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Minnesota Farm Business Notes

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Changing Location of the Livestock Slaughter Industry

K. E. Egertson and W. E. Anthony*

This is the second of two articles dealing with important structural changes in the livestock slaughter industry. The first article,[1] focusing on economic organization, examined the industry in terms of changing size distribution and functions performed by firms. Generally, it concluded that the livestock slaughter industry has altered in two important economic dimensions: functional organization and size distribution. Firms and plants are becoming more specialized and smaller in relative size.

This article focuses on shifts in the geographic distribution of cattle and hog slaughtering facilities. It describes changes in regional livestock slaughter, the major reasons for them, further changes that may occur, and their implications for the livestock industry.

Since Minnesota ranks high in both livestock production and livestock slaughter, the findings have implications for the state.

Locational Organization

A casual glance at the livestock slaughter industry often suggests that little change is occurring. Many old, familiar slaughter plants and marketing institutions still exist. In large measure, they perform the same functions they have done for years. But alongside these stable characteristics are forces of change; many of them are already reshaping the livestock slaughter industry.

Paralleling the marked adjustments in size structure and functional organization, adjustments in geographic organization are occurring swiftly. In response to the great increase in total livestock production, most regions show some increases in slaughter. However, the relative shifts in slaughter among regions are dramatic.

Table 1. Change in commercial cattle and hog slaughter and beef and pork production, United States, 1950, 1955, 1960, and 1964*

Year	Cattle and beef: Cattle slaughter	Cattle and beef: Beef produced	Hogs and pork: Hog slaughter	Hogs and pork: Pork produced†
	thousand	million	thousand	million
1950	17,900	9,248	69,543	9,397
1955	25,722	13,213	74,216	10,027
1960	25,224	14,374	79,036	10,863
1964	30,818	18,037	83,019	12,019
	- - - - - - percent change - - - - - -			
1950-55	+43.6	+42.9	+ 6.7	+ 6.7
1956-64	+19.8	+36.5	+11.8	+19.8
1950-64	+72.4	+95.0	+19.4	+28.0

* Source: *Livestock and Meat Statistics*, USDA, 1962 and supplements.
† Excluding lard.

Change in U. S. Slaughter

Slaughter

Since 1950 total U.S. slaughter of both cattle and hogs has grown. But the rate of growth varies considerably (table 1). Commercial cattle slaughter increased 72 percent during 1950-64. And, even more striking, total beef production increased by 95 percent. Of course, this situation resulted because beef production per carcass slaughtered also increased.

In comparison, growth in hog slaughter was at a slower pace, 19 percent, over the same 14-year period. Meanwhile, total production of pork grew by 28 percent.

Although pork production rose, the total increase was only 8 percentage points above the increase in human population over the same 14 years. But the rise in total commercial beef production surpassed population growth by 75 percentage points. Therefore, there was an increase of only one-half percent per year in per capita consumption of pork and a jump of just over 5 percent in per capita consumption of beef.

Capacity

Because of these increases in livestock production and meat consumption, demand for slaughter services has been growing. In response to this demand, expansion in slaughter activity could have come about via: (1) added use of existing capacity and/or (2) building new capacity in the form of additional plants.

Part of the increased slaughter may have come through more intensive use of existing facilities, since the industry typically has some excess capacity.[2] Nevertheless, the number of slaughter plants also increased greatly. The total number of plants operating under federal inspection (FI) rose from 456 in 1950 to 575 in 1963—a 25-percent increase. Therefore, new slaughter plants apparently have provided the major part of the increased slaughter services.

Paralleling the rather dramatic difference between change in amount of cattle slaughter and hog slaughter, the change in the number of establishments slaughtering each species also was markedly different. FI plants slaughtering cattle increased from 383 in 1950 to 492 in 1963. Meanwhile, the number of hog slaughtering plants decreased by one—from 364 in 1950 to 363 in 1963.

With expected continued increases in livestock production, new plants probably will be built. However, these changes will differ greatly among regions.

Regional Shifts in Livestock Slaughter

Cattle Slaughter

Almost all regions in the United States experienced an increase in cattle slaughter during 1950-64 (map). The only exception was New England

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[1] *Minnesota Farm Business Notes*, November 1965.

[2] A study reported in *The National Provisioner*, September 30, 1961, pp. 52, indicated that average utilized capacity during 1950-60 ran only 73 percent for cattle and 65 percent for hogs.

where commercial cattle slaughter declined by nearly one-third. Moreover, growth among regions varied considerably. Cattle slaughter in the Mountain Region almost tripled, but it doubled in the South Central, West North Central, and Southeast Regions.

Minnesota's increase in cattle slaughter was considerably below the averages for the United States or the West North Central Region. Two states were particularly high in this region: Iowa increased commercial cattle slaughter 180 percent; Nebraska's output jumped 135 percent.

Due to these relative differences in growth of cattle slaughter, the relative importance of individual regions in total U.S. slaughter shifted. Nevertheless, the West North Central Region continued to have the largest regional cattle slaughter (table 2). In 1964, over 37 percent of national commercial slaughter was located there.

But comparatively greater shifts occurred in other regions since 1950. Generally, the amount of cattle slaughter increased in the south and west but declined in importance along the Atlantic coast and in the northeast.

Hog Slaughter

The pattern of change in commercial hog slaughter differed from that of cattle slaughter. Three of the nine regions had decreases in the amount of hog slaughter (map). The West North Central Region had a moderate increase in hog slaughter. But in the Southeast and South Atlantic Regions, hog slaughter approximately doubled.

Of course, these changes in hog slaughter are reflected in shifts in the relative importance of individual regions in total commercial hog slaughter. The dominant position of the West North Central Region strengthened during 1950-64 (table 2). Meanwhile, the importance of the East North Central Region declined, largely reflecting the downward adjustment of Chicago as a slaughtering center.

Table 2. Percent of commercial cattle and hog slaughter in each region, 1950 and 1964*

Region	Cattle 1950	Cattle 1964	Hogs 1950	Hogs 1964
	- - - - - percent - - - - -			
New England	1.8	0.7	1.3	0.7
Mid Atlantic	8.5	6.2	9.7	7.5
South Atlantic	4.4	4.2	5.6	7.9
Southeast	4.0	4.5	4.2	7.2
East North Central	24.9	17.3	27.4	24.7
West North Central	32.4	37.2	40.6	43.1
South Central	8.0	9.5	4.2	3.6
Mountain	4.9	8.1	2.3	1.9
West Coast	11.1	12.3	4.7	3.4
Total U. S.	100.0	100.0	100.0	100.0
Minnesota	6.5	5.5	8.1	7.0

* Source: *Livestock and Meat Statistics*, USDA, 1962 and supplements.

Growth in hog slaughter in the southeastern states strengthened the relative importance of the South Atlantic and Southeast Regions.

Although Minnesota's relative share of total hog slaughter dropped from 8.1 percent to 7.0, it still remained well above the share of many regions (table 2).

Regional Changes in Slaughter Plant Number

Slaughter industry adjustment in terms of number of plants per region parallels changing regional slaughter. If all commercial plants are considered, a decline in number of plants shows up in all regions but two. However, the general movement in the industry is toward FI plants.

Table 3. Change in FI slaughter plants slaughtering cattle and hogs, by regions, 1955-65

Region	Slaughtering cattle: Change in: Number	Slaughtering cattle: Change in: Percent	Slaughtering hogs: Change in: Number	Slaughtering hogs: Change in: Percent
New England	− 7	−41.2	− 5	−50.0
Mid Atlantic	+12	+20.0	− 3	− 8.6
South Atlantic	+ 7	+35.0	+ 2	+11.1
Southeast	+ 5	+22.7	+ 3	+14.3
East North Central	− 2	− 2.3	+ 4	+ 8.5
West North Central	+30	+38.5	+ 5	+ 9.6
South Central	+16	+55.2	+ 5	+25.0
Mountain	+12	+41.4	+ 2	+ 9.1
West Coast	+ 7	+ 9.0	−13	−35.1
United States	+80	+19.0	0	0

Therefore, in order to get a more accurate picture of changing slaughter capacity by regions, let us examine changing numbers of FI plants.[3] Data by species go back to 1955 only. But the trends generally fit those established over a longer period. Furthermore, regional changes in FI slaughter plant numbers for 1955-65 followed much the same pattern as changes in the number of cattle and hogs slaughtered over the longer period (table 3).

The largest percentage increase in total FI plants, 62 percent, occurred in the South Central Region. However, this region ranked second to the West North Central in total plants gained. Four other regions—the West North Central, Mountain, Southeast, and South Atlantic—showed increases of more than 40 percent.

In most regions, numbers of plants slaughtering cattle tended to increase faster than hog plants. Following the 1950-64 trend in number of cattle slaughtered by regions, the number of FI beef slaughter plants substantially increased in the West North Central and South Central Regions. Numbers increased there by 39 and 55 percent, respectively, during 1955-65.

Increases in excess of 20 percent also were noted in all regions except New England, East North Central, and the West Coast. New England had 41 percent fewer beef slaughter plants in 1965 than in 1955. Although the East North Central Region showed some increase in total cattle slaughter, the number of plants slaughtering cattle decreased 2 percent from 1955 to 1965.

Nationally, no change between 1955-65 was evident in the number of FI plants slaughtering hogs. However, regional variation was great.

In three regions the number of FI hog slaughtering plants dropped between 1955-65: New England, Mid Atlantic, and the West Coast. Two of these regions also showed decreases in total hog slaughter since 1950. On the other hand, the number of FI hog plants substantially increased in some southern regions, even though the number was not extremely large. These regions also experienced a substantial increase in hog production.

Why Inter-regional Slaughter Shifts

No one factor can be credited for all of this inter-regional shift in livestock

[3] In 1965, FI firms accounted for 83 percent of the cattle slaughtered and 87 percent of the hogs.

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slaughter. Over the industry's long history, numerous forces shaped its locational orientation. These forces included:

1. Changes in methods of transporting livestock and meat.

2. Adjustments in relative rates of shipping live animals vs. meat.

3. Improved technology which facilitated slaughter in small plants.

4. Shifts in livestock production areas.

All of these factors contributed to varying degrees to the movement of the industry from the eastern seaboard to the midwestern terminals and then to the present pattern of interior plants. Bear in mind that the locational pattern continues to shift in response to changing economic forces.

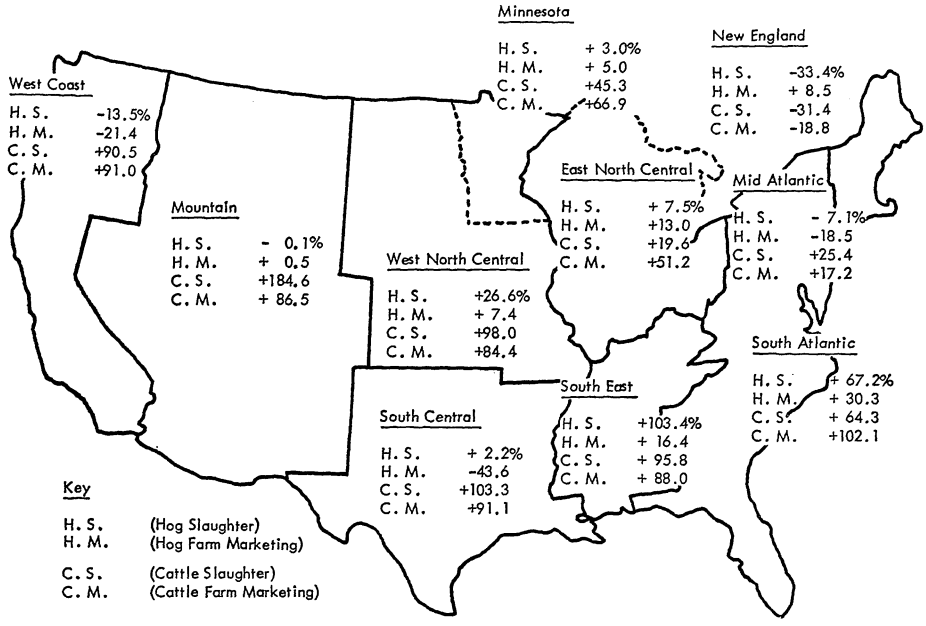
During the 1930's and 1940's, the advent of motor trucks and improvements of highways made livestock shippers less dependent on railroads. Therefore, livestock slaughterers could assemble livestock at interior points as well as at terminals.

Furthermore, this early development was enhanced by the introduction of new technology and facilities which helped small plants achieve costs competitive with large plants. These developments included new carcass handling techniques, mechanical knives, more efficient refrigeration, and more efficient inventory control. Once small plant costs became competitive, slaughter operations could be shifted to locations of concentrated livestock production. Considering the loss in weight from live animal to carcass, savings in transportation were great.

More recently, railroad freight rates for meat declined relative to those for meat animals, again changing relative cost of shipping live animals and meat between regions.

The recent regional adjustments in slaughter identified in this article result chiefly from livestock production adjustments. To minimize livestock transportation costs, slaughtering firms favor areas with high livestock density when selecting plant sites. Since slaughter supplies can be acquired with a minimum amount of transportation, procurement costs are lowered.

Increasing slaughter of hogs and cattle has been associated with expanded **farm marketings**[4] in most regions, except hogs in New England and the South Central Regions (map).[5] A directional discrepancy has occurred between hog farm marketings and hog slaughter in the New England Region. This situation possibly has been due to a lag in slaughter adjustment because of fixed investments in plants.



Percentage change in commercial slaughter and farm marketings, by region, United States, 1950-64.

The South Central Region showed a large drop (44 percent) in hog marketing but a 2-percent increase in hog slaughter. The number of plants slaughtering hogs in this region increased 25 percent between 1955-65. Therefore, hogs are being shipped into the region to make use of expanded capacity.

The association between changes in cattle farm marketings and cattle slaughter is closer than the association for hog farm marketings and hog slaughter, probably because cattle production is rapidly increasing in all regions. Firms tend to adjust more quickly to an industry with expanding production than to one with declining production. It is usually possible to construct new plants more rapidly than to depreciate and deplete fixed investments in old plants.

Conclusions and Implications

This article points out that the livestock slaughter industry has undergone considerable locational adjustment. Changes in recent years were associated with changing livestock production. The implication is that regions growing rapidly in livestock production are likely to see further increases in numbers of slaughter plants.

The rapid change in livestock production put strain on the livestock industry. Old plants had to be closed in favor of new efficient plants at more suitable locations. This situation is indicated by the shifting number of cattle slaughter plants during the period studied.

For the hog industry, however, the adjustment may not have been rapid enough. Production in some areas apparently decreased more than slaughter, indicating that further adjustments in hog slaughter plants are likely.

As adjustments in the location of slaughter plants continue, associated marketing agencies will feel the pressure. Old, existing agencies must make changes in order to continue to serve livestock producers. Furthermore, new agencies and marketing methods likely will develop.

Trends identified here also have implications for livestock producers. If the slaughter industry cannot adjust smoothly to changing patterns of livestock production, operational costs of slaughter could be unnecessarily high. Consequently, net returns to producers could be unnecessarily low. Based on evidence presented here, it appears that locational adjustment has been quite rapid in cattle slaughter but somewhat slower in hog slaughter.

[4] Marketing from the area but not in-shipments; farm marketing denotes relative production estimates.

[5] *Agricultural Statistics;* USDA.

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Shifts in Location of Beef Production

Paul Hasbargen and Rex Smith

The beef industry could be called the rapid growth industry of agriculture. Nevertheless, various segments of the industry have sustained different growth rates. Also, growth rates of the industry among areas have significantly differed.

The rapid increase in cattle feeding between 1955 and 1964 caused total U.S. beef production to increase 37 percent while cattle slaughter increased only 20 percent. In the past decade, marketings of fed cattle increased by 6.5 million head, but total cattle slaughter only increased by 5.1 million. High weights and high dressing percentages of fed cattle accounted for the more rapid increase in beef production than in total cattle marketings during this period.

In the future, cattle feeding will increase about 5 percent per year. But where will this increase in feeding take place and from where will the increased supplies of feeders come?

Beef Cows

Total beef cow numbers approximately doubled in the last 15 years. The Plains area—the tier of states from North Dakota through Texas—has 40 percent of the national beef-cow herd. Apparently, this area is remarkably well suited for beef cattle production compared to other agricultural enterprises. Recent rapid expansion in commercial cattle feeding in this area may encourage further expansion in cow herds.

The Southeastern states moved ahead of the Western states in beef-cow numbers during the early 1960's. In the next 10 years, major structural changes in southern agriculture probably will result in a large increase in beef-cow numbers in this section.

The Western area experienced the smallest increase in beef-cow numbers in recent years. The expansion that occurred was made possible because of a decrease in sheep numbers. Over and above additional substitution for sheep, future expansion will be limited.

The Corn Belt will continue to increase cow numbers more rapidly than the Western states but not as rapidly as the Southeastern and southern Plains states.

Cattle Feeding

Growth rates in fed cattle marketings have varied enough to significantly affect the relative importance of different areas. The Corn Belt decreased its share of marketings from about 47 percent in 1955 to 37 percent in 1964 (see table). This loss in relative importance came despite an annual increase of 2-3 percent in cattle feeding, because other areas increased cattle feeding at an even faster rate.

The Plains states increased their share of total fed marketings from 24 to 30 percent. Some reasons for the rapid growth of commercial feedlots in the Plains states are: (1) nearness to a large supply of feeder cattle, (2) a "two-way" position relative to the large fed beef markets of either coast, (3) relatively few alternative opportunities in agriculture, (4) availability of risk capital after large Western lots demonstrated the feasibility of commercial feeding, and (5) favorable climatic conditions.

When comparing the growth of cattle feeding in the West with that of the Midwest, remember the more rapid population growth of the Western states. In the past 5 years the West enjoyed a population increase of 3 percent per year in contrast to only 1 percent for the North Central states.

Furthermore, the per capita consumption of beef is considerably higher in the Western states than in the Midwest. Consequently, the more rapid growth of cattle feeding in the Western and Plains states has been necessary to supply the rapidly increasing demand for beef in the Western population centers.

Future Growth

Recent trends in the location of cattle feeding probably will continue. The southern Plains states and Colorado will increase cattle feeding more rapidly than other areas of the country because of locational advantages relative to feeders, feed supplies, and markets. West Coast feedlots may have relatively more expansion trouble when cow-calf operations of that area reach expansion limits, thereby limiting feeder supplies.

Well managed Corn Belt feedlots will be able to compete and share in the increased demand for fed beef. However, their growth rate will probably be a more modest 3 percent per year as compared to an over 6-percent rate in the Plains states. This smaller growth rate is expected because of slower population gains in the Midwest and the existence of more opportunities in competing enterprises.

Marketings of fed cattle by areas, 1955 and 1964*

Year	Total	Corn Belt	Western states	Plains states
	- - - - - - thousands - - - - - -			
1955	10,762	4,800	2,636	2,590
1964	17,295	6,440	4,457	5,176
	- - percent of total marketings - -			
1955	100	46.6	24.5	24.0
1964	100	37.2	25.8	29.9
	average percentage rate of increase			
1960-64	6.1	2.6	5.9	12.3

* Source: USDA Livestock Reports

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