

16

UNDERSTANDING MEATS AND GAME

Meat is muscle tissue. It is the flesh of domestic animals (cattle, hogs, and lambs) and of wild game animals (such as deer). As a cook, chef, or food-service operator, you will spend more of your time and money on meats than on any other food.

It is important, then, to understand meats thoroughly in order to cook them well and profitably. Why are some meats tender and some tough? How can you tell one cut from another when there are so many? How do you determine the best way to cook each cut?

In order to answer questions like these, it is helpful to start at the most basic level of composition and structure. We then proceed to discuss grading and inspection, basic cuts, and appropriate cooking and storage methods. In addition, we discuss the characteristics of variety meats and of popular game meats. Only then can we best approach the individual cooking methods and recipes presented in the following chapters.

AFTER READING THIS CHAPTER, YOU SHOULD BE ABLE TO

1. Describe the composition and structure of meat.
2. Explain how to use the federal inspection and grading system and an understanding of the aging process to determine the quality of meats.
3. Identify the primal cuts of beef, lamb, veal, and pork, and the major fabricated cuts derived from each.
4. Select, fabricate, and store meats properly.
5. Select appropriate cooking methods for the most important meat cuts, and determine doneness for each method.
6. Identify the characteristics of variety meats and popular game and specialty meats.



COMPOSITION AND STRUCTURE

To understand how meats react to cooking processes, we need to know what kinds of molecules make up meat tissue and what kinds of structures are formed from those components.

MEAT COMPONENTS

Muscle tissue consists of three major components: water, protein, and fat. In addition, a small but important amount of carbohydrate can be found in muscle tissues.

Water

Water is about 75 percent of muscle tissue. With such a high percentage of water, you can see why **shrinkage** can be a big problem in cooking meat. Too much moisture loss means dry meat, loss of weight, and loss of profit.

Protein

Protein is an important nutrient and the most abundant solid material in meat. About 20 percent of muscle tissue is protein.

As we learned in Chapter 6, protein **coagulates** when it is heated. This means it becomes firmer and loses moisture. **Coagulation** is related to doneness. In dry-heat cooking, when protein has coagulated to the desired degree, the meat is said to be “done.” Doneness is discussed later in this chapter.

After protein has coagulated, applying higher heat toughens it.

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:

1. Juiciness.

Marbling is fat deposited within the muscle tissue. The juiciness we enjoy in well-marbled beef is due more to fat than to 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**.

2. Tenderness.

Marbling separates muscle fibers, making them easier to chew.

3. 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 a lower grade.

Carbohydrate

Meat contains a very small amount of carbohydrate. 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** (p. 114), 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

Muscle Fibers

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.

Connective Tissue

Muscle fibers are bound together in a network of proteins called **connective tissue**. Each muscle fiber also is covered in a sheath of connective tissue.

It is important for the cook to understand connective tissue for one basic reason: **Connective tissue is tough**. To cook meats successfully, you should know:

- Which meats are high in connective tissue and which are low.
- What are the best ways to make tough meats tender.

1. Meats are highest in connective tissue if they come from more muscular regions or from older animals.

- Muscles that are more exercised—muscles in the legs, for example—have more connective tissue than muscles in the back.
- Meat from a young animal, such as veal, is more tender than meat from a young steer, which, in turn, is more tender than meat from an old bull or cow. (Young animals have connective tissue, too, but it becomes harder to break down as the animal ages.)

2. Meats high in connective tissue can be made more tender by using proper cooking techniques.

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

- **Collagen.**

Long, slow cooking in the presence of moisture breaks down or dissolves collagen by turning it into gelatin and water. Of course, muscle tissue is about 75 percent water, so moisture is always present when meats are cooked. Except for very 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.**

Other factors also help tenderize collagen:

Acid helps dissolve collagen. Marinating meat in an acid mixture, or adding an acid such as tomato or wine to the cooking liquid, helps tenderize it.

Enzymes are naturally present in meats. They break down some connective tissue and other proteins as meat ages (see Aging, pp. 460–461). These enzymes are inactive at freezing temperatures, slow-acting under refrigeration, active at room temperature, and destroyed by heat above 140°F (60°C).

Tenderizers are enzymes such as papain (extracted from papaya) that are added to meats by the cook or injected into the animal before slaughter. Exercise care when using enzyme tenderizers. Too long an exposure at room temperature can make the meat undesirably mushy.

- **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:

Pounding and cubing (cubed steaks)

Grinding (hamburger)

Slicing the cooked meat very thin against the grain (as in London broil)

BASIC QUALITY FACTORS

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

FIGURE 16.1 USDA inspection stamp for meat

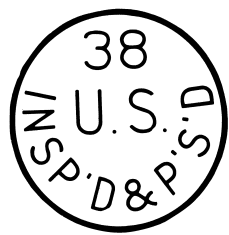
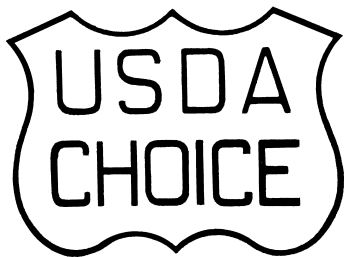


FIGURE 16.2 USDA grade stamp for meat



INSPECTION

- 1. **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.
- 2. That the meat passed inspection is indicated by a round stamp (Fig. 16.1).
- 3. Inspection is required by U.S. law. All meat must be inspected.

QUALITY GRADING

- 1. **Grading** is a *quality* designation.
- 2. The grade is indicated by a shield stamp (Fig. 16.2).
- 3. Grading is not required by U.S. law. (Some packers use a private grading system and give different brand names to different grades. Reliability of private grades depends on the integrity of the packer.)

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. For example, old, tough meat can still have marbling, but it would rate a low grade because of the other factors. Table 16.1 summarizes USDA meat grades.

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**. The meatiest grade is Yield Grade 1. Poorest yield (much exterior fat) is Yield Grade 5.

Pork is yield-graded from 1 to 4, but most pork is sold already cut and trimmed. Veal, which has little fat, is not yield-graded.

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 3–4 days for beef, less time for smaller carcasses like veal, lamb, and pork. This softening is caused by enzymes in the flesh.

Characteristics	Beef	Veal	Lamb	Pork
Highest quality, highest price, limited supply.	Prime	Prime	Prime	Pork used in food service is consistent in quality and is not quality-graded. It is inspected for wholesomeness and graded for yield.
High in quality, generally tender and juicy. Abundant supply. Widely used in food service as well as in retail.	Choice	Choice	Choice	
Lean meat, not as fine or tender. Economical. Can be tender and flavorful if cooked carefully. Used in many institutional food-service operations.	Select	Good	Good	
Least frequently used in food service. Highest of these grades are sometimes used in institutional food service. Lowest of these grades are used by canners and processors.	Standard Commercial Utility Cutter Canner	Standard Utility Cull	Utility Cull	

Note: Quality varies within grades. For example, the best Choice beef is close to Prime, while the lowest Choice beef is close to Select.

Green meat is meat that has not had enough time to soften. It is tough and relatively flavorless. Because it takes several days for meats to reach the kitchen from the slaughterhouse, green meat is seldom a problem with commercially available meats, except when meat is frozen while still green. The problem is sometimes encountered with game killed for home consumption, if the hunter cuts and freezes the meat when it is too fresh.

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**.

Beef and lamb can be aged because high-quality carcasses have enough fat cover to protect them from bacteria and from drying. Veal has no fat cover, so it is not aged. Pork does not require 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 the meat becomes naturally tender without spoiling. There are two 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. These packs are usually known by the trade name **Cryovac®**. The air- and moistureproof packaging protects the meat from bacteria and mold, and it prevents weight loss due to drying. (However, Cryovac-aged meats often lose more weight in cooking than do dry-aged meats.) Vacuum-pack meats must be refrigerated.

2. Dry aging.

Dry aging is the process of storing meats, usually 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. Ultraviolet lights are sometimes used in aging coolers to kill bacteria.

Dry-aged meat can lose up to 20 percent of its weight through moisture loss, depending on the size of the cut and how long it is aged. Consequently, dry aging is a more expensive process than wet aging. Dry-aged meats are usually available from specialty purveyors only, and at a higher price than wet-aged meats. Many customers are willing to pay a premium for fine dry-aged steaks because they are considered the best for flavor and texture.

Aging increases tenderness and flavor. An off taste is not characteristic of aged meat. *If a meat smells or tastes spoiled, it probably is.* Sometimes meats in vacuum packs have a musty aroma when first opened, but this disappears quickly.

Aging costs money. Storage costs, weight loss due to drying, and heavier trimming due to dried and discolored surfaces all add to the price of aged meat (although wet aging costs less than dry aging). As a meat purchaser, you must decide how much quality is worth how much cost for your particular establishment.

OTHER FACTORS AFFECTING MEAT CHOICES

Interest in *sustainable farming* and locally produced, organically grown foods, as described in Chapter 1, affects chefs' choices in meats as well as in vegetables and fruits. In addition, buyers often wish to be assured that animals have been raised humanely.

Antibiotics and Hormones

Raising meat animals in large enough quantities to satisfy demand led to changes in production practices over time. Long ago, meat producers began raising larger numbers of animals in smaller spaces, so that it was possible to greatly increase production. The farmers fed the animals grain in so-called feedlots, rather than allowing them to graze on pastures over a larger area. Grain-feeding also increases growth rate and enhances tenderness of the product, because the animals' muscles are used less. However, feedlot production also increases the possibility of disease, so the animals are regularly given drugs called **antibiotics** to increase their resistance to disease. There is little evidence that the use of these drugs harms the quality of the meat, because tests have shown that almost none of the antibiotics remain in the final product.

However, regular use of the drugs has led to the development of drug-resistant bacteria, which have on some occasions contaminated the meat. For this reason, some chefs try to choose meats raised without antibiotics.

The use of **hormones** is also controversial. Castrating animals to make them less aggressive and their meat tenderer is a practice that is thousands of years old. The practice can be considered ancient hormone therapy, because it eliminates the production of certain hormones in the animals. More recently, however, synthetic hormones have also been used to stimulate growth. Although there is generally very little residue of the hormones in the meat of animals raised this way and no clear evidence that eating the meat causes any harm, some buyers try to avoid purchasing such meats.

Grass-Fed Livestock

Interest in grass-fed rather than grain-fed beef and other meats stems mainly from two sources: concern about humane treatment of the animals, and dietary concern about the higher fat content of grain-fed meats. For this reason, production of grass-fed meat has increased in recent years. Grass-fed meats have markedly different flavor and texture characteristics, however, and chefs should be aware of these differences.

In general, grass-fed meats contain many flavor and aroma compounds not found in grain-fed meat, because these compounds are absorbed from the grass and other plants the animals eat. As a result, the meats have a stronger taste. Also, they are somewhat tougher and chewier because the muscle tissue is lower in fat, or marbling. By contrast, grain-fed meats have more of the taste that we think of as “beefy,” because this flavor is derived from the meat’s higher fat content.

Kosher Meats

Kosher foods are those that are produced according to Jewish dietary law. In the case of meats, this law forbids the eating of pork. Meat must also satisfy several other requirements. The main points are these:

1. The animal must be in good health and not dying or dead.
2. The animal must be slaughtered by a trained rabbi called a *shochet*, who must use a very sharp knife with no nicks or dents.
3. The animal must be killed with one stroke and must be bled thoroughly.
4. After slaughter, the veins and arteries are removed from the meat. For this reason, meat from the hindquarters is not considered kosher, because the veins and arteries are too small to be removed without severely damaging the meat. Blood vessels in the forequarters are larger and are more easily removed by trained personnel.

Islamic law also describes methods for producing approved meats and other foods. Foods that meet Islamic dietary requirements are called *halal*.



KEY POINTS TO REVIEW

- What are the three main components of meat?
- What is connective tissue? How does it affect our choice of cooking techniques for meat?
- What is the difference between inspection and grading?
- What are the best two grades of beef? of lamb? of pork? of veal?
- What are the two types of aging? What effect does aging have on meat?

THE BASIC CUTS

The following discussion of meat cuts focuses on the four primary meat categories in the wholesale and retail markets: beef, lamb, veal, and pork. Keep in mind, however, that game animals, discussed later in the chapter, have the same bone and muscle structure and are generally divided into the same or similar cuts as nongame animals.

Meat cuts are based on two factors:

1. The muscle and bone structure of the meat.
2. Uses of and appropriate cooking methods for various parts of the animal.

Food-service suppliers in the United States may follow a set of specifications called **Institution Meat Purchase Specifications** (IMPS). (IMPS, including numbers and names of cuts, are the same as the North American Meat Processors Association, or NAMP, specifications.) All cuts are described in detail and listed by number. This simplifies purchasing, as you can order by number exactly the cut you want.

Beef, lamb, veal, and pork may be purchased as full carcasses, partial carcasses, primal cuts, and fabricated cuts, each of which has its own IMPS/NAMP number. Mutton and goat are also given NAMP classification numbers, as indicated in Table 16.2, but these meats have minimal importance in North American food service and are not covered here.

CARCASSES

The carcass is the whole animal, minus the entrails, head, feet, and hide (except pork, from which only the entrails and head are removed). Whole carcasses are rarely purchased by food-service operators because of the skill and labor required in cutting and because of the problem of total utilization.

SIDES, QUARTERS, FORESADDLES, HINDSADDLES

These represent the first step in breaking down a carcass.

Again, these larger cuts are no longer frequently used in food service. Fewer establishments cut their own meats.

1. Beef is split first through the backbone into sides. Sides are divided between the 12th and 13th ribs into forequarter and hindquarter.
2. Veal and lamb are not split into sides but are divided in half into foresaddle and hindsaddle. For veal, the cut is made between the 11th and 12th ribs. Lamb, on the other hand, is split either between the 12th and 13th rib or after the 13th rib, depending on the cutting style. For more information, see the charts on page 469.
3. Pork carcasses are not divided in this way. They are cut directly into primal cuts (see below).

PRIMAL OR WHOLESALE CUTS

These are the primary divisions of quarters, foresaddles, hindsaddles, and carcasses. These cuts, called **primal cuts**, are still used, to some extent, in food service, because they

1. Are small enough to be manageable in many food-service kitchens
2. Are still large enough to allow a variety of cuts for different uses or needs
3. Are easier to utilize completely than quarters or halves

Each primal may be **fabricated**, or cut up and trimmed, in several ways. Primal cuts are always the starting point for smaller cuts. For this reason, it will benefit you to be able to identify each one. Study the charts and photos in Figures 16.3 through 16.6. (Please note Figure 16.5 shows the traditional cuts for lamb, not the alternative cuts mentioned in the preceding section.) Learn the names of the primals, their location on the carcass, and the most important cuts that come from each. Then, whenever you work with a piece of meat, try to identify it exactly and match it with its primal cut.

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 and, if applicable, IMPS/NAMP specifications.

The amount of trim and exact specifications can have many variations. For example, a beef primal rib can be trimmed and prepared for roasting at least nine ways.

IMPS/NAMP CLASSIFICATIONS

The IMPS/NAMP system assigns a series of numbers to each major category of meat, as detailed in Table 16.2. Beef, for example, is the 100 series. This means all large beef cuts, from whole carcass to primals and prepared roasts, are assigned a three-digit number from 100 to 199. Portion-size and smaller cuts of beef, such as steaks and stew meat, are assigned a four-digit number, also beginning with 1. For example, a whole beef rib, roast-ready, has the number 109; a beef rib steak, bone in, is 1103.

Note that variety meats and processed meat products, such as cured and smoked meats and sausages, are also categorized (see Table 16.2).

TABLE 16.2
IMPS/NAMPS Meat Categories

Series Number	Series Name
100	Fresh Beef
200	Fresh Lamb and Mutton
300	Fresh Veal and Calf
400	Fresh Pork
500	Cured, Cured and Smoked, and Cooked Pork Products
600	Cured, Dried, and Smoked Beef Products
700	Variety Meats and Edible Byproducts
800	Sausage Products
11	Fresh Goat

Portion-controlled cuts are ready-to-cook meats cut according to customer's specifications. Steaks and chops are ordered either by weight per steak or by thickness. Portion-controlled cuts require the least work for the cook of all meat cuts. They are also the most expensive per pound of all categories of cuts.

BONE STRUCTURE

Knowing the bone structure of meat animals is essential for three purposes:

1. Identifying meat cuts.

The distinctive shapes of the bones are often the best clue to the identification of a cut. Note how the shapes of the bones in the photographs in Figures 16.3 through 16.6 help your recognition.

2. Boning and cutting meats.

Bones are often surrounded by flesh. You need to know where they are even if you can't see them.

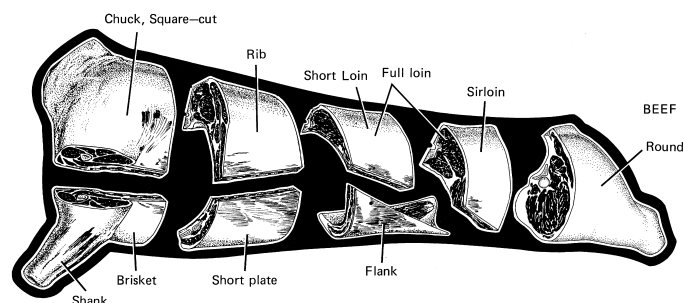
3. Carving cooked meats.

Same reason as number 2.

Study the chart of the beef skeleton in Figure 16.7 and learn the names of the major bones. Then compare the charts in Figures 16.3 through 16.6. You will see the bone structures for all the animals are identical (except for pork, which has more than 13 ribs). Even the names are the same.

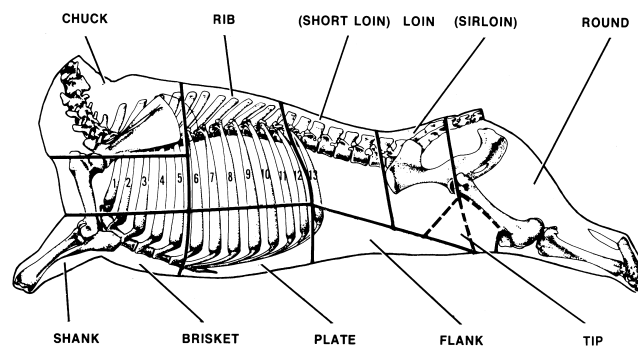
The photographs in Figures 16.3 through 16.6 depict typical primal and fabricated cuts of beef, lamb, veal, and pork (except where noted, courtesy of National Livestock and Meat Board and National Pork Producers Council).

FIGURE 16.3 Beef



(a) Primal (wholesale) beef meat cuts

Courtesy of National Livestock and Meat Board



(b) Primal (wholesale) beef meat cuts and their bone structure

Courtesy of National Livestock and Meat Board



Beef chuck, boneless, separated into blade, clod, and arm (IMPS/NAMPS 115)



Beef rib, roast ready (IMPS/NAMPS 109)
Reprinted with permission of John Wiley & Sons, Inc.



Beef rib steak (IMPS/NAMPS 1103)



Beef loin (IMPS/NAMPS 172)
Reprinted with permission of John Wiley & Sons, Inc.



Beef short loin (IMPS/NAMPS 174)
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Beef porterhouse steak
(IMPS/NAMPS 1173)



Beef shank, cross-cuts
(IMPS/NAMPS 117)



Beef T-bone steak (IMPS/NAMPS 1174)



Beef tenderloin, trimmed (IMPS/NAMPS 189A)



Beef strip loin (IMPS/NAMPS 175)
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Beef outside (bottom) round
(IMPS/NAMPS 170)



Beef round steak (IMPS/NAMPS 1170)



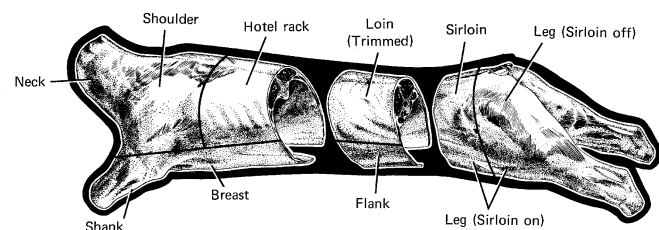
Beef inside (top) round
(IMPS/NAMPS 168)



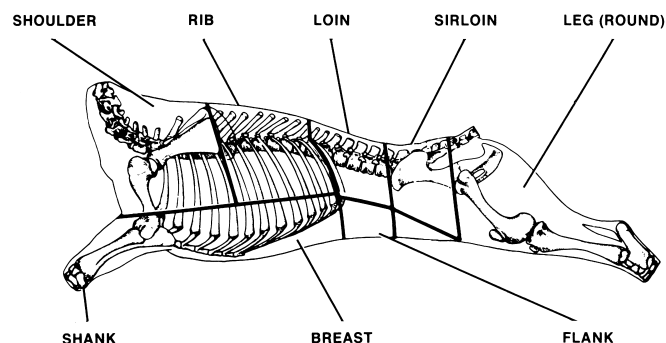
Beef knuckle, untrimmed (IMPS/NAMPS 167)
Reprinted with permission of John Wiley & Sons, Inc.



Beef flank steak
(IMPS/NAMPS 193)

FIGURE 16.4 Veal**(a)** Primal (wholesale) veal meat cuts

Courtesy of National Livestock and Meat Board

**(b)** Primal (wholesale) veal cuts and their bone structure

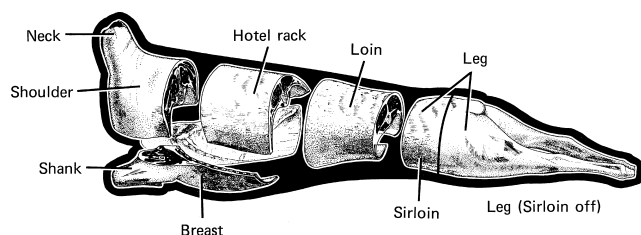
Courtesy of National Livestock and Meat Board



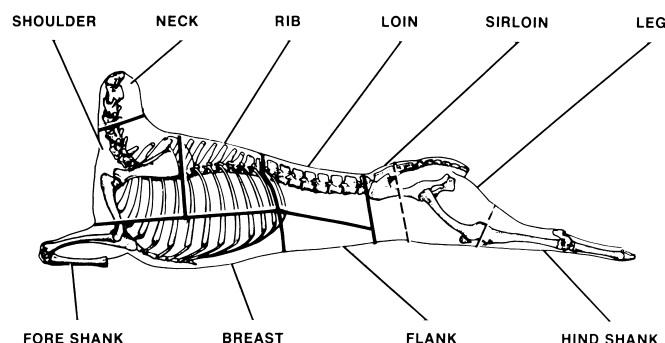
Veal rib roast (IMPS/NAMPS 306)



Veal breast (IMPS/NAMPS 313)

FIGURE 16.5 Lamb**(a)** Primal (wholesale) lamb meat cuts

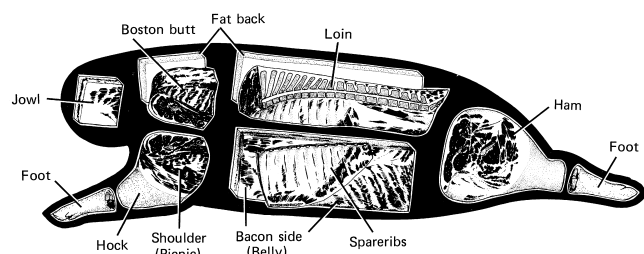
Courtesy of National Livestock and Meat Board

**(b)** Primal (wholesale) lamb cuts and their bone structure

Courtesy of National Livestock and Meat Board

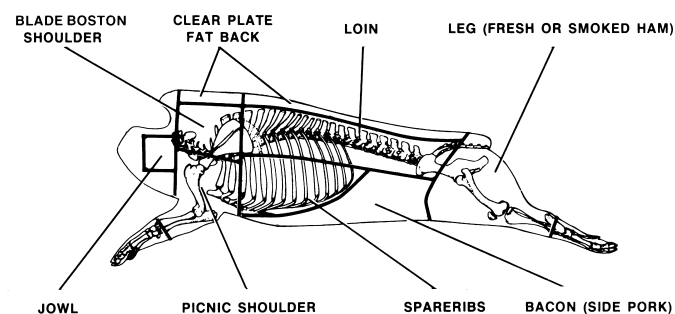
Lamb loin roast
(IMPS/NAMPS 232A)Lamb arm chop
(IMPS/NAMPS 1207)Lamb shoulder blade chop
(IMPS/NAMPS 1207)Lamb rib chop
(IMPS/NAMPS 1204)Lamb loin chop
(IMPS/NAMPS 1232A)Lamb, square-cut shoulder, whole
(IMPS/NAMPS 207)Lamb, whole leg
(IMPS/NAMPS 233)Lamb, boneless shoulder, rolled and tied
(IMPS/NAMPS 208)Lamb foreshank
(IMPS/NAMPS 210)

FIGURE 16.6 Pork



(a) Primal (wholesale) pork meat cuts

Courtesy of National Livestock and Meat Board



(b) Primal (wholesale) pork cuts and their bone structure

Courtesy of National Livestock and Meat Board

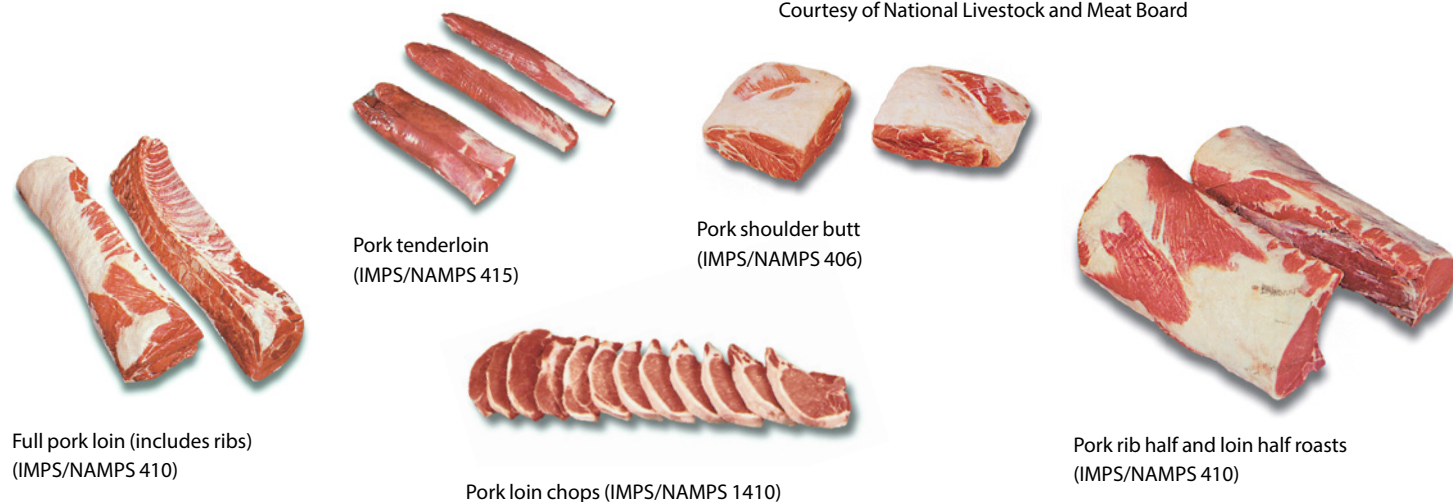
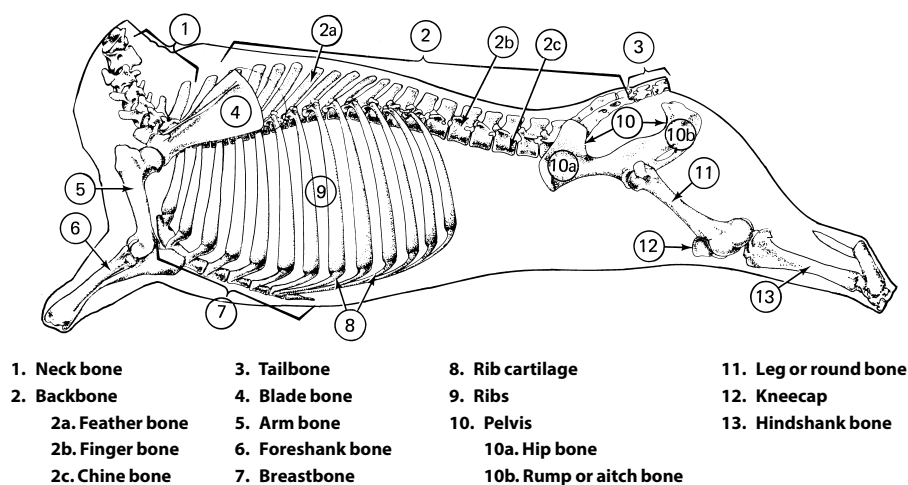


FIGURE 16.7 Beef bone structure.



MEAT-CUTTING TERMINOLOGY

Although the public refers to retail meat cutters as butchers, the meat industry uses this term another way. To **butcher** means to kill and dress a meat animal. To **fabricate** means to cut raw meat into smaller pieces.

A third term, **carve**, also means to cut meat, but this always refers to cooked meat.

BEEF, LAMB, VEAL, AND PORK CUTS

Beef Primal Cuts and Fabricated Cuts			
Primal	Major Bones	Common Fabricated Cuts	Primary Cooking Methods
Forequarter			
Chuck (square cut)	Ribs 1–5 Blade bone Backbone (including chine and feather bones) Neck bones Arm bone	Shoulder clod Triangle Boneless inside chuck Chuck tender Chuck short ribs Cubed steaks Stew meat Ground chuck	Moist heat
Brisket	Rib bones Rib cartilage Breastbone	Boneless brisket and corned beef brisket Ground beef Stew meat	Moist heat Moist heat
Shank	Shankbone	Ground beef	
<i>Note:</i> Square-cut chuck, brisket, and shank, in one piece, are called <i>cross-cut chuck</i> .			
Rib	Ribs 6–12 Backbone (chine and feather bones)	Rib roasts (prime rib) Rib steaks Short ribs	Dry heat Moist heat
Short plate	Rib bones Tip of breastbone Rib cartilage	Short ribs Stew meat Ground beef	Moist heat
Hindquarter			
(Full loin)		Full tenderloin (to have tenderloin in one piece, it must be stripped out of loin before loin is split into short loin and sirloin)	Dry heat
Short loin	Rib 13 Backbone (chine, feather bones, finger bones; see <i>Note 1</i>)	Club steaks T-bone steaks Porterhouse steaks Strip loin Strip loin steaks Short tenderloin	Dry heat
Sirloin	Backbone Hip bone (part of pelvis)	Top sirloin butt Bottom sirloin butt Butt tenderloin	Dry heat
Flank	Tip of rib 13	Flank steak Ground beef	Moist heat (exception: flank steak cooked as London broil)
Round	Round (leg) bone Aitch bone (part of pelvis) Shankbone Tailbone	Knuckle (sirloin tip) Inside (top) round Outside (bottom) round Eye of round (part of outside round) Rump Hind shank	Moist heat and dry heat

Note 1: Finger bones are the short horizontal bones attached to those chine bones that have no ribs attached. They are stems of the T's in T-bones.

Lamb Primal Cuts and Fabricated Cuts

Primal	Major Bones	Common Fabricated Cuts	Primary Cooking Methods
Foresaddle			
Shoulder	Ribs 1–4 or 1–5 (see <i>Note 2</i>) Arm Blade Backbone (chine and feather bones) Neck bones	Shoulder roasts Shoulder chops Stew meat Ground lamb	Moist heat and dry heat
Breast and shank	Rib bones Rib cartilage Breastbone Shankbone	Riblets Breast Stew meat Ground lamb	Moist heat
Hotel rack	Ribs 5–12 or 6–13 (see <i>Note 2</i>) Backbone	Rib roasts (rack) Crown roast Rib, chops	Dry heat
Note: Hotel rack plus connecting portions of breast is called a <i>bracelet</i> .			
Hindsaddle			
Loin (with or without flank)	Rib 13 (optional; see <i>Note 2</i>) Backbone (chine, feather bones, finger bones)	Loin roast Loin chops	Dry heat
Leg	Backbone Tailbone Pelvis Round bone Hindshank	Leg roast Leg chops Sirloin chops Shank	Dry heat Moist heat
Note: Hotel rack and loin attached are called <i>lamb back</i> ; used mostly for chops.			

Note 2: There are two cutting styles for lamb carcasses. In style A, the carcass is divided between the 4th and 5th ribs and again between the 12th and 13th ribs. In style B, the cuts are made between the 5th and 6th ribs and again behind the 13th rib. Both styles yield 8-rib racks. Style B produces a rack with a more uniform eye muscle through the length of the rack.

Veal Primal Cuts and Fabricated Cuts

Primal	Major Bones	Common Fabricated Cuts	Primary Cooking Methods
Foresaddle			
Shoulder (square cut)	Ribs 1–4 or 1–5 (see <i>Note 3</i>) Blade bone Backbone (chine and feather bones) Neck bones Arm bone	Shoulder roasts Shoulder chops Shoulder clod steaks Cubed steaks Stew meat Ground veal	Moist heat and dry heat
Breast	Rib bones Rib cartilage Breastbone	Boneless breast Cubed steaks Ground veal	Moist heat
Shank	Shankbone	Shank cross-cut (osso buco)	Moist heat
Hotel rack	Ribs 5–11 or 6–11 (see <i>Note 3</i>) Backbone (chine and feather bones)	Rib roast Rib chops	Dry heat and moist heat
Note: Hotel rack plus connecting portions of breast is called a <i>bracelet</i> .			
Hindsaddle			
Loin (with or without flank)	Ribs 12 and 13 Backbone (chine, feather bones, finger bones)	Saddle (loin roast) Loin chops	Dry heat and moist heat
Leg	Backbone Tailbone Pelvis (hip bone, aitch bone) Round bone Hindshank	Leg roast Scaloppine or cutlets Shank cross-cut (osso buco)	Dry heat Moist heat
Note: Hotel rack and loin attached are called <i>veal back</i> ; used mostly for chops.			

Note 3: The shoulder may be separated from the rack between the 4th and 5th ribs to yield a 7-rib rack, or between the 5th and 6th ribs to yield a 6-rib rack.

Pork Primal Cuts and Fabricated Cuts

Primal	Major Bones	Common Fabricated Cuts	Primary Cooking Methods
Shoulder picnic	Shoulder (arm) bone Shankbone	Fresh and smoked picnic Hocks Ground pork Sausage meat	Moist heat
Boston butt	Blade bone (rib bones, back and neck bones are removed)	Butt steaks Shoulder roasts Daisy (smoked) Ground pork Sausage meat	Dry heat and moist heat
Loin	Rib bones (see <i>Note 4</i>) Backbone (chine, feather bones, finger bones) Hip bone	Loin roast Loin and rib chops (see <i>Note 5</i>) Boneless loin Country-style ribs Canadian-style bacon (smoked)	Dry heat and moist heat
Ham	Aitch bone Leg bone Hindshank bone	Fresh ham Smoked ham Ham steaks	Dry heat and moist heat
Belly	None	Bacon	Dry heat and moist heat
Spare ribs	Rib bones Breastbone	Spare ribs	Moist heat
Fatback and clear plate	None	Fresh and salt fatback Salt pork Lard	(Used as cooking fats)
Jowl	None	Jowl bacon	Moist heat
Feet	Foot bones		Moist heat

Note 4: Pork has more than 13 ribs (unlike beef, lamb, and veal) due to special breeding to develop long loins.
Note 5: Pork chops cut from the full loin may be called by the names of beef steaks cut from the same part of the rib or loin, as, for example, ribeye chops, T-bone chops, porterhouse chops, and sirloin chops.

MEAT SELECTION, FABRICATION, AND STORAGE

DECIDING WHICH FORMS TO PURCHASE

Whether you buy whole carcasses, fabricated cuts, or anything in between depends on four factors:

- 1. How much meat-cutting skill you or your staff has.
- 2. How much work and storage space you have.
- 3. Whether or not you can use all cuts and lean trim on your menu.
- 4. Which form gives you the best cost per portion after figuring in labor costs.

Meat purveyors can usually cut meat more economically than food-service operators can because they deal in large volume. Carcasses or primal cuts cost less per pound than fabricated cuts, but they have more waste (fat and bone) and require more labor (which costs money). However, some operators still do some of their own cutting, depending on how they answer the four questions above. They feel cutting their own meat gives them greater control over quality.

Some compromises are available. If you want the quality of freshly cut steaks, for example, you might buy boneless strip loins and cut your own steaks to order. You need not buy primal loins.

SPECIFICATIONS

When buying meat, you must indicate the following specifications:

- 1. Item name.**

Include IMPS/NAMPS number, if applicable.

Example: 173 Beef Short Loin, Regular

- 2. Grade.**

Example: U.S. Choice

(You may also want to specify division of grade, such as the upper half or lower half of U.S. Choice.)

- 3. Weight range for roasts and large cuts.**

Portion weight or thickness (not both) for steaks and chops.

- 4. State of refrigeration.**

Chilled or frozen.

- 5. Fat limitations, or average thickness of surface fat.**

Example: $\frac{3}{4}$ -inch average, 1-inch maximum.

(This does not apply to veal.)

Meat purchasers may also have to choose whether or not to purchase irradiated meat. **Irradiation** is the process of exposing foods to radiation in order to kill bacteria, parasites, and other potentially harmful organisms. Irradiation does not harm the meat, make it radioactive, or change its structure, flavor, or nutritional value. Foods treated with radiation must be labeled as such. In the United States, for example, the Food and Drug Administration (FDA) requires that irradiated foods include labeling with either the statement “treated with radiation” or “treated by irradiation” and the international symbol for irradiation, the radura (Fig. 16.8).

Some operators refuse to purchase irradiated foods because they or their customers have concerns about their health effects. The procedure has generated much controversy for other reasons as well. For example, some see the availability of the process as an excuse to avoid normal sanitation procedures. Nevertheless, there is so far no evidence that these foods are harmful for human beings to eat.

FIGURE 16.8 The radura is the international symbol for irradiation.



FABRICATING MEAT

Even though few operations today purchase large cuts, such as primals, and break them down in-house, you still need to know a number of trimming and fabricating techniques to finish or modify the fabricated cuts you purchase. The illustrations in this section demonstrate important procedures. These procedures are used for recipes in Chapter 17.

One term you will encounter often when trimming meat is **silverskin**, a thin layer or membrane of connective tissue that often covers the surface of a muscle. For braised meats, it is not always necessary to remove silverskin, unless it is very heavy, because slow cooking breaks down the collagen of the tissue. However, for roasts, sautés, and grills of tender meats, it should be removed for two reasons: (1) It is tough and would be unpleasantly chewy in the cooked product; (2) It usually shrinks when cooked, making the meat deform or curl.

To remove silverskin:

1. Hold the blade of the knife parallel to the silverskin and perpendicular to the grain of the meat.
2. Insert the tip of the blade just under the silverskin.
3. Hold the knife so the edge of the blade angles slightly upward. Carefully slip the blade under the silverskin in the direction of the grain of the meat while holding the meat steady with your other hand. (Angling the blade upward keeps it from digging into the meat.)
4. Repeat until all silverskin is removed.

This technique is illustrated in Figures 16.9, 16.15, and 16.16.

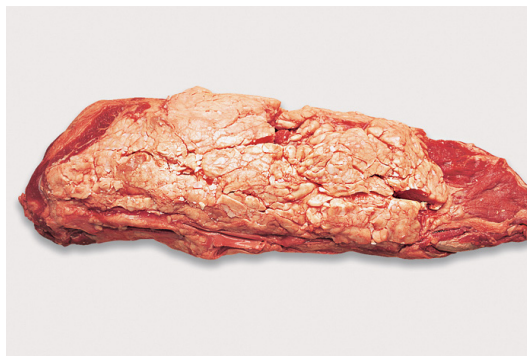
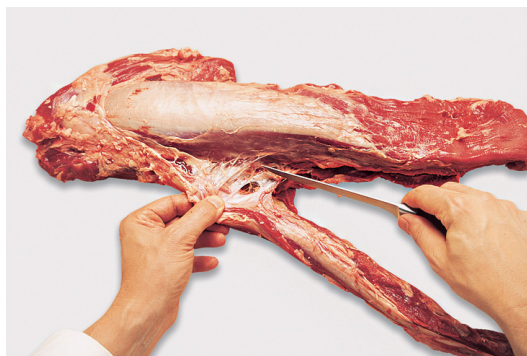
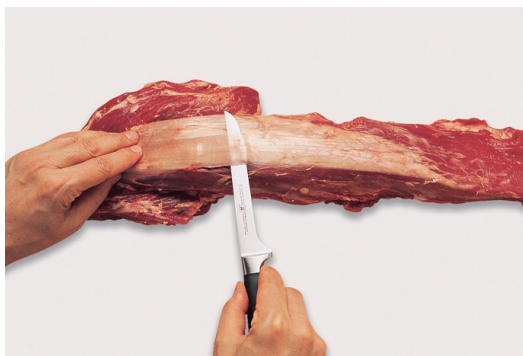
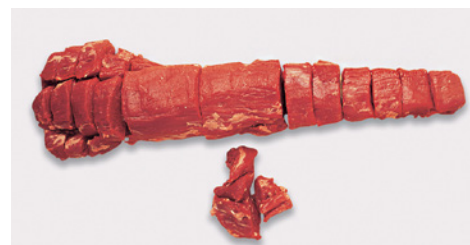
FIGURE 16.9 Preparing beef tenderloin**(a)** A whole, untrimmed beef tenderloin.**(b)** Pull off the heavy fat from the outside of the tenderloin, freeing it with a knife as necessary.**(c)** Separate the strip of gristly meat, or chain, from the side of the tenderloin. Use this piece for ground meat.**(d)** Carefully remove the silverskin.**(e)** The fully trimmed tenderloin before cutting.**(f)** Cut into steaks of the desired size.**(g)** This tenderloin has been cut into a variety of steaks as a demonstration. From left to right: four fillet steaks, two large pieces for Châteaubriand, two tournedos, four filets mignons. In front: trimmings from both ends.**FIGURE 16.10** Shaping medallions.

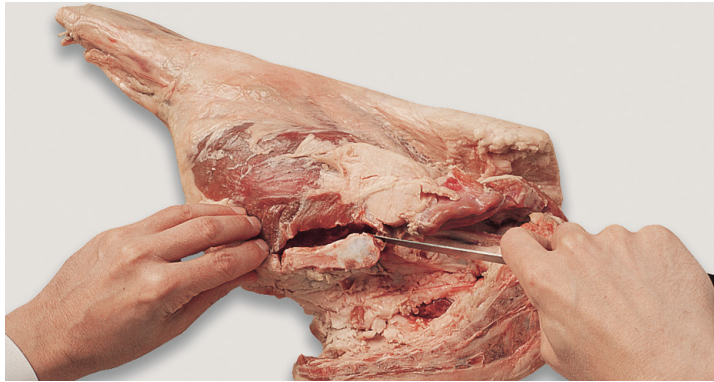
FIGURE 16.11 Preparing a leg of lamb for roasting.**(a)** Begin by removing the hip and tail bones.**(b)** With a sharp-pointed boning knife, cut along the hip bone to separate bone from meat. Always cut against the bone.**(c)** Continue until the hip bone and tailbone are completely removed. Note the round ball joint at the end of the leg bone in the center of the meat.**(d)** Trim off excess external fat, leaving a thin covering.**(e)** Pull off the skin or fell on the outside of the leg.**(f)** Full leg of lamb, ready for roasting. The end of the shankbone and part of the shank meat have been removed.**(g)** The leg may be tied into a more compact shape.**(h)** The sirloin portion may be cut off and used for another purpose, such as shish kebabs.

FIGURE 16.12 Preparing a rack of lamb for roasting.

(a) Begin by cutting down on both sides of the feather bones all the way to the chine bone.



(b) If a meat saw is available, turn the rack over and cut through the rib bones where they attach to the chine bone.



(c) If a meat saw is not available, use a cleaver. Stand the roast on end and cut through the rib bones where they join the chine bone. This separates one rack.



(d) Repeat the procedure on the other side of the chine.



(e) The two halves are separated from the chine.



(f) Trim excess fat from the top of the meat, leaving a thin protective covering. During this step, you should also remove the shoulder blade cartilage, which is embedded in the layers of fat.



(g) To trim the fat and meat from the ends of the bones (called **frenching** the bones), first cut through the fat in a straight line down to the bone, keeping the cut about 1 in. (2.5 cm) from the tip of the eye muscle.



(h) Score the membrane covering the rib bones. Pull and cut the layer of fat from the bones.



(i) The roast is trimmed and ready to cook.

FIGURE 16.13 Butterflying and stuffing a pork loin.

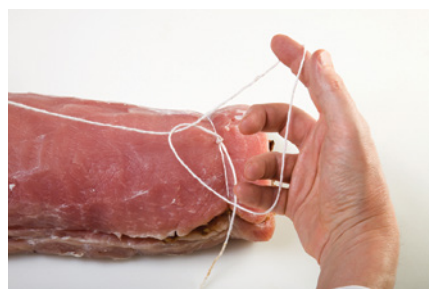
(a) To butterfly, hold the knife blade parallel to the table and cut through the center of the loin as shown. Do not cut all the way through, but leave the meat attached at one edge.



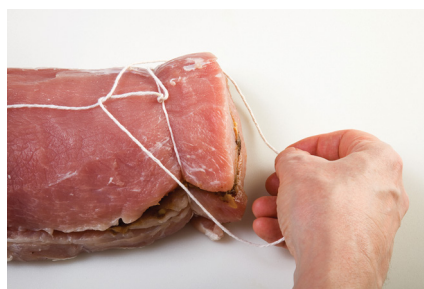
(b) Open the cut meat and spread the filling on the bottom half.



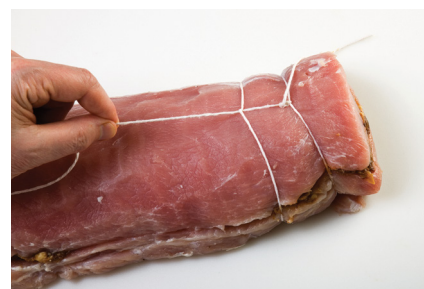
(c) Fold the top half over the filling to reform the loin.

FIGURE 16.14 Tying a roast.

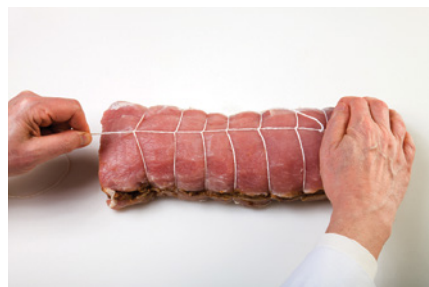
(a) Tie a length of butcher's twine tightly around one end of the roast. After tying the knot securely, twist the length of twine into a loop as shown.



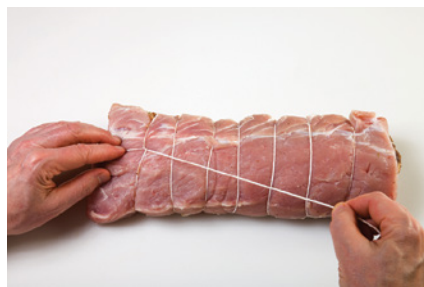
(b) Pass the loop over the end of the roast.



(c) Position the loop 1–2 in. (2.5–5 cm) from the first loop and pull the loose end to tighten.



(d) Continue making loops and tightening them until the whole length of meat is tied.



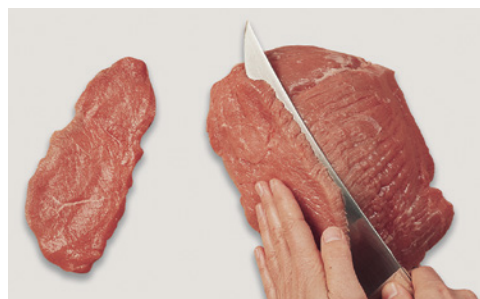
(e) Turn the meat upside down. Pass the loose end of the twine under the last loop and wind it once around as shown.



(f) Repeat step (e) with each of the loops. When you reach the end of the roast, tie it off securely to the short length of twine from the knot made in the first step.

FIGURE 16.15 Trimming, cutting, and pounding veal for scaloppine.

(a) Remove all tendons and connective tissue (silverskin) from the veal. Slip the point of a thin boning knife under the skin. Angle the edge of the blade upward against the skin and cut it away carefully without cutting through the meat.



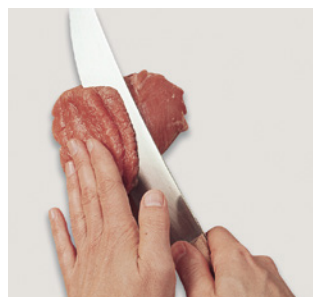
(b) Holding the blade of the knife at an angle if necessary to get a broader slice, cut across the grain of the meat as shown to make thin slices.



(c) Broader slices can be cut from narrower pieces of meat by butterflying. Cut the slice almost through the meat but...



(d) ... leave it attached.



(e) Then cut a second slice the same way, but cut all the way through.



(f) A butterflied scaloppine is twice as large as a single slice. Unfortunately, it has a seam in the center that often detracts from the appearance of the finished dish, unless the veal is breaded or covered with a topping.



(g) If desired, pound the cutlet to an even thickness with a cutlet mallet. This helps disguise the seam in a butterflied cutlet.

FIGURE 16.16 Trimming a pork tenderloin.**FIGURE 16.17** For stuffed pork chops, cut a pocket in the chops as shown.**FIGURE 16.18** Larding meat using a larding needle.

(a) Cut a strip of fatback to fit inside the needle.



(b) Insert the needle through the meat. Pull out the needle, holding the strip of fat so it stays inside the meat.

COOKING AND HANDLING MEATS

TENDERNESS AND APPROPRIATE COOKING METHODS

The heat of cooking affects tenderness in two ways:

1. It tenderizes connective tissue if moisture is present and cooking is slow.
2. It toughens protein. Even meats low in connective tissue can be tough and dry if cooked at excessively high heats for too long.

The Principles of Low-Heat Cooking

1. High heat toughens and shrinks protein and results in excessive moisture loss. Therefore, low-heat cooking should be the general practice for most meat cooking methods.
2. Broiling seems to be a contradiction to this rule. The reason carefully broiled meat stays tender is that it is done quickly. It takes time for the heat to be conducted to the interior of the meat, so the inside never gets very hot. Meat broiled to the point of being well done, however, is likely to be dry.
3. Roasts cooked at low temperatures have better yields than those roasted at high heat—that is, they shrink less and lose less moisture.
4. Because both liquid and steam are better conductors of heat than air, moist heat penetrates meat quickly. Therefore, to avoid overcooking, meat should be simmered, never boiled.

Breaking Down Connective Tissue

Remember that connective tissue is highest in muscles that are frequently exercised and in mature animals.

Look again at the primary cooking methods (column 4) in the table of meat cuts (pp. 468–470). You should detect a pattern of tender cuts, cooked primarily by dry heat; slightly less tender cuts, cooked sometimes by dry and sometimes by moist heat; and least tender cuts, cooked almost always by moist heat.

The concept of moist-heat cooking needs further explanation as it applies to breaking down connective tissue in meat. The usual explanation of the effect of moist heat on connective tissue is that heat breaks down collagen in the presence of moisture. But meat is about 75 percent water, so **moisture is always present**. Collagen breaks down because of long, slow cooking, no matter what cooking method is used.

The catch is that, for small cuts of meat, dry-heat cooking methods are usually short, quick methods. Cooking must be short, in part because too long an exposure to dry heat results in excessive moisture loss from the product. The terms **moist-heat cooking method** and **dry-heat cooking method** refer to the way in which heat is transferred from the heat source to the food, whether by dry means, like hot air or radiation, or moist means, like steam or simmering liquid. Because the product is surrounded by moisture when it is simmered, steamed, or braised, moist-heat cooking methods promote moisture retention, not moisture loss, so cooking time can be as long as desired.

A tough steak on the grill or in the oven doesn't have enough time to become tender before it is dried out. On the other hand, large cuts of less tender meat can be roasted successfully because they are too large to dry out during a long roasting time. A 40-pound (18-kg) roast steamship round of beef can be tender because it takes hours to cook even to the rare stage. A grilled steak cut from the same round, however, is likely to be tough.

To summarize: Long, slow cooking tenderizes collagen. Moist-heat methods are most suitable for long, slow cooking. Dry-heat methods usually are short, quick cooking methods, suitable only for tender cuts, except when larger items are roasted for a relatively long time. The following list summarizes the cooking characteristics of the major cuts:

1. Rib and loin cuts.

Always the most tender cuts, used mostly for roasts, steaks, and chops.

Beef and lamb. Because these meats are often eaten rare or medium done, the rib and loin are used almost exclusively for roasting, broiling, and grilling.

Veal and pork. Pork is generally eaten well done, and veal is most often eaten well done, although many people prefer it slightly pink in the center. Therefore, these meats are occasionally braised, not to develop tenderness but to help preserve juices. Veal chops, which are very low in fat, may be broiled if great care is taken not to overcook them and dry them out. A safer approach is to use a method with fat, such as sautéing or pan-frying, or to use moist heat.

2. Leg or round.

Beef. The cuts of the round are less tender and are used mostly for braising.

Top grades, such as U.S. Prime, U.S. Choice, Canada Prime, and Canada AAA, can also be roasted. The roasts are so large that, roasted at low temperatures for a long time, the beef's own moisture helps dissolve collagen. Inside round (top round) is favored for roasts because of its size and relative tenderness.

Beef round is very lean. It is best roasted rare. Lack of fat makes well-done round taste dry.

Veal, lamb, and pork. These meats are from young animals and therefore tender enough to roast.

Legs make excellent roasts because large muscles with few seams and uniform grain allow easy slicing and attractive portions.

Figure 16.19 shows the muscle structure of the round in cross section. A center-cut steak from a whole round of beef, lamb, veal, or pork has this same basic structure.

3. Chuck or shoulder.

Beef. Beef chuck is a tougher cut that is usually braised. Although chuck is not the ideal choice for braising if uniform slices are desired, it makes braised dishes of excellent eating quality. Its connective tissue is easily broken down by moist cooking, yielding moist, tender meat with abundant gelatin content.

MILK-FED, GRAIN-FED, OR GRASS-FED

The properties of meats are determined, in part, by the diet of the animals. Most of the beef on the market in North America is grain-fed, even though grass, not grain, is the natural diet of cattle. Feeding cattle grain enables producers to raise and fatten them for market more quickly than letting them browse on grass does. Grain-fed beef is tender and has more marbling than grass-fed beef, and it is preferred by most North American consumers. Grass-fed or pastured beef is usually perceived as less tender and less juicy, although it is lower in saturated fat and may have more health benefits. Its flavor is often described as “beefier” than that of grain-fed beef. Grass-fed beef is common in some other countries, such as the beef-eating and beef-producing nation of Argentina. In North America, producers of pastured beef are campaigning for more consumer recognition.

The effect of diet can be seen in other meat animals. Traditionally, the highest-quality veal is considered to be so-called milk-fed veal, more properly called *formula-fed*. The meat is light pink in color and mild and delicate in flavor. Calves fed solid food or allowed into a pasture have darker, more reddish meat with a somewhat beefier flavor. Ethical objections exist about the raising of formula-fed veal because the animals are penned and not allowed much movement. As for the flavor of milk-fed versus pastured veal, this is a matter of personal preference.

The youngest lamb is called *spring lamb*. It is slaughtered before it begins a diet of solid food, and its meat is light in color and delicate in flavor. Older lamb is darker in color and has a more pronounced flavor. After the age of one year, this meat is no longer called lamb but *mutton*, and it has a still darker color and stronger flavor. Little mutton is sold in North America. (In some markets the name mutton may also be used for goat meat, although this is not traditional English usage.)

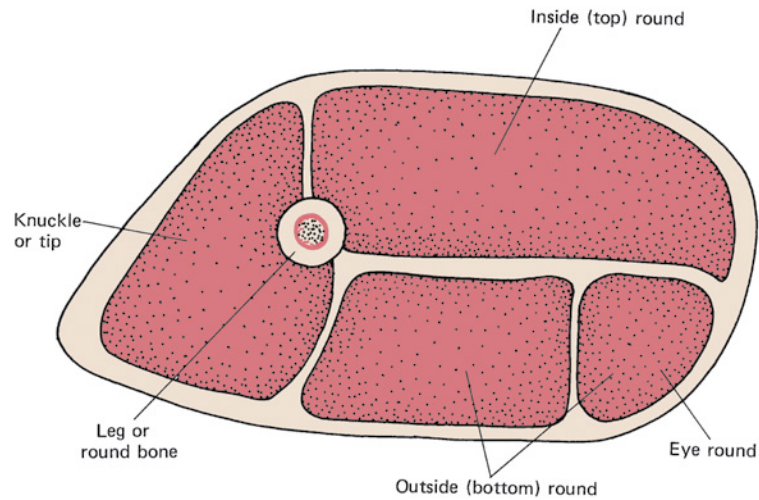


FIGURE 16.19 Location of the muscles in a whole center-cut round steak of beef, veal, lamb, or pork.

Veal, lamb, and pork. These are most often braised but are young enough to be roasted or cut into chops for broiling. Shoulder roasts are not the most desirable because they consist of many small muscles running in several directions. Therefore, they do not produce attractive, solid slices.

4. Shanks, breast, brisket, and flank.

These are the least tender cuts, even on young animals, and are almost always cooked by moist heat.

Shanks are desirable for braising and simmering because their high collagen content is converted into gelatin that gives body to braising liquids and good eating quality to the meat.

Beef flank steaks can be broiled (as London broil) if they are cooked rare and cut across the grain into thin slices. This cuts the connective tissue into chewable pieces (see mechanical tenderization, p. 459).

5. Ground meat, cubed steaks, and stew meat.

These can come from any primal cut. They are usually made from trimmings, although whole chucks are sometimes ground into chopped meat. Ground meat and cubed steaks can be cooked by dry or moist heat because they are mechanically tenderized. Stew meat is, of course, cooked by moist heat.

Other Factors Influencing Choice of Cooking Methods

1. Fat content.

Meats high in fat, such as Prime beef or lamb, are generally cooked without added fat, such as by roasting or broiling.

Meats low in fat, such as veal, are often cooked with added fat to prevent dryness. Sautéing, pan-frying, or braising is generally preferable to broiling for veal chops that are cooked well done.

Fat can be added to lean meats in two ways:

- **Barding.** Tying slices of fat, such as pork fatback, over meats with no natural fat cover to protect them while roasting.
- **Larding.** Inserting strips of fat with a larding needle into meats low in marbling.

These two techniques were developed in Europe when meats were much leaner and not as tender. They are not often used with today's tender, grain-fed meats. These techniques are useful, however, when cooking lean game, such as venison.

2. Developing tenderness is not the only goal of cooking.

Other goals are:

- Developing flavor.
- Preventing excessive shrinkage and nutrient loss.
- Developing appearance.

You must often compromise to get a balanced result. For example, preliminary browning of a roast at high heat increases shrinkage but may be desirable for some roasts to develop flavor and appearance.

Searing and “Sealing”

Searing

Searing meats at high heat creates desirable flavor and color by browning the surfaces. It was long believed that searing the surface of meat “seals the pores,” keeping in juices.

This does not actually happen. Meat does not have pores but rather an open network of fibers. Think of the surface of a steak as resembling the cut end of a thick rope. There are no pores to seal. It is true that heavy browning creates a kind of crust on the surface of the meat, but this crust is no more waterproof than an unbrowned surface.

You can easily demonstrate this. Place a steak or chop on a hot griddle or grill and sear it well. Turn it over and continue cooking. As it cooks, you will see meat juices driven up through the seared top surface. You will continue to hear a sizzling sound, which is the sound of moisture escaping from the meat and quickly vaporizing. Remove the finished steak from the grill and let it set on a plate for a few minutes, and you will see a small pool of juices collect. Everyone who has cooked a steak has seen this demonstration that searing doesn’t seal.

Roasts cooked from the start at a low temperature retain more juices than roasts that are seared at high heat first.

Steaks, chops, and cutlets cooked quickly at high heat retain more moisture at first because the intense heat instantly evaporates the juices from the surface of the meat and forces internal juices further into the meat. This permits browning, because moisture creates steam and inhibits browning. However, overcooked steaks are dry whether or not they were seared.

Blanching and “Sealing”

Dropping meat into boiling water doesn’t seal the pores, either. What actually happens is this: Many proteins dissolve in cold water. When heated, these proteins coagulate and become froth or scum on the surface of the water. When meat is placed into boiling water, some of the soluble protein coagulates inside that meat, and not as much is carried out of the meat with the lost moisture. Prolonged cooking shrinks meat as much if started in boiling water as if started in cold water.

Cooking Frozen Meats

Some sources recommend cooking some meats from the frozen state, without thawing, in order to eliminate drip loss that occurs during defrosting. However, it is usually better to thaw before cooking because of the following reasons:

1. Meats cooked from the frozen state lose no moisture from defrosting but lose more during cooking. The total loss is about the same as for thawed meats. Besides, the perception of juiciness depends as much or more on fat content than on moisture content.
2. Cooking frozen meats complicates the cooking process and requires adjustments in procedure. It is possible for roasts to be cooked on the outside but still frozen in the center. Frozen steaks, too, are more difficult to cook evenly than thawed steaks. Thawed meats, on the other hand, are handled like fresh meats.
3. Cooking frozen meats requires extra energy, and energy is expensive. A hard-frozen roast may take three times as long to cook as a thawed roast.

DONENESS

Definitions

The meaning of the term **doneness** depends on whether the cooking method uses dry heat or moist heat.

1. Dry heat.

Meat is “done” when the proteins have reached the desired degree of coagulation (p. 114), as indicated by internal temperature.

2. Moist heat.

Meat is “done” when connective tissues have broken down enough for the meat to be palatable. With a few exceptions, meat cooked by moist heat is always well done.

Dry-Heat Cooking

The object of dry-heat cooking is to achieve the desired degree of doneness (protein coagulation) while preserving natural tenderness and juiciness.

Degree of Doneness

As meat cooks, its pigments change color. These color changes indicate degrees of doneness.

Red meat (beef and lamb) changes from red to pink to gray or gray-brown.

- Rare: browned surface; thin layer of cooked (gray) meat; red interior
- Medium: thicker layer of gray; pink interior
- Well done: gray throughout

(Of course, there are stages in between.)

White meat (veal and pork) changes from pink or gray-pink to white or off-white. It is generally cooked well done, although many cuts of veal may be considered done when still slightly pink in the center.

As explained on page 22, trichinosis is a disease caused by a parasite that lives in the muscle tissue of hogs and some wild animals. In the United States and Canada, cases of trichinosis from pork are virtually nonexistent, but in countries in which this disease is a problem, pork must be cooked long enough to eliminate this danger. This parasite is killed at 137°F (58°C), but, to be safe, pork should be cooked to at least 145° (63°C). At this stage, pork is only medium to medium-well done. Some people are happy to eat pork that is still pink in the center, but most people prefer it to be cooked slightly more than this. However, it is not necessary to cook pork to 185°F (85°C), as older guidelines said. At this temperature, pork is overcooked and dry. For diners who avoid any trace of pink in pork, perhaps the best doneness range is 160°–170°F (71°–77°C).

Testing Doneness

Determining doneness is one of the most difficult and critical aspects of meat cooking. Anyone can put a steak on the grill or a roast in the oven. But it takes experience and skill to take it off the fire at the right time.

Color change cannot be used to test doneness because it would be necessary to cut the meat. Piercing the meat and examining the color of the juices is not a reliable method.

Internal Temperature

Testing the interior of meat with a meat thermometer is the most accurate method of testing doneness. Thermometers are of two types: **standard**, which are inserted before roasting and left in the roast; and **instant-read**, which are inserted at any time, read as soon as the needle stops moving, and pulled out. Whatever thermometer you use, make sure it is **clean and sanitary** before inserting it in the meat.

The tip of the thermometer should be inserted into the center of the thickest part of the flesh, not touching fat or bone. Table 16.3 gives internal temperatures of meats at various degrees of doneness.

In general, regional traditions of eating well-done or overcooked meats are decreasing, and more people are eating meat cooked rare. For decades, meats cooked to an internal temperature of

TABLE 16.3 Interior Temperatures of Cooked Meats

Meat	Rare	Medium	Well Done
Beef	130°F (54°C)	140°–145°F (60°–63°C)	160°F (71°C)
Lamb	130°F (54°C)	145°F (63°C)	160°F (71°C)
Veal	—	145°–150°F (63°–66°C)	160°F (71°C)
Pork	—	145°–150°F (63°–66°C)	160°–170°F (71°–77°C)

140°F (60°C) were called *rare*, but by today's standards, this is more like medium. Current preferences are reflected in the temperatures given in Table 16.3.

It should be stated that the USDA and other agencies caution that meats may contain harmful bacteria and parasites. Although studies are still being done, these agencies suggest meats be cooked to at least 145°F (63°C) in order to be completely safe. The USDA requires that beef pre-cooked for food-service sale (such as precooked roast beef for sandwiches) be heated to an internal temperature of at least 145°F (63°C) when it is processed.

You may recall from Chapter 2 that cooking foods to lower temperatures can make them safe. Note, however, that according to Table 2.5 on page 30, the lower the final internal temperature, the longer the product must be held at that temperature. Thus, for example, a roast may be brought to an internal temperature of only 130°F (54°C), but it can be considered safe only if it is held at that temperature at least 112 minutes.

Clearly, it is not possible to keep a rare steak at its final temperature for 112 minutes before serving it. According to safety standards, then, rare steaks are not considered safe. Those who prefer their steaks rare, however, are not likely to be swayed by this argument and will continue to request meat done to their liking. Each food-service operator must decide whether to please these customers or to follow food safety guidelines.

In any case, whether or not 145°F (63°C) is the lowest safe temperature for cooking most meats, it is not really accurate to call it *rare*.

Carryover Cooking

Internal temperature continues to rise even after the meat is removed from the oven. This is because the outside of roasting meat is hotter than the inside. This heat continues to be conducted into the meat until the heat is equalized throughout the roast.

Carryover cooking can raise internal temperatures from 5°F (3°C) for small cuts to as much as 25°F (14°C) for very large roasts, such as a steamship round. The usual range is 10°–15°F (6°–8°C) for average roasts. Exact temperature change depends on the size of the cut and on the oven temperature.

Remove roasts from the oven when internal temperature is 10°–15°F (6°–8°C) below the desired reading. Let the roast stand 15–30 minutes before slicing. For example, a beef rib roast cooked rare should be removed from the oven when the thermometer reads 115°–120°F (46°–49°C). Carryover cooking will bring the temperature to 130°F (54°C) after the roast has stood for 30 minutes.

Touch

The small size of steaks and chops sometimes makes using a thermometer impractical. The cook must depend on his or her sense of touch.

Meat gets firmer as it cooks. Pressing it lightly with the finger indicates its doneness. Press the center of the lean part, not the fat.

Rare. Feels soft, gives to pressure, though not as soft and jellylike as raw meat.

Medium. Feels moderately firm and resilient, springs back readily when pressed.

Well done. Feels firm, does not give to pressure.

Time-Weight Ratio

Many charts give roasting times per pound of meat. However, these can be approximate only and should be used in estimating and planning cooking times, not in determining doneness.

Many factors other than weight and oven temperature determine cooking time:

1. Temperature of the meat before roasting.
2. Amount of fat cover (fat acts as an insulator).
3. Bones (bones conduct heat faster than flesh, so boneless roasts cook more slowly than bone-in roasts of the same weight).
4. Size, type, and contents of the oven.
5. Number of times the oven door is opened.
6. Shape of the cut (a flat or a long, thin cut cooks more quickly per pound than a round, compact cut).

You can see why roasting requires experience and judgment. To be really accurate and useful, a complete roasting chart that took all variables into consideration, including all meat cuts, sizes, oven temperatures, and so on, would be the size of a small book.

Point 6 above is a key point. It is the *thickness* of a cut, not its *weight*, that determines cooking time—the time needed for the heat to penetrate to the center. Half a pork loin roasts in about the same time as a whole pork loin, even though it weighs half as much. The thickness is the same.

Perhaps the most useful roasting time charts are those you make yourself. When you regularly roast the same cuts in the same way with the same equipment and find they always take the same length of time, you may use those times as indicators of doneness. Many food-service operators have developed charts based on their own practices, and the correct times are indicated on their individual recipe cards.

Moist-Heat Cooking

Meat cooked by moist heat is cooked well done and actually beyond well done. Doneness is indicated by tenderness, not by temperature.

Piercing with a meat fork is the usual test for doneness. When the prongs of the fork go in and slide out easily, the meat is done.

Low temperatures—no higher than simmering—are essential to avoid toughening protein in moist-cooked meats. Oven temperatures of 250°–300°F (120°–150°C) are usually sufficient to maintain a simmer.

Juiciness

Three main factors determine the juiciness—or, more accurately, the perception of juiciness—in cooked meat. Despite the myths about basting with stock and about searing meat to “seal in the juices,” the following are the only factors that have any significant effect on juiciness.

1. Internal fat.

Fat makes meat taste juicy. This is why well-marbled meats taste juicier than lean meats. We understand the health effects of too much fat in the diet, but there is no getting around the fact that high fat content makes meat taste juicier. When lean meats are cooked, other measures (such as using sauces and, especially, avoiding overcooking) are used to increase palatability.

2. Gelatin.

This factor is most important in braised meats. Gelatin, converted from connective tissue, helps bind water molecules and hold them in the meat. Also, the texture of the gelatin improves the texture of the meat in the mouth. This is why braised beef shank tastes so much juicier than braised outside round.

3. Heat.

Raw meat tastes less juicy than slightly cooked meat. This is in part because the water content of the meat is locked inside individual cells. Even chewing doesn’t break down cell walls. Heat, however, gradually breaks down these cells and releases moisture, so rare meat tastes juicier than raw meat. At the same time, heat begins to coagulate the proteins, making the meat firmer. Thus, chewing becomes more effective, because the meat is torn rather than just squeezed. With continued heat, the proteins coagulate further, forcing out more and more moisture, until the meat becomes dry. The only way to minimize the loss of moisture is to avoid overcooking.

STORAGE OF MEATS

The quality of a finished meat product depends not only on proper selection and cooking of the meat but also on its proper storage. Fresh meat is highly perishable. The high cost of meat makes it essential to avoid spoilage.

Fresh Meats

1. Check purchases on arrival to ensure the purchased meat is of good quality.
2. Do not wrap tightly. Bacteria and mold thrive in moist, stagnant places. Air circulation inhibits their growth. Store meat loosely arranged on pans or racks to allow air circulation between pieces, but cover cut surfaces to prevent excessive drying.
3. Do not open vacuum-packed meats until ready to use.
4. Store at 32°–36°F (0°–2°C). Meat does not freeze until about 28°F (–2°C).
5. Keep meats separated in the cooler (or, even better, in separate coolers) and on the worktable to avoid cross-contamination.
6. Use as soon as possible. Fresh meats keep well only two to four days. Ground meats keep even less well because so much surface area is exposed to bacteria. Cured and smoked products may keep up to one week. For these reasons, frequent deliveries are better than long 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

1. Wrap frozen meats well to prevent freezer burn.
2. Store at 0°F (–18°C) or colder.
3. Rotate stock—first in, first out. Frozen meats do not keep indefinitely. Recommended shelf life at 0°F (–18°C) for beef, veal, and lamb: 6 months; for pork: 4 months (pork fat turns rancid easily in the freezer).
4. Defrost carefully. Tempering in the refrigerator is best. Defrosting at room temperature encourages bacterial growth.
5. Do not refreeze thawed meats. Refreezing increases loss of quality.
6. Keep freezers clean.



KEY POINTS TO REVIEW

- What are the primal cuts of beef? of lamb? of veal? of pork? What are the main fabricated cuts from each of these primal cuts?
- What are the proper ways to store fresh meats? Frozen meats?
- How do you determine the most appropriate cooking methods for the various fabricated cuts of meat?
- How can you tell when meat is done?

VARIETY MEATS, GAME, AND SPECIALTY MEATS

IDENTIFYING AND HANDLING VARIETY MEATS

Variety meats, also known as offal, include the organs, glands, and other meats that don't form a part of the dressed carcass of the animal.

For cooking purposes, we can divide the most popular variety meats into two groups:

Glandular Meats	Muscle Meats
Liver	Heart
Kidneys	Tongue
Sweetbreads	Tripe
Brains	Oxtails

Glandular meats do not consist of muscle tissue like regular meats but instead are internal organs or glands. This fact is important for two reasons:

1. Because they do not consist of bundles of muscle fibers, the texture of glandular meats is unlike that of regular meats. Because they are not muscle tissue, they are naturally tender and do not need long, slow cooking like muscular variety meats do. If organ meats are dry and tough, it is usually because they have been overcooked.
2. Glandular meats are much more perishable than muscle meats. While some muscle meats, especially beef, benefit from aging, organ meats must be very fresh to be of the best quality. Liver, sweetbreads, and brains must be used within a day or two after purchase. If brains or sweetbreads must be kept longer, they should be blanched as described below so they will keep another day or two.

Heart, tongue, oxtails, and tripe are made of muscle tissue, just like other meats from the carcass. They are all tough, however, and must be cooked for a long time by simmering or braising in order to be made tender.

Liver

Calf's liver is the most prized because it is tender and delicate in flavor. It is easily recognized by its pale, pinkish color. Most calf's liver is served pan-fried, sautéed, or broiled.

Beef liver is darker in color (see accompanying photo), stronger in flavor, and tougher than calf's liver. It is also pan-fried or broiled, and it is frequently braised.

Pork liver is also available, but it is used mostly in pâtés and sausages.



Top: milk-fed calf's-liver slice;
Bottom: beef-liver slice

Preparation

- Remove outer skin.
- Slice on the bias about ¼ inch (0.5 cm) thick. Slicing is easier if the liver is partially frozen.
- Remove tough membranes.

Cooking

Cook to order. Do not cook ahead.

- To broil: Brush with (or dip in) oil or melted butter. Broil according to basic procedure for meats.
- To pan-fry, griddle, or sauté: Dredge in seasoned flour. Cook in desired fat over moderately high heat.
- **Do not overcook**, unless customer requests well done. To be moist, liver must be slightly pink inside. Liver cooked well done is very dry.
- Serve with bacon, French-fried or smothered onions, or seasoned butter.

Kidneys

Veal and lamb kidneys are the most popular, especially in the more upscale restaurants. They are usually prepared by sautéing and broiling. Beef kidneys are tougher and more strongly flavored.

They are often cooked by braising and served in specialty items, like steak and kidney pie. Pork livers are not often used.

Veal kidneys weigh 8–12 oz (225–350 g) each. Lamb kidneys are very small, 1½–3 oz (40–85 g) each. If you purchase whole lamb or veal carcasses, you will find a pair of kidneys inside the cavity, attached to the small of the back in the region of the tenderloin and surrounded by a heavy layer of fat or suet.

Preparation

If the kidney is encased in fat, pull the fat away with your hands and use a knife to cut it away from the core area where the ducts emerge from inside the kidney.

Lamb kidneys are usually broiled and served two or three per portion, or as part of a mixed grill. Butterfly them by splitting them almost in half, starting at the curved or convex side. Spread them open and skewer them to hold them open during cooking.

Veal kidneys can be broiled like lamb kidneys, but they are most often cut up, sautéed, and served in a sauce. To prepare them for sautéing, first split them in half. Remove the white ducts from the center. Then cut into large dice or thick slices.

Cooking

There are two main pitfalls to cooking kidneys. First, they become tough and rubbery if overcooked. Properly cooked, they are pink in the middle and still tender and juicy. Cooking time is very short.

Second, they have a high moisture content, which can interfere with proper sautéing. Make sure the pan is very hot before adding the kidneys, and do not overcrowd the pan. Failure to do this results in kidneys that are boiled in their juices rather than sautéed.

To avoid overcooking when sautéing over high heat, do not try to brown the kidneys too heavily. Brown them only lightly and remove them from the pan when they are still somewhat rare. Set them aside while you deglaze the pan and prepare the sauce. During this time, some juices will be released from the kidneys. Drain this juice and add it to the sauce if desired, or discard it if you feel the flavor is too strong. Finally, add the kidneys to the sauce and warm them gently. Do not let them simmer long. Serve at once.

Sweetbreads

Sweetbreads are the thymus glands of calves and young beef animals. (The gland gradually disappears as the animal matures.) They are considered a delicacy and are often expensive. Sweetbreads are mild in flavor and delicate in texture. They are usually braised or breaded and sautéed in butter.

Before cooking, sweetbreads should be prepared according to the following procedure (Fig. 16.20):

1. Soak in several changes of cold water for several hours or overnight. This removes blood, which would darken the meat when cooked.
2. Blanch in simmering salted water for 10 minutes. Some chefs like to add a little lemon juice or vinegar to the water to preserve whiteness and make the meat firmer.
3. Refresh under cold water and peel off membranes and connective tissue.
4. Press between two trays, with a light weight on top, and refrigerate for several hours. If desired, wrap in cheesecloth before pressing, as shown in Figure 16.20.
5. Prepare for cooking:
 - For braising, leave whole or cut into large dice.
 - For breading and sautéing, split in half horizontally. Pass through Standard Breading Procedure (p. 155) or dredge in flour.

Brains

Brains are not a popular item, but they are delicate in both flavor and texture. Calf's brains are the most frequently used.

Brains are very perishable and should be cooked as soon as possible. They are also fragile and must be handled carefully.



Left: lamb kidney; Right: veal kidney

FIGURE 16.20 Preparing sweetbreads.**(a)** Raw sweetbreads.**(b)** After the sweetbread has been blanched, peel off the membrane.**(c)** Wrap the sweetbreads in clean cheesecloth.**(d)** Tie the ends securely.**(e)** Place in a hotel pan or other flat pan and top with another pan.**(f)** Place weights in the top pan and refrigerate for several hours.

Brains must be pre-prepared according to the following procedure. They may then be served hot with black butter (p. 196) or cooled and then dipped in batter, deep-fried, and served with tomato sauce.

1. Soak in fresh water, as for sweetbreads.
2. Peel off outer membrane (this may be done before or after poaching).
3. Poach 20 minutes in court bouillon made of 1 oz (25 mL) lemon juice or vinegar per pint (500 mL) of salted water, plus a bouquet garni.
4. Drain and serve immediately, or cool in fresh, cold water.

Heart

Heart, usually from veal or beef, is very tough and lean. It can be braised or simmered, or it may be ground and added to chopped meat for casserole dishes and meatloaf.

Before cooking, trim coarse fibers and veins inside and at top.

Tongue

Cooked beef tongue is popular as a cold, sliced meat for sandwiches. It may be fresh, cured, or smoked. Veal and lamb tongues are also available.

Tongue is almost always cooked by simmering. After simmering, remove the skin and trim the gristle at the base of the tongue before slicing.

Oxtails

Oxtails contain flavorful meat and a rich gelatin content, making them highly desirable for soups and stews.

To disjoint oxtails, cut into sections at the joints with a French knife or butcher knife. Do not use a cleaver, or you may splinter the bones.

Tripe

Tripe is the muscular stomach lining of meat animals. Although lamb and pork tripe are sometimes available, beef tripe is by far the most widely used. Because cattle have four stomachs, there are four kinds of beef tripe. Honeycomb tripe, from the second stomach, is the kind most widely available. Other kinds, however, can be substituted in recipes that call for honeycomb tripe. In France, another type of beef tripe, known as **gras-double**, is popular; it is smooth rather than honeycombed.

Most tripe that comes from the market has been partially cooked, but it still requires several hours of simmering to be made tender. Undercooked tripe is chewy and somewhat rubbery, but tripe that has simmered long enough is tender, with a pleasant gelatinous texture.

To prepare, first remove any lumps of fat by pulling or cutting them off. Next, blanch the tripe, if desired. Although it is already partially cooked when purchased, blanching freshens it. Place it in a pot with cold, salted water. Bring to a boil, simmer 5–10 minutes, drain, and rinse under cold water.



Tripe

Other Variety Meats

Intestines

The most common use for intestines is to make sausage casings. These are discussed in Chapter 28.

Chitterlings are pork intestines that are treated like tripe. They are blanched or simmered, and then braised or fried. Chitterlings are generally available in 10-lb (4.5-kg) pails. Because they shrink a great deal when simmered, this quantity yields only 3 lb (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 **crépinettes** (p. 853). 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 Tripes 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.



KEY POINTS TO REVIEW

- What is the difference between glandular variety meats and muscular variety meats? List the most important types of each.
- Muscular variety meats are nearly always cooked by what cooking methods? Why?
- What are the most appropriate cooking methods for liver?
- How are sweetbreads prepared for cooking?

GAME AND SPECIALTY MEATS

The term **game** is used to refer to poultry and meat animals normally found in the wild. However, most of the "wild" game that has become so popular on restaurant menus is actually from farm-raised animals. Venison farms, in particular, have become numerous and productive, supplying a growing demand.

Farm-raised game birds are discussed along with other poultry in Chapter 18. This section is concerned with furred game.

Although a great variety of game, large and small, can be found on hunters' tables, the supply of game for the restaurant and retail markets is more limited. Venison, the most popular game item, is the main subject of this section. Other products, such as boar and hare, are occasionally available as well. In addition, domestic rabbit is considered here, although its meat has little in common with true game.

Note that the term **venison** is sometimes used in a broader sense to mean meat from deer, elk, moose, caribou, antelope, and pronghorn. However, when any of these meats is offered for sale, the name of the animal must appear on the packaging.

The French terms for game meats are often used on menus and in cooking manuals and references. To clarify these terms, a list of those most commonly used follows:

Chevreuil: often translated as “venison”; the term refers specifically to the roe deer, the most prized European variety.

Cerf: red deer; often farm raised.

Daim: fallow deer; often farm raised.

Marcassin: young boar, especially under six months of age.

Sanglier: boar.

Lapin: rabbit.

Lapereau: young rabbit.

Lièvre: hare.

Levraut: young hare.

Venaïson: usually translated as “venison”; the term in fact refers to the meat of any game animal.

BONE STRUCTURE OF GAME

The bone and muscle structure of furred game such as venison and elk is the same as that of familiar meats such as beef and lamb. The carcasses are also broken down and fabricated in the same ways. After you have become familiar with the charts and diagrams on pages 464–467, you can apply the same cuts to venison and other large game.

Unlike those larger game animals, however, rabbit is cut differently, so separate illustrations are provided in this section beginning on page 490.

Venison

Several varieties of deer are raised on farms for use as meat, including the red deer and the smaller fallow deer. Deer meat is typically called **venison**. An important advantage of farm-raised venison, besides its year-round availability, is that the cook can be assured it is from young, tender animals. In the wild, young animals less than two years old are likely to have tender meat, but the meat rapidly becomes tough as the animal matures and ages. The tradition of marinating game for several days in strong wine marinades originates, in large part, from efforts to tenderize hunted game enough to make it palatable.

Marination, Flavor, and Tenderness

The first thing to be said about farm-raised venison is that it is milder in flavor than venison hunted in the wild. It has little, if any, of the strong, gamy flavor usually associated with wild game. In fact, a farm-raised venison steak tastes rather like an especially flavorful lean cut of beef. Those who enjoy strong, gamy flavors may even find farmed venison a little bland. Although it does have some tenderizing effect, marination is not necessary for commercially raised venison because the meat is already tender. Nevertheless, marinating is widely used as a flavoring technique. Much of the flavor traditionally associated with venison, in fact, is due less to its gaminess than to the red wine marinades that were invariably used.

To retain more of the natural flavor of the meat, cook it without marination, or let it marinate for only a short period (30 minutes to 3 or 4 hours) with the desired seasonings and flavoring ingredients. Modern quick marinades are often simple and may contain only a few ingredients.

Fat Content

Venison, like other game, is very low in fat. This makes it especially popular with health-conscious diners. The meat is likely to become dry unless the cook takes great care.

The loin and leg, being tender, are best cooked by dry-heat methods and served rare or medium done. If cooked longer, they will dry out. Roast these cuts whole, either bone-in or deboned, or cut them into steaks, cutlets, and medallions, and sauté, pan-fry, or broil them, taking care not to overcook.

Whole leg of venison, completely boned, seamed, and vacuum packed, is available. Weights range from 5 to 10 pounds (2 to 4.5 kg). Whole bone-in saddle weighs 5 to 20 pounds (2.3 to 9 kg), while the loin muscle weighs about half that after boning and trimming.

Tougher cuts, chiefly the shoulder, neck, and breast, are braised, stewed, or made into ground meat or sausage. These cuts are also lean, but because they are higher in connective tissue and gelatin, they take more readily to stewing and braising.

To generalize, farm-raised venison can be treated like very lean beef. Take care not to cook it to the point of dryness.

Boar

Boar is a type of wild pig. Its meat is somewhat similar to pork, except it is leaner and its flavor fuller and richer. Boar is now raised commercially on a few farms and is available in limited quantities.

Boar is somewhat more difficult to cook than venison and other game because, like pork, it must be cooked until well done. At the same time, it is leaner and less tender than domestic pork, so it tends to be somewhat dry and chewy. Special care must be taken to cook it adequately without overcooking. Because boar is usually tougher than farm-raised venison, its legs or hams are better suited for braising or slow roasting, while the loins can be used for roasts or cut into medallions and sautéed.

Traditionally, boar is handled much like venison, and typical recipes call for red wine marinades. Although marinating a white meat in red wine may seem strange at first, this treatment actually works very well with boar. The red wine accentuates the more pronounced flavor of boar (as compared to pork) and makes it taste more like game.

Other Large Game

Other meats are sometimes found in food service kitchens. *Elk*, *caribou*, *moose*, and *antelope* are all similar to venison and are handled in much the same way. The first three of these, especially moose, are larger than deer, so it may be necessary to allow for longer cooking times when using venison recipes for them.

Buffalo, or *American bison*, are raised on ranches in the western United States and Canada and handled like beef. Flavor and cooking characteristics are similar to those of beef, but the meat is somewhat richer in flavor and has less fat and cholesterol than beef.

Rabbit

Domestic rabbit is a versatile meat that can be cooked in most of the same ways as chicken. In fact, in some countries it is classified as poultry. Some typical recipes for rabbit are included in Chapter 17, but nearly any chicken recipe can be used for domestic rabbit as well. In addition, many recipes for veal or pork are adaptable to rabbit.

Rabbit's light, delicate meat is often compared to chicken, but there are differences. It is somewhat more flavorful than chicken, with a mild but distinctive taste that is not exactly like that of other poultry or meat. Also, it is very lean (more like chicken or turkey breast than legs) and can become dry if overcooked.

Rabbit takes well to marination; it can also be cooked without prior marination. Either way, it can be cooked by long, slow simmering, braising, or stewing, or it can be quickly cooked by sautéing, grilling, or roasting.

The structure of rabbit, of course, is like that of other land mammals rather than like that of poultry. Cutting methods divide the meaty hind legs, the bonier forelegs, and the choice saddle or back section (*râble* in French). The whole carcass, cut up, is used for stews and sautés, while the saddle alone is often roasted. It may be boned or bone-in (Fig. 16.21).

Small rabbits, 3 pounds (1.5 kg) or less, are the best for cooking. Mature rabbits, weighing 4 to 5 pounds (about 2 kg), tend to be tougher and drier.

Hare

Hare is a wild cousin of the rabbit. (Please note that rabbits and hares are different animals. The American jackrabbit, for example, is actually a hare, not a rabbit.) Unlike domestic rabbit, with its light-colored, delicate meat, hare has flesh that is dark reddish-brown and gamy.

Hares 7–8 months old and weighing about 6 pounds (2.7 kg) make the best eating. Larger ones, over 8 pounds (3.6 kg), are likely to be tough and stringy.

Because its structure is the same, hare is cut the same way as rabbit.

HANGING GAME

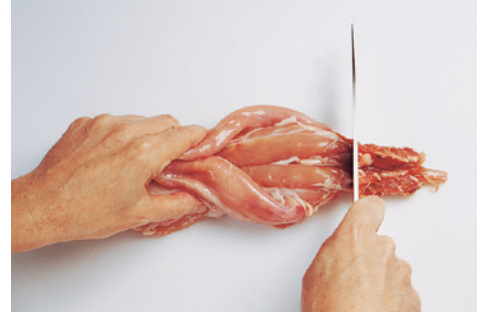
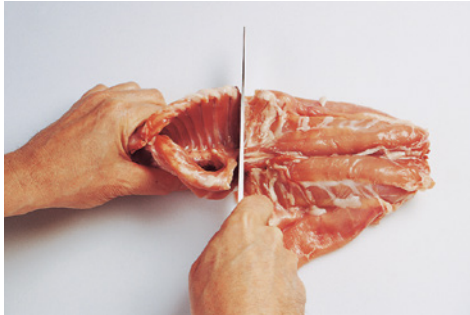
Much of the strong flavor associated with game comes from the practice of hanging. Hunters, processing game for their own use, often allow a dressed carcass to hang much longer than necessary to soften the meat (see Green Meat, p. 461), or long enough for it to become high, or actually near spoilage.

The farm-raised game discussed here and used in commercial kitchens is not hung. Thus, its flavor is milder.

INSPECTION OF GAME

In the United States, wild game that can be hunted legally under federal or state authority may not be sold. Farm-raised game species, if raised under the appropriate regulations, may be sold. Some animals are inspected by the USDA and others by the FDA. Imported game must meet the same standards of wholesomeness as domestically produced game.

In Canada, the Canadian Food Inspection Agency (CFIA) oversees inspection of game offered for sale. Just as for domesticated meats, federal and provincial inspection of farm-raised game for wholesomeness is mandatory. Game may be imported only from countries that have approved inspection systems. As in the United States, hunted game may not be sold.

FIGURE 16.21 Cutting rabbit for stews and sautés.**(a)** Cut off the hind legs, separating them at the hip joint.**(b)** Cut off the forelegs by cutting under the shoulder blade.**(c)** Cut off the hip bone.**(d)** Cut through the backbone to separate the bony rib section from the meaty loin or saddle.**(e)** Carefully separate the remaining rib bones from the loin and remove them. The saddle can then be cut crosswise through the backbone into pieces if desired.**(f)** This is the cut-up rabbit, with the forelegs and rib section on the left, the saddle in the center, and the hind legs and hip bone on the right.

Roast Saddle of Hare

Like other game, hare is very lean and therefore becomes dry if overcooked. If roasted, it should be removed from the oven while rare or at least still pink. Rare roast hare has an attractive, deep red color. A typical classic preparation of saddle of hare is as follows. Note that this is also the classic treatment for roast venison.

1. Marinate the saddle of hare in a red wine marinade (such as the venison marinade on p. 505).
2. Brown it on top of the stove and roast it rare or medium done, about 15 minutes at 425°F (220°C).
3. Remove the loin muscles from the bone and cut lengthwise into thin slices. Remove the tenderloins from the underside of the saddle and leave whole or slice as desired.
4. Serve with a poivrade sauce (p. 193).



KEY POINTS TO REVIEW

- What is the difference between glandular variety meats and muscular variety meats? List the most important types of each.
- Muscular variety meats are nearly always cooked by what cooking methods? Why?
- What are the most appropriate cooking methods for liver?
- How are sweetbreads prepared for cooking?
- What are the most important kinds of game used in food service?
- How does the fat content of game meats affect its cooking qualities?



TERMS FOR REVIEW

coagulation	primal cuts	variety meats
marbling	fabricated (cuts)	sweetbreads
connective tissue	portion-controlled cuts	tripe
collagen	butcher	gras-double
elastin	fabricate	caul
inspection	carve	game
grading	irradiation	venison
yield grading	silverskin	boar
green meat	barding	hare
aging	larding	
Cryovac®	doneness	
dry aging	carryover cooking	

QUESTIONS FOR DISCUSSION

- Many people assume that the leaner a meat is, the better it is. Do you agree? Explain.
- What is connective tissue? Why is it important for the cook to understand connective tissue?
- Flank steak (beef) is high in connective tissue, yet it is often broiled and served in thin slices as London broil. How is this possible?
- Why are portion-controlled meats so widely used in food service, even though their per-pound cost is higher?
- Can you explain why veal loin, a tender cut, is sometimes braised, while veal shoulder, a less tender cut, is sometimes roasted?
- Which of the following cuts are you more likely to braise? Which might you roast?
- You wish to cook a roast rib of beef to a final internal temperature of 145°F (63°C). Why, then, would you remove the roast from the oven when the temperature on the meat thermometer reads 130°F (54°C)?
- Why are weight-time roasting charts inadequate for determining the doneness of roast meats?
- Describe the fat content of game meats such as venison, boar, and elk. Explain how the fat content affects how these meats are handled and cooked.
- How does farm-raised venison differ from wild venison?

Beef chuck	Ground pork	Beef rib
Corned beef brisket	Veal rib	Lamb leg
Lamb shanks	Beef strip loin	Pork shoulder