Iowa Livestock Producers' Choice of Markets

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SUMMARY

This report covers principally the market choices of Iowa livestock producers during 1954. The findings are based on a sample survey of about 400 Iowa farmers who were interviewed at 3-month intervals. These findings show the market outlets and market sources of the major classes of livestock — cattle, calves, hogs and pigs — sold and bought by Iowa producers. The characteristics of both the livestock producers and their livestock sales and purchases are presented with reference to the reported patterns of market selection.

In 1954, every livestock producer in Iowa had available at least one major market outlet within a 20-mile radius of his farm. Geographical differences occurred, however, in the concentration of livestock production, which affected the spatial distribution of market outlets and market sources for Iowa producers. In 1954, livestock sales per acre of farmland, for example, ranged from $10 to $67 among the 99 counties in Iowa. Generally, the eastern and western parts of the state had the most specialization in livestock production.

According to the 1954 survey data, slaughter cattle were sold by farmers largely through terminal markets. These markets, from the livestock producer's viewpoint, offered a specialized service in the form of skilled sales personnel and a large number of active buyers. More than half of all steers and heifers sold by Iowa producers were sold through terminal markets.

Terminal markets were not as important as sales outlets for cows and bulls and were much less important as outlets for hogs and calves than they were in the sales of steers and heifers. In 1954, 49 percent of all sales of cows and bulls were through terminal markets, while only 13 percent of all hogs were sold through terminal markets. Nearly all livestock sales by Iowa producers at terminal markets, moreover, involved livestock intended for slaughter.

Meat packing plants, including packer buyers, and auctions were the next most important group of market outlets for cattle used by farmers. Meat packers purchased 22 percent of the total marketings of cattle by farmers in 1954, while 13 percent were sold through auction markets.

Slaughter hogs were sold largely to packing plants and dealers. Sales directly to packing plants and to packer buyers in 1954 were, respectively, 17 percent and 35 percent of total hog sales. Sales through dealers comprised 24 percent of total hog sales. From the producer's viewpoint, convenience in location was the most important consideration in the choice of packing plants, packer buyers and dealers in the sale of slaughter hogs.

Feeder cattle, calves and pigs were sold largely through auctions or directly to another farmer. Breeding stock followed similar marketing channels. Purchases of feeder and breeding stock also occurred largely through these two markets. Local dealers, in addition, were an important source of feeder pigs.

Differences in marketing services offered by the major types of livestock markets were associated with differences in the livestock characteristics at each major type of market. Terminal markets—the outlet primarily used for slaughter cattle, though in total numbers slaughter hogs also were important—were characterized by relatively large lots shipped relatively great distances and representing relatively high average weight and value per hundredweight when sold.

Packing plants and packer buyers—the predominant outlet for slaughter hogs, though important also as market outlets for slaughter cattle and calves—were characterized by shipments of intermediate lot sizes hauled an intermediate distance, of intermediate average weight and of relatively high value per hundredweight.

Dealers were located, on the average, most conveniently with reference to distance. The local dealer markets also were differentiated from the other major types of markets with reference to the characteristics of the livestock handled.

Auction markets were conveniently located for producers and offered specialized services in the sale and purchase of livestock intended for breeding and feeding. Generally, livestock sales at these markets were in small lots, shipped only a few miles to place of sale, of lighter average weight and of lower average value per hundredweight than the livestock sold at other major market outlets.

Changes during the period from 1940 to 1954 also are cited in this report, of which the most striking was the growth of auction markets. Terminal public markets and packing plants, however, maintained their relative importance as market outlets for slaughter cattle and calves and, because of the secular growth in total marketings, the total sales through these markets increased substantially. Sales of slaughter hogs through packer buyers or directly to packing plants also increased in total volume.

Livestock auctions experienced the largest increase in sales volume through producers' purchases of feeder cattle and calves. Local dealers, however, became the most important market source for feeder pigs—an activity that partly compensated for their declining importance as outlets for slaughter cattle and hogs.

Thus, each livestock market has developed a unique pattern of services and clientele in response to the needs of particular types of livestock enterprises. As the pattern of livestock production has changed, livestock markets have changed also in relative importance as outlets or sources of livestock for Iowa producers.

Iowa Livestock Producers' Choice of Markets[1]

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Livestock producers in Iowa have a wide choice of markets, including terminal markets, packing plants, packer buyers, dealers, auctions, other farmers and miscellaneous marketing agencies. These markets differ in their services and clientele. Their services also vary according to the class of livestock handled.

Iowa livestock markets have experienced several periods of quite drastic adjustments to changing patterns of livestock marketing. Until 1920, Iowa livestock producers depended largely upon the terminal public markets in both buying and selling of livestock. The advent of motor trucks and improved roads, however, triggered the growth of country markets and the gradual shift of slaughtering plants into areas of concentrated livestock production. In the competitive struggle for the producers' patronage, the specialized services of the public stockyards and commission firms vied with the locational convenience of the country markets.[2]

Today, an expanding network of market news serves to connect the hundreds of country markets with the major central markets. Livestock producers thus are able to compare prices at alternative markets and even obtain bids from several buyers on a given sales lot of livestock. In effect, each of the 1,200 livestock markets and the 180,000 livestock producers in Iowa are tied to a nationwide system of markets and market news reporting.

In a perfect market, a particular quality of livestock would bring an identical price (except for transportation costs) at all pricing points. Under imperfect knowledge, however, the theoretical norm is not attained because of variability in livestock quality, demand and marketings. Additional knowledge about existing livestock marketing practices would be useful, therefore, in evaluating the strengths and weaknesses of the present system of marketing and market news reporting. Moreover, this information would be helpful to livestock market operators in adapting their activities to the changing needs of livestock producers.

A sample survey was undertaken in 1953 and 1954 to obtain a more complete picture of marketing practices and market choices of Iowa livestock producers.[3] In this survey, a panel of about 400 farmers in Iowa was interviewed at quarter-year intervals over an 8-quarter period starting in April 1953. The survey findings serve as the source of data reported in this publication.

OBJECTIVES

The primary objective of this report is to provide a basebook of livestock marketing patterns of Iowa farmers for the calendar year 1954. Future studies of livestock marketing patterns can use this basebook to examine trends and to evaluate changes in the market choices of Iowa livestock producers.

Cattle, calves, hogs and pigs are the major livestock classes bought and sold by Iowa farmers. Hence, this report is limited to the sales and purchases of the four major livestock classes, including their interfarm sales. Livestock intended for slaughter, feeding and breeding are included in the tabular presentations, however, both separately and combined under various market-class descriptions.

The data pertain only to the Iowa population of livestock producers (mostly for the one calendar year—1954). Even though producers' choice of markets in 1954 may apply to existing situations, this report does not include an extrapolation of the findings to more recent years. Some data are available, however, to show the aggregate pattern of farm marketings of livestock for the 35-year period—1924 through 1959. The 1954 data also can be related to the 1940 survey of the Corn Belt Livestock Marketing Research Committee.[4]

Briefly, the 1954 farm marketings of cattle, calves, hogs and pigs were somewhat fewer in total number than in later years, as shown in fig. 1. In comparison with 1940, however, the 1954 livestock marketings were substantially larger in total number. Livestock production in Iowa, which has composed about 15 percent of total

[2] The early history of livestock marketing in Iowa is covered in: Sam H. Thompson. Economic trends in livestock marketings. John H. Swift Company, St. Louis. 1940.

[3] The statistical features of this sample survey are discussed in the appendix.

[4] Marketing livestock in the Corn Belt region. S. D. Agr. Exp. Sta. Bul. 365. Nov. 1942.

livestock production in the United States, kept pace with the growth in population and demand for meat during the period since 1940. Cyclical changes occurred, however, in yearly livestock production. The secular and cyclical changes in livestock marketings resulted in two sets of changes in the business volume of each market— changes in total numbers bought and sold and changes in each market's percentage share of total Iowa sales and purchases of livestock.

FACTORS AFFECTING CHOICE OF MARKETS

Choice of market is a terminal decision in the livestock production process. Early in the production process, rather basic farm decisions are involved in the choice of a livestock enterprise and its relative size (as compared with the previous year or the average size of all such enterprises). The aggregate price effects of farmers' decisions are involved in the cyclical changes in farm marketings shown in fig. 1. Choice of market, however, relates to the basic production decisions insofar as the pricing process functions with reference to market organization and structure. If markets fail to precisely discover the derived retail market value of livestock, then livestock quality improvement programs based on adequate price-quality differentials are likely to fail. Moreover, lack of reliability in livestock price forecasting may result in excessive dependence on current prices in making basic production decisions. A better understanding of livestock marketing patterns and changes in these patterns, therefore, may contribute to improvements in the market information used in both the production and distribution processes.

Four different sets of factors are cited as rele-

vant to livestock producers' choice of markets: farm organization, livestock or market class, time of marketing and farmer attitudes. Iowa farms are changing gradually in size, enterprise organization and degree of specialization. Market classes of livestock, particularly the percentage distribution of female stock, also change from year to year as a result of producers' decisions to increase or decrease the number of animals bred or the number of animals on feed. In addition, current and anticipated price relationships for feed grains, cattle and hogs affect the weight of animals bought and sold, or the time of marketing. Finally, producer preferences affect the choice of particular market outlets or market sources, though these preferences may change because of changes in farm organization, livestock classes or time of marketing.

FARM CHARACTERISTICS

Practically all Iowa farms—186,769 farms, or 96.5 percent of the estimated 193,643 farms in 1954—reported one or more head of livestock on hand or sold during the year. Considerable differences occurred, however, in farm organization and the nature of the livestock enterprise. As suggested in table 1, for example, livestock farms are the dominant type of farm in Iowa, though other types of farms also keep livestock, either cattle, hogs or both.[5]

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[5] A farm was classified as livestock, cash grain, dairy and poultry and egg, if 50 percent or more of total cash receipts for 1953 were from one of the particular sources of revenue. A farm was a dairy farm also if dairy products accounted for 30 percent or more of total cash receipts, milk cows represented 50 percent or more of all cows and sales of dairy products together with sales of cattle amounted to 50 percent or more of total receipts. A farm was a general farm if 75 percent or more of the cash receipts came from livestock, grain crops, dairy products and poultry and if it did not fall into any of the other categories. A farm was classified as miscellaneous if it was a truck farm or a type not included in the other five categories.
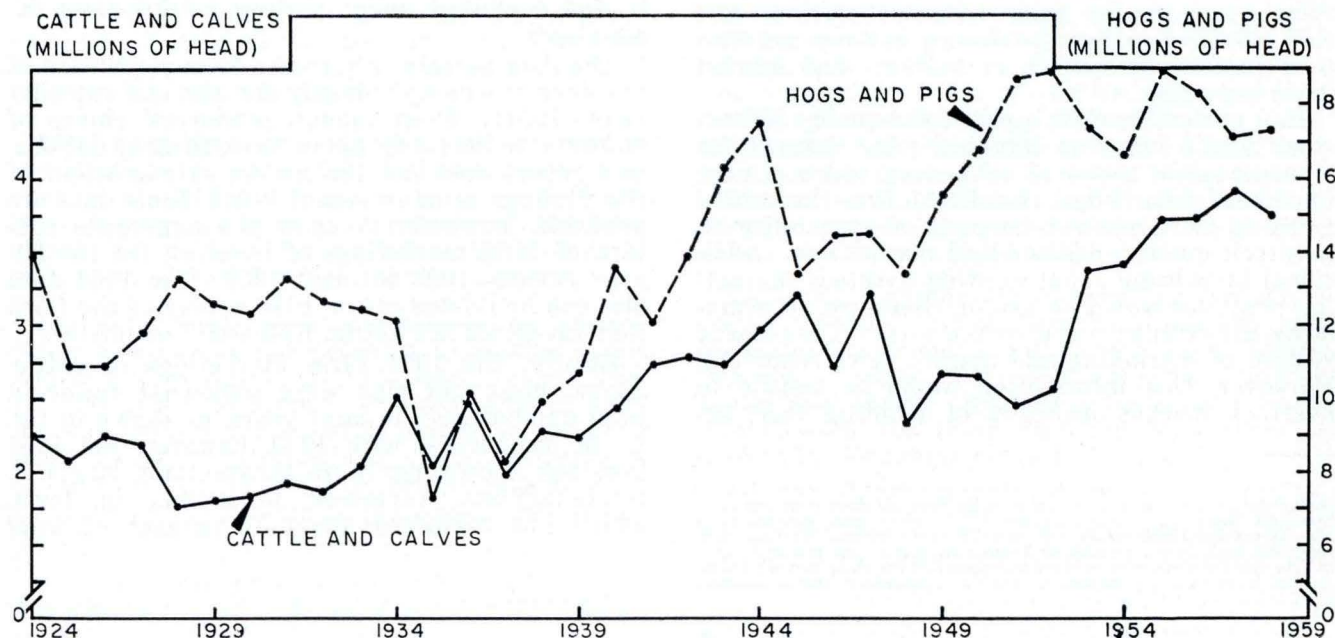

Fig. 1. Estimated annual sales of specified livestock classes by Iowa farmers, 1924-59.

TABLE 1. ESTIMATED NUMBER OF IOWA FARMS OF SPECIFIED TYPE, BY LIVESTOCK ENTERPRISE, 1954.

Livestock enterprise	Livestock	Cash grain	Dairy products	Poultry and eggs[a]	General	Other	All farms
Cattle only	4,068	8,984	2,111	1,674	2,153	0	18,990
Hogs only	4,046	1,237	0	0	0	0	5,283
Cattle and hogs	119,665	19,829	11,401	753	10,848	0	162,496
Neither cattle nor hogs	0	1,852	0	1,674	1,674	1,674	6,874
All farms	127,779	31,902	13,512	4,101	14,675	1,674	193,643

TABLE 2. ESTIMATED NUMBER OF IOWA FARMS HAVING SPECIFIED LIVESTOCK ON HAND, DEC. 31, 1954.

Type of farm	All farms[a]	Cattle and calves	Hogs and pigs
Livestock	127,779	122,681	114,966
Cash grain	31,902	26,304	18,294
Dairy products	13,512	13,512	9,624
Poultry and eggs	4,101	2,427	753
General	14,675	11,660	11,507
All farms	191,969	176,584	155,144

[a] Total number of farms excludes 1,674 farms in the "other" type of farm category. Neither cattle nor hogs were reported by any farm in this category of Iowa farms.

TABLE 3. ESTIMATED NUMBER OF CATTLE AND CALVES ON SPECIFIED TYPE OF FARM, BY LIVESTOCK CLASS, DEC. 31, 1954.

Type of farm	Milk stock	Beef breeding stock	Feeders Home raised	Feeders Purchased	Feeders Total	All cattle
			(1,000 head)			
Livestock	1,118.3	1,098.9	990.4	1,849.0	2,839.4	5,056.6
Cash grain	176.3	195.9	134.2	100.5	234.7	606.9
Dairy products	246.2	40.4	33.8	1.1	34.9	321.5
Poultry and eggs	25.9	9.2	10.8	0.9	11.7	46.8
General	126.9	80.4	55.2	38.3	93.5	300.8
Total	1,693.6	1,424.8	1,224.4	1,989.8	3,214.2	6,332.6[a]

[a] The United States Department of Agriculture reports 6,161,000 head on hand on Jan. 1, 1955. See: Meat animals, farm production, disposition and farm income by states, 1955-56. U. S. Dept. Agr., Agr. Mkt. Serv., Crop Reporting Board, Mt An 101 (57). April 1957.

Somewhat fewer farms reported cattle, calves, hogs or pigs on hand at the end of the 1954 calendar year than during the year (table 2). Total farm marketings of livestock were at a lower level in 1954 than in 1953 or 1955, as shown in fig. 1. Hence, livestock numbers on Dec. 31, 1954, were affected by the general upward movement in livestock numbers. Though hog marketings were fivefold the number of cattle and calves sold by

Iowa farmers in 1954 and 1955, fewer farms reported hogs and pigs on hand than reported cattle and calves.

Cattle and calves kept mainly for milk made up a major part of the total breeding stock on Iowa farms, as shown in table 3. Home-raised feeders on hand were fewer in total number than beef breeding stock or purchased feeders. Most of the purchased feeders were on livestock farms.

TABLE 4.   ESTIMATED NUMBER OF HOGS AND PIGS ON SPECIFIED TYPE OF FARM, BY LIVESTOCK CLASS, DEC. 31, 1954.

Type of farm	Barrows and gilts	Sows and gilts	Boars and stags	Pigs under 3 months	Total
	(1,000 head)				
Livestock	6,702.9	2,108.8	80.8	722.3	9,614.8
Cash grain	481.3	127.5	3.7	117.8	730.3
Dairy products	66.7	136.1	7.2	36.4	246.4
Poultry and eggs	35.1	14.3	1.0	0.0	50.4
General	463.4	106.8	5.2	36.2	611.6
Total	7,749.4	2,493.5	97.9	912.7	11,253.5[a]

[a] The United States Department of Agriculture reports 11,156,000 head on hand on Jan. 1, 1955. For source, see footnote to table 3.

Livestock farms accounted for 80 percent of the cattle and calves on hand Dec. 31, 1954. Estimated average number of head of cattle and calves per farm ranged from 41 on livestock farms to 19 on poultry and egg farms.

Farm inventories of hogs and pigs were relatively small in relation to farm marketings, as illustrated partly in table 4. Livestock farms again accounted for most of the farm inventories on Dec. 31, 1954. Average number of head of all hogs and pigs on hand ranged from 84 on livestock farms to 26 on dairy farms.

In July 1953, the sample of Iowa farmers was interviewed regarding various practices in the choice of markets. Considerable market information was available, according to these interviews. At least one daily newspaper was received by 89 percent of the farmers, while 93 percent received at least one farm paper or magazine. Despite the large proportion of farmers subscribing to both sources of information, only 5 percent of the farmers indicated the daily newspaper as the best source of information in making price forecasts 5 to 6 months ahead, while 21 percent indicated farm papers and magazines as best for this purpose. Radio, however, was listed as the best information source on price forecasts by 14 percent of the farmers. Only 5 percent specifically listed land-grant college and U. S. Department of Agriculture reports as best. Though a wide variety of informational sources was indicated, at least 30 percent of the farmers did not compare prices in different markets for cattle or hogs.

Both buyer and seller cited the element of uncertainty in judging the market value of livestock. Some livestock producers reduced this uncertainty by obtaining bids or price quotations from several different buyers. The 1954 survey data showed that bids or other price indications were obtained on 78 percent of the steers sold and on 67 percent of the mixed lots of steers and heifers sold. Also, 74 percent of the barrows and gilts sold were placed on bid or were priced before the sale. However, only 55 percent of the calves, 42 percent of the cows and bulls, 41 percent of the sows, 33 percent of the boars and stags and

27 percent of the vealers were handled in this manner. Moreover, in 1954, all feeder pigs were sold without prior bids or price indications.

A producer may decide to sell his livestock at a more distant market and, hence, he may compare prices at several markets. In the 1953 survey, 74 percent of Iowa livestock producers reported making market price comparisons. These producers thus reduced some of the uncertainty of selecting the best market for their livestock.

Various practices were used in the comparisons of market prices. The average price was used by 60 percent of the producers making price comparisons. The producers using the top price, the low price, or a price range were almost equally divided. The different practices stemmed from differences in livestock characteristics and in personal evaluations of different market characteristics.

Producers using the average price in making market comparisons were asked to list their reasons for this practice. Most of the respondents believed that they had average stock; hence, they expected an average price on their sales. Nevertheless, a considerable element of pricing uncertainty was apparent in the replies obtained from the sample of producers.

LIVESTOCK CLASSES

Slaughter livestock made up the major part of the 3,777,000 cattle, 293,500 calves and 16,853,300 hogs and pigs sold by Iowa producers in 1954 (table 5). Eighty-two percent of the cattle and 72 percent of the calves were intended for slaughter. Marketings of slaughter hogs were 90 percent of the total sales of hogs and pigs.

Total purchases of cattle and calves in 1954 amounted to 64 percent of the total sales, while

TABLE 5.   ESTIMATED NUMBER OF LIVESTOCK SOLD BY IOWA FARMERS FOR SPECIFIED USE, BY LIVESTOCK CLASS, 1954.

Intended use	Cattle	Calves	Hogs and pigs
	(1,000 head)		
Slaughter	3,074.8	211.1	15,143.4
Feeder	344.6	64.6	1,092.3
Herd or breeding	311.1	14.9	423.1
Unknown	46.5	2.9	194.5
All uses	3,777.0	293.5	16,853.3

Intended use	Cattle	Calves	Hogs and pigs
		(1,000 head)	
Feeder	2,148.5	272.2	2,718.6
Herd	150.9	20.9	476.7
All uses	2,299.4	293.1	3,195.3

total purchases of hogs and pigs were 19 percent of total sales. Over 2 million head of each of the two major classes of livestock were purchased in 1954, as shown in table 6.

The 1954 survey data were used to examine the correlation, if any, between specialization in livestock production and marketings of different livestock classes. Iowa farms were classified into four groups with respect to the percentage of total cash receipts derived from livestock sales during 1954. The four percentage groups and the number of farms in each group were as follows:

Under 25	36,009
25 to 49	24,470
50 to 74	39,741
75 and over	93,423
Total	193,643

Thus, nearly half of all Iowa farms in 1954 derived 75 percent or more of their cash receipts from the sale of livestock.[6]

Iowa farms reporting livestock sales as less than half of total farm sales accounted for only 13 and 12 percent, respectively, of all cattle and calves sold and all hogs and pigs sold (table 7). These percentages, however, varied widely among the several livestock classes, particularly for cattle and calves. Only 6 percent of the steers sold originated among the less specialized producers (farms reporting livestock sales as less than 50 percent of total farm sales), but 33 percent of the dairy heifers, 30 percent of the dairy cows and 23 percent of the vealers originated among these producers. Less than 15 percent of the total sales of any market class of hogs and pigs— barrows and gilts, sows, boars and stags, feeder pigs and gilts for breeding—originated from this producer group. A majority of the less specialized livestock producers reported grain sales as a major source of cash receipts.

TABLE 7. ESTIMATED PERCENTAGE OF SPECIFIED LIVE-STOCK SOLD BY IOWA FARMERS REPORTING SPECIFIED DE-GREES OF ENTERPRISE SPECIALIZATION, BY LIVESTOCK CLASS, 1954.

Livestock sales as percent of total farm sales	Steers and heifers	Cows and bulls	Calves	All cattle and calves	All hogs and pigs
Under 25	4	19	14	7	5
25 to 49	5	11	10	6	7
50 to 74	14	24	29	16	23
75 and over	77	46	47	71	65
Total	100	100	100	100	100

MARKET OUTLETS

The major markets used by Iowa producers in 1954 and the total number of each located in Iowa,

[6] Farms reporting livestock sales as 50 percent or more of total cash receipts were somewhat greater in number in 1954 than in 1953. The earlier data served as a basis for the type-of-farm classification.

were as follows: 1 terminal public market, 49 packing plants and their packer buyers, 660 local independent dealers, 170 auctions and a large fraction of the 187,000 farms reporting sales of livestock. Local cooperative associations, of which 34 were reported, local retailers and miscellaneous markets were unimportant in the state-wide pattern of livestock sales and purchases.[7] In addition, a large number of out-of-state markets were available to Iowa producers.

Most cattle were sold through public stockyards, auctions or packer buyers (including those at packing plants), as shown in table 8. Auctions, however, were the most important outlet for calves. Packer buyers and the public stockyards handled most of the hogs and pigs sold by Iowa farmers.

TABLE 8. ESTIMATED NUMBER OF LIVESTOCK SOLD BY IOWA FARMERS THROUGH SPECIFIED MARKETS, BY LIVESTOCK CLASS, 1954.

Market	Cattle	Calves	Hogs and pigs
		(1,000 head)	
Terminal public markets	1,826.4	2.0	2,181.3
Direct to packing plants	533.7	10.2	2,153.7
Packer buyers	231.8	16.2	6,520.5
Local dealers	164.3	20.0	3,939.1
Auctions	651.0	213.1	777.7
Other farmers	321.8	26.8	811.6
Local cooperatives	4.1	0.0	197.5
Local retailers	17.3	0.0	1.4
Special sales	9.7	0.0	36.1
Unknown	16.9	5.2	234.4
All markets	3,777.0[a]	293.5[a]	16,853.3[b]

[a] Total cattle and calves sold was 4,070,500 head. The United States Department of Agriculture reports 3,393,000 cattle and calves sold, but this excludes interfarm sales. (For source, see footnote, table 3). Interfarm sales, plus the proportionate share of the "unknown" category in this survey, were 350,500 head. This number subtracted from 4,070,500 is equal to 3,620,000, which may be compared with the USDA figure of 3,393,000.

[b] The USDA reports 16,613,000 head of hogs and pigs sold exclusive of interfarm sales. Interfarm sales, plus a proportionate share of the "unknown" category in this survey, were 823,000 head. This number subtracted from 16,853,300 is equal to 16,030,300, which may be compared with the USDA figure of 16,613,000.

TABLE 9. ESTIMATED NUMBER OF LIVESTOCK PURCHASED BY IOWA FARMERS THROUGH SPECIFIED MARKETS, BY LIVE-STOCK CLASS, 1954.

Market	Cattle	Calves	Hogs and pigs
		(1,000 head)	
Terminal public markets	411.9	45.0	0.0
Packer buyers	0.0	0.0	11.1
Local dealers	377.2	1.7	976.2
Auctions	1,087.0	165.6	816.6
Local cooperatives	53.1	0.0	43.0
Special sales	9.3	3.8	22.4
Other farmers	354.3	77.0	1,323.4
Unknown	6.6	0.0	2.6
All markets	2,299.4	293.1	3,195.3

The pattern of livestock purchases differed sharply from the pattern of sales (see table 9). Other farmers and auctions were more important as sources of livestock purchased than as market outlets for livestock sold. In addition, local dealers were an important source of feeder pigs.

Market choices among livestock producers varied according to the degree of specialization in livestock production (table 10). Much of this affinity between type of market and degree of specialization, however, was related to the market classes of livestock sold by different producers. Among producers with similar farm production characteristics and market classes of cattle and calves, a similar pattern of market selection was observed.

[7] These estimates of the number of markets are based on a forthcoming report on Iowa livestock markets.

TABLE 10. ESTIMATED PERCENTAGE OF CATTLE AND CALVES SOLD BY IOWA FARMERS REPORTING SPECIFIED DEGREES OF ENTERPRISE SPECIALIZATION, BY MARKET OUTLET, 1954.

Livestock sales as percent of total farm sales	Terminal markets	Packer buyers[a]	Local dealers	Auctions	Other farmers	Local cooperatives	Other markets	All markets
Under 25	30	5	3	44	18	0	0[b]	100
25 to 49	24	12	12	28	18	0	6	100
50 to 74	46	11	5	26	11	1	0[b]	100
75 and over	50	24	4	16	6	0	0[b]	100
Average	46	20	5	20	8	0[b]	1	100

[a] Including sales at packing plants.

[b] Less than 0.5 percent.

TABLE 11. ESTIMATED PERCENTAGE OF HOGS AND PIGS SOLD BY IOWA FARMERS REPORTING SPECIFIED DEGREES OF ENTERPRISE SPECIALIZATION, BY MARKET OUTLET, 1954.

Livestock sales as percent of total farm sales	Terminal public markets	Packer buyers[a]	Local dealers	Auctions	Other farmers	Local cooperatives	Other markets	All markets
Under 25	8	61	16	8	7	0	0	100
25 to 49	10	55	29	3	2	0[b]	1	100
50 to 74	12	53	27	2	4	2	0[b]	100
75 and over	14	51	23	6	5	1	0[b]	100
Average	13	52	24	5	5	1	0[b]	100

[a] Including sales at packing plants.

[b] Less than 0.5 percent.

The uniformity in patterns of market selection among livestock producers is illustrated in the market choices in the sale of hogs and pigs (table 11). The distribution of market classes of hogs and pigs is almost the same among livestock producers reporting varying degrees of specialization. Again, the distribution of market classes of livestock is a more reliable indicator of producers' selection of market outlets than the distribution of producers according to the percentage of total cash receipts derived from livestock sales.

Farm marketings of all cattle and calves were quite uniformly distributed over the year. Considerable differences occurred, however, among the market classes listed in table 12. The time of marketing among various livestock classes was related through the production process that generated these marketings, such as milk production or breeding of cattle kept mainly for beef. Most of the variability in the bimonthly marketing pattern for cattle and calves was related to the outputs of these two types of livestock enterprises.

Bimonthly sales of hogs and pigs (table 13) followed the characteristic seasonal pattern associated with hog marketings. The 1954 calendar year marked the beginning of a secular trend toward earlier farrowings and earlier marketings.

Farm purchases of cattle and calves during 1954 corresponded in their temporal pattern with farm marketings of feeder calves (table 14). Most feeders were purchased during the last 4 months of the year.

The bimodal purchase pattern for hogs and pigs correlated with the spring and fall pig crops (table 15). In 1954, a major part of the barrows, gilts and sows were purchased during the first quarter-year, while boars, feeder pigs and gilts for breeding were purchased during the final 3- or 4-month period. Though practically all the sows, boars and gilts purchased were intended for breeding, a marked difference existed in the bimonthly distribution of purchases. For all market classes, however, only a few purchases were reported during July and August.

PRODUCER ATTITUDES

Panel members were interviewed regarding their reasons for selling each lot of livestock through the specified market rather than through an alternative market.[8] Essentially, four major types of reasons were given: the degree of market competition, mostly in terms of market price; the location and convenience of the market; the type of animal sold; and various special reasons stated by a relatively small number of respondents. All reasons were given on the basis of number of head of livestock involved rather than the number of lots.

The degree of competition at the preferred market—indicated by the number of buyers and sellers—was stated as the most important reason for each of the three major classes of livestock sold. The notion of "most competition" was re-

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[8] These interviews were completed during April 1953 and July 1953.

TABLE 12. ESTIMATED PERCENTAGE OF CATTLE AND CALVES SOLD BY IOWA FARMERS IN SPECIFIED MONTHS, BY LIVESTOCK CLASS, 1954.

Bimonthly period	Steers and heifers	Dairy heifers	Bulls	Beef cows	Dairy cows	Calves	Vealers	All classes
Jan. - Feb.	15	10	18	27	19	7	13	16
March - April	15	2	17	17	12	8	22	15
May - June	16	12	14	11	15	8	22	16
July - Aug.	18	23	14	12	9	3	17	16
Sept. - Oct.	20	12	16	11	20	29	11	19
Nov. - Dec.	16	41	21	22	25	45	15	18
Total	100	100	100	100	100	100	100	100

TABLE 13. ESTIMATED PERCENTAGE OF HOGS AND PIGS SOLD BY IOWA FARMERS IN SPECIFIED MONTHS, BY LIVESTOCK CLASS, 1954.

Bimonthly period	Barrows and gilts	Sows	Boars and stags	Feeder pigs	Gilts for breeding	All classes
Jan. - Feb.	15	7	9	24	32	15
March - April	17	10	37	12	37	16
May - June	11	35	12	12	6	14
July - Aug.	9	29	6	27	4	12
Sept. - Oct.	20	11	14	14	4	19
Nov. - Dec.	28	8	22	11	17	24
Total	100	100	100	100	100	100

TABLE 14. ESTIMATED PERCENTAGE OF IOWA FARM PURCHASES OF CATTLE AND CALVES IN SPECIFIED MONTHS, BY LIVESTOCK CLASS, 1954.

Bimonthly period	Steers and heifers	Dairy heifers	Bulls	Beef cows	Dairy cows	Calves	All classes
Jan. - Feb.	11	29	10	20	15	7	11
March - April	13	10	20	9	22	3	12
May - June	6	7	24	11	6	3	6
July - Aug.	8	0	17	7	1	4	8
Sept. - Oct.	38	0	11	18	26	63	39
Nov. - Dec.	24	54	18	35	30	20	24
Total	100	100	100	100	100	100	100

TABLE 15. ESTIMATED PERCENTAGE OF IOWA FARM PURCHASES OF HOGS AND PIGS IN SPECIFIED MONTHS, BY LIVESTOCK CLASS, 1954.

Bimonthly period	Barrows and gilts	Sows	Boars and stags	Feeder pigs	Gilts for breeding	All classes
Jan. - Feb.	29	30	10	17	13	17
March - April	39	34	9	14	17	15
May - June	13	21	5	11	6	11
July - Aug.	5	3	3	9	4	9
Sept. - Oct.	6	5	21	22	35	22
Nov. - Dec.	8	7	52	27	25	26
Total	100	100	100	100	100	100

vealed as the most important reason cited with reference to a third of the cattle and calves sold and over a fourth of the hogs. The "most convenient" market, however, was the dominant reason in the choice of the specified market outlet for hogs, while "type of animal" and "special considerations" were relatively more important in the choice of market outlets for calves than for cattle and hogs.

Producers' attitudes on choice of markets were related to the market outlets used for each class of cattle (table 16). Thus, price or the degree of competition was most important with reference to the primary market outlets for slaughter cattle. The belief that a particular market offered the best price was important with respect to packer buyers and dealers (who frequently quoted a price to the producer upon examination of the livestock). The idea of a favorable degree of competition at the terminal market or the packing plant encouraged many producers to select these markets, though a specific price for the cattle was not quoted prior to shipment to the market outlet.

Convenience, type of animal and miscellaneous considerations were important in the choice of the primary market outlets for feeder cattle and cattle intended for breeding purposes. Special considerations were important in the sales to packer buyers. Producers generally expressed a preference for a net price transaction, or one that did not involve deductions for commissions and other charges. Some producers were solicited by the buyer, or the buyer quoted a price. These practices were cited also among the special considerations in table 16.

The notion of a competitive market was an important consideration in the choice of market outlets for calves and vealers (table 17). However, the number of sales through market outlets other than auctions was relatively small. Hence, the

reasons cited with reference to the other markets pertained to a relatively small number of sales.

The degree of competition was cited most frequently as a reason for selecting terminal markets rather than any alternative markets in the sale of hogs (table 18). Price was cited more frequently in connection with the market agencies having personnel customarily visit farms and quote a price upon inspection of the hogs of marketable weights. Convenience was mentioned most frequently with reference to the leading markets for hogs. Auctions were selected because of two reported considerations—the occurrence of a high degree of competition and the suitability of these markets for the sale of feeder pigs.

MARKET CHOICES FOR CATTLE AND CALVES

The patterns of marketings and purchases of cattle and calves of Iowa producers for each of the major markets—public stockyards, packer buyers, local dealers, auctions and other farmers—involve essentially two important variables: the market class of livestock and the distance to market. The implications of these two basic elements of market selection are discussed in later sections of this report. Presently, the market choices for different market classes of cattle and calves are examined with reference to their sales and purchases by Iowa livestock producers.

SALES

In table 19, sales of the major market classes of cattle and calves in 1954 are shown according to intended use. In 1954, practically all slaughter cattle and calves were beef animals. Only 10 percent of the total sales intended for slaughter were dairy heifers, dairy cows or vealers. Fur-

TABLE 16. ESTIMATED PERCENTAGE OF CATTLE SOLD THROUGH SPECIFIED MARKET, BY REASON FOR CHOICE OF MARKET, IOWA. JAN.-JUNE. 1953.

Reason	Terminal public markets	Packing plants	Packer buyers	Local dealers	Auctions	Farmers	All markets
Most competition	42	48	26	23	27	0	36
Best price	24	18	32	61	9	11	23
Most convenient	24	12	2	5	26	0	19
Type of animal	8	4	8	4	36	64	14
Special considerations	2	18	32	7	2	25	8
All reasons	100	100	100	100	100	100	100

TABLE 17. ESTIMATED PERCENTAGE OF CALVES AND VEALERS SOLD THROUGH SPECIFIED MARKET, BY REASON FOR CHOICE OF MARKET, IOWA. JAN.-JUNE. 1953.

Reason	Terminal public markets	Packing plants	Packer buyers	Local dealers	Auctions	Farmers	All markets
Most competition	92	81	19	62	40	0	40
Best price	8	0	15	14	14	0	11
Most convenient	0	14	31	24	16	0	18
Type of animal	0	0	7	0	29	10	17
Special considerations	0	5	28	0	1	90	14
All reasons	100	100	100	100	100	100	100

TABLE 18. ESTIMATED PERCENTAGE OF HOGS SOLD THROUGH SPECIFIED MARKET, BY REASON FOR CHOICE OF MARKET, IOWA. JAN.-JUNE. 1953.

Reason	Terminal public markets	Packing plants	Packer buyers	Local dealers	Auctions	Farmers	All markets
Most competition	60	34	22	18	35	0	27
Best price	16	20	35	33	9	2	28
Most convenient	16	33	30	40	14	46	32
Type of animal	8	6	9	2	31	7	7
Special considerations	0	7	4	7	11	45	6
All reasons	100	100	100	100	100	100	100

TABLE 19. ESTIMATED PERCENTAGE OF SPECIFIED CLASSES OF CATTLE AND CALVES SOLD BY IOWA FARMERS, BY INTENDED USE, 1954.[a]

| Livestock class | Intended use after sale | | |
	Slaughter	Feeder	Herd
Steers	57.4	42.7	0.0
Beef heifers	18.3	9.8	24.9
Dairy heifers	0.7	0.2	15.4
Mixed steers and heifers	7.9	29.3	0.0
Beef cows	4.4	1.4	17.7
Dairy cows	3.7	0.0	26.1
Bulls	1.2	0.8	11.0
Calves	6.4	15.8	4.9
All classes	100.0	100.0	100.0

[a] These percentages may be converted into absolute values by using the data in table 5.

thermore, less than 0.5 percent of the total feeders were dairy stock. Dairy heifers and dairy cows, however, accounted for 41 percent of the total sales of breeding stock.

SLAUGHTER CATTLE AND CALVES

Terminal public markets were the principal market outlet for all slaughter steers and heifers, except dairy heifers (table 20). Auction markets, however, were the most important outlets for the livestock sold less frequently at terminal markets —cows, bulls and calves. Packer buyers, though not a highly favored market for any one market class, accounted for the second largest percentage of the total sales of livestock sold in the largest numbers—steers and heifers, including the mixed lots of steers and heifers.

Public terminal markets, packing plants and auctions were the principal market outlets used by Iowa farmers in the sale of cattle and calves. Practically all—99.9 percent—of the cattle and calves sold by farmers to packing plants, either directly or through packer buyers, were intended for slaughter. A major part of all the cattle sold through the other specified markets were slaughter cattle. Only 4 percent of the sales through

terminal markets were not for slaughter, while 21 percent of the sales through dealers and 36 percent of the sales through auctions were in the herd or feeder category.

Sales of slaughter cattle and calves occurred quite uniformly during the year. The third quarterly period, however, was marked by an increase in the rate of marketings through the two most important outlets, terminal markets and packer buyers (table 21). Sales through packer buyers and local dealers were marked by an inverse correlation in the bimonthly percentages for these two outlets.

FEEDER CATTLE AND CALVES

Auctions or local sales barns were the major market outlets for feeder cattle and calves (table 22). Each market class had, however, a unique percentage distribution of market outlets. The bimonthly distribution of sales through each of four major market outlets generally corresponded to a pattern of peak sales during the winter months and lower sales during July and August (table 23).

BREEDING CATTLE AND CALVES

Sales of breeding stock accounted for only 8 percent of total 1954 sales of cattle and calves. Bulls and calves, moreover, made up less than 16 percent of the total sales of breeding stock. Hence, the data in table 24 on market outlets are based on a rather limited number of reports. Nevertheless, in comparison with the tabular material cited earlier, a consistent pattern of market selection is presented in table 24.

Sales of breeding stock, which were composed

TABLE 20. ESTIMATED PERCENTAGE OF SLAUGHTER CATTLE AND CALVES SOLD BY IOWA FARMERS THROUGH SPECIFIED MARKETS, BY LIVESTOCK CLASS, 1954.

Market	Steers	Beef heifers	Dairy heifers	Mixed steers and heifers	Beef cows	Dairy cows	Bulls	Calves	All classes
Terminal public markets	61.8	66.6	3.5	40.6	36.0	24.1	34.6	0.9	53.8
Packing plants[a]	27.4	20.2	42.7	25.7	14.2	26.0	6.6	12.5	24.2
Local dealers	2.9	5.0	22.0	9.2	4.5	4.1	4.9	9.2	4.5
Auctions	6.8	7.4	28.9	20.0	43.8	45.7	53.9	77.4	16.3
Farmers	0.6	0.3	0.0	0.0	1.5	0.0	0.0	0.0	0.5
Other markets	0.5	0.5	2.9	4.5	0.0	0.1	0.0	0.0	0.7
All markets	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

[a] Including sales through packer buyers.

TABLE 21. ESTIMATED PERCENTAGE OF SLAUGHTER CATTLE AND CALVES SOLD BY IOWA FARMERS IN SPECIFIED MONTHS, BY MARKET, 1954.

Bimonthly period	Terminal public markets	Packer buyers[a]	Local dealers	Auctions	Other	All markets
Jan. - Feb.	16	8	12	16	24	14
March - April	13	15	7	19	29	14
May - June	16	18	26	19	20	17
July - Aug.	18	24	17	17	14	20
Sept. - Oct.	22	19	23	13	11	20
Nov. - Dec.	15	16	15	16	2	15
Total	100	100	100	100	100	100

[a] Including sales at packing plants.

TABLE 22. ESTIMATED PERCENTAGE OF FEEDER CATTLE AND CALVES SOLD BY IOWA FARMERS THROUGH SPECIFIED MARKETS, BY LIVESTOCK CLASS, 1954.

Market	Steers	Heifers	Mixed steers and heifers	Cows and bulls	Calves	All classes
Terminal public markets	15.1	6.4	26.6	63.5	0.2	16.3
Local dealers	9.5	17.0	3.4	0.0	1.0	6.9
Auctions	46.2	61.1	50.8	7.6	72.5	52.4
Farmers	28.6	15.5	19.2	28.9	26.3	24.2
Other	0.6	0.0	0.0	0.0	0.0	0.2
All markets	100.0	100.0	100.0	100.0	100.0	100.0

TABLE 23. ESTIMATED PERCENTAGE OF FEEDER CATTLE AND CALVES SOLD BY IOWA FARMERS IN SPECIFIED MONTHS, BY MARKET, 1954.

Bimonthly period	Terminal public markets	Local dealers	Auctions	Other farmers	All markets
Jan. - Feb.	0	13	26	43	22
March - April	41	40	13	9	19
May - June	0	17	9	7	7
July - Aug.	0	7	2	5	3
Sept. - Oct.	19	0	22	7	16
Nov. - Dec.	40	23	34	29	33
Total	100	100	100	100	100

TABLE 24. ESTIMATED PERCENTAGE OF HERD CATTLE AND CALVES SOLD BY IOWA FARMERS THROUGH SPECIFIED MARKETS, BY LIVESTOCK CLASS, 1954.

Market	Beef heifers	Dairy heifers	Beef cows	Dairy cows	Bulls	Calves	All classes
Local dealers	3.7	5.6	0.0	3.5	4.5	0.0	3.2
Auctions	9.6	34.2	37.8	29.1	24.7	26.3	25.9
Farmers	86.7	58.9	61.0	62.3	65.4	73.7	68.5
Other	0.0	1.3	1.2	5.1	5.4	0.0	2.4
All markets	100.0	100.0	100.0	100.0	100.0	100.0	100.0

largely of heifers and cows, followed the same bimonthly pattern as the sales of feeder cattle and calves (table 25). Since sales through other markets constituted only 2.4 percent of total sales, data on bimonthly sales through these markets were not shown separately.

TABLE 25. ESTIMATED PERCENTAGE OF HERD CATTLE AND CALVES SOLD BY IOWA FARMERS IN SPECIFIED MONTHS, BY MARKET, 1954.

Bimonthly period	Local dealers	Auctions	Farmers	All markets
Jan. - Feb.		23	25	23
March - April	35	10	14	13
May - June	1	6	8	9
July - Aug.	0	21	4	9
Sept. - Oct.	42	27	13	18
Nov. - Dec.	22	13	36	28
Total	100	100	100	100

PURCHASES

Purchases of cattle and calves according to intended use included largely steers, heifers and calves (table 26). Only two market classes of cattle and calves were included among the purchases of feeders, as compared with seven market classes among feeder sales. Since the purchases of feeders constituted 90 percent of the total purchases of cattle and calves, estimates on four of the six market classes in table 26 are based on a rather small number of reports.

TABLE 26. ESTIMATED PERCENTAGE OF SPECIFIED CLASS OF CATTLE AND CALVES PURCHASED BY IOWA FARMERS, BY INTENDED USE, 1954.[a]

Livestock class	Intended use after purchase	
	Feeder	Herd
Steers and/or heifers	88.6	12.1
Dairy heifers	0.0	10.7
Beef cows	0.0	13.0
Dairy cows	0.0	38.6
Bulls	0.1	13.3
Calves	11.3	12.3
All classes	100.0	100.0

[a] These percentages may be converted into absolute values by using the data in table 6.

FEEDER CATTLE AND CALVES

Auctions were the primary market sources, while terminal markets, local dealers and other farmers were secondary market sources for feeder cattle and calves purchased by Iowa farmers (table 27). Frequently the auction markets served as outlets for feeder cattle and calves purchased by the auction operators on their own account. Local

TABLE 27. ESTIMATED PERCENTAGE OF FEEDER CATTLE AND CALVES PURCHASED BY IOWA FARMERS THROUGH SPECIFIED MARKETS, BY LIVESTOCK CLASS, 1954.

Market	Steers and heifers	Calves	All classes[a]
Terminal public markets	19.0	16.5	18.7
Local dealers	17.1	0.3	15.2
Auctions	47.6	56.4	48.6
Local cooperatives	2.5	0.0	2.2
Farmers	13.8	25.6	15.1
Other	0.0	1.2	0.2
All markets	100.0	100.0	100.0

[a] Purchases of beef cows and bulls, which were made entirely through auctions, are included.

dealers also used these markets to sell feeders bought directly from ranchers.[9]

A major part of the 1954 purchases of feeder cattle and calves occurred during the fourth quarter (table 28). Furthermore, the major purchases of feeders occurred somewhat earlier in the fall than did the major sales of feeders by Iowa farmers. This pattern of sales and purchases was related partly to the number of cattle and calves on hand. The bimonthly patterns of market transactions in feeder cattle and calves, therefore, were subject to change during the cycle (that started in 1949 and reached a peak in cattle inventories in 1956).

BREEDING CATTLE AND CALVES

Though the purchases of breeding stock were small, a variety of market classes and market sources were involved in 1954 (table 29). However, auctions and other farmers were reported as the market sources of 84.3 percent of total purchases. Again, the individual percentages must be interpreted with somewhat more caution than the estimates based on a large number of sales.

Breeding cattle and calves were purchased largely during the fall and winter months (table 30). Typically, only 16 to 17 percent of the purchases occurred during the May through August period.

CHANGES IN MARKET CHOICES, 1940-54

Market selection among Iowa livestock producers changed somewhat over the 14-year period from 1940 to 1954 (table 31). In terms of total sales and purchases of Iowa producers, the per-

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[9] Additional data on the operation of Iowa livestock markets are reported in the forthcoming report cited earlier.

TABLE 28. ESTIMATED PERCENTAGE OF FEEDER CATTLE AND CALVES PURCHASED BY IOWA FARMERS IN SPECIFIED MONTHS, BY MARKET, 1954.

Bimonthly period	Terminal public markets	Local dealers	Auctions	Farmers	Other	All markets
Jan. - Feb.	11	6	14	7	79	11
March - April	1	6	16	18	0	12
May - June	5	5	6	8	0	6
July - Aug.	4	14	9	4	21	8
Sept. - Oct.	41	54	33	40	0	39
Nov. - Dec.	38	15	22	23	0	24
Total	100	100	100	100	100	100

TABLE 29. ESTIMATED PERCENTAGE OF HERD CATTLE AND CALVES PURCHASED BY IOWA FARMERS THROUGH SPECIFIED MARKETS, BY LIVESTOCK CLASS, 1954.

Market	Beef heifers	Dairy heifers	Bulls	Beef cows	Dairy cows	Calves	All classes
Terminal public markets	14.3	0.0	0.0	10.6	0.0	0.0	3.1
Local dealers	0.0	0.7	0.4	8.5	12.8	4.5	6.8
Auctions	24.5	72.3	32.2	41.2	46.3	57.9	45.3
Farmers	40.7	27.0	61.4	29.5	38.7	34.8	39.0
Other	20.5	0.0	6.0	10.2	2.2	2.8	5.8
All markets	100.0	100.0	100.0	100.0	100.0	100.0	100.0

TABLE 30. ESTIMATED PERCENTAGE OF HERD CATTLE AND CALVES PURCHASED BY IOWA FARMERS, IN SPECIFIED MONTHS, BY MARKET, 1954.

Bimonthly period	Auctions	Farmers	Other	All markets
Jan. - Feb.	11	14	32	15
March - April	14	25	13	18
May - June	5	11	16	9
July - Aug.	12	5	0	7
Sept. - Oct.	18	17	27	19
Nov. - Dec.	40	28	12	32
Total	100	100	100	100

TABLE 31. ESTIMATED TOTAL SALES AND PURCHASES OF CATTLE AND CALVES THROUGH SPECIFIED MARKETS, BY LIVESTOCK CLASS, IOWA 1940 AND 1954.[a]

Market	Sales								Purchases					
	Slaughter		Feeder		Herd		Total		Feeder		Herd		Total	
	1940	1954	1940	1954	1940	1954	1940	1954	1940	1954	1940	1954	1940	1954
						(1,000 head)								
Terminal public markets	1,364	1,789	54	67	22	0	1,440	1,857	816	453	9	5	825	458
Packing plants	541	805	29	0	7	0	577	805	0	0	0	0	0	0
Local dealers	263	150	61	29	14	11	338	189	332	368	9	12	341	380
Concentration yards	43	0[b]	21	0[b]	3	0[b]	67	0[b]	86	0[b]	2	0[b]	88	0[b]
Auctions	135	542	57	218	36	85	228	845	584	1,179	29	78	613	1,257
Local cooperatives	37	0	2	0	2	0	41	0	23	53	0	0	23	53
Farmers and others	55	40	100	100	70	234	225	374	477	368	68	77	545	445
All markets	2,438	3,326	324	414	154	330	2,916	4,070	2,318	2,421	117	172	2,435	2,593

[a] Based on 1940 data reported in S. D. Agr. Exp. Sta. Bul. 365 and on 1954 data obtained from the Livestock Marketing Survey cited earlier in this report. Estimated sales or purchases through unspecified markets are distributed proportionally among the specified markets; hence, these totals differ from those in table 7.

[b] Farm survey data for 1940 show that about two-thirds of the concentration yards in the Corn Belt were owned by local dealers, while packing plants owned one-third of the yards. The 1954 survey data do not include this additional market characteristic. Hence, differences in sales and purchases through packing plants and local dealers for the 2 years are partly due to this difference in classification.

centage shares for terminal public markets, local dealers and other farmers were reduced, but for auction markets these percentages increased. Sales to packer buyers, including sales directly to packing plants, accounted for about 20 percent of total sales over this 14-year period. In terms of absolute changes in the number of cattle and calves bought and sold, auctions, packing plants and terminal markets were more important in 1954 than in 1940 as outlets for cattle and calves. In addition, purchases through auctions increased twofold during this period. These increases in sales and purchases were associated largely with the secular growth in livestock numbers, though some of these changes were due also to the decline in sales through local dealers.

MARKET CHOICES FOR HOGS AND PIGS

Sales and purchases of hogs and pigs are influenced sharply by the breeding intentions of producers. Increases in hog numbers are associated first with the withholding of gilts for breeding purposes. Marketings of slaughter hogs thus may not correspond with the number of pigs saved 6 to 9 months earlier. A change in the sex distribution of farm marketings, therefore, is an early indication of changes in breeding intentions and the size of the pig crops 6 to 18 months later. This cyclical pattern of hog production and marketings must be recognized in the interpretation of data on sales and purchases of hogs and gilts.

SALES

In 1954, 80 percent of all hogs and pigs sold by Iowa producers were slaughter barrows and gilts, 7 percent were feeder pigs, and only 1 percent were gilts for breeding (table 32). The remaining 12 percent of total sales comprised sows, boars and stags which were sold for slaughter or breeding purposes.

TABLE 32. ESTIMATED PERCENTAGE OF SPECIFIED CLASSES OF HOGS AND PIGS SOLD BY IOWA FARMERS, BY INTENDED USE, 1954.[a]

Market class	Intended use after sale		
	Slaughter	Feeder	Herd
Barrows and gilts	88.1	0.0	0.0
Sows	11.5	0.0	32.7
Boars and stags	0.4	0.0	27.0
Feeder pigs	0.0	100.0	0.0
Gilts for breeding	0.0	0.0	40.3
All classes	100.0	100.0	100.0

[a] These percentages may be converted into absolute values by using the data in table 5.

SLAUGHTER HOGS

Packer buyers, including direct sales to packing plants, local dealers and terminal markets represented the market outlets for 97.4 percent of the slaughter hogs sold by Iowa producers in 1954 (table 33). The percentage distribution of sales among the major market outlets was quite similar among the three market classes of hogs, except perhaps for the somewhat larger sales of boars and stags through auctions.

In summary, the distribution of the annual Iowa hog marketings among alternative livestock markets differed greatly from the distribution of marketings of cattle and calves. A number of factors may account for this difference. First, the value of an average lot of hogs was less than the value of an average lot of cattle and calves. Moreover, the skills required in selling slaughter hogs generally were less—at least in the opinion of the producer—than the skills required in selling cattle. Hence, proximity to market was a more important consideration in the sale of hogs than the specialized services available at more distant markets.

Bimonthly sales of slaughter hogs followed a bimodal distribution, as suggested by table 34. The bimonthly pattern differed, however, among the several market outlets. Sales through local dealers were marked by the smallest degree of intertemporal variability, while sales through the minor slaughter hog markets were exceptionally variable from month to month.

FEEDER PIGS AND OTHER HOGS

Other farmers and auctions were the major market outlets for feeder pigs and hogs intended for breeding purposes (table 35). The bimonthly pattern of feeder pig sales through the two major market outlets shows a bimodal distribution comparable to the sales pattern for slaughter hogs, except for a time-interval lag of 2 to 4 months (table 36). The intertemporal pattern changes abruptly, however, depending upon the position of the hog cycle and producers' breeding intentions.

Sales of breeding stock were concentrated in the first 3 or 4 months of the 1954 calendar year (table 37). The intertemporal sales pattern for breeding stock departed from the bimodal sales distributions cited earlier, partly because of peculiarities in the monthly pattern of sows farrowing. Breeding stock purchased early in 1954 were available for production of both the spring and fall pig crops. Typically, part of the sows farrowing in the spring would be kept through the summer for breeding later in the same calendar year. The monthly level of sales of breeding hogs would be influenced, therefore, by the extent of multiple farrowings during the year.

PURCHASES

Pig purchases were made up almost entirely of feeder pigs, though a small number of pigs intended for breeding purposes at some later time

TABLE 33. ESTIMATED PERCENTAGE OF SLAUGHTER HOGS AND PIGS SOLD BY IOWA FARMERS THROUGH SPECIFIED MARKETS, BY LIVESTOCK CLASS, 1954.

Market	Barrows and gilts	Sows	Boars and stags	All classes
Terminal public markets	13.8	19.0	13.1	14.4
Packer buyers[a]	58.5	49.4	51.4	57.4
Local dealers	25.4	27.8	15.7	25.6
Auctions	0.8	2.7	18.1	1.1
Local cooperatives	1.4	0.7	1.7	1.3
Other	0.1	0.4	0.0	0.2
All markets	100.0	100.0	100.0	100.0

[a] Including sales at packing plant.

TABLE 34. ESTIMATED PERCENTAGE OF SLAUGHTER HOGS SOLD BY IOWA FARMERS IN SPECIFIED MONTHS, BY MARKET, 1954.

Bimonthly period	Terminal public markets	Packer buyers[a]	Local dealers	Auctions	Other	All markets
Jan. - Feb.	11	13	17	16	37	14
March - April	14	17	15	30	3	16
May - June	14	14	15	23	13	14
July - Aug.	11	10	15	2	3	12
Sept. - Oct.	21	20	16	13	30	19
Nov. - Dec.	29	26	22	16	14	25
Total	100	100	100	100	100	100

[a] Including direct to packing plant.

TABLE 35. ESTIMATED PERCENTAGE OF FEEDER AND HERD HOGS AND PIGS SOLD BY IOWA FARMERS THROUGH SPECIFIED MARKETS, BY LIVESTOCK CLASS, 1954.

Market	Feeder pigs	Breeding or herd use			
		Sows	Boars	Gilts	Total
Terminal public markets	0.7	0.0	0.0	0.0	0.0
Local dealers	6.2	0.2	0.3	4.0	1.8
Auctions	48.3	12.9	12.4	27.6	18.7
Farmers	44.1	81.9	84.7	65.3	76.1
Other	0.7	5.0	2.6	3.1	3.4
All markets	100.0	100.0	100.0	100.0	100.0

TABLE 36. ESTIMATED PERCENTAGE OF FEEDER PIGS SOLD BY IOWA FARMERS IN SPECIFIED MONTHS, BY MARKET, 1954.

Bimonthly period	Local dealers	Auctions	Farmers	All markets
Jan. - Feb.	2	30	18	24
March - April	0	14	13	12
May - June	0	14	12	12
July - Aug.	22	16	40	27
Sept. - Oct.	54	19	4	14
Nov. - Dec.	22	7	13	11
Total	100	100	100	100

TABLE 37. ESTIMATED PERCENTAGE OF HERD HOGS, SOLD BY IOWA FARMERS IN SPECIFIED MONTHS, BY MARKET, 1954.

Bimonthly period	Auctions	Farmers	Other	All markets
Jan. - Feb.	33	34	54	35
March - April	23	35	26	32
May - June	2	6	19	6
July - Aug.	10	3	1	4
Sept. - Oct.	12	7	0	8
Nov. - Dec.	20	15	0	15
Total	100	100	100	100

TABLE 38. ESTIMATED PERCENTAGE OF SPECIFIED CLASS OF HOGS AND PIGS, PURCHASED BY IOWA FARMERS, BY INTENDED USE, 1954.[a]

Livestock class	Intended use after purchase	
	Feeder	Herd
Barrows and gilts	3.3	0.0
Sows	0.1	25.0
Boars and stags	0.1	19.1
Pigs	96.5	7.3
Gilts	0.0	48.6
All classes	100.0	100.0

[a] These percentages may be converted into absolute values using the data in table 6.

also were included (table 38). The breeding stock purchased consisted of mostly gilts (i.e., female hogs 3 months or older that had not farrowed prior to the time of purchase) and sows.

FEEDER HOGS AND PIGS

Farmers, local dealers and auctions were the principal market sources for feeder hogs and pigs. Purchases from other farmers and local dealers,

respectively, accounted for 39 percent and 36 percent of total purchases, while 25 percent of the total was purchased through auctions. (Since the patterns of market selection for barrows, gilts and pigs were practically the same, the detailed data are not presented in a separate table.)

Purchases of feeder hogs and pigs in 1954 were concentrated in the fall and winter months (table 39). This purchase pattern differed somewhat from the hog sales patterns cited earlier. Again, the level of hog inventories on farms influenced the timing of feeder purchases during 1954, particularly with reference to the individual market sources.

BREEDING HOGS AND PIGS

Occurrence of specialization again was evident among market sources in farmers' purchases of hogs and pigs intended for breeding. Other farmers were major market sources of gilts, sows and boars, while purchases of gilts through auctions and pigs through local dealers and auctions also were quite large (table 40). These data suggest differences in the procurement channels for the

several market classes of breeding stock based largely on the age of the stock purchased.

A general increase in the size of swine enterprises occurred during the 2 years prior to the 1955-56 peak in hog marketings. Hence, the somewhat higher rate of purchases during the latter part of 1954 would have followed the rise in hog prices and the related shift in breeding intentions (table 41). Also, the major share of the purchases from local dealers and auctions occurred 1 or 2 months earlier than the purchases from other farmers.

CHANGES IN MARKET CHOICES, 1940-54

Iowa livestock producers were involved in several marked shifts in the pattern of market selection for hogs and pigs. Sales of hogs through packer buyers or directly to packing plants more than doubled during the 1940-54 period (table 42). Moreover, purchases of feeder pigs and breeding stock through local dealers quadrupled during this period. Both sales and purchases through auctions also increased sharply. Practically all of these increases were related to the secular or cyclical increases in sales and purchases of hogs and pigs. However, some reallocation of market shares occurred among the several market outlets and sources.

Changes in market shares (as a percentage of total hog sales or purchases of Iowa producers) were obtained largely at the expense of sales and purchases through terminal markets or directly to other farmers. Though local dealers lost several percentage points in their share of all hogs sold by Iowa producers, a much larger relative increase occurred in their sales to Iowa producers. Local dealers enjoyed considerable flexibility in their procurement activities; hence, these dealers were able to obtain large numbers of feeder pigs from supply sources in nearby states for sale to Iowa producers. Auction markets offered the facilities for transactions in small lots where a considerable number of buyers would contribute to an active market. Thus, auctions handled the livestock classes generally sold or bought in small lots.

DISTANCE TO MARKET AND LOT SIZE

Market choices of Iowa livestock producers are related to the characteristics of livestock bought

TABLE 39. ESTIMATED PERCENTAGE OF FEEDER HOGS AND PIGS PURCHASED BY IOWA FARMERS IN SPECIFIED MONTHS, BY MARKET, 1954.

Bimonthly period	Local dealers	Auctions	Farmers	All markets
Jan. - Feb.	15	15	20	17
March - April	13	7	22	15
May - June	7	17	13	12
July - Aug.	10	11	7	9
Sept. - Oct.	32	23	7	20
Nov. - Dec.	23	27	31	27
Total	100	100	100	100

TABLE 40. ESTIMATED PERCENTAGE OF HERD HOGS AND PIGS PURCHASED BY IOWA FARMERS THROUGH SPECIFIED MARKETS. BY LIVESTOCK CLASS, 1954.

Market	Sows	Boars and stags	Pigs	Gilts	All classes
Local dealers	6.3	0.8	35.1	0.5	30.6
Auctions	17.2	16.2	24.3	44.0	25.6
Farmers	73.7	76.1	38.6	51.2	41.4
Other	2.8	6.9	2.0	4.3	2.4
All markets	100.0	100.0	100.0	100.0	100.0

TABLE 41. ESTIMATED PERCENTAGE OF BREEDING HOGS AND PIGS PURCHASED BY IOWA FARMERS IN SPECIFIED MONTHS. BY MARKET. 1954.

Bimonthly period	Local dealers	Auctions	Farmers	Other	All markets
Jan. - Feb.	1	12	19	39	18
March - April	3	15	22	8	18
May - June	25	10	9	6	10
July - Aug.	0	9	5	0	6
Sept. - Oct.	66	46	10	42	24
Nov. - Dec.	5	8	35	5	24
Total	100	100	100	100	100

TABLE 42. ESTIMATED TOTAL SALES AND PURCHASES OF HOGS AND PIGS THROUGH SPECIFIED MARKETS, BY LIVESTOCK CLASS, IOWA, 1940 AND 1954.[a]

Market	Sales								Purchases					
	Slaughter		Feeder		Herd		Total		Feeder		Herd		Total	
	1940	1954	1940	1954	1940	1954	1940	1954	1940	1954	1940	1954	1940	1954
	(1,000 head)													
Terminal public markets	2,327	2,206	234	8	31	0	2,592	2,214	93	0	4	0	97	0
Packing plants	3,721	8,794	311	0	88	0	4,120	8,794	0	11	0	0	0	11
Local dealers	2,811	3,922	232	68	100	8	3,143	3,998	248	962	18	146	266	1,108
Concentration yards	1,774	0[b]	205	0[b]	20	0[b]	1,999	0[b]	14	0[b]	0	0[b]	14	0[b]
Auctions	150	168	222	534	73	80	445	782	455	666	59	122	514	788
Local cooperatives	691	199	83	0	10	0	784	199	13	43	1	0	14	43
Farmers and others	46	31	243	495	408	340	697	866	935	1,036	131	209	1,066	1,245
All markets	11,520	15,320	1,530	1,105	730	428	13,780	16,853	1,758	2,718	213	477	1,971	3,195

[a] Based on 1940 data reported in S. D. Agr. Exp. Sta. Bul. 365 and on 1954 data obtained from the Livestock Marketing Survey cited earlier in this report. Estimated sales or purchases through unspecified markets are distributed proportionately among the specified markets; and, hence, these totals differ from those in table 7.

[b] Farm survey data for 1940 show that about two-thirds of the concentration yards in the Corn Belt were owned by local dealers, while packing plants owned a third of the yards. The 1954 survey data do not include this additional market characteristic. Hence, differences in sales and purchases through packing plants and local dealers for the 2 years are partly due to this difference in classification.

and sold, such as the number of head per lot or the average weight per head. Distance to market outlet or market source, however, relates to market organization and the services available for buying and selling different market classes of livestock. Hence, the survey findings on market selection are examined in terms of (1) the average distance to various markets used by Iowa producers and (2) the average size of sales or purchase lot for specified markets and livestock classes.

LIVESTOCK SALES

Each of the major classes of markets may be characterized by the degree of concentration of its clientele at varying distances from the market. A large sales volume at any market involves an extensive supply area or an intensive coverage in the limited geographical area. The total number of livestock and the total number of markets, however, are the major external restrictions on the business volume of individual markets. The entry of new firms and the liquidation of old firms affect the size distribution of businesses in a specific market group and, hence, the degree and nature of competition within each market group. Thus, the economics of lot size and distance to market only partially explain the Iowa livestock marketing patterns.

Substantial differences occur in lot size and distance to market among the major market classes of livestock. These differences are attributed to the pattern of livestock enterprises in Iowa. Sales patterns for cattle and calves, therefore, are examined first with reference to the selected sales characteristics—lot size, average weight and distance to market—reported for each sales lot.[10]

CATTLE AND CALVES

Lot size. Sales of cattle and calves varied greatly in lot size depending upon the market class and market outlet. Both slaughter and feeder sales averaged about 5 head per lot, but substantial differences occurred among specific market classes of livestock. Slaughter steers and heifers generally were sold in lots of 10 head or more, except for sales through auctions (table 43). Slaughter cows, bulls and calves were sold in much smaller lots—only 1 or 2 head at a time. Thus, the distribution of sales according to livestock class affected the average lot size for any market, but particularly for local dealers and auction markets (which handled a relatively large proportion of the livestock classes sold in small lots).

Most sales through packer buyers, including sales at packing plants, and terminal markets were in lots of 20 head or more (table 44). Though a substantial number of sales through local deal-

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[10] A sales lot generally was equivalent to one transaction or sale, but when more than one species or one market class of livestock was involved in each transaction, the number of lots exceeded the number of transactions or sales. Only one livestock class was included, therefore, in a sales or purchase lot.

ers were in large lots, 50 percent of these sales were in lots of less than 10 head. These percentage differences resulted partly from differences in the percentage distribution of livestock classes sold through these markets (as shown in the tabular material cited earlier).

Feeder cattle and calves were sold in lots of size comparable to slaughter cattle and calves (table 45). A considerable number of cull breeding stock was intended for slaughter, however, which contributed to the variability in the lot size distribution for slaughter cattle. Feeder cattle sales were confined entirely to steers and heifers, and these occurred in sales lots of above-average size. Feeder calves, like vealer calves intended for slaughter, were handled in relatively small lots.

The distribution of feeder sales according to lot size in table 46 again illustrates the effect of livestock class on the average size of sales lot reported for each market outlet. Because substantial numbers of calves, steers and heifers were sold directly to other farmers for feeding purposes, the average number of head per sales lot ranged from 1 to 50 and over, which corresponded with the expected distribution of lot sizes for the specified livestock classes.

Sales of cattle and calves intended for breeding

TABLE 43. ESTIMATED NUMBER OF HEAD PER LOT OF SPECIFIED CLASSES OF SLAUGHTER CATTLE AND CALVES SOLD BY IOWA FARMERS, BY MARKET, 1954.

Animal class	Terminal public markets	Packing plants	Packer buyers	Local dealers	Auctions	All markets
Steers	12	16	12	11	3	10
Heifers	9	6	12	6	2	6
Mixed steers and heifers	10	16	28	18	4	8
Cows	2	2	1	1	1	1
Bulls	1	1	1	1	1	1
Calves	1	2	a	1	1	1
Vealers	1	1	2	2	2	2
All classes	8	7	6	4	2	5

a Few or no sales.

TABLE 44. ESTIMATED PERCENTAGE OF SLAUGHTER CATTLE AND CALVES OF SPECIFIED LOT SIZE SOLD BY IOWA FARMERS, BY MARKET, 1954.

Number of head per lot	Terminal public markets	Packing plants[a]	Local dealers	Auctions	All markets
1 to 3	9	14	28	62	20
4 to 9	14	11	22	21	15
10 to 19	20	10	11	11	16
20 to 49	49	42	30	6	39
50 and over	8	23	9	0	10
Total	100	100	100	100	100

a Including sales through packer buyers.

TABLE 45. ESTIMATED NUMBER OF HEAD PER LOT OF FEEDER CATTLE AND CALVES SOLD BY IOWA FARMERS, BY MARKET, 1954.

Livestock class	Terminal public markets	Local dealers	Auctions	Farmers	All markets
Steers	12	7	4	7	6
Heifers	3	6	2	4	3
Mixed steers and heifers	13	6	6	17	8
Calves	1	1	3	3	3
All classes	10	6	4	6	5

TABLE 46. ESTIMATED PERCENTAGE OF FEEDER CATTLE AND CALVES OF SPECIFIED LOT SIZE SOLD BY IOWA FARMERS, BY MARKET, 1954.

Number of head per lot	Terminal public markets	Local dealers	Auctions	Farmers	All markets
1 to 3	3	14	23	15	17
4 to 9	14	76	41	20	34
10 to 19	19	0	31	35	28
20 to 49	64	10	5	15	17
50 and over	0	0	0	15	4
Total	100	100	100	100	100

or herd use comprised, on the average, about 3 head per lot. All reported sales in the 1954 survey occurred in lots of less than 20 head (table 47). All sales through local dealers, moreover, were in lots of less than 10 head.

Average weight. Considerable data were collected on the weight of each animal sold during each 3-month reporting period. Memory bias in reporting was small because of the short interval between surveys.

Average weight differences among the specified market classes of cattle and calves represented largely differences in grade and degree of finish. The heavier steers and heifers, for example, typically brought the higher prices. Each livestock class, however, presented a different weight-price relationship.

The average weight per head of slaughter cattle and calves sold in 1954 through the major market outlets for the specified livestock classes is shown in table 48. Generally, the lighter animals in each livestock class were sold through auctions or local dealers.

Feeder cattle sold by Iowa farmers in 1954 weighed 270 to 347 pounds less, on the average, than the corresponding market classes of slaughter cattle (table 49). Both feeder and slaughter calves, however, were almost the same average weight at the time of sale.

Cattle and calves intended for breeding or herd use were sold almost entirely—94.4 percent—to other farmers and through auctions. The average weight per head of each of the livestock classes sold in 1954 was essentially the same for the two major market outlets, as shown in table 50.

Distance to market. Data on the average weight per head and the average number of head per lot logically precede a discussion of factors affecting the distance to market. Large scale operations and large sales lots go together. Furthermore, large lots and greater value per pound (as indicated by heavier marketing weights) enhance the importance of selecting the most favorable market outlet. Distance to market, though an important consideration when only 1 or 2 head of cull breeding stock are sold or when prices and grades are quite readily determined, is a less critical factor in the sale of large lots of high-quality cattle. Considerable pricing uncertainty exists in the latter situation, which overshadows the additional transportation and other marketing costs associated with sales through the more distant markets. The more distant markets, moreover, generally deal with a larger number of patrons, and these markets also tend to be fewer in total number because of the facilities, degree of specialization and other scarce inputs required to provide the necessary marketing services.

Slaughter cattle and calves sold through auctions and local dealers in 1954 were hauled an average distance of 14 miles or less, while sales through terminal markets involved an average distance of haul of 110 miles (table 51).

The percentage of total sales of slaughter cattle

TABLE 47. ESTIMATED PERCENTAGE OF HERD CATTLE AND CALVES OF SPECIFIED LOT SIZE SOLD BY IOWA FARMERS, BY MARKET, 1954.

Number of head per lot	Local dealers	Auctions	Farmers	All markets
1 to 3	38	65	46	46
4 to 9	62	20	32	32
10 to 19	0	15	22	22
Total	100	100	100	100

TABLE 48. ESTIMATED AVERAGE WEIGHT IN POUNDS PER HEAD OF SLAUGHTER CATTLE AND CALVES SOLD BY IOWA FARMERS, BY MARKET, 1954.

Livestock class	Terminal public markets	Packing plants	Packer buyers	Local dealers	Auctions	All markets
Steers	1,057	1,039	1,055	991	803	1,031
Heifers	876	861	850	705	645	841
Mixed steers and heifers	900	904	962	881	682	846
Cows	1,079	1,099	1,107	982	1,002	1,041
Bulls	1,189	1,471	975	1,476	656	920
Calves	449	301	a	330	341	341
Vealers	218	171	172	153	172	171
All classes	1,007	982	973	803	622	925

a Few or no sales.

TABLE 49. ESTIMATED AVERAGE WEIGHT IN POUNDS PER HEAD OF FEEDER CATTLE AND CALVES SOLD BY IOWA FARMERS, BY MARKET, 1954.

Livestock class	Terminal public markets	Local dealers	Auctions	Farmers	All markets
Steers	777	668	637	727	684
Heifers	632	600	557	504	540
Mixed steers and heifers	746	530	507	532	576
Calves	314	330	392	221	346
All classes	760	627	537	561	585

TABLE 50. ESTIMATED AVERAGE WEIGHT IN POUNDS PER HEAD OF HERD CATTLE AND CALVES SOLD BY IOWA FARMERS, BY MARKET, 1954.

Livestock class	Auctions	Farmers	Total
Heifers	443	579	543
Bulls	998	948	937
Cows	928	963	963
Calves	192	304	257
Total	792	769	780

TABLE 51. ESTIMATED DISTANCE IN MILES SPECIFIED CLASSES OF SLAUGHTER CATTLE AND CALVES SOLD BY IOWA FARMERS WERE HAULED TO MARKET, BY MARKET, 1954.

Livestock class	Terminal public markets	Packing plants	Packer buyers	Local dealers	Auctions	All markets
Steers	119	48	35	12	13	75
Heifers	105	43	20	18	12	59
Mixed steers and heifers	87	50	19	5	14	41
Cows	101	32	29	6	12	39
Bulls	102	23	12	a	16	53
Calves	48	24	a	3	18	19
Vealers	a	17	20	15	12	16
All classes	110	38	35	14	12	48

a Few or no sales.

TABLE 52. ESTIMATED PERCENTAGE OF SLAUGHTER CATTLE AND CALVES SOLD BY IOWA FARMERS AND HAULED A SPECIFIED DISTANCE, BY MARKET, 1954.

Distance in miles	Terminal public markets	Packing plants a	Local dealers	Auctions	All markets
Under 10	0	7	50	37	10
10 to 24	1	33	35	53	19
25 to 49	18	19	13	10	17
50 to 99	42	27	0	0	29
100 and over	39	14	2	0	25
Total	100	100	100	100	100

a Including sales through packer buyers.

TABLE 53. ESTIMATED DISTANCE IN MILES SPECIFIED CLASSES OF FEEDER CATTLE AND CALVES SOLD BY IOWA FARMERS WERE HAULED TO MARKET, BY MARKET, 1954.

Livestock class	Terminal public markets	Local dealers	Auctions	All markets
Steers	84	24	15	22
Heifers	109	4	14	19
Mixed steers and heifers	81	6	25	35
Calves	68	3	15	15
All classes	87	16	17	23

and calves by specified mileage blocks is shown for each market outlet in table 52. Practically all sales of Iowa producers through local dealers and auctions originated within a 50-mile radius of the market. Only 19 percent of the animals sold through terminal markets originated within the same 50-mile radius.

The somewhat greater "drawing power" of auction markets in the sale of feeder cattle and calves is suggested by the data in table 53 on average distance of haul. The local feeder supply area of auctions appears larger partly at the expense of feeder sales through terminal markets.

The distribution of feeder sales between terminal markets and auctions is related to distance of haul from farm to market, as shown in table 54. Local dealers travel over a considerable area to solicit business; hence, some feeder sales can be expected through dealers whose places of business are 50 to 99 miles from the producer.

Cattle and calves intended for breeding or herd use were hauled an average distance of only 11 miles in 1954. Distance data on sales directly to other farmers (which accounted for 68.5 percent of total herd sales) were not available; hence, no tabular material is presented on sales through this outlet of cattle and calves intended for breeding or herd use. Sales through auctions made up 25.9 percent of total sales, but the average hauling distance on these sales ranged only from 13 to 18 miles with an average distance of 15 miles.

Since distance entails costs, the more distant markets must offer certain additional services to compensate for the added costs and inconvenience of transportation. Livestock producers react to the availability of specialized cattle marketing services at the markets with the extended supply areas with sales consequences depicted in fig. 2. Sales of all cattle and calves through terminal markets, for example, exceeded in number the total sales through any other market despite the greater distance to these terminal markets. (The percentage of all cattle and calves sold through each market outlet and the average distance of haul are shown by the broken lines in fig. 2. The solid lines are used to show the percentage of total sales in each specified mileage block with reference to hauling distance.)

Terminal markets, packing plants, packer buyers, dealers and auctions each, in that order, were progressively closer, on the average, to the Iowa farm which sold slaughter cattle and calves. Shipments to terminal markets generally exceeded 50 miles in length of haul. The Sioux City, Omaha and Chicago terminal markets accounted for most of the terminal market sales of Iowa producers. On the other hand, about 170 auctions were located in Iowa and were available to Iowa producers. The livestock auctions used in marketing Iowa cattle and calves were located within 20 miles of any livestock producer. Thus, the average distance of haul to auctions was considerably less than to terminal markets.

HOGS AND PIGS

Lot size. Sales of hogs and pigs occurred in substantially larger lots than the sales of cattle and calves, though on a total market value basis the two sets of lots were not comparable. For example, the average lot size of slaughter hogs was 14 head in comparison with an average of 5 head per lot of slaughter cattle and calves. (Even if both hogs and cattle were valued at $20.00 a hundredweight, the lot of hogs would sell for only

TABLE 54. ESTIMATED PERCENTAGE OF FEEDER CATTLE AND CALVES SOLD BY IOWA FARMERS AND HAULED A SPECIFIED DISTANCE, BY MARKET, 1954.

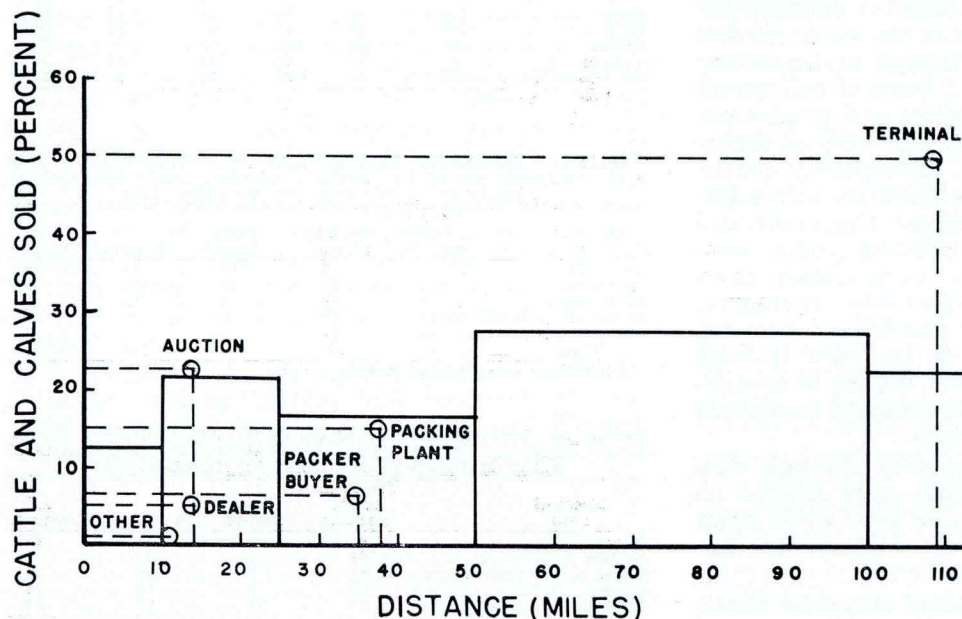| Distance in miles	Terminal public markets	Local dealers	Auctions	All markets
Under 10	0	42	37	32
10 to 24	0	26	51	36
25 to 49	7	10	12	11
50 to 99	63	22	0	15
100 and over	30	0	0	6
Totals	100	100	100	100

Fig. 2. Relationship of distance hauled to market and proportion of all cattle and calves sold through specified market outlets, Iowa, 1954.

$692, while the cattle would sell for $925.) Again, breeding stock sold for slaughter went to market in smaller lots than the barrows and gilts, as shown in table 55. Except for sales through terminal markets and directly to packing plants, the average size of lot for a specified livestock class showed no significant differences among the major market outlets.

The 20-to-49-head lot of slaughter hogs was the modal size for each of the major market outlets (table 56). The lot-size distribution for auctions, however, was bimodal—a result of the widespread use of auctions in the sale of barrows and gilts as well as cull breeding stock.

A marked difference occurred in the average lot size of feeder sales when compared with sales of hogs intended for breeding or herd use (table 57). The size of the former was over ninefold the size of the latter and over fivefold the average size of a lot of sows and gilts sold for breeding. These differences in sales patterns occurred for each of the major market outlets.

Typically, feeder pigs were sold in lots of 50 head or more (table 58). Local dealers, however, usually handled lots of 20 to 49 head, but these sales amounted to only 6.2 percent of the total feeder sales.

The lot-size distribution of sales intended for breeding or herd use varied among the three outlets cited earlier, as shown in table 59, but again the sales through local dealers were quite small— 1.8 percent of the total sales of this livestock class. Many sales comprised only 1 animal, while lots of 4 or 5 head also were quite numerous. A more detailed breakdown of lot size would show a multimodal distribution of sales corresponding with the distribution of the livestock classes—sows, gilts, boars and stags.

Average weight. Hogs sold for slaughter were not differentiated according to any estimated grade or quality. Moreover, heavier weights among hogs failed to correspond with more desirable meat quality as in the sale of slaughter cattle.

Generally, the market classes of slaughter hogs in 1954 corresponded with quality differentials on a rather rough basis. Large differences in average weight per head also were apparent among the specified market classes, as illustrated in table 60. No significant average weight differences for a specified market class were indicated, however, among the major market outlets for slaughter hogs. (The large differences among markets handling boars and stags are based on a very few observations, and, hence, are subject to considerable sampling error.)

Sales of hogs and pigs intended for feeding or breeding showed considerable variability in average weight per head among the three major market outlets (table 61). The degree of over-all weight variability was attributed largely to the auctions, which generally handled the animals of heavier weight.

Distance to market. Most hogs and pigs were sold locally or through nearby terminal markets.

TABLE 55. ESTIMATED NUMBER OF HEAD PER LOT OF SLAUGHTER HOGS SOLD BY IOWA FARMERS, BY MARKET, 1954.

Livestock class	Terminal public markets	Packing plants	Packer buyers	Local dealers	Auctions	All markets
Barrows and gilts	22	21	18	17	17	18
Sows	8	6	4	5	7	5
Boars	1	1	1	1	1	1
Stags	1	1	4	1	a	3
All classes	16	16	14	13	7	14

a Few or no sales.

TABLE 56. ESTIMATED PERCENTAGE OF SLAUGHTER HOGS OF SPECIFIED LOT SIZE SOLD BY IOWA FARMERS, BY LIVE-STOCK CLASS, 1954.

Number of head per lot	Terminal public markets	Packing plants [a]	Local dealers	Auctions	All markets
1 to 3	2	3	4	12	4
4 to 9	18	15	18	39	16
10 to 19	14	18	19	2	17
20 to 49	46	43	43	41	44
50 and over	20	21	16	6	19
Total	100	100	100	100	100

a Including sales through packer buyers.

TABLE 57. ESTIMATED NUMBER OF HEAD PER LOT OF FEEDER AND HERD HOGS AND PIGS SOLD BY IOWA FARMERS, BY MARKET, 1954.

Livestock class	Local dealers	Auctions	Farmers	All markets
Feeder pigs	45	32	42	37
Herd or breeding:				
Sows and gilts	5	6	7	7
Boars	1	1	1	1
Average	4	3	4	4

TABLE 58. ESTIMATED PERCENTAGE OF FEEDER HOGS AND PIGS OF SPECIFIED LOT SIZE SOLD BY IOWA FARMERS, BY MARKET, 1954.

Number of head per lot	Local dealers	Auctions	Farmers	All markets
1 to 3	0	0 [a]	1	1
4 to 9	0	5	7	5
10 to 19	2	7	8	8
20 to 49	57	21	21	23
50 and over	41	67	63	63
Total	100	100	100	100

a Less than 0.5 percent of total sales.

TABLE 59. ESTIMATED PERCENTAGE OF HERD HOGS OF SPECIFIED LOT SIZE SOLD BY IOWA FARMERS, BY MARKET, 1954.

Number of head per lot	Local dealers	Auctions	Farmers	All markets
1 to 3	8	24	25	25
4 to 9	92	46	31	34
10 to 19	0	30	44	41
Total	100	100	100	100

TABLE 60. ESTIMATED AVERAGE WEIGHT IN POUNDS PER HEAD OF SLAUGHTER HOGS SOLD BY IOWA FARMERS, BY MARKET, 1954.

Livestock class	Terminal public markets	Packing plants	Packer buyers	Local dealers	Auctions	All markets
Barrows and gilts	233	232	229	231	240	231
Sows	371	388	369	362	372	371
Boars	474	413	474	458	475	466
Stags	470	527	270	539	a	316
All classes	255	247	244	249	271	247

a Few or no sales.

TABLE 61. ESTIMATED AVERAGE WEIGHT IN POUNDS PER HEAD OF SPECIFIED CLASSES OF FEEDER AND HERD HOGS AND PIGS SOLD BY IOWA FARMERS, BY MARKET, 1954.

Livestock class	Local dealers	Auctions	Farmers	All markets
Feeder pigs	61	103	79	89
Breeding or herd use:				
Sows and gilts [a]	208	278	314	302
Boars	320	369	277	294
Average	214	295	247	256

a Excluding pigs and gilts 3 to 6 months of age.

Distance to market presented a distinguishing characteristic for the two major species. On the average, cattle and calves were hauled two to three times as far to market as were hogs and pigs. Producers faced less price variability in the sale of hogs than in the sale of cattle; hence, producers were willing to incur somewhat less loca-

TABLE 62. ESTIMATED DISTANCE IN MILES SPECIFIED CLASSES OF SLAUGHTER HOGS SOLD BY IOWA FARMERS WERE HAULED TO MARKET, BY MARKET, 1954.

Livestock class	Terminal public markets	Packing plants	Packer buyers	Local dealers	Auctions	All markets
Barrows and gilts	62	24	9	10	7	18
Sows	64	21	9	9	10	17
Boars	69	27	10	6	14	19
Stags	82	16	11	7	a	34
All classes	64	23	9	9	11	18

a Few or no sales.

TABLE 63. ESTIMATED PERCENTAGE OF SLAUGHTER HOGS SOLD BY IOWA FARMERS AND HAULED A SPECIFIED DISTANCE, BY MARKET, 1954.

Distance in miles	Terminal public markets	Packing plants a	Local dealers	Auctions	All markets
Under 10	0b	59	79	58	56
10 to 24	3	28	18	36	22
25 to 49	30	10	1	6	10
50 to 99	56	3	1	0	10
100 and over	11	0b	1	0	2
Total	100	100	100	100	100

a Including sales through packer buyers.
b Less than 0.5 percent of total sales.

TABLE 64. ESTIMATED PERCENTAGE OF FEEDER HOGS AND PIGS SOLD BY IOWA FARMERS AND HAULED A SPECIFIED DISTANCE, BY MARKET, 1954.

Distance in miles	Local dealers	Auctions	Farmers	All markets
Under 10	2	35	100	36
10 to 24	58	54	0	50
25 to 49	41	1	0	5
50 to 99	0	10	0	9
Total	100	100	100	100

TABLE 65. ESTIMATED PERCENTAGE OF HERD HOGS SOLD BY IOWA FARMERS AND HAULED A SPECIFIED DISTANCE, BY MARKET, 1954.

Distance in miles	Local dealers	Auctions	Farmers	All markets
Under 10	100	28	46	43
10 to 24	0	69	54	55
25 to 49	0	2	0	2
50 to 99	0	1	0	0a
Total	100	100	100	100

a Less than 0.5 percent of total sales.

tional inconvenience and costs in the sale of hogs. Nevertheless, slaughter hogs sold through terminal markets were hauled an average distance of 64 miles—or somewhat more than half the distance for slaughter cattle (table 62). Moreover, these distance relationships by species were about the same for each country market, except in the case of sales through packer buyers. The average data in effect reveal a greater concentration of packer buying of slaughter hogs than of slaughter cattle.

The skewness of the distribution of sales according to distance of haul is revealed in table 63. Except for sales through terminal markets, practically all slaughter hogs were sold through markets located within 50 miles of each producer. Moreover, the modal mileage group for the latter markets was "under 10" miles, or about a tenth of the average hauling distance of sales in the modal mileage group for the terminal markets.

Feeder pigs were hauled an average distance of 15 miles. Breeding stock were hauled an average distance of 17 miles.

Sales of hogs and pigs for feeding and breeding involved a typical hauling distance of 10 to 24 miles. Feeder pigs sold to other farmers were hauled less than 10 miles, while 10 percent of the feeder sales through auctions involved a hauling distance of 50 to 99 miles (table 64).

Hogs and pigs sold for breeding and herd use were seldom hauled more than 25 miles to their market outlet (table 65). Because of the few reports of sales to local dealers, however, the mileage distribution of sales through this market outlet may not accurately represent the actual sales pattern.

Selection of a market outlet for hogs presumably involves a different set of market considerations than market selection for cattle in view of the reversal of the distance-sales relationship (fig. 3). Distance to market affects the producer's choice of market because hauling distance is related to net price and because the nearby markets are more convenient than the more distant markets. Transportation charges and losses from shrinkage, for example, must be deducted from the gross market price to obtain the equivalent farm, or net, price. Apparently as a result of these considerations, Iowa producers sold over half
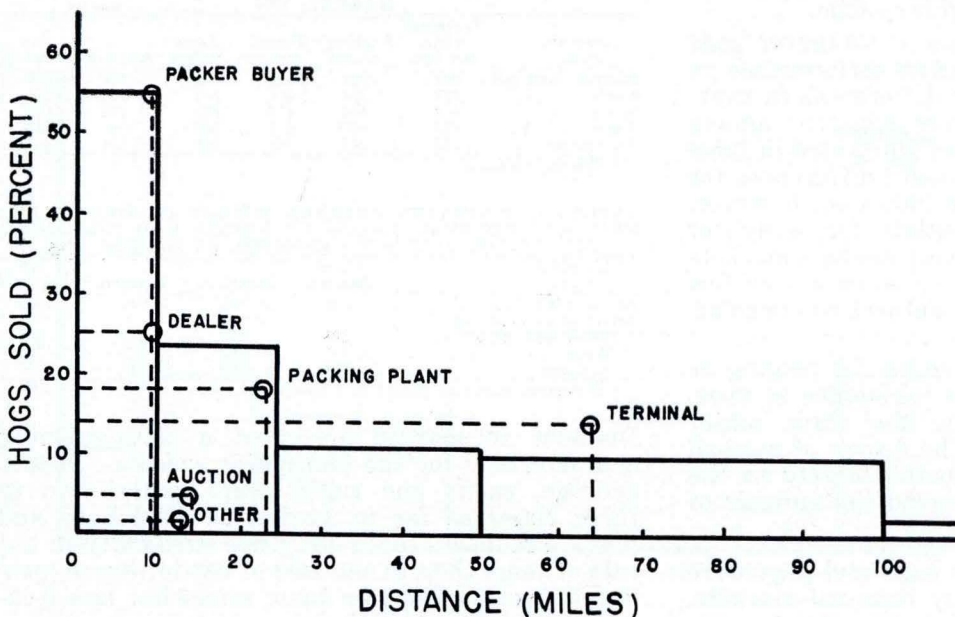

Fig. 3. Relationship of distance hauled to market and proportion of all hogs sold through specified market outlets, Iowa, 1954.

of their hogs and pigs through the nearby country markets, which involved a hauling distance of less than 10 miles (as illustrated by the modal sales-mileage block in fig. 3).

LIVESTOCK PURCHASES

The reported data on livestock purchases of Iowa producers comprise two items of information: average number of head per lot and average distance of haul from the market source. These items are discussed with reference to the livestock purchased for feeding and for breeding or herd use.

CATTLE AND CALVES

Lot size. Feeder cattle and calves were purchased typically in lots of 20 to 49 head (table 66). Thus, the average lot size of feeder purchases was nearly three times the average lot size of feeder sales. Market differences also occurred in the lot-size distributions of purchases and sales, particularly through local dealers and auctions. Livestock producers buying through local dealers and auction markets came from a much greater distance, on the average, than the producers selling through these markets, as illustrated in tables 66 and 46, respectively.

Cattle and calves purchased for breeding and herd use were in somewhat smaller lots than sales of the comparable market class, as shown by a comparison of the data in tables 67 and 47. For example, only 9 percent of the purchases through

livestock auctions were in lots of 4 head or more, while 35 percent of the sales through auctions were in lots of 4 head or more. Purchases of cattle and calves intended for breeding or herd use, however, were substantially smaller in total number than sales—171,800 head as compared with 326,000 head. Data for another period in the cattle cycle may reveal a larger number of purchases than sales and, hence, a somewhat different set of lot-size distributions by market source and market outlet. Again, an evaluation of the 1954 market patterns of Iowa producers must be related to historical conditions, such as the relative level of farm inventories of cattle (illustrated in fig. 1).

Distance to market. Most feeder cattle and calves bought by Iowa producers in 1954 originated from farms and ranches outside Iowa. Hence, the market source usually was more than 100 miles from the producer's farm (table 68). Actually, purchases according to distance of haul were represented by a bimodal distribution. Purchases through local dealers and auctions involved a relatively short hauling distance, while purchases directly from other farmers or ranchers generally involved much greater distances of haul.

A bimodal distribution of purchases according to hauling distance was apparent, also, for purchases of cattle and calves intended for breeding or herd use (table 69). Though the total purchases of breeding stock by Iowa producers were less than their sales, and though the average lot size was smaller, the average distance of haul was substantially greater, largely because of purchases

TABLE 66. ESTIMATED PERCENTAGE OF FEEDER CATTLE AND CALVES IN SPECIFIED LOT SIZE PURCHASED BY IOWA FARMERS, BY MARKET, 1954.

Number of head per lot	Terminal public markets	Local dealers	Auctions	Local cooperatives	Farmers	All markets
1 to 3	0	1	8	0	7	5
4 to 9	2	4	11	0	8	7
10 to 19	3	12	20	0	15	15
20 to 49	79	50	36	80	42	48
50 and over	16	33	25	20	28	25
Total	100	100	100	100	100	100

TABLE 67. ESTIMATED PERCENTAGE OF HERD CATTLE AND CALVES IN SPECIFIED LOT SIZE PURCHASED BY IOWA FARMERS, BY MARKET, 1954.

Number of head per lot	Terminal public markets	Local dealers	Auctions	Farmers	Other	All markets
1 to 3	5	45	91	88	68	83
4 to 9	39	30	9	0	17	8
10 to 19	0	25	0	12	15	7
20 to 49	56	0	0	0	0	2
Total	100	100	100	100	100	100

TABLE 68. ESTIMATED PERCENTAGE OF FEEDER CATTLE AND CALVES PURCHASED BY IOWA FARMERS AND HAULED A SPECIFIED DISTANCE, BY MARKET, 1954.

Distance in miles	Terminal public markets	Local dealers	Auctions	Local cooperatives	Farmers	All markets
Under 10	0	40	27	35	18	23
10 to 24	0	8	33	0	1	19
25 to 49	18	15	13	20	11	16
50 to 99	51	1	9	0	0	14
100 and over	31	36	18	45	70	28
Total	100	100	100	100	100	100

TABLE 69. ESTIMATED PERCENTAGE OF HERD CATTLE AND CALVES PURCHASED BY IOWA FARMERS AND HAULED A SPECIFIED DISTANCE, BY LIVESTOCK MARKET, 1954.

Distance in miles	Terminal public markets	Local dealers	Auctions	Farmers	Other	Total
Under 10	0	41	26	19	35	23
10 to 24	0	9	34	2	5	20
25 to 49	18	15	14	11	19	15
50 to 99	50	1	9	0	4	15
100 and over	32	34	17	68	37	27
Total	100	100	100	100	100	100

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TABLE 70. ESTIMATED PERCENTAGE OF FEEDER PIGS IN SPECIFIED LOT SIZE PURCHASED BY IOWA FARMERS, BY MARKET, 1954.

Number of head per lot	Local dealers	Auctions	Local cooperatives	Farmers	All markets
4 to 9	1	5	0	2	2
10 to 19	3	13	100	10	9
20 to 49	10	38	0	24	22
50 and over	86	44	0	64	67
Total	100	100	100	100	100

TABLE 71. ESTIMATED PERCENTAGE OF HOGS AND PIGS IN SPECIFIED LOT SIZE PURCHASED FOR BREEDING, BY MARKET, IOWA, 1954.

Number of head per lot	Local dealers	Auctions	Farmers	All markets
1 to 3	14	4	6	7
4 to 9	12	19	12	16
10 to 19	74	77	82	77
Total	100	100	100	100

TABLE 72. ESTIMATED PERCENTAGE OF FEEDER HOGS AND PIGS PURCHASED BY IOWA FARMERS AND HAULED A SPECIFIED DISTANCE, BY MARKET, 1954.

Distance in miles	Local dealers	Auctions	Local cooperatives	Farmers	All markets
Under 10	19	24	0	15	21
10 to 24	19	44	0	5	26
25 to 49	29	16	100	0	24
50 to 99	19	12	0	0	15
100 and over	14	4	0	80	14
Total	100	100	100	100	100

TABLE 73. ESTIMATED PERCENTAGE OF HOGS AND PIGS PURCHASED FOR BREEDING AND HAULED A SPECIFIED DISTANCE, BY MARKET, IOWA, 1954.

Distance in miles	Local dealers	Auctions	Farmers	All markets
Under 10	44	42	70	44
10 to 24	21	41	12	33
25 to 49	16	13	0	12
50 to 99	14	3	0	5
100 and over	5	1	18	6
Total	100	100	100	100

from market sources located 100 miles or more from the producer.

HOGS AND PIGS

Lot size. Feeder hogs and pigs often were purchased in lots of 50 head or more (table 70). Generally, auctions handled lots of smaller-than-average size, while local dealers handled lots of above-average size.

Hogs intended for breeding and herd use were purchased most frequently in lots of 10 to 19 head, as shown in table 71. The lot-size patterns were alike for each of the three market sources (through which practically all the hogs were purchased).

Distance to market. The percentage distributions of feeder purchases were quite comparable for hogs and cattle. As shown in table 72, feeder pigs were hauled a greater distance when purchased through local dealers than when purchased through auctions. Feeder purchases through other farmers, however, were represented by a bimodal distribution with a large majority of the purchases originating from a farm 100 miles or more from the purchaser.

Most hogs intended for breeding or herd use were purchased from market sources lying within a 25-mile radius of the purchaser (table 73). Again, the percentage distribution of purchases from other farmers was bimodal.

APPENDIX: SURVEY DESIGN

The farm survey upon which this report is based was completed over an 8-quarter period starting April, 1953. A panel of about 400 farmers was selected from a first-phase sample of 2,000 farms, or 1 percent of the farms located in Iowa. The preliminary sample of farmers was stratified according to the size of livestock enterprises, measured in terms of the number of animal units sold in a year. Farms with 1953 sales of less than 50 animal units were designated as class 1 farms, while farms with total sales of 50 to 124 units and 125 units or more were designated as class 2 and class 3 farms, respectively. The second-phase sample included approximately an equal number of each of the three farm classes which represented approximate sampling rates of 1/800, 1/400 and 1/100, respectively, for class 1, class 2 and class 3 farms.[11] In brief, the survey design used in the study may be generally described as a single-stage, two-phase, stratified random cluster sample design, with repeated visits to the selected units forming the sample.

THE DATA

Experience with similar surveys conducted earlier showed that satisfactory data could be obtained from farmers' responses to various types of questions. Many of these responses would be statements of certain things that the farmer had done and why he did what he did. Other replies would be opinions and attitudes related to livestock marketing. It was important in each case to obtain accurate responses applicable both to specific points in time and over longer periods. Since the validity of conclusions to be drawn from the survey would depend greatly on the accuracy of the responses, it was necessary to minimize memory bias. A panel of farmers was created, therefore, which was interviewed every 3 months.

The enumeration took place during the first 2 weeks of April, July and October of 1953 and of January 1954 for the first series of interviews. Each survey was designed to obtain information on the preceding 3 months. A yearly set of records was obtained from those farmers who cooperated during each of the first four series of interviews. The panel used in the second series of interviews consisted of half of the 1953 sample supplemented by an equal number of new farms. Enumeration for the second series was held during the first 2 weeks of April, June and October 1954 and of January 1955.

AREA OF INVESTIGATION

The state of Iowa constituted the area under investigation.[12] According to the United States Agricultural Census of 1950, this region contained 203,159 farms. Of these farms, 1,875 were rural place and urban farms.

All farms lying in Iowa were members of the universe and, hence, potential members of the sample. The census rules were applied to determine whether or not any particular enterprise constituted a farm. If an enterprise was under 3 acres in area, it must have sold a minimum of $150 worth of agricultural products in the previous year to be counted. If it was 3 acres or more in area, it must have produced at least $150 worth of products.

SAMPLE SIZE

Since most of the information desired from the panel of farmers related to livestock marketing, it appeared that the most generally useful sample design would be one which concentrated heavily on the farmers who produced the most livestock. A two-phase sample design was adopted since it is a relatively inexpensive scheme for detecting the large livestock producers.

If a sampling rate of 1/100 were applied to the 203,159 farms in the universe, a total of about 2,000 would be expected to come into the sample. This number was too large in view of the available funds. Nevertheless, it was possible to use this large sample to obtain some rough estimates of selected general characteristics of the universe.

The initial phase of the survey formed the phase 1 operation. Of these 2,000 farms, a selection of 400, or roughly one-fifth, was to be taken for the final panel of farms to be carried throughout the year. It appeared reasonably efficient to interview about three farms, on the average, in each location. Hence, an area segment of about 14 farms was considered suitable as a primary sampling unit size.

THE SAMPLE DESIGN

Data from the 1950 Census of Agriculture and the materials of the Master Sample of Agriculture[13] were used to form 49 strata of approximately equal size in terms of number of farms. These strata were formed as groups of whole counties or parts of counties containing approximately 4,200 farms each.

Phase 1 sample. The first-phase sampling procedure consisted of the random selection of three area segments averaging about 14 farms within each stratum. In practice, it was found that the segments ranged in area from 3 to 5 square miles. The actual number of farms found on the 147 sample segments in the April 1953 survey ranged from 4 to 26. The sampling rate on phase 1 was about 1 in 100.[14]

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[11] Personnel of Iowa State University Statistical Laboratory prepared the survey procedures and supervised the statistical work involved in the preparation of the tabular data reported in this study. Jack Graham, graduate assistant, Department of Statistics, prepared a draft of this appendix.

[12] A similar survey procedure also was carried out in northern Illinois, but the additional procedure is not reported since the Illinois estimates are not given in this report.

[13] For details concerning the Master Sample of Agriculture see King, A. J. and Jessen, R. J. The Master Sample of Agriculture (2 articles) Jour. Amer. Stat. Assn. 40:38-56. 1945.

[14] The sampling rate was $1,982/203,159 = 1/102.50$ in 1953 and $1,999/203,159 = 1/101.63$ in 1954, where 203,159 is the total number of farms in the sampling frame and 1,982 and 1,999 are the number expected in phase 1 in terms of the frame.

Using personal interviews, information was obtained in the phase 1 enumeration on the number of swine and cattle each farm was expecting to market during the calendar years 1953 and 1954. These data were converted into "animal units" (a.u.'s) by regarding a head of cattle as 1 unit and a pig as 1/3 unit. In 1954, data on acreage per farm were collected for each of the phase 1 farms.

Phase 2 sample. With the animal unit information available, each farm was put into one of the following classes:

Class 1. Those farms expecting to market less than 50 a.u.'s.

Class 2. Those farms expecting to market 50-124 a.u.'s.

Class 3. Those farms expecting to market 125 and over a.u.'s. Table A-1 shows the distribution into the three classes of the 1,907 phase 1 farms for 1953 and the 1,908 phase 1 farms for 1954.

A random sample of one-eighth of the class 1 farms and one-fourth of the class 2 farms, together with all class 3 farms constituted the phase 2 sample. These subsampling rates were determined by applying a formula for optimum rates (ignoring the cluster structure of the sample) :

$$n_i = n \frac{W_i \, s_i}{\Sigma \, W_i \, s_i} \, , \qquad (1)$$

where, n_i = estimated number of phase 2 farms in the ith class;

n = total number of farms in the phase 2 sample;

W_i = estimated proportion of all farms in the ith class;

s_i = standard error of estimated (weighted) sales of cattle and hogs for the survey year. The phase 2 sample distribution is presented in table A-2.

The phase 2 sample farms constituted the panel of farms which were used for the four quarterly sample surveys in each year. Each survey was designed to give information on the preceding 3 months' operations. As indicated in table A-1 for the 1954 sequence of surveys, half of the 1953 sampling units were retained, and an additional random supplement of sampling units was added to maintain the panel size. The 1954 universe was identical to the 1953 universe, except that no attempt was made in 1953 to distinguish between open country, rural place and urban farms. In March 1954, an additional stratum was created in Iowa to include all urban farms. It was decided

that the 1954 panel should have the same composition as the 1953 panel; so similar sampling techniques were used. The new panel was obtained by replacing one segment from half of the strata with a new segment and by replacing two segments from the remaining half of the strata by two new segments. Thus, the 1954 panel consisted of matched farms enumerated in 1953 and those from the new or unmatched segments.

TRAINING OF INTERVIEWERS

Before the initial enumeration in April 1953, a 5-day training session was held to instruct enumerators in all phases of their work. The training program included instructions on the purpose of the survey, the sampling method, the interviewing techniques and interviewer's responsibilities. The questionnaire was discussed in detail with field practice in all phases of the interview supplementing classroom instruction. In addition, a 1-day "refresher" course took place before each of the subsequent quarterly surveys. Any new enumerators received additional training. The assignments from quarter to quarter for any given enumerator generally comprised the same farms because of both the proximity of the enumerator's residence to his assignment and the ease of subsequent approaches after initial contact.

SUMMARY OF COVERAGE EXPERIENCE

The subsampling procedure designated certain of the class 1, 2 and 3 farms as units in the phase 2 sample. Field instructions permitted an interviewer to substitute another farm whenever the orginially designated farmer could not be interviewed because of "refusal" or because he was "away for duration of the survey" or "too busy." In the case of class 1 and class 2 farms, the enumerator substituted a farm belonging to the same volume class and segment as that of the farm for which no interview was obtained. Substitutions were made at random from among the phase 1 farms not having been previously designated in the phase 2 sample.

Since 100 percent of the class 3 farms were covered in the phase 2 operation, no such substitution was possible for them. The substitution rate was 39/390, or 10 percent, in 1953 for the entire sample, and in 1954 it was 16/202, or 7.9 percent, in the new, unmatched portion of the sample.[15] Previous experience on sample surveys of a similar nature indicated that negligible bias could be expected for items of interest in this survey; e.g., farm acreage, cattle or hogs.

For quarters 2, 3 and 4 of 1953, completion rates of 376/390 = 96.4 percent, 374/390 = 95.9 percent and 361/390 = 92.6 percent, respectively, were realized.[16] The completion rate

TABLE A-1. DISTRIBUTION OF PHASE 1 FARMS, IOWA.

Class	April 1953	April 1954 Matched	April 1954 Unmatched	Total
1.	1,313	640	625	1,265
2.	487	243	279	522
3.	107	58	63	121
All farms	1,907	941	967	1,908

TABLE A-2. DISTRIBUTION OF PHASE 2 FARMS, IOWA.

Class	April 1953	April 1954 Matched	April 1954 Unmatched	Total
1.	159	83	78	161
2.	130	63	63	126
3.	107	52	64	116
All farms	396	198	205	403

[15] Table A-2 shows that 396 farms were indicated for the 1953 phase 2 sample and that 205 were indicated for the 1954 unmatched phase 2 sample. It was not possible, however, to obtain substitutes for one class 1, one class 2 and four class 3 farms in 1953; and, in 1954, no substitutes were obtained for one class 1, one class 2 and one class 3 farm. This accounts for the difference in the numbers quoted as 396 and 205 in table A-2 as against 390 and 202 in the footnoted sentence.

[16] "Completion rate" per quarter is defined as the ratio of the number of interviews obtained during a particular quarter to the number who cooperated during the first quarter of the year.

for the 4-quarter match was 357/390 = 91.5 percent. Of the 198 farmers from the 1953 panel who were designated to form the matched portion of the 1954 panel, 19 did not respond during the first quarter of 1954 — a 9.6-percent loss. The total number of interviews obtained in the fifth survey was 381 (179 + 202). Interview rates for the sixth, seventh and eighth quarters of the entire 1954 sample were 373/381 = 97.9 percent, 367/381 = 96.3 percent and 365/381 = 95.8 percent, with an over-all 4-quarter rate of 365/381 = 95.8 percent.

Of those 1953 first-quarter farms (including substitutes) which also were designated for the 1954 panel, about 4 percent were lost subsequently during the first year and an additional 10 percent during the second year, giving an over-all loss of about 15 percent. Hence a completion rate of approximately 85 percent was realized for those farms retained for 2 years. In making estimates for a 1-year period, only data from farmers who had given all four of the quarterly interviews were used.

ESTIMATES OF POPULATION TOTALS, MEANS AND VARIANCES

The estimator employed was a "post-stratified" estimator, using all 33 combinations of the three livestock volume classes, i = 1, 2, 3, and 11 acreage size groups, j = 1, 2, ..., 11 as "post-strata." The acreage size groups were taken as follows: 0-29, 30-49, 50-69, 70-99, 100-139, 140-179, 180-219, 220-259, 260-499, 500-999, 1,000 acres and over.[17]

If the number, N_{ij}, of farms in each of the 33 post-strata were known, an unbiased estimate of the population total X for a farm characteristic would be given by

$$\hat{X} = \sum_{i, j} \frac{N_{ij}}{n_{ij}} x_{ij} \qquad (2)$$

where n_{ij} is the phase 2 sample number and x_{ij} is the phase 2 sample total in the ij^{th} post-stratum.

Since the post-strata were not known, they were estimated from the phase 1 information. Tables A-3 and A-4 show the distribution of the estimated number of farms to the 33 strata in 1953 and 1954. The marginal distribution by acreage size groups may be compared with the corresponding figures from the 1954 Census of Agriculture. It is seen that there is, in general, good agreement. Hence, in what follows we replace the unknown post-stratum size N_{ij} by the corresponding estimate $\hat{N}_{ij}$ and the population total X is estimated by

$$\hat{X} = \sum_{i, j} \frac{\hat{N}_{ij}}{n_{ij}} x_{ij} \quad . \qquad (3)$$

[17] Data on farm size in phase 1 were collected only on the 74 "new" segments in 1954 plus a sample of 24 segments used in 1953 and rechecked in 1954. The size distribution of these 98 segments was assumed to hold for old segments used again in 1954 as well as for all 1953 segments. Total phase 1 farms by size classes thus were estimated from incomplete phase 1 information.

TABLE A-3. ESTIMATED NUMBER OF FARMS IN IOWA BY ACREAGE GROUP AND LIVESTOCK VOLUME OF SALES CLASSES, 1953.[a]

Group acres	Livestock class			Total
	1	2	3	
0 - 29	18,398	0	0	18,398
30 - 49	9,282	0	59	9,341
50 - 69	4,806	262	0	5,068
70 - 99	15,249	1,965	59	17,273
100 - 139	25,691	5,241	118	31,050
140 - 179	33,315	14,936	1,769	50,020
180 - 219	9,613	7,075	1,061	17,749
220 - 259	9,779	9,696	825	20,300
260 - 499	7,624	10,088	5,661	23,373
500 - 999	829	655	1,179	2,663
1,000 and over	0	0	236	236
Total	134,586	49,918	10,967	195,471

[a] Based on Livestock Marketing Survey.

TABLE A-4. ESTIMATED AND CENSUS NUMBERS OF FARMS FOR IOWA BY (a) 1954 ACREAGE GROUP AND VOLUME CLASS, LIVESTOCK MARKETING SURVEY, AND (b) 1954 ACREAGE GROUP, CENSUS OF AGRICULTURE.

Group acres	Livestock class in survey				Census of Agriculture
	1	2	3	Total	Total
0 - 29	16,737	301	0	17,038	17,105
30 - 49	8,444	151	0	8,595	6,435
50 - 69	4,373	302	0	4,675	4,338
70 - 99	13,872	2,262	0	16,134	18,244
100 - 139	23,372	6,031	302	29,705	24,923
140 - 179	30,308	17,039	2,262	49,609	45,564
180 - 219	8,746	7,992	1,357	18,095	22,152
220 - 259	8,896	11,158	1,055	21,109	20,657
260 - 499	6,936	11,460	7,238	25,634	29,960
500 - 999	754	754	1,508	3,016	3,284
1,000 and over	0	0	301	301	271
Total	122,438	57,450	14,023	193,911[a]	192,933

[a] The estimated total number of farms in this table differs from the estimates in earlier tables because of rounding errors in the procedure used to obtain individual class totals.

The estimated variance of these estimates employs the between-primary (segments) within-strata components of variation. Thus $\hat{X}_{ts}$ denotes an estimate of the total of the tth stratum from the data of the sth segment, given by

$$\hat{X}_{ts} = k \sum_{i, j} \left(\frac{\hat{N}_{ij}}{n_{ij}} \right) x_{ij\,ts} \quad , \qquad (4)$$

where the same post-stratum jack-up factor is employed as in equation 2, and where $x_{ij\,ts}$ denotes the phase 2 sample total for the ij^{th} post-stratum in the sth segment of the tth stratum, and where k is the number of segments selected from each stratum. Then the estimated total is

$$\hat{X} = \frac{1}{k} \sum_{t, s} \hat{X}_{ts} \quad . \qquad (5)$$

The variance of $\hat{X}$, $V(\hat{X})$, may be estimated from the between-primary within-strata component of variance by

$$v(\hat{X}) = \frac{1}{k^2} \sum_t k \sum_s \frac{(\hat{X}_{ts} - \bar{X}_t)^2}{k-1} \qquad (6)$$

$$= \frac{1}{(k)(k-1)} \sum_{t, s} (\hat{X}_{ts} - \bar{X}_t)^2 \qquad (7)$$

where $\bar{X}_t = \frac{1}{k} \sum_s \hat{X}_{ts}$. $\qquad (8)$

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Since $k = 3$ segments were selected from each stratum, the preceding equations become

$$\hat{X}_{ts} = 3 \sum_{i, j} \left(\frac{\hat{N}_{ij}}{n_{ij}} \right) x_{ij\,ts} \quad , \tag{9}$$

$$\hat{X} = \frac{1}{3} \sum_{t, s} \hat{X}_{ts} \quad , \tag{10}$$

$$v(\hat{X}) = \frac{1}{6} \sum_{t, s} (\hat{X}_{ts} - \bar{X}_t)^2 \tag{11}$$

where $\bar{X}_t = \frac{1}{3} \sum_{s} \hat{X}_{ts}$. $\tag{12}$

Finally, an estimate of the sample mean is

$$\hat{\bar{X}} = \frac{\hat{X}}{N} = \frac{1}{N} \left(\frac{1}{3} \sum_{ts} \hat{X}_{ts} \right) \tag{13}$$

with estimated variance

$$v(\hat{\bar{X}}) = \frac{1}{N^2} V(\hat{X}) = \frac{1}{6N^2} \sum_{t, s} (\hat{X}_{ts} - \bar{X}_t)^2 \tag{14}$$

SAMPLING ERRORS FOR SELECTED CHARACTERISTICS

The sampling errors for certain of the estimates previously cited are given in table A-5. From this table the reader may obtain a general idea of the accuracy of the estimates given herein.

TABLE A-5. ESTIMATES FOR SELECTED ITEMS AND THEIR STATISTICAL ERROR, LIVESTOCK MARKETING SURVEY, IOWA, 1954.

Item	Estimate	Standard deviation	Coefficient of variation
1. Total hog sales	16,853,329	1,001,278	0.059
2. Slaughter hog sales	15,143,459	1,035,247	0.068
3. Total, less slaughter hog sales	1,709,870	336,350	0.197
4. Slaughter hogs sold directly to packers	2,148,409	215,764	0.100
5. Total cattle and calf sales	4,070,530	212,666	0.052
6. Slaughter cattle and calf sales	3,285,921	191,952	0.058
7. Total, less slaughter cattle and calf sales	784,609	82,970	0.106
8. Slaughter cattle and calves sold through terminal markets	1,761,076	200,751	0.114
9. Slaughter cattle and calves sold through auctions	544,830	51,103	0.094