

# MICHIGAN BEEF PRODUCTION

COOPERATIVE EXTENSION SERVICE • MICHIGAN STATE UNIVERSITY

## The Beef Industry in Michigan and the Eastern Corn Belt: Changing Competitive Positions

by  
Kris Allen and Harold M. Riley<sup>1</sup>

Between 1950 and the mid-1970s the U.S. beef industry grew rapidly. This increase was stimulated by increasing domestic demand for beef and technological advances which enabled beef producers to expand supplies at relatively low cost. At the same time there was an increase in the level of concentration, both economic and geographic, in cattle production, slaughtering and processing.

Michigan and the other Eastern Corn Belt states have lost ground, relative to the Western Corn Belt and the High Plains regions, in cattle feeding and slaughtering. By 1981 Michigan, Ohio and Indiana had net imports of about 65 percent and Illinois about 40 percent of the total beef consumed. While projections of beef production trends in the four states suggest a continuing decline, there are some factors which may change the long term outlook for the region.

### The U.S. Beef Industry

#### Consumption

Beef consumption in the U.S. increased during the 1950s, 1960s and early 1970s and reached a peak of

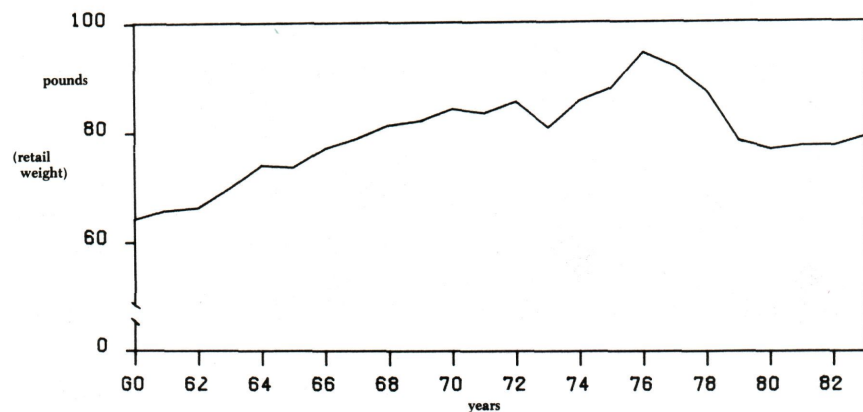


Figure 1: Annual Per Capita Consumption of Beef, United States, 1960-1983

Source: American Meat Institute, 1982, and U.S. Department of Agriculture, Economic Research Service, 1983 and 1984.

94.4 pounds (retail weight) annually per capita in 1976 (Figure 1). In the mid-1970s a downturn in beef cattle numbers and cattle feeding, triggered by grain shortages and consequent high grain prices, raised beef prices. The per capita consumption of beef declined from the 1976 peak throughout the rest of the decade and the early 1980s. By 1983 the annual per capita consumption of beef dropped to almost 79 pounds.

Consumers' incomes and the price of beef relative to other meats and protein sources are the main factors affecting beef purchases. Other, longer term trends, such as changes in consumers' tastes and preferences, demographic changes in the U.S. population and changes in lifestyles have also affected beef demand.

A summary of the ways in which these factors have influenced beef consumption follows:

- Throughout the 1950s and early 1960s rising consumer incomes and relatively low beef prices, brought about by efficiency gains in beef production, stimulated consumption of beef among almost all segments of the U.S. population.
- Since the 1960s, gains in the efficiency of poultry and pork production have resulted in chicken and pork prices rising at a slower rate than have beef prices. While beef remains the "preferred" meat, pork and beef appear to be highly substitutable, with consumers responding to relative changes in the prices of the two meats. Total red meat consump-

<sup>1</sup>Graduate Research Assistant and Professor, Department of Agricultural Economics, Michigan State University.

tion has declined since the mid-1970s due largely to increases in consumption of chicken and, to a lesser extent, fish.

- Rapidly rising beef prices have stimulated consumer demand for more economical cuts of beef, such as hamburger.
- Increasing awareness of the relationship between diet and health has prompted a shift in consumer preferences towards leaner cuts of meat and towards non-meat sources of protein.
- Changes in the basic family unit, with more single people, more childless couples and more two-worker families have stimulated the demand for convenience foods. These include "fast foods" and new food products which can be prepared quickly.
- In recent years the declining real incomes of major segments of the population and the increasing percentage of older people who have decreased food requirements have contributed to a weakening consumer demand for beef. This is likely to continue.

### Production

The evolution of cattle fattening from grass finishing to modern confinement feedlots was a response to increased consumer demand for grain-fed beef, advances in animal husbandry technologies and available, relatively cheap feedgrains, largely due to advances in irrigation and crop production technologies in the Corn Belt and High Plains. The development of interstate highways facilitated the movement of cattle production away from the major population centers in the Eastern states.

A general trend in agriculture has been towards fewer and larger operations in response to new technologies and economies of size. In the cattle feeding industry large commercial feedlots with one-time capacities exceeding 1,000 head have become the dominant suppliers of fed cattle. In 1981, these commercial lots accounted for just over two percent of all feedlots in the U.S., yet they provided about

72 percent of the fed cattle marketed.

### Slaughtering and Processing

Location changes in cattle slaughtering paralleled those in cattle feeding. Efficient refrigerated transportation, available at relatively low cost, enabled packing houses to relocate away from major population centers. The introduction of a (voluntary) federal carcass grading system further facilitated decentralization and decreased economic concentration of cattle slaughtering. The grading system provided a mechanism for trading by description rather than by visual inspection and contributed to the development of a more widely used market information system.

Between 1930 and 1970, concentration in the cattle slaughtering industry decreased. The top four firms controlled 48.5 percent of the market in 1930, but by 1970 the market share held by the top four firms had declined to 21.3 percent.

In the past decade, however, concentration in the industry has increased. In the 1960s and early 1970s new packing firms began to squeeze the "old line Big Four" from their positions of dominance. The "new breed" packers built large, modern, single-storied plants in the cattle producing areas and introduced cost-saving technologies. Included among these were "on-line" slaughter and disassembly, vacuum packing and boxing of primal and sub-primal cuts ("boxed beef"). Vacuum packing increased the shelf life of fresh beef to about four weeks. Boxing of primal and sub-primal cuts at the packing plant reduced transportation costs and the amount of butchering work required at the retail level. The new technologies also allowed the "new breed" packers to hire unskilled or semi-skilled labor at substantially lower wages than were being paid by the "old line" packers.

The lower costs and economies of size of the new plants, most of which slaughter between 200,000 and 500,000 steers and heifers per year, have enabled them to gain substantial shares of the cattle slaughtering industry. In 1983 the

top five beef packers controlled almost 50 percent of the market. Of these, only one was a direct descendant of the "old line" packers.

## The Beef Industry in Michigan and the Eastern Corn Belt

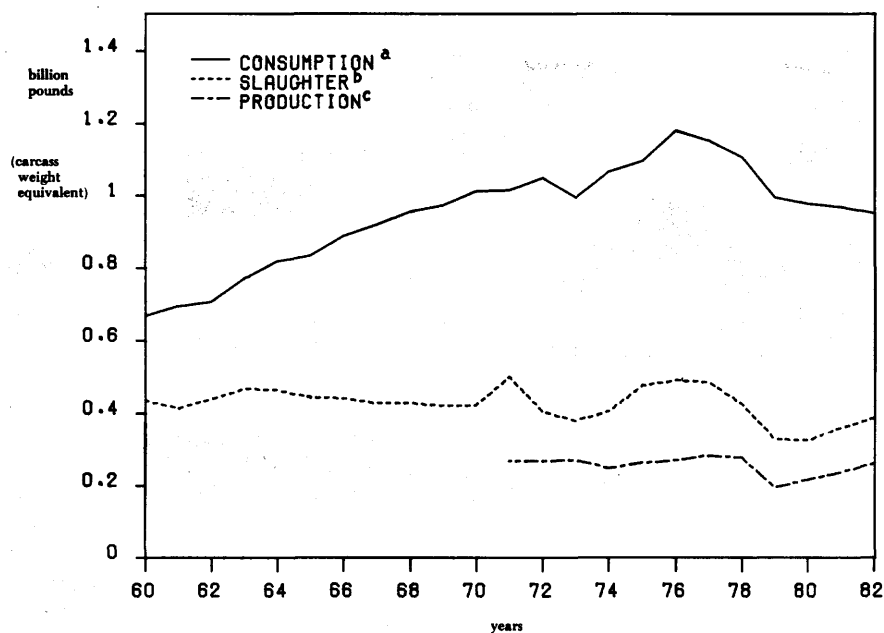
The Eastern Corn Belt region (Michigan, Ohio, Indiana, and Illinois) has become increasingly dependent upon other regions of the U.S. for its beef supply. Between 1970 and 1982, production and slaughter of beef cattle decreased in the four states, both in absolute terms and as a percentage of consumption.

In the early 1980s approximately 76 percent of the beef consumed in Michigan, on a net carcass weight basis, was imported (Figure 2). This net figure does not, however, reflect the actual volume of cattle and beef moving in and out of Michigan. Both slaughter cattle and beef products are shipped out of the state. In 1982 and 1983 between 60 and 70 percent of the cattle fed in Michigan were exported for slaughter, primarily in Ohio, Pennsylvania, Illinois and Ontario. The total volume of beef moving into Michigan is, therefore, greater than 76 percent of consumption.

### Cattle Production

The density of cattle feeding in the Eastern Corn Belt states is relatively low, except in northwestern Illinois and a few isolated counties in the other three states. Commercial cattle feeding is limited in northern Michigan, southern and eastern Ohio, southern Illinois and near the large metropolitan areas of Detroit, Cleveland and Chicago (Figure 3). Cattle feeding in the Eastern Corn Belt is characterized by relatively small sized lots, low rates of turnover and seasonal patterns of marketing fed cattle.

"Farm feedlots" (lots with a one-time capacity of fewer than 1,000 head) comprised 99 percent of the total number of lots in the Eastern Corn Belt in 1981 and marketed 83



**Figure 2: Consumption, Slaughter and Production of Beef in Michigan, 1960/71-1982**

- a. Total state consumption = average per capita consumption for the U.S. × state population.  
 b. For slaughter, carcass weight = liveweight × 0.595 (dressing percentage).  
 c. For production, carcass weight = liveweight × 0.55 (to account for calves and dressing percentage).

Source: American Meat Institute, 1982, p. 22; U.S. Department of Agriculture, Economic Research Service, 1983; Statistical Reporting Service, various years, Commercial Cattle Slaughter, by States, and Production and Income, All Cattle and Calves, by States. U.S. Department of Commerce, Bureau of the Census, various years.

percent of the fed cattle. There were only 30 lots (0.1 percent of the total number of lots) with one-time capacities exceeding 2,000 head in the four states in 1981; of these, 10 were in Michigan and 20 were in Illinois. In the 23 major cattle feeding states in the U.S. in 1981, farm feedlots represented 98 percent of the number of lots, but marketed only 27 percent of the fed cattle.

The relationship between the January 1 inventories of cattle on feed and the number of fed cattle marketed throughout the year provides an estimate of the feedlot turnover rate. The rate of cattle turnover from Eastern Corn Belt lots has been consistently lower than the average for the major U.S. cattle feeding states. In 1981 the average feedlot turnover rate in the four state area was 1.44, compared to 1.98 for the U.S.

The average rate of cattle turnover from Michigan lots was 1.23 in 1981, lower than in the other three states. The lower rate in Michigan may be due, in part, to Michigan feedlot operators purchasing

younger feeder cattle than do operators in other cattle feeding regions.

The seasonal pattern of fed cattle marketings is influenced by the time it takes for the cattle to reach slaughter weight and the characteristics of the feeding operation. Cattle feeding enterprises in the Eastern Corn Belt states, with the possible exception of northwestern Illinois, frequently are not the major source of income for the operators. They may be secondary to cropping or dairy enterprises or may supplement income from off-farm employment. When combined with other farming activities, cattle feeding may fill in the slack period for the farm labor between fall and spring and make use of by-products which would otherwise have a low salvage value.

There was a net decrease in fed cattle production in the U.S. between 1970 and 1984. The trend in the number of cattle on feed in the Eastern Corn Belt has been similar to that for the U.S. as a whole (Figure 4). However, the region has

been losing ground in fed cattle production relative to the rest of the nation. Over the 15 years the region's share of the U.S. cattle feeding industry declined from 12.4 to 9 percent.

Illinois leads the region in both cattle on feed and beef cow inventories by a sizeable margin. Michigan and Ohio trail the other two states in the number of cattle on feed, but lead the region in dairy cow inventories. Over the 1970-1984 period, fluctuations in cattle inventories show similarities among the four states. In part, this reflects the overriding influence of the beef cattle cycle.

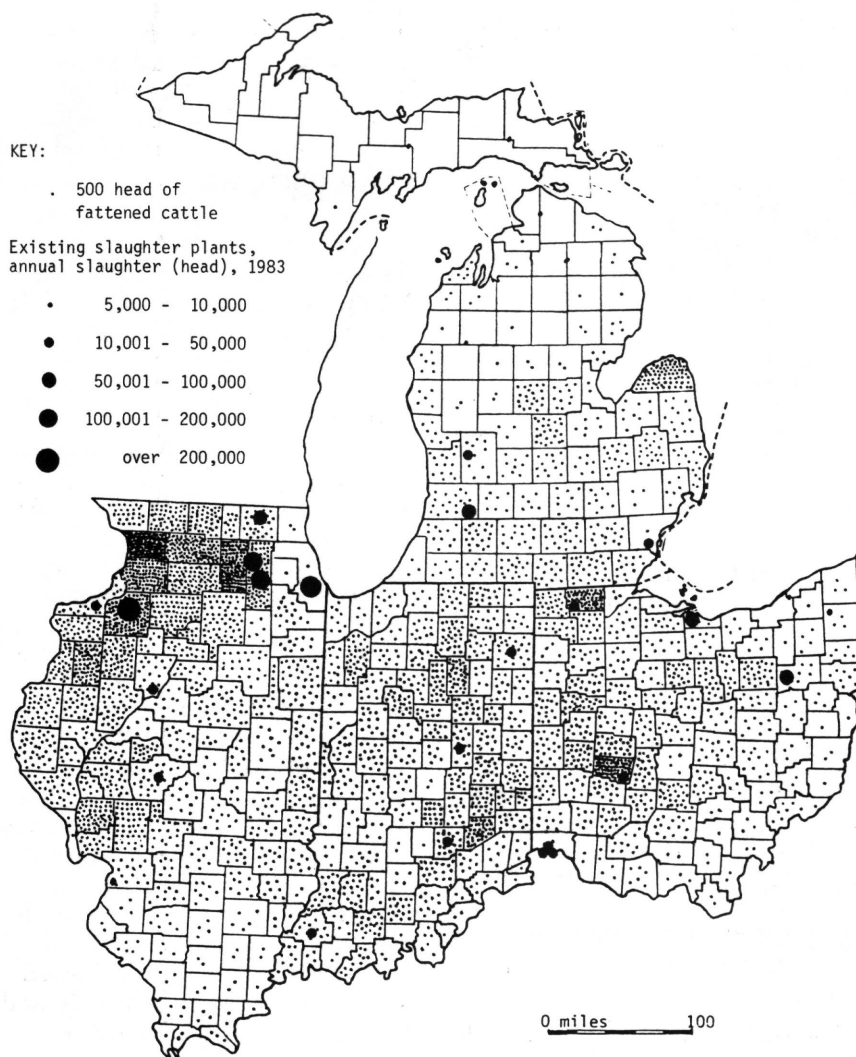
The cow herds in the Eastern Corn Belt are a source of both feeder cattle and cull cows for slaughter. On January 1, 1984 there were 2.8 million cows in the region. Approximately 1.2 million were dairy cows and 1.6 million were beef cows. The total number of cows in the four states has declined slowly since the cattle cycle peaked in the mid-1970s, but the trends over the 1970 to 1984 period differed for the dairy and beef herds. Beef cow inventories fluctuated with the cattle cycle, but showed little net change between 1970 and 1984. The number of dairy cows, however, declined steadily in all four states (Figure 5).

### Marketing Live Cattle

There are a number of ways to coordinate cattle production and slaughtering activities. These include public auctions, terminal markets and privately negotiated arrangements between cattle feeders and packers (or agents for either party).

Direct marketing has become the dominant method of selling slaughter cattle in the U.S., particularly for steers and heifers. The trend towards direct marketing has been largely due to the changes in the size and location of slaughtering plants and feedlots, improved communication and transportation facilities and the relative marketing costs incurred in the different channels.

The relative importance of the three marketing channels in the



**Figure 3: Geographic Distribution of Fed Cattle Marketings, by County, 1978, and Plants Slaughtering Steers and Heifers, 1983, Eastern Corn Belt**

Sources: U.S. Department of Commerce, Census of Agriculture, 1978; U.S. Department of Agriculture, Packers and Stockyards Administration, and personal contacts with slaughtering firms.

Eastern Corn Belt and the U.S. in 1982 is shown in Table 1. In all four states a smaller proportion of the steers and heifers marketed for slaughter move through direct channels than is the case for the U.S. as a whole.

Michigan, however, stands out from the other states with auctions remaining the dominant marketing channel. In 1982, 62 percent of the Michigan steers and heifers and 82 percent of the cull cows and bulls sold for slaughter were sold through auctions. For comparison, in the U.S. only five percent of the slaughter steers and heifers and 51 percent of the cows and bulls for slaughter were marketed through auctions.

In Michigan direct marketing channels accounted for only 24 percent of the slaughter steers and heifers and six percent of the slaughter cows and bulls marketed in 1982. However, this does represent an increase in the use of direct marketing since 1979, when only 11 percent of the steers and heifers and three percent of the cows and bulls were marketed directly or through agents or dealers.

Auctions provide services and facilities for buyers and sellers of cattle. Sorting and assembling livestock into homogeneous groups on the basis of age, weight, condition and/or other distinguishing criteria helps coordinate cattle producing and slaughtering functions.

This is especially important when the sellers are operators of small feedlots and sell cattle in small lots or on an irregular basis, while the buyers are packers requiring homogeneous groups of cattle in sufficient numbers to maintain plant operations at near full capacity.

Direct marketing of slaughter cattle can remove some of the uncertainty inherent in an auction system. Packers can assure themselves of a certain number of cattle on a particular day, and cattle feeders can assure themselves of an outlet for their cattle. Since the cattle are not shipped from the feedlot until the terms of the sale are agreed upon, cattle feeders have more flexibility in the negotiation of price and other conditions of the sale. Some transportation costs, yardage fees and the risk of injury to animals are reduced or eliminated when the sales are direct. The opportunity to take advantage of unexpected daily fluctuations in price found at auctions is exchanged for the advantages of more certain arrangements.

### Cattle Slaughtering and Processing.

The relative position of the Eastern Corn Belt in commercial cattle slaughtering declined between 1970 and 1983, from 10.5 percent to 7.0 percent of the U.S. total. The volume of cattle slaughtered commercially dropped in all four states. Michigan had the smallest absolute decrease in the number of cattle slaughtered and Ohio the largest (Figure 6). In 1981 there were 2.5 million cattle slaughtered in the region; about 81 percent were steers and heifers, the remaining 19 percent were cows and bulls. Most of the plants in the region are relatively small, slaughtering fewer than 10,000 head annually. Twenty nine percent of the plants slaughter between 10,000 and 500,000 head per year and handled 92 percent of the cattle slaughtered commercially in the region in 1981.<sup>1</sup>

1. This is based on the plants which report their annual slaughter volume to the Packers and Stockyards Administration of the U.S. Department of Agriculture. Plants with annual livestock purchases of less than \$500,000 and custom slaughterers are not included.

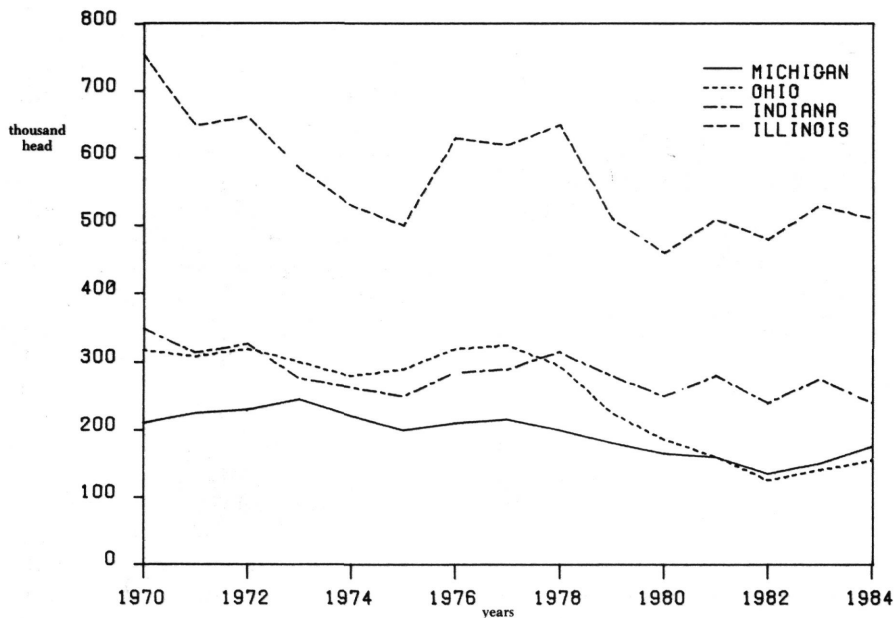


Figure 4: Cattle and Calves on Feed, January 1 Inventories, Eastern Corn Belt, 1970-1984

Source: U.S. Department of Agriculture, Statistical Reporting Service, various years.

The commercial slaughtering industry in Michigan differs from that in the other three states in that cow slaughter comprises the greater proportion of the total volume of cattle slaughtered. In 1981, cows, and some bulls, represented 66 percent of the commercial cattle slaughter. A large proportion of this is accounted for by a very large cow slaughtering and processing plant in southwestern Michigan.

The downward trend in the region's cattle slaughtering industry is due to a number of factors. Cattle feeding in the four states has declined, making it more difficult for packers to acquire slaughter steers and heifers locally. Competition from large modern plants in the Western Corn Belt and Great Plains states puts further pressure on the already small margins in the region's meat packing industry. Many of the "new breed" plants are operating with new facilities and low-wage contracts, while many of the plants in the Eastern Corn Belt have smaller, older facilities and higher costs. A notable exception to this is the IBP Inc. plant at Joslin, in northwestern Illinois. When purchased by IBP in mid-1982 the plant had an annual slaughtering capacity of about 350,000 cattle. IBP is in the process of remodeling

and enlarging the slaughtering and processing facilities of the plant. Their plans are to phase into two shift slaughtering and processing operations in 1984, with a total slaughtering capacity of about 600,000 steers and heifers annually.

### Future Outlook for the Michigan Beef Industry

Linear trend projections suggest that beef production in the four states might continue to decline through the 1980s. If the 1970 to 1981 trend were to continue, the number of fed cattle marketed in the four states would decline to 1.26 million head by 1990. This would represent a 26 percent decline from the 1.7 million head marketed in 1981 and almost a 50 percent decline from the 2.4 million head marketed in 1970. Based on these projections, Ohio and Indiana would witness the greatest percentage decreases in fed cattle marketings between 1970 and 1990 while Michigan would have the smallest percentage decrease. Similar trend projections for the region's cow herds suggest that beef cow inventories in Michigan will decline but in the other three states they will increase, resulting in a net

increase for the region. Dairy cow inventories in all four states are expected to decline. The total cow herd in the Eastern Corn Belt should decrease slightly by 1990.

These rather pessimistic projections of cattle production in the region may, however, be softened by some more qualitative aspects. The trend projections are based on data for only 12 years, which is less than two complete cattle cycles. In addition, the data were collected over a period during which there were major disruptions in world grain markets, structural changes in the U.S. beef production-distribution systems and a reversal of the long-term upward trend in domestic demand for beef. Several forces which may halt or reverse the declining position of the Eastern Corn Belt beef industry in the next decade may be summarized as follows:

- The shift in consumer demand towards leaner meats and more economical and convenient cuts could improve the competitive position of the region's cattle industries. Beef raising systems in the region can make use of forages and by-product feedstuffs to produce leaner beef at lower cost than is possible in the High Plains, where large commercial feedlots rely on concentrated grain rations to produce fat cattle.
- As underground water supplies in many western states are depleted, and as rising energy costs make pumping water more expensive, irrigated production of feedgrains is likely to decline in the High Plains.
- Rising fuel prices will make transportation more expensive and regional self sufficiency will increase. Beef raising and slaughtering could shift closer to centers of population. Such a shift would encourage cattle production and slaughtering in the Eastern Corn Belt region.
- Economic trends, especially in employment, could stimulate cattle feeding in the Eastern Corn Belt. If the relatively high levels of industrial unemployment persist in Michigan, Ohio and

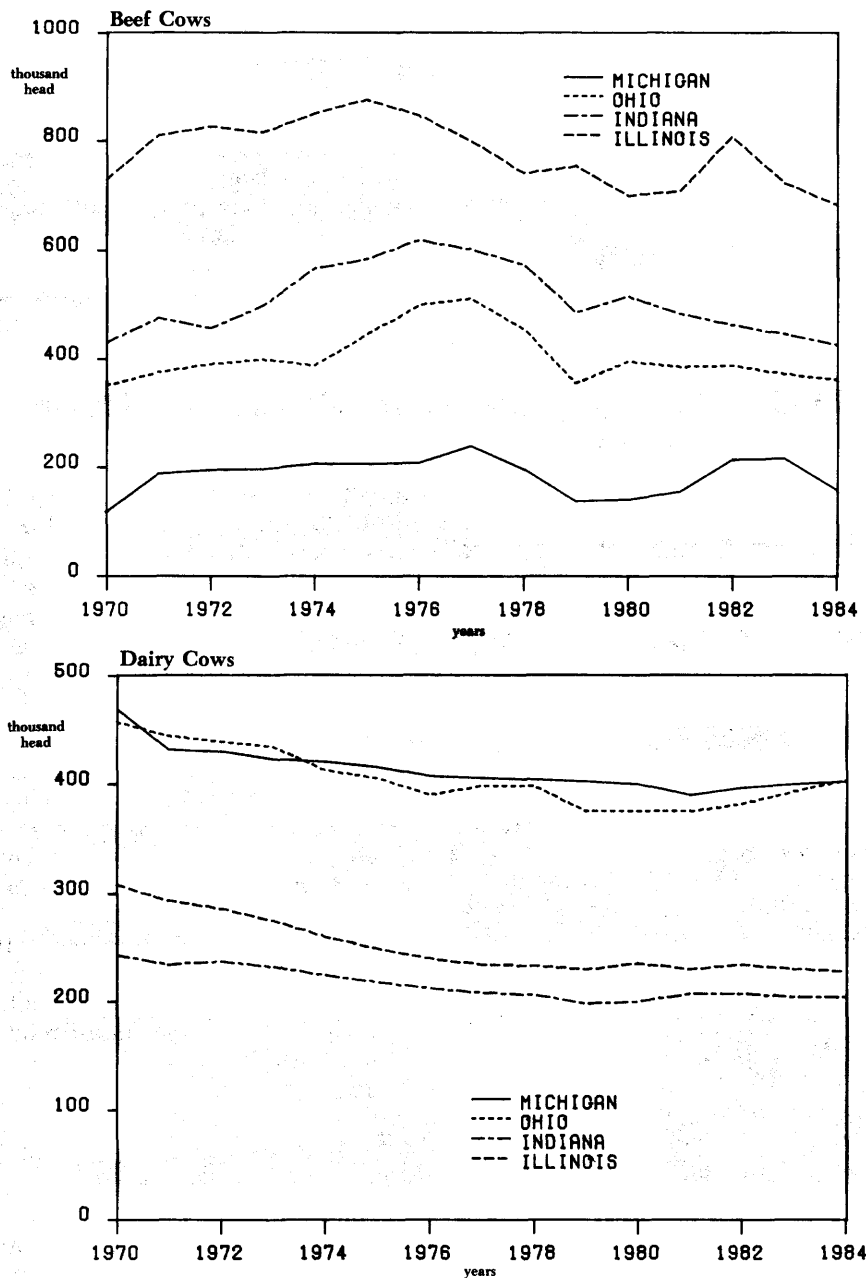


Figure 5: January 1 Inventories of Beef and Dairy Cows, Eastern Corn Belt, 1970-1984

Source: U.S. Department of Agriculture, Statistical Reporting Service, various years.

Indiana through the 1980s, opportunities for off-farm employment will continue to be limited. Livestock enterprises may represent a means of generating additional income and making fuller use of family labor and other farm-based resources. Also, as workers from the northern states have moved south in search of work, wages in the "Sun Belt" have tended to come in line with those in the industrial regions. Increases in wage rates in the

southwest and High Plains states could increase costs for cattle feeders and packers in those regions and erode some of their competitive advantage.

- The expected decline in dairy cow numbers could stimulate further expansion in beef cow herds, backgrounding of stocker calves and cattle feeding as a means of using resources previously used for dairying. Remember that changes in beef

consumption could have an inhibiting effect on the entire U.S. beef industry. Also of considerable importance is the growing public interest in environmental quality. Concerns about long-term use of agricultural chemicals, hormones, antibiotics and other drugs are raising challenging questions for conventional livestock production systems. The implementation of more stringent regulations regarding the use of these substances could change the relative efficiencies of poultry, pork and beef production.

There is growing concern about the effect of continuous planting of grain crops on soils. Questions are being raised about waste disposal from intensive livestock enterprises. In the future we may see these concerns influencing a shift towards less intensive livestock production and more livestock enterprises combined with diversified rotational cropping systems.

#### The Potential for New Investments in Slaughtering Facilities in Michigan

The decline in Michigan's cattle slaughtering capacity since the late 1970s and the increasing number of fed cattle moving out of Michigan to packers in Ohio, Illinois, Pennsylvania, and Ontario has stimulated interest in the potential for investment in new slaughtering facilities in the state. Some Michigan cattle feeders express the view that the development of a more viable and economically efficient cattle slaughtering and processing industry could help revitalize and expand cattle feeding activities in the state.

A study completed in early 1984 assessed the economic potential for investments in modern, efficient-sized beef slaughtering facilities located in Michigan. This study was based on the supplies of slaughter cattle and the existing slaughtering plants in the Eastern Corn Belt region. The study concluded that long term trends in the beef industry, the current and projected levels of cattle feeding, the relatively small size of cattle feedlots, the seasonal patterns of fed cattle marketing and the geographic

	Steers and Heifers			Cows and Bulls		
	Auction	Terminal	Direct, Dealers etc	Auction	Terminal	Direct, Dealers etc
Michigan	62.4	13.8	23.8	82.2	11.4	6.4
Ohio	35.7	15.1	49.1	21.4	0.4	78.1
Indiana	15.6	22.1	62.3	43.6	6.2	50.2
Illinois	16.3	20.9	62.7	52.7	46.4	0.9
United States	5.2	6.4	88.4	50.7	9.4	39.9

**Table 1: Cattle Purchases Through Different Marketing Channels, Percent of Total by Type, Eastern Corn Belt and the U.S., 1982**

Source: U.S. Department of Agriculture, Packers and Stockyards Administration, unpublished data. Percentages based on total figures reported by packers reporting to the Packers and Stockyards Administration.

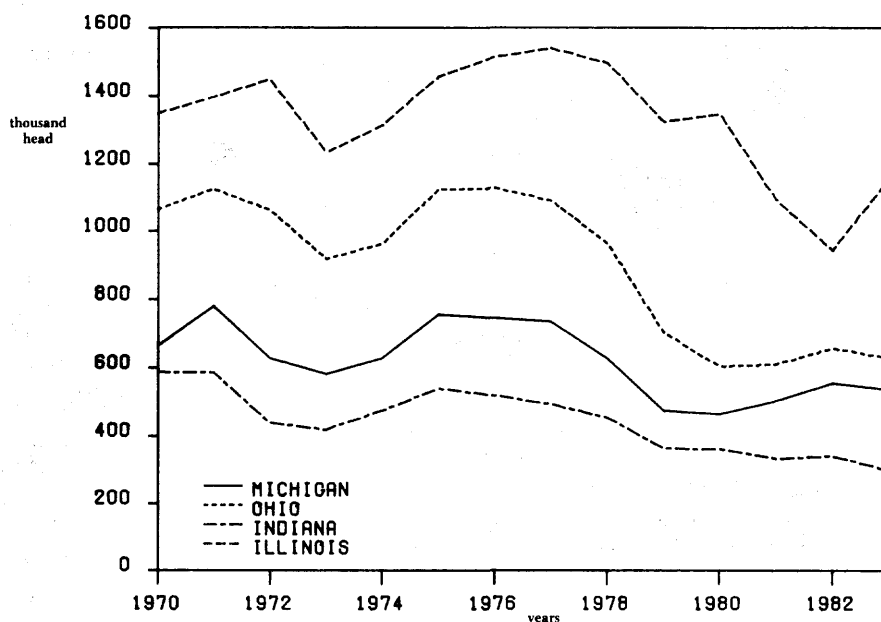
with the greatest potential for acquiring slaughter cattle are the south-central counties and the Thumb area.

A plant slaughtering between 150,000 and 250,000 fed cattle annually, located in one of the south-central counties (Cass, St. Joseph, Branch, Hillsdale or Lenawee) could capture many of the in-plant size economies. The overall economic viability of such a plant, however, would depend on the percent of the available cattle it could acquire from within a 100 mile radius supply area.

An alternative to a large modern slaughtering and processing plant in southern Michigan is a smaller, more specialized plant in the Thumb-central Michigan area. A plant slaughtering between 50,000 and 60,000 fed cattle annually may have slightly higher in-plant costs, but these could possibly be partially offset if most of the cattle slaughtered were acquired from within a 100 mile radius supply area.

#### Market Organization in Michigan

In an earlier section it was noted that Michigan cattle feeders market a large proportion of their cattle through auctions (62 percent in 1982). Several reasons have been given to explain the reliance on auctions. One reason is because the industry consists of many cattle feeders with relatively small lots, who sell cattle infrequently and/or irregularly. Packers find it difficult to assemble truckload lots of similar cattle, on a regular basis, from these individual feedlots. Another argument is that farmer feeders often view packers with suspicion, believing them to have access to more market information, particularly prices. For this reason these operators prefer to sell their cattle through a public auction, where sale prices are presumed to be set by competitive forces. Both of these arguments may partly explain why the Eastern Corn Belt states move more cattle through auctions than is the case for the U.S. They do not explain why in Michigan, with a cattle feeding industry similar to that in the other three states, auctions are by far the



**Figure 6: Commercial Cattle Slaughter, Eastern Corn Belt, 1970-1983**

Source: U.S. Department of Agriculture, Statistical Reporting Service, various years.

distribution of fed cattle supplies, limited the opportunities for building a large specialized steer and heifer plant in the Eastern Corn Belt states in the 1980s.

In 1982 and early in 1984 two Michigan cow slaughtering firms expanded their operations to include steer and heifer slaughtering and processing. Both plants are in southern Michigan and both plan to slaughter in excess of 100,000 steers and heifers annually when fully on-line. If successful, these plants could provide adequate additional slaughtering capacity for fed cattle in the southern Michigan, northern Ohio and northern Indiana market area.

An important advantage these firms have over a new firm entering the industry is that they can make use of existing slaughtering and processing facilities. Thus they can avoid initial investment costs for a new, efficient-sized plant which are estimated to be between \$15 and \$20 million. Established firms also have existing product outlets which could prove to be a significant advantage to them.

Should additional steer and heifer slaughtering and processing facilities be needed, the 1984 study identified two possible plant locations. Based on the 1978 Census of Agriculture data on fed cattle marketings the Michigan locations

most important channel for slaughter cattle.

A third explanation is that many of the larger cattle feeders in Michigan, those who could turn out a truckload of cattle on a regular basis throughout much of the year, tend to feed diverse groups of cattle in terms of breed, size and type of animal. This could make meat packers reluctant to purchase cattle from such feedlots because each truckload could hold new surprises—something most packers with product contracts wish to avoid. This explanation attributes the choice of auction markets to the packers. It assumes that they prefer to accept a little uncertainty in quantity or price in exchange for the assembling and sorting services of the auction. This ensures a relatively homogeneous group of cattle.

The final reason offered is that the phenomenon is due to the strength and large membership of the producer cooperative, the Michigan Livestock Exchange. The M.L.E. holds regular auctions for both feeder and slaughter cattle. While they do handle some direct sales of slaughter cattle they have actively promoted selling by auction. Also, it appears that they provide services which are desired by their members.

Cattle slaughtering is a high volume-low margin industry in which a high level of plant utilization is required to ensure adequate returns on investment. The importance of maintaining a steady supply of slaughter cattle of relatively consistent quality means that the use of direct marketing channels, which may significantly lower the uncertainty facing packers, could be an important factor in plant location decisions. It is likely that all of the factors mentioned, and possibly others, contribute to the dominance

of auctions as a means of marketing slaughter cattle in Michigan. While the foregoing discussion should not be construed to mean that cattle feeders in Michigan should move away from auctions in marketing their fed cattle, the importance to a packer of maintaining a steady supply of cattle of consistent quality cannot be ignored. It is an issue in Michigan which requires further examination, particularly if interest continues in attracting investment in a large specialized steer and heifer slaughtering and processing plant.

## References

- American Meat Institute 1982, *Meatfacts, 1982 Edition*.
- Cornell, Lawrence D., 1983, Implications of Structural Change in U.S. Demand for Meats on U.S. Livestock and Grain Markets, Ph.D. Thesis, Department of Agricultural Economics, Michigan State University.
- McCoy, John H., 1979, *Livestock and Meat Marketing* Second Edition, AVI Publishing Co. Inc., Westport, CT.
- Michigan State University Agriculture Model, 1983, *Long Term Forecast of U.S. and World Agriculture*, Department of Agricultural Economics, Michigan State University, Spring.
- National Cattlemen's Association, 1982, Special Advisory Committee "The Future for Beef" *Beef Business Bulletin*, Close Up.
- Riley, Harold, Kris Allen & Mark Jackson, 1984, *An Assessment of the Economic Feasibility of New Investments in Beef Slaughtering and Processing Facilities in Michigan*, Agricultural Economics Report No. 447, Department of Agricultural Economics, Michigan State University.
- Schneider, Roger E. & Raymond M. Leuthold, 1979, *Livestock Production and Marketing*, AER No. 171, Department of Agricultural Economics, Agricultural Experiment Station, College of Agriculture, University of Illinois, Urbana-Champaign.
- United States Department of Agriculture, Agricultural Marketing Service, Packers and Stockyards Program, 1979, "Concentration in the Meat Packing Industry—National and Local Procurement Levels" Report to Committee on Small Businesses, U.S. House of Representatives.
- \_\_\_\_\_, Statistical Reporting Service, *Livestock and Meat Statistics* Statistical; Bulletin No. 522 and various annual supplements.
- \_\_\_\_\_, Economic Research Service, 1983 and 1984, *Livestock and Poultry Outlook and Situation*, LPS-4, May 1983 and LPS-10, May 1984.
- United States Department of Commerce, Bureau of Census, Population Census for 1975 & 1982-1983.
- \_\_\_\_\_, 1978, Census of Agriculture for Michigan, Ohio, Indiana & Illinois.
- Wright, Karl T., 1984, "Comparing Michigan's Agriculture with that of Nearby States, 1960-1982" AM-33, Cooperative Extension Service, Michigan State University.

MICHIGAN STATE UNIVERSITY



COOPERATIVE  
EXTENSION  
SERVICE

MSU is an Affirmative Action/Equal Opportunity Institution. Cooperative Extension Service programs are open to all without regard to race, color, national origin, sex, or handicap.

Issued in furtherance of cooperative extension work in agriculture and home economics, acts of May 8, and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Gordon E. Guyer, Director, Cooperative Extension Service, Michigan State University, E. Lansing, MI 48824.

This information is for educational purposes only. Reference to commercial products or trade names does not imply endorsement by the Cooperative Extension Service or bias against those not mentioned. This bulletin becomes public property upon publication and may be reprinted verbatim as a separate or within another publication with credit to MSU. Reprinting cannot be used to endorse or advertise a commercial product or company.

1P-3M-12:84-UP-TCM (New). Price 50 cents. For Sale Only.

File 19.263

O-15243