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## **CHANGES IN MINNESOTA'S LIVESTOCK INDUSTRY: FARM LEVEL TRENDS**

by

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FARM-LEVEL TRENDS<sup>1</sup>**

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**Kent D. Olson, Even Bjornstad, and Jorunn Grande<sup>2</sup>**

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<sup>1</sup>This report is part of the project, "Structural Changes and the Future of the Livestock Industry in Minnesota." The project is funded by the Northwest Area Foundation and is part of Minnesota Experiment Station Project 14-22.

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## CHANGES IN MINNESOTA'S LIVESTOCK INDUSTRY: FARM-LEVEL TRENDS

by

Kent D. Olson, Even Bjornstad, and Jorunn Grande

The livestock industry in Minnesota has changed considerably in the past few decades. For example, in 1965 there were 52,000 hog farms in Minnesota with an average of 94 pigs produced per farm.<sup>1</sup> In 1990, there were 15,500 hog farms with an average of 510 pigs. Total pig production increased from 4.9 million pigs in 1965 to 8.9 million in 1980 and decreased to 7.9 million in 1990. A similar pattern can be seen in dairy: fewer dairy farms; fewer milk cows; higher production per cow; and higher total milk production for the state. Other livestock species have also undergone change.

This report covers the changes at the farm-level of the livestock industry in Minnesota. For cattle (dairy and beef), hogs, sheep, and poultry, these trends are presented (when data is available): the number of farms with the livestock, the number of animals (total and per farm), measures of production efficiency, and economic efficiency as measured by returns to management and costs of production. The trends in economic measures for Minnesota and the North Central states are compared to other regions in the U.S. to obtain a picture of the competitive position of the Minnesota livestock industry. To put the changes on livestock farms in perspective, the first section briefly discusses the changes in the number of all farms and farm size.

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<sup>1</sup>The data in this report come from various issues of the annual Minnesota Agriculture Statistics produced by the Minnesota Agricultural Statistics Service and various years of the U.S. Agricultural census.

## 1. Farm size and number of farms

Early records show that Minnesota had 157 farms in 1850 and 18,181 in 1860.<sup>2</sup> In the next 85 years, the number of farms rose rapidly and reached a historical high in 1935 with 204,000 farms (Figure 1). Since then the trend has been toward fewer and fewer farms: 150,000 farms by the early 1960s, below 100,000 by 1984, to 89,000 in 1990. According to the census, the number of farms in the entire U.S. was 2.1 million in 1987, down from 6.4 million in 1910 and 1920 (Stanton). The apparent sudden drop in the number of farms in the mid-1970s is due to a redefinition of the term "farm" and not a sudden drop in the number of farms<sup>3</sup>. The rate of decline per year appears to be relatively steady since 1950--except when the definition changed in the mid-1970s.

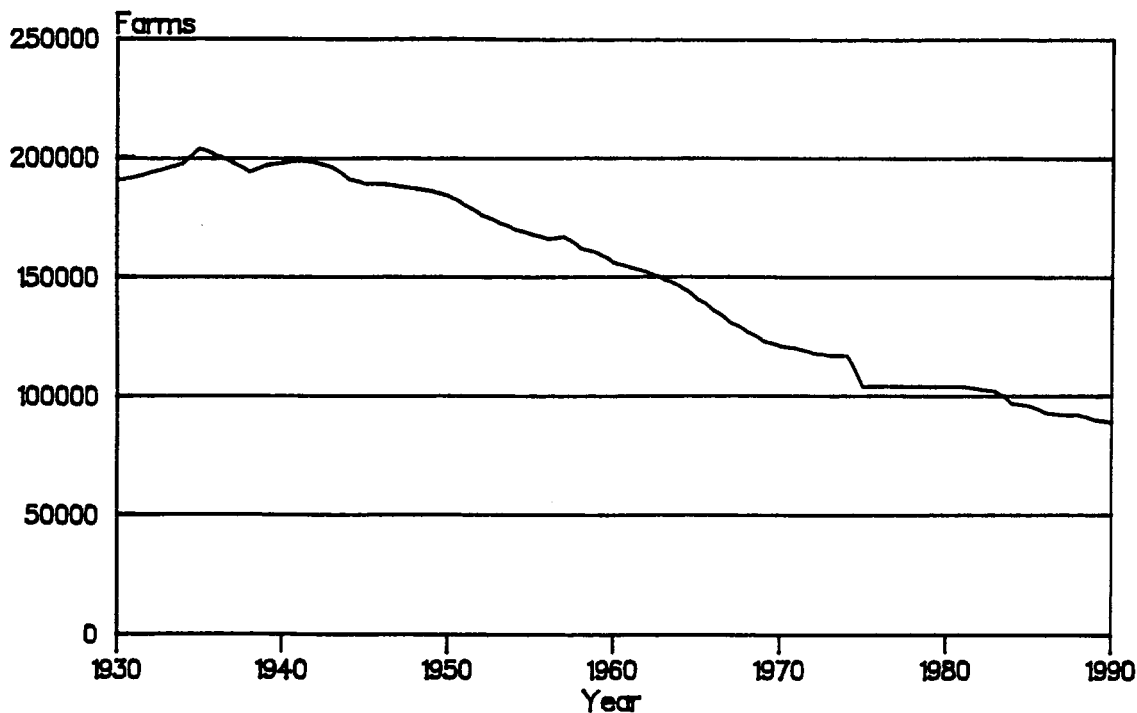
While the number of farms has dropped by half during the last five decades, the amount of land in farms has not changed drastically. More than 90% of all the land that has ever been classified as farmland in Minnesota is still farmed. In 1935, 32.9 million acres were farmed in Minnesota. In 1990, 30 million acres were farmed. The decline in number of farms and the stability in total acreage has an obvious effect on the average farm size. The average Minnesota farm had 165 acres in 1940, 222 acres in 1964, and 326 in 1987 (Figure 2). The average farm size for the entire U.S. was 174 acres in 1940, 352 acres in 1964, and 462 acres in 1987.

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<sup>2</sup>Census of Agriculture, 1920, p. 487.

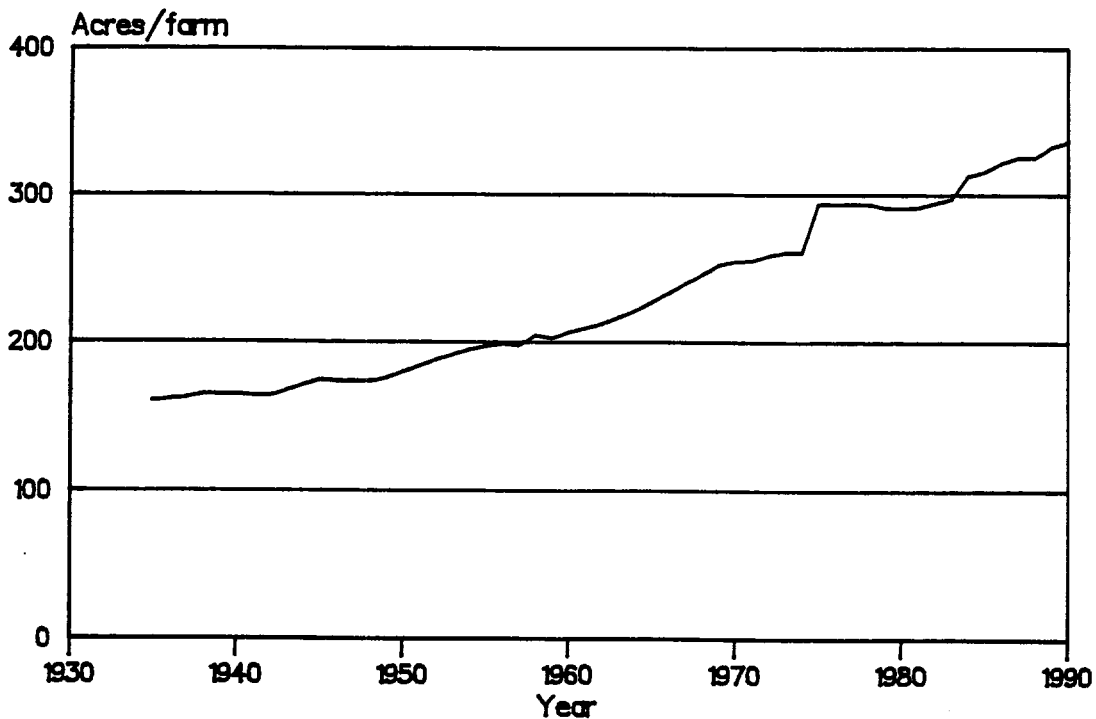
<sup>3</sup>The definition of a farm has changed several times during the history of the Census. See Appendix A for details.

Figure 1. Number of Farms in Minnesota (1930–1990)



Source: Minnesota Agricultural Statistics

Figure 2. Average Farm Size in Minnesota (1930–90)



Source: Minnesota Agricultural Statistics

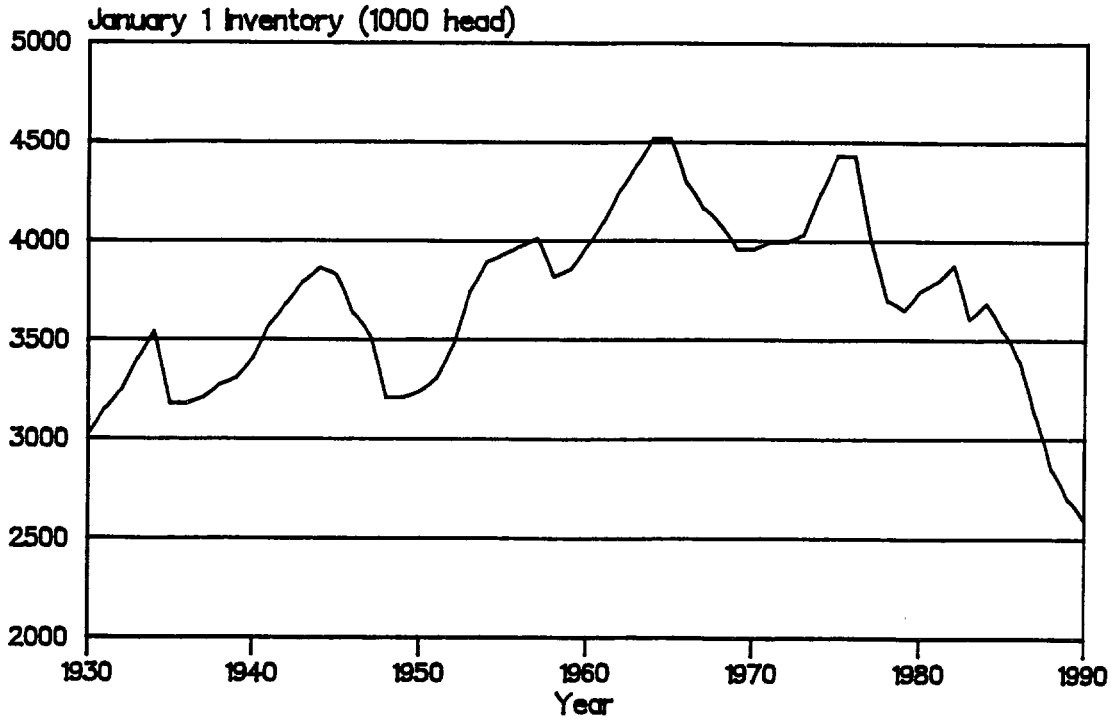
## 2. All Cattle (Beef and Dairy)

The total number of cattle and calves in Minnesota increased from 1930 to 1964/65 when it peaked at 4.5 million head (January 1 inventory; Figure 3). Subsequently, the number of cattle decreased to 4.0 million in 1969; increased to 4.4 million in 1975; and declined to 2.8 million head on January 1, 1991. The number of farms with cattle has decreased at a faster rate than the total number of head causing a rise in the number per farm. In 1965 there were 102,000 farms with cattle; in 1990 40,000 -- a 58% decrease in 25 years (Figure 4). (Prior to 1965, records on the number of farms with cattle are not available.) In the same period, the total number of cattle decreased 35%. Thus, the number of cattle per farm increased.

### 2.1. Dairy

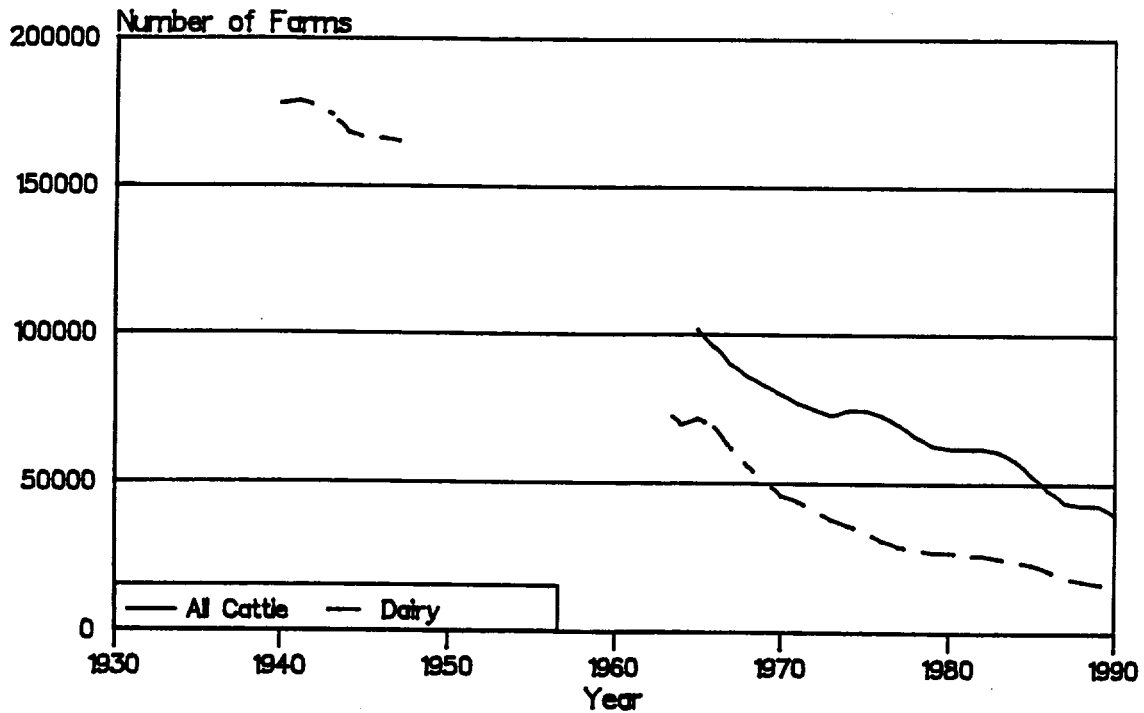
Milk production in Minnesota has increased even though both the number of dairy farms and the number of dairy cows has declined. Between 1943 and 1990, the number of milk cows decreased 59%: from 1.7 million cows in 1943 to 710,000 in 1990 (Figure 5). During this same period, total milk production in the state increased 14%: from 8,810 million lbs. in 1943 to 10,006 million lbs. in 1990. The number of dairy farms was at a high of 179,000 farms in 1941; by 1970 the number of dairy farms had declined to 46,000; in 1990, the number of dairy farms was down to 15,500 farms. Between 1970 and 1980, the number of dairy farms declined by a total of 41% which was an average of 1,900 farms per year. Between 1980 and 1990 during which the farm financial crisis occurred, the number of dairy farms declined a total of 43% which was an average of 1,150 dairy farms per year.

Figure 3. Cattle Inventory in Minnesota (1930–1990)



Source: Minnesota Agricultural Statistics

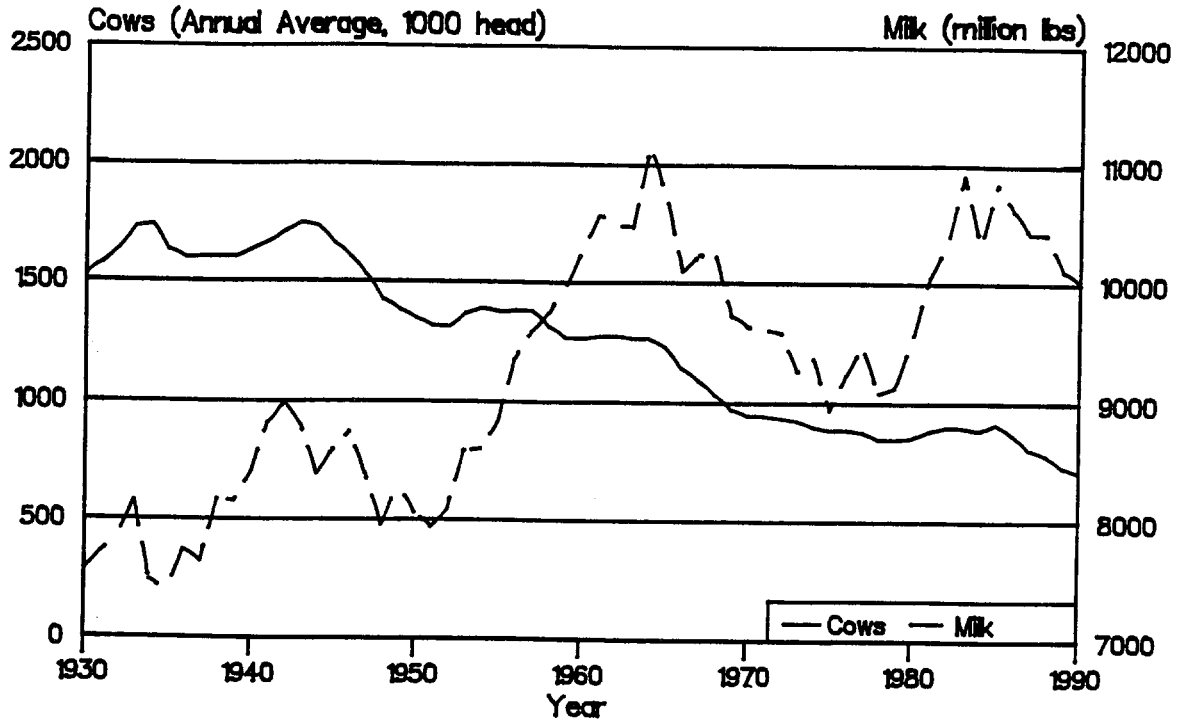
Figure 4. Minnesota Farms with Cattle (1930–1990)



Source: Minnesota Agricultural Statistics

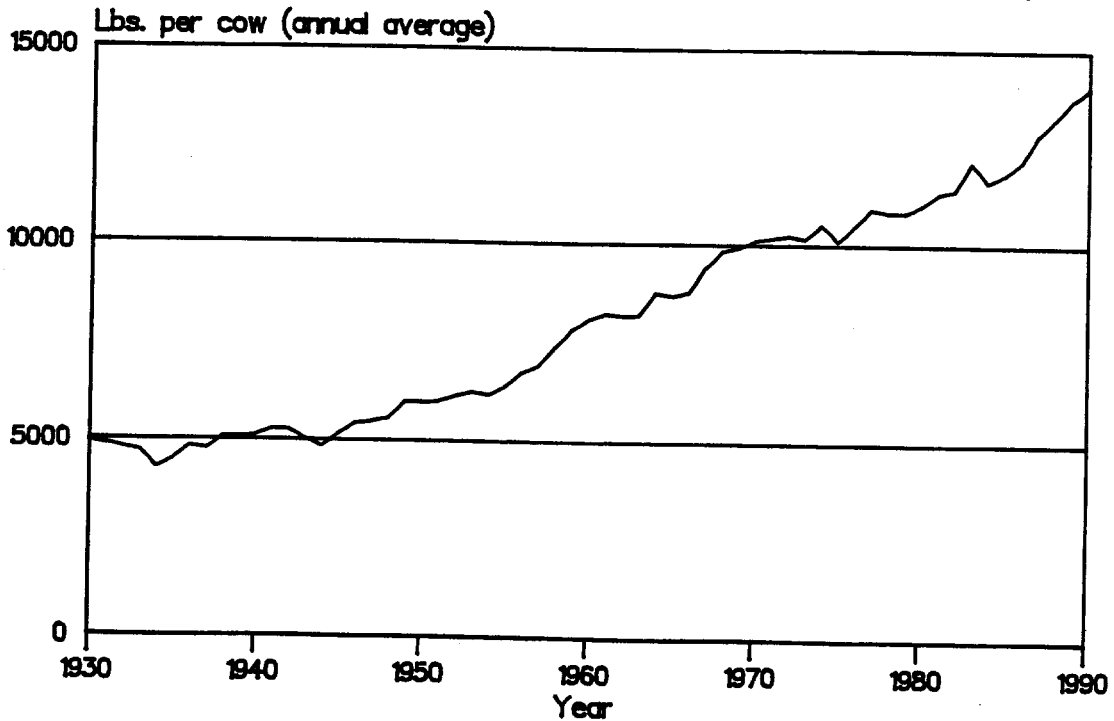


Figure 5. Milk Cows and Milk Production in Minnesota (1930-1990)



Source: Minnesota Agricultural Statistics

Figure 6. Average Milk Production per Cow, Minnesota (1930-1990)



Source: Minnesota Agricultural Statistics

Average milk production per cow has increased steadily since the 1930s (Figure 6). In 1990 the average Minnesota dairy cow produced 14,093 lbs. of milk per year--three times what a cow produced in 1935. The butterfat percentage has decreased from 3.75% the 1930s to 3.65% in 1990. Since the milk production per cow has increased by a higher percentage during this period, the total pounds of butterfat per cow has increased.

## 2.2. Fed beef

Information on the number of fed beef in Minnesota stated in 1955, when the inventory of beef on feed January 1 was 321,000 (Figure 7). The number increased to 589,000 in 1970. Since then the inventory of fed beef has fluctuated, although a declining trend can be seen. On January 1, 1990, the inventory was 300,000 head; in 1991, the number rose to 345,000.

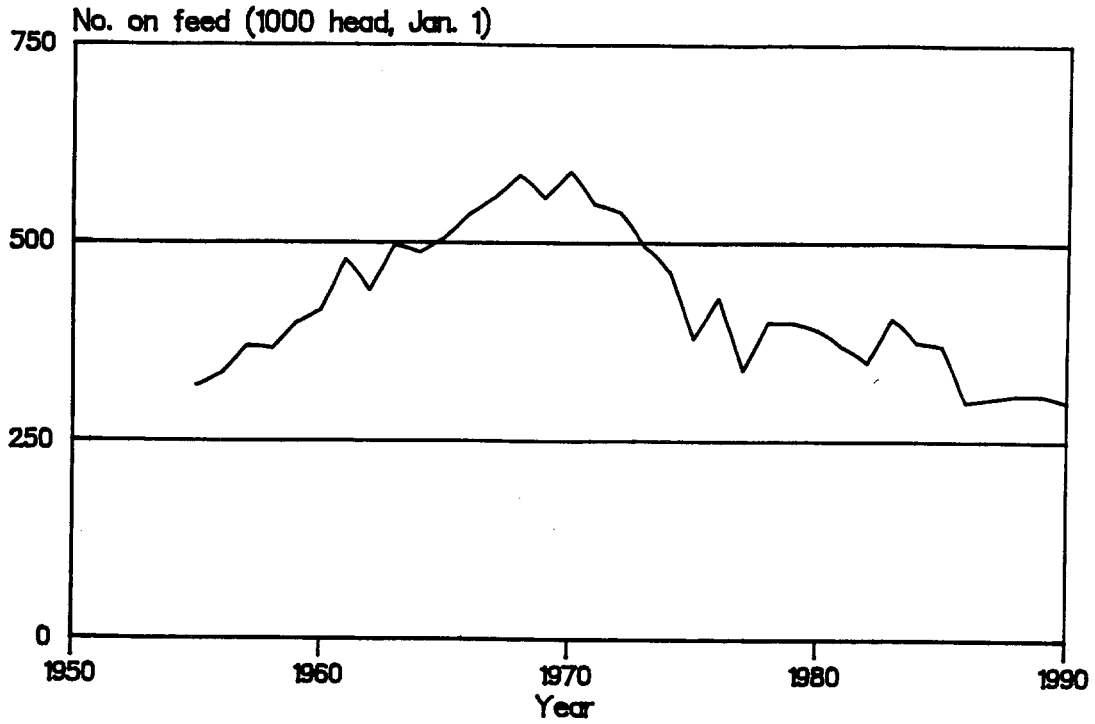
## 2.3. Beef cows

Similar trends can be seen for the number of beef cows (January 1 inventory). The number of beef cows increased from 91,000 in 1939 to its peak at 751,000 head in 1976 (Figure 8). After 1976, the trend reversed. On January 1, 1991, the total number of beef cows in Minnesota was 375,000--about half the 1976 level. The number of farms with beef cows has decreased from 28,170 in the 1964 agricultural census to 15,528 farms in the 1987 census.

## 3. Hogs

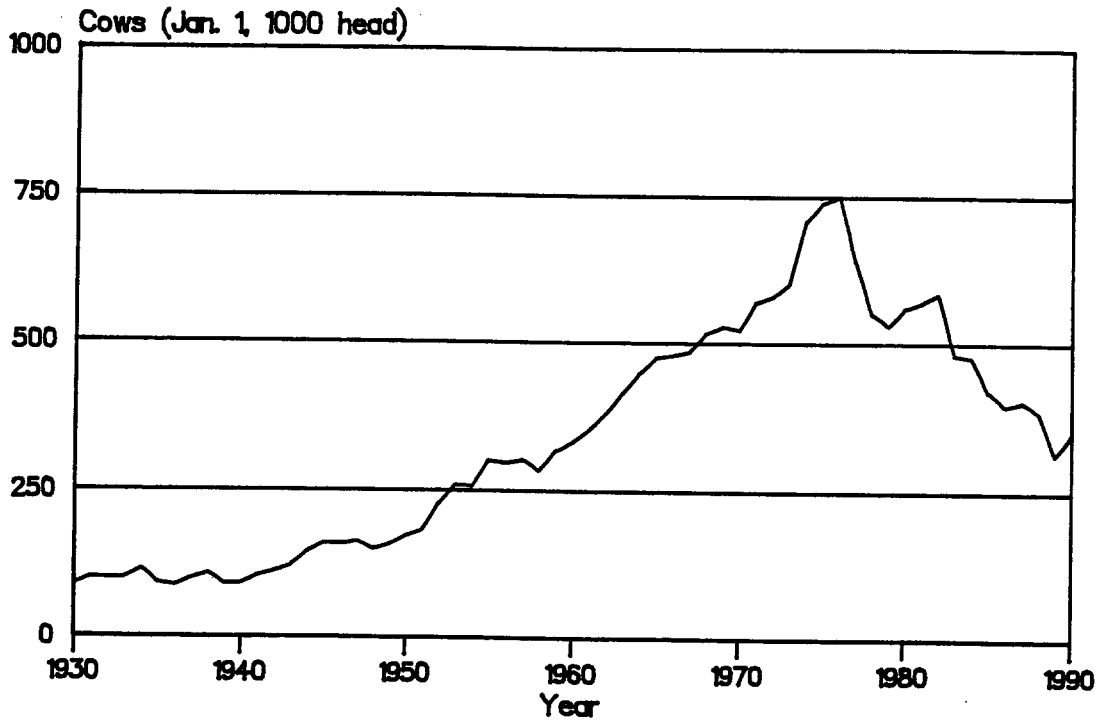
The hog industry in Minnesota has undergone a substantial change since the 1960s. In the early 1950s, there were more than 100,000 farms with hog and pig inventories (Figure 9). In the 1950 agricultural census, 62% of

Figure 7. Number of Fed Beef, Minnesota (1950–1990)



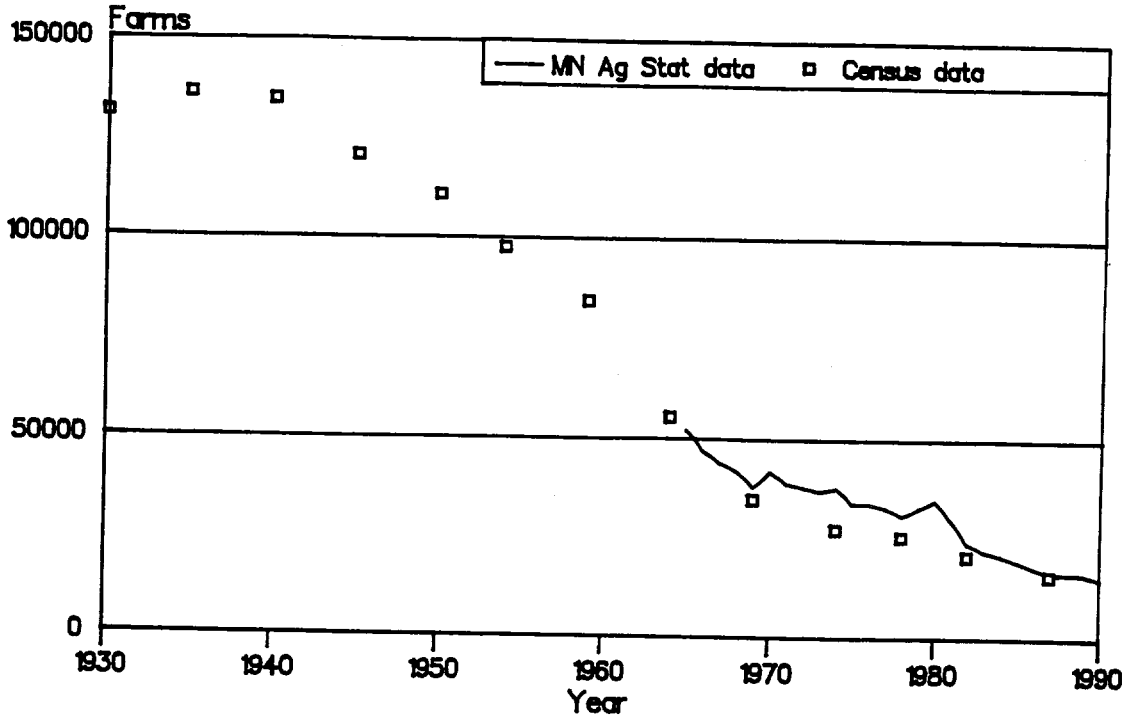
Source: Minnesota Agricultural Statistics

Figure 8. Number of Beef Cows in Minnesota (1930–1990)



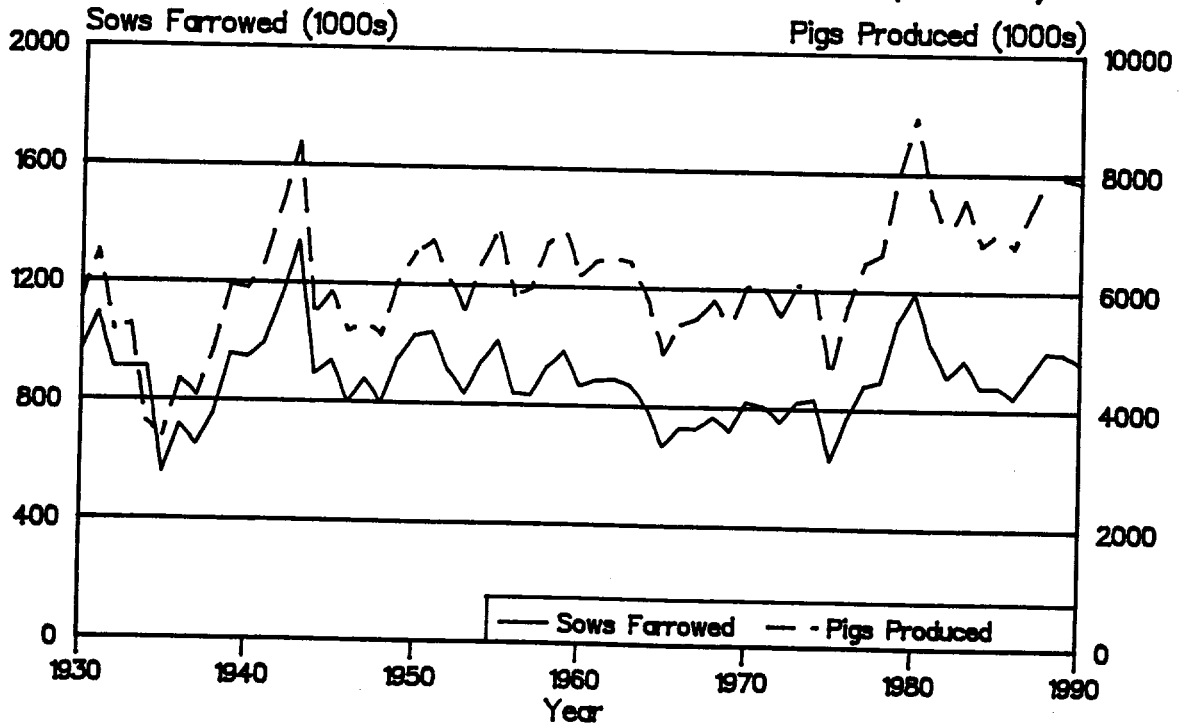
Source: Minnesota Agricultural Statistics

Figure 9. Number of Hog Farms in Minnesota (1930-1990)



Source: Minnesota Agricultural Statistics and Census of Agriculture

Figure 10. Sows Farrowed and Pigs Produced, Minnesota (1930-1990)



Source: Minnesota Agricultural Statistics

Minnesota farms had hogs. Since then hogs have disappeared from the majority of farms. Except for a rise in the number of farms with hogs in 1970, 1974, 1979, and 1980, there have been few disruptions in the downward sloping trend. In 1990, there were 15,000 farms with hogs in Minnesota--17% of all farms in Minnesota.

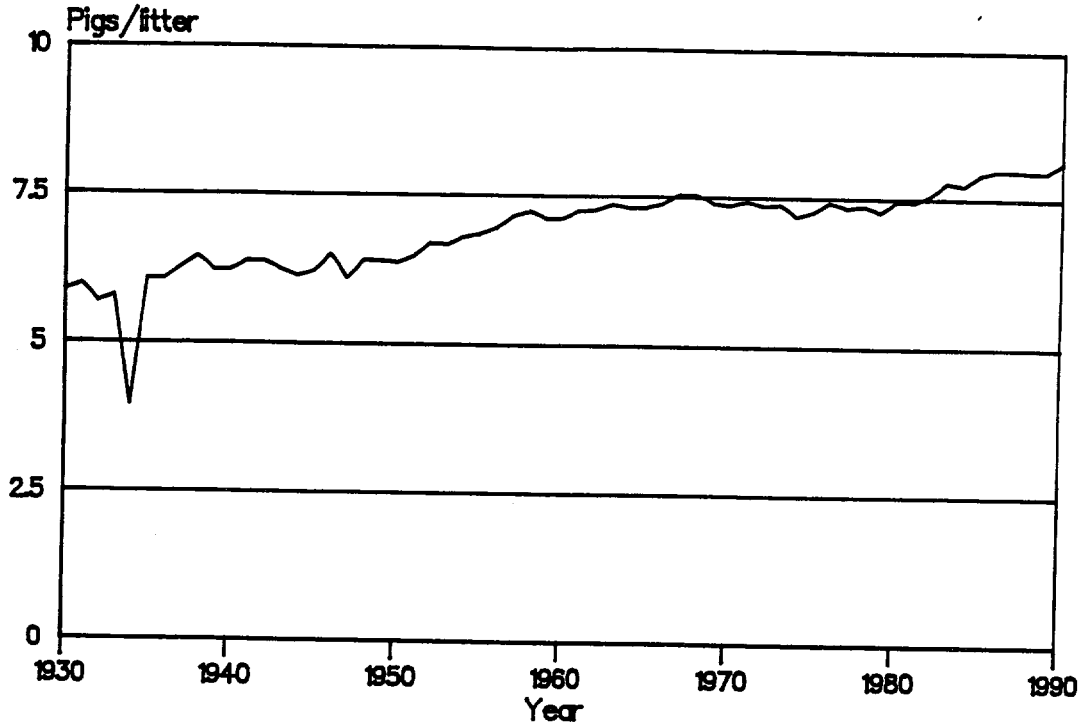
The sharp decline in the number of hog farms is not reflected on the output side. The number of sows farrowed in Minnesota fluctuates in some periods (especially around 1940 and in the late 1970s), but during the whole period since 1930 the average number of sows farrowed is usually between 0.8 and 1.0 million (Figure 10). The number of farrowings was 965,000 in 1990, up from 669,000 in 1965. The pig crop had a pattern very similar to the number of sows farrowed: fluctuations around an annual average of 6 million pigs up to 1979 when production increased to a higher level near 8 million pigs. In 1990, the pig crop was 7.9 million pigs. Average annual production per Minnesota hog farm increased from 94 pigs in 1965 to 524 in 1990.

One measure of efficiency in hog production is the number of pigs born per litter. This is calculated by dividing the annual pig crop by the number of sows farrowed each year. Since 1930 this measure has shown a steady, though not dramatic, increasing trend (Figure 11). In 1930, the average litter was 5.9 pigs. In 1990, the average was 8.1 pigs per litter.

#### 4. Sheep

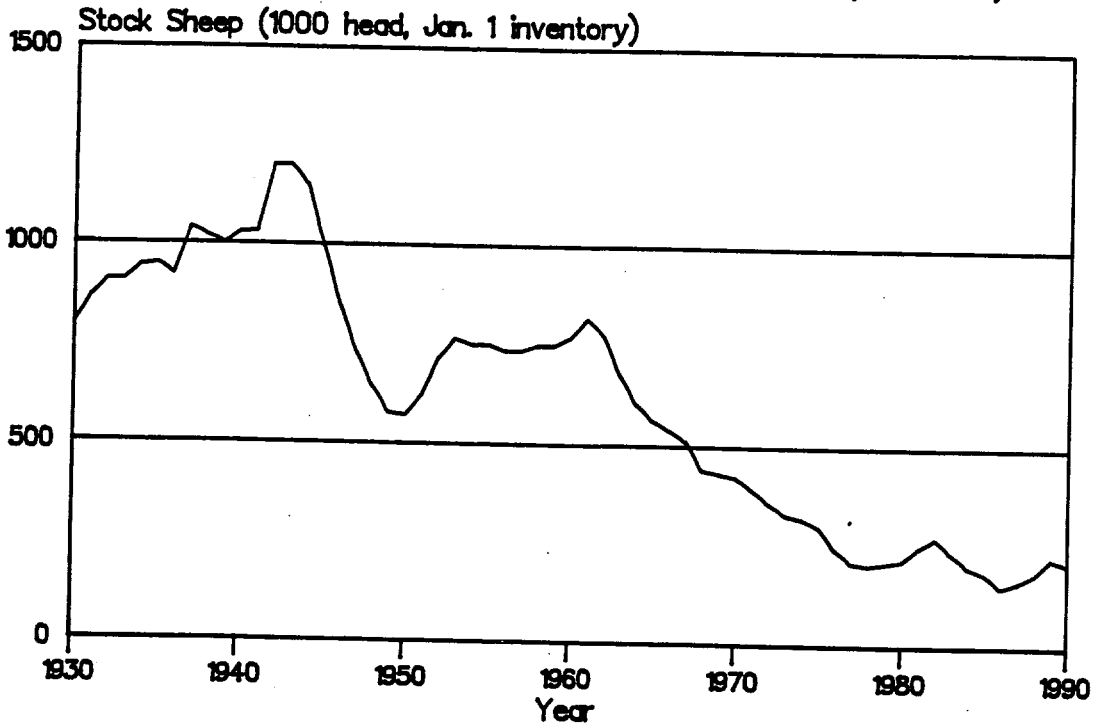
The same trends are seen for sheep as have been seen for other livestock. The inventory of stock sheep for breeding increased to 1.2 million animals on January 1, 1942 (Figure 12). By the end of the 1940s, the number had decreased to half that level. For the next ten years, the number was

Figure 11. Pigs Produced per Litter, Minnesota (1930-1990)



Source: Minnesota Agricultural Statistics

Figure 12. Total number of Stock Sheep, Minnesota (1930-1990)



Source: Minnesota Agricultural Statistics

quite stable before it began to decline again in 1962. The number of stock sheep reached a low in 1986 of 150,000 head. Since then it has increased slightly to 210,000 head in 1990.

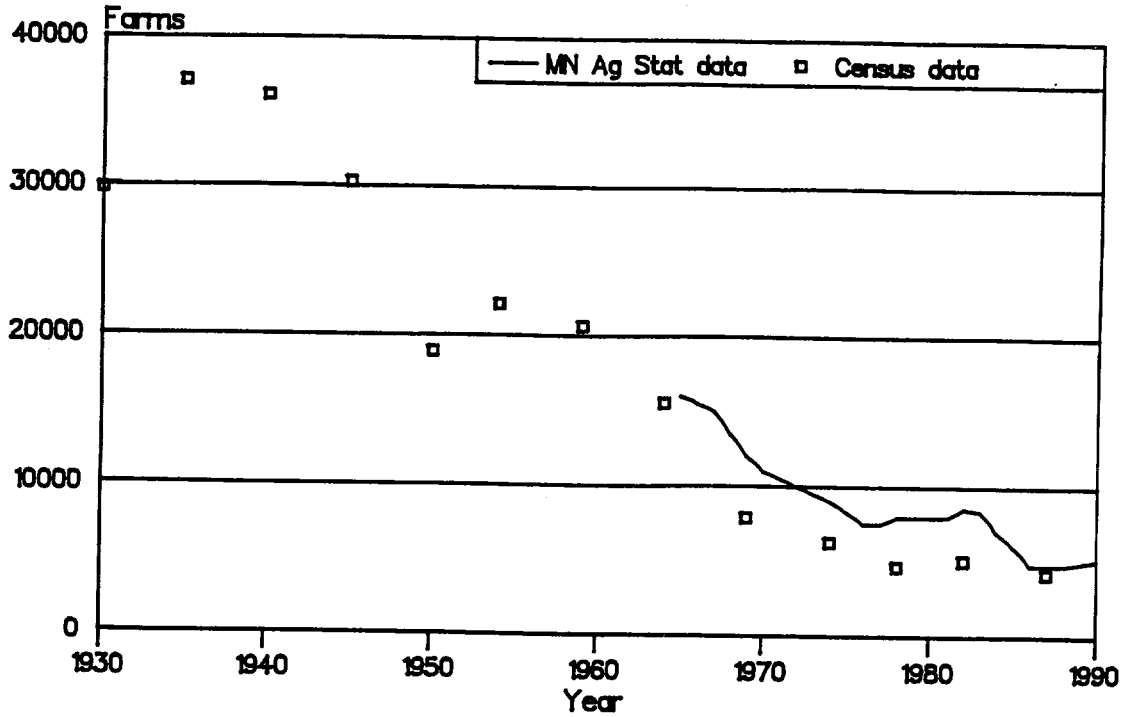
The number of sheep farms in Minnesota reached a high of 37,000 in the 1935 agricultural census (Figure 13). This number declined to 19,000 in 1950 but then increased in the 1950s. The number of sheep farms has declined to 4,250 sheep farms in Minnesota in the 1987 Census. The data gathered by the Minnesota Agricultural Statistics Service beginning in 1965 show the same pattern.

The number of lambs saved and the number of sheep marketed in Minnesota follow patterns similar to each other and similar to the number of farms (Figure 14). In most years the number of sheep marketed has been higher than the number of lambs saved due to imports from other states. In 1990, there were 220,000 lambs saved and 217,000 marketed. The number of lambs saved per stock sheep has slowly, but steadily, increased from 0.8 in 1930 to 1.0 in 1990.

## 5. Poultry

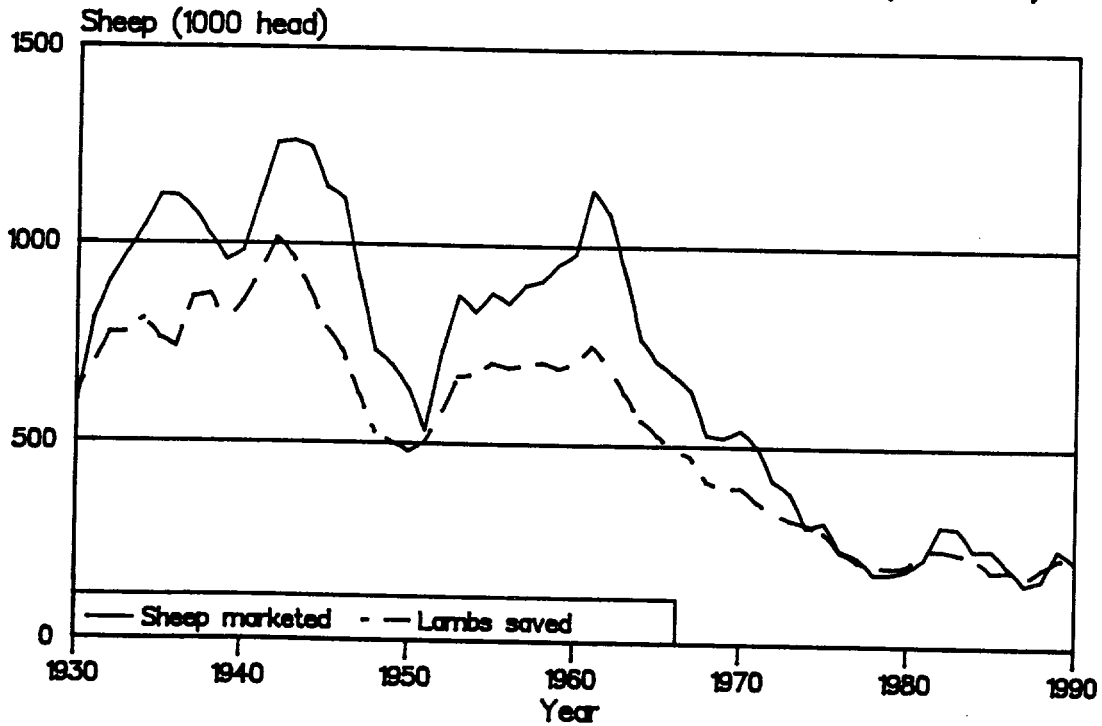
In the analysis of the poultry industry, the production of eggs and the production of meat need to be viewed separately. These two categories have very different trends. In earlier years, farms produced both eggs and poultry meat from the same small flock. In more recent decades, the production of eggs and meat has become separated and specialized. The size of the egg industry in Minnesota has decreased. The story of the broiler and turkey industries, however, has been expansion.

Figure 13. Number of Sheep Farms in Minnesota (1930–1990)



Source: Minnesota Agricultural Statistics and Census of Agriculture

Figure 14. Sheep Marketed and Lambs Saved, Minnesota (1930–1990)



Source: Minnesota Agricultural Statistics



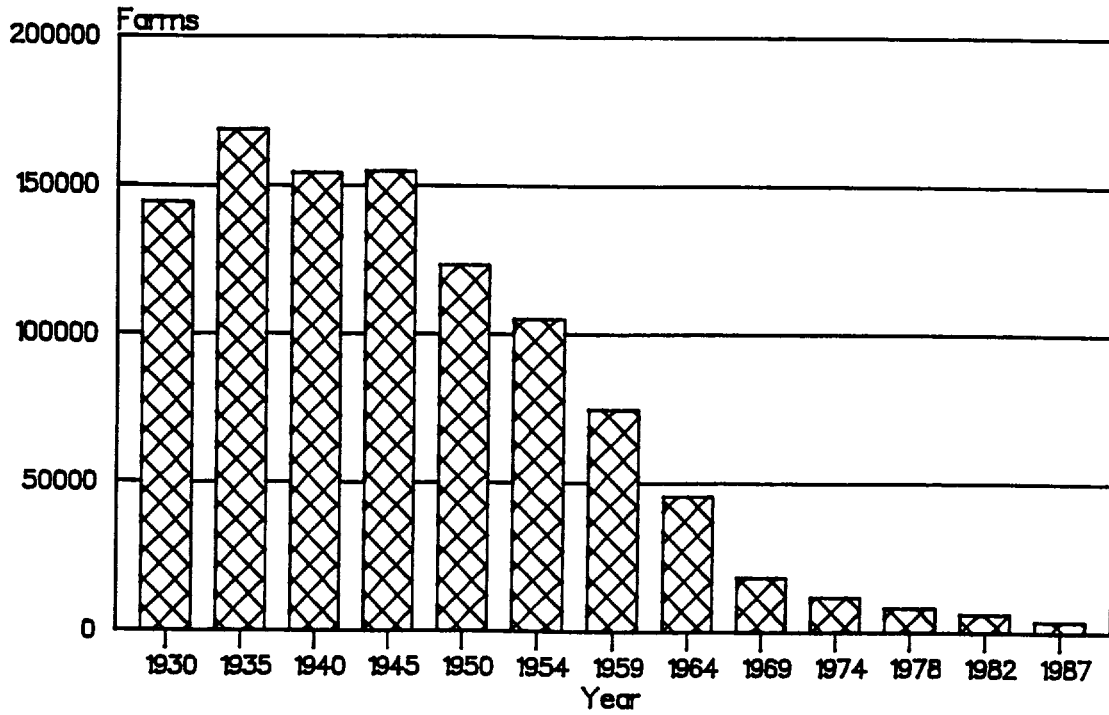
### 5.1. Eggs

The largest number of Minnesota farms producing eggs was 169,000 in the 1935 Census of Agriculture (Figure 15). In 1987, only 4000 farms produced eggs--more than a forty-fold decrease from 1935. The number of layers on Minnesota farms peaked in 1944 at 27 million and has fallen steadily until 1970 (Figure 16). Since 1973, the number of layers on farms in Minnesota had fluctuated between 10.7 million in 1973 and 1974 to 8.7 million in 1989. In 1990, there were 9.6 million layers. Even though the number of layers has declined substantially, each hen is more efficient today than earlier generations were. On an annual basis, the average hen laid 108 eggs in 1943 (Figure 17). Since then, this number has more than doubled. In 1990, the average was 259 eggs per hen per year.

### 5.2 Broilers and Turkeys

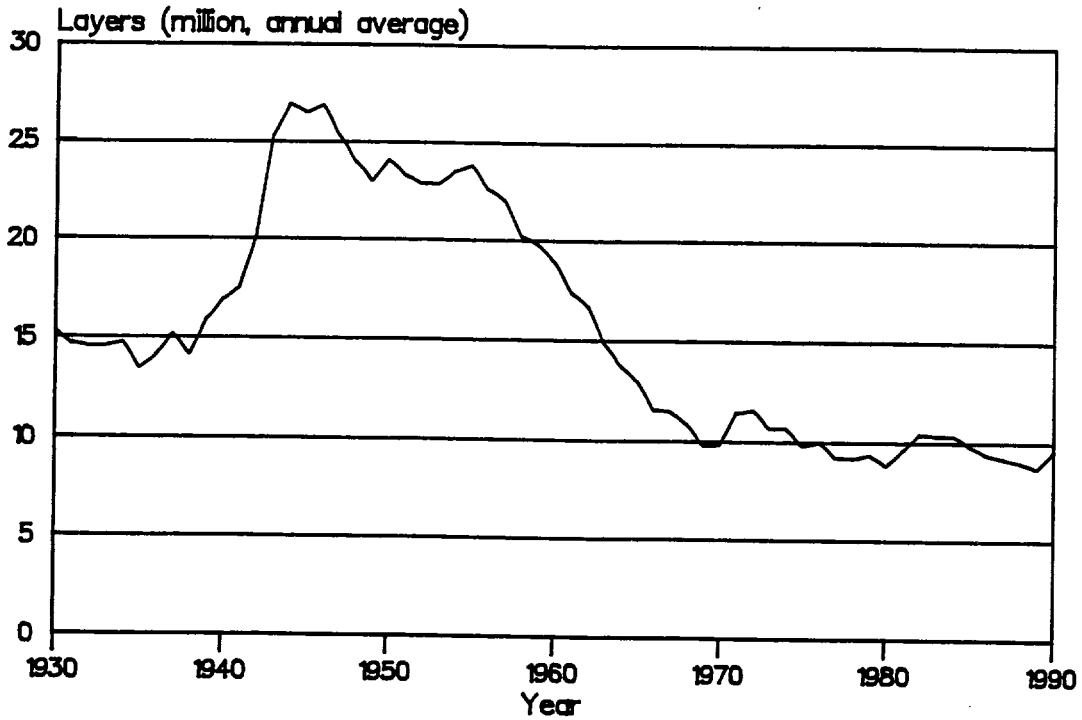
According to the 1987 Agricultural Census, 3,011 Minnesota farms reported an inventory of broilers (or other meat-type chickens) in 1974. This number has decreased to 1,589 farms in 1987 (Figure 18). During the same period there was a very substantial increase in the number of broilers raised on Minnesota farms. From late 1950, the number of broilers rose from 2.2 to 11 million in 1962 (Figure 19). Then the number of broilers leveled off until 1976. In 1988, 41 million broilers were raised in Minnesota. These changes produced some interesting changes in the number of broilers per farm. In 1974, there were an average of 3,600 broilers per farm; by 1987, the average had increased over sevenfold to 25,991.

Figure 15. Number of Farms Producing Eggs, Minnesota (1930–1987)



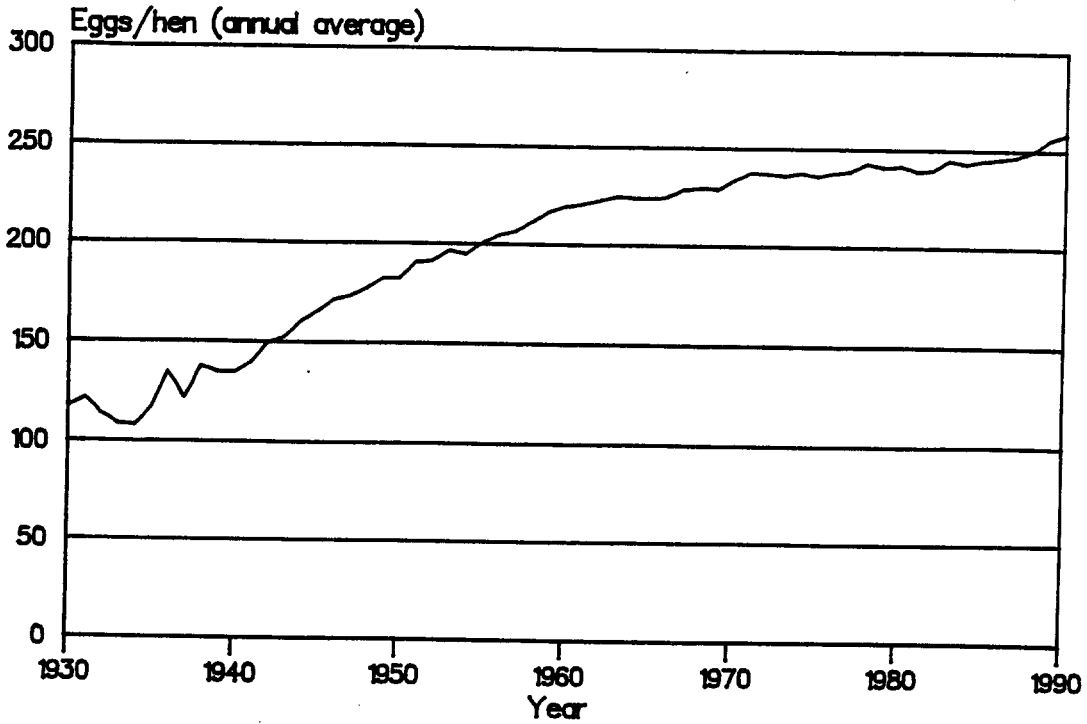
Source: Census of Agriculture

Figure 16. Layers on Farms, Minnesota (1930–1990)



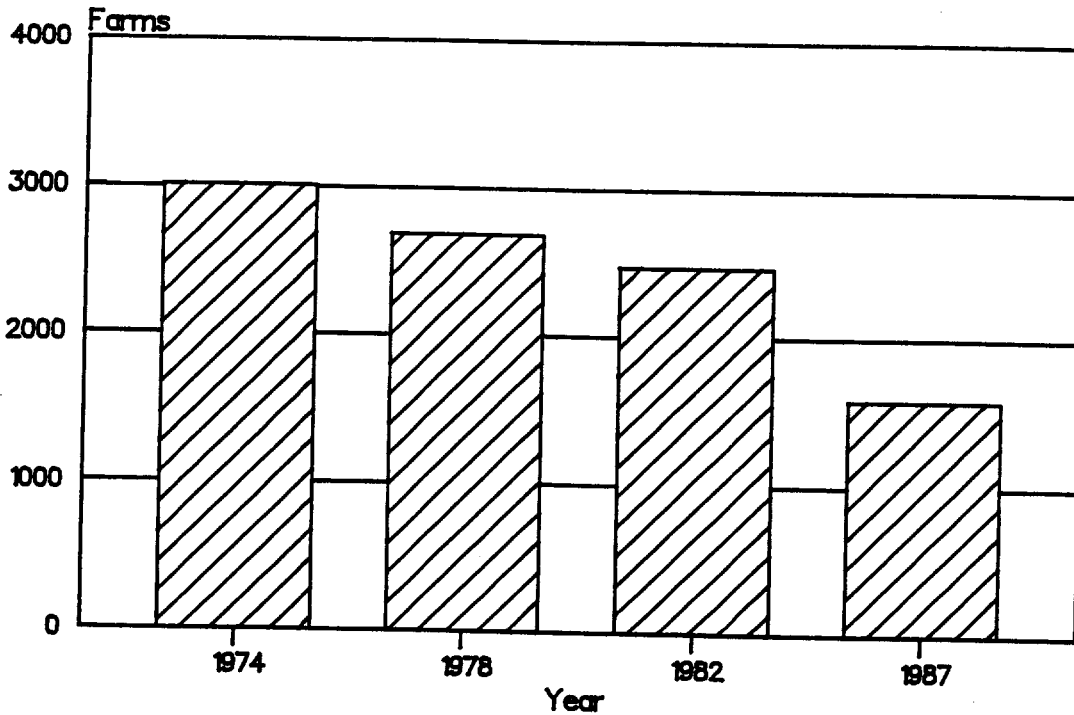
Source: Minnesota Agricultural Statistics

Figure 17. Eggs Produced per Hen per Year, Minnesota (1930–1990)



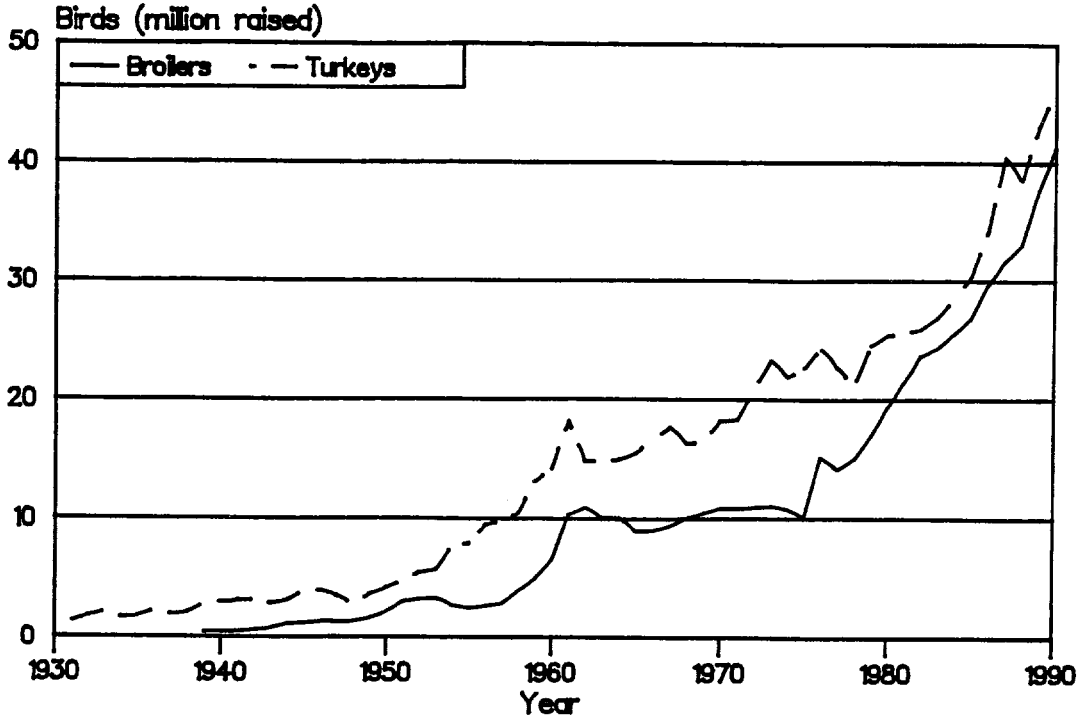
Source: Minnesota Agricultural Statistics

Figure 18. Number of Farms with Broilers and Other Meat Chickens, Minnesota (1974–1987)



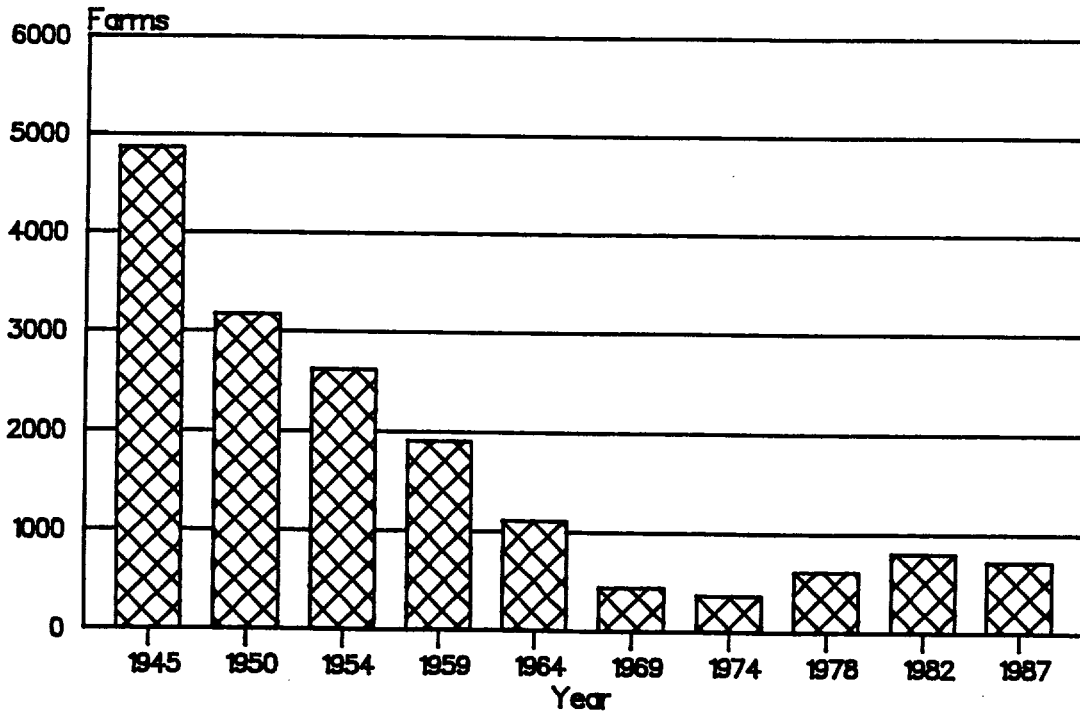
Source: Census of Agriculture

Figure 19. Commercial Broilers and Turkeys Raised, Minnesota (1930-1990)



Source: Minnesota Agricultural Statistics

Figure 20. Number of Farms with Turkeys, Minnesota (1945-1987)



Source: Census of Agriculture

Compared to broilers, the number of turkeys raised has had a more even, but still rapid, increase. In 1930, there were 1.3 million turkeys raised in Minnesota in 1940, 3 million; in 1950, 4.2 million; in 1960, 14.3 million; in 1970, 18.3 million; and in 1980, 25.5 million. In 1990, there were 46.3 million turkeys raised in Minnesota. According to the Census of Agriculture the number of Minnesota farms with turkeys decreased from 4,868 in 1945 to 370 farms by 1974 (Figure 20). The 1987 census reports 723 farms producing turkeys in 1987. Thus, the average number of turkeys per farm has increased tremendously, from 817 in 1945 to 56,000 per farm in 1987.

## 6. Costs and Returns

There are many approaches that can be taken in the attempt to describe economic trends in agricultural production. Ultimately one is interested in knowing what the operator/manager is left with after all expenses incurred in production are covered. This residual amount is subject to variation, the volatility of which differs between enterprises. This variation has two main sources: variation in the costs of production per unit and variation in output prices. In order to separate these two sources of variation, we will look at two different concepts when describing the economic conditions at the farm level. This section utilizes the information provided by the U.S. Department of Agriculture (1990 a and b). The first concept is Total Economic Cost which is a measure of all costs not just out-of-pocket cash costs. It includes both variable and fixed cash expenses as well as the potential returns to (i.e., opportunity costs of) owned inputs, including unpaid labor. Thus, it includes a cost for operator and family labor. The second concept is Residual Returns to Management and Risk. This is a measure of what is left

from the production and sale of one unit of product, when the Total Economic Cost is subtracted. The Total Economic Cost can be viewed as a measure of input costs, while the Residual Return to Management and Risk also takes variation in output prices into account. These estimates are only available up to 1988; more recent estimates have not been published.

### 6.1. Dairy

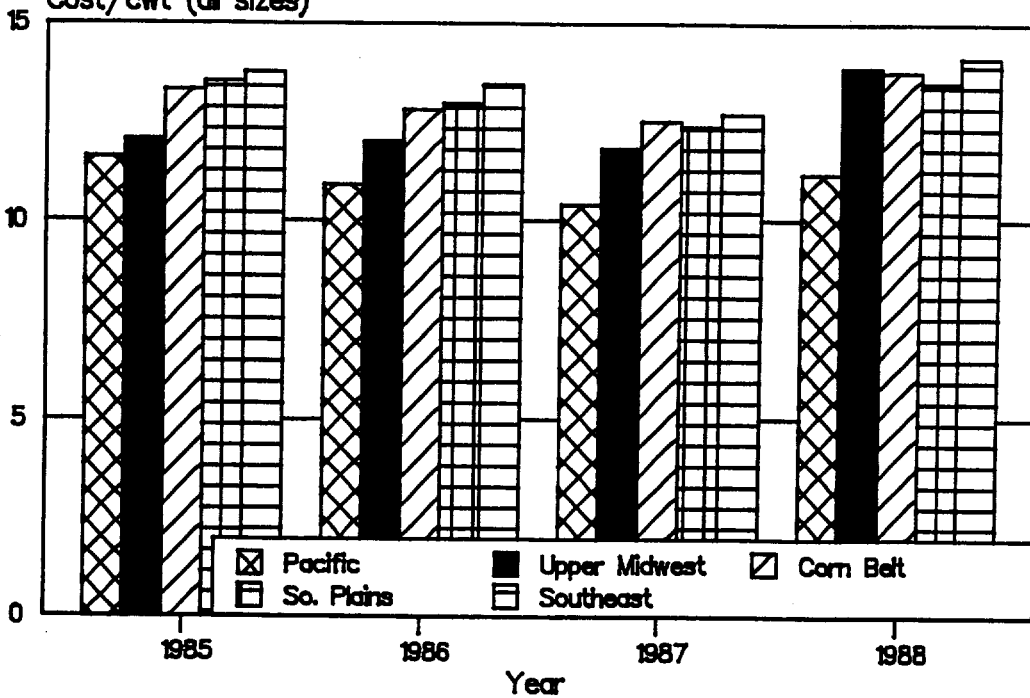
In four selected regions, the total economic cost of milk production was higher in 1988 than in the previous three available years (Figure 21). The Upper Midwest (which includes Minnesota) lost competitiveness since its cost increased at a more rapid rate relative to the other regions. The Pacific region had the lowest costs per cwt; however, the Southeast region had the highest residual returns (Figure 22).

### 6.2 Beef Cow Calf

For beef cow-calf enterprises, the total economic cost per cow has been much higher for small operations (100 or fewer cows) than on large ones (500 or more cows) (Figure 23). In the late 1980s this difference has been as large as \$150 per cow. The western states (West and Great Plains) have significantly lower total economic costs per cow than the North Central and the Southern states (Figure 24).

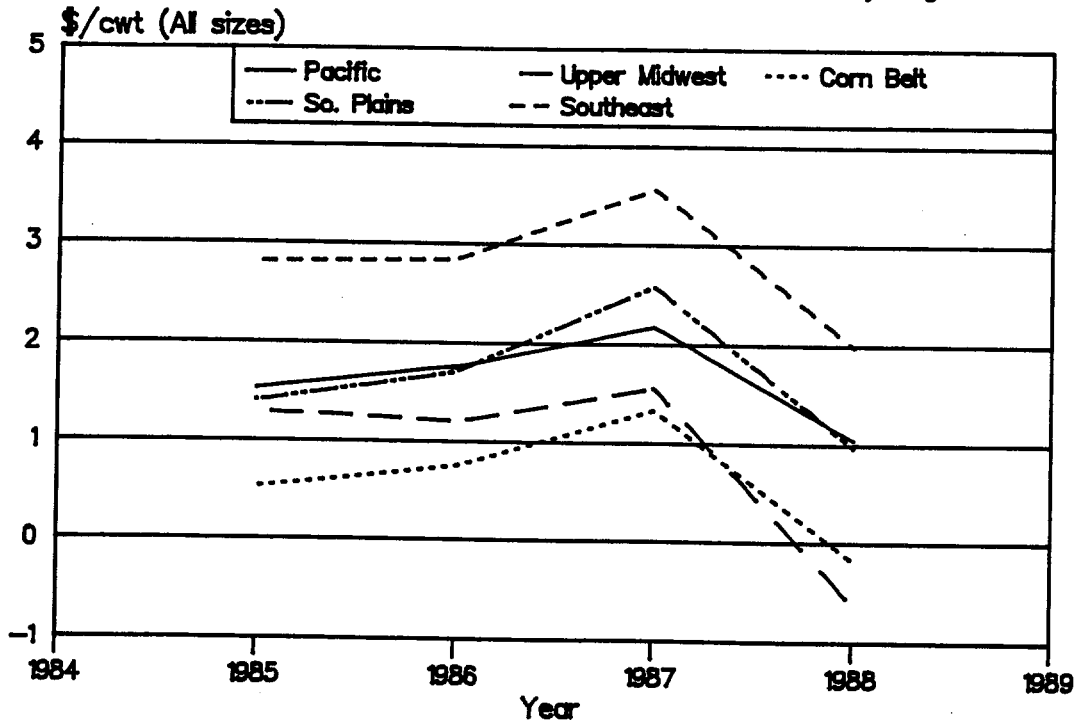
Cow-calf operations had an average residual returns between -\$50 and -\$230 in the period from 1972 to 1988 (Figure 25). Only the western states touched positive returns (in 1979) (Figure 26). Since the 1981 returns have been somewhat more stable than the previous decade.

Figure 21. Total Economic Cost in Milk Production, by selected region  
Cost/cwt (all sizes)



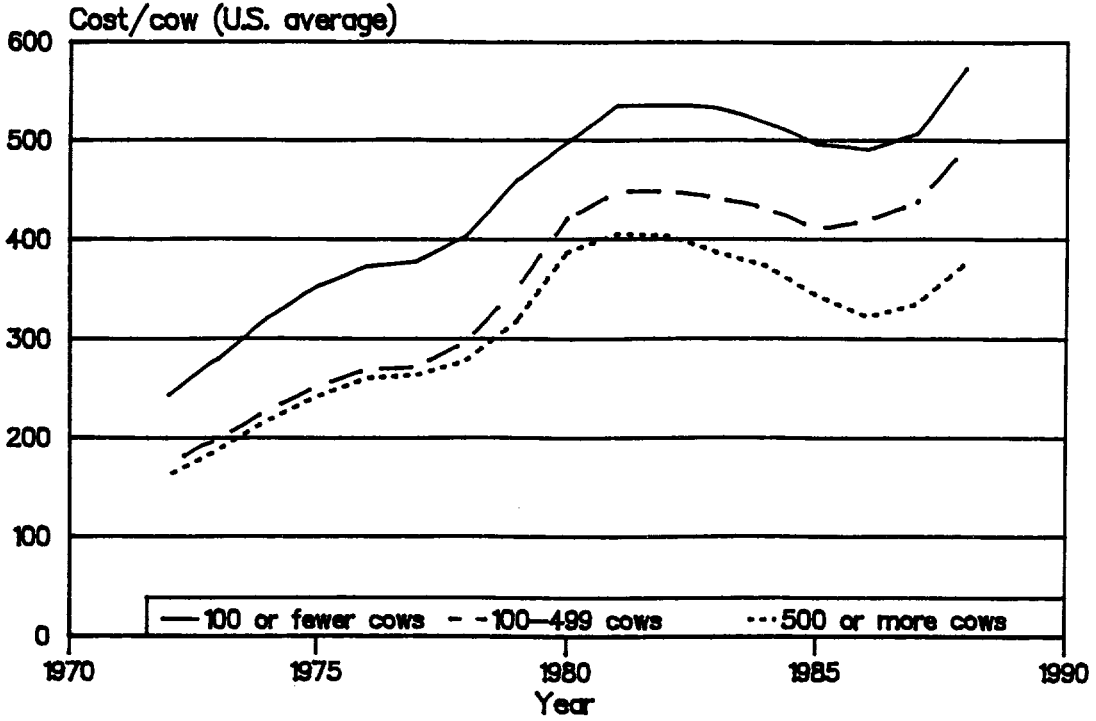
Source: USDA, 1990.

Figure 22. Milk Production, Residual Returns per cwt by region



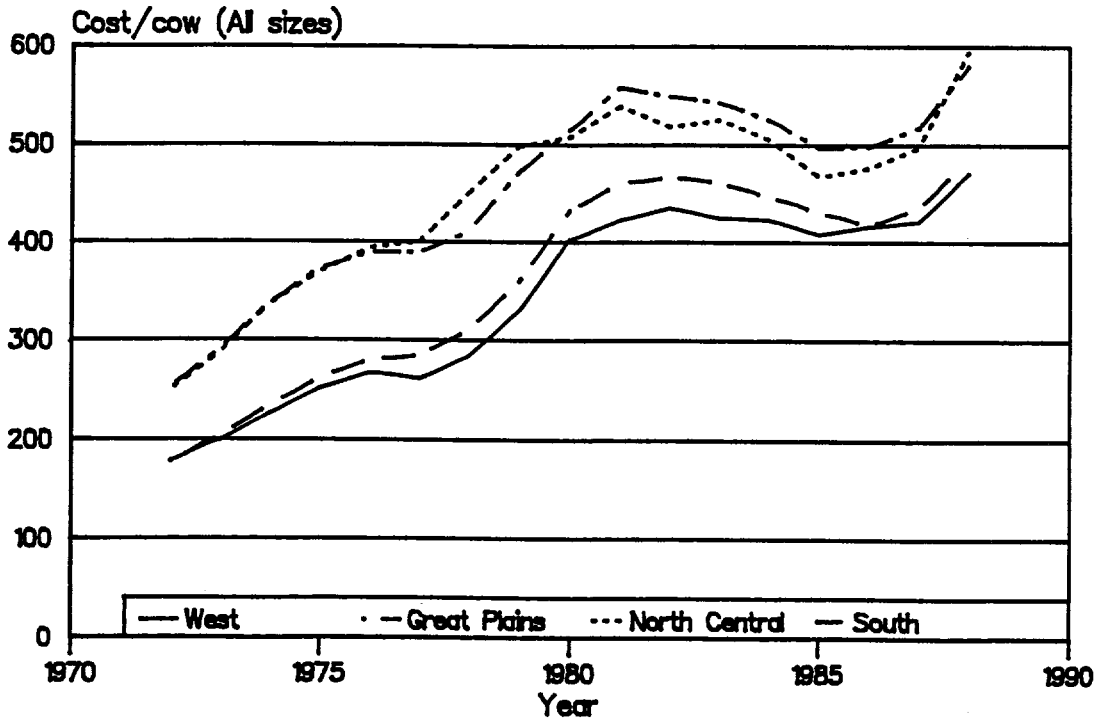
Source: USDA, 1990.

Figure 23. Beef Cow-Calf, Total Economic Cost, by herd size



Source: USDA, 1990.

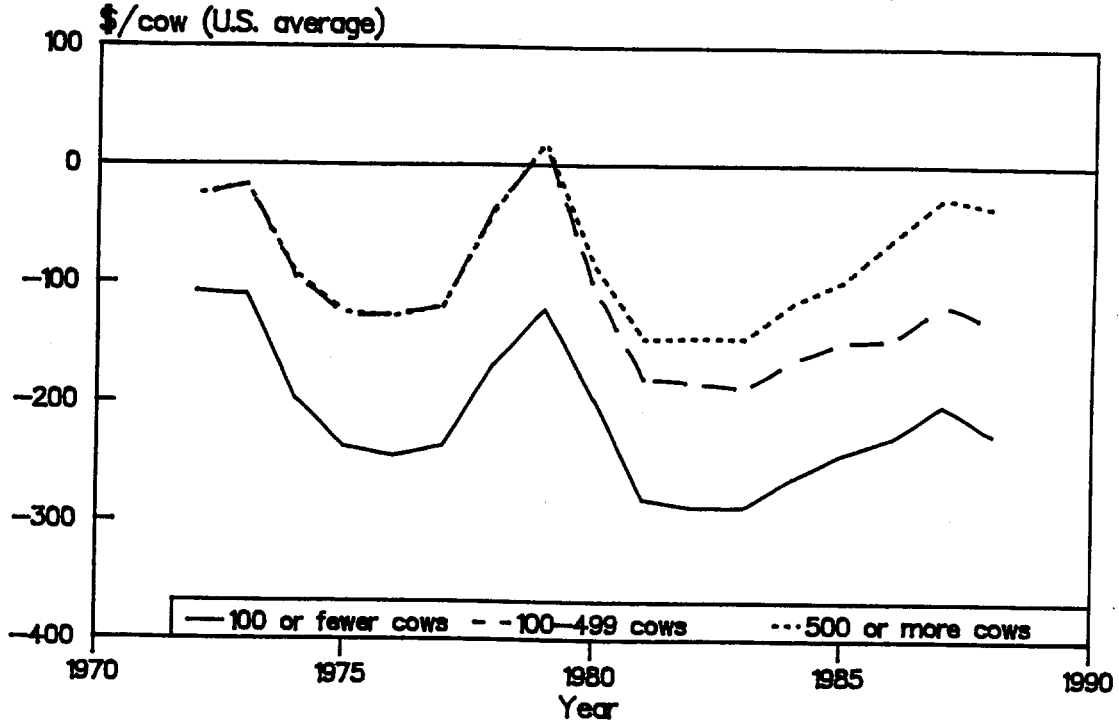
Figure 24. Beef Cow-Calf, Total Economic Cost, by selected region



Source: USDA, 1990.

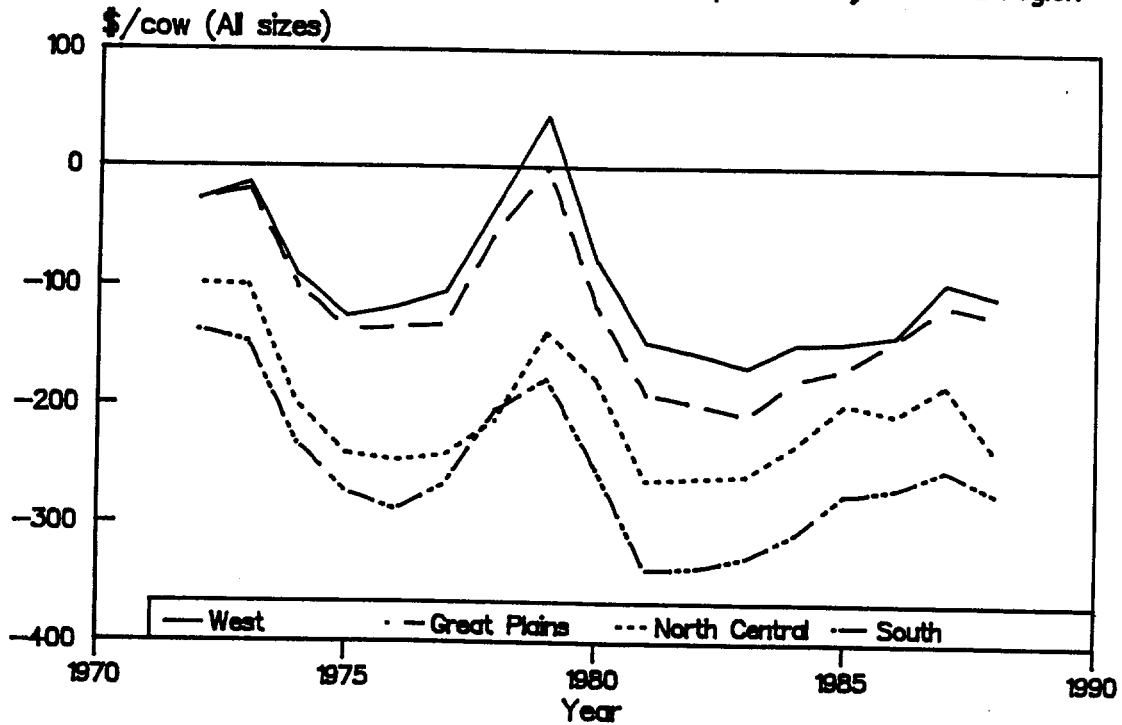


Figure 25. Beef Cow-Calf, Residual Returns per cow by herd size



Source: USDA, 1990.

Figure 26. Beef Cow-Calf, Residual Returns per cow by selected region



Source: USDA, 1990.

### 6.3. Beef Cattle

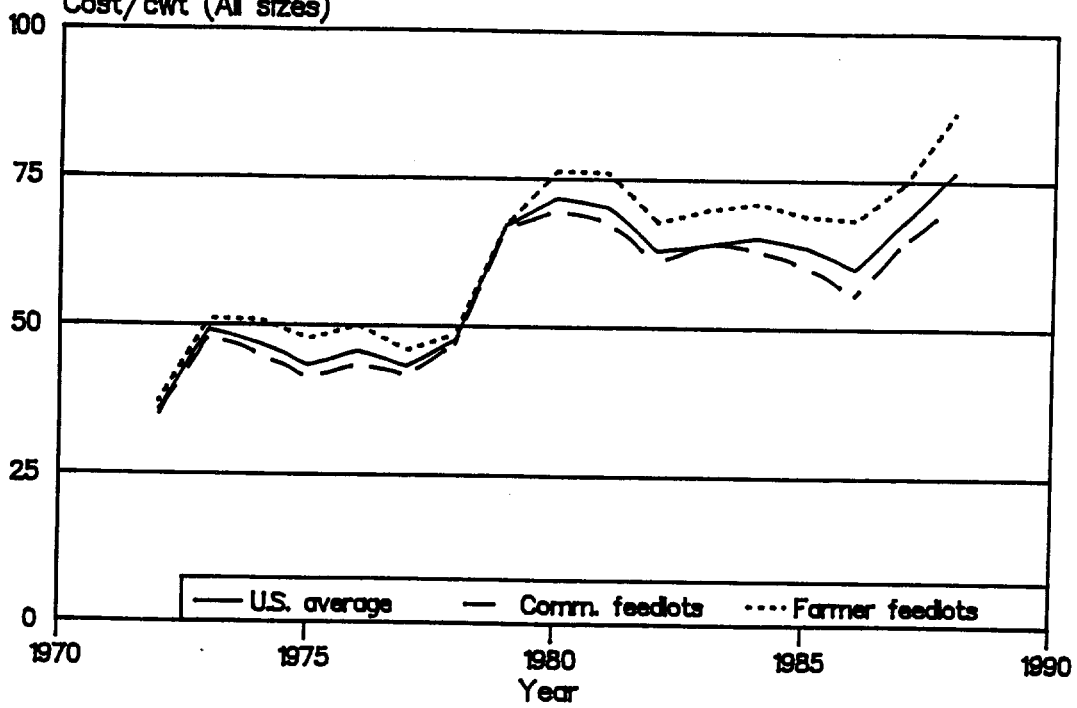
For the fed cattle, the total economic costs per cwt (nominal dollars) have been very stable through long periods (Figure 27). In the 1970s, these costs were typically around \$45 per cwt. The cost rose between 1978 and 1980 to fluctuate around \$65 per cwt. The cost has remained stable at this amount until the 1980s when it began rising again. Farmer feedlots have had consistently higher costs than commercial feedlots for most of the last two decades.

The residual returns to management and risk from fed cattle show great variation within just a few years (Figure 28). For fed cattle, the residual returns has ranged from -\$15 to +\$10 per cwt during the eighties. The difference between farmer and commercial feedlots is also increasing. The residual returns for commercial feedlots has fluctuated around zero with a recent upward trend. Farmer feedlots have had negative residual returns in most years and a recent decreasing trend.

### 6.4. Hogs

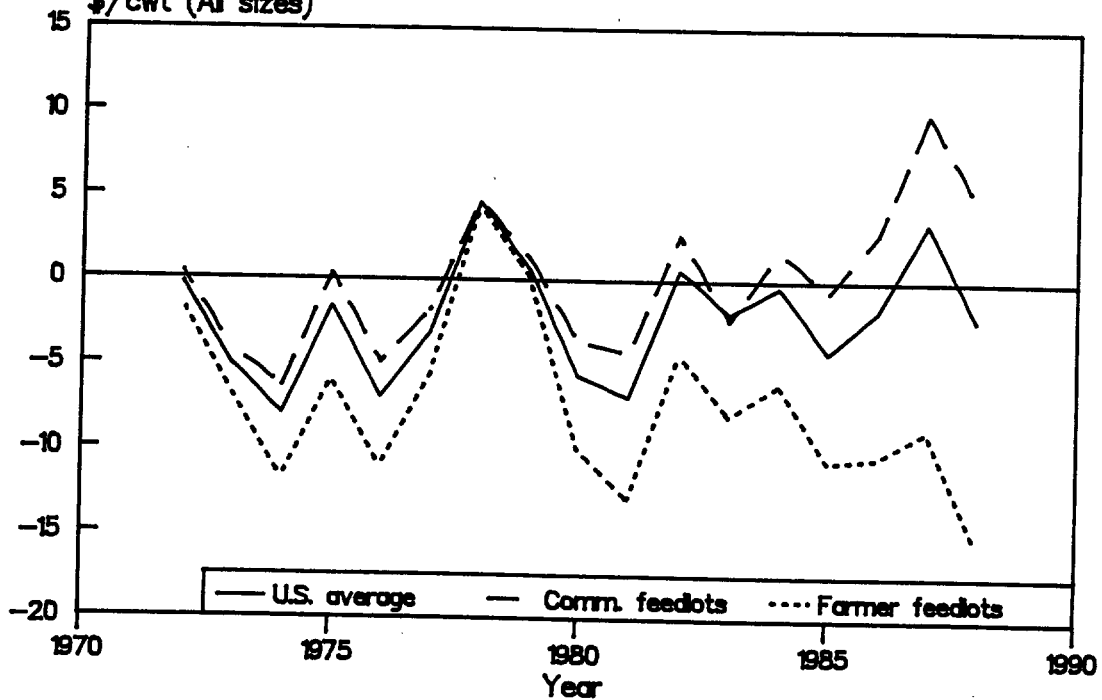
Minnesota is part of the North Central hog producing region, which, together with the Southeastern states, makes up the major source of hogs in the US. Lazarus, Boehlje and Dahl point out (p. 2) that Minnesota's hog industry has showed relative improvements in productivity during the last ten years. USDA's estimates of Total Economic Cost for farrow-to-finish hog operations show that larger operations have a lower cost of production and thus, an economic advantage compared to smaller operations (Figure 29). The returns to management and risk were always higher for the larger farrow-to

Figure 27. Fed Cattle, Total Economic Cost, by type of feedlot  
Cost/cwt (All sizes)



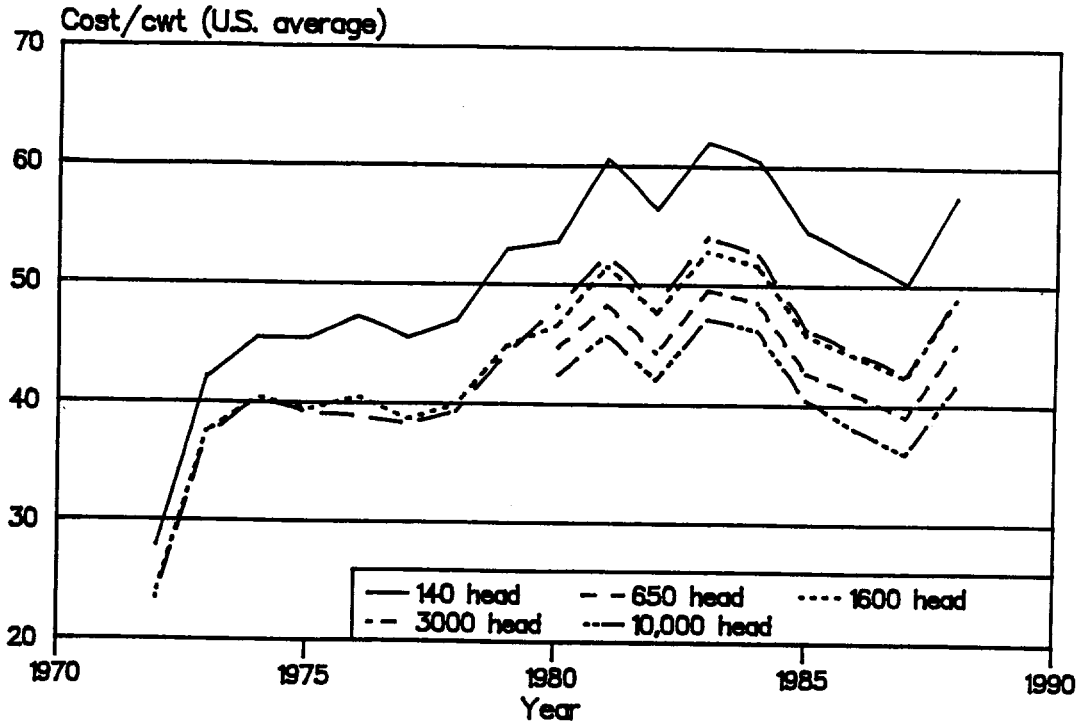
Source: USDA, 1990.

Figure 28. Fed Cattle, Residual Returns per cwt by type of feedlot  
\$/cwt (All sizes)



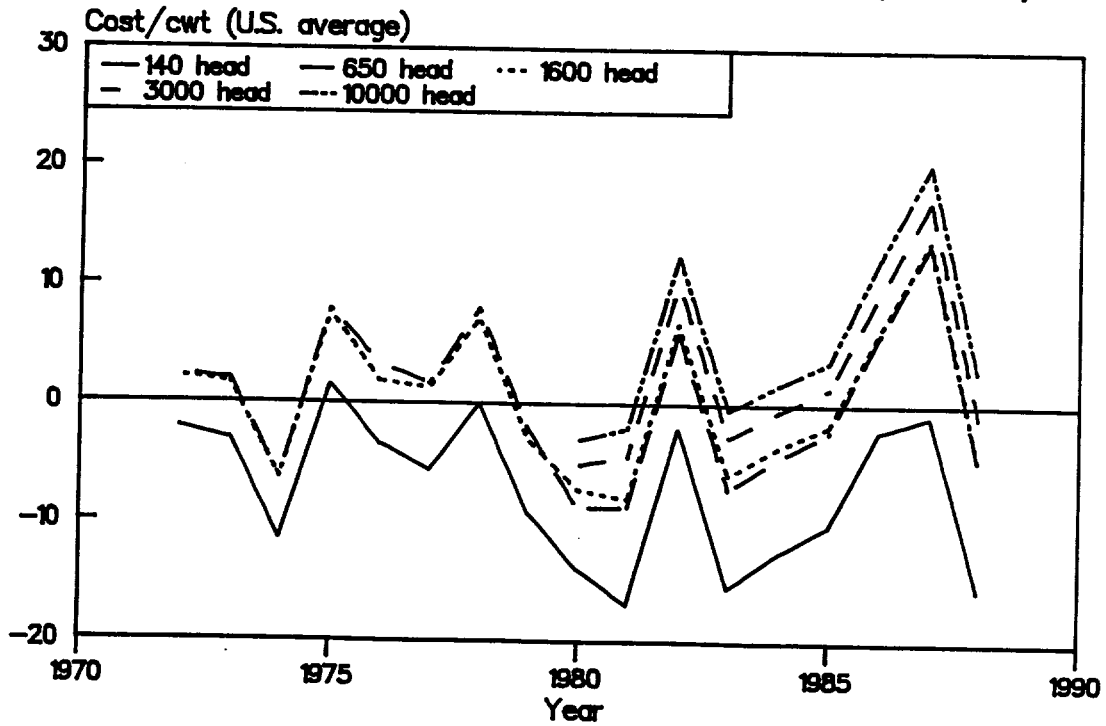
Source: USDA, 1990.

Figure 29. Farrow-to-Finish, Total Economic Cost by size (1972-1988)



Source: USDA, 1990.

Figure 30. Farrow-to-Finish, Residual Returns by size (1972-1988)



Source: USDA, 1990.

-finish operations from 1972 to 1988 (Figure 30). The North Central region has had lower total economic costs than the Southeast region, a major source of competition for the North central region (Figure 31).

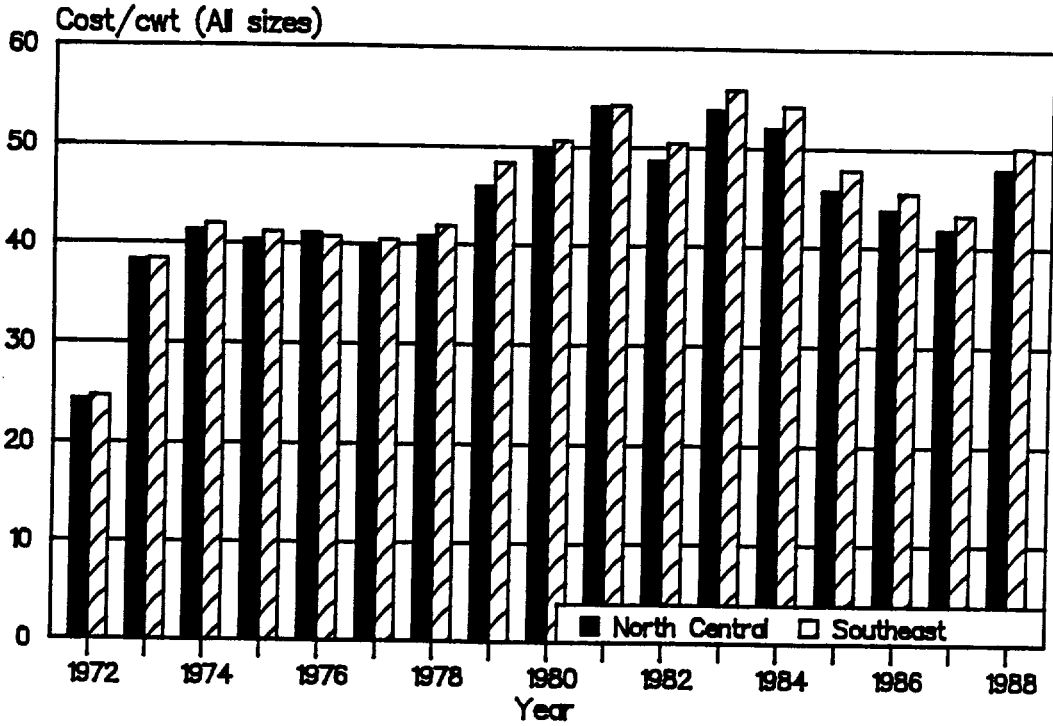
For feeder pig finishing, the North Central region had a lower Total Economic Cost per cost than the Southeast in the 1980s (Figure 32). This is a reversal of the 1970s when the North Central region had higher costs than the Southeast region.

The residual returns for feeder pig production have been negative in recent years for both the North Central and Southeast regions (Figure 33). The North Central region has had lower production costs than the Southeast (Figure 34).

#### 6.5 Sheep and Poultry

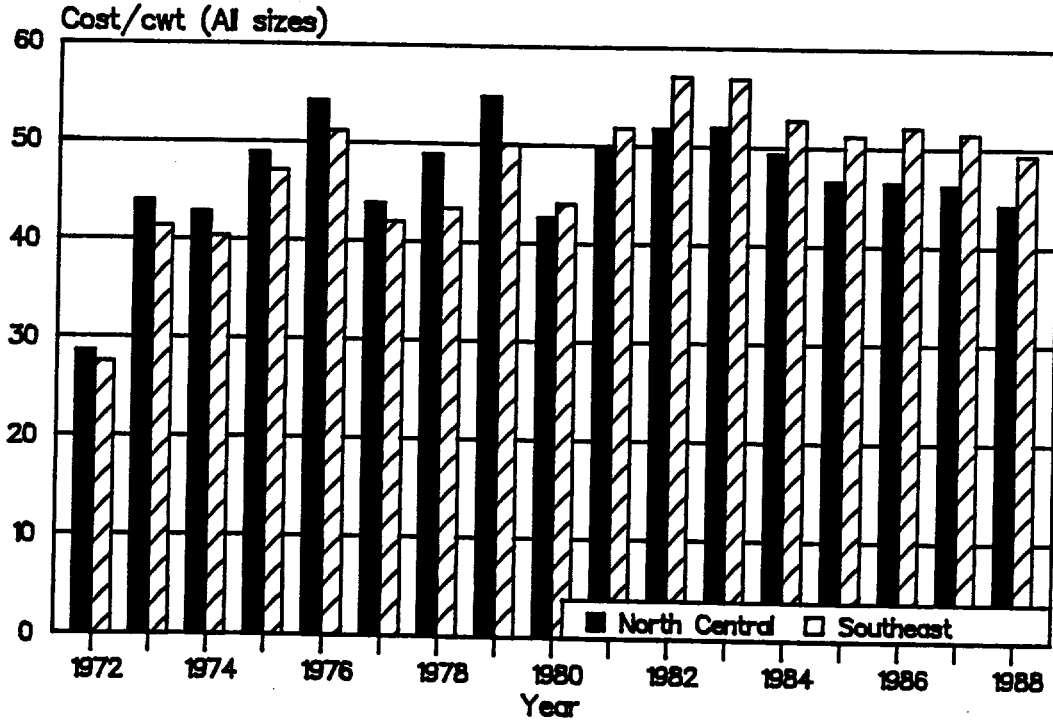
The USDA published estimates only show national averages for all sizes of sheep operations and no estimates for poultry. For sheep, the total economic costs increase over time and the residual returns fluctuate with both positive and negative returns. There are no regional estimates.

Figure 31. Farrow-to-Finish, Total Economic Cost, North Central and Southeast regions, (1972-1988)



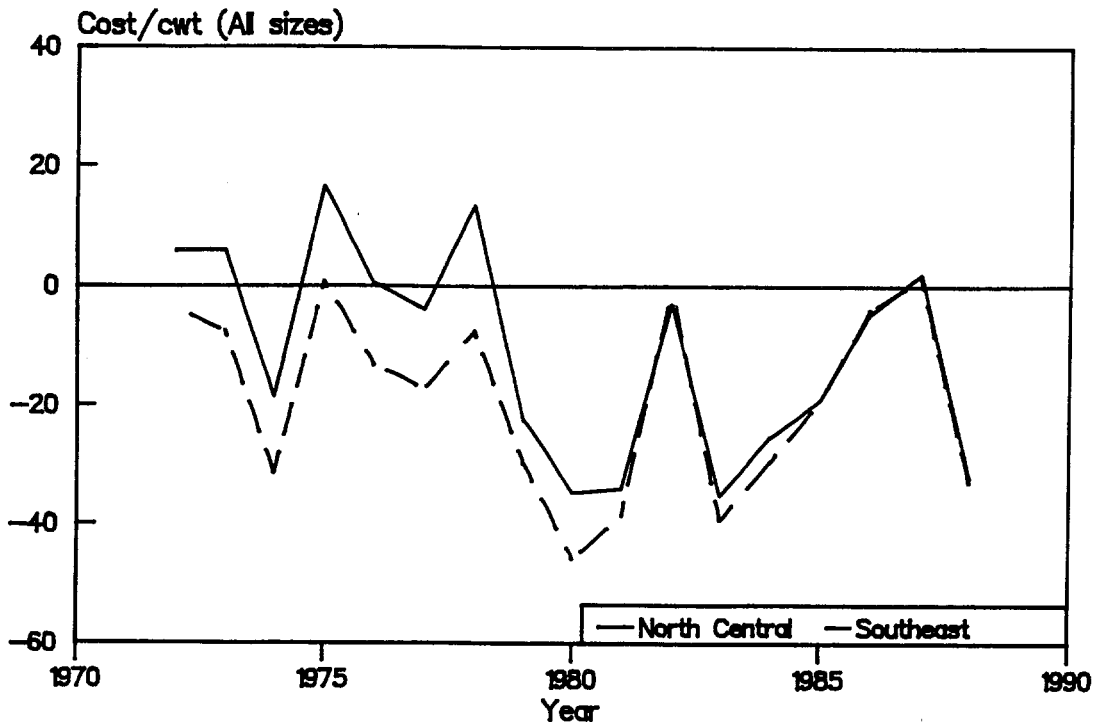
Source: USDA, 1990.

Figure 32. Feeder Pig Finishing, Total Economic Cost, North Central and Southeast regions (1972-1988)



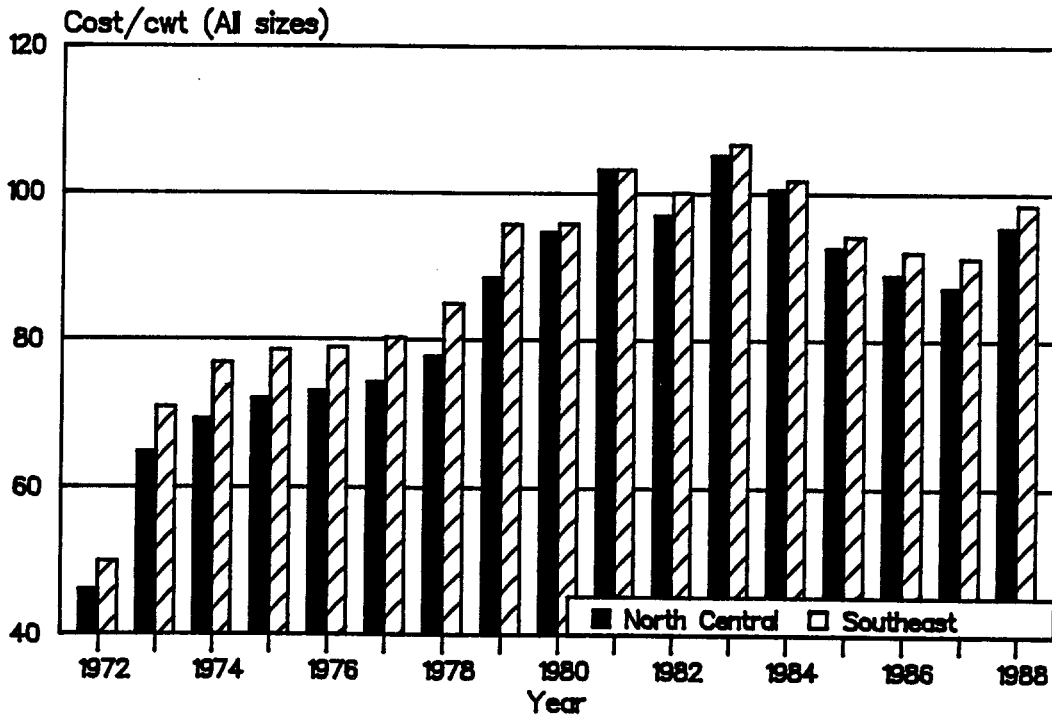
Source: USDA, 1990.

Figure 33. Feeder Pig Production, Residual Returns, North Central and Southeast regions (1972-1988)



Source: USDA, 1990.

Figure 34. Feeder Pig Production, Total Economic Cost, North Central and Southeast regions (1972-1988)



Source: USDA, 1990.

## 7. Summary

The farm-level trends of the Minnesota livestock industry have been presented in this report by livestock type. The variables shown include the number of farms with livestock species, the average size of the individual operation, the size of the state industry, measures of physical efficiency, costs of production, and residual returns to the enterprise.

The common characteristic of the livestock industry in Minnesota is significantly fewer farms with higher livestock populations on the remaining farms. In many instances, there is also a higher total production level for the state. The only exceptions to this common trend is in poultry -- especially broilers and turkey -- where the number of farms has increased in Minnesota but at a slower rate than total production so the production per farm has still increased.

Dairy. Total milk production in Minnesota has stayed at a 10 billion pound level for the past decade which is an increase from earlier years. This level of production has been maintained even though both the number of dairy farms and the number of milk cows has decreased. In 1990, there were 15,500 dairy farms in Minnesota with an average of 46 cows per farm. In 1943, there were 174,000 farms with an average of 10 cows per farm. Total milk production in the state has been maintained because milk production per cow has increased. In 1990, the average cow produced 14,093 lbs. -- three times what a cow produced in 1935.

The Pacific region had the lowest Total Economic Cost per cwt in the years reported. The Southeast region had the highest residual return per cwt. The Upper Midwest (which includes Minnesota) was estimated to have increasing



costs relative to the other regions. The Upper Midwest had one of the lowest residual returns per cwt. Thus, even though productivity per cow is increasing, the competitive position of the Minnesota dairy industry has been deteriorating over time.

Fed cattle. The number of cattle on feed in Minnesota (January 1 inventory) increased until 1970 and then decreased. In 1991, there were 345,000 cattle on feed in Minnesota. While there is no information on the number of farms which feed cattle, anecdotal evidence suggests that the number has decreased steadily and the number of fed cattle per farm has increased.

The USDA estimated the national average cost of production to be \$77 per cwt in 1989 -- the most current year available. Averaging over all sizes, commercial feedlots were consistently, and significantly, lower cost producers than farmer feedlots. However, averaged over all sizes, the commercial feedlots have had only one year with a positive residual return compared to no years for farmer feedlots. As farmer feedlots grow in size they will gain some of the advantages of the commercial feedlots.

Beef cows. The number of beef cows in Minnesota increased substantially until 1976. Since 1976, the number has decreased to 375,000 cows in 1990 which is about half the 1976 level. The average herd was 23 cows in 1990 which is down slightly from the 1964 average of 27 cows. There were 15,000 farms with beef cows in Minnesota in 1990.

According to USDA estimates, beef cow costs per cow of production are lower in the western states than in the North Central and Southern states. USDA estimates show that only the western states had positive residual returns.

Hogs. The number of farms in Minnesota with hog and pig inventories decreased from 110,778 in the 1950 agricultural census to 16,000 in 1987. The Minnesota Agricultural Statistics Service reports 15,000 hog farms in 1990. With some fluctuations, the number of sow farrowings in Minnesota generally has ranged between 800,000 and 1,000,000 per year. Through most of the past decade, total production for the state has been between 7 and 8 million pigs per year. Average annual production per farm increased from 94 pigs per farm in 1965 to 524 in 1990. Average litter size increased from 5.9 pigs in 1930 to 8.1 in 1990.

Larger farrow-to-finish operations have lower costs of production and higher residual returns than smaller operations according to USDA estimates. This advantage starts at a production level of 1,600 pigs per year compared to 140 pigs per year; a production level of 10,000 had lower costs and higher returns than both the 140 and 1,600 sizes. In the 1980s, the North Central region had lower costs than the Southeast region. Indeed, the USDA estimates show the North Central states having more years with positive residual returns than the Southeast region. Thus, if current conditions continue, the Minnesota hog industry will continue to be competitive in the national marketplace.

Sheep. The January 1 inventory of stock sheep in Minnesota decreased from a peak of 1.2 million animals in 1942 and 1943 to 210,000 head in 1990. The number of farms with sheep also declined from 37,000 in the 1935 agricultural census to 4,250 farms in the 1987 census. The Minnesota Agricultural Statistics Service reports 5,200 farms in 1990. In 1990, there were 220,000 lambs saved and 217,000 sheep marketed in Minnesota.

Poultry. There are two parts to the poultry industry in Minnesota: egg production and meat (broiler and turkey) production. They have very different stories. Egg production has decreased in Minnesota; poultry meat production has increased. In 1935 there were 169,000 farms producing eggs in Minnesota. In 1987, there were only 4,000 farms producing eggs. In 1990, there were 9.6 million layers down from 27 million in 1944. The production of broilers increased from 2.2 million in 1950 to 11 million in 1962 and 41 million in 1990. The agricultural census reported 1,589 broiler farms in Minnesota in 1987. The production of turkeys has also increased from 1.3 million in 1930 to 46 million in 1990. The number of farms producing turkeys decreased from 4,868 in the 1945 agricultural census to 723 farms in the 1987 census.

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## APPENDIX A

### THE FARM DEFINITION

"When the first census of agriculture was conducted in 1840, there was no official attempt to define what exactly constituted a farm. The first census definition, for 1850, was simple; any place that had \$100 or more in total agricultural products sales value was a farm. Since that time, acreage and dollar values of sales limits have been added, changed, or removed, but the requirements that the land be involved in, or connected with, agricultural "operations," and that it be under the day-to-day control of a single management (individual, partnership, corporation, etc.) have been retained."

"The most important requirement is, of course, the connection with agricultural operations, which--again for Census purposes--are the production of livestock, poultry, and animal specialties and their products, and/or crops, including fruits, greenhouse, and nursery products. The land involved in these operations need not be contiguous to comprise a single farm, it must only be operated as a single unit." (For an exception to this general rule, see the section on the definition used in 1950-1954 censuses.)

"The changes in the various criteria used for the definition of a farm are outlined below, by census:

1. 1850-1860. No acreage requirement, but a minimum of \$100 in total sales value of agricultural products.
2. 1870-1890. A minimum of 3 acres was needed for a tract to qualify as a farm. Places with less than 3 acres were considered farms if they had a minimum of \$500 in agricultural product sales.
3. 1900. The acreage and minimum sales requirements were removed, and cranberry marshes, greenhouses, and city dairies were included, provided they required the full-time services of at least one person.
4. 1910-1920. A minimum of 3 acres, with \$250 or more in total value of sales, unless the individual operation required the full-time services of at least one person.
5. 1925-1945. The requirement for continuous services by at least one person was dropped for the 1925 and following censuses; otherwise the definition used in the 1910-1920 censuses was unchanged.
6. 1950-1954. The acreage qualification was retained, but places of less than 3 acres were counted as farms if they had \$150 or more in total sales value of agricultural products during the year. Places that would normally have had at least \$150 in sales, or that had begun operating as a farm for the first time in 1954, were also counted as farms. If a place had sharecroppers or other tenants, the land assigned to each was treated as a separate farm, even though the landlord handled the entire holding as

a single unit. Land retained and worked by the landlord was treated as a separate farm.

7. 1959-1974. Any place with 10 acres or more, and with \$50 or more in agricultural products sales, or any place with less than 10 acres, but with at least \$250 in total sales qualified. If sales were not reported, or if the reported sales figures were obviously incorrect, average prices were applied to report estimates of harvests and livestock produced to arrive at estimated sales values.
8. 1978-1982. The minimum acreage requirement was dropped. Any place that had, or would normally have had, \$1,000 or more in total agricultural products sales during the census year was counted as a farm."

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Source: 1982 Census of Agriculture, AC82-SS-4, Volume 2 Subject Series, Part 4, History, U.S. Department of Commerce, Bureau of the Census, p. 72.

Appendix Table A1. Minnesota Data from the U.S. Census of Agriculture

	1930	1935	1940	1945	1950	1954	1959	1964	1969	1974	1978	1982	1987
-----													
Number of farms (1000s)	185.255	203.302	197.351	188.952	179.101	165.225	145.662	131.163	110.747	98.537	98.671	94.382	85.079
-----													
Total farmland (million acres)	30.913	32.818	32.607	33.14	32.883	32.285	30.796	30.805	28.785	27.605	28.46	27.708	26.574
Total cropland (million acres)	21.739	22.79	22.974	22.292	22.461	22.193	21.93	22.243	22.261	21.321	22.577	22.189	21.876
-----													
Number of farms distributed by acreage													
-1-9 acres	7205	6695	7349	7349	5785	5676	2911	2433	2983	2652	3472	4547	4613
-10-49 acres	24756	23326	18825	18825	15206	12066	10120	8237	6459	6846	8775	10461	9481
-50-179 acres	107439	104063	94252	88582	77163	63737	52544	40973	34446	32267	29258	24947	
-180-499 acres	60138	59097	63747	64576	64511	62279	58948	49482	42356	40461	35897	30963	
-500-999 acres	3455	3743	4277	4557	5084	5755	7737	8915	9637	10593	10602	10814	
-More than 1000 acres	309	427	502	593	725	837	1264	1935	2603	3103	3617	4261	
-----													
In more recent years, another size was added:													
-1000-1999 acres							717	1084	1630	2160	2529	2935	3619
-more than 2000 acres							120	180	305	443	574	682	642
-----													
Number of farms with livestock or poultry													
- Dairy	170,317	184,065	173,367	164,463	143,350	122,416	90,518	70,303	49,320	32,227	25,911	24,178	17,454
- Beef Cow-Calf								28,170	21,161	26,342	21,997	20,435	15,528
- Hogs	131,268	136,220	134,690	120,736	110,778	97,529	84,248	55,455	34,920	27,538	25,703	20,813	16,042
- Sheep	29,742	37,040	36,036	30,252	18,942	22,122	20,672	15,555	7,917	6,283	4,675	5,090	4,250
- Egg layers	144,497	168,841	154,129	154,647	123,395	105,267	74,784	45,728	18,565	12,024	8,449	6,375	3,943
- Broiler	164,941	156,855	145,262	150,074					580	3,011	2,690	2,476	1,589
- Turkeys	35,274	N/A	16,847	4,868	3,176	2,629	1,912	1,113	446	370	617	804	723

Appendix Table A2. Minnesota farms, livestock, and production (1930-1990)

	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942
Total # of farms (1000)	191	192	194	196	198	204	201	198	194	197	198	199	198
Total farmland, (million acres)						32.9	32.7	32.4	32.2	32.5	32.7	32.7	32.6
Average farm size (acres)						161	163	164	166	165	165	164	165
Number of farms with livestock or poultry (1000s)													
All Cattle											178	179	177
Dairy													
Beef cow/calf													
Hogs													
Sheep						37							
Total number of head (1000 or million)													
-All cattle (1000, Jan 1 inventory)	3,030	3,151	3,246	3,408	3,545	3,179	3,179	3,211	3,275	3,308	3,407	3,577	3,684
-Milk cows (1000, annual average)	1,524	1,577	1,639	1,730	1,740	1,630	1,597	1,603	1,603	1,600	1,632	1,665	1,710
-Fed beef, On feed, (1000, Jan 1 inventory)													
-Beef cows, (1000, Jan 1 inventory)	92	103	100	102	117	93	88	101	110	91	93	106	114
-Calves born (1000, annual total)	1,479	1,534	1,626	1,685	1,771	1,570	1,560	1,595	1,600	1,619	1,670	1,732	1,788
-Sows farrowed (1000, annual total)	972	1,090	911	912	914	558	718	652	752	960	950	996	1,149
-Pig crop (1000, annual total)	5,729	6,524	5,185	5,292	3,628	3,393	4,359	4,094	4,858	5,977	5,915	6,356	7,334
-Stock sheep (1000, Jan 1 inventory)	800	864	907	907	943	950	921	1,041	1,020	1,000	1,030	1,033	1,201
-Sheep marketed (1000, annual total)	602	809	904	975	1,042	1,122	1,118	1,081	1,018	957	982	1,118	1,256
-Lambs saved (1000, annual total)	630	695	774	777	810	761	738	864	874	797	853	926	1,015
-Comm. Broilers, No. raised (million)										.4	.5	.5	.7
-Layers on farms (million, annual average)	15.4	14.7	14.5	14.6	14.8	13.5	14.1	15.2	14.2	16.0	17.0	17.6	20.1
-Turkeys, No. raised (million)	1.3	1.4	1.8	2.2	1.7	1.8	2.3	2.0	2.1	2.9	3.0	3.2	3.2
Efficiency													
-Total milk, mill lbs. (annual total)	7,590	7,727	7,867	8,166	7,482	7,384	7,745	7,646	8,175	8,160	8,405	8,824	8,995
-Lbs milk per cow (annual average)	4,980	4,900	4,800	4,720	4,300	4,530	4,850	4,770	5,100	5,100	5,150	5,300	5,260
-% butterfat (annual average)	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.6	3.6	3.6
-Eggs/hen/year (annual average rate of lay)	118	122	114	109	108	117	135	122	138	135	135	140	150
-Pigs per litter (calculated from pig crop and farrowings)	5.9	6.0	5.7	5.8	4.0	6.1	6.1	6.3	6.5	6.2	6.2	6.4	6.4
-Lambs saved per stock sheep (calculated from lambs saved and stock sheep)	.8	.8	.9	.9	.9	.8	.8	.8	.9	.8	.8	.9	.8

Source: Minnesota Agriculture Statistics for various years



Appendix Table A2, continued

	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955
Total # of farms (1000)	196	191	189	189	188	187	186	184	180	176	173	170	168
Total farmland, (million acres)	33	32.9	33.2	32.9	32.9	32.6	32.9	33.3	33.3	33.3	33.3	33.3	33.3
Average farm size (acres)	168	172	176	174	175	174	177	181	185	189	192	196	198
Number of farms with livestock or poultry (1)													
All Cattle													
Dairy	174	168	166	166	165								
Beef cow/calf													
Hogs													
Sheep													
Total number of head (1000 or million)													
-All cattle (1000, Jan 1 inventory)	3,795	3,866	3,827	3,636	3,527	3,210	3,210	3,242	3,307	3,472	3,750	3,900	3,939
-Milk cows (1000, annual average)	1,748	1,730	1,660	1,602	1,527	1,424	1,384	1,349	1,317	1,313	1,370	1,394	1,378
-Fed beef, On feed, (1000, Jan 1 inventory)													
-Beef cows, (1000, Jan 1 inventory)	124	147	162	160	165	151	160	175	185	229	262	258	321
-Calves born (1000, annual total)	1,788	1,867	1,684	1,682	1,621	1,542	1,524	1,531	1,480	1,526	1,658	1,674	1,665
-Sows farrowed (1000, annual total)	1,341	895	940	801	879	801	950	1,030	1,043	914	837	943	1,015
-Pig crop (1000, annual total)	8,373	5,487	5,848	5,208	5,361	5,134	6,071	6,552	6,758	6,123	5,581	6,419	6,966
-Stock sheep (1000, Jan 1 inventory)	1,201	1,150	995	846	728	641	577	571	622	715	765	750	750
-Sheep marketed (1000, annual total)	1,263	1,246	1,143	1,115	914	733	698	639	535	731	873	832	880
-Lambs saved (1000, annual total)	968	885	791	734	626	529	503	481	507	578	671	678	706
-Comm. Broilers, No. raised (million)	.8	1.2	1.2	1.4	1.3	1.4	1.7	2.2	3.1	3.3	3.4	2.7	2.5
-Layers on farms (million, annual average)	25.3	26.9	26.5	26.9	25.3	24.0	23.0	24.1	23.3	22.9	22.8	23.5	23.8
-Turkeys, No. raised (million)	2.9	3.2	4.0	4.0	3.5	2.8	3.7	4.2	4.9	5.5	5.8	7.7	8.0
Efficiency													
-Total milk, mill lbs. (annual total)	8,810	8,390	8,599	8,747	8,398	7,960	8,304	8,067	7,942	8,088	8,590	8,615	8,833
-Lbs milk per cow (annual average)	5,040	4,850	5,180	5,460	5,500	5,590	6,000	5,980	6,030	6,160	6,270	6,180	6,410
-% butterfat (annual average)	3.6	3.6	3.6	3.56	3.56	3.57	3.57	3.57	3.58	3.56	3.54	3.55	3.52
-Eggs/hen/year (annual average rate of lay)	153	161	166	172	174	178	183	183	191	192	197	195	201
-Pigs per litter (calculated from pig crop and farrow)	6.2	6.1	6.2	6.5	6.1	6.4	6.4	6.4	6.5	6.7	6.7	6.8	6.9
-Lambs saved per stock sheep (calculated from lambs saved and sto)	.8	.8	.8	.9	.9	.8	.9	.8	.8	.8	.9	.9	.9



Appendix Table A2, continued

	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Total # of farms (1000)	123	121	120	118	117	117	104	104	104	104	104	104	104
Total farmland, (million acres)	31.1	30.9	30.7	30.6	30.6	30.6	30.6	30.6	30.6	30.6	30.3	30.3	30.4
Average farm size (acres)	253	255	256	259	262	262	294	294	294	294	291	291	292
Number of farms with livestock or poultry (1)													
All Cattle	83	80	77	75	73	75	75	73	70	66	63	62	62
Dairy	51	46	44	41	38	36	34	31	29	28	27	27	26
Beef cow/calf													
Hogs	38	42	39	38	37	38	34	34	33	31	33	35	30
Sheep	12	11	10.5	10	9.5	9	8.3	7.5	7.5	8	8	8	8
Total number of head (1000 or million)													
-All cattle (1000, Jan 1 inventory)	3,958	3,958	3,998	3,998	4,038	4,240	4,430	4,430	4,000	3,700	3,650	3,750	3,800
-Milk cows (1000, annual average)	976	949	947	937	926	900	886	890	880	850	850	860	886
-Fed beef, On feed, (1000, Jan 1 inventory)	556	589	548	537	494	464	380	430	340	400	400	390	370
-Beef cows, (1000, Jan 1 inventory)	530	523	570	581	602	708	739	751	640	550	530	560	570
-Calves born (1000, annual total)	1,475	1,473	1,502	1,472	1,480	1,525	1,596	1,450	1,390	1,280	1,290	1,350	1,370
-Sows farrowed (1000, annual total)	723	823	809	757	825	837	630	774	885	900	1,100	1,195	1,020
-Pig crop (1000, annual total)	5,358	6,065	6,026	5,575	6,103	6,020	4,585	5,757	6,498	6,649	8,006	8,937	7,601
-Stock sheep (1000, Jan 1 inventory)	432	423	393	358	330	320	300	245	210	203	210	217	250
-Sheep marketed (1000, annual total)	522	544	502	415	385	297	312	241	224	182	184	194	223
-Lambs saved (1000, annual total)	392	397	361	333	316	304	285	237	214	200	198	205	245
-Comm. Broilers, No. raised (million)	10.5	11.0	10.9	11.0	11.1	10.8	10.1	15.2	14.2	15.1	17.0	19.4	21.5
-Layers on farms (million, annual average)	9.8	9.9	11.5	11.6	10.7	10.7	9.8	10.0	9.2	9.2	9.4	8.8	9.6
-Turkeys, No. raised (million)	16.5	18.3	18.4	20.9	23.3	21.9	22.8	24.4	22.7	21.2	24.7	25.5	25.7
Efficiency													
-Total milk, mill lbs. (annual total)	9,727	9,636	9,618	9,580	9,271	9,382	8,946	9,239	9,483	9,089	9,145	9,535	10,061
-Lbs milk per cow (annual average)	9,966	10,154	10,210	10,279	10,177	10,542	10,120	10,523	10,950	10,859	10,848	11,061	11,356
-% butterfat (annual average)	3.56	3.57	3.58	3.6	3.59	3.62	3.63	3.6	3.59	3.61	3.65	3.64	3.63
-Eggs/hen/year (annual average rate of lay)	229	234	238	237	236	238	236	238	239	243	241	242	239
-Pigs per litter (calculated from pig crop and farrow)	7.4	7.4	7.4	7.4	7.4	7.2	7.3	7.4	7.3	7.4	7.3	7.5	7.5
-Lambs saved per stock sheep (calculated from lambs saved and sto)	.9	.9	.9	.9	1.0	1.0	1.0	1.0	1.0	1.0	.9	.9	1.0

Appendix Table A2, continued

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Total # of farms (1000)	103	102	97	96	93	92	92	90	89	
Total farmland, (million acres)	30.4	30.4	30.4	30.4	30	30	30	30	30	
Average farm size (acres)	295	298	313	317	323	326	326	333	337	
Number of farms with livestock or poultry (1										
All Cattle	62	61	58	53	48	44	43	43	40	
Dairy	26	25	24	23	21	18.5	17.5	16.5	15.5	
Beef cow/calf					17.5	16	16	16	15	
Hogs	24	22	21	19.5	18	16.5	16.5	16.3	15	
Sheep	8.6	8.4	7	6	4.8	4.8	4.8	5	5.2	
Total number of head (1000 or million)										
-All cattle (1000, Jan 1 inventory)	3,880	3,610	3,690	3,550	3,400	3,120	2,850	2,700	2,600	2,760
-Milk cows (1000, annual average)	903	899	887	915	870	809	783	734	710	
-Fed beef, On feed, (1000, Jan 1 inventory)	350	405	375	370	300	305	310	310	300	345
-Beef cows, (1000, Jan 1 inventory)	585	481	477	420	396	405	385	315	350	375
-Calves born (1000, annual total)	1,300	1,360	1,230	1,320	1,270	1,180	1,180	1,075	1,070	
-Sows farrowed (1000, annual total)	915	970	880	885	845	925	1,000	995	965	
-Pig crop (1000, annual total)	6,933	7,559	6,807	7,017	6,764	7,400	7,971	7,942	7,863	
-Stock sheep (1000, Jan 1 inventory)	275	235	200	185	150	165	185	225	210	220
-Sheep marketed (1000, annual total)	305	299	244	247	202	159	172	248	217	
-Lambs saved (1000, annual total)	245	235	225	190	195	170	200	225	220	
-Comm. Broilers, No. raised (million)	23.7	24.4	25.6	26.9	29.7	31.7	33.1	37.7	41.3	
-Layers on farms (million, annual average)	10.5	10.4	10.4	9.8	9.4	9.2	9.0	8.7	9.6	
-Turkeys, No. raised (million)	26.0	27.0	28.5	30.4	34.2	40.5	38.5	43.1	46.3	
Efficiency										
-Total milk, mill lbs. (annual total)	10,341	10,913	10,331	10,840	10,614	10,420	10,413	10,108	10,006	
-lbs milk per cow (annual average)	11,452	12,139	11,647	11,867	12,200	12,880	13,299	13,771	14,093	
-% butterfat (annual average)	3.65	3.63	3.65	3.63	3.64	3.61	3.64	3.66	3.65	
-Eggs/hen/year	240	245	243	245	246	247	250	256	259	
(annual average rate of lay)										
-Pigs per litter	7.6	7.8	7.7	7.9	8.0	8.0	8.0	8.0	8.1	
(calculated from pig crop and farrow										
-Lambs saved per stock sheep	.9	1.0	1.1	1.0	1.3	1.0	1.1	1.0	1.0	
(calculated from lambs saved and sto										