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RELATIVE ECONOMY, COMPOSITION AND NUTRITIVE VALUE OF THE VARIOUS CUTS OF BEEF

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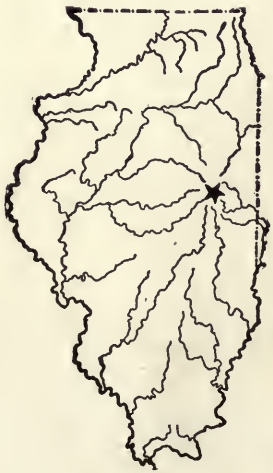

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Summary of Bulletin No. 158

1. Introduction.—A knowledge of the market products into which beef cattle are converted is essential both to the producer and to the consumer of beef. Owing to the increasing cost of meats, there is a growing demand for accurate information on the subject. Pages 135 to 136

2. Objects.—To determine (1) relative proportions of lean, visible fat, and bone in each of the retail and wholesale cuts of beef; (2) chemical composition and nutritive value of edible meat in each wholesale cut; and (3) net cost of the lean, the total edible meat, and the nutrients in each cut at current market prices. Page 137

3. Animals Used.—No. 1: Choice grade Hereford steer, age 18 months, live weight 902 pounds. No. 2: Choice grade Aberdeen-Angus steer, age 24 months, live weight 1190 pounds. No. 3: Prime pure-bred Shorthorn steer, age 29 months, live weight 1,360 pounds. Pages 137 to 139

4. Slaughter Tests.—Weights of dressed beef, hides, fats, and of the various organs and other parts comprising the offal were recorded and reduced to percentage of live weight. Pages 139 to 141

5. Wholesale Cuts.—The right half of each carcass was divided into the "straight" wholesale cuts, viz., loin, rib, round, chuck, plate, flank, and fore shank; also four minor wholesale cuts, the rump, hind shank, shoulder clod, and neck. Each cut was weighed and the percentage of carcass weight calculated. Pages 142 to 144

The amounts and proportions of lean, fat, and bone in each wholesale cut were determined, and the relative economy of the cuts at wholesale market prices was computed. Pages 144 to 147

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7. Retail Cuts.—Each wholesale cut was divided into its proper retail cuts. After weighing, photographing, and trimming such cuts as are ordinarily trimmed of surplus fat and bone, each retail cut was separated into lean, visible fat, and bone, and each portion weighed. Pages 163 to 170

Relative economy of the various cuts was computed in terms of the cost per pound of lean and of total meat in each cut at retail market prices. Pages 170 to 173

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RELATIVE ECONOMY, COMPOSITION AND NUTRITIVE VALUE OF THE VARIOUS CUTS OF BEEF[1]

By L. D. HALL, Assistant Chief in Animal Husbandry, and A. D. EMMETT, Assistant Chief in Animal Nutrition

INTRODUCTION

Precise knowledge of the final market products into which beef cattle are converted is essential both to the producer and to the consumer of beef. In order to place beef production upon the most exact and profitable basis, account must be taken not only of economical methods of breeding and feeding, but also of the quality of the finished beef product as delivered to the ultimate consumer. The relative efficiency of different types of beef cattle or of systems of production cannot be accurately compared without considering the adaptability of the beef to the purpose for which it is used. The same considerations that prompt manufacturers of other food articles to study closely the commodities they place on the market should prompt the meat producer to inform himself as thoroly as possible regarding his finished product. Notwithstanding the evident truth of these propositions, no comprehensive studies have yet been conducted and published which furnish a basis on which to compare live cattle with the various cuts of beef derived from their carcasses. Consequently, beef producers have continued to conduct their operations almost wholly without regard to this important phase of the industry.

Meat-market patrons are more directly, altho no more vitally concerned with this subject than beef producers, since they deal

[1]The investigations herein reported relative to the retail cuts of beef were suggested by Herbert W. Mumford, Chief in Animal Husbandry, and those relating to chemical composition and nutritive value of the wholesale cuts, by H. S. Grindley, Chief in Animal Chemistry. The work was planned jointly under their general supervision, together with their associates, L. D. Hall and A. D. Emmett. Messrs. Grindley and Emmett were entirely responsible for the chemical analysis of the wholesale cuts, and rendered material assistance in connection with the slaughter tests, physical determinations, and in the compilation of the data on the retail cuts.

directly with the market and have occasion almost daily to make use of information concerning the relative values of the different retail cuts. Those who would buy meat most intelligently must know the nature of these cuts, especially with reference to the proportions of lean meat, fat, and bone which they contain and the food value of meat from different parts of the carcass. A large majority of meat consumers have no knowledge whatever of these matters, but make their selections of meat solely according to habit or fancy. In fact, but little accurate data along this line have hitherto been available to those who wished to buy meats on a rational basis. As a result, a few well-known cuts are greatly in demand, and the remainder of the carcass is a "drug on the market." To such an extreme has this condition developed that a portion of the carcass (loins and ribs), forming only about one-fourth of its weight, represents nearly one-half of its retail cost. In view of the large place which meat occupies in the American diet, amounting to nearly one-third of the average expenditure for all food, the importance of an intelligent understanding of the subject on the part of the consumer is readily apparent.

Not only are the foregoing statements true of meat producers and consumers as individuals, but it is highly essential to the entire beef-cattle industry, on the one hand, and the economic welfare of the beef-eating public, on the other, that a more intelligent understanding of the different cuts of meat be acquired by consumers generally. An increased demand for those portions of the carcass which are now difficult for the butcher to dispose of would contribute largely toward a more stable condition of the trade and thus enable the producer to operate with greater confidence and economy. At the same time it would effect a tremendous saving to the consumer himself by more nearly equalizing the market values of the various cuts and by enabling the retailer to operate with a smaller margin of profit. A thoro awakening of our own people in this matter is no less essential to the future of beef production in this country than the development of our foreign markets, on the one hand, or a more efficient system of cattle raising, on the other. Thus producer and consumer are in a large sense inter-dependent with respect to the whole question, and the dissemination of useful information along this line is clearly to their mutual advantage. Further, cattle raisers themselves constitute an important proportion of the beef-consuming class; hence they have a two-fold interest in the matter. The increasing cost of meats, in keeping with prices of other foods, has stimulated popular interest in the whole subject, and there is a growing demand for accurate information bearing upon it.

OBJECTS AND PLAN OF INVESTIGATION

The principal objects of the investigation reported in this bulletin were to determine (1) the relative proportions of lean, visible fat, and bone in each of the retail and wholesale cuts of beef; (2) the chemical composition and nutritive value of the boneless meat (all lean and fat) of the various wholesale cuts; and (3) the net cost to the consumer of the lean, the gross meat, and the food nutrients in each cut at current market prices. Incidentally, data were obtained relative to the amounts and proportions of the various internal organs and other by-products of slaughter yielded by cattle.

Steers from the University herd were slaughtered at a local abattoir, the weights of hides, fats, various internal organs, and other by-products being recorded, as well as those of the different live animals and their dressed carcasses. After proper refrigeration in a cold storage room at the abattoir, the right half of each carcass was brought to the laboratory and divided into wholesale cuts; and these in turn were cut up as in retail markets. Some of the retail cuts were trimmed free of surplus fat and bone in accordance with meat-market custom, and the lean, fat, and bone of each cut were then separated as carefully and completely as could be done by the use of boning knives. A composite sample of all the boneless meat derived from each wholesale cut was taken for chemical analysis. Each step in the slaughtering, cutting, and sampling was performed rapidly in order to minimize loss by evaporation, and careful precautions were observed to make the records exact and complete.

ANIMALS USED

These tests were made upon the carcasses of three steers: a choice grade Hereford, a choice grade Aberdeen-Angus, and a prime pure-bred Shorthorn.

Steer No. 1, the grade Hereford, was one of a carload of choice calves from the Panhandle of Texas, purchased by the University in December, 1904, at the International Live Stock Exposition in Chicago. They were spring calves (April and May, 1904) and ran with their dams on grass without grain until November, 1904, when they were shipped to Chicago. About December 10 they were shipped to the University, where they were gradually placed on a fattening ration consisting of crushed ear corn, cottonseed meal, clover, and alfalfa hay, with a small amount of corn stover, and continued on full grain feed until marketed in November (1905). Pure corn meal was used during a part of the feeding period instead of crushed ear corn, and linseed meal was

used instead of cottonseed meal part of the time. This steer was about eighteen months old when slaughtered November 14, 1905. It was a choice yearling in prime condition but not fancy in quality nor form, and would have sold at twenty-five to fifty cents per hundred weight below the top of the beef-cattle market. Thru an oversight Steer No. 1 was not photographed.

Steer No. 2, a grade Aberdeen-Angus, was bought as a calf in the fall of 1904 and was used as a specimen steer for the class in stock judging. It was fed a ration of three parts corn, one part oats, one part bran, and one part oil meal together with clover hay, and was on pasture about five months in the summer of 1905. When slaughtered (March 20, 1906, age 24 months) it was a choice beef steer, sufficiently fat but not quite good enough in quality nor form to grade prime. See Fig. 1.

FIG. 1. CHOICE ABERDEEN-ANGUS GRADE STEER.

Steer No. 3, the Shorthorn (Fig. 2), was bred and raised at the University. It was calved in May, 1904; ran on pasture and was fed milk at the pail during the first summer; received a light ration of three parts corn, three parts oats, three parts bran, and one part oil meal during the winter; ran on pasture during the summer of 1905; and was changed to a ration of three parts corn, one part oats, one part bran, and one part oil meal during the following winter, which ration, together with clover hay in the winter and

pasture in the summer, it was fed until slaughtered October 22, 1906, at 29 months. At the time of slaughtering, this steer graded strictly prime, somewhat over-ripe in condition, but fancy in quality and form, being the best of the three steers in these respects. The carcass was cut up October 25, 1906. All the photographs of retail cuts reproduced in this bulletin (Figs. 13 to 69) were made from this carcass.

FIG. 2. PRIME PURE-BRED SHORTHORN STEER.

The reader is cautioned against regarding this experiment as a comparison of the three breeds of cattle involved. The differences observed in the carcasses and in the cuts of beef must be attributed chiefly to differences in age, condition (fatness) and individuality of the animals. It also should be borne in mind that the results of this investigation are not in all respects applicable to the medium and lower grades of beef.

SLAUGHTER TESTS

The cattle were fasted twenty-four hours before slaughtering, but were given water. The live weight was taken at the abattoir immediately before slaughtering. Table 1 shows the weights recorded in connection with the slaughter test and the percentage of carcass and of by-products based on the live weight.

Comparatively little shrinkage occurred in cooling the carcasses, owing to insufficient ventilation and a high degree of mois-

TABLE I.—RESULTS OF SLAUGHTER TESTS

	Steer No. 1, pounds	Steer No. 2, pounds	Steer No. 3, pounds	Steer No. 1, percent	Steer No. 2, percent	Steer No. 3, percent
Live weight	902.0	1190.0	1360.0			
Dressed beef, warm	549.0	739.0	870.0	60.86	62.10	63.97
Dressed beef, cold	544.5	724.5	870 0	60.36	60.88	63.97
Shrinkage	4.5	14.5	0	.50	1.22	0
Right half cascass	274.3	357.5	430.0	30.41	30.04	31.62
Left half carcass	270.2	367.0	440.0	29.96	30.84	32.35
Hide	67.5	77.5	87.5	7.48	6.51	6.43
Fats						
Total	46.5	71.0	64.1	5.15	5.97	4.71
Caul	16.0	29.4	24.5	1.77	2.47	1.80
Intestinal	22.5	31.4	23.5	2.49	2.64	1.73
Pluck	8.0	10.2	16.1	.89	.86	1.18
Tongue	5.1	3.8	6.2	.57	.32	.46
Heart	3.9	4.4	5.5	43	.37	.40
Liver	13.0	13.6	14.0	1.44	1.14	1.03
Sweet breads	.6	1.0	.9	.07	.08	.07
Lungs	5.8	5.5	7.0	.64	.46	.51
Trachea (windpipe)	2.5	3.0	1.7	.28	.25	.12
Penis	.5	1.0	.8	.06	.08	.06
Tail	1.6	1.6	1.6	.18	.13	.12
Stomachs						
Total, with contents	86.8	119.5	134.0	9.62	10.04	9.85
Rumen and reticulum, empty	18.3	18.0	22.5	2.03	1.51	1.65
Rumen and reticulum with contents	66.3	98.0	102.5	7.35	8.23	7.53
Omasum and contents	10.5	16.0	20.0	1.16	1.35	1.47
Abomasum, empty	10.0	4.5	10.3	1.11	.38	.76
Abomasum and contents	.....	5.5	11.5	.....	.46	.85
Intestines	33.0	33.4	43.0	3.66	2.81	3.16
Spleen	4.0	1.6	1.9	.44	.13	.14
Gall bladder and contents	.....	1.0	1.7	.....	.08	.12
Head						
Total	21.5	27.5	30.0	2.38	2.31	2.21
Bone	12.0	15.0	22.5	1.33	1.26	1.65
Trimmings	9.5	12.5	7.5	1.05	1.05	.55
Fore feet						
Total	7.3	7.5	9.2	.81	.63	.68
Bone	6.0	6.0	8.0	.67	.50	.59
Trimmings	1.3	1.5	1.2	.14	.13	.09
Hind feet						
Total	7.0	7.5	9.5	.78	.63	.70
Bone	5.5	6.0	7.5	.61	.50	.55
Trimmings	1.5	1.5	2.0	.17	.13	.15
Blood	29.0	35.2	43.5	3.22	2.96	3.20
Loss in dressing	17.4	32.8	27.65	1.93	2.76	2.03

[1]No shrinkage, due to humidity of the cooler and fat condition of carcass.

ture in the atmosphere of the chillroom, which retarded radiation of moisture from the beef. Carcasses Nos. 1 and 2 remained in cold storage 44 hours after dressing and No. 3, 68 hours at a temperature of 38° to 40° F. Notwithstanding the longer period of chilling, carcass No. 3, being extremely fat, showed no shrinkage; and the others sustained much less loss than commonly occurs under normal packing-house conditions.

Referring to the percentage of dressed beef (cold basis), it is found that Steer No. 3 gave the highest yield and Steer No. 1 the lowest. Had the relative weight of undigested food in the stomach at the time of slaughter been the same as in the case of Steer No. 1, the dressed yield of Steer No. 2 would have been 61.80 percent and that of No. 3, 64.40 percent, thus comparing even more favorably with Steer No. 1 than is indicated by the yields based on actual live weight, as in Table 1. The variations in yield were due, chiefly, to the fatter condition of Steer No. 3 and the thinner condition of No. 1, but they were influenced to some extent by differences in conformation and quality of the cattle.

The smallest relative weight of internal fat was yielded by Steer No. 3, and the highest by Steer No. 2. Considering the high condition of Steer No. 3 and the large percentage of dressed beef netted by this animal, the small proportion of internal fat is significant, indicating a high degree of efficiency for beef production.

Relative weights of the various organs and parts of the three animals are scarcely comparable, being influenced to an unknown extent by the differing degrees of condition and "fill" already mentioned. It will be noticed, however, that the body of Steer No. 1 contained the largest relative weight of organs and parts that constitute the offal,[1] due in part to lower condition and consequently smaller percentage of carcass to live weight, and doubtless, also, to a natural tendency to coarseness of bone, skin, and general quality. Steer No. 2, on the other hand, altho lower in condition and therefore in carcass yield than No. 3, yielded a smaller percentage of bone than the latter, as shown by figures for the head and feet, also a smaller proportion of various internal organs such as the paunch and intestines, and a similar percentage of hide; thus indicating that the highest degree of general quality, as between the three steers, was possessed by No. 2.

[1]By-products other than the hide and fats.

WHOLESALE CUTS

After chilling, the right half of each carcass was taken to the laboratory for cutting and sampling. Altho cut up on different dates, the cutting in each instance was done by the same man, an expert from the packing-house market of Swift and Company, Chicago, and identical methods of procedure were observed as nearly as possible with the three carcasses.

The accompanying diagram (Fig. 3) illustrates the wholesale cuts that were made. In addition to the seven "straight" cuts, four secondary wholesale cuts were made; viz., the hind shank, rump, clod, and neck. In the section on retail cuts they are included with the respective "straight" cuts to which they belong.

RELATIVE WEIGHTS OF THE VARIOUS CUTS

Results of the cutting tests are summarized in the following table. The weights were taken in terms of pounds and ounces but are here reduced to decimals for convenience of comparison.

TABLE 2.—WEIGHTS AND PERCENTAGES OF THE STRAIGHT WHOLESALE CUTS

	Steer No. 1, pounds	Steer No. 2, pounds	Steer No. 3, pounds	Steer No. 1, percent	Steer No. 2, percent	Steer No. 3, percent	Average percent
Loin	42.58	63.45	70.46	15.75	17.71	16.60	16.76
Rib	26.53	35.78	40.52	9.81	9.99	9.54	9.77
Round	60.15	77.12	92.11	22.25	21.53	21.70	21.78
Chuck	61.86	77.07	91.55	22.88	21.52	21.56	21.89
Plate	40.13	51.95	72.50	14.84	14.50	17.08	15.63
Flank	14.53	19.30	20.37	5.37	5.39	4.80	5.15
Fore shank	13.93	16.50	21.96	5.15	4.61	5.17	4.97
Kidney suet	10.65	17.03	15.06	3.94	4.75	3.55	4.06
Entire side	270.36	358.20	424.53	99.99	100.00	100.00	100.00

The proportions of the various cuts as shown above are similar in the three carcasses. The percentages correspond in general to average results of other tests on prime steers. Steer No. 1 appears to have been relatively lightest in loin and heaviest in round and chuck; Steer No. 2 shows the largest percentage of loin, rib, and kidney suet, and the smallest shank; Steer No. 3 was lowest in percentage of rib, round, chuck, flank and kidney suet, and highest in shank and plate. To what extent these differences are due to unavoidable variations in the cutting of the carcass, it is

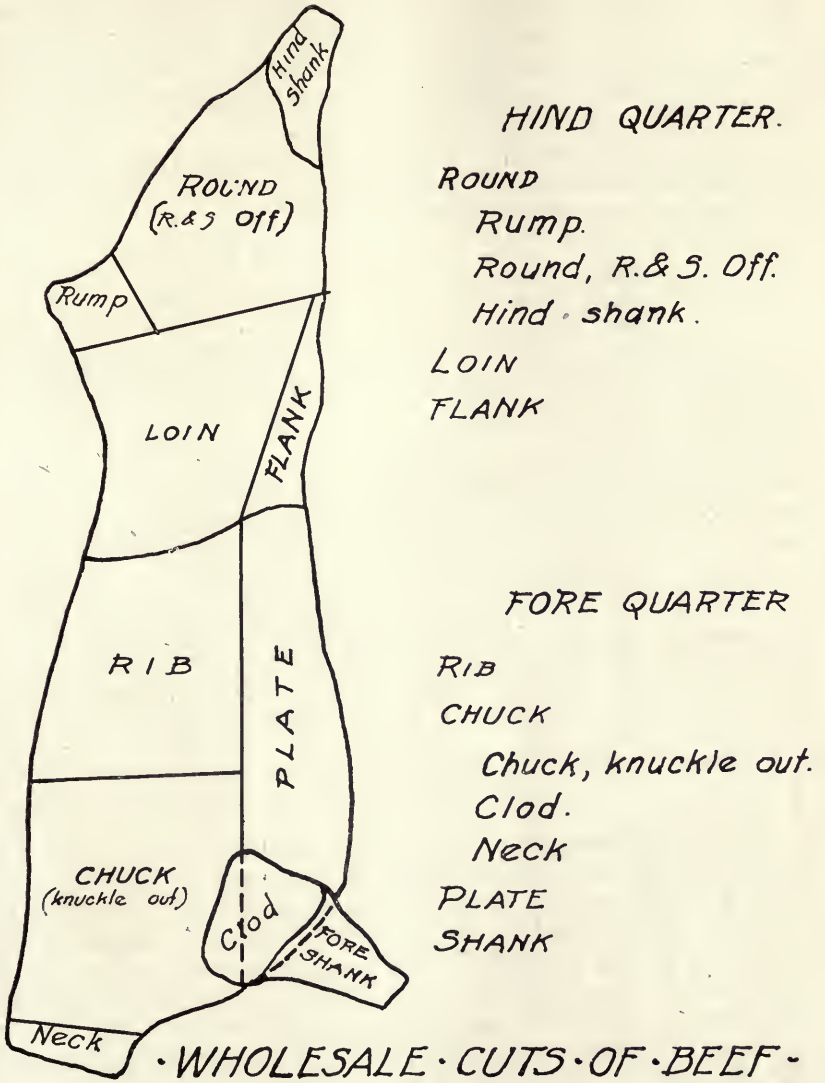

FIG. 3. METHOD OF CUTTING THE THREE SIDES, SHOWING WHOLESALE CUTS.

impossible to say, but probably this factor exercised considerable influence. For instance, the large percentage of plate in Steer No. 3, considered in connection with the small percentage of rib and chuck, indicates that the plate was cut slightly higher on the side than was the case in the other carcasses. The large percentage of round compared with the small percentage of loin in the

Hereford suggests that the round probably received a slight advantage in cutting this carcass. Undoubtedly, however, the carcass of Steer No. 2 had a larger actual proportion of loin and suet than the others; while that of Steer No. 1 was naturally heaviest in the chuck and lightest in the loin.

The total percentage of loin and rib is generally considered an important indication of the cutting value of a carcass; hence the following comparison will be of interest:

	Percent loin and rib
Steer No. 1	25.24
Steer No. 2	27.83
Steer No. 3	26.05

The relative proportions of the fore and hind quarters as expressed in the following table were calculated from the weights of wholesale cuts in each quarter.

TABLE 3.—WEIGHTS AND PERCENTAGES OF THE FORE AND HIND QUARTERS

	Steer No. 1, pounds	Steer No. 2, pounds	Steer No. 3, pounds	Steer No. 1, percent	Steer No. 2, percent	Steer No. 3, percent	Average percent
Fore quarter ...	142.45	181.30	226.53	52.69	50.68	53.36	52.21
Hind quarter....	127.91	176.42	198.03	47.31	49.32	46.64	47.79
Entire side	270.36	357.72	424.56	100.00	100.00	100.00	100.00

EDIBLE MEAT AND WASTE

The straight cuts may now be compared with reference to the relative proportions of lean, visible fat, and bone which they contain. For the sake of convenience and brevity, the discussions relative to the food values and waste of the various wholesale and retail cuts will be confined to the *average* results obtained from the three carcasses and will be stated in percentages. The complete data on which the averages are based will be found in the appendix. The following table is based upon the sum of the data derived from the various retail cuts into which each wholesale cut was divided.

This summary shows that the three sides used in this test averaged about 57 percent lean meat, 30 percent visible fat, and 12 percent bone. The proportion of lean in the various cuts (except the kidney) varied from about one-third in the flank to about two-thirds in the chuck; the extreme percentages of visible fat were 11 percent in the fore-shank and 63 percent in the flank; and the percentage of bone ranged from practically nothing, in the

TABLE 4.—PERCENTAGES OF LEAN, VISIBLE FAT, AND BONE IN THE STRAIGHT WHOLESALE CUTS

Straight wholesale cuts	Lean	Fat	Bone	Total
Loin	58.53	31.75	8.89	99.17
Rib	55.21	30.17	14.18	99.56
Round	64.61	18.03	16.63	99.27
Chuck	69.47	18.63	11.26	99.36
Plate	50.61	40.73	8.47	99.81
Flank	36.30	63.18	.25	99.73
Fore shank	47.61	11.63	40.20	99.44
Kidney suet	7.01[1]	92.99	0	100.00
Entire side	56.90	30.29	12.34	99.53

[1]Kidney.

flank, to 40 percent in the fore shank. From the data here given we may also calculate the relative amounts of lean, visible fat, and bone in the hind and fore quarters, with the following results: hind quarter, 54.42 percent lean, 34.55 percent visible fat, and 10.71 percent bone; fore quarter, 59.12 percent lean, 26.69 percent fat, and 13.73 percent bone.

In order to render the important data in Table 4 more easily studied, the following diagram (Fig. 4) is presented.

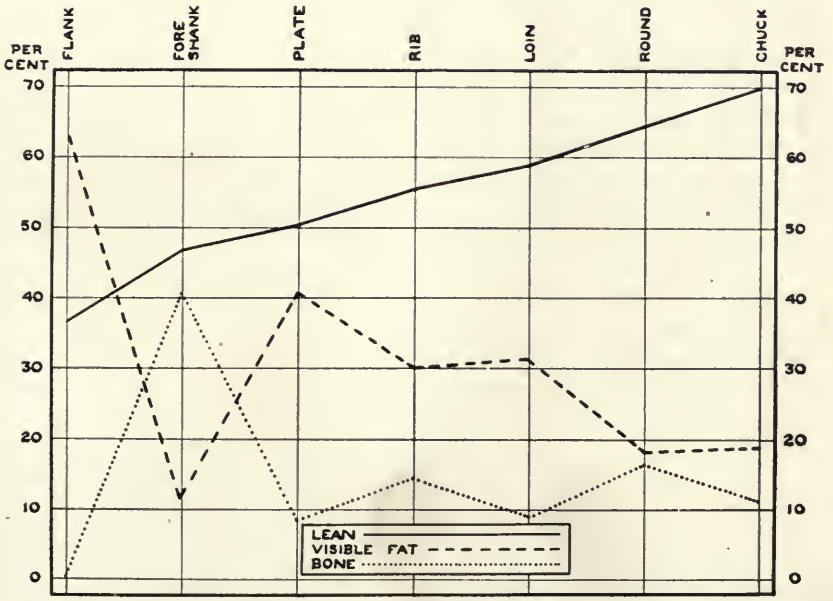

FIG. 4. PERCENTAGES OF LEAN, VISIBLE FAT, AND BONE IN THE STRAIGHT WHOLESALE CUTS.

In this diagram, and in similar illustrations in the following pages, the various wholesale cuts are represented by vertical lines, each being designated at the top. The horizontal lines represent percentages, which are read by means of the numerical scale at the right and left. The irregular lines represent various constituents of beef, according to the key given on each diagram; thus their position and direction are determined by the percentage of each constituent contained in the different wholesale cuts.

Referring to Fig. 4, the heavy solid line shows the percentage of lean meat in each of the seven straight cuts, which are arranged from left to right in order of the percentage of lean which they contain. The minimum percentage of this constituent, about 36 percent, occurs in the flank and the maximum, about 70 percent, in the chuck; while the comparatively regular ascending course of the heavy line indicates various percentages of lean in other cuts between these extremes. Following the broken line from left to right it is evident that in general the percentage of fat varies inversely as the percentage of lean, the shank, however, being a prominent exception. The dotted line, representing the percentage of bone, shows less variation than do the others, but, with the exception of the shank, its general direction corresponds to the line showing the percentage of lean, and is opposite that of the fat. The large percentage of bone in the shank corresponds to its low percentage of fat, and in both constituents this cut varies widely from the others.

In general, the cuts containing a large percentage of lean have a small percentage of visible fat, and vice versa, while the relative weight of bone is more variable. The round and chuck are the leanest cuts of the carcass. Loin and rib cuts are intermediate with respect to lean, fat, and bone. The flank and fore shank are low in percentage of lean, the former being high in percentage of fat and the latter in proportion of bone.

Relative Economy of Meat from the Straight Wholesale Cuts

The relative economy of the different cuts may be further expressed in terms of the net cost per pound of lean and of total meat (consisting of all the lean and visible fat) in each cut at market prices. This is calculated by dividing the percentage of each constituent into the market price per pound of the entire cut.

Thus the cost per pound of lean is based on the proportion of lean contained in the cut in question, and the cost per pound of gross meat is determined from the total percentage of lean and fat. For this comparison wholesale prices are used, leaving the retail cost to be considered in connection with the various retail cuts. (Table 19).

Table 5.—Cost of Lean and of Total Meat in the Straight Wholesale Cuts at Market Prices

Straight wholesale cuts	Wholesale price per pound of cut, cents	Cost per pound of lean in cut, cents	Cost per pound of total meat in cut, cents
Loin	18.5	31.6	20.5
Rib	15.0	27.1	17.5
Round	11.5	17.8	13.9
Chuck	9.5	13.7	10.8
Plate	8.0	15.8	8.7
Flank	8.0	22.0	8.0
Fore shank	5.0	10.5	8.4

The net cost per pound of lean is, in general, greatest in the cuts which command the highest prices, and vice versa. The flank is an exception to this rule, and the chuck is more economical in this respect than the plate. Referring to the last column it is also observed that the more expensive the cut, the greater the cost per pound of visible fat and lean combined, the flank being the only exception. From these figures it is apparent that food values of beef cuts do not correspond to their wholesale market prices, and that the cheaper cuts are by far the most economical sources of both lean and fat meat. On the whole, the different cuts vary more widely in net cost of food ingredients than in market price per pound of gross meat. The following discussion tends to confirm these statements.

CHEMICAL COMPOSITION OF THE BONELESS MEAT OF THE WHOLESALE CUTS

After separating each of the wholesale cuts mechanically into lean, visible fat, and bone, as already described, the lean and the visible fat were sampled for chemical analysis. The rump, hind shank, shoulder clod, and neck were sampled separately, thus making eleven cuts in all, as illustrated by Fig. 3 on page 143.

With Steers Nos. 1 and 2 the visible fat from all the cuts was composited and analyzed, while the lean meat from each of the cuts was subjected to a detailed chemical study. With Steer No. 3, however, the visible fat and lean of each cut were combined and analyzed. In none of these cases was the bone subjected to chemical analysis.

Methods of Analysis

The following determinations were made on the samples of boneless meat:

1. Water
2. Dry substance, water-soluble and insoluble
3. Fat, ether-soluble matter
4. Protein, water-soluble and insoluble
5. Organic extractives, nitrogenous and non-nitrogenous
6. Ash, water-soluble and insoluble
7. Phosphorus, water-soluble organic and inorganic, and water-insoluble

The methods used in making the chemical study of the various cuts of beef were those which have been published from the Laboratory of Physiological Chemistry of this department.[1] It is not the object of the writers to outline these methods at this time nor to discuss these technical data excepting in as practical a way as possible.

As in the preceding discussion, the corresponding data from the three steers have been averaged, and it is upon these average data that the statements herein are based. The detailed chemical results for each of the animals will, however, be found in full in the appendix. Attention should again be called to the fact that the animals used in these tests were choice and prime steers.

PERCENTAGES OF WATER, DRY SUBSTANCE, AND FAT IN THE BONELESS MEAT OF THE WHOLESALE CUTS OF BEEF

In the following table the data are given showing the distribution of water, dry substance, and fat in the boneless meat (all lean and fat) from the eleven cuts. The results are expressed in percentages calculated on the basis of the fresh substance.

[1]Journal American Chemical Society, 27, 658-678, and 28, 25-64 (1905), Grindley and Emmett.

TABLE 6.—PERCENTAGES OF WATER, SOLUBLE AND INSOLUBLE DRY SUBSTANCE, AND FAT IN THE BONELESS MEAT OF THE WHOLESALE CUTS

Wholesale cut	Water	Dry substance				
		Other than fat			Fat	Total
		Soluble	Insoluble	Total		
Flank	32.26	1.73	8.88	10.61	57.16	67.77
Plate	39.42	2.29	9.89	12.16	48.57	60 75
Rib	45.15	3.06	11.23	14.29	40.62	54.91
Rump	46.25	3.33	11.42	14.75	38.95	53.70
Loin	47.42	3.48	11.69	15.17	37.71	52.88
Chuck	55.47	3.82	13.53	17.35	27.54	44.89
Neck	56.32	3.80	14.07	17.87	26.12	43.99
Fore shank	60.95	3.80	15.75	19.55	19.98	39.53
Hind shank	61.02	3.90	14.84	18.74	20.77	39.51
Round	60.86	4.89	14.55	19.44	19.65	39.09
Clod	63.04	4.48	15.02	19.50	17.96	37.46

In the above table dry substance refers to that portion of the flesh that is not driven off upon heating the sample at the boiling point of water, or the flesh minus the water contained in the cut. Fat includes not only visible fat but also all the ether extract derived from the so-called lean of each cut. The soluble dry substance is that portion of the meat which is dissolved out by pure water at ordinary room temperature. It is supposed that the water-soluble constituents of flesh are more easily and quickly digested than the non-soluble, and hence of greater use to the needs of the body. The insoluble dry substance other than fat is that portion which remains after treatment with water.

Water.—The cuts are arranged according to the percentages of water they contain. The percentage of water represents all that portion of each cut not included in the dry substance. The wide variation in water content of different cuts of beef is here shown in a striking manner, ranging from about one-third up to two-thirds of the weight of edible meat.

It will be noticed that the arrangement of the various cuts is substantially in inverse order with respect to the percentages of fat and of total dry substance; also that in general the higher the percentage of fat, the lower the percentage of water. Two of the cheaper cuts of the carcass, viz., the flank and plate, contain the lowest percentages of water, due to their large proportions of fat. The round and clod rank highest in respect to water because of the large percentages of lean meat they contain. The high-priced rib and loin cuts are intermediate.

Dry Substance.—The relationship between the dry substance content of the eleven wholesale cuts is shown graphically in Fig. 5. It will be seen that the upper curve gives the distribution of the percentages of total dry substance in the boneless meat. This curve rises continuously from the clod to the flank cuts, indicating an increasing percentage of dry substance with the fatter cuts. The cheaper cuts such as the shank, clod, and round have the smallest percentages of dry substance.

The order of increasing percentages of soluble dry substance shown by the second curve, corresponds, with the exception of a few minor rearrangements, to the order of cuts given in Fig. 6 for fat. It is seen that the expensive cuts are not at all favorably distinguished from the cheaper ones, the loin and rib cuts possessing, in fact, smaller percentages of soluble dry substance than the average-priced cuts. The round, however, a medium-priced cut, has the largest proportion of soluble matter, 4.89 percent; the clod comes next, having 4.48 percent; while the flank is lowest, 1.73 percent. The values for the loin and rib are respectively 3.48 and 3.06 percent.

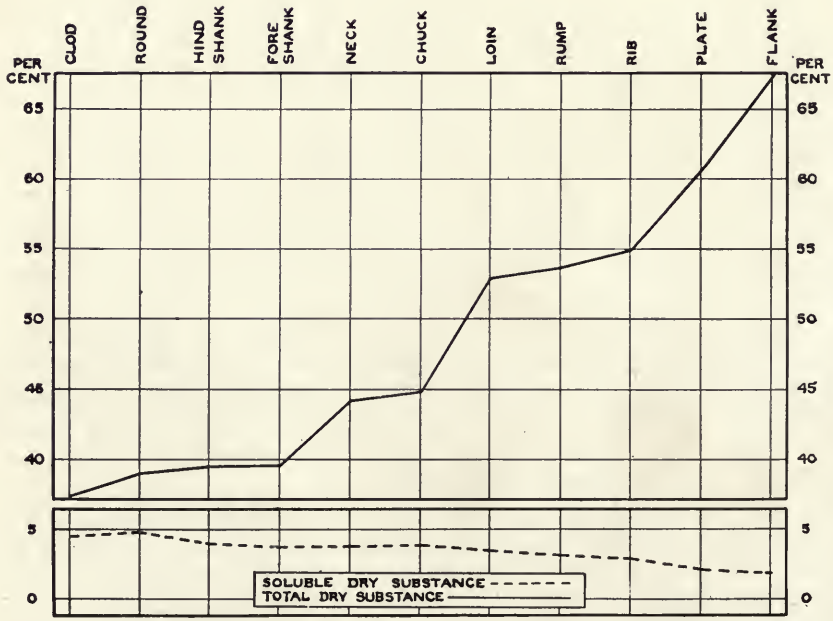

FIG. 5. PERCENTAGES OF TOTAL AND SOLUBLE DRY SUBSTANCE IN THE BONELESS MEAT OF THE WHOLESALE CUTS.

If the influence of the difference in fat be eliminated by calculating the soluble dry substance of each cut on the fat-free basis, the order of the cuts is considerably modified, as the following data show:

	Percent
Round	6.09
Loin	5.59
Clod	5.46
Rump	5.45
Chuck	5.27
Rib	5.15
Neck	5.14
Hind shank	4.92
Fore shank	4.75
Plate	4.45
Flank	4.04

The most significant rearrangements are those of the loin and rib cuts. According to these calculations the new arrangement of the cuts conforms more nearly to the order of their decreasing popularity as indicated by their market value, the round, loin, rump, chuck, and rib cuts, representing the most expensive portions of the beef carcass, clustering toward the top.

Fat.—The distribution of the fat among the cuts is represented in Fig. 6 by two curves, one on the fresh and the other on the dry basis. These two curves run approximately parallel. This latter

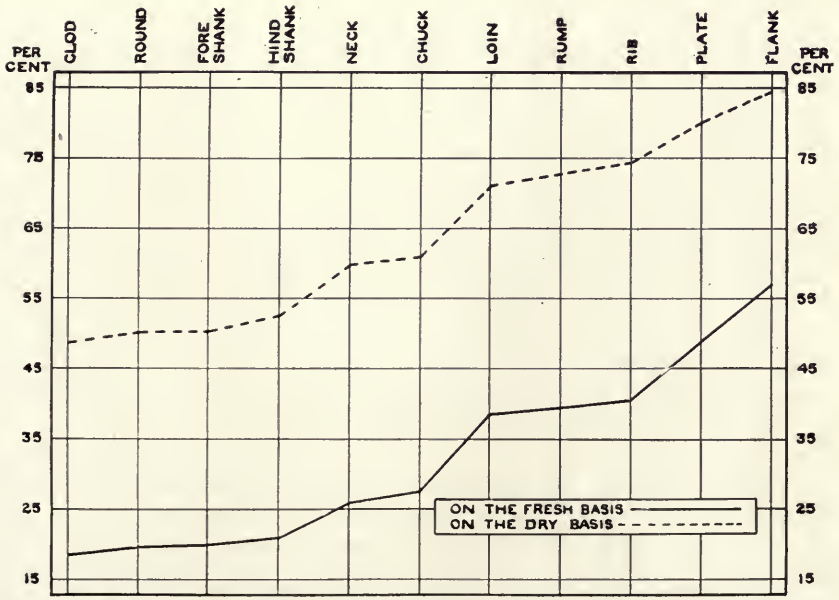

FIG. 6. PERCENTAGES OF FAT IN THE BONELESS MEAT OF THE WHOLESALE CUTS.

relation indicates that an increase in the percentage of fat in a cut results in a decrease in the percentage of water. In view of the great differences between the various cuts as regards fat content, the question arises whether these differences do not largely or entirely account for the differences in the percentages of dry substance and water. This question is answered in part by eliminating the fat from the percentage of dry substance, that is, by calculating the percentage of dry substance other than fat to the fat-free basis. The uniformity of the data in this form leads to the conclusion that, as regards the water content of the boneless fat-free meat, the eleven cuts do not distinctly differ among themselves, being very nearly the same.

The differences among the eleven cuts of beef as to their content of fat is shown in the curves (Fig. 6). The extreme positions are occupied by the clod and round cuts, on one hand, and the plate and flank cuts, on the other. The loin, rib, and rump cuts contain more fat than the chuck, neck, and shanks. So marked are these differences in fat that the percentages of all the constituents except the total dry substance, calculated on the fresh basis vary inversely as the percentage of fat. If the influence of the fat be eliminated by calculating the percentage of total dry substance on the fat-free basis, it is found that the leaner cuts are not clearly distinguished from one another.

PERCENTAGES OF TOTAL AND SOLUBLE PROTEIN IN THE BONELESS MEAT OF THE WHOLESALE CUTS

Total Protein.—The term protein as used here refers to the percentage of *protein* nitrogen multiplied by the factor 6.25. As already stated, protein is the essential constituent of lean meat. It consists largely of albumin compounds which serve as muscle-building material in the human body. The protein dissolved out by water at room temperature, that is, water-soluble protein, is thought to be more easily and quickly digested and hence more available to the body than the water-insoluble protein. Since beef is used chiefly for the lean meat it contains, the economic significance of the data given in Table 7 is readily apparent.

The curves of the total and soluble protein are given in Fig. 7. The order of the cuts for the two forms of protein is the inverse of that for the dry substance and fat; i.e., the shanks, clod, and round contain the highest amounts, and the flank, plate, and rib the lowest. Since a high percentage of water indicates a low percentage of fat, it naturally accompanies a large percentage of lean meat. Consequently the curve indicates that a relatively large percentage of protein is contained in the cheaper cuts of beef, while

TABLE 7.—PERCENTAGES OF WATER-SOLUBLE, INSOLUBLE, AND TOTAL PROTEIN IN THE BONELESS MEAT OF THE WHOLESALE CUTS

Wholesale cuts	Soluble	Insoluble	Total
Fore shank	1.42	15.56	16.98
Clod	1.81	14.88	16.69
Round	2.08	14.42	16.50
Hind shank	1.59	14.67	16.26
Neck	1.65	13.94	15.59
Chuck	1.47	13.40	14.87
Loin	1.37	11.59	12.96
Rump	1.26	11.30	12.56
Rib	1.20	11.12	12.32
Plate	.83	9.76	10.59
Flank	.66	8.78	9.44

the high-priced cuts, the rib and loin, are intermediate. Thus the most essential food constituent of beef is seen to vary in the different cuts quite independently of market prices.

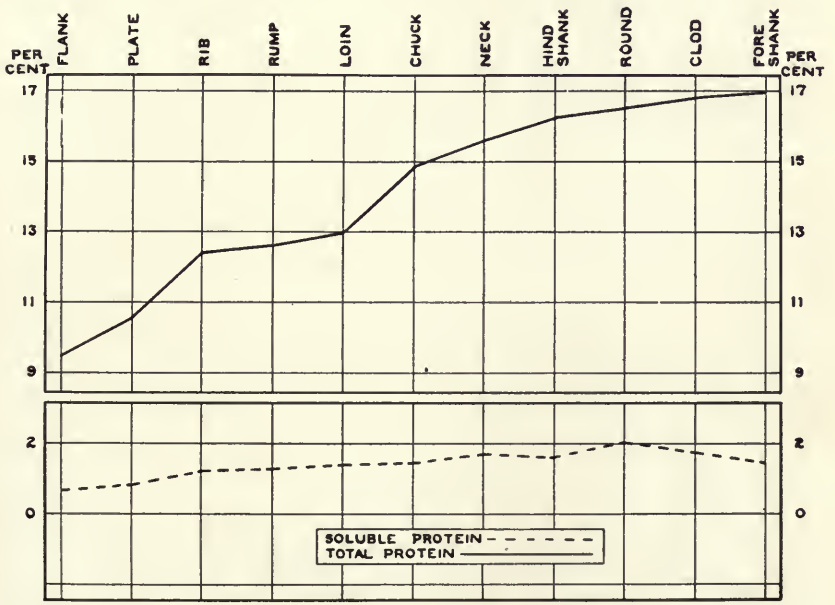

FIG. 7. PERCENTAGES OF TOTAL AND SOLUBLE PROTEIN IN THE BONELESS MEAT OF THE WHOLESALE CUTS.

The relationship between the water, fat, and total protein content of the eleven wholesale cuts is shown in Fig. 8. The curve representing the distribution of the percentages of total protein in

the boneless meat rises continuously from the flank to the fore shank, being approximately the same as the curve representing the percentages of dry substance other than fat.

When figured on the dry basis the curve shows that the percentage of protein increases much more rapidly from the flank to the fore shank, due to the fact that the shanks, clod, round, and neck contain more lean and less fat, and also to the fact that lean is higher in water. If the fat be eliminated from consideration by calculating the protein on the fat-free basis, the eleven cuts are not markedly distinguished from one another, as the curve in the diagram shows. Here the curve is nearly a straight line, again showing that the market prices have no relation to the nutritive value of the cuts.

From the data available it would seem that the most expensive cuts of meat, the rib and the loin, occupy an intermediate position as to their protein content with respect to the eleven cuts of beef. This statement applies when the data are presented on either the fresh or the water-free basis, but not on the fat-free basis. In this last case there is little or no difference between any of the cuts.

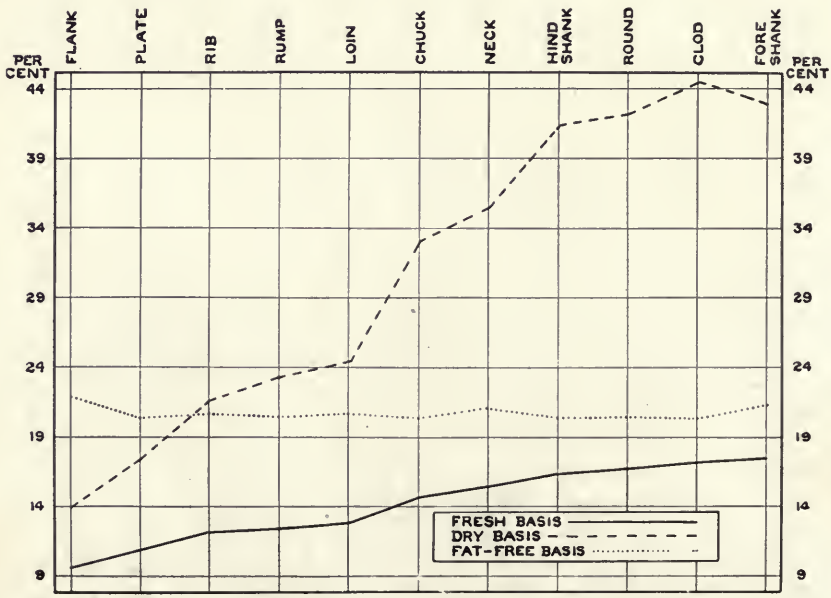

FIG. 8. PERCENTAGE OF TOTAL PROTEIN IN THE BONELESS MEAT OF THE WHOLESALE CUTS.

Soluble Protein.—On an average about one-tenth of the total protein of beef is soluble in water. The data given in Table 7, page 153, show the relative proportions of soluble protein in the

various cuts. In Fig. 7, page 153, the distribution of soluble protein is shown. The percentage values for the individual cuts arrange themselves in approximately the same order as the percentages of total protein. The most significant difference in the two cases is the position of the round cut, which is third in relative value as regards total protein and first as regards soluble protein. The percentages of soluble protein range from 0.66 in the flank to 2.08 in the round. These differences also appear to be largely due to the fat content of the cuts. When the data are calculated to the fat-free basis, it is of interest to note that the arrangement of the cuts then conforms more nearly to the current market prices

PERCENTAGES OF ORGANIC EXTRACTIVES AND ASH IN THE BONELESS MEAT OF THE WHOLESALE CUTS OF BEEF

Organic Extractives.—The organic extractives of meat consist of certain water-soluble compounds. They aid in giving cooked meat its flavor. They also serve in part as stimuli to several of the glands of the digestive tract. They are increased to some extent during the ripening of meats. The nitrogenous form of extractives is made up mostly of creatin and purine bodies. The non-nitrogenous form is composed chiefly of lactic acid and glycogen. The organic extractives form the essential ingredient of beef extract, and, altho possessing only slight food value, their influence on the palatability of meat undoubtedly renders them of considerable nutritive importance.

The data given in Table 8 show that the various cuts rank in practically the same order with regard to organic extractives as to

TABLE 8.—PERCENTAGES OF ORGANIC EXTRACTIVES AND ASH IN THE BONELESS MEAT OF THE WHOLESALE CUTS

Wholesale cuts	Organic extractives			Ash		
	Nitrogenous	Non-nitrogenous	Total	Soluble	Insoluble	Total
Round	.94	1.11	2.05	.76	.11	.87
Clod	.94	1.12	1.96	.71	.14	85
Fore shank	.74	.99	1.73	.65	.18	.83
Hind shank	.75	.92	1.67	.64	.17	.81
Chuck	.78	.90	1.68	.66	.12	.78
Neck	.70	.84	1.54	.53	.14	.75
Rump	.63	.91	1.54	.53	.11	.64
Loin	.69	.88	1.57	.54	.10	64
Rib	.60	.75	1.35	.50	.12	.62
Plate	.46	.62	1.08	.38	.13	.51
Flank	.34	.42	.76	.30	.10	.40

protein. Comparing these data with those in the preceding table (No. 7) a rather close correlation is observed between the amounts of protein and organic extractives, indicating again that the leaner cuts contain larger proportions of organic extractives. Altho, so far as these figures indicate, no relation exists between the market prices and the flavor of the various cuts, it is interesting to note that the cheap cuts contain considerably larger percentages of flavoring matter, as measured by the percentages of organic extractives and soluble ash, than do several of the high-priced cuts. The proportions of nitrogenous and non-nitrogenous organic extractives are similar in the different cuts, the average ratio being about 1 to 1.25.

In Fig. 9 the data for the total and the nitrogenous organic extractives are represented by curves showing the relative distribution of the two forms among the eleven cuts of beef. In general, the two curves run in the same direction; that is, the percentage values increase in both cases from the flank to the round cuts. The chief irregularity is in the fore shank, where the percentage of nitrogenous extractives seems to drop, giving the chuck cut a higher value. The more expensive cuts, the rib and the loin, occupy an intermediate position, while the round, clod, and chuck are near the top of the curve.

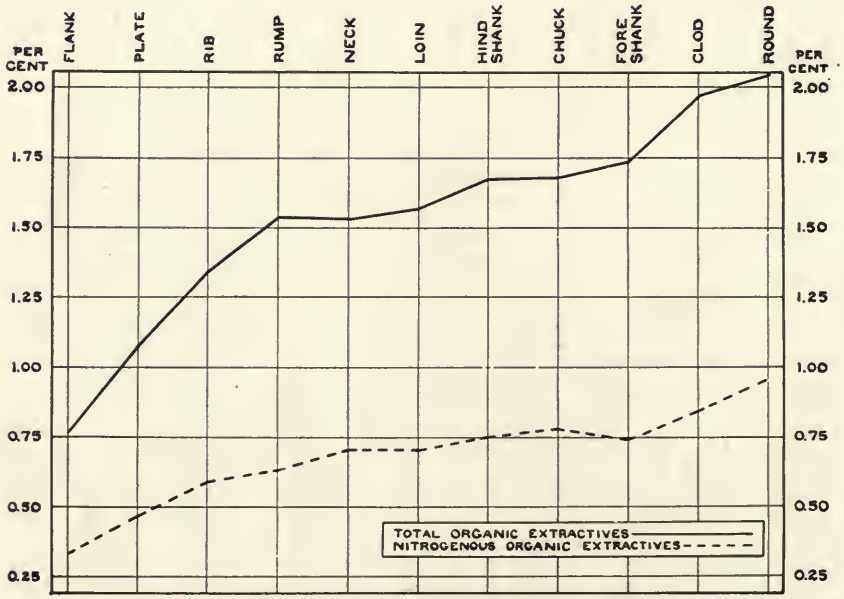

FIG. 9. PERCENTAGES OF TOTAL AND NITROGENOUS ORGANIC EXTRACTIVES IN BONELESS MEAT OF THE WHOLESALE CUTS.

Ash.—Ash, or mineral matter, is the residue that remains after cautiously burning the sample of meat until all the organic matter has been driven off. It is made up chiefly of the chlorids and phosphates of potassium, sodium, calcium, and magnesium. These contribute to the structure of bone and other body tissues, aid in the digestive functions, and increase the palatability of cooked meats.

In Table 8 the percentage values for the soluble, insoluble, and total ash are given. The soluble ash forms from 70 to 87 percent of the total. The percentage values for the total ash are about one-half those for the total organic extractives and about the same as those for the nitrogenous extractives. The soluble and total ash data are higher in the cheaper cuts.

In Fig. 10 the relative distribution of the total and the soluble ash is shown. There is a close correlation between the two curves. The main exception in the soluble ash lies in the chuck cut. To give a continuously rising curve the chuck cut should interchange places with the fore shank. Here, as in the case of the organic extractives, the rib and loin cuts occupy a place on the curve below the average value, being third and fourth respectively from the flank, between the plate and rump cuts. The chuck, shanks, clod, and round cuts are nearer the top.

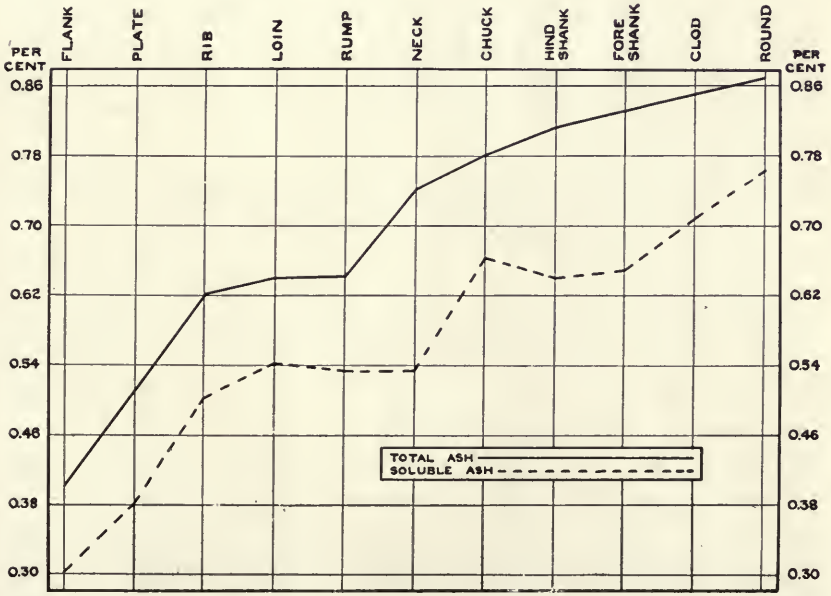

FIG. 10. PERCENTAGES OF TOTAL AND SOLUBLE ASH IN THE BONELESS MEAT OF THE WHOLESALE CUTS.

These facts are of further interest when we consider that while it is known that some of the mineral constituents of meat contribute to its palatability, it is probable that the water-soluble constituents are the most active. The percentage of soluble ash in the edible meat of the different cuts of beef should therefore be some indication of the relative degree of palatability. The curve for the soluble ash calculated on the fresh basis does not, however, distinguish the cheaper from the dearer cuts of beef. If these data be calculated to the fat-free basis, the tendency then seems to be toward making the different cuts more nearly alike; thus, the round contains 0.95 percent soluble ash and the flank 0.70 percent, while on the fresh basis the range for these cuts is 0.76 and 0.30 percent respectively.

In the same way, when the total ash is calculated to the fat-free basis the differences between the minimum and maximum percentages are much less. Thus, the round has the maximum percentage of 1.08 and the flank the minimum of 0.93.

Phosphorus.—In view of the important functions of phosphorus in animal nutrition, as indicated by recent investigations, a comparison of the forms and amounts as they occur in the various cuts is of interest. The data in the following table show that the percentages of total phosphorus vary from 0.077 in the flank to 0.184 in the round. Thus the various cuts rank in substantially the same order with respect to phosphorus and ash content. Phosphorus, like total mineral matter, is most abundant in the leaner cuts of beef, and vice versa; and its amounts are entirely independent of current market prices of the various cuts.

TABLE 9.—PERCENTAGES OF SOLUBLE AND INSOLUBLE PHOSPHORUS IN THE BONELESS MEAT OF EACH CUT

Wholesale cuts	Soluble			Insoluble	Total
	Inorganic	Organic	Total		
Round	.093	.032	.125	.059	.184
Clod	.094	.033	.127	.046	.173
Hind shank	.085	.024	.109	.052	.161
Chuck	.091	.015	.106	.052	.158
Neck	.085	.013	.098	.050	.148
Fore shank	.092	.016	.108	.033	.141
Loin	.072	.017	.089	.053	.142
Rump	.062	.022	.084	051	.135
Rib	.065	.019	.087	.043	.130
Plate	.050	.015	.065	.039	.104
Flank	.048	.006	.054	.023	.077

The amounts of soluble phosphorus are, in general, about twice as great as those of insoluble phosphorus, and the different cuts stand in approximately the same order with regard to the soluble and insoluble forms as with respect to the total. The exceptions to this rule do not appear to follow any regular order. The same is true of the inorganic and the organic forms of soluble phosphorus, as indicated by the first and second columns of the table.

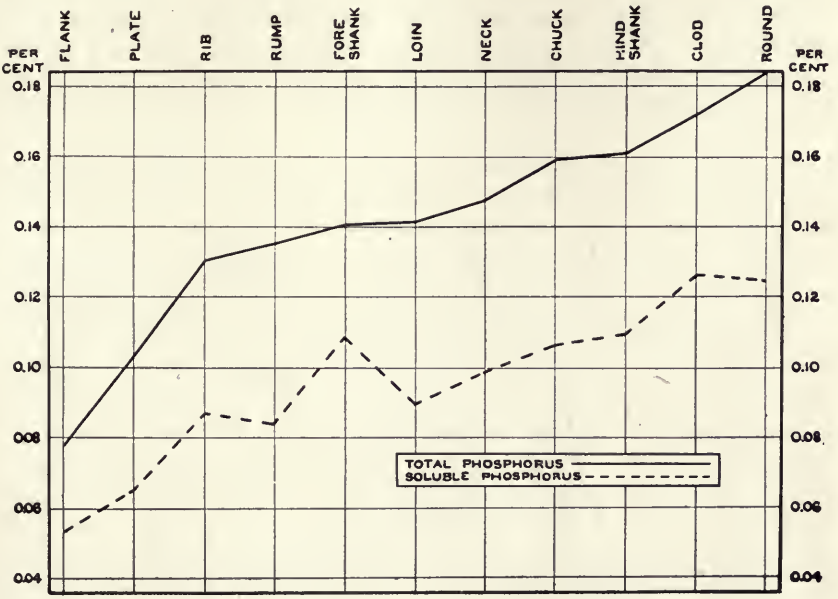

FIG. 11. PERCENTAGES OF TOTAL AND SOLUBLE PHOSPHORUS IN THE BONELESS MEAT OF THE WHOLESALE CUTS.

The above diagram (Fig. 11) shows the distribution of the total and the soluble phosphorus in the eleven wholesale cuts. From these curves it is apparent that the prices of the various cuts of beef are independent of their phosphorus content either total or soluble.

RELATIVE FUEL VALUE OF THE BONELESS MEAT OF THE WHOLESALE CUTS

As stated previously, fat, which is one of the chief food nutrients of meat, either is deposited in the body as such, or else yields energy, i.e., it produces heat and thus has fuel value. Protein, the other chief food nutrient of meat, may be used in the body not only for the formation of muscular tissue but also for the production of energy.

It therefore will be of interest to compare the fuel value of the fat and protein in the different cuts of beef, and also to compare the total fuel value of the cuts. It has been found experimentally that a gram[1] of fat when burned will yield 9.45 calories[2] of heat and that a gram of protein will produce 4.35 calories.[3]

If then the composition of the meat is known, the fuel value can be calculated by means of the above factors. In the following table these values are given for each of the eleven wholesale cuts and for the percentage distribution of the calories between the fat and protein. In order to make the relative comparison of the cuts more direct, the amounts of boneless meat necessary to furnish 1000 calories have also been calculated.

TABLE 10.—RELATIVE FUEL VALUE OF THE BONELESS MEAT OF THE WHOLESALE CUTS

Wholesale cuts	Calories[4] furnished by 100 grams of boneless meat			Percentage distribution of calories		Pounds of boneless meat required to furnish 1000 calories
	Fat x9	Protein x4	Total	In fat	In protein	
Flank	514.4	40.5	554.9	92.7	7.3	.40
Plate	437.1	46.0	483.1	90.5	9.5	.46
Rib	365.6	54.1	419.7	87.1	12.9	.52
Rump	350.5	55.3	405.8	86.4	13.6	.54
Loin	339.4	57.4	396.8	85.5	14.5	.56
Chuck	247.9	65.8	313.7	79.0	21.0	.70
Neck	235.1	67.9	303.0	77.6	22.4	.73
Hind shank	186.9	71.0	257.9	72.5	27.5	86
Fore shank	179.8	73.9	253.7	70.9	29.1	.87
Round	176.9	73.6	250.5	70.6	29.4	.88
Clod	161.6	73.5	235.1	68.7	31.3	.94

In the above table the data were calculated as follows: The percentages of fat in the various cuts were obtained from Table 6, page 149. Those for the protein, as previously referred to in Table 7, page 153, are not applicable. In this case the total nitrogen content of the meat was multiplied by 6.25 to obtain crude protein, that being the value usually assigned in calculating the energy of protein. The percentage of fat was multiplied by 9, and the per-

[1] 453.59 grams equal one pound.

[2] A large calorie is the amount of heat required to raise the temperature of one kilogram of water one degree Centigrade.

[3] 95 percent of the energy of fat and 92 percent of that of protein are available in the case of man. Hence, the approximate fuel values of fat and protein are 9=(9.45x95) and 4=(4.35x92) calories per gram respectively.

[4] Large calorie.

centage of protein by 4, and the two results added to give the total calories in the cut. Thus, in the flank, the percentage of fat is 57.16, and that of protein 10.12. Therefore, one hundred grams of the meat will yield 514.4 calories from the fat (57.16 x 9) and 40.5 calories from the protein (10.12 x 4), making a total of 554.9 calories.

The data in the table show, as would be expected, the high calorific value of those cuts which have a high percentage of fat. Thus, in the third column the flank, plate, rib, rump and loin cuts are from one and one-half to two times as great in fuel value as the shanks, round, and clod. These differences are shown in column 1. also, where the extremes are 514.4 calories for the flank and 161.6 calories for the clod. In column 4 the percentage distribution of calories in the fat is shown to range from 68.7 in the clod to 92.7 in the flank cut. In the rib and the loin cuts the fat furnishes 87.1 and 85.5 percent respectively of the fuel value, while in the shanks, round, and clod cuts the fat makes up about 69 percent. The protein, on the other hand, supplies from 7.3 percent of the total calorific value in the flank cut to 31.3 percent in the clod cut. In order to make a more direct comparison of the different cuts, the amount of boneless meat required to furnish 1000 calories has been calculated. These data, in the last column, show that the flank and plate cuts require the smallest amounts, 0.40 and 0.46 pounds respectively. The rib, rump, and loin cuts come next, averaging 0.54 pounds. The chuck and neck cuts follow with values averaging 0.71 pounds. The shanks and round run about the same, varying from 0.86 pounds for the hind shank to 0.88 pounds for the round and averaging 0.87 pounds for all three cuts. The clod cut requires the largest amount of boneless meat, 0.94 pounds, to furnish 1000 calories.

RELATIVE ECONOMY OF THE NUTRIENTS OF THE BONELESS MEAT OF THE WHOLESALE CUTS AT CURRENT MARKET PRICES

From the discussion of the distribution of the various nutrients in the eleven wholesale cuts of beef, it was seen that some of the cheaper cuts, such as the round, clod, chuck, and shanks, contained just as high or higher percentages of protein, organic extractives, and mineral matter as the more expensive cuts. The main difference between the cuts was in the fat content. Since meat is bought chiefly for the protein it contains and secondarily for fat, it will be of interest to compare the net cost of a given amount of protein from each cut, and also the cost of the meat from each cut needed to supply a definite number of calories. These data are given in Table 11.

TABLE 11.—COST OF MEAT REQUIRED TO FURNISH ONE POUND OF PROTEIN AND 1000 CALORIES FROM WHOLESALE CUTS AT MARKET PRICES

Wholesale cuts	Retail[1] price per pound, cents	Boneless meat in the cut, percent	Cost of pound boneless meat in cut, cents	Cost of pound protein in cut, cents	Cost of 1000 calories in cut, cents
Fore shank	5	59.56	8.4	50	7
Hind shank	5	48.84	10.2	63	9
Neck	6	84.31	7.1	46	5
Flank	8	99.44	8.0	85	3
Plate	8	91.23	8.7	82	4
Clod	10	95.18	10.5	63	10
Chuck	11	87.99	12.5	84	9
Rump	12	79.85	15.0	119	8
Round	15	90.39	16.6	101	15
Rib	18	85.56	21.0	171	11
Loin	22	90.23	24.4	188	14

[1]Average prices calculated from the retail prices given in Table 19, page 171.

The calculations are based upon the prices given in the first column. From the percentage of boneless meat, the retail cost per pound of the boneless meat in the cuts was obtained. Knowing the percentage of protein in the boneless meat (Table 7), and the percentage of boneless meat in the cut, the cost per pound of protein was calculated. The cheapest cuts for protein are the neck, shanks and clod. The neck furnishes a pound of protein for 46 cents; the fore shank for 50 cents; the hind shank for 63 cents, and the clod for 63 cents. The loin, rib, rump, and round furnish a pound of protein for the most money: the loin for $1.88; the rib for $1.71; the rump for $1.19, and the round for $1.01. The flank, plate, and chuck cuts supply a pound of protein for 85, 82, and 84 cents respectively. With reference to the cost of protein, the most economical cuts which are suitable for general use are the clod, plate, and chuck, in the order named.

From the cost per pound of the boneless meat and from the amount of boneless meat required to furnish 1000 calories (Table 10), it is possible to determine the cost of the meat necessary to supply the same fuel value for each cut. These results are given in the last column. They indicate that the eleven cuts can be grouped into four classes: first, the flank, plate, and neck, costing 3, 4 and 5 cents, respectively, per 1000 calories; second, the fore shank and the rump, costing 7 and 8 cents respectively; third, the hind shank, chuck, clod and rib, costing 9, 9, 10 and 11 cents respectively; and fourth, the loin and round, costing 14 and 15

cents respectively. Considering their adaptability for general use, the most economical cuts in terms of fuel value are the plate, rump, chuck, and clod.

It will be of interest to see which cuts of beef are the most economical for protein and fuel value combined. In the above discussion the relative order of the cuts is not the same in the two cases. The neck, shank, and plate are among the cheapest cuts in both instances, while the round, rib, and loin are the most expensive. From the standpoint of both protein and energy value, the most economical cuts adapted to general use are the clod, chuck, and plate, in the order named.

It should of course be borne in mind that some of these cheaper cuts are less tender and therefore more difficult to prepare for use than steaks and roasts. Nevertheless, in view of the fact that there is little difference between the various cuts as to their percentages of organic extractives and ash (the nutrients which assist in giving flavor and palatability to cooked meat), and since the digestibility[1] of protein is independent of the kind or cut of meat and of the method of cooking (broiling, roasting or boiling), the cheaper cuts, in general, may be said to compare favorably with the higher-priced ones, even in regard to flavor and palatability. Considering the further fact that they furnish more protein and fuel value per unit of meat, these cuts are evidently more economical sources of food nutrients.

RETAIL CUTS

The wholesale cuts (Fig. 3, page 143) were further divided into the various retail cuts that are commonly made in meat markets. Fig. 12 represents the manner of cutting and the location of the different cuts. The weight of each, taken immediately upon cutting, is recorded in the appendix (Tables 10-23). The cuts that required trimming to remove surplus fat and bone were so trimmed in accordance with meat-market custom, the trimmings and the trimmed cut being weighed in each case (Tables 24-38, Appendix). Each retail cut was then carefully separated by means of boning knives into lean, visible fat, and bone, and the weight of each portion recorded[2] (Tables 24-32, Appendix). In the case of trimmed cuts the different constituents of the trimmings were likewise separated and weighed (Tables 33-38, Appendix).

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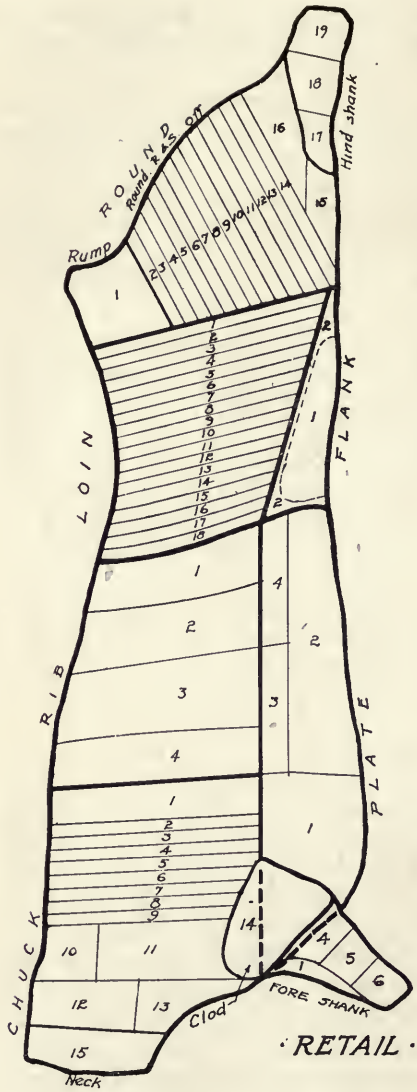
[1]Bulletin 162, U. S. Dept. Agr., O.E.S. (1903), by Grindley and Emmett; also Bulletin 193 by Grindley, Mojonnier, and Porter (1907).

[2]In the case of Steer No. 1 the weight of bone in each cut was determined by difference. In Nos. 2 and 3 the bone was weighed separately, which accounts for the slight amounts of loss and error recorded in those instances and in the general averages.



HIND QUARTER

ROUND
Rump
1 Rump
Round: rump & shank off.
2 Round steak, first cut.
3-13 Round steaks.
14 Round steak, last cut.
15 Knuckle soup bone.
16 Pot roast
Hind shank.
17, 18 Soup bones
19 Hock soup bone
LOIN
1 Butt-end sirloin steak.
2 Wedge-bone sirloin steak.
3,4 Round-bone " "
5,6 Double-bone " "
7 Hip-bone " "
8 Hip-bone Porterhouse steak.
9-15 Regular " "
16-18 Club steaks.
FLANK
1 Flank steak
2 Stew.

FORE QUARTER

RIB
1 11th & 12th Rib roast.
2 9th & 10th " "
3 7th & 8th " "
4 6th " "
CHUCK
1 5th Rib roast.
2-9 Chuck steaks.
10-13 Pot roasts.
14 Clod
15 Neck
PLATE
1 Brisket
2 Navel
3,4 Rib ends
FORE SHANK
1 Stew.
2 Knuckle soup bone.
3-6 Soup bones.

FIG. 12. METHOD OF CUTTING THE THREE SIDES, SHOWING RETAIL CUTS.

In order to compare the various retail cuts as to their relative amounts of lean, fat, and bone, the weights of these constituents have been reduced to percentages; and in the interest of brevity, average percentages of the respective constituents yielded by corresponding cuts from the three sides of beef are made the basis of the following summary and discussion. Tables 12 to 18, inclusive,

represent untrimmed cuts. Further differences brought about by trimming will be briefly summarized in connection with the discussion of the various cuts, and will be considered more specifically in the following section with reference to the question of relative economy.

LOIN

With reference to the proportions of lean and fat in the cuts of the loin (Table 12) it will be noticed that the sirloin steaks are in general leaner than the porterhouse and club steaks, and that all of the latter are comparatively similar in this respect. The percentage of bone varies considerably; and it is apparent that the double-bone, hip-bone and club steaks have relatively more bone than the remainder of the loin, owing to portions of the hip-bone contained

TABLE 12.—PERCENTAGES OF LEAN, VISIBLE FAT, AND BONE IN THE RETAIL CUTS

Retail loin cuts	Lean	Fat	Bone	Total
1. Sirloin steak (butt-end)	70.46	23.32	5.67	99.45
2. Sirloin steak (wedge-bone)	69.82	23.27	6.40	99.49
3. Sirloin steak (round-bone)	65.71	28.17	5.37	99.25
4. Sirloin steak (round-bone)	61.43	29.18	8.94	99.55
5. Sirloin steak (double-bone)	59.01	26.55	13.84	99.40
6. Sirloin steak (double-bone)[1]	68.69	17.72	12.49	98.90
7. Sirloin steak (hip-bone)[2]	50.11	31.73	16.05	97.89
8. Porterhouse steak (hip-bone)	54.39	32.88	11.51	98.78
9. Porterhouse steak	53.78	39.22	5.80	98.80
10. Porterhouse steak	53.56	39.24	6.64	99.44
11. Porterhouse steak	59.41	32.93	6.46	98.80
12. Porterhouse steak	56.22	35.96	6.84	99.02
13. Porterhouse steak	55.49	35.41	8.23	99.13
14. Porterhouse steak	54.83	34.33	9.52	98.68
15. Porterhouse steak	50.04	41.44	7.77	99.25
16. Club steak	55.38	36.35	7.89	99.82
17. Club steak	55.33	32.93	12.80	99.06
18. Club steak	54.10	33.81	11.19	99.10
19. Trimmings (wholesale)[3]	9.79	90.21	0	100.00
Entire loin	58.53	31.75	8.89	99.17

in the former and of the thirteenth rib in the latter. It is evident from these figures that while porterhouse steaks command a higher price than sirloin, they actually contain a smaller proportion of lean meat and more excess fat. See Figs. 13 to 28.

Trimming the retail cuts of the loin reduces their weight about 12 percent. (Tables 33 and 34, Appendix). The relative amount of trimmings is similar in the three classes of steaks; but those

[1]This cut was made from the loins of Steers Nos. 1 and 2 only.
[2]This cut was made from the loins of Steers Nos. 2 and 3 only.
[3]This cut was made from the loin of Steer No. 3 only.

from the porterhouse cuts contain the largest proportion of fat, while the sirloin trimmings contain the most bone. The trimmings from the various loin steaks consist of about 80 percent visible fat, 18 percent bone, and 2 percent lean.

RIB

Table 13 shows that the first cut of the rib contains the smallest proportion of lean meat, while the last cut, or sixth rib roast, is the leanest. The reverse is true of the percentage of fat. In terms of gross meat, i.e., lean and fat combined, the first roast is most valuable and the third cut least; moreover, the greater degree of tenderness and general quality in the first cut makes it the most popular and therefore the highest-priced of the rib roasts. Since, however, beef roasts are valuable primarily for the lean meat they contain, it is evident that the sixth rib is the most economical at a given price. See Figs. 29 to 32.

TABLE 13.—PERCENTAGES OF LEAN, VISIBLE FAT, AND BONE IN THE RETAIL CUTS

Retail rib cuts	Lean	Fat	Bone	Total
1. Roast (11th and 12th ribs)	49.44	37.74	12.41	99.59
2. Roast (9th and 10th ribs)	54.26	31.41	13.97	99.64
3. Roast (7th and 8th ribs)	56.00	27.81	15.79	99.60
4. Roast (6th rib)	61.43	23.72	14.27	99.42
Entire rib	55.21	30.17	14.18	99.56

ROUND

Comparing the retail cuts of the round (Table 14) it is found that the rump roast is made up of about one-half lean and one-third visible fat; the round steaks, from 73 to 85 percent lean and 9 to 22 percent visible fat; and the hind-shank soup bones are exceedingly variable in proportions of lean, visible fat, and bone. The various steaks are somewhat similar in percentage of lean meat, but cuts Nos. 5 to 12 contain noticeably less bone and more visible fat than those nearer the extremities of the round. The round pot roast, which is usually a boneless cut, contains a larger proportion of lean meat than any other cut of the round. The knuckle and hock soup bones consist very largely of bone, while the remaining soup-bone cuts have considerable percentages of lean. See Figs. 33 to 45.

Results of trimming the various round cuts are shown in Tables 35 and 36, Appendix. Rump roasts are thus reduced in weight by

TABLE 14.—PERCENTAGES OF LEAN, VISIBLE FAT, AND BONE IN THE RETAIL CUTS

Retail round cuts	Lean	Fat	Bone	Total
1. Rump roast	48.62	31.13	19.81	99.57
2. Round steak (first cut)	74.16	13.57	11.26	98.99
3. Round steak	76.99	13.19	9.02	99.20
4. Round steak	84.47	9.71	5.13	99.31
5. Round steak	83.12	12.94	3.33	99.39
6. Round steak	81.84	14.36	2.64	98.84
7. Round steak	78.79	17.63	2.52	98.94
8. Round steak	77.53	19.61	2.62	99.76
9. Round steak[1]	81.85	15.93	2.22	100.00
10. Round steak[1]	78.15	19.33	2.52	100.00
11. Round steak[1]	74.90	21.96	3.14	100.00
12. Round steak	73.73	21.95	3.77	99.45
13. Round steak[1]	81.02	14.36	4.62	100.00
14. Round steak	75.05	16.63	7.31	98.99
15. Knuckle soup bone	19.00	21.78	58.36	99.14
16. Pot roast	85.43	13.38	0.87	99.68
17. Shank soup bone	40.13	11.37	47.62	99.12
18. Shank soup bone	66.72	12.35	20.19	99.46
19. Shank soup bone (hock)	8.08	10.36	80.86	99.30
Entire round	64.61	18.03	16.63	99.27

[1]This cut was made from the round of Steer No. 1 only.

about one-third; and the rump trimmings are composed of about 56 percent bone, 30 percent fat and 14 percent lean. Fat only is trimmed from the round steaks, as a rule, and they are reduced only about 5 percent in weight. The greatest proportionate amount of trimmings is taken from the first cut steak, in which case the trimmings consist principally of bone; and, in general, the fifth to the eighth cuts are trimmed more than the remaining ones.

CHUCK

The fifth rib roast, taken from the chuck (Table 15), resembles the prime rib roast in regard to proportions of meat and bone, but exceeds them in relative amount of lean, just as the adjacent sixth rib roast shows the largest percentage of lean in the prime ribs (Table 13). It is also observed that the successive chuck steaks, which are cut anterior and parallel to the fifth rib roast, tend in general toward a larger proportion of lean meat with a smaller percentage of fat and bone. Three pot roasts, cuts Nos. 10, 11, and 12, cut next to the chuck steaks, vary considerably with respect to all three constituents, Nos. 10 and 12 resembling the chuck steaks, while No. 11 has a comparatively small percentage of lean and a large percentage of fat. The stew (No. 13), taken from the lower portion of the shoulder near the brisket, is the fattest cut of

TABLE 15.—PERCENTAGES OF LEAN, VISIBLE FAT, AND BONE IN THE RETAIL CUTS

Retail chuck cuts	Lean	Fat	Bone	Total
1. Roast (5th rib)	64.07	20.78	14.65	99.50
2. Chuck steak	62.11	18.80	18.33	99.24
3. Chuck steak	66.26	22.29	10.94	99.49
4. Chuck steak	72.41	15.81	11.37	99.29
5. Chuck steak	69.91	16.60	12.50	99.01
6. Chuck steak	75.64	14.23	9.68	99.55
7. Chuck steak	82.10	6.41	10.78	99.29
8. Chuck steak	75.60	13.60	10.28	99.48
9. Chuck steak	74.76	14.57	9.85	99.18
10. Pot roast	75.89	14.44	8.89	99.22
11. Pot roast	58.45	26.53	13.94	98.92
12. Pot roast	78.06	9.07	12.66	99.79
13. Stew	60.79	33.86	5.03	99.68
14. Clod	80.39	14.62	4.69	99.70
15. Neck	60.47	22.12	16.48	99.07
Entire chuck	69.47	18.63	11.26	99.36

the chuck, and contains but little bone. The neck piece is intermediate in proportionate amounts of edible meat and waste. The clod is the most economical cut of the chuck in point of gross meat, and, with one exception, also contains the highest percentage of lean. See Figs. 46 to 60.

Retail trimmings from the chuck (Tables 37 and 38, Appendix) consist chiefly of neck scraps, these making up nearly half the total trimmings taken from the chuck of Steer No. 1 and about one-third in the case of Steer No. 2. The chuck roast and steaks are trimmed to about the same extent as the round steaks, amounting to 5 percent of their weight; the trimmings consisting largely of bone. Of the remaining cuts only No. 11 (the pot roast adjacent to the clod and knuckle) requires much trimming, the surplus in this case being chiefly fat and bone. On the average the chuck cuts are reduced in weight by about 10 percent, and the trimmings are composed of about 40 percent fat, 30 percent lean and 30 percent bone.

PLATE

The two principal divisions of the plate, viz., the brisket and the navel, are remarkably similar in proportions of lean, visible fat, and bone (Table 16). The rib ends, which are small pieces cut from the upper portion of the navel, contain relatively more bone and less lean than the remainder of the plate, but are similar to it in percentage of visible fat. The wholesale trimmings consist chiefly of surplus fat taken from the lower edge of the plate. See Figs. 61 to 64.

TABLE 16.—PERCENTAGES OF LEAN, VISIBLE FAT, AND BONE IN THE RETAIL CUTS

Retail plate cuts	Lean	Fat	Bone	Total
1. Brisket	53.33	38.81	7.78	99.92
2. Navel	54.87	37.22	7.91	100.00
3. Rib ends	49.44	37.31	12.35	99.10
4. Rib ends	50.79	36.39	12.36	99.54
5. Wholesale trimmings	13.89	86.11	0	100.00
Entire plate	50.61	40.73	8.47	99.81

FLANK

About half the weight of the flank cut from prime cattle consists of surplus fat which must be trimmed off and sold for tallow (Table 20, Appendix). A boneless steak is then stripped off, which, in this test, consisted of about 83 percent lean and the remainder, visible fat. The rest of the flank (cut No. 1) is stewing meat containing about two parts of lean to one of visible fat. See Figs. 65 and 66.

TABLE 17.—PERCENTAGES OF LEAN, VISIBLE FAT, AND BONE IN THE RETAIL CUTS

Retail flank cuts	Lean	Fat	Bone	Total
1. Stew	64.11	34.79	.58	99.48
2. Flank steak	83.05	16.44	0	99.49
3. Trimmings (wholesale)	.37	99.63	0	100.00
Entire flank	36.30	63.18	0.25	99.73

FORE SHANK

The boneless stewing piece taken from the front of the shank (cut No. 1) contains a larger proportion of both lean and fat than the shank soup-bone cuts. Of the latter, it is seen in Table 18 that

TABLE 18.—PERCENTAGES OF LEAN, VISIBLE FAT, AND BONE IN THE RETAIL CUTS

Retail fore-shank cuts	Lean	Fat	Bone	Total
1. Stew	82.58	17.10	0	99.68
2. Soup bone (knuckle)	29.38	11.12	58.68	99.18
3. Soup bone	28.03	10.98	60.23	99.24
4. Soup bone	39.88	13.14	46.61	99.62
5. Soup bone	68.88	5.68	25.16	99.72
6. Soup bone	17.43	6.51	74.94	98.88
Entire shank	47.61	11.63	40.20	99.44

the two cuts nearest the chuck (Nos. 2 and 3) are very similar, containing small proportions of lean and much bone. In the next two cuts the percentage of lean increases and that of bone decreases. The fifth cut contains a remarkably large percentage of lean and of gross meat, while the sixth cut, containing about 75 percent of bone, has the smallest relative amount of meat. See Figs. 67 to 69.

RELATIVE ECONOMY OF THE VARIOUS RETAIL CUTS

From the proportions of lean, fat and bone in the different cuts, their relative economy at retail market prices may be determined. The net cost of lean meat is an approximate index of the relative economy of steaks and roasts, since they are purchased and used primarily for the lean they contain; but in comparing boiling, stewing, and similar meats, the cost of gross meat, or fat and lean combined, should be more largely considered, because the fat is more completely utilized, as in the case of meat loaf, hash, Hamburger and corned beef. Soup bones, being valued for flavoring matter as well as for the nutritive substance they contain, are more difficult to compare with other cuts in respect to relative economy. They vary materially, however, in proportions of edible meat and waste, and should therefore be studied in this connection.

The relative cost of lean meat in a given cut consists of the price per pound paid for the cut divided by the percentage of lean it contains; and, similarly, the cost per pound of gross meat is the market price of the cut divided by its total percentage of lean and fat meat. For example, in a steak costing 20 cents per pound and composed of 80 percent lean, 10 percent visible fat and 10 percent bone, the net cost per pound of lean is 20 cents ÷ .80, or 25 cents, and the net cost per pound of total meat is 20 cents ÷ .90 (.80 + .10), or 22.2 cents.

Retail prices of beef cuts vary widely, depending upon market prices of live cattle and carcass beef; also upon the method of cutting and trimming used, and upon local customs and conditions. Consequently, the relative economy of the different cuts varies accordingly and cannot, therefore, be expressed in fixed terms The following table is based upon prices charged for the highest grade of beef cuts in first-class city meat markets. Altho it fairly represents the relative net cost of the retail cuts under the conditions stated, the table is designed primarily to illustrate the method by which the relative economy of different cuts may be calculated for any given scale of prices.

Table 19 is based upon Tables 13, 16, 17 and 18 of the text, and, in the case of cuts that were trimmed, Tables 26, 29 and 32, Appendix. In case it is desired to compare the untrimmed cuts,

then Tables 12 to 18 inclusive in the foregoing text should be used as the basis, and prices assigned accordingly.

TABLE 19.—COST OF LEAN AND OF TOTAL MEAT IN THE VARIOUS RETAIL CUTS AT MARKET PRICES

RETAIL CUTS	Diagram number Fig. 12)	Retail price per pound of cut, cents	Cost per pound of lean meat in cut, cents	Cost per pound of lean and fat meat in cut, cents
STEAKS				
Porterhouse, hip-bone	8	25	38.6	28.9
Porterhouse, regular.....	10	25	40.2	27.2
Club steak	18	20	32.1	22.6
Sirloin, butt-end.....	1	20	25.3	20.6
Sirloin, round-bone	3	20	28.3	21.1
Sirloin, double-bone	5	20	28.7	22.7
Sirloin, hip-bone	7	20	32.3	24.2
Flank steak	1	16	19.3	16.0
Round, first cut.....	2	15	17.0	15.3
Round, middle cut	6	15	17.3	15.6
Round, last cut.....	14	15	19.3	16.0
Chuck, first cut.....	2	12	18.3	14.1
Chuck, last cut	9	12	15.7	13.1
ROASTS				
Prime ribs, first cut.....	1	20	40.5	22.9
Prime ribs, last cut.....	4	16	26.1	18.8
Chuck, 5th rib	1	15	22.8	17.3
Rump	1	12	19.4	12.8
BOILING AND STEWING PIECES				
Round pot roast	16	10	11.6	10.1
Shoulder clod	14	10	12.3	10.5
Shoulder pot roast	11	10	14.3	11.6
Rib ends	3	8	16.2	9.2
Brisket	1	8	15.0	8.7
Navel	2	7	12.8	7.7
Flank stew	2	7	10.9	7.1
Fore shank stew	1	7	8.5	7.0
Neck	15	6	8.5	7.0
SOUP BONES				
Round, knuckle	2	5	26.3	12.5
Hind shank, middle cut....	18	5	7.5	6.3
Hind shank, hock.....	19	5	62.5	26.6
Fore shank, knuckle.....	2	5	17.2	12.5
Fore shank, middle cut....	4	5	12.5	9.4
Fore shank, end	6	5	28.8	20.9

Taking the net cost of the lean meat as a basis of comparison, we learn from these data that the most expensive steaks at the prices given are the porterhouse cuts, followed by the club, sirloin, flank, round, and chuck steaks. Of the different roasts, the first-cut prime ribs are the most costly in terms of lean meat, and the rump roast is the most economical. The various boiling and stewing pieces furnish

lean meat more economically at market prices than either the roasts or steaks; the rib ends and brisket being the dearer cuts of this class, while the neck and shank stews are relatively cheapest. Several of the soup bones are very economical sources of lean meat, particularly the middle cuts of both shanks; and only one of them is extremely expensive, even on this basis. In general, the wide variation between the various cuts in net cost of lean is remarkable, ranging from 7.5 cents in one of the soup bones to 40.5 cents in a prime rib roast, and up to 62.5 cents in the hock soup bone; the latter, however, being used primarily for its flavoring substance rather than for lean meat. It will be observed, also, that the market prices of the cheaper cuts correspond much more closely to their net cost of lean meat than is true of the higher-priced steaks and roasts.

The net cost per pound of gross meat, or lean and fat combined, varies much less as between the different cuts than does the net cost per pound of lean, because the proportions of total meat are more nearly uniform than the percentages of lean. The various steaks and roasts rank in substantially the same order as to relative economy on this basis as on the basis of lean meat. The rib roasts, however, are considerably more economical as compared with the porterhouse and sirloin steaks when all the edible meat is considered. The rump shows a very low cost per pound of edible meat, due to the large proportion of fat it contains; and a still further difference is noticed in the case of the rib ends, brisket, navel, flank, neck, and several of the soup-bone cuts. The stewing meats are generally the most economical sources of edible meat at these prices, while porterhouse steaks are the most expensive.

On the whole, the data clearly show that the cheaper cuts of beef are by far the most economical sources both of lean and of total edible meat, including fat and lean. It has been shown elsewhere (page 156) that no correlation exists between market prices and the proportion of flavoring substances contained in various portions of the carcass; and cooking tests indicate that the proportion of waste and shrinkage is not necessarily greater in the cheaper than in the more expensive cuts.[1] It is evident, therefore, that retail prices of beef cuts are determined chiefly by considerations other than their food value, such as tenderness, grain, color, general appearance, and convenience of cooking.

In view of these facts, Table 19 constitutes a striking illustration of the irrational standards which characterize the demand for beef, and of the consequent wide variation in prices between retail beef cuts from different portions of the carcass. A careful study

[1]Bulletin 162, U. S. Dept. Agr., O.E.S. (1903), by Grindley and Emmett.

of these data, together with Fig. 12 and the following photographs of all the cuts from Steer No. 3, will enable the reader to purchase the various retail cuts of choice beef with respect to the relative amounts of edible meat and waste they contain, and thus to profit by the prevailing discrepancies in market prices.

CONCLUSIONS

1. The relative efficiency of different types of cattle or systems of production cannot be accurately compared without considering the adaptability of the beef to the purpose for which it is used.

2. Those who would buy meats most intelligently must know the nature of the different cuts, especially with reference to the proportions of lean meat, fat, and bone they contain and the food value of edible meat cut from different parts of the carcass.

3. It is highly essential to the entire beef-cattle industry, on the one hand, and the economic welfare of the beef-eating public, on the other, that a more intelligent understanding of the different cuts of meat be acquired by consumers generally.

SLAUGHTER TESTS

4. *Dressed Beef.*—The proportion of chilled dressed beef to live weight yielded by the two choice steers used in these investigations was 60.36 and 60.88 percent respectively, and that of the prime steer was 63.97 percent. Page 140

5. *Internal Fat.*—The killing fats yielded by the three steers were 5.15, 5.97, and 4.71 percent respectively (live weight basis). Notwithstanding the high condition of Steer No. 3, this animal yielded the lowest percentage of internal fat, indicating marked efficiency for beef production. Page 140

6. *Hides.*—The yields of hides were 7.48, 6.51, and 6.43 percent respectively (live weight basis). Page 140

7. *Offal.*—Steer No. 1 yielded the largest proportion of head, feet, tail, tongue, heart, liver, lungs, trachea, paunch, intestines, and spleen. Steer No. 3 had the smallest relative weight of offal. Page 140

WHOLESALE CUTS

8. *Percent Yield.*—Average yields of straight cuts were: loins, 16.76 percent; ribs, 9.77; rounds, 21.78; chucks, 21.89; plates, 15.63; flanks, 5.15; fore shanks, 4.97; and kidney suet, 4.06. Page 142

6. *Lean, Fat, and Bone.*—The proportion of lean in the various straight wholesale cuts varied from about one-third in the flank to about two-thirds in the chuck; the extreme percentages of visible fat were 11 percent in the shank and 63 percent in the

flank; and the percentage of bone ranged from practically nothing in the flank to 40 percent in the shank. In general, the cuts containing a large percentage of lean had a small percentage of visible fat, and vice versa, while the relative weight of bone was more variable. Page 145

The relative amounts of lean, visible fat, and bone in the hind and fore quarters were as follows: hind quarter, 54.42 percent lean, 34.55 percent visible fat, and 10.71 percent bone; fore quarter, 59.12 percent lean, 26.69 percent visible fat, and 13.73 percent bone. Page 145

The three sides of beef used in this experiment averaged about 57 percent lean meat, 30 percent visible fat, and 12 percent bone. Page 145

7. *Relative Economy.*—The net cost per pound of lean meat is, in general, greatest in the cuts which command the highest prices, and vice versa. Further, the more expensive the cut, the greater the cost per pound of visible fat and lean combined. Thus the relative food values of the various cuts do not correspond to their market prices, the cheaper cuts being by far the more economical sources both of lean and of total edible meat. Page 147

Nutritive Value of the Boneless Meat of the Various Wholesale Cuts

8. *Dry Substance.*—The average water content of the edible meat of the wholesale cuts varied from 32 percent in the flank to 63 percent in the clod; and consequently the total dry substance ranged from 37 percent in the clod to 68 percent in the flank. The percentage of soluble dry substance varied inversely as that of total dry substance in the various cuts. Page 150

9. *Fat.*—In general, the various wholesale cuts stood in the same order with respect to the percentages of both total fat and total dry substance contained in the edible meat; in other words, the higher the percentage of fat, the lower the percentage of water. The total fat content varied from 18 percent in the clod to 57 percent in the flank. Page 151

10. *Protein.*—Protein, the most essential food constituent of beef, varied in the different cuts inversely as the dry substance and fat. The maximum percentage, 16.98, was found in the shank; and the minimum, 9.44, in the flank. Soluble protein varied from 0.66 to 2.08 percent, and was, in general, proportional to total protein in the different cuts. If calculated to the fat-free basis, the eleven wholesale cuts correspond closely in percentages of protein, ranging only from 20 to 22 percent. Page 152

11. *Organic Extractives.*—These varied from 0.76 percent in the flank to 2.06 percent in the round. The ratio of nitrogenous

to non-nitrogenous extractives in the various cuts was similar. A rather close correlation existed between the relative amounts of protein and those of organic extractives, indicating that the leaner cuts contained larger proportions of organic extractives than did those rich in fat. No relation seemed to exist between the market prices and the flavoring constituents of the various cuts. The high-priced cuts (the loin and rib) contained considerably smaller percentages of organic extractives than did several of the cheaper cuts. These statements do not take into account the influence of marbling upon flavor of the different cuts. Page 155

12. *Ash.*—The percentage of ash varied from 0.40 in the flank to 0.87 in the round. The soluble ash formed from 70 to 87 percent of the total. There was a tendency for both the soluble and the total ash to be higher in the cheaper cuts, and since these, especially the soluble form, contribute to the palatability of meat, there would seem to be no relation between market prices and the palatability of different cuts. Page 157

13. *Phosphorus.*—Phosphorus, like total mineral matter, was most abundant in the leaner cuts of beef, and vice versa, and its relative amounts were therefore independent of current market prices of the various cuts. The percentage of phosphorus in the meat varied from 0.077 in the flank to 0.184 in the round. Page 158

14. *Fuel Value.*—The relative fuel value is a significant factor in considering the nutritive value of meat. It depends primarily on the fat content, the fatter cuts of meat being highest in fuel value. One hundred grams of meat from the flank furnished the maximum calories, 554.9, and one hundred grams from the clod furnished the minimum number, 235.1. It required from 0.40 pound of boneless meat in the flank to 0.94 pound in the clod to furnish 1000 calories. Page 159

15. *Relative Economy.*—There seems to be no relation between market prices and the percentages of fat, protein, extractives, and ash. The cheaper cuts appear to be as valuable and in some cases actually more so than the higher-priced cuts from the standpoint of protein and of energy. These statements do not take into account the factors of tenderness nor the influence the degree of fatness may have upon the palatability of cooked meat. In purchasing meat for protein primarily, the neck, shanks and clod are the most economical cuts; the plate, chuck, flank and round follow; with the rump, rib, and loin as the most expensive. From the standpoint of fuel value, the flank, plate, neck, and shank cuts are the cheapest, while the rib, loin, and round are the most expensive. Considering both factors, protein and fuel value, and along with

these the adaptability of the meat for general use the clod, chuck, and plate are the most economical cuts at the retail prices given. Page 161

RETAIL CUTS

16. *Loin Cuts.*—Loin steaks averaged 59 percent lean, 32 percent visible fat, and 9 percent bone. Sirloin steaks in general contained a greater proportion of lean and smaller proportion of fat than porterhouse and club steaks. Page 165

17. *Rib Cuts.*—Rib roasts contained, on the average, 55 percent lean, 30 percent visible fat, and 15 percent bone. The greatest percentage of lean was found in the sixth rib roast, and the smallest in the eleventh and twelfth rib cut. Page 166

18. *Round Cuts.*—The various cuts made from the round averaged 65 percent lean, 18 percent visible fat, and 17 percent bone. Round steaks contained 74 to 84 percent lean; the rump roast, 49 percent; round pot roast, 85 percent; and soup bones, 8 to 66 percent. The maximum percentage of fat was found in the rump roast, and the maximum percentage of bone, in the hock soup bone. Page 166

19. *Chuck Cuts.*—These contained an average of 69 percent lean, 19 percent fat, and 11 percent bone. Chuck steaks varied from 62 to 82 percent lean, and from 6 to 22 percent fat. The shoulder clod contained 80 percent lean and only 5 percent bone. Relatively more lean and less fat were found in the chuck rib roast than in those cut from the prime rib. Page 167

20. *Plate Cuts.*—The brisket, navel, and rib ends averaged 51 percent lean, 41 percent fat, and 8 percent bone. The brisket and navel were similar in proportions of the different constituents, but the rib ends were slightly higher in percentage of bone and lower in lean. Page 168

21. *Flank Cuts.*—The flank steak contained 83 percent lean and 16 percent fat; and the flank stew, 64 percent lean and 35 percent fat. Page 169

22. *Fore Shank Cuts.*—Soup bones from the fore shank varied from 17 to 69 percent lean, and from 25 to 75 percent bone. The boneless shank stew contained 83 percent lean and 17 percent visible fat. Page 169

23. *Retail Trimmings.*—Trimming the loin steaks reduced their weight 12 percent, and the trimmings were about four-fifths fat and one-fifth bone. Round and chuck steaks were reduced but 5 percent in weight by trimming, only fat being taken from the former, as a rule, and principally bone from the latter. Other cuts that were materially affected by cutting off surplus fat and bone were the rump, shoulder pot roast, and neck. Pages 165-168

24. *Relative Economy.*—Of the various steaks, the porterhouse cuts were highest in net cost of edible meat, and chuck steaks lowest. Of the roasts, the first cut of the prime ribs was relatively dearest and the rump cheapest. The most expensive boiling and stewing cuts, in terms of edible meat, were the shoulder pot roast and clod, while the rib ends and brisket cost the most with respect to lean meat alone, and the shank stew and neck were most economical, either as source of lean or of total meat. Soup bones were exceedingly variable in relative economy, the middle cuts from the shanks being relatively cheapest, and the hock and end of the fore shank most expensive. Page 170

In general, the low-priced cuts were by far the most economical sources both of lean and of total edible meat. It is evident, therefore, that market prices of the various retail cuts of beef are determined chiefly by considerations other than their relative food values. Page 172

In the preparation of samples and in the analytical work of this investigation, valuable assistance was rendered by P. F. Trowbridge, Elizabeth C. Sprague, L. F. Shackell and J. M. Barnhart.

PHOTOGRAPHS OF THE RETAIL CUTS

The following figures, Nos. 13 to 69, are photographs of all the retail cuts of steer No. 3. As previously stated, this was the fattest of the three steers and was not only highly finished, but somewhat over-done. Consequently the illustrations do not represent ideal cuts of beef, but show a larger proportion of fat than usually is desirable. The photographs were taken before trimming. For the amount and nature of the trimmings from each cut see Tables 33 to 38, Appendix. The numbers of the retail cuts refer to those indicated in Fig. 12, page 164. The instances in which these numbers are not consecutive are due to slight differences in thickness of the cuts. Below is shown the order of the photographs.

	Fig. No.
Loin steaks	13 to 28
Rib roasts	29 to 32
Rump roast	33
Round steaks	34 to 42
Round pot roast and soup bones	43 to 45
Chuck rib roast	46
Chuck steaks	47 to 54
Chuck pot roasts and stews	55 to 60
Plate cuts: brisket, navel and rib ends	61 to 64
Flank steak and stew	65 to 66
Fore shank stew and soup bones	67 to 69

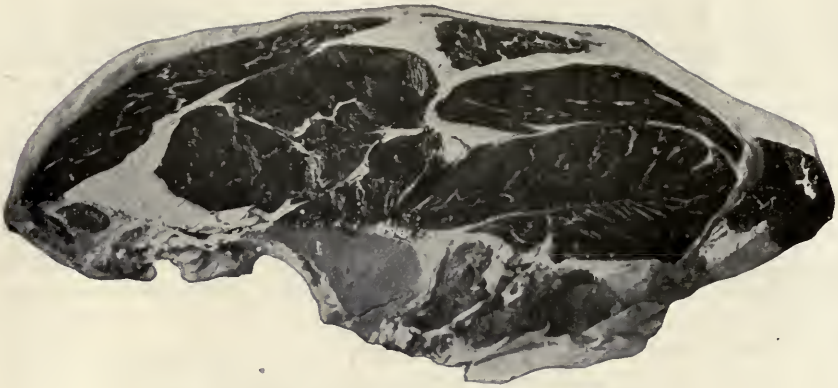


Fig. 13. Butt-end sirloin steak. Loin Cut No. 1.

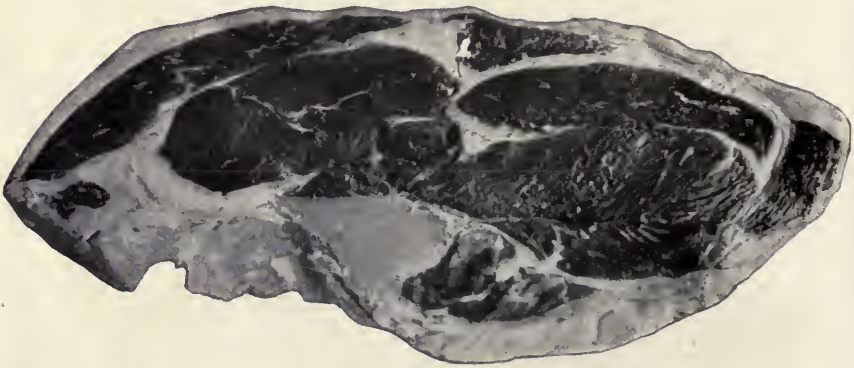


Fig. 14. Wedge-bone sirloin steak. Loin cut No. 2.

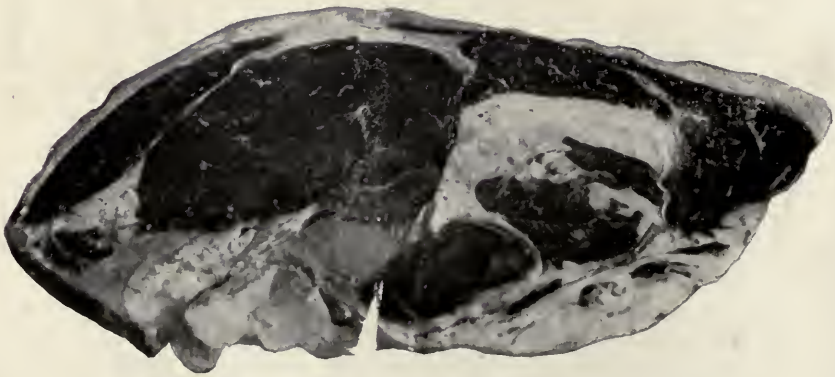


Fig. 15. Round-bon sirloin steak. Loin cut No. 3.

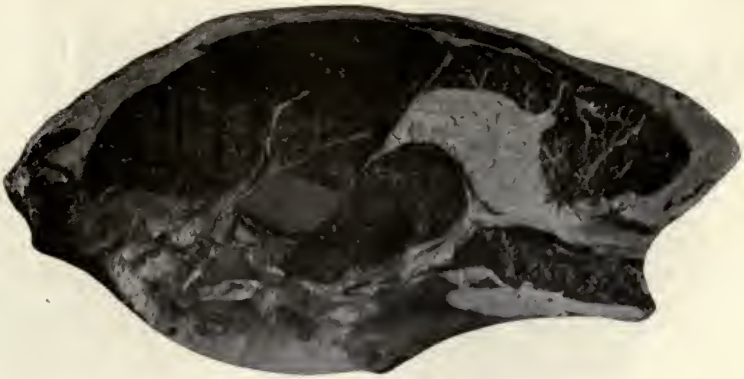


Fig. 16. Round-bone sirloin steak. Loin cut No. 4.

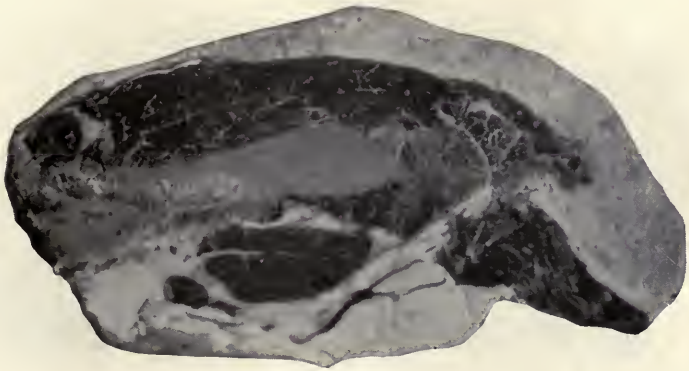


Fig. 17. Double-bone sirloin steak. Loin cut No. 5.

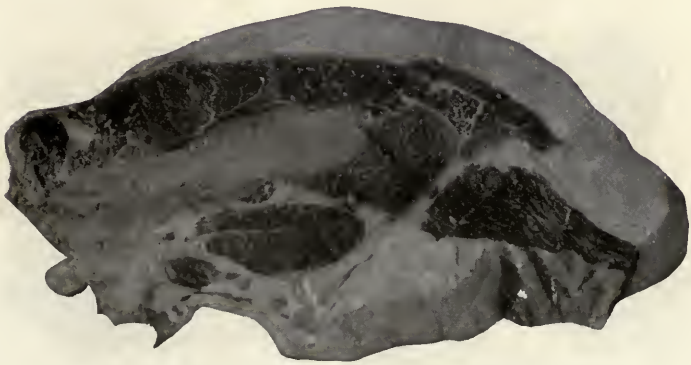


Fig. 18. Hip-bone sirloin steak. Loin cut No. 7.

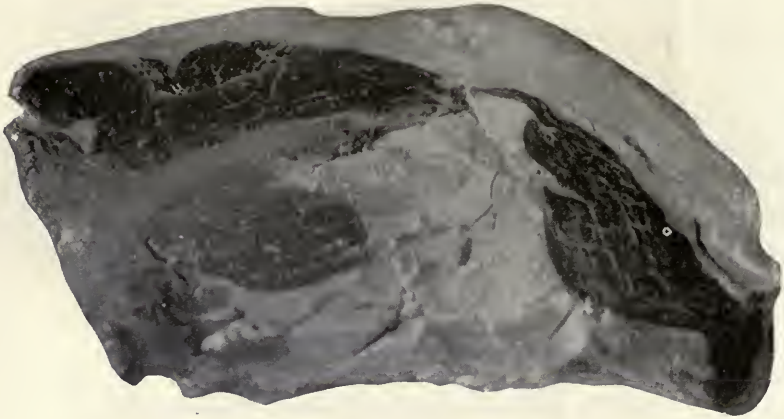


Fig. 19. Hip-bone porterhouse steak. Loin cut No. 8.

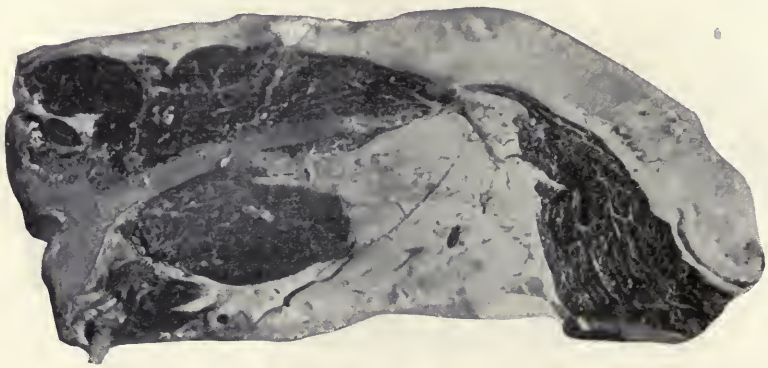


Fig. 20. Regular p rterhouse steak. Loin cut No. 9.

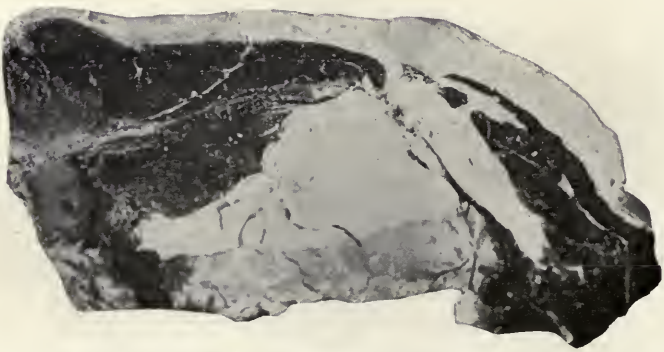


Fig. 21. Regular porterhouse steak. Loin cut No. 10.

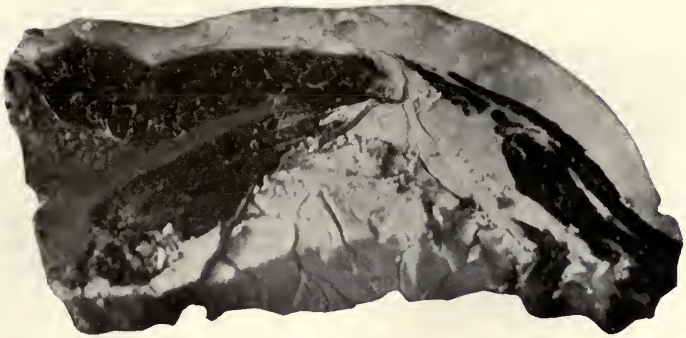


Fig. 22. Regular porterhouse steak. Loin cut No. 12.

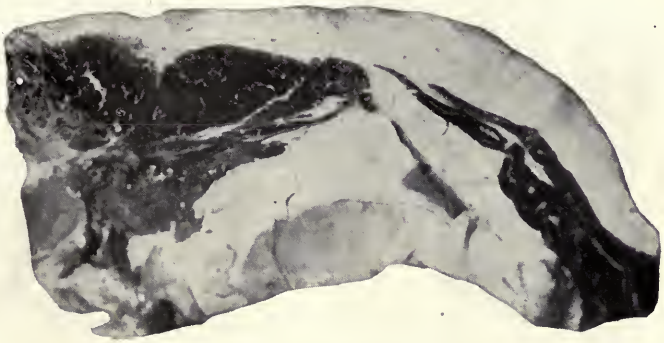


Fig. 23. Regular porterhouse steak. Loin cut No. 13.

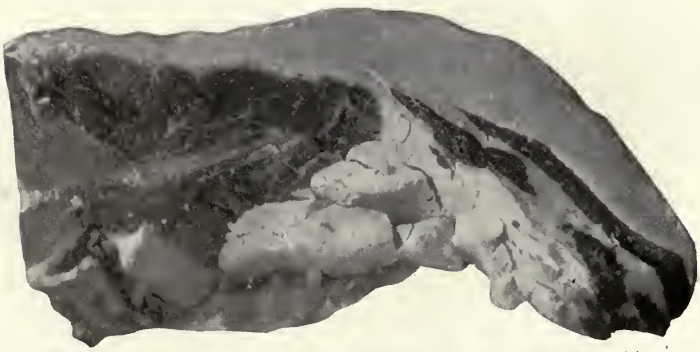


Fig. 24. Regular porterhouse steak. Loin cut No. 14.

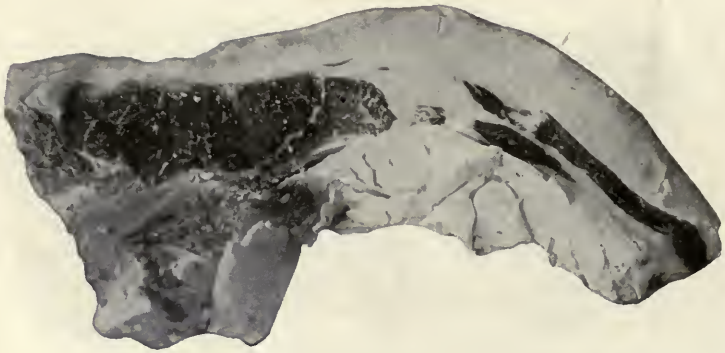


Fig. 25. Regular porterhouse steak. Loin cut No. 15.

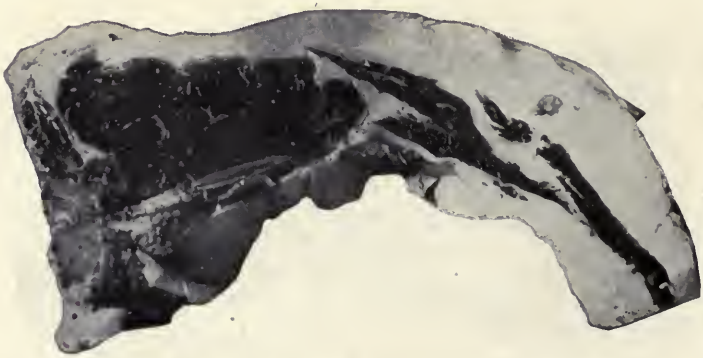


Fig. 26. Club steak. Loin cut No. 16.

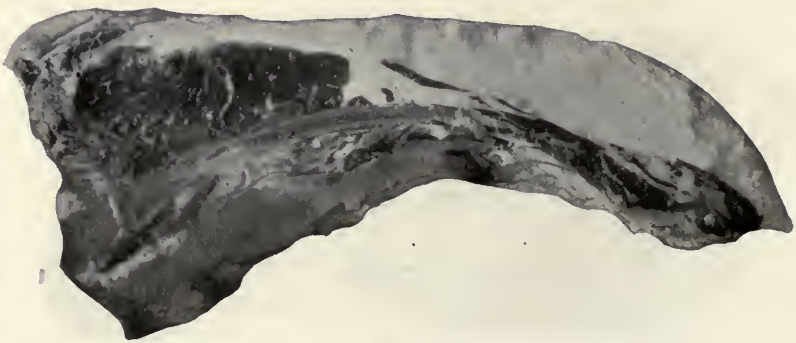


Fig. 27. Club steak. Loin cut No. 17.

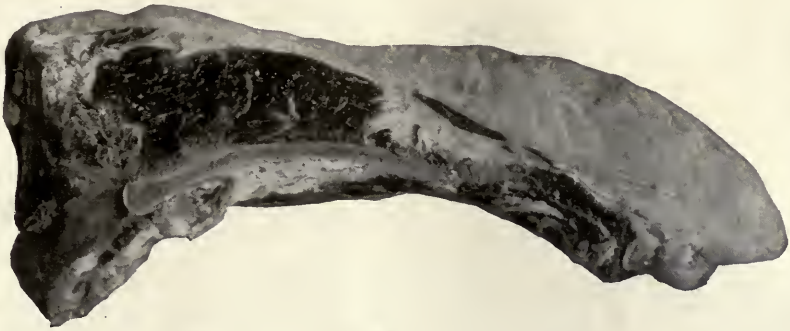


Fig. 28. Club steak. Loin cut No. 18.

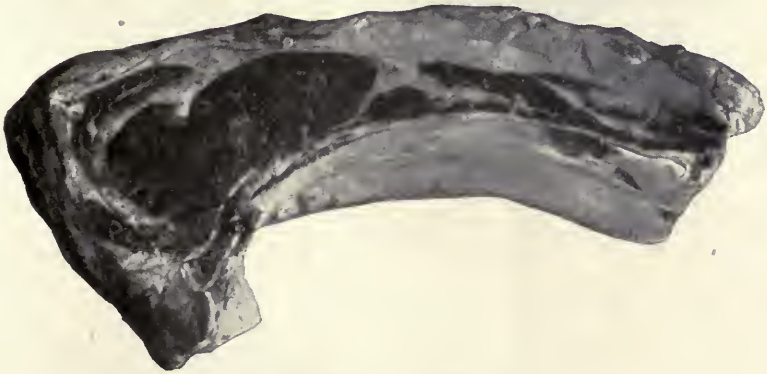


Fig. 29. 11th and 12th rib roast. Rib cut No. 1.

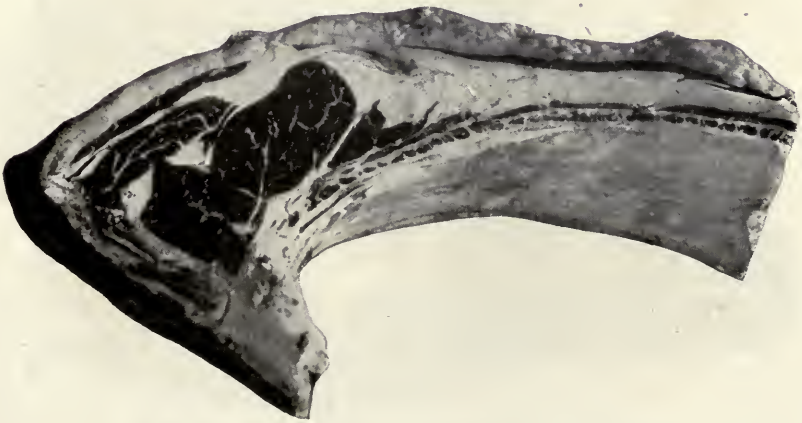


Fig. 30. 9th and 10th rib roast. Rib cut No. 2.

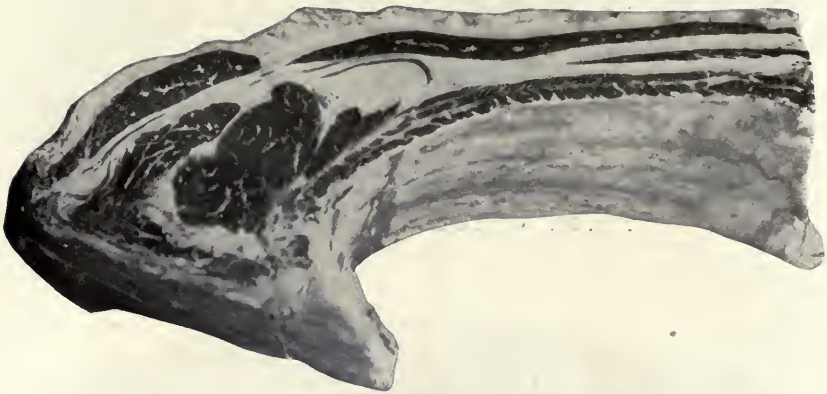


Fig. 31. 7th and 8th rib roast. Rib cut No. 3.

Fig. 32. 6th rib roast. Rib cut No. 4.

Fig. 33. Rump roast. Round cut No. 1.

Fig. 34. Round Steak. Round cut No. 2.

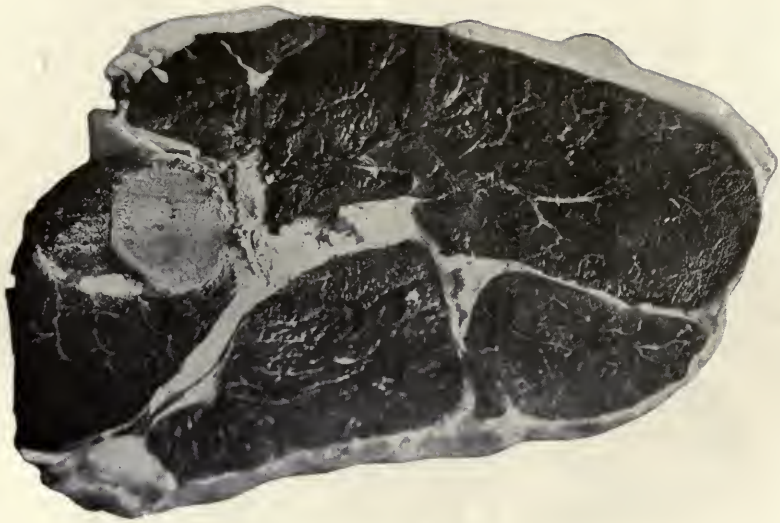


Fig. 35. Round steak. Round cut No. 3.

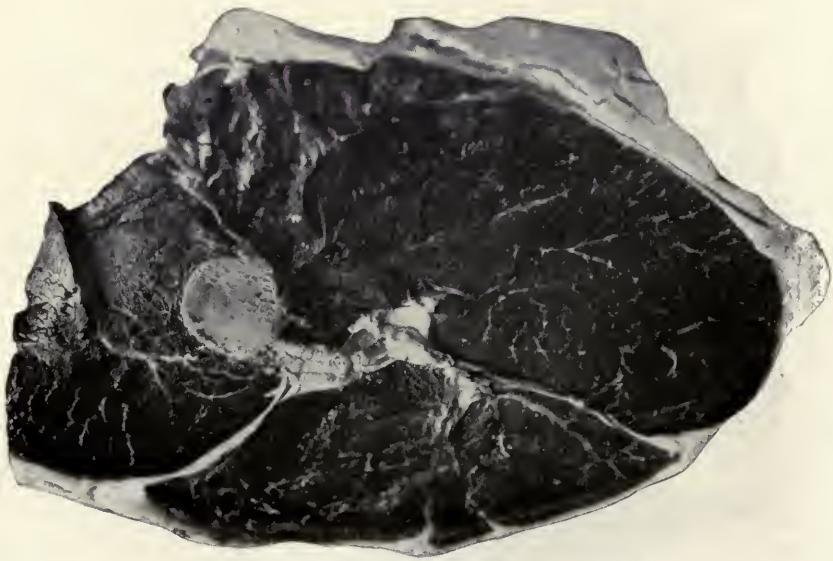


Fig. 36. Round steak. Round cut No. 4.

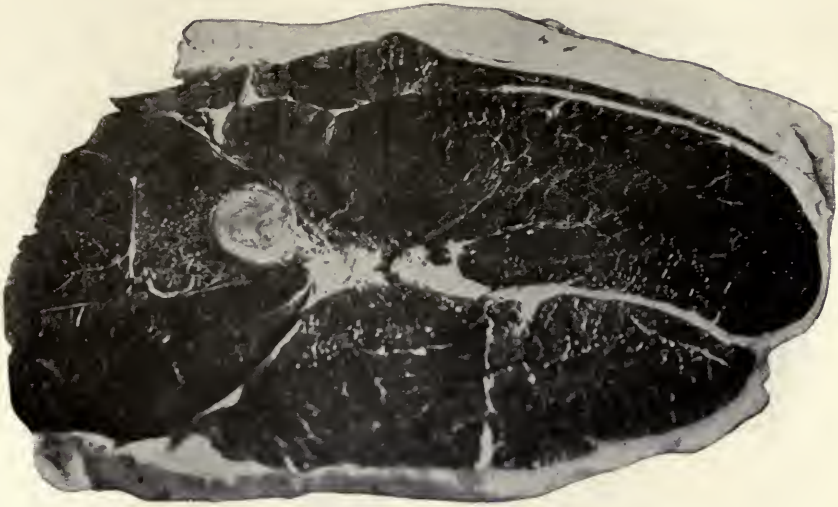


Fig. 37. Round steak. Round cut No. 5.

Fig. 38. Round steak. Round cut No. 6.

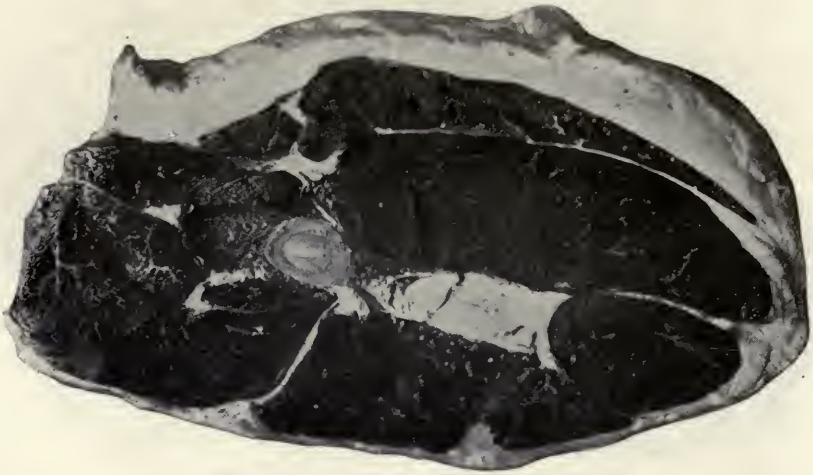


Fig. 39. Round Steak. Round cut No. 7.

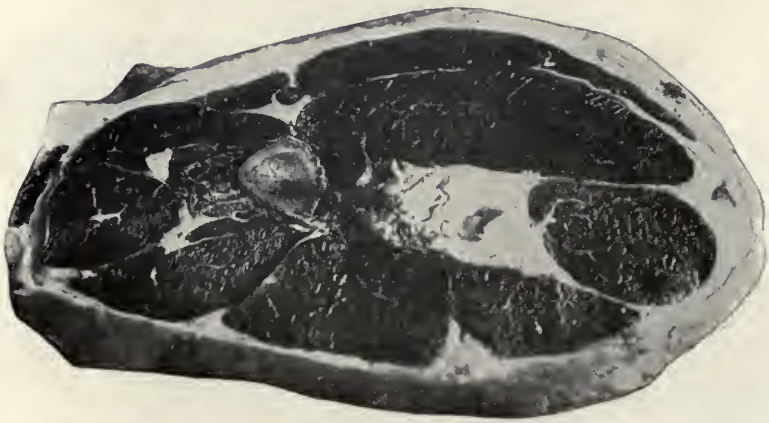


Fig. 40. Round steak. Round cut No. 8.

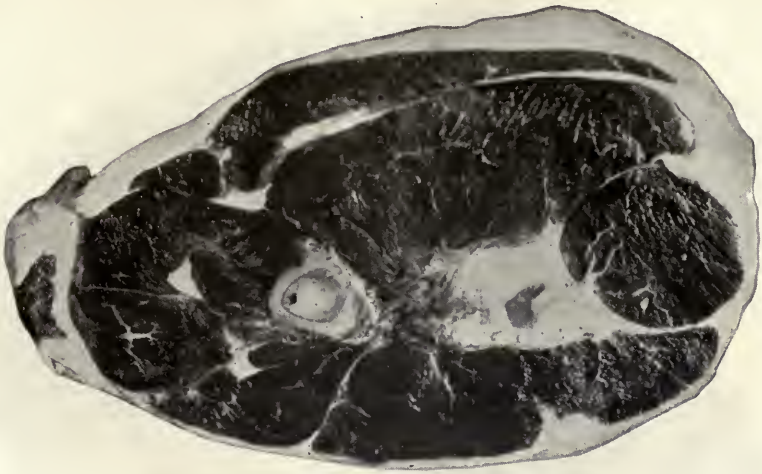


Fig. 41. Round steak. Round cut No. 12.

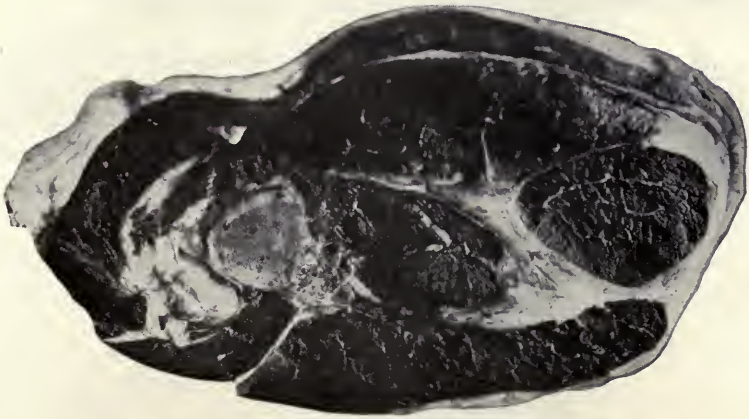


Fig. 42. Round steak. Round cut No. 14.

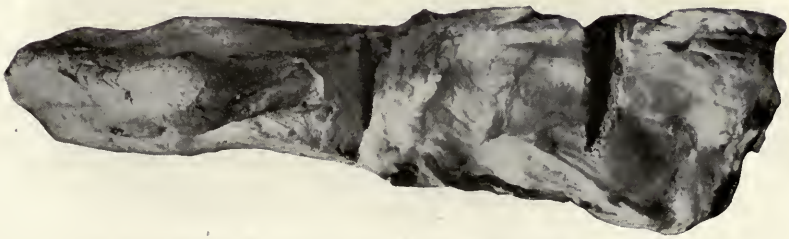


Fig. 43. Hind shank soup bone. Round cuts Nos. 17, 18, 19.

Fig. 44. Round pot roast. Round cut No. 16.

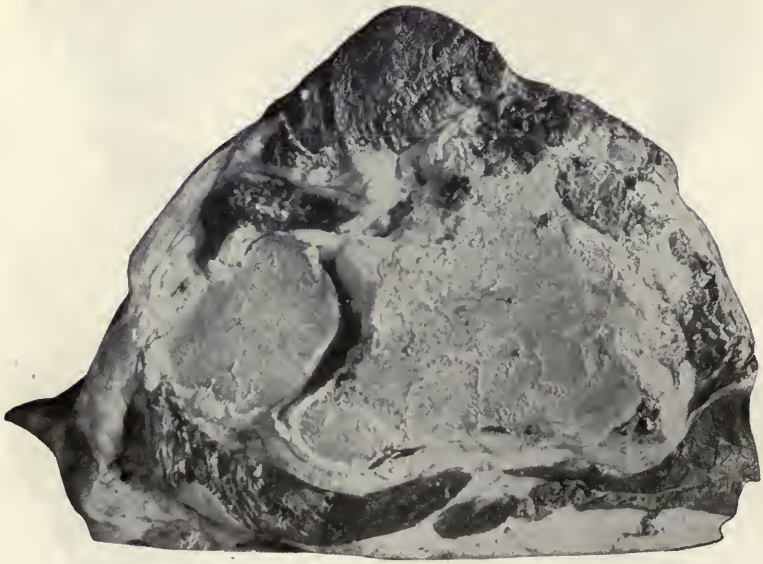


Fig. 45. Knuckle soup bone. Round cut No. 15.

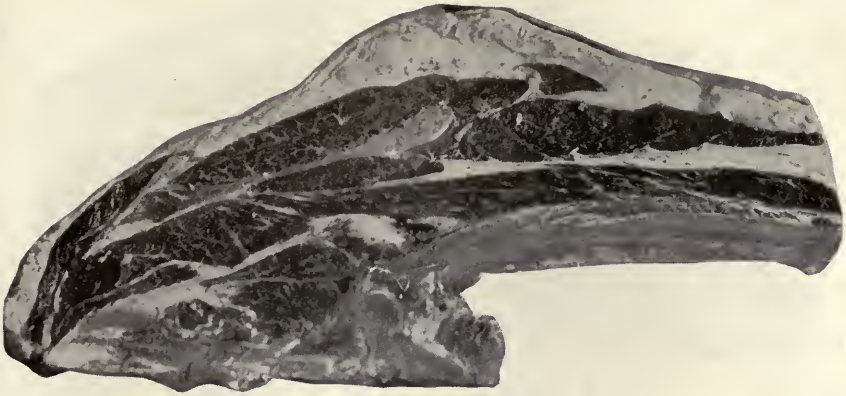


Fig. 46. Chuck rib roast. Chuck cut No. 1.

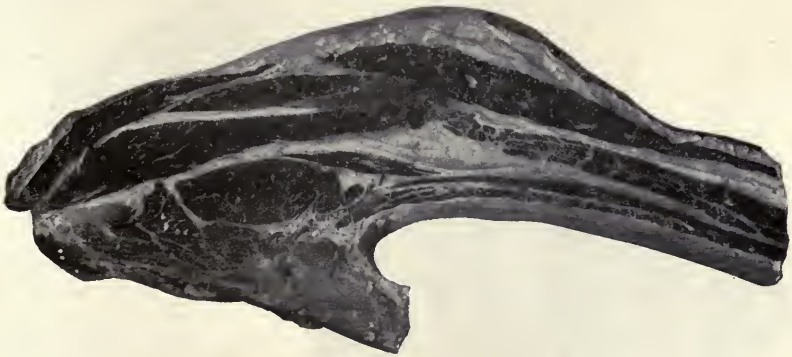


Fig. 47. Chuck steak. Chuck cut No. 2.

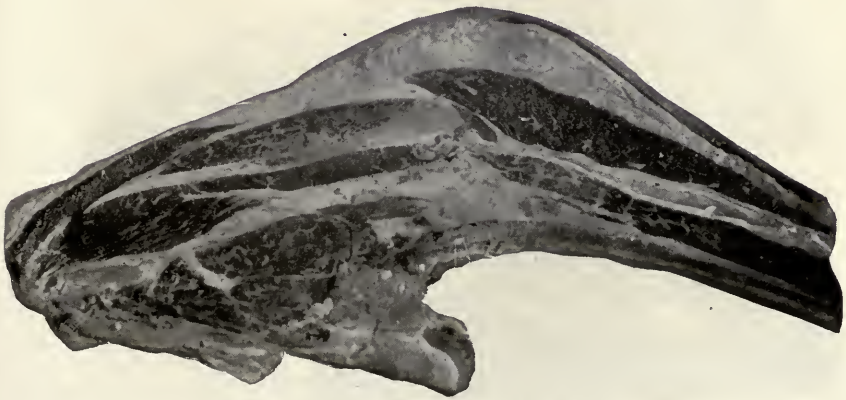


Fig. 48 Chuck steak. Chuck cut No. 3.

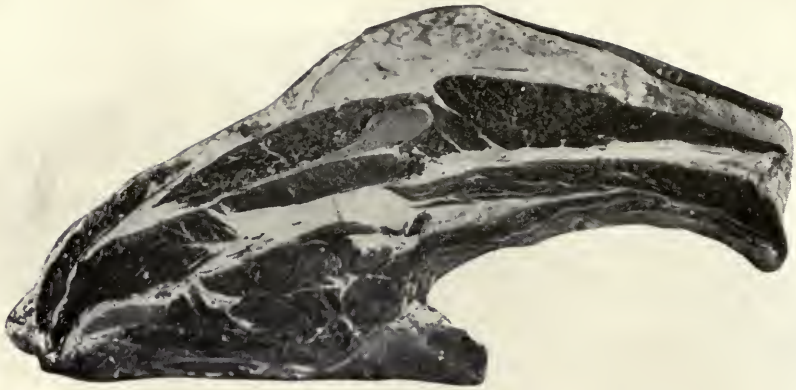


Fig. 49. Chuck steak. Chuck cut No. 4.

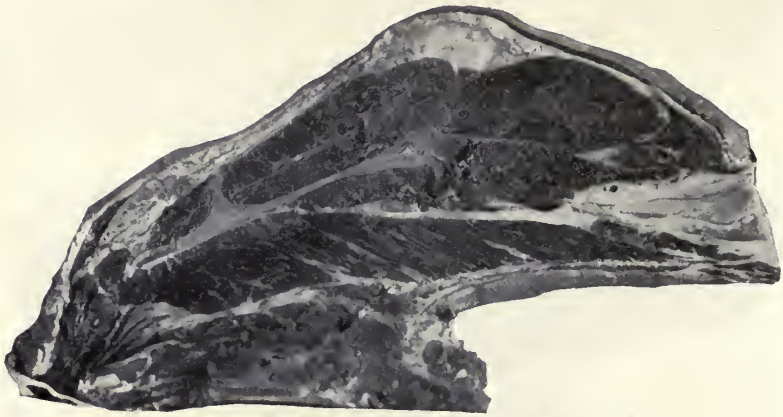


Fig. 50. Chuck steak. Chuck cut No. 5.

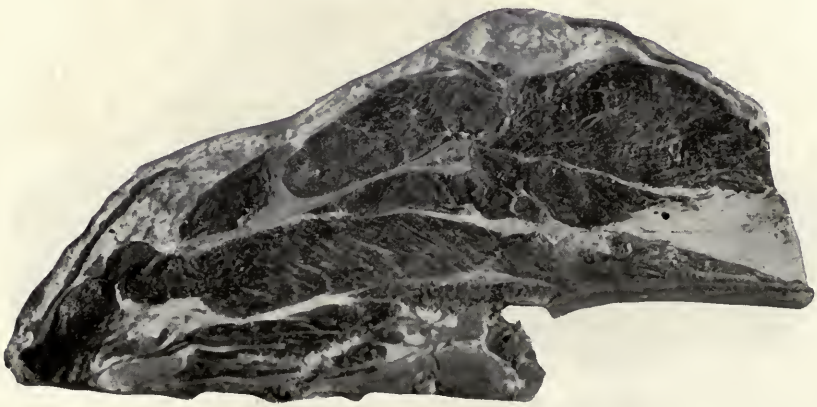


Fig. 51. Chuck steak. Chuck cut No. 6.

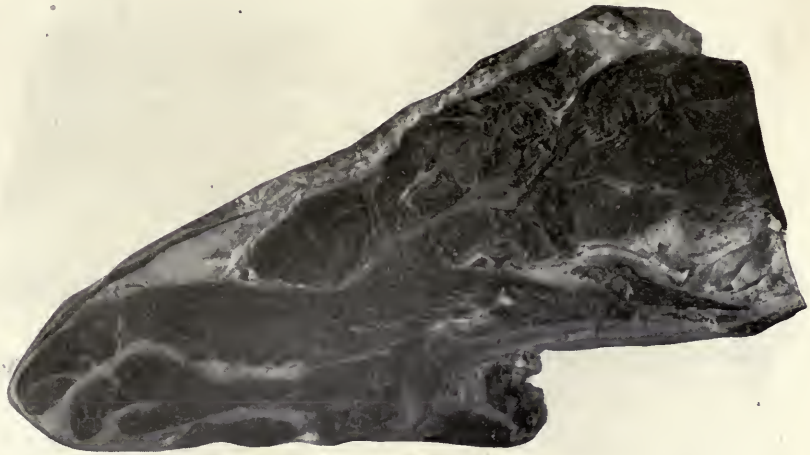


Fig. 52. Chuck steak. Chuck cut No. 7.

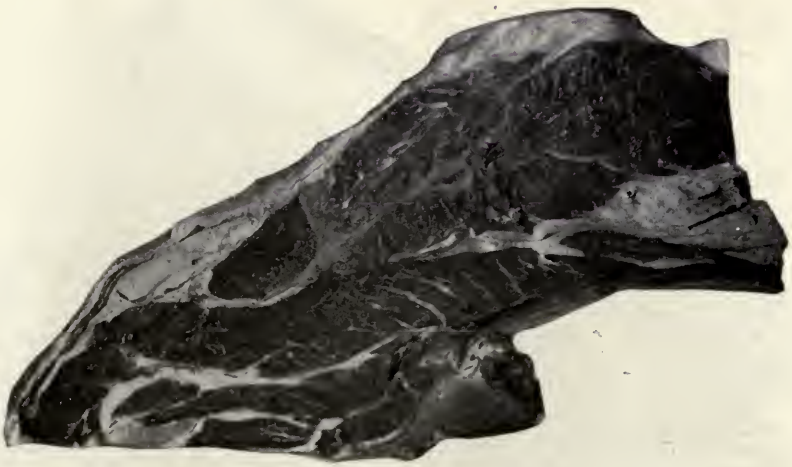


Fig. 53. Chuck steak. Chuck cut No. 8.

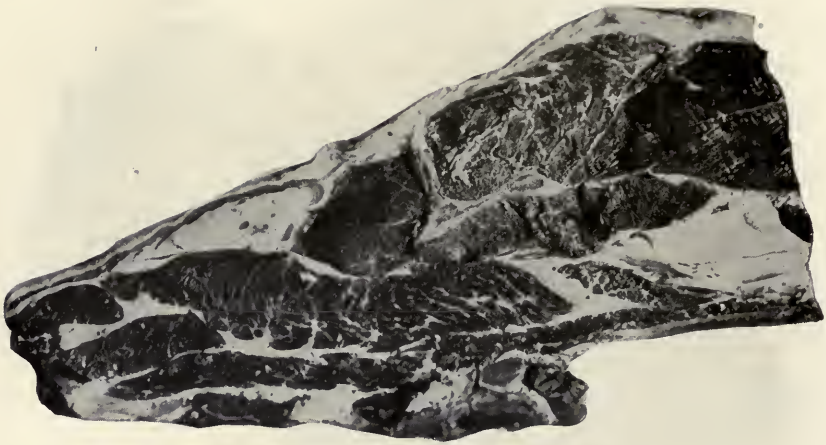


Fig. 54. Chuck steak. Chuck cut No. 9.

Fig. 55. Shoulder pot roast. Chuck cut No. 10.

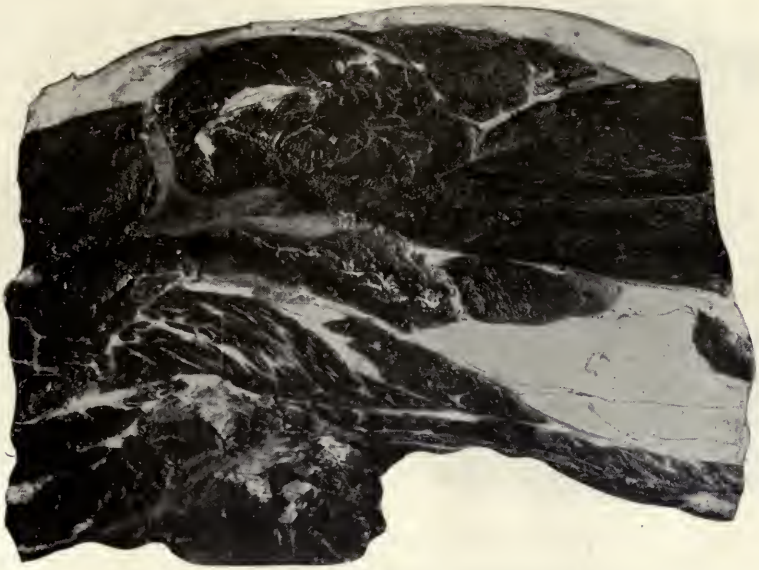


Fig. 56. Shoulder pot roast. Chuck cut No. 11.

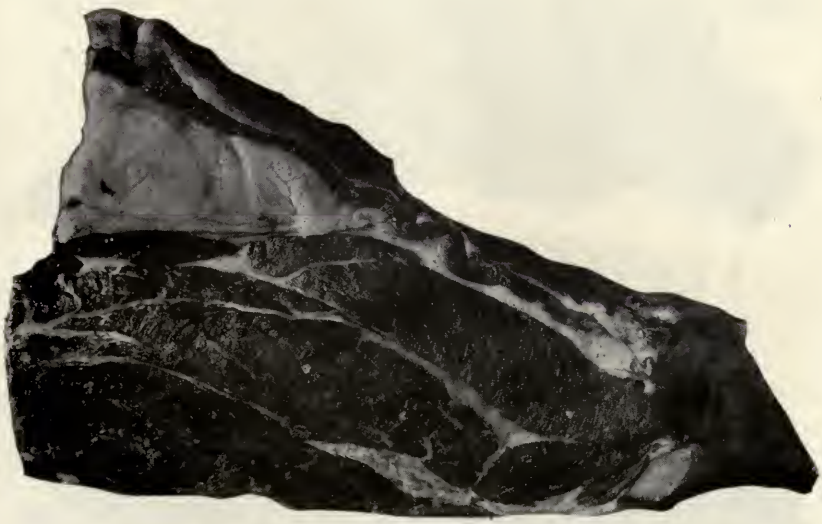


Fig. 57. Shoulder pot roast. Chuck cut No. 12.

Fig. 58. Chuck stew. Chuck cut No 13.

Fig. 59. Shoulder clod. Chuck cut No. 14.

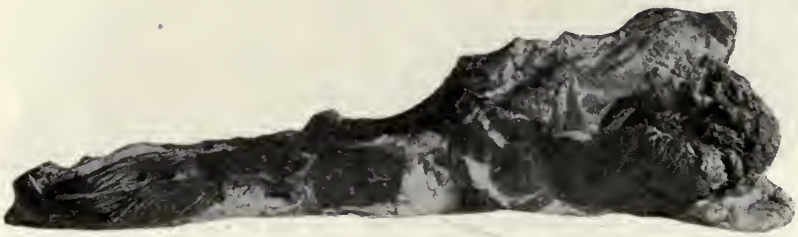


Fig. 60. Neck Chuck cut No. 15.

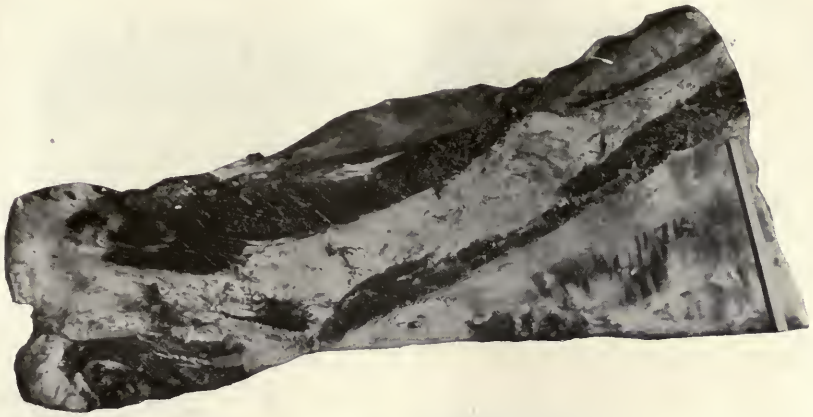


Fig. 61. Brisket. Plate cut No. 1.

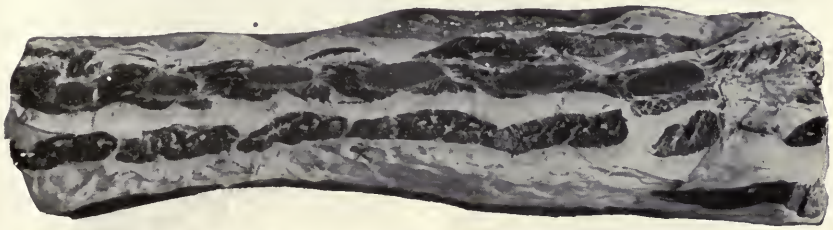


Fig. 62. Navel. Plate cut No. 2.

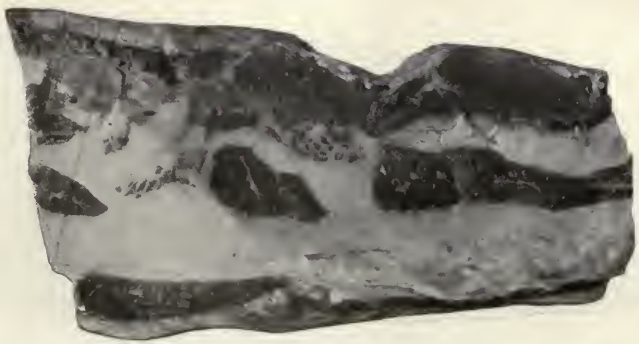


Fig. 63. Rib ends. Plate cut No. 3.

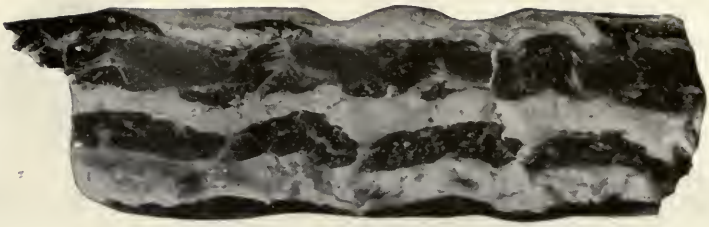


Fig. 64. Rib ends. Plate cut No. 4.

Fig. 65. Flank stew. Flank cut No. 1.

Fig. 66. Flank steak. Flank cut No. 2.

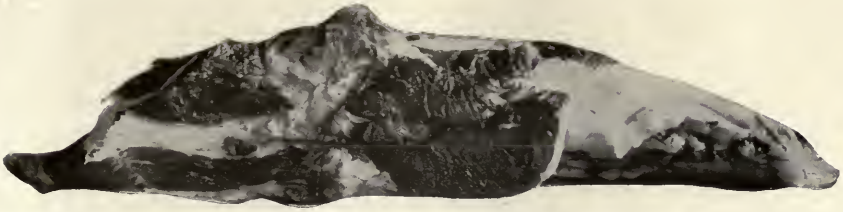


Fig. 67. Shank Stew. Fore shank cut No. 1.

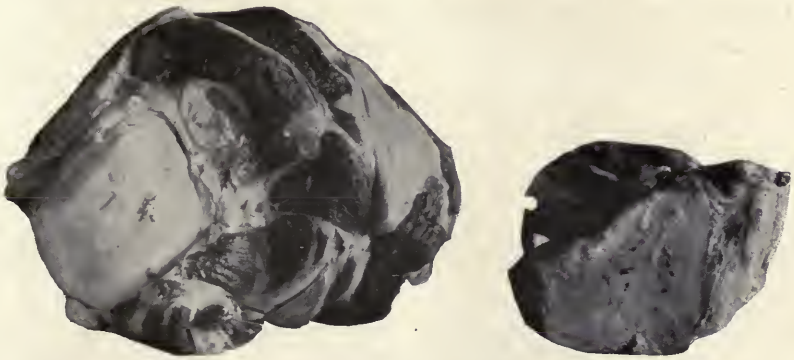


Fig. 68. Knuckle soup bones. Fore shank cuts Nos. 2, 3.

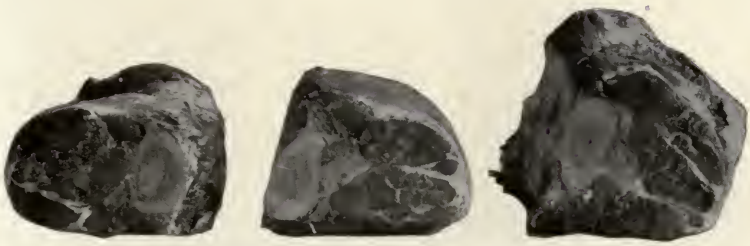


Fig. 69. Fore shank soup bones. Fore shank cuts Nos. 4, 5, 6.

APPENDIX

The results presented in the text of this bulletin are, in the main, averages based on data obtained from the carcasses of three steers, one side of beef being used in each instance. For the convenience of any who may wish to study the individual results, the cutting tests and chemical analyses are tabulated in full on the following pages.

Wholesale cuts of three sides of beef:
Weights and percentages of lean, visible fat, and bone. Tables 1 and 2.....Pages 201-202
Chemical analysis of boneless meat from three sides of beef:
Percentage composition of wholesale cuts, Tables 3, 4 and 5 .....Pages 203-205
Percentage composition and weight of nutrients in fore quarter, hind quarter, and entire side. Tables 6 and 7 .....Pages 206-207
Ratio, non-protein to protein nitrogen in the wholesale cuts. Table 8.....Page 208
Percentage composition of visible fat. Table 9.....Page 208
Retail cuts from three sides of beef:
Weights and percentages of lean, visible fat, and bone in entire cuts. Tables 10 to 23.....Pages 209-218
Weights and percentages of lean, visible fat, and bone in trimmed loin, round, and chuck cuts. Tables 24 to 32 .....Pages 219-227
Weights and percentages of lean, visible fat, and bone in trimmings from loin, round and chuck cuts. Tables 33 to 38.....Pages 228-233

TABLE 1.—LEAN, VISIBLE FAT, AND BONE IN THE WHOLESALE CUTS, EXPRESSED IN POUNDS

Wholesale cuts	Steer No. 1				Steer No. 2				Steer No. 3			
	Lean	Fat	Bone	Total[1]	Lean	Fat	Bone	Total[1]	Lean	Fat	Bone	Total[1]
Loin	26.81	12.19	3.58	42.58	38.70	17.80	5.61	63.45	36.38	27.17	6.64	70.46
Rib	15.24	6.94	4.35	26.53	20.68	10.26	4.37	35.78	20.49	14.34	5.69	40.52
Round	39.37	10.30	10.48	60.15	51.48	10.59	13.66	77.12	56.75	21.41	13.59	92.11
Round, R. and S. off	30.27	5.81	3.51	39.59	41.54	6.58	5.47	54.58	45.26	13.82	5.28	64.36
Hind shank	3.12	.54	4.49	8.15	3.87	.64	5.69	10.42	4.41	2.68	5.53	12.63
Rump	6.00	3.95	2.49	12.44	6.01	3.44	2.50	12.11	7.08	4.90	2.77	14.75
Chuck	43.96	10.15	7.75	61.86	54.97	12.80	7.93	77.07	60.46	20.93	10.03	91.55
Chuck, knuckle out	35.27	7.66	6.46	49.39	46.91	11.05	7.25	66.38	53.87	18.92	8.80	81.89
Clod	3.45	.55	.22	4.22	4.76	.58	.25	5.64	4.74	1.29	.28	6.31
Neck	5.23	1.93	1.09	8.25	3.33	1.15	.44	5.06	1.84	.72	.97	3.53
Plate	20.95	15.36	3.82	40.13	29.09	18.28	4.29	51.95	31.63	35.34	5.53	72.50
Flank	5.80	8.71	.02	14.53	7.58	11.53	.06	19.30	6.06	14.25	.06	20.37
Fore shank	7.20	1.15	5.58	13.93	7.86	1.27	7.09	16.50	9.55	4.16	8.25	21.96
Kidney suet	.95	9.70	0	10.65	.93	16.10	0	17.03	1.00	14.06	0	15.06
Entire side	160.28	74.50	35.58	270.36	211.24	98.65	43.41	357.72	222.33	151.66	49.79	424.56

[1]Includes loss and error in weighing.

TABLE 2.—LEAN, VISIBLE FAT, AND BONE IN THE WHOLESALE CUTS, EXPRESSED IN PERCENT

Wholesale cuts	Steer No. 1				Steer No. 2				Steer No. 3			
	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total
Loin	62.96	28.63	8.41	100.00	60.99	28.05	8.84	97.88	51.63	38.56	9.41	99.60
Rib	57.44	26.16	16.40	100.00	57.80	28.67	12.21	98.68	50.57	35.39	14.04	100.00
Round	65.46	17.12	17.42	100.00	66.75	13.73	17.71	98.19	61.61	23.24	14.75	99.60
Round, R. and S. off	76.46	14.67	8.87	100.00	76.11	12.06	10.02	98.19	70.32	21.47	8.20	99.99
Hind shank	38.46	6.51	55.03	100.00	37.14	6.14	54.61	97.89	34.92	21.22	43.78	100.00
Rump	48.23	31.75	20.02	100.00	49.63	28.38	20.65	98.66	47.98	33.26	18.76	100.00
Chuck	71.06	16.41	12.53	100.00	71.32	16.61	10.29	98.22	66.04	22.86	10.96	99.86
Chuck, knuckle out	71.41	15.51	13.08	100.00	70.67	16.65	10.92	98.24	65.78	23.10	10.75	99.63
Clod	81.75	13.03	5.21	100.00	84.40	10.28	4.43	99.11	75.00	20.55	4.45	100.00
Neck	63.39	23.28	13.33	100.00	65.81	22.73	8.69	97.23	52.21	20.36	27.43	100.00
Plate	52.21	38.27	9.52	100.00	55.99	35.11	8.26	99.37	43.63	48.74	7.63	100.00
Flank	39.92	59.94	.14	100.00	39.27	59.74	.31	99.32	29.71	69.85	.29	99.85
Fore shank	51.69	8.25	40.06	100.00	47.64	7.70	42.97	98.30	43.49	18.94	37.57	100.00
Kidney suet	8.92	91.08	0	100.00	5.46	94.54	0	100.00	6.64	93.36	0	100.00
Entire side	59.28	27.56	13.16	100.00	59.05	27.58	12.14	98.77	52.37	35.72	11.73	99.82

TABLE 3.—CHEMICAL COMPOSITION OF THE BONELESS MEAT OF THE WHOLESALE CUTS FROM STEER NO. 1, EXPRESSED IN PERCENT

Constituents	Hind shank	Round	Rump	Loin	Rib	Flank	Plate	Chuck	Clod	Neck	Fore shank
Water	63.62	61.75	46.97	50.02	49.08	33.03	40.69	56.54	65.07	55.27	60.79
Dry substance											
Soluble	4.22	4.84	3.58	3.83	3.28	1.82	2.45	3.82	4.68	3.60	3.81
Insoluble	32.89	33.18	49.81	46.70	47.90	65.59	56.94	40.54	30.77	41.36	35.64
Total	37.11	38.02	53.39	50.53	51.18	67.41	59.39	44.36	35.45	44.96	39.45
Soluble protein											
Coagulable protein	1.60	2.21	1.28	1.42	1.22	.70	.84	1.38	2.01	1.41	1.39
Non-coagulable protein	.24	.12	.11	.14	.12	.08	.09	.29	.22	.28	.09
Total	1.84	2.33	1.39	1.56	1.34	.78	.93	1.67	2.23	1.69	1.48
Insoluble protein	15.27	14.31	11.51	11.91	11.80	9.55	10.32	13.59	15.11	13.25	15.19
Total protein	17.11	16.64	12.90	13.47	13.14	10.33	11.25	15.26	17.34	14.94	16.67
Organic extractives											
Nitrogenous	.84	.89	.66	.79	.68	.34	.51	.76	.78	.69	.79
Non-nitrogenous	.81	.89	1.00	.93	.73	.39	.58	.74	.98	.61	.87
Total	1.65	1.78	1.66	1.72	1.41	.73	1.09	1.50	1.76	1.30	1.66
Fat	17.47	18.73	38.23	34.76	36.02	55.97	46.56	26.82	15.46	28.00	20.30
Ash											
Soluble	.73	.73	.54	.55	.53	.30	.43	.65	.70	.60	.67
Insoluble	.14	.14	.06	.03	.10	.07	.06	.13	.19	.12	.15
Total	.87	.87	.60	.58	.63	.37	.49	.78	.89	.72	.82
Nitrogen											
Soluble coagulable protein	.255	.353	.205	.226	.196	.112	.124	.230	.322	.183	.223
Soluble non-coagulable protein	.038	.020	.016	.024	.018	.014	.025	.036	.033	.087	.014
Total protein	.293	.373	.221	.250	.214	.126	.149	.266	.355	.270	.237
Soluble non-protein	.269	.286	.212	.253	.218	.110	.163	.246	.252	.224	.251
Total soluble nitrogen	.562	.659	.433	.503	.432	.236	.312	.512	.607	.494	.488
Insoluble protein	2.444	2.289	1.843	1.906	1.888	1.527	1.650	2.176	2.419	2.119	2.431
Total nitrogen	3.006	2.948	2.276	2.409	2.320	1.763	1.962	2.688	3.026	2.613	2.919
Phosphorus											
Soluble inorganic	.095	.082	.055	.066	.067	.044	.045	.088	.100	.086	.093
Soluble organic	.035	.042	.029	.031	.029	.011	.030	.025	.044	.021	.024
Total soluble	.130	.124	.084	.097	.096	.055	.075	.113	.144	.107	.117
Insoluble	.050	.069	.048	.049	.037	.027	.031	.056	.046	.041	.059
Total phosphorus	.180	.193	.132	.146	.133	.082	.106	.169	.190	.148	.176

TABLE 4.—CHEMICAL COMPOSITION OF THE BONELESS MEAT OF THE WHOLESALE CUTS FROM STEER NO. 2, EXPRESSED IN PERCENT

Constituents	Hind shank	Round	Rump	Loin	Rib	Flank	Plate	Chuck	Clod	Neck	Fore shank
Water	62.65	61.94	46.65	49.09	45.37	33.32	42.45	57.78	63.59	54.35	62.95
Dry substance											
Soluble	4.33	5.24	3.58	3.92	3.30	2.03	2.80	4.36	4.96	4.00	4.15
Insoluble	33.46	32.87	50.10	47.28	51.60	64.80	54.96	38.29	31.71	42.52	33.31
Total	37.79	38.11	53.68	51.20	54.90	66.83	57.76	42.65	36.67	46.52	37.46
Soluble protein											
Coagulable protein	1.56	2.03	1.31	1.46	1.19	.68	.96	1.67	1.74	1.50	1.49
Non-coagulable protein	.11	.16	.10	.13	.11	.09	.09	.15	.13	.11	.10
Total	1.67	2.19	1.41	1.59	1.30	.77	1.05	1.82	1.87	1.61	1.59
Insoluble protein	14.85	15.18	11.67	12.14	11.58	8.97	10.69	13.98	15.27	13.95	16.32
Total protein	16.52	17.37	13.08	13.73	12.88	9.74	11.74	15.80	17.14	15.56	17.91
Organic extractives											
Nitrogenous	.85	1.04	.69	.76	.64	.43	.55	.80	.99	.75	.81
Non-nitrogenous	1.12	1.22	.93	.98	.87	.51	.76	1.02	1.32	1.01	1.04
Total	1.97	2.26	1.62	1.74	1.51	.94	1.31	1.82	2.31	1.76	1.85
Fat	18.43	17.54	38.27	34.99	39.82	55.66	44.08	24.15	16.34	28.42	16.78
Ash											
Soluble	.69	.80	.55	.59	.49	.32	.44	.72	.78	.63	.72
Insoluble	.18	.14	.16	.15	.20	.17	.19	.16	.10	.15	.21
Total	.87	.94	.71	.74	.69	.49	.63	.88	.88	.78	.93
Nitrogen											
Soluble coagulable protein	.251	.325	.209	.233	.190	.108	.153	.267	.278	.242	.249
Soluble non-coagulable protein	.017	.033	.016	.021	.018	.015	.015	.024	.019	.017	.007
Total soluble protein	.268	.352	.225	.254	.208	.123	.168	.291	.297	.259	.256
Soluble non-protein	.272	.331	.217	.243	.205	.136	.174	.259	.318	.239	.261
Total soluble nitrogen	.540	.683	.442	.497	.413	.259	.342	.550	.615	.498	.517
Insoluble protein	2.376	2.428	1.867	1.943	1.852	1.434	1.710	2.235	2.446	2.231	2.611
Total nitrogen	2.916	3.111	2.309	2.440	2.265	1.693	2.052	2.785	3.061	2.729	3.128
Phosphorus[1]											

[1]Phosphorus was not determined.

TABLE 5.—CHEMICAL COMPOSITION OF THE BONELESS MEAT OF THE WHOLESALE CUTS FROM STEER NO. 3, EXPRESSED IN PERCENT

Constituents	Hind shank	Round	Rump	Loin	Rib	Flank	Plate	Chuck	Clod	Neck	Fore shank
Water	56.79	58.88	45.13	43.16	41.01	30.44	35.13	52.08	60.47	59.33	59.11
Dry substance											
Soluble	3.15	4.60	2.83	2.69	2.59	1.34	1.62	3.28	3.79	3.79	3.43
Insoluble	40.47	36.54	51.21	54.21	56.04	67.73	63.49	44.37	36.47	36.70	38.23
Total	43.62	41.14	54.04	56.90	58.63	69.07	65.11	47.65	40.26	40.49	41.66
Soluble protein											
Coagulable protein	1.18	1.59	.91	.90	.90	.37	.48	.86	1.25	1.57	1.11
Non-coagulable protein	.08	.13	.07	.06	.07	.06	.04	.07	.07	.07	.07
Total	1.26	1.72	.98	.96	.97	.43	.52	.93	1.32	1.64	1.18
Insoluble protein	13.88	13.78	10.73	10.71	9.97	7.81	8.26	12.63	14.27	14.63	15.18
Total protein	15.14	15.50	11.71	11.67	10.94	8.24	8.78	13.56	15.59	16.27	16.36
Organic extractives											
Nitrogenous	.56	.90	.55	.53	.49	.26	.31	.79	.75	.65	.63
Non-nitrogenous	.83	1.23	.80	.73	.66	.36	.53	.94	1.07	.90	1.06
Total	1.39	2.13	1.35	1.26	1.15	.62	.84	1.73	1.82	1.55	1.69
Fat	26.40	22.69	40.36	43.38	46.01	59.85	55.08	31.66	22.07	21.94	22.87
Ash											
Soluble	.50	.76	.50	.47	.47	.29	.26	.62	.65	.60	.56
Insoluble	.19	.06	.12	.12	.06	.07	.15	.08	.13	.14	.18
Total	.69	.82	.62	.59	.53	.36	.41	.70	.78	.74	.74
Nitrogen											
Soluble coagulable protein	.188	.253	.145	.145	.143	.059	.076	.138	.200	.251	.177
Soluble non-coagulable protein	.013	.021	.011	.009	.011	.010	.007	.011	.011	.012	.011
Total soluble protein	.201	.274	.156	.154	.154	.069	.083	.149	.211	.263	.188
Soluble non-protein	.179	.290	.175	.168	.158	.082	.100	.252	.241	.207	.203
Total soluble nitrogen	.380	.564	.331	.322	.312	.151	.183	.401	.452	.470	.391
Insoluble protein	2.222	2.206	1.717	1.714	1.596	1.250	1.321	2.021	2.283	2.340	2.429
Total nitrogen	2.602	2.770	2.048	2.036	1.908	1.401	1.504	2.422	2.735	2.810	2.820
Phosphorus											
Soluble inorganic	.076	.105	.069	.079	.069	.053	.056	.095	.088	.084	.091
Soluble organic	.013	.022	.016	.004	.010	.001	.001	.005	.022	.005	.008
Total soluble	.089	.127	.085	.083	.079	.054	.057	.100	.110	.089	.099
Insoluble	.055	.050	.054	.058	.049	.019	.047	.049	.047	.080	.008
Total phosphorus	.144	.177	.139	.141	.128	.073	.104	.149	.157	.149	.107

TABLE 6.—CHEMICAL COMPOSITION OF THE BONELESS MEAT OF THE FORE AND HIND QUARTERS, AND THE ENTIRE SIDES, EXPRESSED IN PERCENT

Constituents	Fore quarter			Hind quarter			Half carcass		
	Steer No. 1	Steer No. 2	Steer No. 3	Steer No. 1	Steer No. 2	Steer No. 3	Steer No. 1	Steer No. 2	Steer No. 3
Water	50.91	51.00	45.01	51.92	51.67	47.81	51.38	51.32	46.32
Dry substance									
Soluble	3.32	3.67	2.61	3.89	4.11	3.24	3.58	3.88	2.89
Insoluble	46.20	45.66	52.37	44.44	44.42	48.65	45.39	45.07	50.76
Total	49.52	49.33	54.98	48.33	48.53	51.99	48.97	48.95	58.65
Soluble protein									
Coagulable	1.21	1.34	.77	1.59	1.54	1.09	1.38	1.44	.92
Non-coagulable	.18	.12	.06	.12	.12	.09	.16	.12	.07
Total	1.39	1.46	.83	1.71	1.68	1.18	1.54	1.56	.99
Insoluble protein	12.42	12.67	10.87	12.50	12.81	11.59	12.46	12.74	11.12
Total protein	13.81	14.13	11.71	14.21	14.49	12.77	14.00	14.30	12.18
Organic extractives									
Nitrogenous	.67	.70	.55	.75	.81	.63	.71	.75	.59
Non-nitrogenous	.70	.92	.76	.84	1.00	.87	.77	.96	.81
Total	1.37	1.62	1.31	1.59	1.81	1.50	1.48	1.71	1.40
Fat	33.60	32.82	41.39	31.86	31.44	37.06	32.84	32.17	39.46
Ash									
Soluble	.56	.59	.46	.56	.63	.55	.58	.60	.50
Insoluble	.11	.18	.11	.08	.15	.10	.09	.17	.10
Total	.67	.77	.57	.66	.78	.65	.67	.77	.60

TABLE 7.—WEIGHTS OF CHEMICAL CONSTITUENTS OF THE BONELESS MEAT OF THE FORE AND HIND QUARTERS, AND THE ENTIRE SIDES, EXPRESSED IN KILOGRAMS[1]

Constituents	Fore quarter			Hind quarter			Half carcass		
	Steer No. 1	Steer No. 2	Steer No. 3	Steer No. 1	Steer No. 2	Steer No. 3	Steer No. 1	Steer No. 2	Steer No. 3
Total weight without bone	54.85	69.74	92.23	46.82	62.44	74.23	101.67	132.53	166.41
Water	27.92	35.57	41.51	24.31	32.26	35.49	52.23	67.83	77.10
Dry substance									
Soluble	1.82	2.56	2.41	1.82	2.56	2.40	3.64	5.12	4.81
Insoluble	25.34	31.85	48.30	20.81	27.73	36.19	46.15	59.58	84.50
Total	27.16	34.40	50.71	22.63	30.30	38.60	49.79	64.70	89.31
Soluble protein									
Coagulable	.66	.94	.71	.74	.96	.81	1.41	1.90	1.52
Non-coagulable	.10	.08	.05	.06	.08	.06	.16	.16	.12
Total	.76	1.02	.77	.80	1.05	.88	1.57	2.07	1.64
Insoluble protein	6.81	8.83	10.03	5.85	8.00	8.60	12.66	16.84	18.63
Total	7.58	9.85	10.80	6.65	9.05	9.48	14.23	18.90	20.28
Organic extractives									
Nitrogenous	.37	.49	.51	.35	.51	.47	.72	.99	.98
Non-nitrogenous	.38	.64	.70	.39	.62	.65	.78	1.27	1.34
Total	.75	1.13	1.21	.75	1.13	1.12	1.50	2.26	2.33
Fat	18.47	22.89	38.17	14.92	19.63	27.51	33.39	42.52	65.69
Ash									
Soluble	.31	.41	.43	.27	.39	.41	.58	.80	.84
Insoluble	.06	.12	.10	.04	.09	.07	.10	.22	.17
Total	.37	.53	.53	.31	.48	.48	.68	1.02	1.01

[1]One kilogram equals 2.2 pounds.

TABLE 8.—RATIO OF NON-PROTEIN TO PROTEIN NITROGEN IN THE BONELESS MEAT OF THE WHOLESALE CUTS

	Steer No. 1		Steer No. 2		Steer No. 3	
	In water extract	In meats	In water extract	In meats	In water extract	In meats
Hind shank	1: 1.09	1:10.20	1: 0.99	1: 9.70	1: 1.12	1:13.53
Round	1: 1.30	1: 9.30	1: 1.06	1: 8.40	1: 0.94	1: 8.55
Rump	1: 1.05	1: 9.40	1: 1.04	1: 9.80	1: 0.89	1:10.70
Loin	1: 0.99	1: 8.50	1: 1.04	1: 9.00	1: 0.92	1:11.11
Rib	1: 0.98	1: 9.60	1: 1.01	1:10.00	1: 0.97	1:11.07
Flank	1: 1.15	1:15.00	1: 0.90	1: 9.50	1: 0.84	1:16.08
Plate	1: 0.91	1:11.60	1: 0.95	1:10.80	1: 0.83	1:14.04
Chuck	1: 1.08	1: 9.90	1: 1.12	1: 9.80	1: 0.59	1: 8.61
Clod	1: 1.41	1:11.00	1: 0.94	1: 8.70	1: 0.88	1:10.34
Neck	1: 1.21	1:16.60	1: 1.08	1:10.40	1: 1.27	1:12.57
Fore shank	1: 0.94	1:10.60	1: 0.99	1:11.00	1: 0.93	1:14.86
Average	1: 1.02	1:11.10	1: 1.02	1: 9.70	1: 0.93	1:11.95

TABLE 9.—CHEMICAL COMPOSITION OF THE VISIBLE FAT FROM STEERS NOS. 1 AND 2, EXPRESSED IN PERCENT

	Calculated to the fresh substance					Calculated to water-free substance			
	Water	Protein	Ether extract	Ash	Nitrogen	Protein	Ether extract	Ash	Nitrogen
Steer No. 1	12.07	4.54	83.39	.....	.726	5.17	94.83	.....	.826
Steer No. 2	13.22	4.30	82.71	.20	.689	4.95	95.32	.23	.794

TABLE 10.—LEAN, VISIBLE FAT, AND BONE IN THE RETAIL CUTS OF THE LOIN, EXPRESSED IN POUNDS

Retail loin cuts	Steer No. 1				Steer No. 2				Steer No. 3			
	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total[1]	Lean	Fat	Bone	Total[1]
1. Sirloin steak (butt-end)	1.88	.59	.14	2.61	3.38	1.06	.33	4.85	3.88	1.42	.27	5.57
2. Sirloin steak (wedge-bone)..	2.47	.62	.22	3.31	2.70	.88	.25	3.89	3.84	1.67	.36	5.87
3. Sirloin steak (round-bone)..	2.39	1.14	.20	3.73	2.80	.83	.25	3.97	3.52	1.86	.25	5.63
4. Sirloin steak (round-bone)..	2.14	1.32	.31	3.77	2.91	1.11	.34	4.42	3.62	1.61	.64	5.87
5. Sirloin steak (double-bone)..	2.61	1.03	.53	4.17	3.10	1.20	.59	4.98	2.74	1.62	.89	5.25
6. Sirloin steak (double-bone)..	2.15	.91	.36	3.42	3.04	.36	.59	4.08				
7. Sirloin steak (hip-bone).....					2.14	1.16	.66	4.08	2.25	1.65	.75	4.71
8. Porterhouse steak	1.76	.86	.38	3.00	2.44	1.59	.57	4.74	2.37	1.63	.44	4.47
9. Porterhouse steak	1.65	.99	.14	2.78	2.08	1.42	.20	3.81	2.00	1.89	.30	4.22
10. Porterhouse steak	1.56	.97	.14	2.67	2.02	1.31	.22	3.61	1.94	1.89	.36	4.19
11. Porterhouse steak	1.48	.78	.16	2.42	1.92	1.12	.21	3.33				
12. Porterhouse steak	1.36	.64	.14	2.14	1.69	1.00	.17	2.92	1.62	1.50	.28	3.43
13. Porterhouse steak	1.23	.50	.11	1.84	1.80	.95	.23	3.06	1.53	1.80	.42	3.75
14. Porterhouse steak	1.19	.53	.17	1.89	1.36	.68	.24	2.36	1.40	1.46	.30	3.19
15. Porterhouse steak					1.13	.72	.14	2.02	1.28	1.37	.25	2.90
16. Club steak	.88	.48	.11	1.47	1.31	.78	.17	2.26	1.28	1.11	.23	2.65
17. Club steak	.98	.39	.21	1.58	1.44	.81	.28	2.58	1.45	1.47	.49	3.44
18. Club steak	1.08	.44	.26	1.78	1.44	.82	.17	2.49	1.47	1.47	.41	3.38
19. Trimmings (wholesale)									.19	1.75	.00	1.94
Entire loin	26.81	12.19	3.58	42.58	38.70	17.80	5.61	63.45	36.38	27.17	6.64	70.46

[1]Includes loss and error.

TABLE 11.—LEAN, VISIBLE FAT, AND BONE IN THE RETAIL CUTS OF THE LOIN, EXPRESSED IN PERCENT

Retail loin cuts	Steer No. 1				Steer No. 2				Steer No. 3			
	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total[1]	Lean	Fat	Bone	Total[1]
1. Sirloin steak (butt-end).....	72.03	22.61	5.36	100.00	69.69	21.86	6.80	98.35	69.66	25.49	4.85	100.00
2. Sirloin steak (wedge-bone)..	74.62	18.74	6.64	100.00	69.41	22.62	6.43	98.46	65.42	28.45	6.13	100.00
3. Sirloin steak (round-bone)..	64.07	30.56	5.37	100.00	70.53	20.91	6.30	97.74	62.52	33.04	4.44	100.00
4. Sirloin steak (round-bone)..	56.77	35.01	8.22	100.00	65.84	25.11	7.70	98.65	61.67	27.43	10.90	100.00
5. Sirloin steak (double-bone)..	62.59	24.70	12.71	100.00	62.25	24.10	11.85	98.20	52.19	30.86	16.95	100.00
6. Sirloin steak (double-bone)..	62.87	26.61	10.52	100.00	74.51	8.83	14.46	97.80				
7. Sirloin steak (hip-bone).....					52.45	28.43	16.18	97.06	47.77	35.03	15.92	98.72
8. Porterhouse steak	58.67	28.66	12.67	100.00	51.48	33.54	12.03	97.05	53.02	36.47	9.84	99.33
9. Porterhouse steak	59.35	35.61	5.04	100.00	54.59	37.27	5.25	97.11	47.39	44.79	7.11	99.29
10. Porterhouse steak	58.43	36.33	5.24	100.00	55.96	36.29	6.09	98.34	46.30	45.11	8.59	100.00
11. Porterhouse steak	61.16	32.23	6.61	100.00	57.66	33.63	6.31	97.60				
12. Porterhouse steak	63.55	29.91	6.54	100.00	57.88	34.25	5.82	97.75	47.23	43.73	8.16	99.12
13. Porterhouse steak	66.85	27.17	5.98	100.00	58.82	31.05	7.52	97.39	40.80	48.00	11.20	100.00
14. Porterhouse steak	62.97	28.04	8.99	100.00	57.63	28.81	10.17	96.61	43.89	45.77	9.40	99.06
15. Porterhouse steak					55.94	35.64	6.93	98.51	44.14	47.24	8.62	100.00
16. Club steak	59.87	32.65	7.48	100.00	57.96	34.51	7.52	99.99	48.30	41.89	8.68	98.87
17. Club steak	62.03	24.68	13.29	100.00	55.81	31.39	10.85	98.05	42.15	42.73	14.25	99.13
18. Club steak	60.67	24.72	14.61	100.00	57.83	32.93	6.83	97.59	43.79	43.49	12.13	99.71
19. Trimmings (wholesale)									9.79	90.21	0.	100.00
Entire loin	62.96	28.63	8.41	100.00	60.99	28.05	8.84	97.88	51.63	38.56	9.41	99.60

[1]Includes loss and error.

TABLE 12.—LEAN, VISIBLE FAT, AND BONE IN THE RETAIL CUTS OF THE RIB, EXPRESSED IN POUNDS

Retail rib cuts	Steer No. 1				Steer No. 2				Steer No. 3			
	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total
1. Roast (11th and 12th ribs)..	2.95	1.94	.89	5.78	4.22	2.92	.89	8.14	4.34	4.19	1.03	9.56
2. Roast (9th and 10th ribs)..	3.70	2.06	.91	6.67	5.41	2.62	1.17	9.30	5.28	3.78	1.69	10.75
3. Roast (7th and 8th ribs)..	4.56	1.77	1.44	7.77	5.80	2.83	1.42	10.17	6.47	4.06	1.84	12.37
4. Roast (6th rib)	4.03	1.17	1.11	6.31	5.25	1.89	.89	8.17	4.40	2.31	1.13	7.84
Entire rib	15.24	6.94	4.35	26.53	20.68	10.26	4.37	35.78	20.49	14.34	5.69	40.52

TABLE 13.—LEAN, VISIBLE FAT, AND BONE IN THE RETAIL CUTS OF THE RIB, EXPRESSED IN PERCENT

Retail rib cuts	Steer No. 1				Steer No. 2				Steer No. 3			
	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total
1. Roast (11th and 12th ribs)..	51.04	33.56	15.40	100.00	51.84	35.87	11.06	98.77	45.43	43.78	10.78	100.00
2. Roast (9th and 10th ribs)..	55.47	30.89	13.64	100.00	58.17	28.17	12.58	98.92	49.13	35.17	15.70	100.00
3. Roast (7th and 8th ribs)..	58.69	22.78	18.53	100.00	57.03	27.83	13.96	98.82	52.27	32.83	14.90	100.00
4. Roast (6th rib)	63.87	18.54	17.59	100.00	64.26	23.13	10.89	98.28	56.18	29.48	14.34	100.00
Entire rib	57.44	26.16	16.40	100.00	57.80	28.67	12.21	98.68	50.57	35.39	14.04	100.00

TABLE 14.—LEAN, VISIBLE FAT, AND BONE IN THE RETAIL CUTS OF THE ROUND, EXPRESSED IN POUNDS

Retail round cuts	Steer No. 1				Steer No. 2				Steer No. 3			
	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total[1]	Lean	Fat	Bone	Total[1]
1. Rump roast	6.00	3.95	2.49	12.44	6.01	3.44	2.50	12.11	7.08	4.90	2.77	14.75
2. Round steak (first cut)	1.78	.30	.25	2.33	3.48	.42	.52	4.50	3.39	.83	.56	4.84
3. Round steak	1.86	.33	.23	2.42	3.70	.36	.38	4.55	3.65	.91	.47	5.03
4. Round steak	2.03	.15	.16	2.34	4.25	.45	.22	5.00	4.90	.82	.25	6.00
5. Round steak	2.20	.31	.11	2.62	4.39	.55	.14	5.17	4.90	1.00	.19	6.09
6. Round steak	2.12	.32	.08	2.52	4.00	.54	.12	4.79	5.65	1.38	.16	7.25
7. Round steak	1.97	.33	.06	2.36	3.83	.80	.11	4.85	5.03	1.53	.19	6.81
8. Round steak	2.26	.41	.06	2.73	3.61	.78	.14	4.61	4.31	1.50	.16	6.03
9. Round steak	2.21	.43	.06	2.70								
10. Round steak	1.86	.46	.06	2.38								
11. Round steak	1.91	.56	.08	2.55								
12. Round steak	1.68	.44	.08	2.20	3.14	.81	.14	4.61	4.03	1.53	.25	3.84
13. Round steak	1.58	.28	.09	1.95								
14. Round steak	1.67	.23	.13	2.03	2.95	.64	.17	3.86	3.17	1.05	.53	4.78
15. Knuckle soup bone	.98	.84	2.05	3.87	1.09	.30	3.42	4.91	.44	1.75	2.44	4.66
16. Pot roast	4.14	.42	0	4.56	7.16	.86	.11	8.21	5.79	1.52	.09	7.40
17. Shank soup bone	1.67	.27	1.58	3.52	1.34	.14	1.99	3.56	1.41	.90	1.69	4.00
18. Shank soup bone	1.36	.24	.45	2.05	2.23	.27	.61	3.16	2.37	.63	.72	3.72
19. Shank soup bone (hock)	.09	.03	2.46	2.58	.30	.23	3.09	3.70	.63	1.16	3.12	4.91
Entire round	39.37	10.30	10.48	60.15	51.48	10.59	13.66	77.12	56.75	21.41	13.59	92.11

[1]Includes loss and error.

TABLE 15.—LEAN, VISIBLE FAT, AND BONE IN THE RETAIL CUTS OF THE ROUND, EXPRESSED IN PERCENT

Retail round cuts	Steer No. 1				Steer No. 2				Steer No. 3			
	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total[1]	Lean	Fat	Bone	Total[1]
1. Rump roast	48.23	31.75	20.02	100.00	49.63	28.38	20.65	98.66	47.98	33.26	18.76	100.00
2. Round steak (first cut)	76.40	12.87	10.73	100.00	76.07	10.75	11.44	98.26	70.00	17.10	11.61	98.71
3. Round steak	76.86	13.64	9.50	100.00	81.43	7.93	8.24	97.60	72.67	18.01	9.32	100.00
4. Round steak	86.75	6.41	6.84	100.00	85.00	9.06	4.38	98.44	81.67	13.67	4.17	99.51
5. Round steak	83.97	11.83	4.20	100.00	84.89	10.57	2.72	98.18	80.51	16.41	3.08	100.00
6. Round steak	84.13	12.70	3.17	100.00	83.38	11.40	2.60	97.38	78.02	18.97	2.16	99.15
7. Round steak	83.48	13.98	2.54	100.00	79.04	16.42	2.27	97.73	73.85	22.48	2.75	99.08
8. Round steak	82.78	15.02	2.20	100.00	78.31	17.94	3.06	99.31	71.50	25.88	2.59	99.97
9. Round steak	81.85	15.93	2.22	100.00								
10. Round steak	78.15	19.33	2.52	100.00								
11. Round steak	74.90	21.96	3.14	100.00								
12. Round steak	76.36	20.00	3.64	100.00	75.85	19.64	3.40	98.39	68.99	26.20	4.28	99.47
13. Round steak	81.02	14.36	4.62	100.00								
14. Round steak	82.27	11.33	6.40	100.00	76.52	16.60	4.45	97.57	66.37	21.97	11.09	99.30
15. Knuckle soup bone	25.32	21.71	52.97	100.00	22.28	6.05	69.75	98.08	9.40	37.59	52.35	99.34
16. Pot roast	90.79	9.21	0	100.00	87.23	10.48	1.34	99.05	78.26	20.47	1.27	100.00
17. Shank soup bone	47.44	7.67	44.89	100.00	37.71	3.95	55.71	97.37	35.25	22.50	42.25	100.00
18. Shank soup bone	66.34	11.71	21.95	100.00	70.57	8.52	19.30	98.41	63.86	16.81	19.33	100.00
19. Shank soup bone (hock)	3.49	1.16	95.35	100.00	8.02	6.35	83.54	97.91	12.74	23.57	63.69	100.00
Entire round	65.46	17.12	17.42	100.00	66.75	13.73	17.71	98.19	61.61	23.24	14.75	99.60

[1]Includes loss and error.

TABLE 16.—LEAN, VISIBLE FAT, AND BONE IN THE RETAIL CUTS OF THE CHUCK, EXPRESSED IN POUNDS

Retail chuck cuts	Steer No. 1				Steer No. 2				Steer No. 3			
	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total[1]	Lean	Fat	Bone	Total[1]
1. Roast (5th rib)	4.09	.85	.97	5.91	4.48	1.70	1.02	7.31	5.78	2.31	1.28	9.38
2. Chuck steak	1.45	.36	.50	2.31	2.70	.77	.58	4.14	1.87	.72	.62	3.21
3. Chuck steak	1.84	.22	.25	2.31	2.98	.63	.47	4.14	1.52	1.36	.34	3.22
4. Chuck steak	1.84	.22	.27	2.33	3.19	.56	.46	4.27	2.23	.89	.41	3.56
5. Chuck steak	2.08	.30	.46	2.84	3.06	.66	.37	4.19	2.61	.97	.51	4.12
6. Chuck steak	1.98	.31	.23	2.52	3.61	.51	.48	4.66	3.28	.91	.44	4.63
7. Chuck steak	2.25	.23	.44	2.92	3.16	.46	.35	4.06	3.88	.00	.37	4.25
8. Chuck steak	2.44	.24	.34	3.02	3.13	.45	.34	3.98	2.70	.86	.44	4.00
9. Chuck steak	2.28	.25	.31	2.84	3.37	.48	.49	4.45	2.75	.97	.31	4.03
10. Pot roast	3.92	.53	.38	4.83	4.45	1.02	1.04	6.67	6.41	1.37	.25	8.03
11. Pot roast	4.92	1.94	1.34	8.20	3.64	2.37	.61	6.81	8.63	2.94	2.31	13.94
12. Pot roast	3.33	.44	.92	4.69	4.48	.27	.36	5.14	7.31	1.22	1.09	9.62
13. Stew	2.86	1.78	.03	4.67	4.63	1.19	.67	6.55	4.91	4.40	.41	9.72
14. Clod	3.45	.55	.22	4.22	4.76	.58	.25	5.64	4.74	1.29	.28	6.31
15. Neck	5.23	1.93	1.09	8.25	3.33	1.15	.44	5.06	1.84	.72	.97	3.53
Entire chuck	43.96	10.15	7.75	61.86	54.97	12.80	7.93	77.07	60.46	20.93	10.03	91.55

[1]Includes loss and error.

TABLE 17.—LEAN, VISIBLE FAT, AND BONE IN THE RETAIL CUTS OF THE CHUCK, EXPRESSED IN PERCENT

Retail chuck cuts	Steer No. 1				Steer No. 2				Steer No. 3			
	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total[1]	Lean	Fat	Bone	Total[1]
1. Roast (5th rib)	69.21	14.38	16.41	100.00	61.32	23.30	13.88	98.50	61.67	24.67	13.66	100.00
2. Chuck steak	62.77	15.58	21.65	100.00	65.30	18.49	13.94	97.73	58.25	22.34	19.41	100.00
3. Chuck steak	79.65	9.53	10.82	100.00	72.06	15.09	11.32	98.47	47.08	42.23	10.69	100.00
4. Chuck steak	78.97	9.44	11.59	100.00	74.72	13.00	11.00	98.72	62.64	25.00	11.52	99.16
5. Chuck steak	73.24	10.56	16.20	100.00	73.13	15.69	8.94	97.76	63.35	23.54	12.38	99.27
6. Chuck steak	78.57	12.30	9.13	100.00	77.52	10.73	10.40	98.65	70.84	19.66	9.50	100.00
7. Chuck steak	77.05	7.88	15.07	100.00	78.06	11.35	8.47	97.88	91.18	0	8.82	100.00
8. Chuck steak	80.79	7.95	11.26	100.00	78.43	11.37	8.63	98.43	67.58	21.48	10.94	100.00
9. Chuck steak	80.28	8.80	10.92	100.00	75.77	10.87	10.89	97.53	68.22	24.03	7.75	100.00
10. Pot roast	81.16	10.97	7.87	100.00	66.76	15.22	15.69	97.67	79.77	17.12	3.11	100.00
11. Pot roast	60.00	23.66	16.34	100.00	53.45	34.85	8.95	97.25	61.91	21.09	16.51	99.51
12. Pot roast	71.00	9.38	19.62	100.00	87.22	5.17	7.00	99.39	75.97	12.66	11.37	100.00
13. Stew	61.24	38.12	.64	100.00	70.64	18.13	10.27	99.04	50.48	45.34	4.18	100.00
14. Clod	81.76	13.03	5.21	100.00	84.40	10.28	4.43	99.11	75.00	20.55	4.45	100.00
15. Neck	63.39	23.28	13.33	100.00	65.81	22.73	8.69	97.23	52.21	20.36	27.43	100.00
Entire chuck	71.06	16.41	12.53	100.00	71.32	16.61	10.29	98.22	66.04	22.86	10.96	99.86

[1]Includes loss and error.

TABLE 18.—LEAN, VISIBLE FAT, AND BONE IN THE RETAIL CUTS OF THE PLATE, EXPRESSED IN POUNDS

Retail plate cuts	Steer No. 1				Steer No. 2				Steer No. 3			
	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total[1]	Lean	Fat	Bone	Total[1]
1. Brisket, boiling or corning piece	8.32	4.94	1.05	14.31	11.44	8.78	1.72	22.00	13.91	11.72	2.28	27.91
2. Navel, stew	6.47	4.12	1.19	11.78	10.31	5.01	1.18	16.50	12.06	11.84	1.66	25.56
3. Rib ends	2.69	1.95	.66	5.30	2.99	1.39	.64	5.16	2.44	2.97	.75	6.16
4. Rib ends	3.47	1.55	.92	5.94	3.60	2.05	.75	6.49	3.22	4.31	.84	8.37
5. Trimmings (wholesale)	0	2.80	0	2.80	.75	1.05	0	1.80	0	4.50	0	4.50
Entire plate	20.95	15.36	3.82	40.13	29.09	18.28	4.29	51.95	31.65	35.34	5.53	72.50

TABLE 19.—LEAN, VISIBLE FAT, AND BONE IN THE RETAIL CUTS OF THE PLATE, EXPRESSED IN PERCENT

Retail plate cuts	Steer No. 1				Steer No. 2				Steer No. 3			
	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total[1]	Lean	Fat	Bone	Total[1]
1. Brisket, boiling or corning piece	58.14	34.52	7.34	100.00	52.00	39.91	7.82	99.73	49.84	41.99	8.17	100.00
2. Navel, stew	54.92	34.98	10.10	100.00	62.48	30.36	7.15	100.00	47.19	46.33	6.48	100.00
3. Rib ends	50.76	36.79	12.45	100.00	57.95	26.94	12.40	97.29	39.61	48.21	12.18	100.00
4. Rib ends	58.42	26.09	15.49	100.00	55.47	31.59	11.56	98.62	38.47	51.49	10.04	100.00
5. Trimmings (wholesale)	0	100.00	0	100.00	41.67	58.33	0	100.00	0	100.00	0	100.00
Entire plate	52.21	38.27	9.52	100.00	55.99	35.19	8.26	99.44	43.63	48.74	7.63	100.00

[1]Includes loss and error.

TABLE 20.—LEAN, VISIBLE FAT, AND BONE IN THE RETAIL CUTS OF THE FLANK, EXPRESSED IN POUNDS

Retail flank cuts	Steer No. 1				Steer No. 2				Steer No. 3			
	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total[1]	Lean	Fat	Bone	Total[1]
1. Stew	4.43	2.02	.02	6.47	5.83	2.31	.06	8.30	4.59	3.88	.06	8.56
2. Flank steak	1.37	.22	0	1.59	1.65	.30	0	1.98	1.47	.37	0	1.84
3. Trimmings (wholesale)	0	6.47	0	6.47	.10	8.92	0	9.02	0	10.00	0	10.00
Entire flank	5.80	8.71	.02	14.53	7.58	11.53	.06	19.30	6.06	14.25	.06	20.40

TABLE 21.—LEAN, VISIBLE FAT, AND BONE IN THE RETAIL CUTS OF THE FLANK, EXPRESSED IN PERCENT

Retail flank cuts	Steer No. 1				Steer No. 2				Steer No. 3			
	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total[1]	Lean	Fat	Bone	Total[1]
1. Stew	68.47	31.22	.31	100.00	70.24	27.83	.72	98.79	53.62	45.33	.70	99.65
2. Flank steak	86.17	13.83	0	100.00	83.33	15.15	0	98.48	79.66	20.34	0	100.00
3. Trimmings (wholesale)	0	100.00	0	100.00	1.11	98.89	0	100.00	0	100.00	0	100.00
Entire flank	39.92	59.94	.14	100.00	39.27	59.74	.31	99.32	29.71	69.85	.29	99.85

[1]Includes loss and error.

TABLE 22.—LEAN, VISIBLE FAT, AND BONE IN THE RETAIL CUTS OF THE FORE SHANK, EXPRESSED IN POUNDS

Retail shank cuts	Steer No. 1				Steer No. 2				Steer No. 3			
	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total[1]	Lean	Fat	Bone	Total[1]
1. Stew	2.91	.53	0	3.44	2.75	.34	0	3.12	4.50	1.50	0	6.00
2. Soup bone (knuckle)	.76	.16	1.47	2.39	1.06	.27	2.22	3.64	1.19	.84	2.34	4.37
3. Soup bone	.33	.06	.67	1.06	.88	.30	1.42	2.66	.31	.25	1.00	1.56
4. Soup bone	.97	.27	1.37	2.61	1.36	.31	.94	2.64	1.18	.66	1.97	3.81
5. Soup bone	1.53	.11	.52	2.16	1.69	.05	.62	2.38	1.84	.28	.72	2.84
6. Soup bone	.70	.02	1.55	2.27	.12	0	1.89	2.06	.53	2.63	2.22	3.38
Entire fore shank	7.20	1.15	5.58	13.93	7.86	1.27	7.09	16.50	9.55	4.16	8.25	21.96

TABLE 23.—LEAN, VISIBLE FAT, AND BONE IN THE RETAIL CUTS OF THE FORE SHANK, EXRESSED IN PERCENT

Retail shank cuts	Steer No. 1				Steer No. 2				Steer No. 3			
	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total[1]	Lean	Fat	Bone	Total[1]
1. Stew	84.59	15.41	0	100.00	88.14	10.89	0	99.03	75.00	25.00	0	100.00
2. Soup bone (knuckle)	31.80	6.70	61.50	100.00	29.12	7.42	60.99	97.53	27.23	19.22	53.55	100.00
3. Soup bone	31.13	5.66	63.21	100.00	33.08	11.28	53.38	97.74	19.87	16.02	64.11	100.00
4. Soup bone	37.16	10.34	52.50	100.00	51.52	11.74	35.61	98.87	30.97	17.32	51.71	100.00
5. Soup bone	70.83	5.09	24.08	100.00	71.01	2.10	26.05	99.16	64.79	9.87	25.34	100.00
6. Soup bone	30.84	.88	68.28	100.00	5.77	0	90.87	96.64	15.68	18.64	65.68	100.00
Entire fore shank	51.69	8.25	40.06	100.00	47.64	7.69	42.97	98.30	43.49	18.94	37.57	100.00

[1]Includes loss and error.

TABLE 24.—LEAN, FAT, AND BONE IN THE TRIMMED RETAIL CUTS OF THE LOIN, EXPRESSED IN POUNDS

Retail loin cuts	Steer No. 1				Steer No. 2				Steer No. 3			
	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total[1]	Lean	Fat	Bone	Total[1]
1. Sirloin steak (butt-end).....	1.88	.34	.05	2.27	3.36	.62	.08	4.11	3.88	1.25	.25	5.38
2. Sirloin steak (wedge-bone)..	2.47	.36	.20	3.03	2.70	.69	.17	3.62	3.84	1.38	.31	5.53
3. Sirloin steak (round-bone)..	2.39	.87	.20	3.46	2.80	.64	.22	3.70	3.44	1.53	.16	5.13
4. Sirloin steak (round-bone)..	2.14	.96	.20	3.30	2.89	.86	.22	4.00	3.59	1.41	.50	5.50
5. Sirloin steak (double-bone)..	2.61	.69	.30	3.60	3.02	.86	.34	4.28	2.69	.87	.50	4.06
6. Sirloin steak (double-bone)..	2.15	.52	.27	2.94	3.02	0	.47	3.56				
7. Sirloin steak (hip-bone).....					2.11	.61	.55	3.38	2.22	.84	.56	3.62
8. Porterhouse steak	1.76	.58	.33	2.67	2.42	.92	.52	3.97	2.37	.72	.44	3.53
9. Porterhouse steak	1.65	.77	.14	2.56	2.08	.89	.17	3.23	2.00	.97	.19	3.16
10. Porterhouse steak	1.56	.80	.14	2.50	2.02	.92	.22	3.22	1.94	.97	.25	3.16
11. Porterhouse steak	1.48	.64	.16	2.28	1.92	.87	.19	3.06				
12. Porterhouse steak	1.36	.64	.14	2.14	1.69	.78	.17	2.70	1.62	.94	.16	2.72
13. Porterhouse steak	1.23	.50	.11	1.84	1.80	.73	.23	2.84	1.53	.94	.28	2.75
14. Porterhouse steak	1.19	.53	.17	1.89	1.36	.45	.24	2.13	1.40	.88	.19	2.47
15. Porterhouse steak					1.15	.61	.14	1.91	1.28	.65	.16	2.09
16. Club steak	.88	.48	.11	1.47	1.31	.67	.17	2.15	1.28	.59	.12	1.99
17. Club steak	.98	.38	.16	1.52	1.44	.64	.28	2.41	1.44	.81	.38	2.63
18. Club steak	1.08	.42	.20	1.70	1.44	.52	.17	2.19	1.47	.75	.28	2.50
Entire trimmed loin.....	26.81	9.48	2.88	39.17	38.51	12.28	4.55	56.46	35.99	15.50	4.73	56.22

[1]Includes loss and error.

TABLE 25.—LEAN, VISIBLE FAT, AND BONE IN THE TRIMMED RETAIL CUTS OF THE LOIN, EXPRESSED IN PERCENT

Retail loin cuts	Steer No. 1				Steer No. 2				Steer No. 3			
	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total
1. Sirloin steak (butt-end).....	82.82	14.98	2.20	100.00	81.75	15.09	1.95	98.79	72.12	23.23	4.65	100.00
2. Sirloin steak (wedge-bone)..	81.52	11.88	6.60	100.00	74.59	19.06	4.70	98.35	69.44	24.96	5.60	100.00
3. Sirloin steak (round-bone)..	69.08	25.14	5.78	100.00	75.68	17.30	5.95	98.93	67.06	29.82	3.12	100.00
4. Sirloin steak (round-bone)..	64.85	29.09	6.06	100.00	72.25	21.50	5.50	99.25	65.27	25.64	9.09	100.00
5. Sirloin steak (double-bone)..	72.50	19.17	8.33	100.00	70.56	20.09	7.94	98.59	66.26	21.43	12.31	100.00
6. Sirloin steak (double-bone)..	73.13	17.69	9.18	100.00	84.83	0	13.21	98.04				
7. Sirloin steak (hip-bone).....					62.43	18.05	16.27	96.75	61.33	23.20	15.47	100.00
8. Porterhouse steak	65.92	21.72	12.36	100.00	60.06	23.17	13.10	97.25	67.14	20.40	12.46	100.00
9. Porterhouse steak	64.45	30.08	5.47	100.00	64.40	27.55	5.26	97.21	63.29	30.70	6.01	100.00
10. Porterhouse steak	62.40	32.00	5.60	100.00	62.73	28.57	6.83	98.13	61.39	30.70	7.91	100.00
11. Porterhouse steak	64.91	28.07	7.02	100.00	62.75	28.43	6.21	97.39				
12. Porterhouse steak	63.55	29.91	6.54	100.00	62.59	28.89	6.30	97.78	59.56	34.56	5.88	100.00
13. Porterhouse steak	66.85	27.17	5.98	100.00	63.38	25.70	8.10	97.18	55.64	34.18	10.18	100.00
14. Porterhouse steak	62.97	28.04	8.99	100.00	63.85	21.13	11.27	96.25	56.68	35.63	7.69	100.00
15. Porterhouse steak					59.16	31.94	7.33	98.43	61.24	31.10	7.66	100.00
16. Club steak	59.87	32.65	7.48	100.00	60.93	31.16	7.91	100.00	64.32	29.65	6.03	100.00
17. Club steak	64.47	25.00	10.53	100.00	59.75	26.56	11.62	97.93	54.75	30.80	14.45	100.00
18. Club steak	63.53	24.71	11.76	100.00	65.75	23.74	7.76	97.25	58.80	30.00	11.20	100.00
Entire trimmed loin.....	68.45	24.20	7.35	100.00	68.21	21.75	8.06	98.02	64.02	27.57	8.41	100.00

TABLE 26.—AVERAGE PERCENTAGES OF LEAN, VISIBLE FAT, AND BONE IN THE TRIMMED RETAIL CUTS OF THE THREE LOINS

Retail loin cuts	Lean	Fat	Bone	Total
1. Sirloin steak (butt-end)	78.90	17.77	2.93	99.60
2. Sirloin steak (wedge-bone)	75.18	18.63	5.63	99.44
3. Sirloin steak (round-bone)	70.61	24.09	4.95	99.65
4. Sirloin steak (round-bone)	67.46	25.40	6.88	99.74
5. Sirloin steak (double-bone)	69.77	20.23	9.53	99.53
6. Sirloin steak (double-bone)[1]	78.98	8.85	11.19	99.02
7. Sirloin steak (hip-bone)[2]	61.88	20.63	15.87	98.38
8. Porterhouse steak	64.76	21.76	12.64	99.16
9. Porterhouse steak	64.05	29.44	5.58	99.07
10. Porterhouse steak	62.17	30.42	6.78	99.37
11. Porterhouse steak	63.83	28.25	6.61	98.69
12. Porterhouse steak	61.90	31.12	6.24	99.26
13. Porterhouse steak	61.96	29.02	8.09	99.07
14. Porterhouse steak	61.17	28.27	9.32	98.76
15. Porterhouse steak	60.20	31.52	7.50	99.22
16. Club steak	61.71	31.15	7.14	100.00
17. Club steak	59.66	27.45	12.20	99.31
18. Club steak	62.69	26.15	10.24	99.08
Entire trimmed loin	66.89	24.51	7.94	99.34

[1]This cut was made from the loins of Steers Nos. 1 and 2 only.
[2]This cut was made from the loins of Steers Nos. 2 and 3 only.

TABLE 27.—LEAN, VISIBLE FAT, AND BONE IN THE TRIMMED RETAIL CUTS OF THE ROUND, EXPRESSED IN POUNDS

Retail round cuts	Steer No. 1				Steer No. 2				Steer No. 3			
	Lean	Fat	Bone	Total[1]	Lean	Fat	Bone	Total[1]	Lean	Fat	Bone	Total[1]
1. Rump roast	6.00	3.14	.58	9.72	5.87	2.53	.67	9.20	4.60	2.84	.25	7.69
2. Round steak (first cut)	1.78	.16	0	1.94	3.36	.36	.11	3.89	3.09	.47	0	3.56
3. Round steak	1.86	.22	.11	2.19	3.70	.33	.38	4.52	3.65	.91	.47	5.03
4. Round steak	2.03	.09	.16	2.28	4.25	.36	.22	4.91	4.90	.63	.25	5.78
5. Round steak	2.20	.22	.11	2.53	4.39	.30	.14	4.92	4.90	.72	.19	5.81
6. Round steak	2.12	.19	.08	2.39	4.00	.37	.12	4.62	5.65	.88	.16	6.69
7. Round steak	1.97	.22	.06	2.25	3.83	.61	.11	4.66	5.03	1.03	.19	6.25
8. Round steak	2.26	.30	.06	2.62	3.61	.66	.14	4.49	4.31	1.25	.16	5.72
9. Round steak	2.21	.34	.06	2.61								
10. Round steak	1.86	.33	.06	2.25								
11. Round steak	1.91	.52	.08	2.51								
12. Round steak	1.68	.36	.08	2.12	3.14	.70	.14	4.03	4.00	1.31	.25	5.56
13. Round steak	1.58	.25	.09	1.92								
14. Round steak	1.67	.20	.13	2.00	2.95	.64	.17	3.86	2.75	.81	.19	3.75
15. Knuckle soup bone	.98	.84	2.05	3.87	1.09	.30	3.42	4.91	.44	1.59	2.44	4.47
16. Pot roast	4.14	.42	0	4.56	7.16	.86	.11	8.21	5.56	1.25	.09	6.90
17. Shank soup bone	1.67	.27	1.58	3.52	1.34	.14	1.99	3.56	1.41	.90	1.69	4.00
18. Shank soup bone	1.36	.24	.45	2.05	2.23	.27	.61	3.16	2.37	.63	.72	3.72
19. Shank soup bone (hock)	.09	.03	2.46	2.58	.30	.23	3.09	3.70	.63	1.16	3.12	4.91
Entire trimmed round	39.37	8.34	8.20	55.91	51.22	8.66	11.42	72.64	53.29	16.38	10.17	79.84

[1]Includes loss and error.

TABLE 28.—LEAN, VISIBLE FAT, AND BONE IN THE TRIMMED RETAIL CUTS OF THE ROUND, EXPRESSED IN PERCENT

Retail round cuts	Steer No. 1				Steer No. 2				Steer No. 3			
	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total
1. Rump roast	61.73	32.30	5.97	100.00	63.80	27.50	7.28	98.58	59.82	36.93	3.25	100.00
2. Round steak (first cut)	91.75	8.25	0	100.00	86.38	9.25	2.83	98.46	86.80	13.20	0	100.00
3. Round steak	84.93	10.05	5.02	100.00	81.86	7.30	8.41	97.57	72.57	18.09	9.34	100.00
4. Round steak	89.04	3.95	7.01	100.00	86.56	7.33	4.48	98.37	84.78	10.90	4.32	100.00
5. Round steak	86.96	8.70	4.34	100.00	89.23	6.10	2.85	98.18	84.34	12.39	3.27	100.00
6. Round steak	88.70	7.95	3.45	100.00	86.58	8.01	2.60	97.19	84.45	13.15	2.40	100.00
7. Round steak	87.56	9.78	2.66	100.00	82.19	13.09	2.36	97.64	80.48	16.48	3.04	100.00
8. Round steak	86.26	11.45	2.29	100.00	80.40	14.70	3.12	98.22	75.35	21.85	2.80	100.00
9. Round steak	84.67	13.03	2.30	100.00								
10. Round steak	82.67	14.67	2.66	100.00								
11. Round steak	76.10	20.72	3.18	100.00								
12. Round steak	79.25	16.98	3.77	100.00	77.92	17.37	3.47	98.76	71.94	23.56	4.50	100.00
13. Round steak	82.29	13.02	4.69	100.00								
14. Round steak	83.50	10.00	6.50	100.00	76.42	16.58	4.40	97.40	73.33	21.60	5.07	100.00
15. Knuckle soup bone	25.32	21.71	52.97	100.00	22.20	6.11	69.65	97.96	9.84	35.57	54.59	100.00
16. Pot roast	90.79	9.21	0	100.00	87.21	10.48	1.34	99.03	80.58	18.12	1.30	100.00
17. Shank soup bone	47.44	7.67	44.89	100.00	37.64	3.93	55.89	97.46	35.25	22.50	42.25	100.00
18. Shank soup bone	66.34	11.71	21.95	100.00	70.57	8.54	19.30	98.41	63.71	16.94	19.35	100.00
19. Shank soup bone (hock)	3.49	1.16	95.35	100.00	8.11	6.22	80.81	95.13	12.83	23.63	63.54	100.00
Entire trimmed round	70.42	14.92	14.66	100.00	70.51	11.92	15.72	98.15	66.75	20.52	12.73	100.00

TABLE 29.—AVERAGE PERCENTAGES OF LEAN, VISIBLE FAT, AND BONE IN THE TRIMMED RETAIL CUTS OF THE THREE ROUNDS

Retail round cuts	Lean	Fat	Bone	Total
1. Rump roast	61.78	32.24	5.50	99.52
2. Round steak (first cut)	88.31	10.23	.94	99.48
3. Round steak	79.79	11.81	7.59	99.19
4. Round steak	86.79	7.39	5.27	99.45
5. Round steak	86.84	9.06	3.49	99.39
6. Round steak	86.58	9.70	2.82	99.10
7. Round steak	83.41	13.12	2.69	99.22
8. Round steak	80.67	16.00	2.74	99.41
9. Round steak[1]	84.67	13.03	2.30	100.00
10. Round steak[1]	82.67	14.67	2.66	100.00
11. Round steak[1]	76.10	20.72	3.18	100.00
12. Round steak	76.37	19.30	3.91	99.58
13. Round steak[1]	82.29	13.02	4.69	100.00
14. Round steak	77.75	16.06	5.32	99.13
15. Knuckle soup bone	19.12	21.13	59.07	99.32
16. Pot roast	86.19	12.60	.88	99.67
17. Shank soup bone	40.11	11.37	47.68	99.16
18. Shank soup bone	66.92	12.35	20.19	99.46
19. Shank soup bone (hock)	8.14	10.34	79.90	98.38
Entire trimmed round	69.23	15.79	14.37	99.39

[1]This cut was made from the round of Steer No. 1 only.

TABLE 30.—LEAN, VISIBLE FAT, AND BONE IN THE TRIMMED RETAIL CUTS OF THE CHUCK, EXPRESSED IN POUNDS

Retail chuck cuts	Steer No. 1				Steer No. 2				Steer No. 3			
	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total
1. Roast (5th rib)	4.03	.80	.81	5.64	4.36	1.64	.75	6.84	5.69	2.31	1.16	9.16
2. Chuck steak	1.39	.34	.27	2.00	2.64	.75	.49	3.97	1.84	.66	.53	3.03
3. Chuck steak	1.83	.20	.22	2.25	2.89	.58	.36	3.91	1.50	1.31	.16	2.97
4. Chuck steak	1.81	.22	.19	2.22	3.14	.55	.40	4.14	2.22	.84	.38	3.44
5. Chuck steak	2.03	.30	.29	2.62	3.00	.64	.30	4.02	2.56	.94	.28	3.78
6. Chuck steak	1.96	.31	.17	2.44	3.55	.49	.42	4.52	3.28	.88	.28	4.44
7. Chuck steak	2.19	.22	.25	2.66	3.12	.45	.27	3.92	3.88	0	.37	4.25
8. Chuck steak	2.39	.24	.28	2.91	3.08	.45	.31	3.92	2.69	.81	.22	3.72
9. Chuck steak	2.22	.25	.25	2.72	3.28	.45	.30	4.11	2.75	.97	.31	4.03
10. Pot roast	3.92	.53	.38	4.83	4.06	.97	.56	5.69	6.41	1.37	.25	8.03
11. Pot roast	4.78	1.44	.72	6.94	3.44	.90	.61	5.11	7.97	1.25	1.72	10.94
12. Pot roast	3.33	.44	.92	4.69	4.48	.27	.36	5.14	7.31	1.22	1.09	9.62
13. Stew	2.14	.19	.03	2.36	4.63	1.19	.67	6.5[illegible]	4.91	4.40	.41	9.72
14. Clod	3.45	.55	.22	4.22	4.76	.58	.25	5.6[illegible]	4.63	1.09	.28	6.00
15. Neck	3.65	.28	.58	4.51	2.39	.64	0	3.06	1.84	.72	.97	3.53
Entire trimmed chuck	41.12	6.31	5.58	53.01	52.82	10.55	6.15	70.54	59.48	18.77	8.41	86.66

TABLE 31.—LEAN, VISIBLE FAT, AND BONE IN THE TRIMMED RETAIL CUTS OF THE CHUCK, EXPRESSED IN PERCENT

Retail chuck cuts	Steer No. 1				Steer No. 2				Steer No. 3			
	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total
1. Roast (5th rib)	71.45	14.19	14.36	100.00	63.74	23.97	10.97	98.68	62.12	25.22	12.66	100.00
2. Chuck steak	69.50	17.00	13.50	100.00	66.50	18.88	12.34	97.21	60.73	21.78	17.49	100.00
3. Chuck steak	80.88	8.88	9.73	99.49	73.91	14.83	9.20	97.94	50.51	44.11	5.38	100.00
4. Chuck steak	81.53	9.91	8.56	100.00	75.84	13.28	9.66	98.78	64.53	24.42	11.05	100.00
5. Chuck steak	77.48	11.46	11.06	100.00	74.62	15.92	7.46	98.00	67.72	24.87	7.41	100.00
6. Chuck steak	80.33	12.71	6.96	100.00	78.53	10.84	9.29	98.66	73.87	19.82	6.31	100.00
7. Chuck steak	82.34	8.27	9.39	100.00	79.59	11.48	6.89	97.96	91.29	0.00	8.71	100.00
8. Chuck steak	82.13	8.25	9.62	100.00	78.57	11.48	7.91	97.95	72.31	21.78	5.91	100.00
9. Chuck steak	81.62	9.19	9.19	100.00	79.81	10.95	7.30	98.06	68.24	24.07	7.69	100.00
10. Pot roast	81.16	10.97	7.87	100.00	71.35	17.05	9.84	98.24	79.83	17.06	3.11	100.00
11. Pot roast	68.87	20.75	10.38	100.00	67.32	17.61	11.94	96.87	72.85	11.43	15.72	100.00
12. Pot roast	71.00	9.39	19.61	100.00	87.16	5.29	7.00	99.45	75.99	12.68	11.33	100.00
13. Stew	90.68	8.05	1.27	100.00	70.69	18.17	10.23	99.09	50.51	45.27	4.22	100.00
14. Clod	81.76	13.03	5.21	100.00	84.40	10.28	4.52	99.20	77.17	18.17	4.66	100.00
15. Neck	80.93	6.20	12.87	100.00	78.10	20.92	0.00	99.02	52.12	20.40	27.48	100.00
Entire trimmed chuck	77.57	11.90	10.53	100.00	74.88	14.96	8.72	98.56	68.64	21.66	9.70	100.00

TABLE 32.—AVERAGE PERCENTAGES OF LEAN, VISIBLE FAT, AND BONE IN THE TRIMMED RETAIL CUTS OF THE THREE CHUCKS

Retail chuck cuts	Lean	Fat	Bone	Total
1. Roast (5th rib)	65.77	21.13	12.66	99.56
2. Chuck steak	65.57	19.22	14.44	99.07
3. Chuck steak	68.58	22.61	8.10	99.14
4. Chuck steak	73.97	15.87	9.76	99.60
5. Chuck steak	73.27	17.42	8.64	99.33
6. Chuck steak	77.58	14.46	7.52	99.56
7. Chuck steak	84.41	6.58	8.33	99.32
8. Chuck steak	77.67	13.84	7.81	99.32
9. Chuck steak	76.56	14.74	8.06	99.36
10. Pot roast	77.45	15.03	6.94	99.42
11. Pot roast	69.68	16.60	12.68	98.96
12. Pot roast	78.05	9.11	12.65	99.81
13. Stew	70.63	23.83	5.24	99.70
14. Clod	81.11	13.83	4.80	99.74
15. Neck	70.38	15.84	13.45	99.67
Entire trimmed chuck	73.70	16.17	9.65	99.52

TABLE 33.—LEAN, VISIBLE FAT, AND BONE IN TRIMMINGS FROM THE RETAIL CUTS OF THE LOIN, EXPRESSED IN POUNDS

Retail loin cuts	Steer No. 1				Steer No. 2				Steer No. 3			
	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total[1]
1. Sirloin steak (butt-end)	0	.25	.09	.34	.02	.44	.25	.74	0	.17	.02	.19
2. Sirloin steak (wedge-bone)	0	.26	.02	.28	0	.19	.08	.27	0	.29	.05	.34
3. Sirloin steak (round-bone)	0	.27	0	.27	0	.19	.03	.27	.08	.33	.09	.50
4. Sirloin steak (round-bone)	0	.36	.11	.47	.02	.25	12	.42	.03	.20	.14	.37
5. Sirloin steak (double-bone)	0	.34	.23	.57	.08	.34	.25	.70	.05	.75	.39	1.19
6. Sirloin steak (double-bone)	0	.39	.09	.48	.02	.36	.12	.52				
7. Sirloin steak (hip-bone)					.03	.55	.11	.70	.03	.81	.19	1.03
8. Porterhouse steak	0	.28	.05	.33	.02	.67	.05	.77	0	.91	0	.91
9. Porterhouse steak	0	.22	0	.22	0	.53	.03	.58	0	.92	.11	1.03
10. Porterhouse steak	0	.17	0	.17	0	.39	0	.39	0	.92	.11	1.03
11. Porterhouse steak	0	.14	0	.14	0	.25	.02	.27				
12. Porterhouse steak	0	0	0	0	0	.22	0	.22	0	.56	.12	.68
13. Porterhouse steak	0	0	0	0	0	.22	0	.22	0	.86	.14	1.00
14. Porterhouse steak	0	0	0	0	0	.23	0	.23	0	.58	.11	.69
15. Porterhouse steak					0	.11	0	.11	0	.72	.09	.81
16. Club steak	0	0	0	0	0	.11	0	.11	0	.52	.11	.63
17. Club steak	0	.01	.05	.0	0	.17	0	.17	.01	.66	.11	.78
18. Club steak	0	.02	.06	.0	0	.30	0	.30	0	.72	.13	.85
Total loin trimmings	0	2.71	.70	3.41	.19	5.52	1.06	6.99	.20	9.92	1.91	12.03

[1]Includes loss and error.

TABLE 34.—LEAN, VISIBLE FAT, AND BONE IN THE TRIMMINGS FROM THE RETAIL CUTS OF THE LOIN, EXPRESSED IN PERCENT

Retail loin cuts	Steer No. 1				Steer No. 2				Steer No. 3			
	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total
1. Sirloin steak (butt end).....	0	73.53	26.47	100.00	2.70	59.45	33.78	95.93	0	89.47	10.53	100.00
2. Sirloin steak (wedge-bone)..	0	92.86	7.14	100.00	0	70.37	29.63	100.00	0	85.29	14.71	100.00
3. Sirloin steak (round-bone)..	0	100.00	0	100.00	0	70.37	11.11	81.48	16.00	66.00	18.00	100.00
4. Sirloin steak (round-bone)..	0	76.60	23.40	100.00	4.76	59.52	28.57	92.86	8.11	54.05	37.84	100.00
5. Sirloin steak (double-bone)..	0	59.65	40.35	100.00	11.43	48.57	35.71	95.71	4.20	63.03	32.77	100.00
6. Sirloin steak (double-bone)..	0	81.25	18.75	100.00	3.85	69.23	23.08	96.16				
7. Sirloin steak (hip-bone).....					4.29	78.57	15.71	98.57	2.91	78.64	18.45	100.00
8. Porterhouse steak	0	84.85	15.15	100.00	2.60	87.01	6.49	96.10	0	100.00	0	100.00
9. Porterhouse steak	0	100.00	0	100.00	0	91.38	5.17	96.55	0	89.32	10.68	100.00
10. Porterhouse steak	0	100.00	0	100.00	0	100.00	0	100.00	0	89.32	10.68	100.00
11. Porterhouse steak	0	100.00	0	100.00	0	92.59	7.41	100.00				
12. Porterhouse steak	0	0	0	0	0	100.00	0	100.00	0	82.35	17.65	100.00
13. Porterhouse steak	0	0	0	0	0	100.00	0	100.00	0	86.00	14.00	100.00
14. Porterhouse steak	0	0	0	0	0	100.00	0	100.00	0	84.06	15.94	100.00
15. Porterhouse steak					0	100.00	0	100.00	0	88.89	11.11	100.00
16. Club steak	0	0	0	0	0	100.00	0	100.00	0	82.54	17.46	100.00
17. Club steak	0	16.67	83.33	100.00	0	100.00	0	100.00	1.28	84.62	14.10	100.00
18. Club steak	0	25.00	75.00	100.00	0	100.00	0	100.00	0	84.71	15.29	100.00
Total loin trimmings.....	0	79.47	20.53	100.00	2.72	78.97	15.16	96.85	1.66	82.46	15.88	100.00

TABLE 35.—LEAN, VISIBLE FAT, AND BONE IN TRIMMINGS FROM THE RETAIL CUTS OF THE ROUND, EXPRESSED IN POUNDS

Retail round cuts	Steer No. 1				Steer No. 2				Steer No. 3			
	Lean	Fat	Bone	Total[1]	Lean	Fat	Bone	Total[1]	Lean	Fat	Bone	Total[1]
1. Rump roast	0	.81	1.91	2.72	.14	.91	1.83	2.91	2.48	2.06	2.52	7.06
2. Round steak (first cut)	0	.14	.25	.39	.12	.06	.41	.61	.30	.36	.56	1.22
3. Round steak	0	.11	.12	.23	0	.03	0	.03	0	0	0	0
4. Round steak	0	.06	0	.06	0	.09	0	.09	0	.19	0	.19
5. Round steak	0	.09	0	.09	0	.25	0	.25	0	.28	0	.28
6. Round steak	0	.13	0	.13	0	.17	0	.17	0	.50	0	.50
7. Round steak	0	.11	0	.11	0	.19	0	.19	0	.50	0	.50
8. Round steak	0	.11	0	.11	0	.12	0	.12	0	.25	0	.25
9. Round steak	0	09	0	.09								
10. Round steak	0	.13	0	.13								
11. Round steak	0	.04	0	.04								
12. Round steak	0	.08	0	.08	0	.11	0	.11	.03	.22	0	.25
13. Round steak	0	.03	0	.03								
14. Round steak	0	.03	0	.03	0	0	0	0	.42	.24	.34	1.00
15. Knuckle soup bone	0	0	0	0	0	0	0	0	0	.16	0	.16
16. Pot roast	0	0	0	0	0	0	0	0	.23	.27	0	.50
17. Shank soup bone	0	0	0	0	0	0	0	0	0	0	0	0
18. Shank soup bone	0	0	0	0	0	0	0	0	0	0	0	0
19. Shank soup bone (hock)	0	0	0	0	0	0	0	0	0	0	0	0
Total round trimmings	0	1.96	2.28	4.24	.26	1.93	2.24	4.48	3.46	5.03	3.42	11.91

[1]Includes loss and error.

TABLE 36.—LEAN, VISIBLE FAT, AND BONE IN TRIMMINGS FROM THE RETAIL CUTS OF THE ROUND, EXPRESSED IN PERCENT

Retail round cuts	Steer No. 1				Steer No. 2				Steer No. 3			
	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total
1. Rump roast	0	29.78	70.22	100.00	4.81	31.27	62.54	98.62	35.13	29.18	35.69	100.00
2. Round steak (first cut)	0	36.00	64.00	100.00	19.67	9.84	67.21	96.72	24.59	29.51	45.90	100.00
3. Round steak	0	48.00	52.00	100.00	0	100.00	0	100.00	0	0	0	0
4. Round steak	0	100.00	0	100.00	0	100.00	0	100.00	0	100.00	0	100.00
5. Round steak	0	100.00	0	100.00	0	100.00	0	100.00	0	100.00	0	100.00
6. Round steak	0	100.00	0	100.00	0	100.00	0	100.00	0	100.00	0	100.00
7. Round steak	0	100.00	0	100.00	0	100.00	0	100.00	0	100.00	0	100.00
8. Round steak	0	100.00	0	100.00	0	100.00	0	100.00	0	100.00	0	100.00
9. Round steak	0	100.00	0	100.00								
10. Round steak	0	100.00	0	100.00								
11. Round steak	0	100.00	0	100.00								
12. Round steak	0	100.00	0	100.00	0	100.00	0	100.00	12.00	88.00	0	100.00
13. Round steak	0	100.00	0	100.00								
14. Round steak	0	100.00	0	100.00	0	0	0	0	42.00	24.00	34.00	100.00
15. Knuckle soup bone	0	0	0	0	0	0	0	0	0	100.00	0	100.00
16. Pot roast	0	0	0	0	0	0	0	0	46.00	54.00	0	100.00
17. Shank soup bone	0	0	0	0	0	0	0	0	0	0	0	0
18. Shank soup bone	0	0	0	0	0	0	0	0	0	0	0	0
19. Shank soup bone (hock)	0	0	0	0	0	0	0	0	0	0	0	0
Total round trimmings	0	46.23	53.77	100.00	5.80	43.08	50.00	98.88	29.05	42.23	28.72	100.00

TABLE 37.—LEAN, VISIBLE FAT, AND BONE IN TRIMMINGS FROM THE RETAIL CUTS OF THE CHUCK, EXPRESSED IN POUNDS

Retail chuck cuts	Steer No. 1				Steer No. 2				Steer No. 3			
	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total[1]	Lean	Fat	Bone	Total[1]
1. Roast (5th rib)	.06	.05	.16	.27	.12	.06	.27	.47	.09	0	.12	.22
2. Chuck steak	.06	.02	.23	.31	.06	.02	.09	.17	.03	.06	.09	.18
3. Chuck steak	.01	.02	.03	.06	.09	.05	.09	.23	.02	.05	.18	.25
4. Chuck steak	.03	0	.08	.11	.05	.01	.06	.13	.01	.05	.03	.09
5. Chuck steak	.05	0	.17	.22	.06	.02	.07	.17	.05	.03	.23	.31
6. Chuck steak	.02	0	.06	.08	.06	.02	.06	.14	0	.03	.16	.19
7. Chuck steak	.06	.01	.19	.26	.04	.01	.08	.14	0	0	0	0
8. Chuck steak	.05	0	.06	.11	.05	0	.01	.06	0	.05	.22	.28
9. Chuck steak	.06	0	.06	.12	.09	.03	.19	.34	0	0	0	0
10. Pot roast	0	0	0	0	.39	.05	.48	.98	0	0	0	0
11. Pot roast	.14	.50	.62	1.26	.20	1.47	0	1.70	.66	1.69	.59	2.94
12. Pot roast	0	0	0	0	0	0	0	0	0	0	0	0
13. Stew	.72	1.59	0	2.31	0	0	0	0	0	0	0	0
14. Clod	0	0	0	0	0	0	0	0	.11	.20	0	.31
15. Neck	1.58	1.65	.51	3.74	.94	.51	.44	2.00	0	0	0	0
Total chuck trimmings	2.84	3.84	2.17	8.85	2.15	2.25	1.84	6.53	0.98	2.16	1.62	4.77

[1]Includes loss and error.

TABLE 38.—LEAN, VISIBLE FAT, AND BONE IN TRIMMINGS FROM THE RETAIL CUTS OF THE CHUCK, EXPRESSED IN PERCENT

Retail chuck cuts	Steer No. 1				Steer No. 2				Steer No. 3			
	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total	Lean	Fat	Bone	Total
1. Roast (5th rib)	22.00	18.52	59.26	100.00	25.53	12.77	57.45	95.75	40.91	0	54.55	95.46
2. Chuck steak	19.36	6.45	74.19	100.00	35.29	11.77	52.94	100.00	16.67	33.33	50.00	100.00
3. Chuck steak	16.67	33.33	50.00	100.00	39.13	21.74	39.13	100.00	8.00	20.00	72.00	100.00
4. Chuck steak	27.27	0	72.73	100.00	38.46	7.69	46.16	92.31	11.11	55.56	33.33	100.00
5. Chuck steak	22.73	0	77.27	100.00	35.29	11.77	41.18	88.24	16.13	9.68	74.19	100.00
6. Chuck steak	25.00	0	75.00	100.00	42.86	14.28	42.86	100.00	0	15.79	84.21	100.00
7. Chuck steak	23.08	3.85	73.07	100.00	28.57	7.14	57.15	92.86	0	0	0	0
8. Chuck steak	45.45	0	54.55	100.00	83.33	0	16.67	100.00	3.57	17.86	78.57	100.00
9. Chuck steak	50.00	0	50.00	100.00	26.47	8.83	55.88	91.18	0	0	0	0
10. Pot roast	0	0	0	0	39.80	5.10	48.98	93.88	0	0	0	0
11. Pot roast	11.11	39.68	49.21	100.00	11.77	86.47	0	98.24	22.45	57.48	20.07	100.00
12. Pot roast	0	0	0	0	0	0	0	0	0	0	0	0
13. Stew	31.17	68.83	0	100.00	0	0	0	0	0	0	0	0
14. Clod	0	0	0	0	0	0	0	0	35.48	64.52	0	100.00
15. Neck	42.24	44.12	13.64	100.00	47.00	25.50	22.00	99.50	0	0	0	0
Total chuck trimmings	32.09	43.39	24.52	100.00	32.93	34.45	28.20	95.58	20.55	45.28	33.96	99.79