

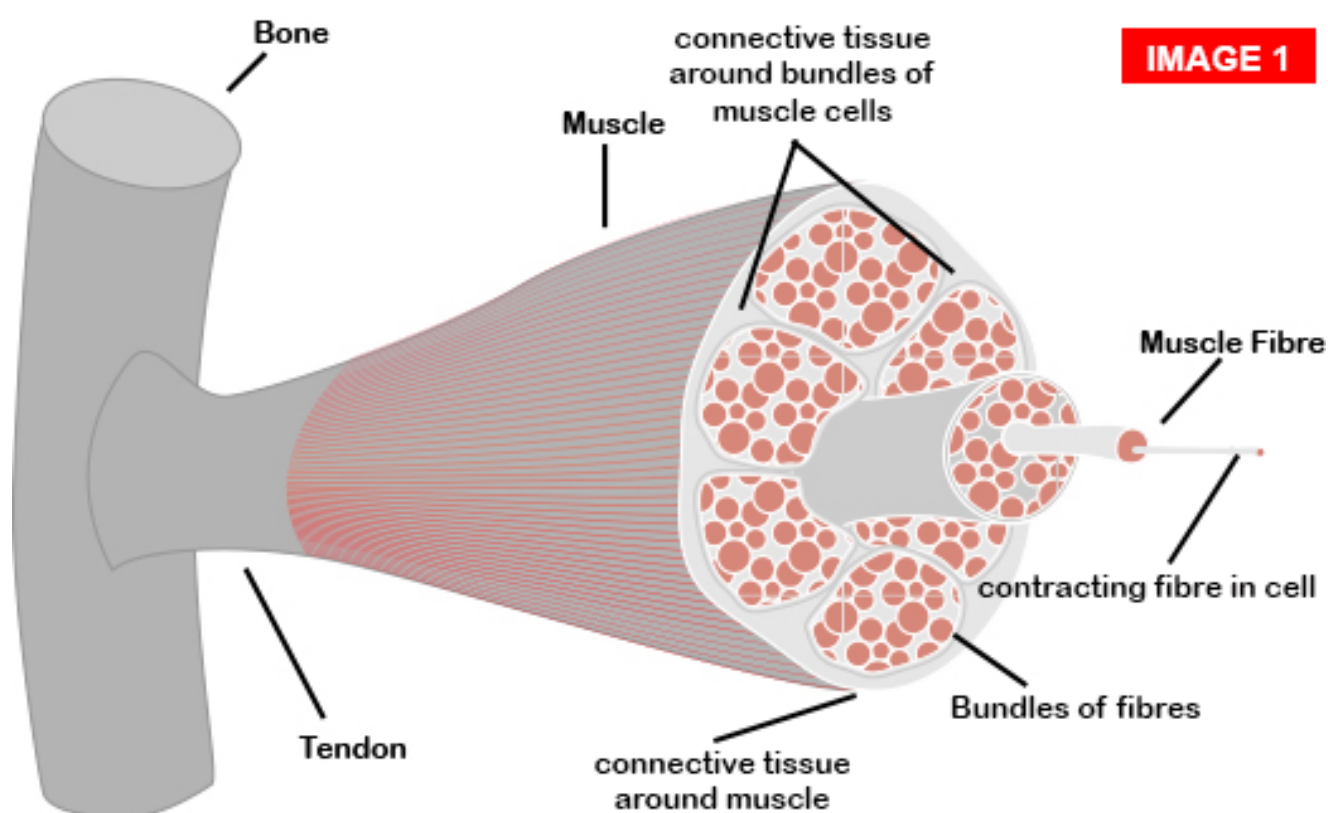
The structure and composition of meat

Meat is a term used for the muscle of animal flesh. It is these muscles that enable the living animal to move. These muscle fibres contain two proteins: **myosin** and **actin**.

What determines how tender or tough meat is when you eat it?

It's all to do with the muscle fibres in the meat and the way you prepare and cook the meat. In parts of the animal where the muscles are well used, and also as the animal ages, these will contain muscle fibres that are thick and long. In parts of the animal where the muscles are less used, and also in younger animals, these will contain muscle fibres that are thin and short.

This is what a muscle fibre looks like:



- Thin, short fibres will give us meat that is mostly tender to eat.
- Thick, long fibres will give us meat that is mostly tough to eat.
- The meat fibres are arranged in bundles, held together with connective tissue.

The muscle fibres in the meat are formed into bundles, and these bundles are surrounded by connective tissue – see image 1 above.

Muscles are attached to bones by tendons. Connective tissue is composed of the two proteins: **collagen** and **elastin** (sometimes elastin is referred to as gristle).

Tendons are made up of mostly **collagen**. When tough cuts of meat are cooked with moisture the collagen changes to gelatine, and gelatine is soluble. It is this change from collagen to gelatine which makes the meat more tender. Collagen is creamy white in colour.

Ligaments are made up of mostly **elastin**. Elastin (as the name suggests – elastic) has the ability to stretch and return to its original shape. Unlike collagen, it is insoluble. It is quite a tough protein, but because tender cuts of meat (steaks etc) don't contain much elastin compared to collagen it doesn't make meat tough to eat. Elastin is yellow in colour.

If you toughen the meat through cooking, you make it more difficult to chew and digest.

The cooking of meat

Meat will begin to denature from 50°C and this continues to approximately 70°C.

When meat begins to denature, the two proteins in the meat muscle (myosin and actin) will become firmer. When meat is cooked, the muscle fibres coagulate and water is lost – this can cause the meat to shrink. Depending on the cut of meat and the cooking methods used, the meat can either become more tender or tough. To ensure you achieve the best eating quality, it is important to know and understand the cut of meat you are using and the most appropriate cooking method to use for it.

Dry cooking methods such as grilling and roasting can cause the meat to shrink very quickly and the meat becomes tough to eat. This is because the meat juices are squeezed out as the collagen contracts at around 60°C. These meat juices contain the extractives (flavour compounds) plus vitamins, minerals and soluble proteins. This loss of juice causes the meat to shrink and lose weight, as well as tasting dry and even chewy. This is why only tender cuts of meat should be cooked using dry cooking methods.

Moist cooking methods such as stewing meat in the oven, for example in a casserole, can cause the meat to shrink more slowly. The long slow cooking process also enables the collagen to change to gelatine, resulting in the quality of the meat being more tender. This is why only tough cuts of meat are used for long and moist cooking methods.

Examples of tender cuts of meat (beef, pork and lamb)

Beef	Pork	Lamb
Sirloin, rump, rib-eye	Chops, loin, rib	Chops, cutlets, loin

Examples of tough cuts of meat (beef, pork and lamb)

Beef	Pork	Lamb
Shin, neck, brisket, flank	Knuckle, belly, blade	Scrag end, breast

How should you cook tough cuts of meat?

Long, moist methods such as simmering on hob or stewing in the oven (casseroles), slow roasting

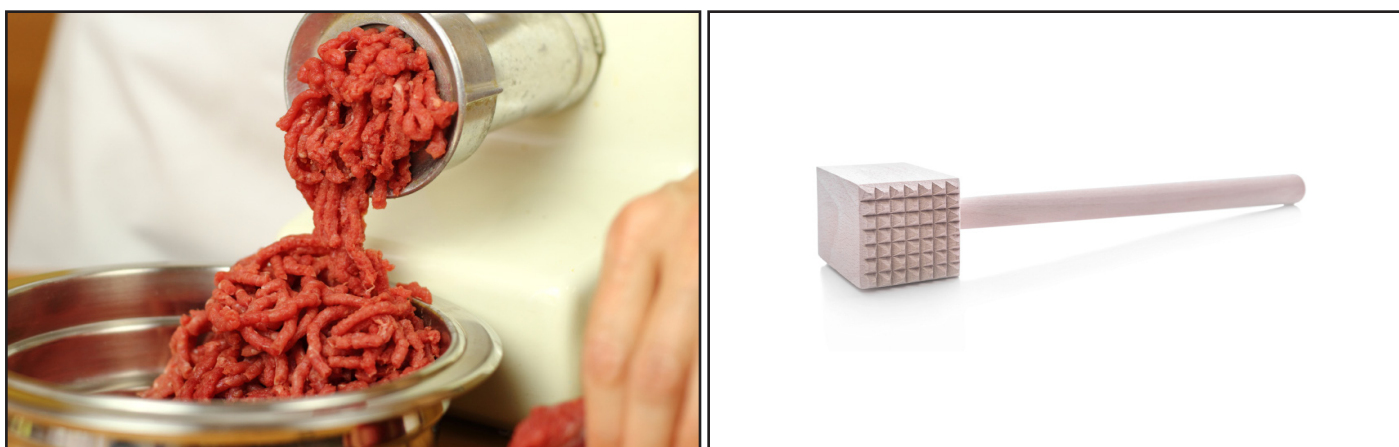
How should you cook tender cuts of meat?

Fast, dry methods such as grilling, pan frying

Can you tenderise meat before you cook it?

Yes!

You can apply mechanical force such as mincing or using a meat tenderiser which is like a hammer with small spikes. It is usually made from metal or wood (see below).



Or, you can use a meat tenderiser which contains stainless steel bladed knives (see below).



This will cut the muscle fibres, making them shorter.

You can use enzymes. It is possible to buy powders that contain enzymes such as bromelain from pineapples.

You can use a marinade which contains acidic ingredients, for example wine, lemon juice, vinegar.

What happens to the flavour of meat on cooking?

Even before cooking, there are many factors that can affect the flavour of meat. You should consider the breed of the animal, the exercise and the feed it gets, the care it is given when its reared, how much care is taken to keep the animal calm prior to slaughtering, and whether the meat is hung before cooking.



It is well agreed by chefs that the muscles from older animals, plus from the parts of the animal that are the most exercised, will provide the tastiest of meat. Muscles from older animals, plus from parts of animals which have been well exercised, contain greater extractives.

Fat found within the meat also affects the flavour and aroma of cooked meat. When meat is cooked using a dry method, such as grilling, the extractives and fat will collect on the surface of the meat. In moist cooking methods such as braising, the extractives and fat will pass into the cooking liquid.