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marketing patterns of — MINNESOTA HOG PRODUCERS

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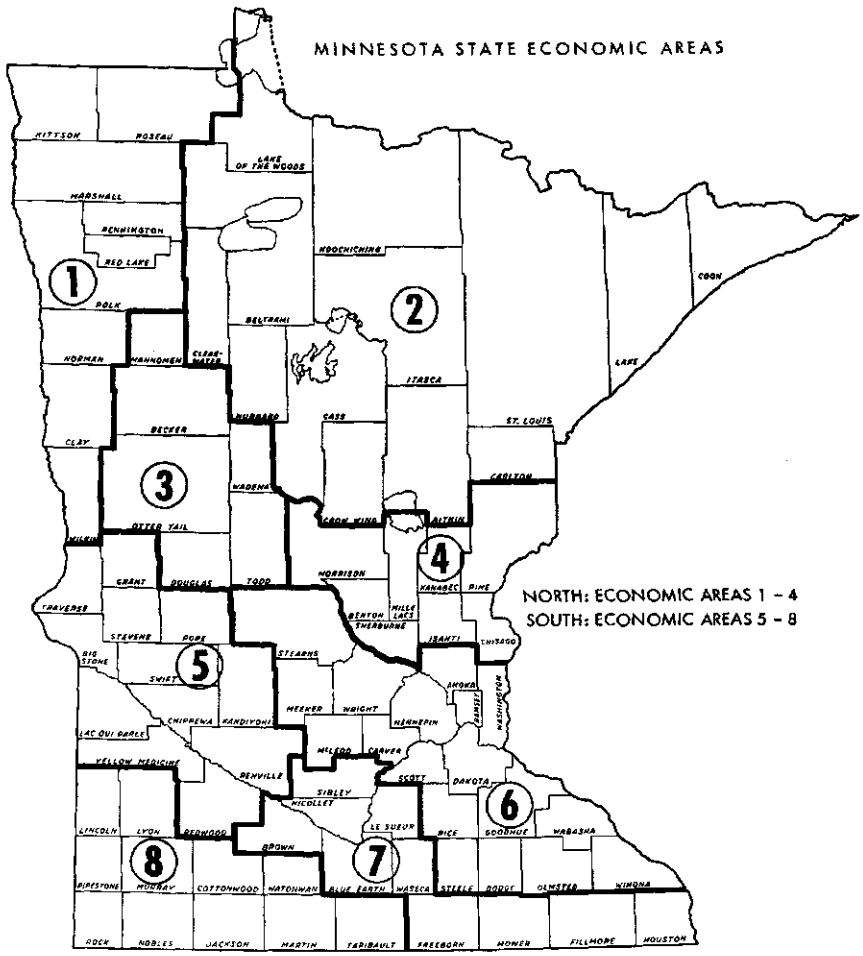
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CLEARWATER
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ST. LOUIS
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BECKER
WADENA
CARLTON
OTTER TAIL
CROW WING
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WILKIN
GRANT
DOUGLAS
TODD
MORRISON
KANABEC
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TRAVERSE
BENTON
MILLE LACS
STEVENS
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BIG STONE
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KANDIYOHI
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COTTONWOOD
WATONWAN
BLUE EARTH
WASECA
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NORTH: ECONOMIC AREAS 1 - 4
SOUTH: ECONOMIC AREAS 5 - 8

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Marketing Patterns of Minnesota Hog Producers
By M. Miller, K. Egertson, and D. Fienup

PART I INTRODUCTION

Significant changes have occurred in the channels used in the marketing of Minnesota hogs. Some channels have declined in importance, others have remained stable or increased their volume. Part of this adjustment is due to changes in farmers personal preferences for various market outlets. But changes in marketing patterns are also related to basic changes in the size, type, organization, and location of hog producing firms in Minnesota.

These basic changes within the hog industry include the tendency of hog producers to become specialized in one or more parts of the hog production phase. For example, there is evidence that feeder pig production has begun and will continue to become a separate phase of the hog industry. Other producers have tended to specialize in finishing barrows and gilts. The existence of specialized feeder pig producers has enabled them to do this.

New production techniques and change in relative prices often cause the profitability of various enterprises to change among areas. The magnitude of these changes is not the same for all parts of the state. Thus, locational adjustments in production and marketing patterns emerge.

Past and present changes in marketing needs have been associated with changing production patterns. These have enhanced both establishment of and adjustment in different types of market channels to meet these needs.

These past changes in hog marketing have caused uncertainty regarding the future use and even the need for some types of existing market outlets. To determine future marketing patterns, factors associated with past changes in marketing patterns must be identified and analyzed. Prediction of probable changes in these variables may then be used to help determine future marketing changes.

The general purpose of this report is to identify some of these factors and associate them with existing marketing patterns.

The specific objectives are:
(1) to describe the characteristics and attributes of hog marketing patterns found in Minnesota, 1961;

(2) to determine trends and changes in these characteristics and attributes since 1956;
(3) to identify some of the important interrelationships between marketing and production patterns.

PART II SOURCE OF DATA

This report emphasizes hog marketing patterns and related production patterns. Present marketing and production patterns were described from information received from a 1,750 unit mail-in survey conducted in 1962 by Minnesota Crop and Livestock Reporting Service.

For making comparisons of the hog marketing patterns, 1956 data from a north central regional bulletin1/ and an unpublished manuscript from the University of Minnesota were used along with the 1961 survey information.

The importance and impact of various geographical developments in the production and marketing of Minnesota hogs are revealed by a comparison of data describing northern and southern parts of the state. To make this geographical separation, economic areas as defined in the U. S. Census of Agriculture were combined. The north included economic areas 1-4 and the south 5-8. (Inside cover.)

PART III PRESENT MARKETING PATTERNS

Description of Outlets

Hog producers have several alternative market outlets available to them. They vary from highly organized terminal markets to simple on-the-farm sales.

The market outlets used in Minnesota are as follows:

Terminal Public Markets

These markets are referred to as public stockyards or terminal markets. At these markets large numbers of livestock are generally consigned to commission firms by pro-

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1/ R. R. Newberg, Livestock Marketing in the North Central Region, North Central Regional Publication 104, Ohio Agricultural Experiment Station, Research Bulletin 846, December 1959.

ducers. A minimum of two commission firms must function at each market in order to qualify as a terminal. A stockyard company owns and maintains the physical facilities which are leased to the commission firms. These markets not only furnish physical facilities for marketing, but are also important sources of market information on price, quantity, quality, and other more general market conditions. The terminal markets serving Minnesota hog producers are located at South St. Paul, Minn.; Sioux Falls, S. D.; Sioux City, Iowa; and Fargo, N. D. (figure 1).

The terminal market at South St. Paul serves a larger area of the state than the other markets. This is due to its central location and its location in the state relative to the other terminal markets.

Auctions

Auction markets, often referred to as sale barns or community sales, receive livestock from farmers and dealers. The livestock are sold on an auction basis, with bidding and selling open to the public. Auctions in Minnesota are owned by individuals, partnerships, corporations, or cooperative associations.

Approximately 60 auction markets operate in Minnesota. Auction markets are located throughout the state (figure 2). The type of livestock handled by these concerns vary. The largest proportion of livestock marketed through auctions is made up of feeders and breeding stock. A few auctions located in southern Minnesota are also becoming important outlets for slaughter animals.

Interior Packers

Interior packers and packer buying stations are generally located in concentrated livestock producing areas (figure 1). Interior packers procure the majority of their supplies through their own buying stations located throughout their trade area or by direct purchases at the plant. Many use both the grade and yield and/or the liveweight method of purchase, with or without sorting. The choice is made by the farmer or seller at the time of consignment.

Special Markets

Special markets are informal markets where a direct transaction is facilitated between the seller and the buyer; they are common in the feeder pig producing areas of the state

Figure 1. Location of Terminal Markets, Federally Inspected Slaughter Plants, and Packer Buying Stations.

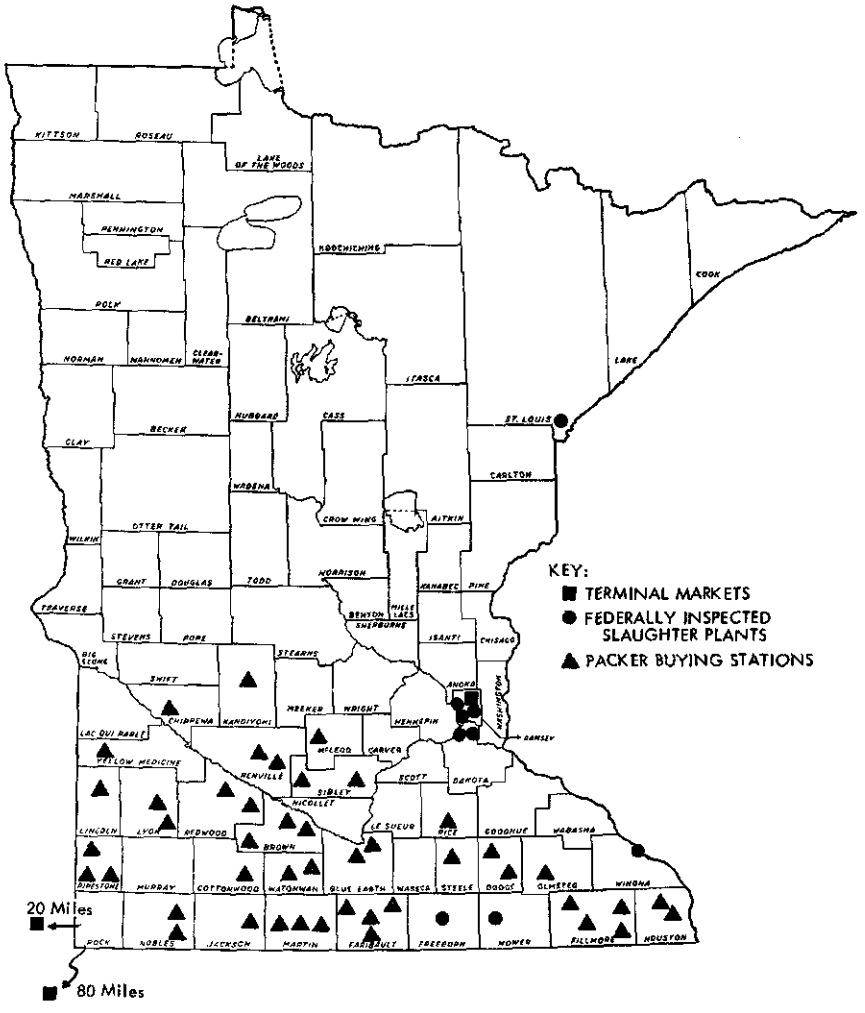
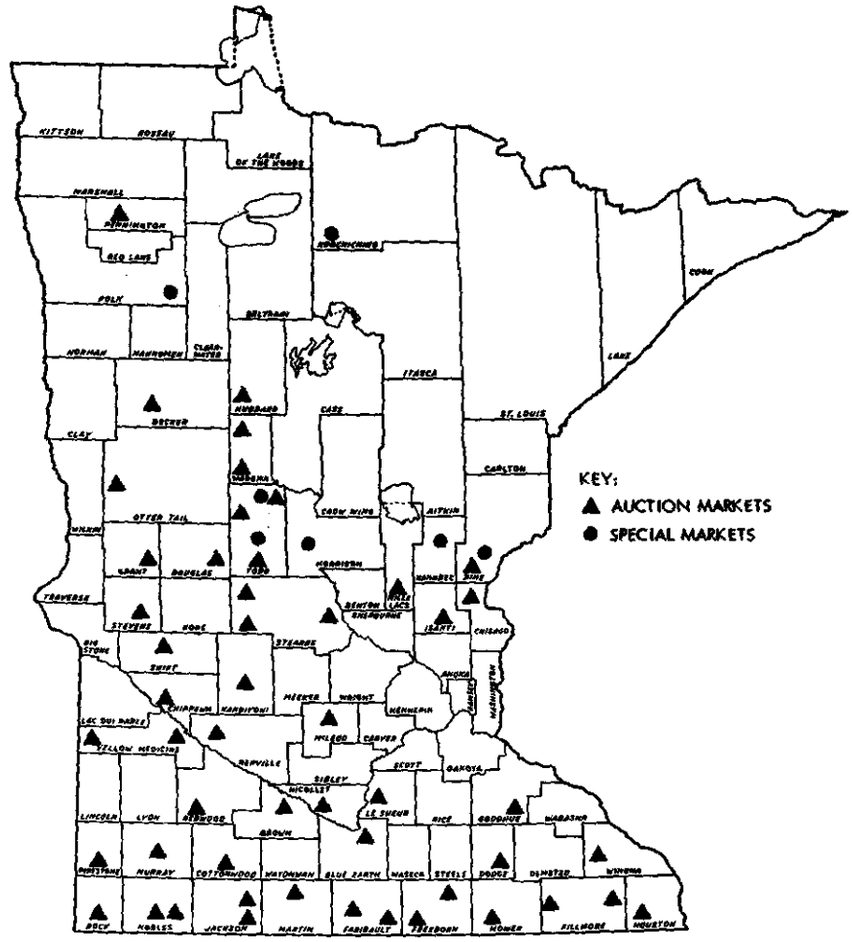


Figure 2. Location of Auction Markets and Special Markets, 1961.



(figure 2). These markets are informal meeting places for buyers and sellers at a specific time and place.

There are approximately seven of these markets operating in Minnesota. Most of them have no physical facilities; some are merely located on a street in a rural town within the feeder pig supply area. The first market of this type established in Minnesota was at Little Falls.

Farmer-to-Farmer Transactions

The direct transaction between a farm seller and a farm buyer is a common form of marketing, especially when selling feeders or breeding stock. This category also includes a farm auction when a farmer liquidates his enterprise or his entire farming operation.

Other Buyers

Many individuals buy and sell livestock on their own accounts. They are required to be licensed and bonded when operating in Minnesota. There were approximately 1,100 licensed and bonded dealers and agents operating in Minnesota in 1961.

Importance of Outlets

The extent to which the outlets described are utilized by producers varies considerably both by type of hogs marketed and by location of producer. Changes have also occurred over time (table 1).

Terminal markets are the most important market when measured in terms of percentage of hogs marketed. Approximately 44 percent of all hogs were marketed through terminal markets in 1961. Though still the major outlet, there was a 5 percentage point drop from 1956 (table 1). Terminal markets are mainly used for slaughter animals. Approximately 60 percent of the slaughter hogs marketed in Minnesota moved through these outlets in 1956, compared with 51 percent in 1961. Terminals are not a significant outlet for feeder pigs or breeding stock.

The relative importance of terminal markets varies significantly between northern and southern Minnesota. With fewer alternative outlets in the north, terminal markets in both 1956 and 1961 received over 80 percent of the slaughter hogs marketed from this area as compared to approximately 50 percent from the South.

Terminal markets have declined in importance as an outlet in southern Minnesota, but the percent of slaughter hogs marketed by this method from the north has increased from 80 to 83 percent since 1956.

Terminal markets have become slightly more important as an outlet for breeding stock since 1956. Six percent of the breeding stock was marketed through terminals in 1961; this represents an increase of 5 percentage points from 1956. The overall increase is due mainly to the substantially increased use by producers from the north. These producers have few alternative outlets for mature hogs of any class.

Auction markets appear to specialize in handling types of hogs which terminal markets do not. They are of minor importance for all hogs in total, handling only about 2 percent in each area and for the state in 1961. They receive a small proportion of the slaughter hogs but are somewhat more important for feeders and breeding stock. This type of market outlet functions better where the supply and demand areas coincide. This is characteristic of the feeder pigs and breeding stock market in the southern part of the state.

A substantial reduction in feeder pig receipts at auctions was noted between 1956 and 1961. However, this was likely due to a difference in the schedules used for surveys in the 2 separate years. Special markets were not listed in the 1956 survey, although a few did exist. The sale of feeder pigs through special markets was listed under auctions. Therefore, part of the substantial decrease in the proportion of feeder pigs marketed through auction markets between 1956 and 1961 was likely due to the deletion of special market sales from the category in 1961. This hypothesis is reinforced when the north-south breakdown is considered. The proportion of feeder pigs marketed through auctions in the north decreased substantially, while the proportion in the south remained the same. The decline in use of the auction market for breeders may be partially accounted for by the same facts, although major changes occurred in the marketing patterns of breeders. The demand for improved breeding stock has increased the importance of knowing the production records and performance of breeding stock. Many buyers would rather buy on the farm for this reason.

Dealers receive a relatively large share of all hogs and of each individual class; as might be expected, they receive a higher proportion of feeder pigs than any other class. They are most important in the north as an outlet for feeder pigs, while in the south they are more important for slaughter hogs and breeders.

Table 1. Percentage of hogs marketed by Minnesota farmers at various outlets by use in northern and southern Minnesota and in the state, 1961 and 1956.

Market outlet	Total			Slaughter			Feeder			Others (Breeders)		
	State	North*	South	State	North	South	State	North	South	State	North	South
	percent											
Terminal:												
1961	44	44	44	51	83	48	**	**	**	6	15	5
1956	49	37	53	59	80	55	**	**	1	1	**	3
Auction:												
1961	2	2	2	1	2	1	6	2	13	9	5	9
1956	4	17	1	**	1	**	29	33	13	14	13	15
Dealers (other):												
1961	18	27	16	17	3	18	40	58	11	8	2	9
1956	18	24	17	14	3	16	40	41	40	40	53	5
Packers:												
1961	27	7	31	31	12	33	**	**	**	**	**	**
1956	24	7	27	27	15	29	**	**	**	**	**	**
Farm sale:												
1961	7	9	7	**	**	**	37	16	70	69	76	69
1956	5	15	2	**	1	**	31	26	46	45	34	77
Special:												
1961	2	11	**	**	**	**	17	24	6	8	2	8
1956***	**	**	**	**	**	**	**	**	**	**	**	**
Total:												
1961	100	100	100	100	100	100	100	100	100	100	100	100
1956	100	100	100	100	100	100	100	100	100	100	100	100

*North--Economic areas I-IV
South--Economic areas V-VIII
**Indicates less than 0.5 percent
***Not listed on survey in 1956

There was no change in the proportion of total hogs marketed through dealers from 1956 to 1961, although there were significant changes with regard to the type of hogs marketed. For instance, the two seperate surveys indicated that 2 percent of the breeding stock from the north was marketed through dealers in 1961 as compared to 53 percent in 1956. However, part of the difference is probably due to a sampling error as a result of the very small number of schedules that showed the sale of breeding stock. More feeder pigs from the north were marketed through dealers in 1961 while the proportion from the south declined 29 percentage points.

Packers handle only slaughter hogs. This outlet received approximately one-third of the barrows and gilts in 1961; this proportion was a slight proportional increase from 1956. Although the south had increased direct-to-packer marketings, this category increased in the north. The resulting net change was a 4 percentage point increase, since the north markets a smaller proportion of the total slaughter hogs.

Farmer-to-farmer transactions are mainly carried out in the sale of feeder pigs and breeding stock. In the case of feeder pigs, this type of transaction is most important in the south because of the close proximity of the southern feeder pig producers to the feeder pig finisher in the same area. Farmer-to-farmer transactions seem to be the most efficient method of marketing in the finishing areas. However, individual transactions between feeder pig producers from the northern areas and finishers from the south are not as economical. Therefore, northern dealers serve the needs by buying feeder pigs and transferring them to the finishers in southern Minnesota. Special markets and cooperatives also provide a link between distant buyers and sellers.

Farmer-to-farmer sales represent the major market outlet for the sale of breeding stock. These sales increased in importance from 1956. Large increases in the north dominated decreases in the south. This pattern results because the producer selling breeding stock in the north is in the same area as the feeder pig producers who have the greatest demand for breeding stock.

Special markets, a relatively new outlet, receive approximately one-fourth of northern feeder pigs. Supplies from the local areas can be easily aggregated at these markets for larger purchases by either dealers or large finishers. The extent to which this outlet will dominate as the market for feeder pigs in the south will be a function of the number of such markets that will locate in that area.

Since this survey was taken, producer cooperatives have begun serving as an outlet in the sale of feeder pigs in northern Minnesota.

Types of Producers

There are vast differences in the market outlets utilized for the various classes of hogs. Also, the relative importance of outlets for a given class of hogs varies among areas within the state. Due to these differences, five types of hog producers were defined and analyzed from the information gathered from the survey to further describe their marketing patterns and the factors associated with these patterns.

Commercial hog farmers were classified as follows:

Type I Complete slaughter hog producer: Farrows all his feeding stock and markets them as slaughter barrows and gilts.

Type II Partially specialized slaughter hog producer: Buys some feeder pigs to supplement those he farrows; markets both groups as slaughter barrows and gilts.

Type III Specialized slaughter hog producer: Buys feeder pigs and markets them as slaughter barrows and gilts; farrows none.

Type IV Specialized feeder pig producer: Farrows pigs and markets them as feeder pigs.

Type V Diversified hog producer: Farrows pigs and markets some as feeder pigs and the remainder as slaughter barrows and gilts.

Type I producers make up the highest proportion of the total hog producers in Minnesota (table 2). This group represents 63 percent of all producers and markets 68 percent of the barrows and gilts. These producers sold an average of 96 barrows and gilts in 1961. The main reasons for the dominance of this type are: (1) historically hog production consisted largely of the complete producers and the transition period to specialization is expected to be long; (2) farmers are accustomed to raising and feeding their own pigs, also they are reluctant to deal with the additional problems normally associated with buying feeder pigs such as disease, marketing, and credit; (3) many farmers have facilities for the farrowing and finishing phases but do not have needed facilities for specializing in merely one phase of production; and (4) the complete hog production enterprise may still be the most profitable type of operation in many cases.

Type II producers marketed an average of 133 barrows and gilts per producer. This represents the highest average for any one of the types marketing barrows and gilts. In total marketings they account for 15 percent, whereas this type only includes 10 percent of the producers. Type II producers buy the majority of the pigs they finish to slaughter weight. Thus, the farrowing phase is a relatively small part of their total hog enterprise, although these producers can vary the proportion of pigs they purchase depending upon feeder pig, corn, and expected slaughter hog prices.

The specialized type III slaughter hog producers market only 9 percent of the barrows and gilts. The relatively low average of 90 pigs per producer is due to the large proportion of these producers who buy only a few feeder pigs to run behind feeder cattle. The time lapse between purchase and sale may account for some of the discrepancy between the 104 average number of feeder pigs purchased and the average of 90 barrows and gilts marketed by this group. Death loss may also contribute to the difference.

Table 2. *Relative importance of type of producers in* Minnesota, 1961.

Type	Percent of producers by type	Barrows & gilts		Feeder pigs			
		Percent sold	Average number per producer	Percent sold	Average number per producer	Percent purchased	Average number per producer
I	63.3	67.7	96	----		----	
II	10.2	15.2	133	----		46.1	81
III	9.3	9.4	90	----		53.9	104
IV	7.5	----		54.3	86	----	
V	9.7	7.7	71	45.7	56	----	

The future of this type of producer depends largely on how the feeder pig industry develops. The availability and accessability of good feeder pigs will determine whether the majority of slaughter barrows and gilts will be marketed by these producers or by producers of another type. Other factors which can determine the future importance of this type are (1) the possibilities of economies of scale in the finishing phase of hog production, and (2) the future size and profitability of other livestock enterprises.

The specialized feeder pig producer, represented by

type IV, marketed over 50 percent of the feeder pigs produced in Minnesota. Slightly less than 8 percent of the hog producers in Minnesota are in this group. Average annual sales per producer of this group are 86 feeder pigs. The feeder pig enterprise of these producers is relatively small in terms of resources used and gross receipts realized. Presently feeder pig production appears to be quite supplementary, especially with the dairy enterprise in the north. But this type of hog system is believed to have potential on many Minnesota farms, particularly in the northern counties. The gradual adjustment of small dairy farms out of dairying may hasten expansion of the feeder pig enterprise in this area.

Type V producers represent about 10 percent of all hog producers and market approximately 8 percent of the barrows and gilts and one-half of the feeder pigs. Their sales in 1961 averaged 71 head of barrows and gilts and 56 head of feeder pigs. This type of hog enterprise probably offers the greatest degree of flexibility. Depending on the feeder pig prices, expected slaughter of barrows and gilts and the corn situation, these producers can sell all or none of the pigs they farrow as feeder pigs. The average size of these producers is relatively large; they supply a significant share of the total hogs marketed in Minnesota.

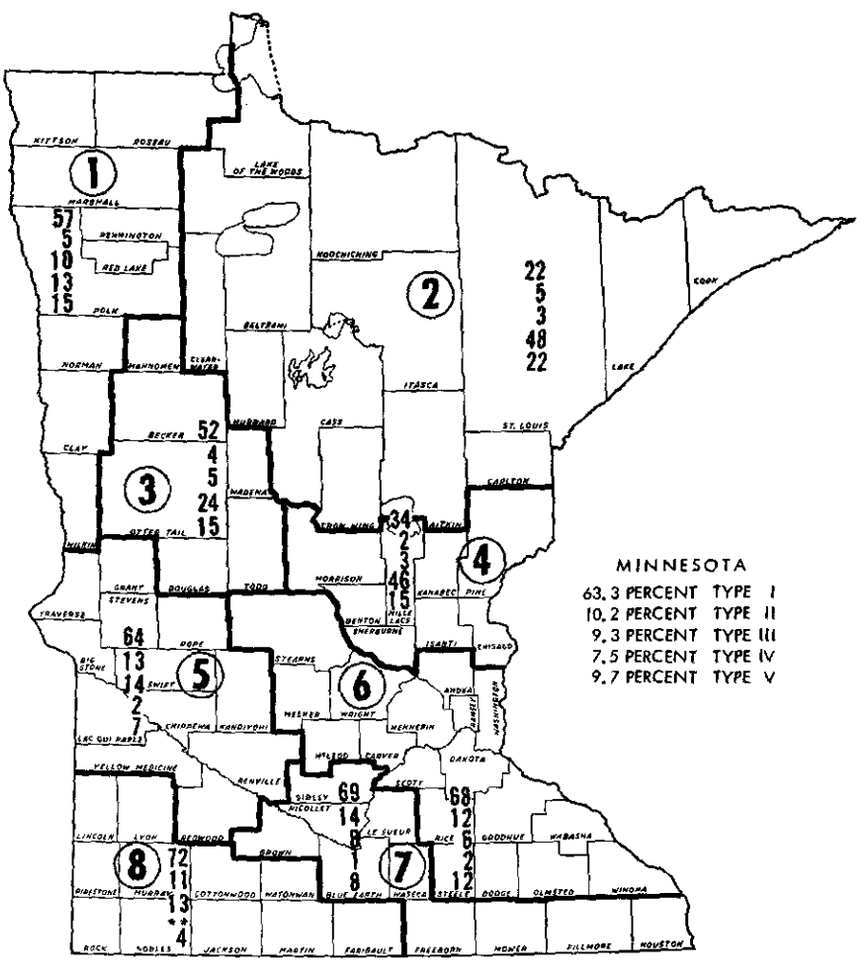
Along with the differing degrees of importance of each type with regard to the share of the hogs marketed, the relative concentration of each of the types varies throughout the state (figure 3). 2/

Type I producers, the predominate type, are not concentrated when compared with other producers in the area. Except in economic areas 2 and 4, over 50 percent of the producers are of this type; they tend to predominate in areas of ample feed grain production.

The somewhat specialized finishers, the type II producers, make up 2 to 5 percent of the hog producers in economic areas 1 to 4, the northern half of the state. In the remaining economic areas the proportion of these producers varies from 11 to 14 percent. These locational differences are related to the major corn producing areas.

2/ The relative concentration of each type was determined from the survey by calculating the proportion of producers in each type by economic areas.

Figure 3. Percent of hog producers in each type by economic areas, 1961.



A similar distribution exists for type III producers. However the proportion of these producers is slightly lower in the southeastern area of the state while it is slightly higher in the northwest and southwest. The specialized hog finishers appear to be in areas where cattle feeding is prevalent. Both of these enterprises compete for similar factors of production. There are also instances where the two feeding enterprises are complementary. This exists when farmers buy feeder pigs to run in beef feedlots to utilize waste feed.

Very different locational patterns exist for the feeder pig producers. The specialized feeder pig producers, type IV, are more concentrated in the northern half of the state. The highest proportion of producers in economic areas 2 and 4 are classified in this type. In the southern economic areas only 1 or 2 percent of the producers are of this type. A similar distribution exists for the type V producers, although, the magnitude of the differences between the northern and southern economic areas is smaller.

Marketing Patterns of Types of Producers

The marketing patterns of types of producers were studied in an effort to further describe the hog marketing patterns for Minnesota's producers. The main differences in the use of market outlets for slaughter hogs by types of producers were between the use of terminal markets and direct-to-packer sales (table 3).

Table 3. Percent of barrows and gilts sold through various market channels by types of producers, 1961

Type producer	Terminal market	Auction market	Direct to packers	Other buyers	Total
			(percent)		
I	51	1	33	15	100
II	42	2	42	14	100
III	42	1	35	22	100
V	59	1	26	14	100
All types	50	1	34	15	100

The somewhat specialized producers, types II and III, marketed greater proportions direct to packers or to other buyers as compared to types I and V, who used terminal

markets to a great extent. Type II producers marketed the highest proportion of hogs direct to packers, 42 percent.

Type V producers marketed the highest proportion of barrows and gilts through terminal markets. This may be due to the northern location of these producers. The higher proportion of barrows and gilts marketed through other buyers by Type III producers may be related to the producers running a few hogs behind feeder cattle or to the specialized finishers which are large enough operators to encourage buyers to make the transactions at the farm. Auction markets received a very insignificant proportion of the barrows and gilts from all types of producers.

Table 4. Percent of feeder pigs sold through various market channels by types of producer, Minnesota 1961.

Type producer	Terminal market	Special market	Auction market	Farmer to farmer	Other buyers	Total
			(percent)			
IV	*	23	2	25	50	100
V	*	10	11	52	27	100
Both types	*	17	6	37	40	100

There were marked differences between the marketing patterns of the two types of feeder pig producers. Although, if the proportion of feeder pigs marketed off the farm and on the farm were considered, very similar marketing patterns would exist for the two types. The differences in marketing patterns are evident when the off-farm sales are separated into auction and special market sales and the on-farm sales are separated into farmer to farmer sales and other buyers (table 4). The Type IV producers marketed approximately one-fourth of their feeder pigs through special markets and a very small proportion through auctions. This may be related to their location in the State (figure 3). Other buyers were a much more important means of marketing their feeder pigs than farmer to farmer sales.

Special markets and auction markets received approximately the same proportion of feeder pigs from Type V producers. But farmer-to-farmer sales and other buyers played the reverse role for type V producers as compared to type IV

producers. The increased importance of the farmer-to-farmer sales for type V producers probably is also related to the relative location of these producers (figure 3).

PART IV CORRELATION ANALYSIS

In an attempt to quantify the extent of the association of the variables hypothesized to be associated with the marketing patterns of barrows and gilts, data from the survey were fitted to a linear multiple correlation model. Marketing patterns of barrows and gilts were chosen for analysis because the majority of the surveys pertained to this class of hogs. We were interested in variables associated with marketing patterns of all barrows and gilts, but the information needed was most complete for those marketing through the terminal markets. Therefore, the analysis was made on data reflecting terminal market receipts. The variables would have different relationships with marketings through other outlets.

Based on available information the following hypotheses were postulated:

(1) The proportion of an individual's barrows and gilts sold through a terminal market is inversely related to the distance to a terminal market.
(2) The proportion of an individual's barrows and gilts sold through a terminal market is inversely related to the number of alternative market outlets available in the county where the producer is located.
(3) The proportion of an individual producer's barrows and gilts sold through a terminal market is inversely related to the number of barrows and gilts he sells per year.
(4) The relative influence on the individual's marketing patterns of distance to terminal markets, number of alternative market outlets available in the county, and the number of barrows and gilts sold per year, differ for the various types of producers.

The Model

The variables available for study and believed to be associated with the marketings to a terminal market were; distance to a terminal market (X_2), The number of licensed buyers per county (X_3), and the relative size of the producer

(X_4). The estimated model was as follows:

$$X_1 = \alpha + \beta X_2 + \gamma X_3 + \delta X_4$$

Where X_1 was the proportion of a farmer's barrows and gilts marketed through a terminal market.

The Variables

The distance of producers from the terminal market indirectly measures the transportation charge associated with terminal marketing. With the above model the transportation cost is assumed to be a linear function of the distance to the terminal market.

Varying degrees of "drawing power" are associated with different terminal markets. To take account of this, an arbitrary weighting scheme was employed in which the distance to all terminal markets, except to South St. Paul, was given a weight of one.

To take account of South St. Paul's quarter "drawing power", a weight of two was applied to it, i. e., the distance to South St. Paul was used if the center of the county was less than twice the distance from South St. Paul as compared to the distance to any other terminal market.

It was hypothesized that as competition from other buyers and outlets in the production area increased, farmers would market a smaller proportion of their barrows and gilts through a terminal market. The number of licensed buyers and dealers per county was used as a measure of the degree of competition. This is not a good measurement of the competition since all buyers do not purchase equal numbers of barrows and gilts from farmers. In fact, not all licensed buyers even purchase barrows and gilts. But this was the best measure of competition available.

It was hypothesized also that as a farmer markets greater numbers of barrows and gilts per year, the proportion marketed through a terminal market declines. This hypothesis was based on the assumption that buyers, either private or representatives of interior packers, would be more interested in purchasing barrows and gilts in larger lots. Hence, some of the marketing costs such as transportation charges may be paid by the buyers as an inducement to the farmer to sell to him rather than market through a terminal market.

Results of Analysis

The correlation model was estimated for all producers and for each of the separate types. It was estimated for each of the types in order to determine whether the degree of association between the various variables and the proportion of barrows and gilts marketed through terminal markets differed for each type as compared to all producers combined. The degree of association did differ between each type and all producers. Therefore, when South St. Paul was given twice the "drawing power" of other terminal markets, it was unnecessary to estimate an equation for all producers combined.

When the model was estimated for all producers, 18 percent of the variation in the proportion of barrows and gilts marketed through terminal markets was associated with the variation in the other variables. (table 1 of appendix). The number of licensed buyers per county accounted for over one-half of the variation explained by the three variables. The distance to a terminal market explained more of the variation than did the number of barrows and gilts sold. All of the variables were found to be negatively related to the proportion of barrows and gilts marketed through terminal markets as was hypothesized at the beginning of the analysis.

When the model was estimated for each of the types of producers separately, the relative importance of the variables in explaining the variability of the proportion of barrows and gilts marketed through a terminal market was the same as stated above, although the magnitude of the explanation varied from 11 percent for type V producers to 22 percent for type II producers.

When the South St. Paul terminal market was assumed to have twice the "drawing power" of the other terminal markets, the amount of variation explained by the variables was higher for each type of producer except for type III, the specialized finisher (tables 2-5 of appendix).

The fact that more of the variation was explained by the variation in the other variables when South St. Paul was assumed to have twice the "drawing power" is substantiating evidence of differences in "drawing power" among the terminal markets. However, twice the "drawing power" for South St. Paul may not be the correct weighting. In fact, a proper weighting scheme may require different weights depending on the direction of measurement from the terminal market. For instance, distance does not have the same influence when con-

sidering the area lying to the north of South St. Paul as compared to the area south of South St. Paul.

When this weighting was used, the amount of variation explained varied from 12 percent for type V producers to 23 percent for type II producers. As previously, the relative rank of the variables according to the amount of variation explained was: the number of licensed buyers, distance to a terminal market, and the number of barrows and gilts sold.

PART V CONCLUSIONS

Minnesota hog producers continue to use several market outlets for marketing their hogs but the patterns are changing. The extent to which these changes take place will depend on future developments in

(1) the overall agriculture in Minnesota
(2) the degree of specialization in specific phases of hog production
(3) the market outlets available for hogs.

If overall developments continue, such as continuing specialization in livestock production or changing relative profitability of the various enterprises by areas, the relative location of hog production may shift. This could result in certain market outlets becoming more important for the various classes of hogs. For instance, if the feeder pig enterprise expands in the north one could expect the special markets and other methods of marketing feeder pigs to increase in importance. Likewise, if the finishing phase of hog production continues to concentrate in the south one could expect the proportion of barrows and gilts marketed direct to packers to be larger.

With evidence that specialized feeder pig producers are becoming the prominent source of feeder pigs, it may be true that in the future we will find two completely separate enterprises; that is, the feeder pig enterprise and the finishing enterprise. Consequently, additional outlets may be necessary to facilitate the transfer of feeder pigs to the finishers. As this separation continues toward two separate enterprises, changes in the marketing patterns of feeder pigs will certainly occur and probably the importance of market outlets used for barrows and gilts by specialized finishers will change considerably.

With the predicted changes in the production phases, the additional marketing needs may be met by new market out-

lets. Also, some of the existing market outlets may develop their facilities and services to meet the changing needs.

The correlation analysis indicates that as more competition develops on the buying side, i. e., as the number of licensed buyers in a county increases, the proportion of the barrows and gilts marketed through terminal markets declines. Granted, this statement is based on the assumption that all other things are constant which eliminates possible changes in the relative prices between terminal markets and other market outlets. Also, as producers sell more barrows and gilts per year the relative importance of terminal markets will probably decline.

If terminal markets do decline in relative importance as the projection would indicate, the marketing outlets used would still vary as competition between outlets other than terminal markets increased. The possibility of auction markets becoming important markets for barrows and gilts still exists since there is evidence of increasing importance at the present time.

A substantial amount of variation was unexplained by the correlation analysis. This indicates that variables other than those included in the model can be associated with the variation in the use of terminal markets as markets for barrows and gilts. Marketing costs associated with the various market outlets and the magnitude of the price differences between markets certainly influence the market outlet selected by the producer. However, in this study the degree of competition and the distance to a terminal market were measurable only for all producers in a specific county rather than for each individual producer. Consequently, the variation in the proportion of barrows and gilts marketed through a terminal market for farmers within a county was associated with the above variables measured for a county that had the same values for all producers. This may have contributed to part of the unexplained variation. If these variables could have been measured for each producer, the amount of the unexplained variation would have been reduced.

With hog marketing patterns changing and continual adjustments in the production of hogs, it is helpful to know what factors or variables are associated with these changes to aid in predicting probable future trends. If these predictions are reasonably correct the future needs may be known more accurately; this will aid in planning for necessary adjustments.

APPENDIX

Appendix--table 1.--Some results of the analysis of factors influencing the proportion of barrows and gilts marketed through terminal markets by all producers in Minnesota, 1961

Coefficient of multiple determination	.18035*
Standard error of estimate	43.4782
Constant term	1.068

Independent variable	Regression coefficient	Standard deviation of the coefficient	Beta coefficient
Number of barrows and gilts sold	-.051543*	.012542	-.096373
Distance to closest terminal market	-.32902*	.045273	-.17699
Number of buyers per county	-1.2036*	.097643	-.30414

*Significantly different from zero at the .05 level.

Appendix--table 2. --Some results of the analysis of factors influencing the proportion of barrows and gilts marketed through terminal markets by type I producers in Minnesota, 1961

Coefficient of multiple determination**.	.18959* .19465*
Standard error of the estimate	43.1735 43.0385
Constant term	1.088 1.069

Independent variable	Regression coefficient	Standard deviation of the coefficient	Beta coefficient
Number of barrows and gilts sold	-.063383* -.064935*	.015348 .015299	-.11582 -.11866
Distance to closest terminal market	-.32187* -.25503*	.054213 .039311	-.17519 -.18476
Number of licensed buyers	-1.2262* -1.2862*	.11805 .11409	-.30930 -.32443

*Significantly different from zero at the .05 level.

**The top number in each case is the result of each terminal market having equal "drawing power;" the bottom number is the result of South St. Paul having twice the "drawing power" of other terminals.

Appendix--table 3-- Some results of the analysis of factors influencing the proportion of barrows and gilts marketed through terminal markets by type II producers in Minnesota, 1961

Coefficient of multiple determination**.	.21750* .23265*
Standard error of the estimate	42.70 42.8853
Constant term	1.108 1.092

Independent variable	Regression coefficient	Standard deviation of the coefficient	Beta coefficient
Number of barrows and gilts sold	-.041548 -.039373	.031831 .031541	-.091859 -.087050
Distance to closest terminal market	-.41680* -.34081*	.15197 .10281	-.19950 -.22793
Number of licensed buyers	-1.2007* -1.3172*	.27233 .25852	-.32565 -.35725

*Significantly different from zero at the .05 level.

**The top number in each case is the result of each terminal market having equal "drawing power;" the bottom number is the result of South St. Paul having twice the "drawing power" of other terminals.

Appendix--table 4-- Some results of the analysis of factors influencing the proportion of barrows and gilts marketed through terminal markets by type III producers in Minnesota, 1961

Coefficient of multiple determination**	.15511* .14110*
Standard error of estimate	44.5607 44.9286
Constant term	.9342 .8427

Independent variable	Regression coefficient	Standard deviation of the coefficient	Beta coefficient
Numbers of barrows and gilts sold	.02179 .026558	.041199 .041507	.055891 .050871
Distance to closest terminal market	-.38418* -.21062*	.14655 .10141	-.20710 -.16127
Number of licensed buyers	-1.1985* -1.3076*	.33684 .33277	-.29193 -.31849

*Significantly different from zero at the .05 level.

**The top number in each case is the result of each terminal market having equal "drawing power;" the bottom number is the result of South St. Paul having twice the "drawing power" of other terminals.

Appendix--table 5-- Some results of the analysis of factors influencing the proportion of barrows and gilts marketed through terminal markets by type V producers in Minnesota, 1961

Coefficient of multiple determination**	.11349 .11943
Standard error of estimate	44.4665 44.3172
Constant term	1.016 1.008

Independent variable	Regression coefficient	Standard deviation of the coefficient	Beta coefficient
Number of barrows and gilts sold	-.052254 -.051427	.050153 .049976	-.078910 -.077660
Distance to closest terminal market	-.21733 -.17245	.13466 .089960	-.12358 -.14407
Number of licensed buyers	-1.0972* -1.1704*	.30595 .30027	-.27584 -.29424

*Significantly different from zero at the .05 level.

**The top number in each case is the result of each terminal market having equal "drawing power;" the bottom number is the result of South St. Paul having twice the "drawing power" of other terminals.