WARTIME BEEF PRODUCTION

What grade of feeders?
What finish?

By Fred C. Francis
Sleeter Bull
W. E. Carroll

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Carcass from a Choice steer fed to a Good finish

Such carcasses are palatable, economical to produce, and have as much fat as most people will eat

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WARTIME BEEF PRODUCTION

By Fred C. Francis, Sleeter Bull, and W. E. Carroll[1]

NO GENERAL SHORTAGE of beef in this country has as yet been caused by the war. The local beef famines which have occurred have been only temporary and the results of maldistribution and bad management of the beef resources of the country rather than to any real shortage. In fact, the year 1944 opened with the record number of over 82 million cattle on the farms and ranches of the United States.

A turn of events in either of two possible directions, however, could change this situation radically. A year of short crops or a substantial reduction in cattle-feeding operations would bring a genuine beef famine, while the prolongation of the war for several years even with good crop yields would bring about a similar change more gradually.

The most immediate threat to the beef supply is inadequate amounts of farm grains and protein supplements to feed in the customary manner the peak numbers of beef cattle, dairy cattle, swine, and poultry on the farms and ranches of the country. A report submitted in January, 1944, to the Feed Industry Council by a special Feed Survey Committee indicates that this country has on hand or can hope to import less grains and mill feeds by 11 percent and less high-protein feeds by 25 percent than is necessary to feed the 1944 livestock population their customary rations.

A special need has been expressed for milk, eggs, and pork, but the country cannot afford to discontinue the production of beef merely because it can be demonstrated that dairy cattle, swine, and poultry produce more human food per unit of feed consumed than beef cattle do, or that an acre of cultivated soil planted to grains or soybeans produces more human food than can a similar area devoted to any kind of livestock production. The fallacy of such arguments is found in the millions of acres of American soil which, because of topography, climate, or location, cannot be utilized by other animals and which cannot be forced to produce food grains or soybeans. They do, however, provide feed for the growth of millions of pounds of meat which needs only a short finish on concentrates to become beef.

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Palatable beef is the product of fattened cattle. The meat "production line" only begins on the western ranges and farm pastures of the country. The animals leave these grazing grounds weighing from 400 pounds, in the case of calves, to 700 or 800 pounds, in the case of older cattle, and are not usually fat enough to yield beef of desirable quality if slaughtered in this condition. Of even more importance to wartime meat requirements is the reduced tonnage of beef which would be obtained if the crop were "harvested" in this "immature" stage. A turn in the feedlot adds 200 to 400 pounds to the weight of each animal (no mean addition to the beef supply), increases its carcass yield, and greatly improves the quality and nutritive value of the beef.

During the emergency, when corn is required in such large amounts by other food-producing farm animals and for essential industrial purposes, only enough corn should be fed to beef cattle to yield maximum returns in increased tonnage and quality of beef for each bushel of corn fed. Federal agencies have suggested that this goal is reached with Good and Choice feeders by the time they have attained a finish required on Good carcasses. Medium and Common feeders should usually carry even less fat than this.

Of course, a Choice steer yields more beef and better beef than a Good steer because he is heavier, has a higher dressing percentage, and is fatter. The same relationships hold true with Good, Medium, and Common cattle. Unfortunately, however, the fatter the animal becomes, the more corn is required to produce a pound of gain. Furthermore, after the animal reaches a certain degree of fatness, the increase in weight is largely fat, much of which is trimmed off the lean and discarded by most people. Hence very fat beef, altho very palatable, is both uneconomical to produce and wasteful for the consumer.

In order to make this grain-saving program most effective in producing beef, the animals should be grown to weights of 700 to 800 pounds on roughages and pasture before they are fattened. Animals of this weight finish in shorter time and require less grain for a given degree of finish than younger animals and they yield heavier carcasses.

The war has not changed the grades of feeder cattle available for the feedlots, and there is little experimental information on the time and feed necessary to bring feeder cattle of different grades to different degrees of finish, the increase in tonnage of beef resulting from different degrees of finish, and the amount of fat in beef of different grades. The experiments here reported were undertaken in the hope that data on these various questions would be useful to beef-cattle producers and feeders in planning their operations.

Four Grades of Feeders Fed

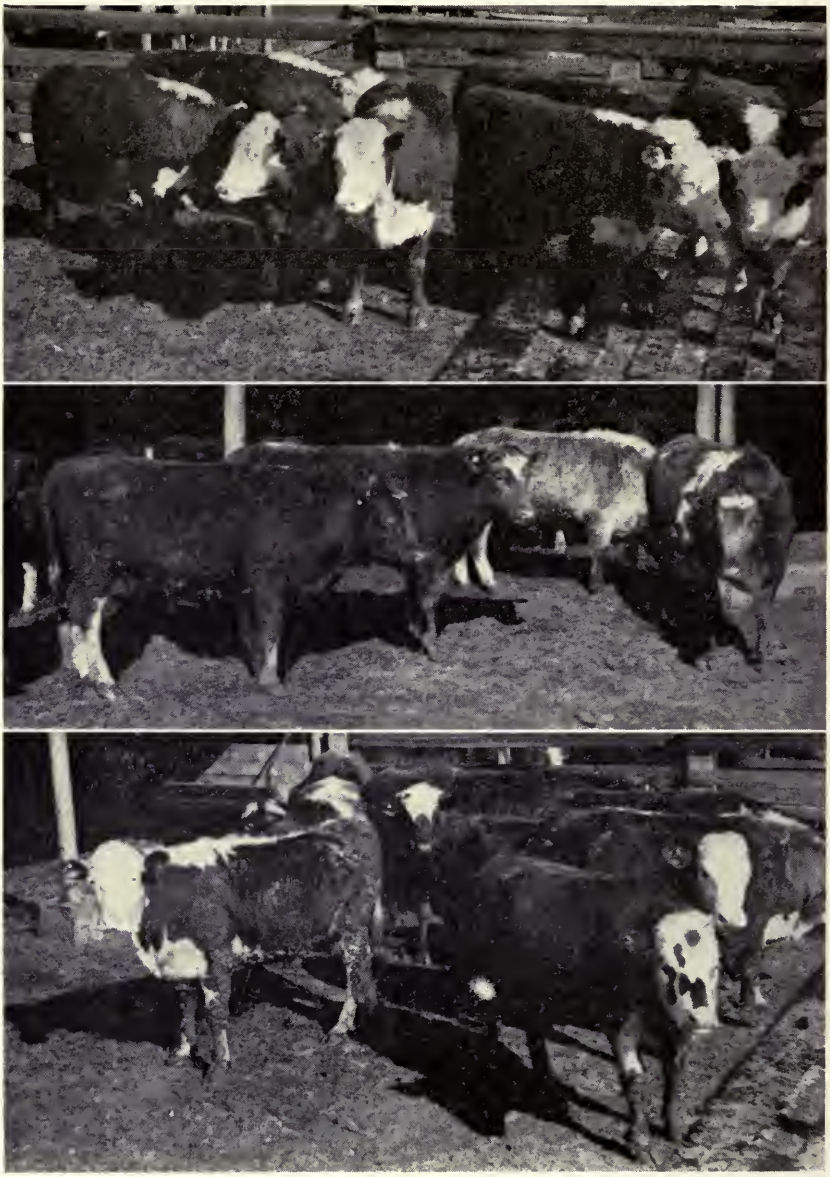
Fifty long 2-year-old feeder steers were started on feed on November 13, 1942. There were two lots of 10 Choice steers each, one lot of 10 Good steers, one lot of 10 Medium steers, and one lot of 10 Common steers. All steers were fed a full feed of corn, together with approximately 2 pounds of soybean oilmeal, and suitable amounts of corn silage and red clover hay.

With the exception of one lot of Choice feeders, which was fed to a Choice finish, the cattle were all fed to the same degree of finish—Good. Each steer was slaughtered when, in the opinion of the experimenters, he reached this finish.

The dressing percentage and grade of each carcass was determined. A cutting test, using the O.P.A. method, was made on the right side of each carcass, and each wholesale cut was separated into lean, fat, and bone.

A second experiment was begun on April 29, 1943. Sixty 2-year-old feeder steers were put on feed. There were two lots of 10 Choice, two lots of 10 Good, one lot of 10 Medium, and one lot of 10 Common steers each. All steers were fed a full feed of corn together with red clover hay. One lot of Choice feeders was fed to a Choice

Choice feeders carried to a Good finish. In normal times Choice feeders would be carried to a Choice finish and would produce Choice or AA carcasses. This takes too much corn in wartime.



Good, Medium, and Common feeders carried to a Good finish. Good feeders (*top*) produced Good or A beef economically. Whether Medium feeders (*center*) can be brought to a Good finish economically depends upon the margin. Common feeders (*bottom*) should be fed to only a Medium finish.

finish, the other to Good; one lot of Good feeders was fed to a Choice finish, the other to Good; both the Medium and the Common lots were fed to a Good finish. Each steer was slaughtered when he reached the finish desired for his lot.

The carcasses were treated as in the preceding experiment except that the wholesale cuts of the entire right side of only six carcasses from this experiment were separated into lean, fat, and bone. Only the wholesale rib cuts from both sides of the remaining carcasses were so separated (*see Table 4 and footnote*).

Choice Finish Wastes Feed

The results of the feeding tests are given in Tables 1 and 2. Owing probably to differences in initial condition, the time required for cattle

TABLE 1.—BEEF FROM DIFFERENT GRADES OF FEEDER CATTLE
EXPERIMENT 1, 1942-43: FEED CONSUMPTION AND GAINS MADE
(10 steers per lot; all figures are averages)

Lot No.	1	2	3	4	5
Feeder grade	Choice[a]	Choice[a]	Good	Medium	Common
Condition at close of test	Choice	Good	Good	Good	Good
Fat in carcass, percent	34.1	25.2	27.4	28.8	27.3
Days to finish	174	100	114	137	141
Weights and gains	*lb.*	*lb.*	*lb.*	*lb.*	*lb.*
Initial weight	968	966	876	796	743
Final weight	1 268	1 122	1 147	1 091	1 030
Total gain	300	156	271	295	287
Daily gain	1.73	1.56	2.37	2.15	2.04
Feed eaten daily					
Corn	14.3	13.8	15.5	14.5	14.3
Soybean meal	2.0	2.0	2.2	2.1	2.0
Silage	10.6	14.0	12.3	10.2	9.9
Clover hay	2.9	2.5	2.6	2.7	2.7
Feed per 100 pounds gain					
Corn	829	889	652	677	704
Soybean meal	118	127	93	96	101
Silage	612	899	517	475	488
Clover hay	166	161	109	126	134
	bu.	*bu.*	*bu.*	*bu.*	*bu.*
Corn eaten per head	44.4	24.7	31.5	35.7	36.1
Costs and values per hundredweight					
Cost of cattle in lot	$14.37	$14.37	$12.21	$11.14	$ 9.51
Feed cost of gain[b]	23.39	25.74	18.24	18.87	19.67
Necessary selling price in lot	16.50	15.95	13.63	13.23	12.34
Value in lot for grade[c]	16.55	15.03	14.90	14.77	14.30
Value of finished cattle in lot[d]	14.75	14.00	14.00	14.00	14.00
Value of feeders in lot[e]	12.08	12.10	12.69	12.20	11.81
Profit per head	$ .60	−$10.37	$14.51	$16.83	$20.15

[a]See footnote on page 132 concerning the temperament of the steers in these two lots.

[b]Feed prices used: corn, $1.07 a bushel; soybean meal, $55 a ton; silage, $7.25 a ton; clover hay, $25 a ton.

[c]Chicago price less 75 cents per hundredweight.

[d]Feedlot value per hundredweight of finished cattle based on ceiling prices on beef current at the time (Chicago value less 75 cents per hundredweight).

[e]Price per hundredweight which owner could have paid for the feeders and still have broken even by selling the fat cattle in line with ceiling prices on beef.

TABLE 2.—BEEF FROM DIFFERENT GRADES OF FEEDER CATTLE
EXPERIMENT 2, 1943: FEED CONSUMPTION AND GAINS MADE
(10 steers per lot; all figures are averages)

Lot No.	1	2	3	4	5	6
Feeder grade	Choice	Choice	Good	Good	Medium	Common
Condition at close of test	Choice	Good	Choice	Good	Good	Good
Fat in carcass, percent	33.2	25.8	34.5	28.7	28.0	25.9
Days to finish	148	79	204	130	134	166
Weights and gains	*lb.*	*lb.*	*lb.*	*lb.*	*lb.*	*lb.*
Initial weight	870	866	777	772	721	737
Final weight	1 175	1 049	1 183	1 069	1 019	1 033
Total gain	305	183	406	297	298	296
Daily gain	2.06	2.32	1.99	2.28	2.22	1.78
Feed eaten daily						
Corn	15.2	14.1	15.3	15.1	14.7	14.0
Clover hay	6.8	7.2	6.6	6.9	6.9	6.7
Feed per 100 pounds gain						
Corn	738	606	769	662	662	783
Clover hay	329	312	332	303	309	376
	bu.	*bu.*	*bu.*	*bu.*	*bu.*	*bu.*
Corn eaten per head	40.2	19.8	55.8	35.1	35.2	41.4
Costs and values per hundredweight						
Cost of cattle in lot	$15.95	$15.95	$14.90	$14.90	$13.70	$13.25
Feed cost of gain[a]	18.21	15.49	18.85	16.43	16.50	19.67
Necessary selling price in lot	16.54	15.87	16.25	15.33	14.52	15.09
Value in lot for grade[b]	15.47	14.50	15.16	14.07	13.52	11.15
Value of finished cattle in lot[c]	14.75	14.00	14.75	14.00	14.00	11.75
Value of feeders in lot[d]	13.54	13.69	12.61	13.06	12.97	8.57
Loss per head	$12.53	$14.36	$12.95	$13.42	$10.18	$40.71

[a]Feed prices used: corn, $1.07 a bushel; clover hay, $25 a ton.

[b]Chicago price less 75 cents per hundredweight.

[c]Feedlot value per hundredweight of finished cattle based on ceiling prices on beef current at the time (Chicago value less 75 cents per hundredweight).

[d]Price per hundredweight which owner could have paid for the feeders and still have broken even by selling the fat cattle in line with ceiling prices on beef.

of different grades to reach a Good finish varied with the grade, Choice feeders[1] requiring least time and Common longest. Rates of gain did not differ greatly, tho the Common cattle gained somewhat more slowly than those of other grades.

The amount of feed eaten for 100 pounds of gain increased slightly as the grade went down. The Common steers required considerably more feed for 100 pounds of gain, probably due to their greater age. The total corn required to bring an average steer of each grade to Good finish varied from 20 bushels for the Choice feeders to about 40 bushels for the Common feeders.

Under existing feed prices and prices of finished cattle which are in line with ceiling prices on beef, the test indicates that Good-to-

[1]In interpreting the data relating to the two lots of Choice feeders in Table 1, it should be kept in mind that these cattle were very nervous and did not respond to feed in as normal a manner as did the other cattle. For this reason it may well be that the performance of Choice steers is more accurately represented by Lots 1 and 2 in Table 2 than by corresponding data in Table 1.

Choice feeder fed to a Good finish. This steer produced a Good or A carcass (see page 126). More finish would have made him Choice but would have taken too much corn.

Good feeder fed to a Good finish. This steer also produced a Good or A carcass. A higher finish probably would have made him Choice but would have taken 20 to 25 bushels more corn.

Choice 2-year-old feeder cattle can be brought to a Good degree of finish on a spread in price between finished cattle and feeders (feedlot basis) of about 50 cents to $1.00 a hundred. Medium feeders will need a spread of $1.00 to $2.00, and Common feeders, a spread of $2.50 to $3.50 if they are to be given a finish characteristic of Good carcasses at a profit above cattle and feed costs.

To carry Choice feeders which have reached Good condition on to Choice finish required about as much corn as was needed to bring them from feeder flesh to Good finish. In other words, the corn required to put a Choice feeder in Choice slaughter condition will put two Choice feeders in Good killing condition, and thus produce about 81 percent more edible meat than is found in the one Choice carcass.

To feed cattle of Good feeder grade to Choice finish also was very wasteful of corn—56 bushels per head compared with 30 to 35 bushels for similar cattle stopped at Good finish.

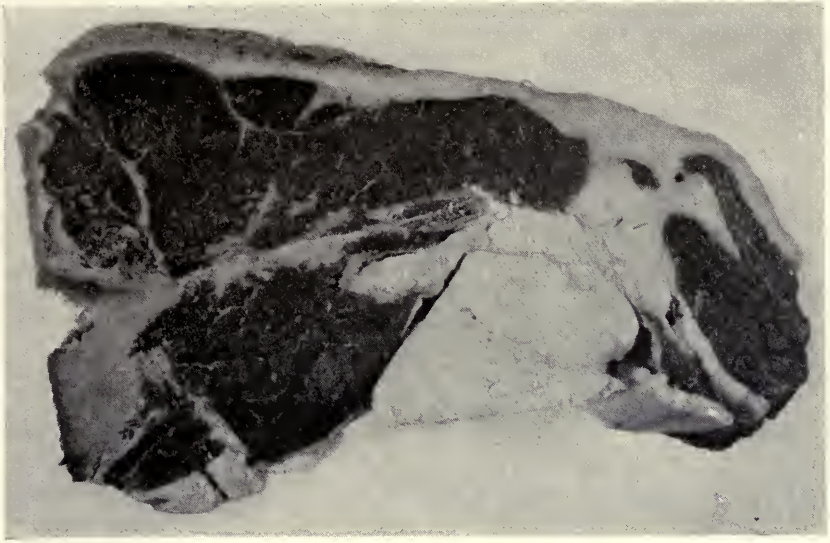
Choice Finish Wastes Fat

The grades, dressing percentages, and physical composition of the carcasses (by lots) are shown in Tables 3 and 4. Table 5 gives the average physical composition of the carcasses by grades, regardless of the lot from which they came. In general, Choice feeders fed to a Choice finish, containing about 34 or 35 percent of fat in the carcasses, produced AA carcasses, as expected. Choice feeders with a Good finish, 27 or 28 percent of fat, produced only A carcasses due to insufficient finish. Good feeders fed to a Choice finish produced a majority of AA carcasses, 7 AA and 3 A. The A carcasses from this lot contained only 24 to 29 percent of fat and graded too low in conformation for AA carcasses.

The Good feeders slaughtered in Good condition yielded A carcasses containing approximately 28 percent of fat. The Medium feeders fed to Good condition contained enough fat, 28 percent, to Grade A, but owing to deficient conformation only 12 carcasses graded A, the other 8 grading B.

The Common steers fed to a Good finish, 26 to 27 percent fat, produced 3 A, 16 B, and 1 C carcass, due largely to inferior conformation and quality. The C carcass also was distinctly unfinished, containing only 21 percent of fat.

The large amount of corn required to carry cattle from a Good to a Choice finish is explained by Table 6, page 137, showing the physi-



Porterhouse steak from a Good carcass. Such beef is relatively inexpensive to produce, is highly palatable, and most people eat the fat.

Choice or Prime beef is out for the duration. It takes too much corn to produce and most people trim off much of the fat.

TABLE 3.—CARCASS GRADES AND DRESSING PERCENTAGES

Lot	Feeder grade	Finish	Number of carcasses grading—							Dressing percentage
			AA+	AA−	A+	A−	B+	B−	C+	
			First experiment							
1	Choice	Choice	6	4	..	..	..	..	..	64.6
2	Choice	Good	..	..	6	4	..	..	..	62.1
3	Good	Good	..	..	2	8	..	..	..	59.1
4	Medium	Good	..	..	..	6	3	1	..	57.7
5	Common	Good	..	..	..	3	2	5	..	58.7
			Second experiment							
1	Choice	Choice	4	5	1	..	..	..	..	61.5
2	Choice	Good	..	..	4	6	..	..	..	58.4
3	Good	Choice	2	5	2	1	..	..	..	62.1
4	Good	Good	..	..	3	7	..	..	..	58.4
5	Medium	Good	..	..	2	4	3	1	..	59.2
6	Common	Good	..	..	..	..	1	8	1	59.7

cal composition of the increase in the carcass weight. Lean meat contains about 75 percent water, and the energy content of the dry substance is comparatively low; fat meat contains only 10 to 30 percent water and the energy content of fat is very high; bone contains considerable water—around 35 percent—and the energy content is medium. Thus lean and bone are produced with relatively small amounts of feeds of low net energy, such as hays and pastures, while large amounts

TABLE 4.—AVERAGE PHYSICAL COMPOSITION OF CARCASSES, BY LOTS

Lot	Feeder grade	Number of carcasses with grades indicated	Percentage of—		
			Lean	Fat	Bone
		First experiment			
1	Choice	6 AA+, 4 AA−	52.5	34.1	12.8
2	Choice	6 A+, 4 A−	59.4	25.2	15.0
3	Good	2 A+, 8 A−	57.1	27.4	15.2
4	Medium	6 A−, 3 B+, 1 B−	55.1	28.8	15.4
5	Common	3 A−, 2 B+, 5 B−	56.3	27.3	15.8
		Second experiment[a]			
1	Choice	4 AA+, 5 AA−, 1 A+	49.3	33.2	17.3
2	Choice	4 A+, 6 A−	54.2	25.8	19.4
3	Good	2 AA+, 5 AA−, 2 A+, 1A−	48.2	34.5	16.8
4	Good	3 A+, 7 A−	52.4	28.7	18.4
5	Medium	2 A+, 4 A−, 3 B+, 1B−	52.4	28.0	19.1
6	Common	1 B+, 8B−, 1 C+	54.8	25.9	18.9

[a]The wholesale cuts of the entire right side of only six carcasses from this experiment were separated into lean, fat, and bone. Only the wholesale rib cuts from both sides of the remaining carcasses were so separated. This change was made after a correlation of .92 was shown to exist between the fat content of the wholesale rib cut and of the entire right side.

TABLE 5.—AVERAGE PHYSICAL COMPOSITION OF CARCASSES, BY GRADES

Number	Grade	Percentage of—			Number	Grade	Percentage of—		
		Lean	Fat	Bone			Lean	Fat	Bone
First experiment					Second experiment				
6	AA+	51.3	35.4	12.5	6	AA+	47.3	36.4	16.1
4	AA−	54.2	32.1	13.2	10	AA−	48.3	34.4	16.9
10	AA	52.5	34.1	12.8	16	AA	47.9	35.1	16.6
8	A+	57.9	27.1	14.5	12	A+	52.3	28.6	18.6
21	A−	56.8	27.4	15.4	18	A−	54.4	27.6	17.6
29	A	57.1	27.3	15.1	30	A	53.5	28.0	18.0
5	B+	55.9	28.2	15.4	4	B+	53.6	26.8	19.2
6	B−	57.4	25.8	16.3	9	B−	55.4	25.7	18.6
11	B	56.7	26.9	15.9	13	B	54.8	26.0	18.8
					1	C+	55.2	21.2	23.3

of fat are produced only with large amounts of high-energy feeds, such as corn.

In carrying Choice and Good feeders from a Good to a Choice finish, the additional carcass weight was made up largely of fat which, as already noted, is very expensive to produce. Furthermore, while this additional fat increases the grade of the carcass and improves the palatability of the beef, it usually is not eaten and therefore represents an economic waste of the extra corn used to produce it.

TABLE 6.—PHYSICAL COMPOSITION OF INCREASE IN CARCASS WEIGHT WHEN CHANGING FINISH FROM A TO AA

Feeder grade	Age, years	Percentage of—		
		Lean	Fat	Bone
Choice	2½	10.1	90.6	0
Choice	2	21.1	76.0	5.8
Good	2	24.5	67.0	8.5

Beef Produced Largely on Grass

The statement is often made that beef cattle are inefficient machines for the conversion of corn to human food. That beef as customarily produced in this country (that is, grown on roughage, then fattened on corn) is not wasteful of corn is shown by the following data from the second experiment, in which both Choice and Good feeder cattle were fed to Choice as well as to Good slaughter finish. These calculations credit all the carcass to the corn consumed during the fattening period.

Feeder grade	Initial weight	Final weight	Dressing test	Degree of finish	Carcass fat	Corn eaten for each pound of—	
						Carcass	Boneless meat[a]
	lb.	*lb.*	*perct.*		*perct.*	*lb.*	*lb.*
Choice	870	1 175	61.5	Choice	33.2	3.2	4.3
Good	774	1 184	62.1	Choice	34.5	4.4	6.0
Choice	866	1 049	58.4	Good	25.8	1.9	2.4
Good	772	1 069	58.4	Good	28.7	3.2	4.2
Medium	721	1 019	59.2	Good	28.0	3.4	4.4
Common	737	1 033	59.7	Good	25.9	3.9	4.9

([a]Adjusted to 25 percent of fat, as this is about as much fat as most people will eat on beef.)

These yields of carcass and of edible meat in terms of corn consumed are considerably greater than can be expected from hogs for the reason that hogs require a concentrated ration thruout their lives rather than just for a short finishing period, as is the case with cattle.

Slaughter of Range Cattle Wastes Beef

Many people urge the immediate slaughter of cattle directly from the range as a means of saving corn. Each year a limited number of older cattle on the better ranges *are* fat enough to slaughter as they leave the range. The great majority of cattle, however, come from the ranges thin, and many of them are so young that their carcasses would be very light. To slaughter such cattle would waste much badly needed beef due to their thin condition and low dressing percentage. The amount of such loss is shown by the following data from the second experiment:

Feeder grade and finish grade	Carcass weight of feeder (estimated)	Carcass weight of slaughter steer	Increase in carcass weight due to feeding	
	lb.	*lb.*	*lb.*	*perct.*
Choice feeder fed to Choice finish	478	698	220	46
Good feeder fed to Choice finish	410	712	302	74
Choice feeder fed to Good finish	476	594	118	25
Good feeder fed to Good finish	409	606	197	48
Medium feeder fed to Good finish	360	580	220	61
Common feeder fed to Good finish	354	595	241	68

In estimating the differences in beef produced by fed cattle and by unfattened cattle, it seems logical for the present discussion to consider only the Choice, Good, and Medium grades of feeders which were fed to Good finish, for Choice finish is definitely too high for wartime

beef and Common feeders should manifestly be given no more than Medium finish. The figures in the above tabulation show that feeding Choice, Good, and Medium feeders to a Good finish increased the carcass beef yielded by these cattle an average of 45 percent over the amount which could have been expected had the cattle been slaughtered without being fattened.

For each pound the carcasses of these three grades of feeder cattle were increased, about 9 pounds of corn were fed. This amount is not excessive when it is considered that the corn which produced this added carcass weight at the same time brought about a marked improvement in the quality and considerable increase in the nutritive value of the carcass originally carried by these cattle when they went into the feedlot.

Feeding enough grain to develop Choice, Good, and possibly Medium feeders to the point where their carcasses will grade Good can thus be easily justified by the increase in the amount of meat produced and the improvement in its quality.

Feeding Insures Even Beef Supply

There is another serious objection to the slaughter of cattle directly off the range or farm pasture. Such cattle are marketed when there is no more pasture for them to eat. While the exact time of marketing depends upon weather conditions and locality, the great majority of range cattle are sold in the fall. Under normal conditions many of these cattle go to the feedlot. Some are marketed for slaughter in two or three months, others in four or six months, and some in eight or nine months. Thus there is a more or less constant supply of beef coming onto the market thruout the year.

If all cattle were slaughtered at the end of the range season, there would be a serious glut of cattle during the fall and early winter months, which would tax marketing and slaughter facilities. Since the only method by which beef can be stored for more than a few days is by freezing, there would temporarily be more beef than could be eaten, followed by a beef famine for the rest of the year.

AMERICAN RANCHMEN AND FARMERS, during periods of feed-grain scarcity, can produce the most edible beef with the least corn by adhering to the following practices, as demonstrated by the experiments reported here:

1. Keep cattle largely on pasture and roughage until they have most of their growth, or until they are about two years old.

2. Feed Common 2-year-old feeder cattle a minimum amount of corn until they have no more than a Medium finish, thus producing Commercial or B carcasses.

3. Feed Medium 2-year-old feeder cattle a minimum amount of corn to a Medium finish, producing Commercial or B carcasses; or short-feed them a full feed of corn to a Good finish, producing Good or A carcasses. Which is better depends on the spread in price between feeder and finished cattle.

4. Short-feed Good and Choice 2-year-old feeders a full feed of corn, suitably supplemented, to a Good finish, thus producing Good or A carcasses.

If these practices are followed, beef supplies will be distributed reasonably uniformly thruout the year.

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