

MEAT COOKERY

Introduction to Meat Cookery

Meat is muscle tissue. It is the flesh of domestic animals (cattle, hogs, lamb) and of wild game animals such as venison. Meat is a main stay of our diet

Slaughtering

Slaughtering & Butchery -Pre slaughtering steps:

1. Inspection
2. Resting
3. Fasting
4. Washing
5. Stunning (knocking with hammer, co2 chamber, cartridge pistols, electric tongs)
6. Sticking (halal & jhatka)
7. Bleeding
8. Flaying and cleaning

COMPOSITION

Muscle tissue consists of three major components: water, protein & fat

1. Water

It is about 75% of muscle tissue. With such a high percentage of water in meat, you can see why shrinkage in meat a problem in cooking meat can be.

2. Protein

- Protein is an important nutrient and the most abundant solid material in meat. About 20 percent of muscle tissue is protein.
- Protein coagulates when it is heated. This means it becomes firmer and loses moisture. Coagulation is related to doneness. When protein has coagulated to the desired degree, the meat is said to be “done.” After protein has coagulated, applying higher heat *toughens it*.

3. Fat

- Fat accounts for up to 5 percent of muscle tissue. Of course, more fat may surround the muscles. A beef carcass can be as much as 30 percent fat. Because of health and dietary concerns, many meat animals are being bred and raised with a lower fat content than in past years. Nevertheless, a certain amount of fat is desirable for three reasons:
 - a. Juiciness
- Marbling is fat that is deposited within the muscle tissue. The juiciness we enjoy in well marbled beef is due to more fat than moisture. Surface fat protects the meat—especially roasts—from drying out during cooking as well as in storage. Adding surface fats where they are lacking is called Barding.
 - b. Tenderness
- Marbling separates muscle fibers making them easier to chew
- c. Flavor
- Fat is perhaps the main source of flavor in meat. A well marbled Prime (top grade) steak tastes “Beefier” than the same cut of lower grade
- Carbohydrate: Meat contains an exceedingly small amount of carbohydrates. From the standpoint of nutrition, its quantity is so small that it is insignificant. It is important, however, because it plays a necessary part in the complex reaction, called the Maillard reaction that takes place when meats are browned by roasting, broiling, or sautéing. Without these carbohydrates, the desirable flavor and appearance of browned meats would not be achieved.

STRUCTURE

1. MUSCLE FIBERS

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Lean meat is composed of long, thin muscle fibers bound together in bundles. These determine the *texture or grain of a piece of meat*. *Fine-grained meat is composed of small fibers bound in small bundles*. Coarse-textured meat has large fibers. Feel the cut surface of a tenderloin steak, and compare its smooth texture to the rough cut surface of brisket or bottom round.

2. CONNECTIVE TISSUE:

Muscle fibers are bound together in a network of proteins called connective tissue. Also, each muscle fiber is covered in a sheath of connective tissue.

There are two kinds of connective tissue: collagen, which is white in color, and elastin, which is yellow.

a. Collagen.

Long, slow cooking in the presence of moisture breaks down or dissolves collagen by turning it into gelatin and water. Except for exceptionally large roasts, however, long cooking by a dry-heat method has the danger of evaporating too much moisture and drying out the meat. Therefore, *moist-heat cooking methods at low temperatures are most effective for turning a meat high in connective tissue into a tender, juicy finished product*.

b. Elastin.

Older animals have a higher proportion of elastin than younger animals. Elastin is not broken down in cooking. Tenderizing can be accomplished only by removing the elastin (cutting away any tendons) and by mechanically breaking up the fibers, as in Pounding and cubing (cubed steaks), Grinding (hamburger), Slicing the cooked meat very thin against the grain (as in London broil)

BASIC QUALITY FACTOR

- Cooks and food service operators in the United States are assisted in their evaluation of meats by a federal inspection and grading system.

Inspection

Inspection is a *guarantee of wholesomeness, not of quality or tenderness*. It means the animal was not diseased and the meat is clean and fit for human consumption.

Quality Grading

Quality grading is based on the texture, firmness, and color of the lean meat, the age or maturity of the animal, and the marbling (the fat within the lean).

All these factors must be considered together.

YIELD-GRADING

In addition to quality grading, beef and lamb are graded according to how much usable meat in proportion to fat they have. This is called yield-grading.

SELECTION CRITERIA

BEEF

- Fresh meat must be hung to allow it to become tender. The color darkens after it has been hung.
- Lean meat should be bright red, with small flecks or fat interspersed in the muscle (marbled)
- Fat should be firm, brittle in texture, creamy white in color and odorless.

VEAL

- Flesh should be pale, pink, firm, not soft or flabby
- Cut surfaces should be moist
- Bones in young animals are pinkish, white, porous and with an exceedingly small amount of blood in their structure.

LAMB

- Carcass should be compact and evenly fleshed, having an even coat of fat
- Lean flesh is firm and of a pleasing, dull red color and of a fine texture of grain
- Fat should be evenly distributed, hard, brittle, flaky and clean white in color
- Bones are porous in young animals, as age progresses, they are smooth, white and brittle

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PORK

- Lean flesh should be pale pink changing to rose as the animal matures
- Fat is white, firm, smooth and not excessive
- Bones must be small, slender and pinkish
- Fat ought to be white, smooth and not excessive in proportion to the bacon
- Lean meat should be deep pink in color and firm

OFFALS

- Liver should be fresh and not dry
- Should be smooth in texture and not contain tubers in the flesh
- There should be a pleasant odor
- 1. Kidney
 - Should be fresh
 - Certain amount of fat should be attached to the kidney as it keeps them moist
 - The fat should be crisp and not sticky
- 2. Tongue
 - Lamb or Ox Tongue should be fresh
 - There must not be an excessive amount of waste at the root end
- 3. Sweetbreads
 - They should be creamy white in color
 - They should have a pleasant smell
 - They should be fleshy and large
- 4. Oxtail
 - They should be of good size and lean
 - There should be no sign of stickiness
- 5. Head
 - Pig's & Calf's head should not be sticky
 - They should be well fleshed and odorless

OFFAL'S

Variety meats also known as offal includes various organs, glands and other meats that do not from a part of the dressed carcass of the animal. For cooking purpose, we can divide the most popular variety meats into two groups

1. Glandular meats

Liver

Kidney

Sweetbreads

Brains

2. Muscle meats

Heart

Tongue

Tripe

Oxtails

Sweetbreads:

- These are the thymus glands of calf and young beef animals (the gland gradually disappears as the animal matures) they are considered a delicacy and are often expensive.
- Sweetbreads are very mild in flavor and delicate in texture.
- They are usually braised or breaded and sautéed in butter.
- Tripe
- Tripe is the muscular stomach lining of the beef animal (although lamb and pork tripe are sometimes available in ethnic market).

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- Honeycomb tripe is the most popular.
- Most tripe that comes from the market has been partially cooked, but it still requires several hours of simmering to be made tender.

• OTHER VARIETY MEATS

- Intestines
- The most common use for intestines is to make sausage casings.
- Chitterlings are pork intestines that are treated like tripe.
- They are blanched or simmered, then braised or fried. Chitterlings are generally available in 10-pound (4.5-kg) pails.
- Because they shrink a great deal when simmered, this quantity yields only 3 pounds (1.3 kg) or less of finished product.
- Caul
- Pig's caul is a fatty membrane covering the animal's stomach.
- It looks somewhat like a delicate piece of lace
- Its main uses are to line terrines and to wrap forcemeats and other foods, so they hold their shape during cooking and do not dry out.
- Sausage patties wrapped in caul are called *crêpinettes* the advantage of using caul instead of fatback to line terrines is that the caul is so thin it melts away almost completely during cooking.
- Feet
- Feet are exceptionally rich in gelatin. For this reason, they are added to soups, stews, and stocks to add richness and body. Indeed, some stews made with feet, such as Trips à la Mode de Caen, may be so rich in gelatin that not only do they solidify when cold, but they can even be unmolded and sliced like cold cuts. Pig's feet are readily available in most markets. Calf's feet and ox's feet are also available, but often only on the wholesale market. The feet from older animals have less gelatin. If a recipe calls for a calf's foot but none is available, in most cases you can substitute two pig's feet.

AGING

Green Meat

Soon after slaughter, an animal's muscles stiffen due to chemical changes in the flesh. This stiffness, called *rigor mortis*, gradually disappears. Softening takes three to four days for beef, less time for smaller carcasses like veal, lamb, and pork. This softening is caused by enzymes in the flesh.

Green meat is meat that has not had enough time to soften. It is tough and relatively flavourless.

Aged Meat

Enzyme action continues in muscle tissue even after meat is no longer green. This tenderizes the flesh even more and develops more flavor. Holding meats in coolers under controlled conditions to provide time for this natural tenderizing is called "Aging"

Aging does not mean just storing meat in the refrigerator. There is a difference between aged meat and old meat. Conditions must be carefully controlled so that the meat will undergo natural tenderizing without spoiling. There are 2 primary methods used for aging.

1. Wet aging

Today most wholesale meat carcasses are broken down into smaller cuts and enclosed in plastic vacuum packs. The air and moisture proof packaging protects the meat from bacteria and mold, and it prevents weight loss due to drying. Vacuum-pack meats must be refrigerated.

2. Dry Aging

It is the process of storing meats, generally large cuts under carefully controlled conditions. The meat is not packaged or wrapped, and it is exposed to air on all sides. Temperature, humidity and air circulation are precisely controlled to prevent spoilage. Dry aged meat can lose up to 20 % of its weight through moisture loss, depending on the size of the cut and how long it is aged

UNDERSTANDING THE BASIC CUT

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- Meats are available in a variety of forms
- These includes whole carcasses, partial carcasses, primal, sub-primal & fabricated cuts
- Beef, lamb, veal & pork may be purchased in these forms

CARCASSES:

- These are the whole animal, minus entrails, head, feet etc (except pork, which has only the entrails and head removed).
- Whole carcasses are rarely purchased by food service operator because of the skill and labor required in cutting and because of the problem of total utilization.

Partial carcasses:

- This form of meat is more commonly referred to as sides, quarters, fore saddle & hind saddle
- Sides & quarters- beef is split through the backbone into sides
- The sides are then divided between the 12th & 13th ribs into a forequarter & hindquarter
- Fore saddle & hind saddle- veal & lamb are not split into sides but are divided between the 12th & 13th ribs into the fore saddle & hind saddle.
- Pork carcasses are not divided in this way. They are cut directly into primal cuts.

PRIMAL OR WHOLESALE CUTS

- These are primarily divisions of quarter, Fore saddles, hind saddles and carcasses.
- Each primal may be fabricated, or cut up and trimmed, in several ways.
- Primal cuts are always the starting point for smaller

FABRICATED CUTS:

- Primal cuts are fabricated into smaller cuts for roasts, steaks, chops, cutlets, stewing meat, ground meat, and so forth, according to individual customer requirements.
- The amount of trim and exact specifications can have many variations. For e.g. a beef primal rib is trimmed and prepared for roasting at least nine different ways.

LAMB

lamb is the meat of a young sheep, mutton the flesh of the mature sheep or goat
lamb usually is the flesh of animals not more than 14 months of age.

BEEF CUTS

Beef is the flesh of steers, heifers, cows, bulls & stags

VEAL

Flesh of calf (less than three months of age) which lives on milk
Calves-The animals are from 3 to 8 months

PORK

The flesh of a pig is called pork.

Most of the pork meat comes from animal not more than a year old

A suckling pig is about 5 to 6 weeks old

PORK

Cuts	Uses	Weight
Head	Whole decorated for buffets	3 – 4 kg
Spare rib	Roast, Pies	2 kg
Lion	Roast, Fry, Grill	6 kg

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Leg	Roast, Boil, Ham	5 kg
Shoulder	Roast, Sausage, Pies	3 kg
Belly	Boil, Braise	2 kg
Trotter	Grill, Boil	2 kg
Belly part is called as Bacon		
Part of leg is called as Ham		

Lamb

Cuts	Uses	Weight	
		Lamb	Mutton
Scrag end	Stew, broth	½ kg	1 kg
Middle end	Stew	2 kg	3 kg
Best end	Roast, grill, fry	2 kg	3 kg
Saddle	Roast, grill, fry	3.5 kg	5 kg
Legs	Roast	3.5 kg	5 kg
Breast	Roast, stew	1.5 kg	2.5 kg
Shoulders	Roast	3 kg	4.5 kg
Chump	roast	3 kg	4.5 kg

Beef

Cuts	Uses	Weight
Hindquarter		
Shank	Clarification, stew	7-8 kg

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Top side	Braising, stew, roast	9-10 kg
Silver side	Boil, stew, pickle	10 kg
Thick flank	Braising, stew	11-12 kg
Rump	Grill, fry, steak	9-10 kg
Sirloin	Roast, grill, fry	10-11 kg
Wing rib	Roast, grill, fry	4-5 kg
Thin flank	Stew, boil, sausage	9-10 kg
Fillet	Roast, grill, fry	3-4 kg
Forequarter		
Fore ribs	Roast, grill, fry	7-8 kg
Mid ribs	Roast, braise	9-10 kg
Chuck ribs	Stew, mince, braise	13-15 kg
Sticking piece	Stew, mince, sausage	8-9 kg
Brisket	Boiled, brined	6-7 kg
Plate	Stew, boil, mince, sausage	9-10 kg
Leg	Braise, stew	10-11 kg
Shin	Clarification, mince	6-7 kg

Veal

Cuts	Uses
Foresaddle	
Shoulder	Moist heat and dry heat
Breast	Moist heat
Shank	Moist heat
Hotel rack	Dry heat & moist heat
Hindsaddle	

Loin (with or without flank)	Dry heat and moist heat
Leg	Dry heat and moist heat

FACTORS AFFECTING TENDERNESS

1. Moist heat: when moist heat is applied to collagen, changes into gelatin. Elastin does not change by cooking or marinating. It should be either discarded or finely minced or chopped, which breaks it down.
2. Tenderizers: tenderizers make food tender. commercial tenderizers contain proteolytic enzyme, such as papain, an enzyme found in raw papaya & its leaf. Raw papaya paste applied to meat helps to tenderize it. Acidic foods like vinegar, tomato, curd, lemon, tamarind help to tenderize food
3. Ripening or aging of meat: the muscles is hung in cool conditions 1-2c , the period varies depending upon the type of meat, i.e. beef or mutton, etc. there is an improvement in tenderness, flavour, moisture, colour in the meat.
4. Marinating: tough meats soaked in an acidic solution, i.e. wine, vinegar, curds make the meat tender & enhance the flavor.
5. Mechanical pounding & grinding is done to break down the connective tissues.

APPROPRIATE COOKING METHODS

- The method of cooking which is most suitable for a particular piece of meat is decided by the kind of animal from which it comes, its condition, age, quality, fat content, the cut of the animal, size of the cut and its tenderness. The tenderness and the amount of fat in the tissues influence cooking method and eating quality. Developed muscle fibers usually take longer to cook. A suitable cooking method should be used for various cuts of meat that preserve nutrients, develop tenderness, preserve juiciness, thus resulting in the least shrinkage.
- Moist Heat - Braising, Broiling or Stewing are methods of cooking in which liquid is a medium of cooking. Collagen in the meat, when subjected to moist heat, changes to gelatin. For basting the meat is browned and then placed in the oven between 250 ° - 300 ° F for cooking. Medium heat makes the meat tender.
- Steaming - Meat cooked in a steamer is less tender and juicy and does not have such a good flavor. The moisture in the tissues of the cuts of meat changes the collagen or connective tissues into gelatin and tenderizes the meat.

Approximate Roasting Time for Meat

- Dry Heat Roasting
- For roasting a constant temperature of 250 ° - 300 ° F should be used till the internal temperature of the meat has reached 180 ° F, as it makes meat palatable and enhances flavor and there is less shrinkage. After it is cooked, the meat should be browned by increasing the oven temperature. A meat thermometer helps in determining the degree
- Beef – 15 to 20 minutes per 455 gm & 20 minutes over
- Mutton – 25 minutes per 455 gm & 20 minutes over
- Lamb – 20 minutes per 455 gm & 20 minutes over
- Veal – 25 minutes per 455 gm & 20 minutes over
- Pork – 25 minutes per 455 gm & 25 minutes over

Internal Temperature Recommended for Roasting Meat

Beef	Mutton
Rare 60 ° C (140 ° F)	Rare 60 ° C (140 ° F)
Medium 71 ° C (160 ° F)	Medium 71 ° C (160 ° F)

Well Done 82 ° C to 85 ° C (180 ° F to 185 ° F)	Well Done 82 ° C to 85 ° C (180 ° F to 185 ° F)
All pork meat is well done	

Grilling

Tender cuts of meat are used for grilling such as cutlets, boti kababs, seekh kebabs, chops, beef, ham steaks and bacon. The temperature of distance of the grid on which meat is cooked should be varied according to the thickness of the meat. A thin piece can be grilled by turning only once and thick pieces, several times. Oiling aids cooking and browning the meat helps the appearance by giving sheen to the surface. Steaks and chops 2 ½ cm to 4 cm thick should be cooked in moderate heat. A steak 1 ½ cm and 2 cm thick should be exposed to higher temperatures. To test whether it is cooked the meat should be pressed. If it resists, then it is cooked. The pressure brings the juice to the surface and their color is a guide. Hamburgers are usually griddled i.e. placed on a flat hot surface, with a little fat and cooked on both sides.

- The hamburgers are placed on one side and allowed to brown and when the juices rise to the top, they should be turned on the other side and cooked. Only those meats are fried that have a protective coating and binding e.g. meat croquettes, meat balls, cutlets, scotch eggs etc.

PRINCIPLES OF STORAGE

- The ideal storage temperature is usually between 1°C and 5°C. Under hygienic conditions, safe storage times at these temperatures are:
 - BEEF : up to 3 weeks
 - VEAL : 1- 3weeks
 - LAMB : 10-15 days
 - PORK : 7-14 days
- The quality of the finished product depends not only on proper selection and cooking of meats, but on proper storage as well. Fresh meat is highly perishable. The high cost of meat makes it essential to avoid spoilage.

Fresh Meats

1. Check in purchases on arrival to ensure that the purchased meat is of good quality.
2. Do not wrap tightly. Bacteria and mould thrive in moist, stagnant places. Air circulation inhibits their growth. Store loosely but cover cut surfaces to prevent excessive drying.
3. Do not open Cryovac – wrapped meats until ready to use.
4. Store at 0°C to 2°C. Meat does not freeze until about - 2°C
5. Keep meat separate in cooler (and on worktable) to avoid cross contamination
6. Use as soon as possible. Fresh meats keep well for only 2 to 4 days. Ground meats keep even less well because so much surface area is exposed to bacteria. Cured and smoked products may keep up to a week. Frequent deliveries are better than longer storage.
7. Do not try to rescue meats that are going bad by freezing them. Freezing will not improve the quality of spoiling meat.
8. Keep coolers clean

Frozen Meats

- Wrap frozen meats well to prevent freeze burns
- Store at - 18°C or colder
- Rotate stock – FIFO. Frozen meats do not keep indefinitely. Recommended shelf life at - 18°C for beef, veal & lamb: 06 months for pork: 04 months (pork fat turns rancid in the freeze)
- Defrost carefully. Tempering in the refrigerator is best. Defrosting at room temperature encourages bacterial growth.
- Do not refreeze thawed meats. Refreezing increase loss of quality

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- Keep freezers clean

THAWING:

- Upon removal of frozen food items from the freezer bacteria start multiplying within the dangerous zone (40 – 140 °F) therefore the defrosting process should be looked at as a race between the consumer and the bacteria with the aim of completing the defrosting process in way that maintains the taste and nutritive value of the food before the bacteria exceeds the permitted concentrations. Bacteria win this race if food is kept more than 2 hours within the dangerous zone.

The most common thawing methods of frozen food include:

1. Refrigerator Method
2. Cold Water Method.
3. Method Microwave.
4. Cook it frozen method.
5. Metal pan method
6. Room temperature method
7. Warm water method

Refrigerator Method:

The packed frozen food is placed in a refrigerator (4-6 C). The drippings are collected in a pan. This method reserves energy as the frozen food help cooling the refrigerator. Food thawed using this method can be directly cooked and, in some instances, they can be refrozen if not consumed.

Cold Water Method:

The frozen food is wrapped in a plastic bag and placed in cold water however water should be changed every half an hour to maintain it cold. Exposing the frozen food to running tap water is a quicker and safer way to defrost frozen food. Food thawed via this method should be immediately cooked. Practically defrosted food might be left in water for more than 2 hours with the possibility of the water heats up, therefore, food controlling authorities worldwide do not recommend this method for restaurants, some of the authorities prohibit it

Method Microwave:

The unwrapped frozen food is placed in a container suitable for microwaving. The microwave is operated in the defrosting mode where only 30% of the energy is used. A 2-inch distance between the food and the inner walls of the microwave should be left. Small food items (e.g. nuggets) should be dispatched before being placed in the microwave.

Cook it frozen method:

The frozen food is unwrapped and cooked while frozen. It should be cooked for a relatively longer time than fresh and or thawed food.

This method is ideal for frozen vegetables, ready-to-eat frozen food, small cuts of meat, chicken and fish. Large cuts of meat, fish and chicken should not be cooked while frozen.

Metal pan method:

The frozen food is placed in a stainless-steel container and kept thawing in room temperature (25 °C). The food should not be left for more than 2 hours. Do not use this method to thaw meat and chicken.

Room temperature method:

The frozen food is left on the table to thaw at room temperature. As air movement accelerates the thawing process, it is recommended to expose the food to flow of air via a table fan.

Warm water method

Frozen canned juices are placed under running or immersed in warm water.

Other thawing methods:

Other uncommon thawing methods include Antifreeze protein High-pressure thawing, Ohmic thawing

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High Heat Develops Flavour

Browning creates a tremendous amount of flavour and is a key step when cooking meat. This happens through a process called the Maillard reaction, named after the French chemist who first described it in the early 1900s. The Maillard reaction occurs when the amino acids and sugars in the food are subjected to heat, which causes them to combine. In turn, hundreds of different flavour compounds are created.

Low Heat Preserves Moisture

For large cuts of meat or poultry, we often advocate a low-and-slow cooking method. We find that this approach allows the centre to come up to the desired internal temperature with less risk of overcooking the outer layers.

An experiment we recently conducted proves that even cooking isn't the only benefit of slow roasting: It also helps minimize the loss of flavourful juices (and fat).

Match the Cut to the Cooking Method

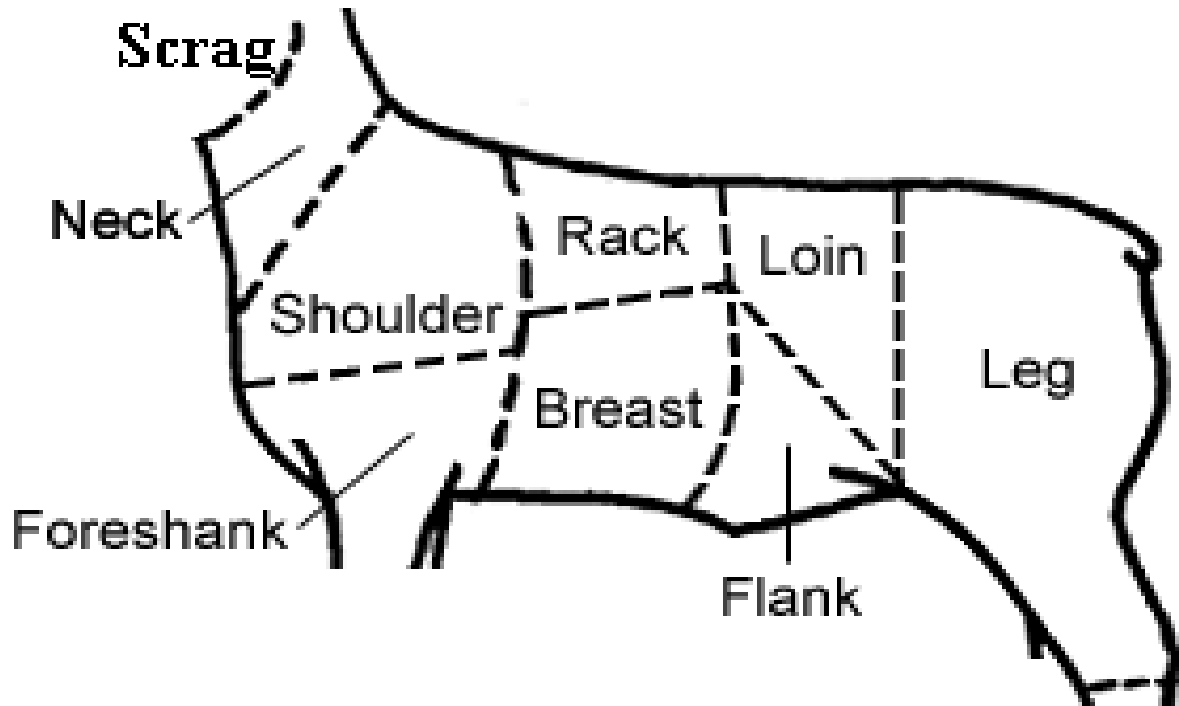
Tough cuts, which generally come from the heavily exercised parts of the animal, such as the shoulder or rump, respond best to slow-cooking methods, such as pot roasting, stewing, or barbecuing. The primary goal of slow cooking is to melt collagen in the connective tissue, thereby transforming a tough piece of meat into a tender one. These cuts are always served well done.

Tender cuts with little connective tissue generally come from parts of the animal that receive little exercise (like the loin, the area along the back of the cow or pig). These cuts respond best to quicker, dry-heat cooking methods, such as grilling or roasting.

Remember About Carryover Cooking

Since the temperature of meat will continue to rise as it rests, an effect called carryover cooking, meat should be removed from the oven, grill, or pan when it is 5 to 10 degrees below the desired serving temperature. Carryover cooking does not apply to poultry and fish

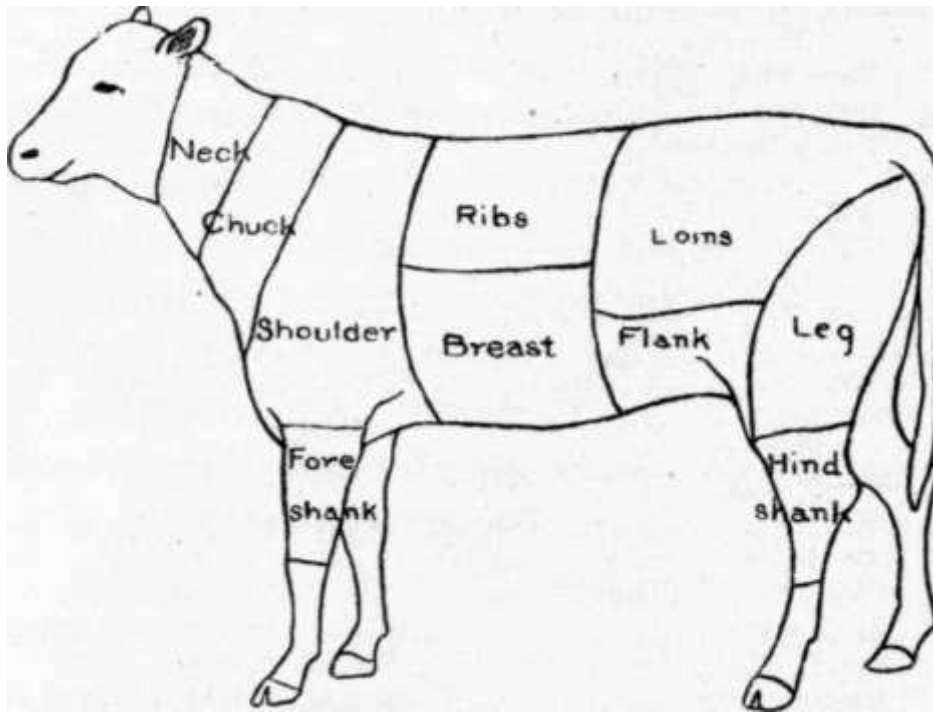
PRIMAL CUTS OF LAMB



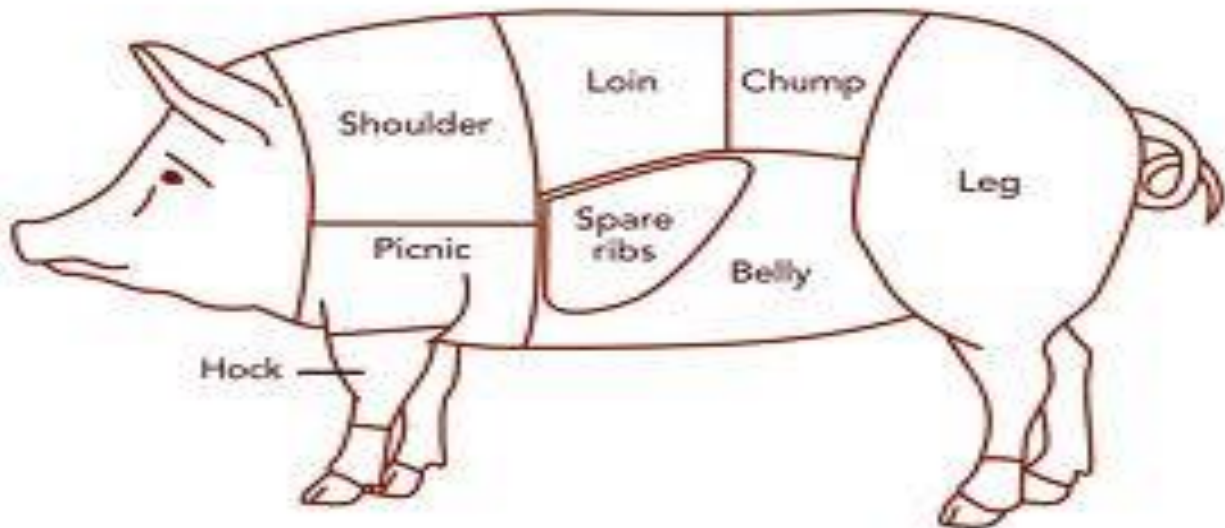
PRIMAL CUTS OF BEEF



PRIMAL CUTS OF VEAL



PRIMAL CUTS OF PORK



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