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# B606: An Economic Study of the Beef Cattle Industry in Maine

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# An economic study of the Beef Cattle Industry in Maine

Dean F. Tuthill

John A. Graffam



By-A-Brook Farm of Henry Swanton, West Buxton, Maine, a cooperator in research in feeding trials and in the economics of beef cattle production.

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## SUMMARY

The history of beef cattle in Maine shows a long-run decline from 182 thousand head in 1880 to 21 thousand in 1950, with a slight increase to around 25 thousand head in 1958. Beef cattle represent a relatively minor segment of Maine agriculture at the present time. Cash receipts from marketings of all cattle and calves, including dairy animals, in 1957 totaled \$6 million or 3.4 per cent of total cash receipts for farmers in Maine. Beef cattle accounted for approximately \$732 thousand or 12.2 per cent of cash receipts from all cattle and calves.

In this study about one-quarter of the beef producers in Maine were selected randomly to provide management practices and costs and returns for beef production. The sample included small as well as large units and hobby as well as commercial enterprises. The average herd had 48.3 head, 35.6 animal units and 20.1 cows. The beef enterprise was usually found in combination with another farm enterprise such as dairy, poultry or potatoes or with a non-farm occupation.

The cost of production for the average beef herd was \$180.35 per animal unit or \$319.43 per cow. Feed, including home-grown feed, pasture, bedding and purchased feed, made up 61.7 per cent of the total cost. Home-grown hay was the largest item of feed cost at 38.5 per cent of total cost. Other costs included labor which accounted for 12.5 per cent of total cost; purchase of cattle, 7.6 per cent; interest on cattle, 7.3 per cent; buildings, 3.8 per cent and machinery and equipment, 2.5 per cent. Miscellaneous costs including taxes on cattle, veterinary and medicine, telephone and electricity and other minor costs equaled 4.6 per cent of the total cost.

The gross returns were \$103.20 per animal unit or \$182.79 per cow for the average herd. The sale of cattle accounted for 64.7 per cent and an increase in the beef herd inventory 26.5 per cent of the returns. Manure credit, an estimated fertilizer value for the manure, and miscellaneous receipts made up 7.7 and 1.1 per cent respectively of the returns. The total cost deducted from gross returns resulted in a loss of \$77.15 per animal unit or \$136.64 per cow for the average herd.

Although there was a loss suffered on the average by beef producers, the majority planned to continue or expand beef production. This indicated that some producers felt that beef cattle did cover costs of production or that they fit in well with other farm enterprises to form an overall economic farm unit. The losses in some cases, especially for hobby herds, might be considered as a cost covered by the pleasure and pride in ownership of beef cattle.

For producers concerned with lowering costs, the most important area in which to consider cost reduction is feed, particularly hay. The cost of hay was the average market price which varied according to quality and the market situation. The pasture costs were less than one-third of the hay costs, but improvement in pasture might pay for the cost by decreasing hay and grain costs. Grain costs, for both home-grown and purchased grain, amounted to only 6.9 per cent of total costs, but again, an increase in grain feeding resulting in faster gains and earlier marketing might be profitable. Reduction in overall feed costs would vary with different individual situations, and the best feeding program would have to be adapted to the area and the marketing practice.

The labor cost was calculated on the basis of a dollar an hour for all labor on the beef cattle including that of the operator and the family. The owner might be willing to accept less than this wage for his and his family's labor and thus reduce this cost. The average labor requirements included producers who stanchioned their cattle and required a considerable amount of labor for feeding and manure removal. The labor requirement could be considerably reduced by efficient housing and care of cattle.

The building costs were calculated as the annual costs for a newly constructed pole-type shed of sufficient capacity for the average herd. The costs of some buildings already on the farm might be less than this, but many producers used more elaborate and expensive buildings than were necessary resulting in higher costs than the estimate used in this study.

The financial loss of the average herd appeared to be due to high costs rather than low returns. Costs, prices and production practices of Maine producers were compared to those of other beef producing areas to determine whether losses in Maine were due to poor management, to economic conditions beyond the control of producers or perhaps to some of both.

Maine producers did feed more hay and less grain than other areas (Illinois, New York, Ohio), but considering Maine conditions, this would be expected, and the quantity of feed fed did not appear excessive. The prices received by Maine farmers for hay and grain, however, were consistently above those of New York, the north central states or the United States. The price of hay, in particular, was from \$4 to \$7 per ton above the hay prices in the other areas during an eight year period. The higher prices of feed put Maine producers at a considerable disadvantage in competing with other areas.

The price per hundredweight received for beef by producers in the study was not ascertained since most animals were sold by

the head rather than by weight. An estimate of this price per hundredweight showed it to be better than the average beef price received by farmers in Maine for all cattle, which would include cull dairy animals. The prices received by Maine farmers for all cattle marketed, however, were \$2 to \$6 per hundredweight lower than prices received for all cattle by farmers in New York, the north central states or the United States over an 8-year period. This was partly due to the larger proportion of dairy cattle slaughtered for beef in Maine, but the price for steers and heifers in 1960 was also \$2 to \$4 less per hundredweight in Maine than the other areas. Thus the price for good quality beef sold in Maine may well have compared unfavorably, on the average, with similar beef prices in the other beef producing areas. The lower price for all cattle would tend to depress the price for beef cattle, particularly as long as there was no federal inspection or grading in Maine for distinguishing and marketing the better quality beef.

The marketing program for the average Maine beef herd differed considerably from that revealed by studies in New York and Ohio. In Maine, 28 per cent of the cattle marketed were steers two years old and older compared to none and 2 per cent marketed in this age group in New York and Ohio respectively. Forty-six per cent of Maine's marketed cattle were calves and yearlings compared to 91 and 83 per cent in the age group of all cattle marketed respectively in New York and Ohio. Beyond some initial growth period, the feeding of cattle is certainly in the area of diminishing returns. In this area of diminishing returns, higher feed costs and a tendency toward lower beef prices in Maine require earlier marketing of animals compared to the other producing areas for maximum profits or minimum losses. The comparison of Maine to the other areas showed that the reverse seemed to be the practice. The additional costs for overwintering market cattle for one or two years under Maine conditions did not appear to be covered by the additional returns for the larger animals.

Beef cattle enterprises may be made relatively more profitable in Maine by more efficient feeding and use of labor to decrease costs and by federal inspection and grading of beef to improve prices. Perhaps the best and simplest method, however, to reduce costs would be to recommend and emphasize a marketing program for selling beef animals sooner or at lower weights and ages. This program would require some changes in management practices, particularly breeding and feeding for faster gains, but such a program might well pay off in higher returns for Maine beef producers.

# AN ECONOMIC STUDY OF THE BEEF CATTLE INDUSTRY IN MAINE

DEAN F. TUTHILL AND JOHN A. GRAFFAM<sup>1</sup>

## INTRODUCTION

Historically, beef cattle have played an important part in the agriculture of Maine. In 1880 there were 182 thousand head of beef cattle in Maine, but this number declined to 21 thousand in 1930 and remained relatively stable from then until 1950. A definite increase was apparent in 1952 and a peak of 30 thousand was reached in 1955. Preliminary statistics indicate a total of 25 thousand in 1958. This is 12.5 per cent of all cattle in Maine in 1958.

Beef cattle are now a relatively minor segment of Maine agriculture. Cash receipts from farm marketing of all cattle and calves including dairy animals in 1957 totaled \$6 million or 3.4 per cent of total cash income from all farm marketings. Cash receipts from beef cattle were approximately \$732 thousand or 12.2 per cent of total cash receipts from all cattle and calves.<sup>2</sup>

This study was designed to determine the nature and location of the beef cattle industry of Maine, to investigate its economic aspects and to ascertain the conditions under which a beef enterprise would most likely succeed. This information should be useful to both present and prospective beef enterprise operators.

## METHOD AND SCOPE OF STUDY

This study was based on a survey conducted in August and September, 1958. Records were obtained from 52 Maine beef enterprises, a random sample selected from county agents' lists of beef enterprises in their respective counties. The survey schedule was designed to obtain basic information essential for the description and analysis of the industry. Data were obtained for the period from June 1, 1957, to May 31, 1958, with some flexibility to fit individual calving and pasture seasons.

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<sup>1</sup> Tuthill, Dean F., Associate Professor, Dept. of Agr. Economics, Maine Agricultural Experiment Station and Graffam, John A., former farm foreman of the University Farm. (Much of the statistical material in this publication was submitted by Graffam as a masters thesis in Agricultural Economics and Farm Management, University of Maine.)

<sup>2</sup> Estimated on the basis of relative numbers of dairy and other cattle, United States Department of Agriculture, *Agricultural Statistics: 1958*. (Washington: Government Printing Office, 1959. pp. 307-308)



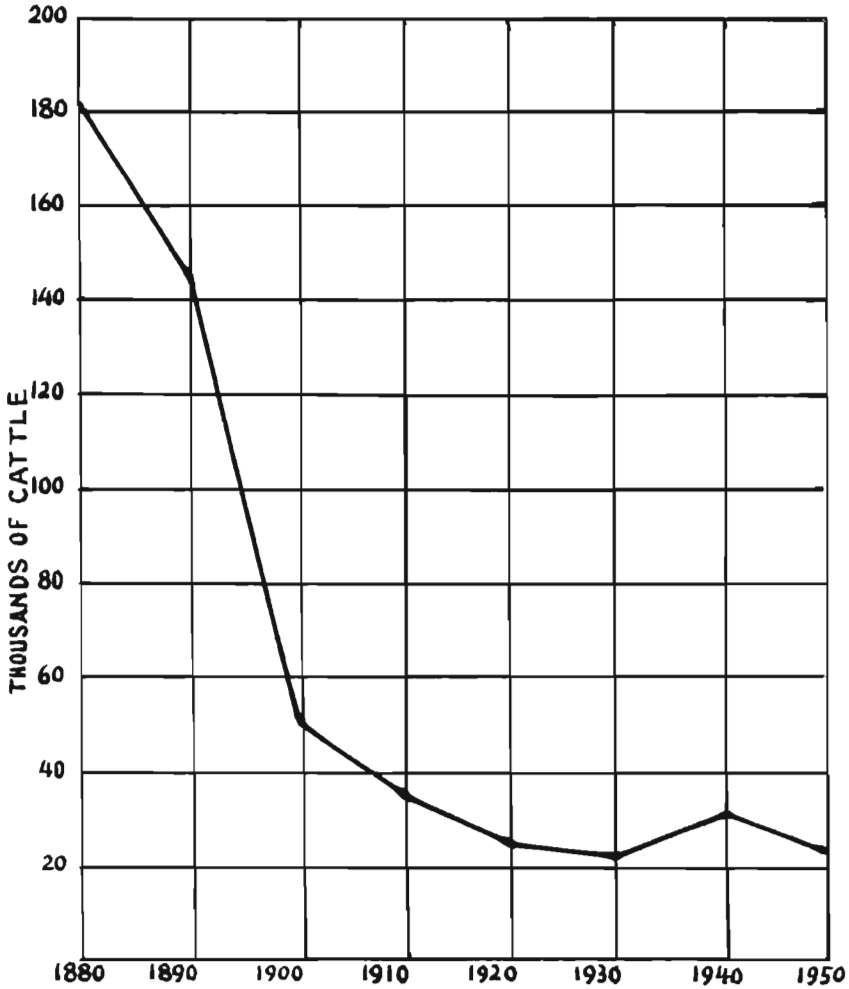


FIG. 1. Trend in beef cattle numbers in Maine 1880-1950.

Source: 1880 to 1920, The Agricultural Survey Committee of The Maine Development Commission, *Progress in Maine Agriculture, 1850-1920*. (The Maine Development Commission, 1929), p. 12; 1920 to 1950, The United States Department of Agriculture, *Agricultural Statistics: 1921-1957* (Washington: Government Printing Office, 1922-1958).

### LOCATION AND DESCRIPTION OF FARMS

The 52 farms in the survey were distributed among all counties except one, Washington county (table 1). Except for this county the distribution of these sample farms approximates that of the total beef population so far as could be determined.

Table 1  
Distribution of Farms with Beef Enterprises by Counties  
52 Maine Farms, 1957-58

County	No. of farms in survey	Total no. of farms
Androscoggin and Sagadahoc	4	22
Aroostook	11	47
Cumberland	2	7
Franklin	7	27
Hancock	2	4
Oxford	6	32
Kennebec	2	10
Knox and Lincoln	3	22
Penobscot	1	7
Piscataquis	3	9
Somerset	6	25
Waldo	1	6
Washington	0	2
York	4	18
Total	52	238

Beef enterprises were found in combination with many other farm enterprises and non-farm occupations. While beef was the major farm enterprise (produced over 50 per cent of gross farm income) in 21 instances, it was the major source of the operator's gross income in only three cases because of non-farm sources of income (table 2). Except for these three cases, beef was a supplemental enterprise or a hobby. Beef was found chiefly in conjunction with poultry or potatoes or with non-farm occupations. These non-farm occupations included lawyer, businessman, machinist, mail carrier, deputy sheriff, and several others.

Table 2  
Relationship of Beef to Other Farm Enterprises and Income Sources  
52 Maine Farms, 1957-58

	No. of enterprises	Major farm enterprise	Major gross income source
Beef	52	21	3
Dairy	6	6	5
Poultry	11	9	6
Sheep	4	0	0
Potatoes	14	13	12
Canning Crops	6	3	1
Non-farm	—	—	25

### SIZE AND LAND USE

The farms averaged 604 acres in size, with a range from 39 to 3500 acres, including woods (table 3). Cropland including hay averaged

114 acres with a range from 7 to 370 acres. Permanent pasture averaged 90 acres, of which 33 were improved and 57 were unimproved. Woodland accounted for an average of 396 acres, or 66 per cent of total acreage. Farm buildings and other uses occupied an average of 4 acres.

Table 3  
Size and Land Use of Farms Having Beef Enterprises, by Acres  
51\* Maine Farms, 1957-58

	In farms	Cropland	Permanent pasture		Woods	Buildings & other use
			Improved	Unimproved		
Average	604	114	33	57	396	4
Range	39-3500	7-370	3-300	4-400	4-2270	1-90

\*One record was omitted as it was incomplete in respect to acreages.

Seventeen farmers rented a portion of the land operated while two farmers rented to others a portion of the land owned. Land rented averaged 53 acres per farm renting and constituted 7.3 per cent of the land operated in those farms. In the two instances of land rented to others, one farmer rented 300 out of 675 acres and the other rented 200 out of 1500 acres.

Cropland use on the farms studied was indicated by the acreages of crops produced (table 4). Of the 52 farms studied, 50 farms devoted an average of 78 acres to hay, 9 farms used an average of 10 acres for corn silage and 5 farms produced grass silage on an average of 28 acres. Oats for grain were grown on 21 farms with an average of 24 acres per farm. Fifteen farms producing potatoes averaged 54 acres

Table 4  
Crops Produced and Utilization by Beef Cattle  
51\* Maine Farms, 1957-58

Crop	No. farms produced on	Average acreage on farms where produced	Average acreage for all farms
Potatoes	15	54	16.0
Sweet Corn	5	10	1.0
Snap Beans	1	12	.2
Peas	1	20	.4
Dry Beans	2	10	.4
Oats for Grain	21	24	10.0
Hay	50	78	76.8
Rotational Pasture	3	23	1.4
Annual Pasture	2	17	.7
Corn Silage	9	10	1.8
Grass Silage	5	28	2.7
Soiling Crop	3	21	1.2
Other	8	11	1.7

\*One record was omitted as it was incomplete in respect to acreages.

per farm. Other crops grown included sweet corn, snap beans, dry beans, peas and rotational and annual pasture.

When the average cropland acreage was calculated for all 51 farms, hay remained the most important crop (76.8 acres). Potatoes accounted for 16.0 acres and oats for 10.0 acres. All other crops, though important on the farms where produced, were minor in the overall picture.

### OTHER LIVESTOCK

Other livestock kept by the operators of beef enterprises consisted mostly of dairy animals and poultry (table 5). Dairy animals were produced on 32 farms while poultry was found on 16. Poultry included laying hens, broilers and turkeys. Sheep, swine and horses were kept occasionally.

The relationship of beef cattle to other livestock was computed in animal units. The animal unit factors used for beef animals were as follows: each animal 2 years and over 1.0, each yearling .67, and each calf .33. Other animal unit factors were as follows: mature horses or dairy animal 1.0; pony, colt, dairy yearling or dairy calf .5; hog .2, sheep .14, hen .01, turkey .012, and broiler .001.

Table 5  
Relationship of Beef Cattle and Other Livestock  
52 Maine Farms, 1957-58

Livestock	No. farms produced on	Average animal units* on farms where produced	Average animal units on 52 farms
Beef	52	35.6	35.6
Dairy	32	12.5	7.7
Poultry	16	17.9	5.5
Others	24	5.2	2.4

\*Ending Inventory.

### DESCRIPTION OF THE BEEF ENTERPRISES

In order to place in better perspective the economics of beef production disclosed by this study, considerable description of the beef enterprises is desirable.

#### TYPE OF ENTERPRISE

All of the 52 herds were basically cow-calf operations with individual variations in handling the calf crop. Some operators also purchased feeders or other cattle for fattening or for more immediate resale. Ten herds were kept chiefly to produce breeding stock, 27 were primarily commercial beef producers and 15 were for both.

### Reasons for Keeping Beef

The most common reason for keeping beef cattle was to make use of resources such as feed, land and buildings. Forty of the 52 operators gave this as the primary reason. Even dairymen sometimes had resources unsuited, due to location or quality, to the dairy enterprise which were suitable for beef production. Other reasons for keeping beef cattle were for financing purposes and for a hobby. Some potato farmers kept beef as a reserve for bad potato years, selling cattle when necessary to help finance potato planting. Twelve herds were hobby herds, kept because the owners liked beef cattle.

### Herd Size

The beef herds ranged in size from 8 to 338 animals with an average of 48.3. The number of animal units ranged from 6 to 291 with an average of 35.6 per farm. The composition of the average herd was 15.8 mature cows; .7 mature bulls; 4.3, 3.2 and .3 two-year old heifers, steers and bulls; 5.9, 3.6 and .5 yearling heifers, steers and bulls and 14.0 calves. Most of the herds were small, 35 per cent numbering less than 25 and 70 per cent less than 50 animals (table 6).

Table 6  
Herd Size  
52 Maine Beef Enterprises, 1957-58

Herd size	No. of herds	Per cent of herds
Under 25	18	35
25 - 49	18	35
50 - 74	7	13
75 - 99	4	8
100 and over	5	9
	52	100

### Permanence of Enterprise

The degree of permanence of beef enterprises is shown in table 7. Nearly half, or 46 per cent, of the herds had been established for 10 years or more. Only 16 per cent had been in existence for less than five years. Future plans of the owners called for increase in size of 46 per cent of the herds and maintenance of present size of 36 per cent of the herds. In the other 18 per cent, 12 per cent planned to decrease the size of the herd or to sell out, and 6 per cent were uncertain of future plans.

Table 7  
 Permanence of Enterprise  
 52 Maine Beef Enterprises, 1957-58

Item	No. of herds	Per cent of herds
<b>No. of Years Established</b>		
Under 5	8	16
5 - 9	20	38
10 - 14	9	17
15 - 19	6	12
20 - 24	1	2
25 and over	8	15
	52	100
<b>Future plans</b>		
Increase	24	46
Decrease or sell out	6	12
Remain same	19	36
Uncertain	3	6
	52	100

### Breeds of Beef Cattle

The Hereford breed predominated with 71 per cent of total numbers (table 8). Angus and Shorthorn were found on about an equal number of farms but Shorthorn led Angus in number of animals. Fifteen per cent were Shorthorn and 10 per cent were Angus. Other minor breeds are known to be kept in Maine, but they were not encountered in the study. Crosses were found on 11 farms and two owners were planning to try cross-breeding for hybrid vigor. In several cases the crosses were between beef and dairy breeds.

Table 8  
 Breeds of Beef Cattle  
 51<sup>a</sup> Maine Beef Enterprises, 1957-58

Breed	No. of farms	No. of cattle	Avg. number per farm	Per cent of cattle
Hereford**	35	1710	48.9	71
Hereford only	24	1246	54.2	—
Shorthorn**	11	350	31.8	10
Shorthorn only	8	342	42.8	—
Angus**	10	252	25.2	15
Angus only	7	218	27.2	—
Crosses	10	102	10.2	4

<sup>a</sup>One farm with Hereford, Angus and crosses gave no breakdown of number of each.

\*\*Some herds in each of these groups had a mixture of breeds including the listed breed.

## PRODUCTION PRACTICES

Considerable variation in production practices was found. The variation reflects owner preferences, special conditions and differing types of enterprises.

### Breeding

Pasture breeding was used by six times as many operators as was barn breeding. A few men used both methods, especially where calves were desired at all seasons in the production of breeding stock and for show herds. Barn breeding was most common where fall or winter calving was planned. In some instances the bull used was not available in pasture season, necessitating a different breeding season.

Spring calving was preferred by three-fourths of the operators. Winter and summer calving was the rule in five instances. Two operators preferred fall calving. Information on the calf crop was obtained from 40 herds for 1957 and from 50 herds for 1958. Disregarding one case of a sterile bull the 1957 calf crop ranged from 56 per cent to 100 per cent of bred cows with an average of 87 per cent. The 1958 calf crop ranged from 50 to 100 per cent with an average of 91 per cent.

### Housing

Loose-housing was the most common housing practice. The existing type of barn on the farm determined the housing method in many cases. Several dairy barns had been converted to beef use. Of the 52 herds, 21 had loose housing, 17 stanchions or tie-ups, 10 had both and 4 had little or no housing. Where both types of housing were used, the cows were usually tied up while the heifers and steers were loose-housed. Farms with little or no housing allowed the cattle to find shelter as best they could in the woods or in old sheds which were large enough for only part of the herd. In contrast there were ample quarters designed and built especially for the beef cattle.

### Feeding

Feeding practices varied widely. Some herd owners had definite, well-organized forage programs, while others provided only scrub pasture and poor hay for which no better use could be found. Hay and permanent pasture were the forage stand-bys.

*Pasture*—Permanent pasture was designated as improved when fertilization, liming and clipping or re-seeding had been practiced. Sixteen operators maintained only improved pasture for their beef cattle, 17 used only unimproved pasture and 18 used both, while one substituted rotational pasture and a soiling crop for permanent pasture. Another

pastured yearling heifers only and fed the rest of the herd with soiling crops. Aftermath was a major source of late summer pasture and was used by 44 out of 52 operators.

*Winter Forage*—Hay was the most important forage provided for the barn-feeding season. Hay was fed by all operators but one, who fed grass silage only except to the show herd. Corn silage was fed to 9 herds, grass silage to 4 herds and corn waste from processing plants to 4 herds.

*Concentrates*—Grain was fed in 50 herds, either for fattening or as a ration supplement. Twenty-one operators grew oats for grain, and 17 fed all or part of this grain to beef cattle. Other home-grown grains fed to beef cattle were corn, rye and barley. All of the 50 operators who fed grain purchased at least a part of it. Twenty-seven of these purchased a mixed ration, 13 a protein supplement and 7 bought potato pulp, oats or some other concentrate. There was little heavy grain feeding such as is associated with the feedlots of the cornbelt. Stilbesterol was used by three operators. One used implants while the other two used feed containing stilbesterol. Results were satisfactory in all cases.

## Labor

Most of the labor involved in general care, feeding, bedding, manure removal, marketing, dehorning, etc., was performed by the operator and his family. However, five operators provided only management and supervision and hired labor for all other functions. Eight other operators hired some labor. Seventy-nine per cent of the year-round labor was required during the barn season for feeding, bedding and general care (64 per cent), manure removal (14 per cent) and marketing and other (1 per cent). Twenty-one per cent of the labor was used in the pasture season for these same operations with only marketing and other requiring more labor in summer than in winter (table 9).

Table 9  
Labor Use  
51\* Maine Beef Enterprises 1957-58

Season	Feeding, bedding & general care	Manure removal	Marketing and other**	Total
	per cent	per cent	per cent	per cent
Barn	64	14	1	79
Pasture	15	4	2	21
Total for Year	79	18	3	100

\*One record was omitted as it was incomplete in respect to labor.

\*\*Other includes dehorning, castrating, tattooing, etc.



### MARKETING

Beef cattle were marketed through several channels (table 10). Of the beef cattle marketed by 52 beef operators, 33.3 per cent were sold to livestock dealers, 31.5 per cent to slaughter plants and 21.2 per cent to private individuals. The remainder (14.0 per cent) were sold at auction, sold by commission agents or consumed on the farm. Nearly two-thirds of the cattle sold to dealers were commercial whereas three-fourths of the sales to slaughter plants were of purebred stock. Purebreds led in sales to private individuals by 6 to 1, and all of the cattle sold at auctions were purebred.

Table 10  
Cattle Marketed Through Various Channels  
52 Maine Beef Enterprises, 1957-58

	Individuals	Auctions	Dealers	Slaughter plants	Other	Total
	per cent	per cent	per cent	per cent	per cent	per cent
Purebred*	18.2	3.5	12.8	23.4	0.6	58.5
Commercial**	3.0	0.0	20.5	8.1	9.9	41.5
Total	21.2	3.5	33.3	31.5	10.5	100.0

\*Includes both registered cattle and unregistered cattle of registered parentage.

\*\*This term used instead of "grade" because unregistered cattle in purebred category also could be called grades.

Approximately 59 per cent of the cattle marketed were purebred (table 11). The breeding-stock market was virtually dominated by purebred cattle, and more purebred cattle than commercial cattle were consumed on the farm. Slaughter cattle accounted for 73.5 per cent of the cattle marketed, and slightly more than half, or 56.9 per cent of these, were purebred. Feeders constituted 12.2 per cent of the cattle marketed and were 62.8 per cent commercial. Other purposes for which cattle were marketed included matched pairs of steers for cattle-pulling affairs and calves for 4-H projects.

Table 11  
Cattle Marketed for Various Uses  
52 Maine Beef Enterprises, 1957-58

	Breeding stock	Slaughter	Feeders & stockers	Consumed on farm	Other	Total
	per cent	per cent	per cent	per cent	per cent	per cent
Purebred	8.2	41.8	4.5	4.3	0.5	59.3
Commercial	0.1	31.7	7.6	1.0	0.3	40.7
Total	8.3	73.5	12.1	5.3	0.8	100.0

## COSTS AND RETURNS IN PRODUCING BEEF CATTLE

Costs may be calculated for different purposes, for different time periods or from different points of view. Farmers who have beef cattle or who are considering adding them may be most interested in the immediate cash outlay or operating costs. In the long-run viewpoint, however, all buildings and equipment must be paid for or replaced in time, and beef cattle should pay their share of costs in proportion to their use of all facilities. Also, the money invested in land, buildings, equipment and the animals should earn a fair rate of return, and this return becomes a cost for having it invested in the beef enterprise. This method of calculating all production costs including depreciation on buildings and equipment and interest on investment chargeable to beef cattle will be used first in presenting beef costs. In later sections these costs will be analyzed and adjustments considered for individual situations.

Home-grown feed can be charged to the beef enterprise at the cost for producing it or at an opportunity cost. The cost of production should include all long-run costs allocated to the crop. The opportunity cost is the estimated market price for the crop had it been sold rather than fed to the beef cattle. In the following sections both methods of calculating feed costs are used.

In this study costs are presented on both an animal unit and a cow unit basis (table 12). To avoid confusion and unnecessary duplication, discussion of costs are generally on an animal unit basis. The number of animal units used to derive costs on an animal unit basis included all animals in the average herd assigned an animal unit equivalent according to age as previously explained. Costs on a cow unit basis were derived by dividing the average herd costs by the number of cows, including two-year-old heifers, in the herd. Care should be used in interpretation of costs on the per cow basis. The cow unit cost includes a pro rata share of the costs of bulls and young stock and the cow unit cost varies according to the proportion of cows to other animals. If young stock were sold as calves, the cow unit could be equal to less than one and one-half animal units. If young stock were kept up to two years of age, the cow unit could be equal to two or more animal units. The relationship of cows to total number of animal units, or animal units per cow, is a useful measure of the marketing program of the producer. Its size indicates the length of time that young stock are kept in the herd before being sold. Lower costs per cow may mean that animals are marketed sooner rather than managed more efficiently (except that this in itself may be better management). The cow unit in the average herd of this study represented 1.77 animal units. This is, therefore, the relationship between costs on a per animal unit and a per cow basis.

The average cost of producing beef cattle for 52 Maine beef enterprises in 1957-58 was \$180.35 per animal unit or \$319.43 per cow (table 12). The cost of home-grown feed amounted to 55.4 per cent of this cost, purchased feed 6.3 per cent and labor and all other costs 38.3 per cent. Gross returns totaled \$103.20 per animal unit or \$182.79 per cow. Sales of cattle accounted for 64.7 per cent of the gross returns, increase in inventory 26.5 per cent., manure credit 7.7 per cent and miscellaneous receipts 1.1 per cent. Costs exceeded returns by \$77.15 per animal unit or \$136.64 per cow.

Table 12  
Summary of Costs and Returns in Producing Beef Animals,  
52 Maine Beef Enterprises, 1957-58

Item	Average per animal unit		Average per cow	Per cent of total
	Quantity	Value or cost	Value or cost	
	(35.6 animal units)		(20.1 cows)	
Home-grown Feed:				
Hay (Tons)	2.8	\$ 69.43	\$122.97	38.5
Pasture (Acres)	3.0	18.48	32.74	10.3
Silage (Tons)	.7	5.43	9.61	3.0
Oats (Bushels)	7.2	5.10	9.03	2.8
Straw (Tons)	.1	.96	1.70	.5
Other		.53	.95	.3
Total		\$ 99.93	\$177.00	55.4
Purchased Feed:				
Grain (Cwt.)	1.7	\$ 6.92	\$ 12.27	3.8
Hay (Tons)	.1	3.03	5.36	1.7
Bedding		.91	1.61	.5
Salt and Minerals		.50	.88	.3
Total		\$ 11.36	\$ 20.12	6.3
Labor (Hours)	22.65	\$ 22.65	\$ 40.12	12.5
Purchase of Cattle		13.62	24.12	7.6
Interest on Cattle (%)	5.0	13.24	23.45	7.3
Buildings		6.80	12.04	3.8
Machinery & Equipment		4.50	7.97	2.5
Taxes on Cattle		3.48	6.16	1.9
Veterinary & Medicine		1.31	2.32	.7
Livestock Insurance		1.08	1.92	.6
Telephone & Electricity		1.01	1.78	.6
Other Operating Expenses		1.37	2.43	.8
TOTAL COSTS		\$180.35	\$319.43	100.0
Returns:				
Sale of Cattle		\$ 66.74	\$118.21	64.7
Increase in Inventory		27.37	48.48	26.5
Manure Credit		7.98	14.13	7.7
Miscellaneous Receipts		1.11	1.97	1.1
GROSS RETURNS				
Net Return to Management		\$103.20	\$182.79	100.0
		- \$ 77.15	- \$ 136.64	

## COSTS OF BEEF PRODUCTION

### Home-Grown Feed and Bedding

The largest single item of cost was home-grown hay which averaged 38.5 per cent of the total cost of producing a beef animal unit. An average of 2.8 tons of hay per animal unit was fed at a cost of \$69.43. The value of hay was based on opportunity cost. Forty of the 52 operators, or 77 per cent, gave estimates that ranged from \$10 to \$40 per ton. The weighted average was \$24.88 per ton which approximated the average Maine market price of \$26.73 for all hay at the farm for the period covered by the survey.<sup>3</sup> The average of \$24.88 per ton was used in records for which no price was estimated by the operator. Quality was not determined but was indicated somewhat by the price estimate where one was given. Several operators sold or fed their best hay to dairy cattle and wintered the beef cattle on poorer quality hay.

Pasture was the second largest item of cost among home-grown feeds and third largest of all cost items. An average of 3.0 acres of pasture was provided per animal unit at an average cost of \$18.48 which represented 10.3 per cent of total cost. This acreage consisted of 42 per cent unimproved permanent pasture, 25 per cent improved permanent pasture and 33 per cent aftermath grazing. Annual and rotational pastures were used on a limited scale for beef, and the costs of these types of pasture were included in other home-grown feeds. The cost of pasture was distributed 15.6 per cent for unimproved pasture, 57.2 per cent for improved pasture and 27.2 per cent for aftermath. The average cost per pasture day for unimproved pasture was 9.5 cents per animal unit with a range from 1.9 to 37.2 cents. The average cost per pasture day for improved pasture was 16.4 cents per animal unit with a range from 2.3 to 40.0 cents. Aftermath cost was assumed to be the same as improved pasture.

Pasture cost was determined from farmers' estimated costs for producing pasture including labor and tractor hours, materials, and taxes and interest on the land. Labor and tractor hours included time spent in fencing, fertilizing, liming, fitting and seeding land and spreading manure. Materials included fencing materials, seed, lime and fertilizer. Labor was charged at \$1.00 per hour and tractors at \$1.04 per hour.

The most commonly used home-grown grain was oats, usually produced in a crop rotation but in some instances grown specifically for the beef cattle. The average of 7.2 bushels fed per animal unit was valued at \$5.10 and represented 2.8 per cent of total cost. Less than half of

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<sup>3</sup> United States Department of Agriculture, Agricultural Marketing Service, *Agricultural Prices*, June 1957-May 1958.

the operators feeding oats estimated the value per bushel. The average of the estimates was 69 cents per bushel. The average Maine market price as given in "Agricultural Prices" was 71 cents and was used where no estimate was given.

Other home-grown feeds included oat, grass and corn silage, corn stover, potatoes, barley and rye. The cost of these feeds was the farmers' estimates of their value. The cost of silage was an average of about \$8 per ton. Home-produced straw was used for bedding, and the estimated cost was \$15 per ton.

### **Purchased Feed and Bedding**

Purchased feed and bedding at \$11.36 per animal unit constituted 6.3 per cent of total cost. The largest of these items was grain which included protein supplements, corn, hominy, bran, potato pulp, citrus pulp, beet pulp and mixed rations. Operators bought and fed an average of 1.7 hundredweight of grain at a cost of \$6.92 per animal unit. This was 3.8 per cent of total cost. The average price of grain per hundredweight was \$4.08.

Purchased hay was a relatively small item averaging \$3.03 per beef animal unit or 1.7 per cent of cost. The average amount fed was .1 ton. Only eight operators reported purchases of hay for beef cattle. The price range was \$10 to \$40 per ton as with home-grown hay, and the average price paid was \$21.83 per ton.

Purchased bedding was a very minor item averaging 91 cents per animal unit or .5 per cent of total cost. Some operators purchased all or most of the bedding used, while others used home-grown straw, sawdust that was free for the hauling or hay rejected by the cattle as feed. Purchased bedding included straw, sawdust, shavings and used poultry litter.

Salt and minerals, though a necessary item for the beef cattle, were a minor cost averaging 50 cents per animal unit or .3 per cent of the total cost.

### **Labor**

The second largest item of cost of beef production was labor. This item included the labor directly involved in care of the cattle. It did not include the labor used in maintenance of pasture or that involved in production of feed. A rate of \$1.00 per hour was assumed for both hired and operators' labor. This was the most commonly paid hourly rate for hired labor. Some full-time employees were paid a weekly wage plus rent and other benefits. The average animal unit required 22.65 hours of labor amounting to \$22.65 which was 12.5 per cent of the total cost. Forty-two per cent of the labor for all 52 enterprises was hired.

The 22.65 hours of labor per animal unit compares closely with data from a Cornell study of beef herds made in 1951.<sup>4</sup> The Cornell labor requirement was 21.4 hours per animal unit.

### Purchase of Cattle

Purchases of beef cattle amounted to an average of \$13.62 per animal unit or 7.6 per cent of total cost. Twenty-three of the operators purchased a total of 174 beef animals ranging from a half interest in a bull to 24 feeder steers per operator. Fifty per cent of these animals were purebred; the rest were commercial cattle. The average prices paid per animal purchased were \$196.07 for purebred and \$87.98 for commercial.

### Interest on Beef Herd Investment

The interest on beef herd investment averaged \$13.24 or 7.3 per cent of total cost. Interest was charged at the rate of 5.0 per cent on the average of the beginning and ending inventory values as estimated by the operators. The average herd investment was \$9,428 or \$264.83 per animal unit.

### Buildings

The cost of \$6.80 per animal unit, amounting to 3.8 per cent of all costs for housing, was based on providing an adequate pole-frame,



**FIG. 2.** The open-front pole barn is adequate shelter for beef cattle in Maine. This type of structure is the basis for housing cost information developed for this bulletin.

<sup>4</sup> Carpenter, K. S., *Beef Costs and Returns on 41 New York Farms, 1951*. Publication A.E. 847 (Ithaca, New York: Cornell University, February, 1953), p. 6, table 6.

open front loafing shed constructed at a cost of \$1.25 per square foot of area. The space requirements were based on 50 square feet for two-year-old and older animals and 30 square feet for calves and yearlings. The total space for the average herd was 1,935.5 square feet costing \$2,419.38 to construct. Ten per cent of this initial investment was charged as annual cost to cover depreciation, interest, maintenance, insurance and taxes on the building. The 10 per cent charge gave an annual cost of \$241.94 for the average herd or \$6.80 per animal unit.

### **Machinery and Equipment**

The average cost of machinery and equipment was \$4.50 per animal unit which accounted for 2.5 per cent of total cost. This item included tractor and truck costs for manure removal and hauling of cattle, feed and bedding which were charged directly to the beef cattle. It also included annual costs of machinery and equipment such as feed bunks, water bowls, manure spreader, loader, scales, loading chute and fitting and showing equipment which was used in care and management of the beef herd.

Tractor cost was based on hours used for beef cattle. The hourly charge was 92 cents for 1 plow tractors, \$1.04 for 2 plow tractors and \$1.36 for 3 plow tractors. Truck cost was computed at 9.5 cents per mile for small trucks and 17.05 cents per mile for large trucks.<sup>5</sup> The total farm investment in tractors and trucks averaged \$3,585 per farm or \$100.70 per animal unit. Interest on this investment was included in the hourly charge for tractors and mileage charge for trucks.

The cost of machinery and equipment other than tractors and trucks was arrived at by taking a comprehensive annual cost of 36 per cent of the operators' estimated value of machinery and equipment devoted to the beef enterprise.<sup>6</sup> The average investment was \$5,050 per farm. The beef share was \$378 per farm or \$10.62 per beef animal unit.

### **Other Costs**

Other cost items included taxes on cattle, veterinary and medicine expense, livestock insurance, telephone, electricity, fly spray, trucking hire, registration fees, show costs and several others. These items cost \$8.25 per beef animal unit or 4.6 per cent of total cost.

<sup>5</sup> Cornell University Agricultural Experiment Station, *Farm Cost Accounts, 40 Farms, 1956*. Publication A.E. 1071 (Ithaca, N. Y.: Cornell University, Sept. 1957), pp. 13-15; Cornell University Agricultural Experiment Station, *Farm Cost Accounts, 38 Farms, 1957*. Publication A.E. Res. 8 (Ithaca, N. Y.: Cornell University, Oct., 1958), pp. 16-19.

<sup>6</sup> *Ibid*, A.E. 1071, p. 11; A.E. Res 8, p. 13.

### RETURNS FOR BEEF PRODUCTION

Gross returns for 52 Maine beef enterprises averaged \$103.20 per beef animal unit (table 12). Sale of cattle amounted to \$66.74 per animal unit or 64.7 per cent of gross returns, increase in inventory \$27.37 or 26.5 per cent, manure credit \$7.98 or 7.7 per cent and miscellaneous receipts \$1.11 or 1.1 per cent. Net returns per beef animal unit averaged a minus \$77.15. The range in net returns was from plus \$11 to minus \$248.

A total of 730 head of cattle was sold for \$121,179.70. Of these, 58 per cent were purebred and 42 per cent were commercial. The average prices were \$170 per head for purebred and \$161 per head for commercial or an average of \$166 for all cattle. The beginning and ending inventories were adjusted to the same price level so that the increase in inventory represented a real increase in herd size and/or age composition and not just a change in cattle prices during the year.

Manure credit was computed on the basis of a recovery of 6 tons per animal unit per year at a value of \$1.20 per ton for manure piled outdoors and \$1.80 per ton for manure stored indoors. These were agronomists' estimates of the fertilizer value of manure. Manure spread on beef cattle pasture was not included in manure credit.

### ANALYSIS OF COSTS AND RETURNS

The average net loss for beef production in Maine as shown in this study does not present a very bright picture of the present situation or lend much encouragement for future expansion of a beef cattle industry. Yet the majority of the producers indicated intentions to continue or expand with only 18 per cent of the sample uncertain of the future or planning to decrease or sell out. Hence, there must have been producers who felt that beef production was profitable, fitted well with other farm enterprises or was a satisfactory sideline to a non-farm occupation.

On some farms, returns from beef cattle did cover all costs of production. These producers by good management were able to decrease costs from the average and/or market beef at better than average prices. A second group of producers didn't cover all costs, but in their farm organizations the addition of beef cattle used resources which would have otherwise been unused or under-used. Any return to these resources from beef cattle would be an additional return to the overall business. Such resources might be labor at certain times of the year, buildings and, in some cases, machinery and equipment. In a third group some beef enterprises were actually losing money, and either this was not realized or the loss was counted as the cost of having beef as a hobby, compen-



sated for by the pleasure and pride in ownership. Costs and returns for beef production by the first two groups of producers will be analyzed. The third group may very rationally continue to keep beef cattle for other than economic reasons, but this cannot be very well justified or analyzed on a basis of economic costs and returns.

### COSTS

Costs will be analyzed by recognizing that some farmers had costs which were lower than the average as presented in table 12. Consideration also will be given to ways in which costs could be reduced. Some reduction in costs from the average may be based on the use of different methods of calculating costs. The possibility and validity of these different methods will be examined.

#### Feed Costs

The cost of home-grown hay at \$24.88 per ton was the average estimated market price if the hay had been sold rather than fed. Information was not obtained in this study on costs for producing hay, but appropriate forage cost studies showed that this average price for hay was fairly close to production costs, as should be the case over a period of time. Cost account data from Cornell University for 1957 listed the cost at \$24.56 per ton.<sup>7</sup> A 1954-55 study of forage costs in Maine gave costs for producing, harvesting and storing hay at \$22 per ton for 30 specialized dairy farmers producing other forages as well and \$28 per ton for 5 dairy farmers producing hay only.<sup>8</sup> An average of these two costs would about equal the cost of hay considered in this study.

Some farmers could produce hay at a lower than average cost. Other farmers had special situations in which they bought very cheaply, or were given, standing hay which had only to be harvested and stored. In these cases where production costs were below the market price of hay the following quote from an English bulletin on beef production is particularly appropriate.

Many farmers, when questioned about the rations of their stock, will say, "We did give them some hay and oats, but of course, we had those on the farm" . . . the implication being that these foods are "free" and should not really be taken into account. In fact most feed has a market

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<sup>7</sup> *Ibid.*

<sup>8</sup> Metzger, H. B., *Costs of Forage Production and Utilization on Central Maine Dairy Farms*, Maine Agricultural Experiment Station Bulletin 561, July, 1957, pp. 28-31.

<sup>9</sup> Jones, R. Bennett and Jones, Gwyn E., *Systems of Beef Rearing and Fattening, Three Examples*, University of Nottingham School of Agriculture, Loughborough, England. F.R. No. 143, April, 1961, p. 2.

value—sometimes a very low one it is true. This means that every feed has a “cost” and its true cost is the market value (either to sell or to let) or its cost of production (*whichever is the higher*).<sup>9</sup>

This study assumes that the average price of hay covers the cost of production, but the correctness of the phrase “*whichever is the higher*” is recognized.

Since the price of \$24.88 per ton was a weighted average within a range from \$10 to \$40, the opportunity costs for individuals differed. Due to poor quality or isolated location, a price for hay lower than the average would be the cost to the beef cattle as long as it covered all costs of producing or procuring the hay. Better quality hay or a better market for hay would increase the price and thus the cost to beef cattle.

For purchased hay the purchase price would, of course, be the cost to the beef cattle. A lower price, however, might not be entirely advantageous. Cheap hay could result in more waste and more expensive gains than would a better quality, more expensive hay.

The pasture cost of \$18.48 per animal unit was an average from the data collected from each producer. Cornell cost account figures for 1957 show a pasture cost of \$22.95 per animal unit. Individual costs varied greatly depending on the type of pasture, value of the land and the management given the pasture. Individual adjustments would have to be made in this cost, but increased costs for good management might well be more than covered by faster gains of cattle and decreased costs of hay and grain.

The cost of purchased grain at \$6.92 per animal unit was a small item but one which might be reduced by a well-managed feed and forage program. On the other hand, it might be well to purchase more feed. An increase in grain feeding might increase the rate of gain and reduce expenses by earlier marketing more than enough to cover added grain costs. The decision depends on the best feeding technique to fit the individual production and marketing situation.

### Labor Costs

All labor was included at the cost of a dollar an hour amounting to \$22.65 per animal unit. Where the operator and his family provided all or most of the labor, much of the work could be done before and after school or before and after the day's work and in winter time and other off-seasons. The producer may feel there is little other productive use for this labor, and its opportunity cost is practically zero. Hired labor which is employed year-round so as to be available for seasonal crop production could be considered in this category. Any return to these unproductive periods of labor would be a net gain for the overall farm

organization. Adjustment in the cost of labor could be made based on the above reasoning. This should be interpreted with care, because any labor hired year-round in any degree because of beef cattle should be charged at cost, and the opportunity cost of family labor, on careful analysis, may not be zero even if the alternative use is only for personal pleasure.

More efficient use of labor would reduce labor costs even if wages remained at a dollar an hour. The beef producers who stanchioned their cattle and cleaned gutters daily by pitchfork increased the average labor requirements. Housing efficiently organized for feeding and manure removal could considerably reduce the hours of labor. Before the average enterprise would be profitable, however, any improvement in labor use would have to be combined with changes in several other factors.

### **Building Costs**

Building costs were calculated as an annual charge for a newly constructed pole-type shed. The cost of constructing the shed at \$1.25 per square foot was on the upper side of the estimated range from \$1.00 to \$1.25 for Maine conditions. Costs could be reduced in some cases, but the reduction should not be due to neglect of labor or lumber costs. The annual charge of 10 per cent includes 5 per cent a year depreciation and 2½ per cent a year average lifetime interest with the remaining 2½ per cent for annual maintenance, insurance and taxes. The space requirements per animal were also on the high side of the recommended range and could be reduced somewhat.

The actual costs for using a barn already standing, especially if depreciation and interest were not considered, might be less than the annual costs of the newly constructed shed. But the reduction in cost may well be over-balanced by increased labor and feed costs of inefficient housing. As formulated for this study, building cost at \$6.80 was a minor cost, but this was not the average situation in Maine. Housing was frequently more elaborate and expensive than necessary or justifiable for beef.

### **Other Costs**

The cost of cattle actually purchased amounted to \$13.62 or 7.6 per cent of the total cost. The interest on cattle of \$13.24 or 7.3 per cent of the total cost was entirely an opportunity cost. However, if the money invested in cattle could not bring a fair return, it might better be invested elsewhere. The value that the farmer placed on his cattle was his estimate, and it was important that this be as accurate and up-to-date as possible. The value should not be changed with each seasonal or

short-run change in price of cattle but should reflect the long-run trends in prices.

Machinery and equipment costs at \$4.50 per animal unit only equaled 2.5 per cent of total costs. All costs for the share of facilities allocated to beef cattle were included in this annual charge. Producers may feel that beef cattle need not pay any share of the fixed costs (depreciation, interests, insurance, taxes) on trucks, tractors and other equipment which was required for and used mainly in other enterprises. These facilities would be needed even if beef cattle were not kept. Charging for only the beef share of operating costs (gas, oil, grease and repairs) would reduce machinery and equipment costs to the beef cattle but at the expense of another enterprise which would be absorbing all of the fixed costs.

Taxes have to be paid on all cattle over 18 months of age. The commonly mentioned rate was \$5 per head, and this was about the average rate for all two-year-old and older animals in the average herd. All other costs which were relatively minor include veterinary and medicine, insurance, telephone and electricity and other expenses.

## RETURNS

The returns should be as carefully analyzed as the costs. Returns could be higher for some producers because of more favorable markets or better than average quality animals resulting in higher prices. While recognizing that better than average prices could be received, the following section examines the average returns for their reasonableness under Maine conditions. The number of animals sold and their price per head or per hundredweight, the increase in inventory and value of manure are considered.

### Number of Animals Sold

The number of young stock sold or added to the herd as a per cent of the number of cows in the herd is an important measure of the productivity of the herd. In round numbers, 14 animals were sold during the year from the average herd of 48 animals or 20 cows. The herd inventory increased during the year by five head. The number of animals thus sold or added to the herd was 19 head. Not all of these were produced on the farm; about three head were purchased and either resold or added to the herd inventory. Deducting the purchased animals from the total of 19 head leaves 16 head sold or added to inventory from natural increase or reproduction of the herd itself. Since the size of the cow herd was increasing, this natural increase didn't result from the average inventory of 20 cows during the year but from the 19 cows in the be-

gining of year inventory. The 16 head from 19 cows represented an 84 per cent marketable crop of beef animals.<sup>10</sup> This percentage is a respectable performance for beef herds, and indicates that financial losses for the average Maine producer were not due to low reproductive rates.

### **Returns from Animals Sold and Added to Inventory**

The return from the 14.3 animals sold was \$2,376.07, or an average of \$166.16 per head. The price received per hundredweight by the farmers was not obtained as most animals were sold unweighed on the hoof. The price per hundredweight can be estimated, however, by assigning average weights to the different age groups. Of 14.3 animals sold, 3.5 were calves, 3.0 yearlings, 4.8 two-year-olds and 3.0 mature cows or bulls. Assigning weights to these age groups of 500 pounds per calf, 750 pounds per yearling and 1000 pounds per two-year-old and mature animal makes a total of 11,800 pounds of beef sold. Dividing the return of \$2,376.07 by this weight gives an estimated price of \$20.14 per hundredweight. This was considerably better than the average price received by Maine farmers for all cattle (\$11.55) or even than the average price received by farmers in the north central states (\$17.98) in the year of the study. Table 15 in the section on beef cattle prices shows the prices received by farmers for cattle over a period of years and in certain selected years to which the estimated price for farmers in this study can be compared.

The increase in inventory of the herd by \$974.35 for 4.7 head would average \$207.31 per head. This increase was largely comprised of cows added to the breeding herd, accounting for the higher price per head than for animals sold.

### **Returns for Manure**

The return for manure was \$7.98 per animal unit or 7.7 per cent of the total returns. This was seldom a cash return, being largely realized in return from crops. It was a small item, but its consideration could make the difference between profit and loss in some herds. Many farmers with beef as a supplementary enterprise to cash crops may feel that the value of manure in maintaining soil condition and organic matter is greater than the estimated cash value applied here. The intangible benefit may be part of the reason that farmers keep beef cattle even when dollars and cents calculations showed a loss.

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<sup>10</sup> Part of these 16 animals were born in years prior to the year of the study. If the increase in cow numbers which occurred this year had been a trend during the previous years, the percentage of young stock sold or added to inventory of the actual number of cows producing then would have been more favorable than 84 per cent.

## MAINE'S COMPETITIVE POSITION IN BEEF PRODUCTION

As a potentially important industry for Maine, the climatic and economic environment for beef production in Maine relative to other beef producing areas should be considered. The following sections compare some of Maine's costs, prices and practices, particularly in feeding and marketing, to New York, the mid-west and in some cases the entire United States.

### FEED INPUT

The cost of feed is the only single area of costs in which real savings could materially reduce costs of beef production. Higher costs in Maine compared to other areas could be due either to larger quantities fed and/or to higher prices for feed.

#### Quantities of Feed Fed

The quantities of feed fed per animal unit in Maine were compared to standards from the University of Illinois and to studies of beef cattle production at Cornell and Ohio Universities (table 13).<sup>11</sup> Maine producers fed about a ton more of hay per animal unit than the average amount of hay fed in the other three areas and 418 pounds less of grain. Grains such as corn and oats were included in concentrates, and silage was converted to a hay equivalent.

Table 13  
Comparison of Beef Cattle Feed Use from Illinois  
Standards, Cornell, Ohio and Maine Data

Area	Concentrate pounds	Hay tons
Illinois Standards	919	2.14
Cornell	620	2.13
Ohio	876	2.03
Average	805	2.10
Maine	387	3.12
Difference	- 418	+ 1.02

The larger hay and smaller grain feeding in Maine compared to the average of the other areas was natural in a forage-producing, grain-

<sup>11</sup> Carpenter, Kendall S., *Beef Costs and Returns in 41 New York Farms, 1951*, Cornell University Agricultural Experiment Station Mimeo., A.E. 847, 1953; E. T. Shaudys and J. H. Litterley, *Costs of Producing Beef in Southeastern Ohio, 1954*, Ohio Agricultural Experiment Station Research Circular 45, 1957; *Planning the Farm Business*, Extension Service in Agriculture and Home Economics, University of Illinois.

deficit area such as Maine. Even considering a substitution rate of two to three pounds of hay for grain, Maine was still feeding more hay, or more total feed per animal unit than the other areas. Some of the higher hay feeding would be explained by the longer winter-feeding period in Maine, or replacement of pasture with hay. Also Maine on the average does have a lower quality hay nutrition-wise in the sense that most hay mixtures contain more grass and much less alfalfa than would be true of the other areas. Considering the substitution of hay for grain, the longer winter-feeding period and the lower average quality of hay, the 3.12 ton rate of hay fed per animal unit does not seem excessive.

### Cost of Feed

The average price estimated for hay fed to beef cattle by producers in the study was \$24.88 which was slightly less than the average price received by farmers in the period of the study of \$26.73. Comparing the price received for hay by Maine farmers to that received by farmers in New York, the north central states and the United States over the 8-year period revealed that Maine prices were \$4 to \$7 above prices received in the other areas (table 14). This relationship was fairly consistent from year to year during the period. The prices of oats and corn show a very similar relationship among the areas, though New York prices averaged closer to Maine's. Since feed costs accounted for over 60 per cent and hay cost over 40 per cent of total costs of production, the beef industry in Maine faces a rather constant and significant cost disadvantage.

Table 14

Comparison of Maine, New York, North Central States\*, and United States Farm Prices of Hay, Oats, and Corn, 1951-58 Average

Area	Hay per ton	Oats per bu.	Corn per bu.
Maine	\$25.30	\$0.79	\$1.80
New York	21.64	0.78	1.50
North Central States	18.16	0.67	1.34
United States	21.34	0.69	1.37

\* North Central States: Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas.

### BEEF CATTLE PRICES

Maine farmers consistently received lower prices for all cattle than New York, the north central states and the United States (table 15). Though only slightly less than New York in some cases, they were 5 to 6 dollars less than the north central states or United States for the eight-

year average, in the year of the study (1957) and in the most recent year (1960). This lower price for Maine beef can partly be explained by differences in the composition of "all cattle." Dairy animals constitute a larger proportion of all cattle in Maine (and in New York) than in the other areas. However, the 1960 price for steers and heifers, presumably largely beef-type animals, still showed a price differential of over 4 dollars between Maine and either the north central states or the United States, and a difference of over 2 dollars between Maine and New York.

Table 15  
Comparison of the Farm Prices for Cattle in Maine, New York,  
the North Central States and the United States

Area	1951-58 average for all cattle	1957 average for all cattle	1960 average for all cattle	1960 Steers and heifers
	per cwt.	per cwt.	per cwt.	per cwt.
Maine	\$13.98	\$11.55	\$15.23	\$18.83
New York	15.03	11.74	15.82	21.46
North Central States	19.86	17.98	21.02	23.40
United States	19.36	17.07	20.48	22.92

In Maine, beef cattle have to compete with dairy animals for slaughter which tends to depress the price for beef from beef animals towards the cull dairy price. In order to establish a premium price for quality beef on an accepted state-wide basis, federal inspection and grading are necessary. And in order to have federal inspection and grading of beef for proper retail merchandising, a fairly large, dependable, year-round supply of beef animals is necessary. Slaughterers need the assurance of a large, steady volume of good beef before they can afford to meet plant specifications for federal inspection, or pay the cost of federal grading, and farmers need some assurance of better beef prices to provide them with the incentive for producing beef in larger, year-round volume. Federal inspection may shortly become a reality in Maine, and improvement in beef merchandising and price is within the realm of possibility.

#### AGE OF MARKETING BEEF ANIMALS

The age of beef steers and heifers at the time of marketing, or what may be called the age-pattern of marketing, affects the composition of the herd. The longer the young stock are kept before marketing, the smaller will be the proportion of cows to all animals in the herd. In this respect, the composition of the average Maine herd in this study was quite different from average herds in the studies made in New York and Ohio (table 16, top). Cows made up 41 per cent of the average herd



in Maine, but 51 and 53 per cent, respectively, of the herds in New York and Ohio. Steers two years old and over were 7 per cent of the average herd in Maine, but their numbers were negligible in the other states.

Table 16  
Composition of Beef Herds and Marketing of Animals for Beef  
Cattle Studies in Maine, New York State and Ohio

	Maine (per cent)	New York (per cent)	Ohio (per cent)
Beef Herds			
Brood Cows	41	51	53
Bulls	3	3	3
Steers (two years & over)	7	0	(0.2)
Yearlings	20	20	12
Calves	29	26	32
Total	100	100	100
Beef Marketing			
Brood Cows	23	8	12
Bulls	3	1	3
Steers (two years & over)	28	0	2
Yearlings	21	54	37
Calves	25	37	46
Total	100	100	100

The reason for the differences in the herd composition among the three states was revealed by the marketing pattern for the young stock (table 16, bottom). In Maine, steers two years old and older accounted for 28 per cent of all animals marketed, yearlings 21 per cent and calves 25 per cent. In New York, no young stock were sold at two years of age or over, 54 per cent of all animals sold were yearlings and 37 per cent were calves. In Ohio, 2 per cent of the animals sold were two-year olds, 37 per cent were yearlings and 46 per cent were calves. The rest of the animals sold were cows or bulls, a matter of culling rather than a marketing program. The large proportion of cows sold in Maine seems to have no significance except as an adjustment or culling procedure, since the number of cows in the average herd was actually increased from purchases and raised heifers during the year.

The age-pattern of marketing young stock in Maine compared to the other states is significant in helping to explain the net loss to Maine producers. As the length of feeding time for a steer or heifer is increased (or a larger total quantity of feed is fed), the animal adds weight as it grows, but, at least after an initial growth period, at a diminishing rate. In this area of diminishing returns of beef to feed input, the point of maximum profit (or minimum loss) is attained sooner, or at lower

weights, as the relative cost of feed is increased and/or the price of beef is decreased. Maine producers with higher feed costs and a tendency toward lower beef prices compared to other beef-producing areas should market animals at earlier ages and lower weights rather than the reverse which seems to be the practice. In more practical terms, the study indicated strongly that the additional cost of feeding and over-wintering steers to two or more years of age was not covered by the additional returns for the larger animal.

### CONCLUSIONS

This study of beef production in Maine showed that the average beef herd was operated at a loss when all costs and returns were considered. The gross returns for the average herd appeared satisfactory considering both the number of animals sold as a proportion of cows in the herd and the price received. The gross return is misleading, however, as the net return is the important item to the farmer. The gross return may be increased by selling heavier animals while the net may be decreased because of increasing cost per pound for the added weight. Though the estimated price received by the producers in the study compared favorably to beef prices in other areas, the price received by farmers in Maine for all cattle was low compared to other areas. Lack of federal inspection and grading of beef in Maine fails to distinguish effectively between beef from beef animals and poorer quality beef from dairy animals. This lack tends to depress the price of beef animals toward the price for all cattle.

The losses in beef production for the average herd resulted mainly from high costs rather than from low returns. Some costs were minor and probably could or should not be reduced, others, such as labor could be reduced, and others, such as grain cost, might be profitably increased in some situations. The largest item of cost, and the only one which if substantially reduced could do much to erase the loss, was the cost of feed, particularly hay. The quantity of hay fed in Maine was larger than that fed in other beef producing areas, but not excessive for Maine conditions. Improved forage programs for producing hay, silage and pasture could in many cases reduce the amount and cost of hay fed. The high cost of feed, however, was due mainly to higher feed prices, particularly of hay, in Maine compared to other areas. The higher prices of feed were consistent over a period of years and existed in spite of the fact that alfalfa production as a proportion of all hay was far greater in the other areas than in Maine.

Some costs could be reduced from the averages of table 12 by different methods of estimating costs. Some of these reductions would

be justifiable, some questionable. The farmer might well be satisfied with less than a dollar an hour return on his or his family's labor. This is justifiable. The charging of fixed costs of hired labor, buildings, machinery and equipment all to a major enterprise instead of to beef cattle is questionable. The farm organization as a whole might benefit by addition of beef cattle to make use of existing facilities, thus reducing the average cost per hour, per year or per mile of use. But all of this benefit should not accrue to the beef cattle, while a major enterprise bears all the fixed costs. This would make the minor enterprise look relatively more favorable and might lead to mistaken decisions in the overall organization of the farm. The best method is to attempt to allocate all costs equitably among several enterprises.

In recognition of higher costs of feed and a tendency towards lower prices of beef in Maine compared to other beef producing areas, Maine producers should feed their market animals for a shorter period of time as the most logical way to reduce costs. A production and marketing program which would move beef animals to market at an earlier age, considering particularly a shorter over-wintering period, should be recommended and emphasized for more successful beef production in Maine. This program would have to include recommendations for feeding techniques to accomplish faster gains, including, perhaps, the use of hormones. Emphasis should also be put on breeding animals which have the capacity for a fast rate of gain.

APPENDIX TABLE 1  
 NUMBERS AND RELATIONSHIP OF BEEF CATTLE  
 TO ALL CATTLE  
 MAINE 1936-1958

Year	All Cattle (thousands)	Beef Cattle* (thousands)	Per Cent Beef Cattle
1936	231	23	9.9
1937	231	23	9.9
1938	229	23	10.0
1939	231	23	9.9
1940	235	23	9.7
1941	230	23	10.0
1942	218	23	10.5
1943	209	20	9.6
1944	226	22	9.7
1945	226	21	9.3
1946	223	22	9.8
1947	225	22	9.8
1948	218	21	9.6
1949	212	21	9.9
1950	216	21	9.7
1951	208	22	10.6
1952	223	27	12.1
1953	243	29	11.9
1954	245	28	11.4
1955	233	30	12.9
1956	224	29	12.9
1957	213	26	12.2
1958	200	25	12.5

\* Includes dairy bulls and steers.

Source: United States Department of Agriculture,  
*Agricultural Statistics: 1938-1959*. (Washington: Govern-  
 ment Printing Office, 1939-1960).

APPENDIX TABLE 2  
 CASH RECEIPTS FROM FARM MARKETINGS  
 MAINE, 1957

Item	Million Dollars	Per Cent of Total
Livestock & Livestock Products		
Cattle and calves	6	3.4
Sheep and lambs	—	—
Hogs	1	.5
Total meat animals	7	3.9
Dairy Products	36	20.1
Poultry and eggs	67	37.5
Wool	—	—
Other	—	—
Total	110	61.5
Crops		
Food grains	—	—
Feed crops	4	2.2
Vegetables	50	27.9
Fruit and tree nuts	5	2.8
Other	8	4.5
Total	67	37.4
Total Cash Receipts	177	98.9
Government Payments	2	1.1
Total Cash Income	179	100.0

Source: The American Meat Institute, *The Meat and Livestock Industry in Maine and The Nation*. (Chicago: The American Meat Institute, 1959), table 5.