates at about 60⁰C and in the yolk at about 68⁰C.
- If eggs are cooked for so long or at high temperature they curdle i.e. the protein shrinks and water separates from the egg, a process called syncresis.
- If over cooked, the white becomes tough and the yolk crumbly. Eventually a greenish black rim appears around the yolk owing to the combination of iron and sulphur forming iron sulphide.
- Egg white (albumen) is soluble in cold water but becomes insoluble even when slightly heated.
- Small amounts of vitamin B are destroyed on heating.

Hints on how to use eggs

- (i) For boiled and poached eggs, water should simmer gently. For hard boiled eggs, cook in boiling water.
- (ii) Always cool hot mixtures before adding eggs to prevent curdling
- (iii) When whisking egg whites, make sure that the bowl and the whisk are clean and free from fat. Fat and a speck of yolk prevent the white from reaching the required volumes.
- (iv) Use eggs at room temperature, whisking should be done at approximately 20⁰C if you are to achieve a good volume.
- (v) When making mayonnaise oil should be slightly warmed and added slowly in order to allow it be emulsified more easily.

Preservation of eggs

The principle is to prevent entry of air which bring bacterial into the egg through the porous shell.

1. Coating in a solution of sodium silicate;
This solution clings and seals the pores
2. Coating with oteg;

This is a special varnish that is greasy and sticky but dries fast on eggs

3. Chilling;

This is done at 20 to 40 C (36o to 40o F) and eggs can keep fresh for at least three (3) months.

4. Frozen eggs;

Here the shell are removed, the white and the yolk separated and then frozen

Methods of cooking eggs

There are a variety of ways to cooking eggs and they include:

- Boiling
- Scrambling
- Etc
- Frying
- Baking
- Poaching
- Steaming