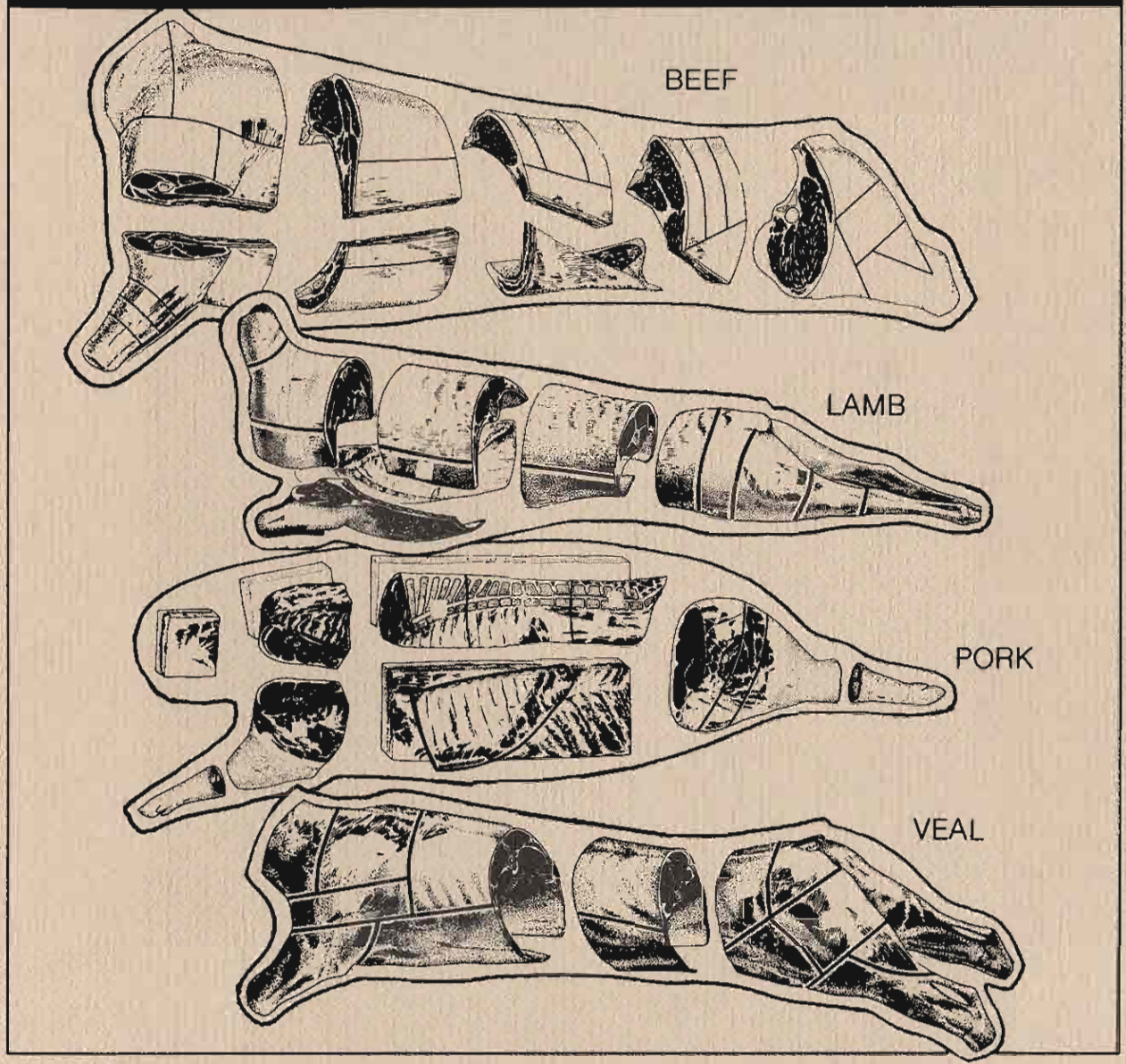
Purchasing Carcass Meats

Some things you should know about beef, lamb, pork and veal. This includes discussions of inspection, quality and yield grading, and the origin of common cuts.



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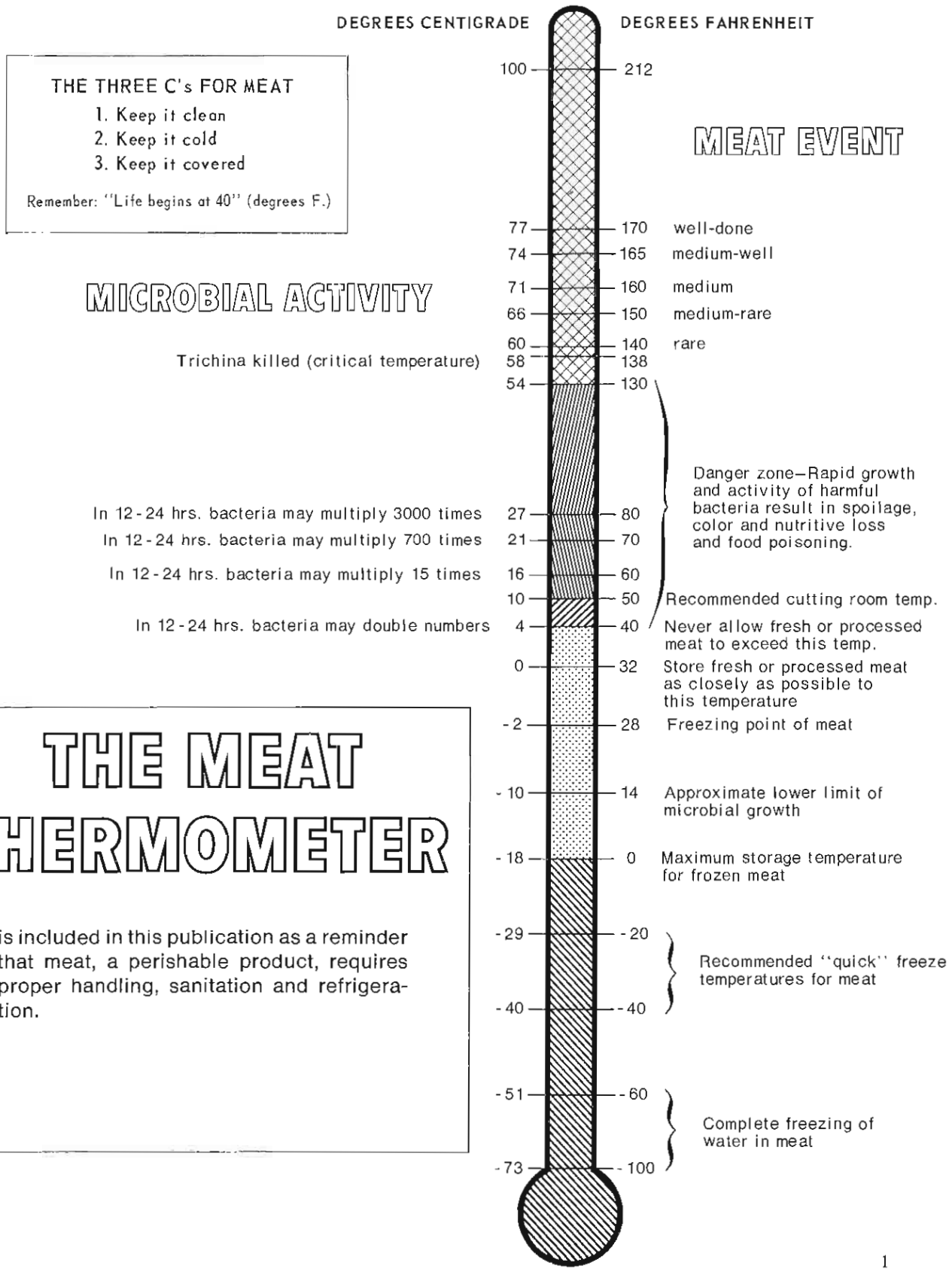
DEGREES CENTIGRADE
DEGREES FAHRENHEIT
THE THREE C's FOR MEAT
1. Keep it clean
2. Keep it cold
3. Keep it covered
Remember: "Life begins at 40" (degrees F.)
MEAT EVENT
MICROBIAL ACTIVITY
100 212
77 170 well-done
74 165 medium-well
71 160 medium
66 150 medium-rare
60 140 rare
Trichina killed (critical temperature) 58 138
54 130
Danger zone—Rapid growth and activity of harmful bacteria result in spoilage, color and nutritive loss and food poisoning.
In 12-24 hrs. bacteria may multiply 3000 times 27 80
In 12-24 hrs. bacteria may multiply 700 times 21 70
In 12-24 hrs. bacteria may multiply 15 times 16 60
10 50 Recommended cutting room temp.
In 12-24 hrs. bacteria may double numbers 4 40 Never allow fresh or processed meat to exceed this temp.
0 32 Store fresh or processed meat as closely as possible to this temperature
-2 28 Freezing point of meat
-10 14 Approximate lower limit of microbial growth
-18 0 Maximum storage temperature for frozen meat
-29 -20
Recommended "quick" freeze temperatures for meat
-40 -40
-51 -60
Complete freezing of water in meat
-73 -100
THE MEAT THERMOMETER
is included in this publication as a reminder that meat, a perishable product, requires proper handling, sanitation and refrigeration.

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Inside Back Cover—Inserts of Retail Cuts of Beef, Lamb, Pork, and Veal

Purchasing Carcass Meats

Some things you should know about beef, lamb, pork and veal. This includes discussions of inspection, quality and yield grading, and the origin of common cuts.

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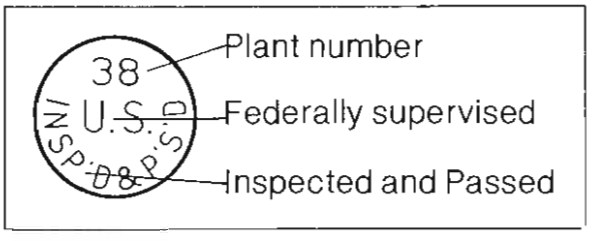
Introduction

IF YOU BUY MEAT, you should understand something about grading, processing, and storage. It is particularly important for those of you who are buying in quantity in an attempt to save money. The information contained in this booklet, it is hoped, will answer many questions and remove some of the uncertainties commonly felt by buyers of meat in retail markets.

Your first consideration when obtaining any foodstuff should be that it is wholesome—that is, it is safe to eat. The federal government, through the Food Safety and Quality Service of the USDA, employs inspectors to assure the wholesomeness of meat. It is mandatory for any establishment which processes meat or meat products intended for public distribution. This service is paid for by the taxpayers and is estimated to cost about 50¢ per person per year in taxes. Assurance of wholesome meat in the stores is well worth this small amount.

Meat which is purchased in a food store is inspected before slaughter (ante-mortem), after slaughter (post-mortem), and at any time it is further processed before it reaches the store. This ensures that the animal from which the meat was derived was healthy, and that all processing was accomplished under strict, sanitary conditions. Inspected meat will have this stamp of approval.



A Mark of Quality

To avoid wasting money and at the same time to obtain the kind of meat you are looking for, you need to understand the meat grading system.

Quality grade serves as a measure of palatability or "eatability" of meat. Palatability of meat is defined as tenderness, juiciness and flavor. Two predominating factors affect palatability—age of the animal at the time of slaughter and marbling or flecks of fat (intramuscular fat) within the lean.

Greater maturity tends to decrease tenderness and increase the intensity of meat flavor. Although marbling of lean is most important, color, firmness and texture are other quality factors. Common quality grades for typical meat animal species are:

Quality Grade Stamp

Beef[1]		Lamb[2]	Veal[3]	Pork[4]
Young	Old			
Prime	Commercial	Prime	Prime	
Choice	Utility	Choice	Choice	
Good	Cutter	Good	Good	
Standard	Canner	Utility	Standard	
Utility		Cull	Utility	

[1]Grade is subdivided according to maturity with two distinct classifications. Young beef is normally marketed through fresh channels while old beef is more commonly further processed. The degree of marbling (flecks of fat within the lean) is a major factor in determining grade within maturity ranges.

[2]Lamb is distinguished from mutton on the basis of maturity. Quality grade is determined from a composite of lean color, feathering between the ribs, flank fat streaking, firmness and fullness of flank.

[3]Veal grading is dependent on carcass weight, conformation and quality.

[4]Pork quality grade is designated as either acceptable or unacceptable in view of the young age (5-7 months at slaughter) and normal acceptable fat accumulation by that age. Unacceptable carcasses are typically associated with a stressful condition causing either Pale, Soft, Exudative (PSE) lean surfaces or the opposite condition of Dark, Firm and Dry. (DFD)

Yield or Cutability

Yield Grading serves as a measure of cutability or yield of the primal or four lean cuts. In beef, these are chuck, rib, loin, and round. Through extensive cut-out analysis in association with easily-obtained carcass measurements, prediction equation tables have been established. They accurately predict the yield of boneless trimmed product from the major wholesale cuts of the carcass. In short, yield grading evaluates the carcass or cut for its muscle (lean), fat and bone, and assigns a numerical value to that appraisal.

Yield Grades with Retail Equivalents (%)*

Yield Grade	Beef	Lamb	Pork
1	52.6-54.6	47.6-49.4	53 and over
2	50.3-52.3	45.8-47.2	50-52.9
3	48.0-50.0	44.0-45.4	47-49.9
4	45.7-47.7	42.2-43.6	Less than 47
5	43.5-45.4	40.4-41.8	

*% of chilled carcass weight represented by the trimmed boneless four major primal (wholesale) cuts.

All federally graded meat is evaluated for both quality and yield. This dual system provides the consumer with an insight into both the expected palatability and cutability of a carcass or cut. With an understanding of the principles underlying the grading system, the consumer can enter the marketplace well prepared to obtain palatable meat economically.

Yield Grade Stamp

Meat's Contribution to the Diet

Red meat (beef, pork, lamb and veal) is a highly nutritious food. It is composed of complete protein containing all the essential amino acids as well as a great many of the other nutrients our bodies require. It is also a good source of many minerals, especially iron and phosphorus Meat, particularly pork, is an excellent source of the B complex vitamins. Meat serves as a nucleus for most menus. Meat also has a high "satiety value" or lasting effect.

Beef

Beef is the red meat most popular in the United States, with an annual per capita consumption of 120 pounds in 1979. This is 63% of our annual red meat consumption of 190 pounds per person. Beef dominates the menus of most American families and is, therefore, in great demand. It is, however, difficult to handle in bulk due to its large size. Voluminous space is required for storage, which means a lot of expense.

Because the beef carcass is so large, marketing of beef is in "quarters." You can buy a full side (300-400#), a hindquarter (150-200#) or a forequarter (150-200#), depending on your preference and economic situation. Forequarters contain the lower-priced cuts, generally speaking, although the highly desirable rib is there. The hindquarter, including the ever-popular loin steaks and the highly cutable round, is generally 20 to 40 cents per pound more expensive than the forequarter.

Beef animals at slaughter weigh 800 to 1400 pounds, but 1000 to 1200 pound steers are generally considered ideal market weight. Dressing percent for choice beef is about 60 percent, thus a carcass weighing 600 to 700 pounds (300 to 350 pounds per side) would be considered average. The forequarter usually weighs 10 to 20 pounds more than the hind, or 160 to 180 pounds for the forequarter versus 140 to 160 pounds for the hindquarter in cattle of this weight range.

The meat cuts of the forequarter are the chuck, rib, short plate, brisket, and foreshank. The chuck can be offered as either bone-in or boned-out cuts. It yields a few steaks, either bone-in or boneless, a larger portion of pot roasts, and a large amount of stew and ground beef. The rib area is either cut into steaks or can be made into rib roasts (prime rib is a popular party dish) or some of each. The short plate is "leaned out" for ground beef, as is the foreshank (if not cut as crosscut shank). The brisket produces a large flat cut which

is commonly cured as corned beef. The brisket could be leaned out for ground beef and stew meat or used as a fresh brisket for pot roasting.

The hindquarter is usually cut into club, T-bone, porterhouse, and sirloin steaks from the loin. The tenderloin may be removed separately for use as filet mignon steaks or for chateaubriand roasts. The large bones of the round are removed, leaving heavy lean portions (top round, bottom round, eye of round, and sirloin tip) which are cut and merchandised as boneless steaks and roasts, stew, and ground beef. The flank possesses one muscle suitable as a steak (flank steak) which, if properly prepared, is considered by some to be one of the most delectable cuts in the carcass. The remaining portion of the flank is leaned out for ground beef.

Beef Forequarter Yields

	% Side	% Quarter	% Cut	Number of Pieces
RIB	9.5	18.0	—	—
steaks	4.0	7.5	41.0	8.5
roasts	3.0	6.0	32.5	1.0
(all steaks)[1]	(6.5)	(12.0)	(64.0)	(13.0)
shortribs	2.0	3.5	20.5	—
bone	0.5	1.0	4.5	—
CHUCK	24.5	47.0	—	—
Bone-In				
steaks	8.0	15.5	33.0	12.0
roasts	6.0	11.5	24.0	3.0
lean trim	3.5	7.0	15.5	—
fat trim	3.5	7.0	15.5	—
bone	2.5	4.5	9.0	—
Boneless[2]				
steaks	2.0	4.0	9.5	7.0
roasts	8.0	15.5	34.0	9.0
lean trim	5.0	10.0	22.0	—
fat trim	3.5	6.5	14.5	—
bone	3.5	7.0	15.0	—
RATTLE[3]	18.5	35.5		
lean trim	10.0	18.5	51.0	
fat trim	5.0	9.0	24.5	
bone	4.0	7.5	20.0	
FOREQUARTER TOTALS				
Retail Yield	21.0	44.0		
Lean Trim	13.5	25.5		
Waste	15.5	30.5		

[1]If rib were cut entirely into steaks.

[2]If chuck were boned out completely.

[3]Rattle=brisket, foreshank and short plate.

Beef Hindquarter Yields

	% Side	% Quarter	% Cut	Number of Pieces
ROUND	23.5	49.5	—	—
steaks	3.5	7.0	14.5	9.5
roasts	9.5	19.5	39.5	8.5
lean trim	4.5	10.0	20.0	—
fat trim	2.0	3.5	7.5	—
bone	4.5	9.0	18.0	—
LOIN	18.5	38.5	—	—
steaks	14.5	30.5	79.5	22.5
fat trim	1.5	3.0	7.5	—
kidney	2.5	5.5	14.0	—
FLANK	5.5	11.0	—	—
steak	0.5	1.0	10.5	1.0
lean trim	1.5	3.0	25.5	—
fat trim	3.5	7.0	62.0	—
HINDQUARTER TOTALS				
Retail Yield	28.0	56.0		
Lean Trim	7.5	13.0		
Waste	14.5	30.5		

Retail cuts (approximately half roasts and half steaks) 49%

Lean trim (as stew beef and/or ground beef) 21%

Waste (approximately 20% fat and 10% bone 30%

Total carcass 100%

Lamb

Lamb tends to be not very popular in this country. We consume only 2 to 3 pounds per person annually in the United States. When it is carefully selected and properly prepared, however, it provides a delectable and nutritious addition to the menu. In lamb, quality is critical and depends a great deal on the handling and feeding of the live lamb. Imported lamb is finished on grass, which requires more time and produces more mature carcasses than domestic lamb, which is usually finished on grain. This produces more rapid gains and a more youthful carcass so necessary to palatability. Therefore domestic lamb, although slightly more expensive, tends to be a more acceptable product.

Lambs usually weigh between 80 and 120 pounds live, when marketed. With a typical dressing percent of 50 to 55 percent, a 40 to 70 pound carcass is obtained. Because of the smaller size of lamb, relative production and processing costs are higher, making lamb relatively high priced compared to beef and pork. In retail stores the leg and loin demand the greatest premium. By purchasing the whole lamb you can obtain these premium cuts at a lower price but, of course, you will be buying other portions as well. These, in spite of not being popular cuts, also make fine eating when properly prepared.

The lamb is divided into the hindsaddle, which yields the leg, loin and flank and; foresaddle, which includes the rack, shoulder and breast. The leg, when the sirloin is included, is called the "leg-o-lamb," but is more commonly utilized as a short leg, removing the sirloin

for chops. A number of roasts can be fabricated from the leg depending upon the intended use. The American-style leg is a semi-boneless roast with the shank bone removed, making it a compact and easily stored roast. The French-style leg leaves the shank bone in, but exposed with some shank meat removed, leaving a handle which allows for ease of carving. A boneless, rolled leg roast has all the bones removed allowing easy carving also.

The loin may be completely fabricated into either double chops (backbone not split) or single chops (backbone split). It may also be used as a roast, bone-in or boneless. The flank, because of its small size, is leaned out and used as stew or ground lamb. A number of items can be made from the "rack" or rib section. It can be cut into chops, left as roasts, or made into a crown roast. The crown roast is a popular party entree —the rack is left whole, the backbone removed, and the rib ends stripped of lean, brought around to meet each other, and tied so that the whole thing makes a hollow crown-shaped roast.

The shoulder also offers a variety of potential cuts. The bone may be left in, resulting in a square-cut shoulder roast or the bone can be removed to make a boneless cushion shoulder roast. Alternatively, the entire shoulder could be made into blade and arm chops. The shoulder provides a reasonable amount of lean trim for stew or ground lamb. The neck could be boned and ground or cut into neck slices. The breast includes the foreshank and each has a variety of uses limited only by the imagination.

Lamb Yields

	% Carcass	% Cut	Number of Pieces
LEG (SHORT)	24.5	—	—
roasts	20.5	84.0	2.0
lean trim	0.5	2.5	—
bone	2.5	12.0	—
*LOIN	16.0	—	—
chops	15.0	95.0	22.0
lean trim	1.0	5.0	—
FLANK	6.0	—	—
lean trim	3.0	55.0	—
fat trim	2.8	45.0	—
RACK	9.5	—	—
chops	8.5	93.0	13.5
lean trim	1.0	2.5	—
SHOULDER	21.0	—	—
chops	5.5	34.0	6.0
roast	7.5	36.0	1.0
lean trim	2.5	13.0	—
bone & fat trim	4.0	19.5	—
BREAST	18.0	—	2.0

Retail cuts	75%
Lean trim	8%
Waste (fat and bone)	17%
Total carcass	100%

Pork

The pig is a versatile source of meat. In addition to fresh pork products, many items requiring further processing are derived from the pork carcass. This gives consumers a great variety of meat and meat products. In the United States we consume per person annually approximately 65 pounds of pork in many forms. This is 34 percent of our red meat consumption.

Pigs are marketed at 5 to 7 months of age and a weight of 200 to 240 pounds. Dressed at 70 to 75 percent, carcasses are between 140 and 180 pounds. They are split down the backbone yielding sides of 70 to 90 pounds.

The carcass is divided into four "primal" cuts—the leg (ham), loin, picnic shoulder, and Boston butt. This leaves the belly, which provides bacon and spareribs. The ham is obtained from the leg and can be used either in its fresh form or, commonly, cured and smoked. The ham can be further cut into butt and

shank portions, along with center-cut slices. The loin is normally utilized in its fresh form, cutting chops from the center portion and roasts from either end (blade and sirloin). Other ways of utilizing the loin are as cured and smoked roasts and chops, as Canadian-style bacon (boneless loineye muscle—cured and smoked) or as boneless roasts.

The shoulder is divided into the Boston butt and picnic, either of which can be bone-in or boneless roasts—fresh or cured and smoked. Or it can be boned and ground for sausage. Other products obtained from the pork carcass include the jowl, which may be cured and smoked; the feet and hocks and fat back, which is often salted (fat salt pork) or rendered for lard.

Although the fabrication of a pork carcass is fairly consistent, the specific yield varies with workmanship, demand for certain cuts, and length of carcass, as well as muscle and fat distribution. For example, the number of chops obtained from a loin depends on the length of loin, thickness of the chops, and number of roasts desired. Bacon and spareribs vary according to the amount of lean left on the spareribs when they are removed from the bacon, as well as the size of the belly made from the carcass in the first place.

Pork Yields

	% Side	% of Cut	Number of Pieces
LEG	23.0	—	—
Ham	21.0	93.0	1.0
LOIN	27.0	—	—
Chops	9.5	35.0	16.0
Roasts	11.0	40.0	2.0
Lean trim	7.0	25.0	—
SHOULDER	23.5	—	—
Picnic	8.5	36.0	1.0
Butt	9.0	34.0	1.0
Lean trim	6.5	30.0	—
BELLY	18.0	—	—
Bacon	11.5	64.5	1.0
Spareribs	3.0	17.5	1.0
Lean trim	3.5	19.0	—

Retail cuts	73.5%
Lean trim	17.0%
Waste	9.5%
Total carcass	100.00%

Curing and Smoking

The process of curing and smoking meat products is not a recent development. The earliest civilizations recognized the value of salting or drying as a preservation measure. In the absence of adequate refrigeration, salt was the principal means of preserving meat over extended periods of time. This process has been modified over the years to include other curing ingredients to enhance the flavor or tenderness of the product.

Formerly, cured meats were extremely salty because a high salt content was necessary to prevent bacterial spoilage. Now, since preservation is supplemented with refrigeration, the salt content is low enough to result in a palatable product without resorting to special cooking techniques to remove part of it.

Meats are smoked for three reasons: to dry, to color, and to flavor them. Smoking should always be done with the smoke produced by burning hardwoods. Hickory, maple, oak or applewood or the chips or sawdust of these woods are mostly commonly used. Combinations of these woods and other hardwoods are also frequently employed.

Curing and smoking is most commonly associated with pork, although other meat species may also be used, examples are corned beef, pastrami and beef jerky. Custom charges for curing and smoking are approximately 30¢ per pound of product. (Fall, 1980). Thus, a 15 pound ham would cost $4.50 to be cured and smoked; an 8 pound bacon, $2.40; or a 6 pound picnic shoulder, $1.80.

Veal

Veal, the meat of immature bovines, usually less than twelve weeks of age, is consumed at an annual level of 3 to 4 pounds per person in the United States. Cut very much like lamb and with similar yields, it is not treated in detail in this booklet. The leg of veal is often cut as veal ronnd cutlets or portions of it sliced thinly as scallopini, which would be the chief difference in merchandising the hind leg compared to the leg of lamb. Otherwise the sirloin, loin, rack or rib, shoulder and breast and foreshank would be cut very much like those same cuts of lamb.

Economic Considerations

When buying meat in bulk, the price is usually based on hanging weight. Therefore, in order to determine the true value of the meat wlnch you bring home, a few mathematical calculations must be made. First of all, it is necessary to know the percent of retail product yielded from the hanging carcass. This can be estimated by thc yield grade rcported previously. Then the price paid for the hanging carcass is divided by the percent yield in order to obtain the average price which was paid for the actual retail product. If a more detailed appraisal is desired, it is possible to multiply the hanging weight by the approximate percentage of the different retail cuts in order to identify specific yields of retail cuts. These yields could then be multiplied by the price for each retail cut charged by the local grocery store so that you can evaluate whether or not a savings would be made by buying in bulk. You must also consider processing costs. Cutting costs about 10¢ per pound (hanging weight basis). Grinding, wrapping, and freezing run about 5¢ per pound. Therefore, it would cost at least 15¢ per pound to have the carcass processed. For a 300-pound side of beef, that amounts to $45.00.

Some examples of "take-home" meat costs compared to carcass (hanging weight) costs are listed for the reader's consideration.

Species	Average Weight	Average Yield[1] of Trimmed Retail Cuts	Amount of[2] Meat into the Freezer	Total[3] Cost	Cost per[4] Pound into the Freezer
Beef (side)	300 lbs	70%	210 lbs	$375	$1.79
Lamb (whole)	50 lbs	80%	40 lbs	$ 75	$1.88
Pork (side)	75 lbs	85%	63 lbs	$ 75	$1.19
Veal (whole)	150 lbs	85%	125 lbs	$265	$2.10

[1]Assuming an average yield. Fatter carcasses will have more waste and therefore a lower yield.

[2]Amount of meat into the freezer includes some bone and some fat remaining with some cuts.

[3]At today's (Fall, 1980) prices: beef is about $1.25; lamb, $1.50; pork, $1.00; and veal, $1.75 per pound, cut and ground; on a hanging weight (carcass) basis.

[4]Cost into the freezer is usually 20¢ to 60¢ per pound higher than carcass costs per pound, depending on the species, yields, and utilization of all cuts.

Storage

To make the best use of your money when purchasing meat for the freezer, consider your personal convenience, storage space, the length of time the meat may be stored, and the cost of the freezer and the electricity to operate it.

For proper storage, meat should be properly wrapped. Use a moisture-vapor-proof wrap such as a heavy waxed or laminated freezer paper. Wrap the meat closely, pressing out as much air as possible. A double thickness of freezer paper should be placed between chops and between steaks to prevent them from freezing together. Seal the packages with freezer tape and mark them with the name of the cut, weight or number and the date.

Once the meat is wrapped, proper freezing is necessary to preserve the quality. Meat should be frozen as quickly as possible at an initial temperature of $-20°$ F. or lower. Only the amount of meat that will freeze in 24 hours should be placed at one time in a freezer. Slow freezing causes damage to the tissues due to the formation of large ice crystals which increases thaw loss and lowers quality. On the average, one cubic foot of freezer space will accommodate 35 pounds of meat.

Properly wrapped and frozen meats can be stored for great lengths of time, if freezer temperature is properly maintained (no higher than 0° F.). However, maximum quality is assured only if you do not exceed these limitations.

Beef	8-12 months
Lamb	8-12 months
Fresh Pork	4-8 months
Ground Meat	3-4 months
Sausage and Cured Meats	1-3 months

Note: It is not recommended to refreeze meat that has been defrosted; it is best to cook and use it. However, if held at refrigeration temperature and not unwrapped, it could be safely refrozen—but with some loss of quality. An alternative would be to cook the defrosted meat and freeze it in cooked form.

Yields cited in this bulletin are the compilation and average of many carcasses of each species processed in the University of Connecticut Meat Laboratory.

Meat Science at the University of Connecticut

Research and extension activities (such as this booklet) help solve problems facing the meat industry and provide information to all the citizens of the state. More formal education in the classroom and laboratory is also offered.

Many career opportunities exist for young men and women who may have an interest in this specific field or in such closely related areas as biological scienees, business, nutrition or pathobiology.

The Animal Industries program at the University of Connecticut offers students Meat Science courses at the two-year (Ratcliffe Hicks School), four year (College of Agriculture and Natural Resources and graduate (Master of Science) levels.

These conrses include Introductory Meat Science, Meat Technology and Processing, and Meat Grading and Evaluation—as well as independent research and internships in Meat Sciences.

Graduates of this program can be found in the meat industry and in the federal (USDA) and state inspection and grading services. Others do advanced work in research or become teachers or extension workers.