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SOUTH DAKOTA BEEF INDUSTRY

BY

DAVID B. BAU

A thesis submitted in partial fulfillment
of the requirements for the degree
Master of Science
Major in Economics
South Dakota State University
1987

SOUTH DAKOTA BEEF INDUSTRY

This thesis is approved as a creditable and independent investigation by a candidate for the degree, Master of Science, and is acceptable for meeting the thesis requirements for this degree. Acceptance of this thesis does not imply that the conclusions reached by the candidate are necessarily the conclusions of the major department.

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Date

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Date

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CHAPTER I

Introduction

The beef industry in South Dakota is an important component of the state's agricultural economy. South Dakota beef producers market approximately 2.0 million head of cattle and calves annually with value in excess of 1.2 billion dollars in 1984. This revenue represents over 60 percent of total livestock receipts for the state and over 35 percent of total agricultural sales. (39)

In 1985, South Dakota cattle gross income was over \$1,336 million. This represents over 12 percent of the total state gross income of \$10,766 million based on information provided by the Small Business Development Center. (57) The significance of South Dakota cattle production is further demonstrated by a national ranking of fifth in beef cows that calved and ninth in total production of cattle and calves in 1985. (39)

The cattle industry presently is in the downward part of its' production cycle. Cattle numbers are declining both on a national and state level, declining from a national total of 114.4 million head at the end of 1980 to 105.5 million head at the end of 1985. South Dakota cattle numbers declined from 4.1 million head to 3.6 million head over the same five year period. The 3.6 million head in 1985 was 13 percent less than year earlier figures of 4.16 million, and the first significant decline in South Dakota

in the present cycle.

Consumption of beef per capita has held fairly constant since 1978 at 77-80 retail pounds, and is presently around 77 pounds per capita. (39) Even with the declining numbers of cattle and consumption remaining constant, price has not increased enough to stop the reduction phase of the present cycle.

In fiscal year 1985, 1,499,489 head of cattle were shipped out of South Dakota with only 477,167 head of cattle coming in, leaving a net out flow of 1,022,322 head. State inventories were down slightly. This leaves the South Dakota cattle producer dependent on out-of-state cattle demands to absorb the net flow of cattle out of South Dakota.

The beef processing industry also is undergoing significant changes. The meat packing industry has changed in size, location and methods of production. The total number of packing plants in the United States decreased from a peak in 1976 of 6,255 plants to 5,558 at the end of 1983. Average plant size is increasing, reflecting closings of small plants through the last decade. U.S. beef slaughter is shifting west and south. The West North Central and Southern Plains regions reported a 12 percent increase in the proportion of cattle slaughtered there between 1972 and 1982. This indicates a shift in slaughter away from plants located near large urban areas in East North Central and Eastern regions of the nation to plants located close to cattle production areas. This shift in slaughter plant location parallels the westward movement of cattle

feeding. Today, plants are increasing the production of boxed beef and decreasing the production of whole carcass beef. Processing beef into boxed beef increased from 44 percent to 58 percent of all steer and heifer slaughter between 1979 and 1982. (32)

This study was conducted to update existing information on the South Dakota cattle industry at the producer, feeder, slaughter, and processor levels and to examine construction and operating costs of South Dakota beef slaughter plants.

Problem Statement

With the significance of the beef industry to the South Dakota economy, a thorough knowledge of the state's beef marketing system could improve the efficiency of cattle marketing. Although a great variety of information is available, a complete study of the South Dakota beef industry has not been accomplished since 1972. Changes in beef production location and producer characteristics, market channels selection, South Dakota cattle export and import factors, and processing cost levels, are areas of concern discussed in this study. The information provided in this study will assist industrialists, researchers, producers and processors in their efforts to gain insight into South Dakota's most important industry.

Studies on the feasibility of beef processing plants in South Dakota are outdated. Because of outdated information, there

is a need to acquire descriptive data on the state's processing industry and update related costs. The information developed in this study can serve as basic data for future localized studies on slaughter plant feasibility. If potential for more slaughter in the state is demonstrated, it could have a very beneficial impact on the state's economy.

Objectives

The general objective of research presented in this thesis was to identify the structure and conduct parameters of South Dakota's beef production, marketing, and processing industries.

Specific objectives are:

- 1) To examine characteristics of South Dakota beef producers and beef farms.
- 2) To identify South Dakota marketing channels used for marketing feeder and slaughter cattle.
- 3) To determine the composition and magnitude of flows of cattle to and from South Dakota.
- 4) To review trends and recent developments in the beef packing and processing industries in South Dakota and the United States.
- 5) To develop construction and operating costs for a model beef slaughter plant located in South Dakota.

Methodology and Procedures

South Dakota beef industry production patterns, marketing patterns, cattle movements, and slaughter volume were analyzed in this study. Each part of the study included a breakdown of the data for South Dakota into nine crop reporting districts.

South Dakota beef production patterns were analyzed using United States census data available for each county. Total farm numbers, beef farm numbers, average size of farms, numbers of cattle, and the number of beef cattle sold in South Dakota was summarized and compared to corresponding national information. Total production and consumption of beef at the national level was derived using secondary data sources, recent studies of the United States beef industry. This data was descriptive in nature and comparisons were made through inspection of tabular summaries.

Market channels used to market cattle were determined on the national level using secondary cross-sectional data from several federal publications. Data on South Dakota marketing channels were provided by the South Dakota crop and livestock reporting service until 1972. This data was compared to existing channels used based on a cattle producer survey conducted in 1979 by Clauson (8) and cattle movement records obtained from the South Dakota Livestock Sanitary Board. These records showed the type of marketing channel used for all cattle shipments in and out of the state. South Dakota cattle movements were determined from a random

sampling of all cattle inshipments and outshipments recorded at the South Dakota Livestock Sanitary Board.

Health certificates collected for the Livestock Sanitary Board are required for all cattle transported across the South Dakota state lines. A systematic random sampling was completed by recording the data from every tenth health certificate. Frequency counts, cross-tabulations and chi-square were the statistical methods conducted to analyze this information.

Cross-tabulations simply indicate how the frequency of one variable is related to another variable. Cross-tabulations were determined for each crop reporting district relating CRD to animal type shipped. Some other cross-tabulations completed were: CRD to market channel used, CRD to state/region of export destination.

Chi-square was used to test whether two variables in the cross tabulations were independent or related. For example, if the null hypothesis indicated no difference or dependence between or among each crop reporting district and animal type shipped, the alternative hypothesis would be that there is a difference or dependence between or among the variables tested. If the calculated chi-square is small than the expected chi-square, the null hypothesis would be rejected. If the calculated chi-square is smaller than the expected chi-square, the null hypothesis would be accepted. The calculated chi-square for all cross-tabulations completed in this study were significant indicating a relationship existed between variables tested.

Primary and secondary data used in this study was summarized using computer sorting, frequency and summary programs. Feedlot numbers and volume data for South Dakota was analyzed using these methods. Trends in the feedlot size and number in South Dakota are presented based on a study by the Western Livestock Marketing Information project. Data was given providing the number of feedlots and the production output based on capacity of the feedlots. Data on cattle fed grain and concentrate was collected for the state and each crop reporting district, based on county census data provided in the U.S. Census of Agriculture.

Trends in the beef slaughter industry were reviewed based on secondary data and the implications to South Dakota presented. The marketing cost of retail meat was examined based on national studies which break down the costs by farm value, slaughter value, intercity transportation, warehousing and store delivery, breaking carcass, cutting and merchandising.

Existing slaughter plant locations in South Dakota and their volume was determined on an individual plant and crop reporting district basis. Total state slaughter volume was provided by the crop and livestock reporting service. Data on state inspected slaughter plant location and volume were provided by the South Dakota Livestock Sanitary Board. Federally inspected slaughter plant volume collected by the USDA was confidential, but estimates were determined from interviews with meat inspectors, plant operators, and other people in the beef packing industry.

The type of beef animal being slaughtered was available for a small number of state inspected plants.

A model estimating beef packing plant costs in South Dakota for plants slaughtering 20 head of cattle per hour and 120 head of cattle per hour was developed using an engineering cost approach. Estimates for the various plant costs were determined from phone interviews with equipment dealers, industrial engineers, utilities personnel, contractors, and plant operators. The estimates provided through the interviews were averaged and used to develop construction and operating cost tables for beef packing plants able to slaughter 20 head of beef per hour and 120 head per hour. The cost estimates were based on existing technology at the time this study was completed.

Scope and Outlook of Study

A review of beef industry literature used in this study are included in the next chapter.

Characteristics of South Dakota's beef production industry is provided in chapter three. Marketing channels used for marketing feeder and slaughter cattle are examined and identified on the national, state and district level. The composition and magnitude of cattle shipments to and from South Dakota is discussed in chapter four.

A discussion of the beef packing and processing industry

structure on the national and state level is provided in chapter five. Structural changes in South Dakota plant location and volume are addressed.

Construction and operating costs for two sizes of beef slaughter plants in South Dakota are provided in chapter six. Conclusions, limitations and recommendations for further research are presented in chapter seven.

CHAPTER II

Review of Literature

A review of national and South Dakota literature of the beef industry is provided in this chapter. This review includes beef production, beef marketing channels, and the flow of cattle shipments to and from South Dakota. Literature relating to the state and national beef slaughtering and processing industry is discussed. The literature review includes historical studies which described U.S. and South Dakota beef industry characteristics. The findings of these studies were used as a base to compare the findings of this study with and identify changes in beef industry characteristics which have occurred over time.

Cattle Production

(33) Nelson, Kenneth E., 1984

An overview of the United States beef industry was presented in four stages. The first stage was cow-calf operations, the second stage was cattle feeding, the third stage was packing/processing, and the final stage was distribution. Nelson noted in the first stage, cattle raising exists in significant numbers in all regions and climates of the United States. Most operations are cow-calf where the calves are sold at various ages

and weights to feedlot operators for finishing.

In the second stage, cattle feeding, he acknowledged the United States as the country finishing the highest number or proportion of cattle on concentrate feeds. In the third stage, he determined that the beef packing/processing industry has moved away from multi-story, multi-species plants, located near terminal markets, to fewer, larger, single-story, specialized plants located farther west, closer to supplies of fed cattle. In the distribution stage of the industry he found that most processed beef was moved by refrigerated truck with a switch to boxed beef away from the traditional method of shipping the carcass.

Nelson indicated coordination in the cattle-beef subsector is poor. Cattle often are transported several times, fed for too long or too short a period, sold at the wrong time, and inaccurately priced due to a lack of coordination.

(23) Madsen, Gee and Kruse, 1985

A comprehensive study of the Colorado beef industry was completed by Madsen, Gee, and Kruse. Three sectors of the beef industry covered in the report were: feeder cattle production, fed beef production, and meat packing.

Farm size, cash receipts, marketings and flow of cattle and their effect on Colorado beef markets were covered in the first section of the study. The biggest change in the last decade in Colorado cattle production was that many producers and feedlots

have gone out of business.

The meat packing section of the study listed Colorado cattle slaughter and fed cattle marketings on a monthly basis. Tables listing the portion of cattle purchased through direct, terminal, auction, and on a grade and yield basis were given. Colorado packers accounted for 7.7 percent of total U.S. boxed beef production and shipped the meat to 42 states plus the District of Columbia in 1979. Results of the study indicate the Colorado slaughter cattle market appears to be relatively competitive.

(9) Cotton, W. P., 1942

Cotton found that in five years from 1936 to 1940, 78.7 percent of all cash farm income, exclusive of government payments, came from livestock in South Dakota. Beef alone accounted for 32.7 percent of total cash farm income. A majority of the cattle was sold through terminal markets. A trend toward direct marketing of slaughter animals was identified over this time period. Cotton also noted that hired truckers were the main transportation method used in marketing South Dakota cattle.

Cattle Market Channels

(26) Høglund, C. R. and Johnson, M. B., 1971

Ranching in South Dakota was the focus of this study. A trend toward larger ranches was indicated. The average ranch size

in 1920 was 897 acres. Ranch size increased to 1,671 acres in 1945. The percent of ranches over 1,000 acres doubled from 1930 to 1945.

Ranch characteristics such as land use, organization, income, investment, mechanization, age of operator, land ownership, and management practices were discussed. Livestock marketing also was covered. It was noted that 45 percent of the ranchers made a practice of shipping some or all cattle sold to terminal public markets. About one-third sold direct to feedlots and 27 percent sold through auctions.

Hoglund and Johnson found cattle ranching with the highest net income of \$4,170 compared to \$3,196 for sheep ranchers; \$3,445 for general ranchers, farmers involved in both livestock and grain operations; and \$3,607 for cash grain operators.

(34) Nervik, Ottar, 1951

In this study a survey of South Dakota cattle feeders was conducted to determine what market channels they used. Results showed 41 percent of the feeder cattle were sold through livestock auctions and 35 percent through terminal markets. Lists of livestock auction locations in South Dakota and their volume were presented for 1949.

Other factors that influence marketing were discussed. They included size of shipment, method of transportation, and market costs. Trucks accounted for 75 percent of the shipping of

cattle from market to feedlot, rail was used 19 percent of the time, and foot accounted for 6 percent. Nervik found that South Dakota beef sales accounted for 27 percent of the state's total cash farm income in 1949.

(22) Gaarder, Raymond O., 1972

Gaarder reported that cattle and calf sales accounted for about half of all cash receipts from South Dakota farm marketings in 1970. This study of South Dakota's beef industry contained an extensive examination of feedlots, market channels, market agencies, slaughter firms, grading and various information sources used by South Dakota producers.

Results indicated an increase in auction market use from 34 percent in 1957 to 64 percent in 1970 as a percent of all South Dakota cattle and calves sold. Public stockyard use declined from 38 percent in 1957 to 12 percent in 1970. Gaarder noted that public stockyards handled more cattle than auctions. Purchase of cattle directly from farmers or country dealers by the packers increased from 38 to 65 percent from 1960 to 1970.

Gaarder reported that from 1960 to 1970, South Dakota became more important as a feeder cattle exporter and less important in cattle feeding and in beef slaughter. County numbers of cattle on feed were presented for 1969. Most of South Dakota feedlots were found near the terminal market in the southeast part of the state. After examining market news sources, Gaarder

suggested an unbiased third party livestock news system would be useful to the South Dakota beef industry.

(8) Clauson, Annette, 1983

Clauson examined the beef industry of South Dakota from the producer level. The flow of cattle through existing South Dakota marketing channels was determined. In this study, the South Dakota market was reported for nine crop reporting regions. Data was collected through a producer survey. Clauson found that the predominant type of farm organization was sole proprietorship. The mean age of cattle producers was 49.2 years of age. The mean number of years in business for cattle producers was 25.8 years.

Clauson determined what type of cattle were being marketed and purchased in South Dakota. What market channels were being used and the inflow and outflow of cattle from South Dakota were provided. Results indicated fewer slaughter cattle were being exported in 1980 than in 1972, while total cattle inshipments were reduced from 794,755 head in 1972 to 452,793 in 1980.

(29) Janssen, Larry, 1983

Janssen studied swine production and marketing patterns in South Dakota. United States census data provided structure characteristics for the swine industry on a national and state level.

Janssen determined the number of swine producers in South Dakota declined 60 percent from 1959 to 1978. Average annual sales

tripled for the same period. In 1978, 300 swine producers sold 1,000 or more hogs and pigs compared to only five producers in 1959. Part ownership was determined to be the major type of swine farm organization.

South Dakota swine production was concentrated in east central and southeastern South Dakota. Results of a 1980 marketing survey indicated regional differences in producer selection of market channels. Western South Dakota swine producers tended to use auctions more while producers in the east and central regions of South Dakota used terminal markets. Janssen found all state swine producers have increased direct shipment of slaughter hogs to packers and decreased their use of terminal markets. Auction markets had maintained or increased their share of producer slaughter hog marketings from 1957 to 1972.

Trends in Cattle Slaughter and Processing

(32) Nelson, Kenneth E., 1985

Nelson reported various structural changes in the meat slaughter and processing industry in the United States. He found that increasing concentration was a result of plant closings or plant buyouts leaving fewer or larger firms in the United States. In his analysis he used federal inspection data and Packers and Stockyards Administration data, breaking down the plants by size, volume, location, labor costs, and area concentration ratios.

Nelson indicated there were barriers to entry into the beef slaughter industry based on existing technology. Nelson noted that there presently is overcapacity in the slaughter industry so there are few reasons for entering the market. Nelson also examined price efficiency and indicated that fewer buyers were available for producers with the increased concentration of the industry. Nelson stated that overcapacity and competition from poultry likely will keep downward pressure on margins for red meat packers. Pressure for cost reduction through increased market shares, low wage rates or other economies would continue in the future according to Nelson.

(28) The National Provisioner, 1977

This study presents an overview of the whole meat slaughter industry in the United States. A breakdown of federal and state inspected plants on a state level is provided. A total of 12,542 plants were inspected in 1976 in the United States. South Dakota had 13 meat only plants, 4 poultry only, and 2 meat and poultry plants in 1976 that were federally inspected. Of these plants, 3 were slaughter only, 6 were processing only, and 10 provided slaughter and processing. South Dakota had 157 state inspected plants in 1976.

Results of the study indicated the size of plants in the United States was increasing based on slaughter volume. Slaughter totals for beef, hogs, sheep and poultry combined were given on a

monthly basis for 1975 and 1976. The study was completed to show the effects of the Wholesome Meat Act of Dec 1967 on red meat industry inspection. In 1967 there were 2,016 red meat plants under federal inspection. That number had increased to 6,408 in 1976.

(37) Schnittker Associates, 1980

This study was conducted to provide information for pending legislation aimed at restructuring the meat packing industry. Attempts were made to determine if non-competitive market forces were in place in the meat packing industry. Tests for monopoly power were conducted for the American Meat Institute.

Results were determined from profits, market share, and competition for available supplies. No evidence was found of monopolistic power in the meat industry. Rather than proving that monopoly power existed in the meatpacking industry, the study results indicated that growth of efficient firms in several important cattle slaughter regions of the country had improved competition and increased returns to cattle feeders and cattle producers.

(10) Dietrich and Farris, 1976

Dietrich and Farris analyzed the market structure, performance, and competitive practices of the Texas beef industry at the retail, wholesale and slaughter level. Data was obtained through personal interviews with owners or managers of slaughter

plants in Texas in 1974. Plant capacity, location, volume and animal availability were examined, followed by a determination of what type of meats were being sold and where the meat was being marketed.

Results indicated Texas transformed from a deficit fed beef producing state in the 1960's to a surplus state today. A trend toward fabricated or box beef also was discussed. Dietrich and Farris found that about sixty percent of the steer and heifer beef went out-of-state, primarily to the east and west coasts.

(20) Faminow and Sarhan, 1983

Faminow and Sarhan conducted an extensive study of the United States' beef slaughter and processing industry. The authors attempted to identify the economic factors that influence the number, size, and location of beef slaughtering and processing plants. Two models, one for 1980 and one for the year 2000, were set up to determine the optimal number, location, and volume of fed beef slaughtering and processing plants in the United States.

Over this 20 year time period shifts in fed cattle production from the upper midwest to the states in the lower midwest and southwest plains were identified. Also a trend toward larger sized plants was reported.

Slaughter and Processing Costs

(13) Deuwer, Lawrence A., 1985

Deuwer derived a model to determine the lowest beef-handling cost system at the processor and retail level of the U.S. beef industry. Ten different methods of handling and processing the meat at the packer, central warehouse or retail level were compared. A relatively new processing system, tray-ready beef, was also included in the model. In this system the meat is cut into final retail cuts before packaging; the retailer then has only to weight, wrap and price the individual cuts.

Economic engineering and capital budgeting were used to determine the costs of each system. The lowest cost system was determined to be a central warehouse where meat was processed into tray-ready retail cuts. This tray-ready system had the lowest cost of processing on the basis of net sales minus costs, but may or may not be adopted by the industry according to Deuwer.

(41) Stuck, Haven L., 1972

Stuck analyzed the beef industry in South Dakota to determine the optimum number, location and size of specialized beef slaughter plants for the state. The state was divided into eleven potential beef supply areas. Estimates were made for the operating cost of various sized plants. A simplex or linear programming, transportation model was used to determine the optimum location and

size of potential plants.

Stuck's results indicated the use of six plants at 60 head per hour and two at 75 head per hour as the optimal number and size of plants in South Dakota with cattle supply at current production levels. When Stuck reduced potential supply to 60 percent of the estimated cattle production, a total of five plants were recommended, one 40 head per hour in region 8, one 60 head per hour in regions 3 and 6, and one 75 head per hour located in regions 7 and 11. Stuck concluded that cattle numbers available for slaughter appear to imply expanding beef slaughter but noted the limitations of the study for not accounting for influencing factors outside of South Dakota.

(19) Faminow, M. D., February 1983

Faminow synthesized unit costs for alternative sizes of cattle slaughtering plants in the Montana cattle industry. He found plants with large slaughter capacity were more efficient in concentrated fed cattle production areas than smaller sized plants.

Faminow's results indicated economies associated with plant size were present in the industry and that increased capacity utilization resulted in lower unit slaughter costs. Faminow stated that a larger plant could operate at less than full capacity and still achieve a lower unit cost than a smaller plant operating at full capacity.

(11) Duewer, Lawrence A., 1986 (Draft)

Duewer developed a U.S. model to determine beef packing plant cost components, economies of scale, and costs incurred when operating beef processing plants at less than full capacity. Plants killing 47 to 300 head per hour and selling carcasses and boxed subprimals were compared. Duewer gives extensive plans of labor and equipment needed to operate a 120 head/hour plant under various capacity levels. Other cost components included parking, procurement, corrals, kill floor, breaking and fabrication, finances, coolers, by products, transportation, waste treatment, sales, sanitation, maintenance and security, revenues, and administration wages.

Economies of scale were demonstrated in the results, with the larger plants having lower costs per unit. Duewer also broke down the costs into fixed and variable. He found fixed costs are a higher proportion of total costs for kill only plants than for kill and boxed beef plants.

CHAPTER III

SOUTH DAKOTA AND U.S. BEEF PRODUCTION

This chapter contains a summary of background information on beef cattle production in South Dakota and the United States. After reading this chapter, one should have a feel for the future potential supply of South Dakota cattle for processing and the demand for the processed product. Data on number of farms, size of farms, cattle inventory cycles, meat consumption, and market channels are presented on the state and national level. Producer characteristics, land tenure, farm organization, gross farm sales, farm size, and the age of operator are presented for South Dakota.

U.S. and S.D. Cattle Farm Numbers

Farm numbers by type of production, Table 3.1, are provided for South Dakota and the United States from 1950 to 1982. Total farm numbers in the United States have declined dramatically from 1950 from 5.39 million to 2.24 million in 1982. The decrease in numbers during that period was 58.4 percent. South Dakota farm numbers declined 44.1 percent from 66,452 farms in 1950 to 37,148 farms in 1982. Livestock farms declined 61.4 percent nationally and 47.5 percent in South Dakota over this same time period.

The number of United States cattle farms raising beef and

Table 3.1 United States and South Dakota Farm Numbers and Size by Type of Production

United States	1950	1959	1969	1978	1982	Percent Change *
All Farms (in thousands)	5,388	3,711	2,730	2,258	2,241	-58.4
Land in Farms (thousand acres)	1,161,420	1,123,508	1,062,893	1,014,777	986,797	-15.0
Average Size of Farm (acres)	216	303	389	449	440	+103.7
Livestock and Poultry Farms (thousands)	4,219	2,701	1,734	1,628	1,627	-61.4
All Cattle Farms (thousands)	4,065	2,674	1,719	1,346	1,355	-66.7
Beef Farms (thousands)	2,983	2,304	1,151	954	958	-67.9
South Dakota	1950	1959	1969	1978	1982	Percent Change *
All Farms	66,452	55,727	45,726	38,741	37,148	-44.1
Land in Farms (thousand acres)	44,786	44,851	45,584	44,422	43,810	- 2.2
Average Size of Farm (acres)	674	805	997	1,147	1,179	+74.9
Livestock and Poultry Farms (thousands)	59	51	36	32	31	-47.5
All Cattle Farms (thousands)	55	47	34	28	27	-50.9
Beef Farms (thousands)	51	41	28	22	21	-58.8

*Percent Change from 1950-1982.

Source: U.S. Department of Commerce, Bureau of the Census, U.S. Census of Agriculture, United States and South Dakota, 1950-1982 reports.

dairy cattle declined from 4.06 million in 1950 to 1.35 million in 1982, a 66.7 percent decline. South Dakota cattle farm numbers declined 50.9 percent from 55 thousand in 1950 to 27 thousand in 1982. The largest percentage decline was found in cattle farms that raised beef. United States beef farm numbers fell from 2.98 million in 1950 to .96 million in 1982, a decline of 67.9 percent. South Dakota beef farm numbers declined from 51 thousand in 1950 to 21 thousand in 1982, a 55.8 percent decrease.

A significant number of cattle farms have discontinued beef operations. The ratio of beef farm numbers to all farm numbers can be used to demonstrate this. For the United States this ratio declined from 55.3 percent in 1950 to 42.9 percent in 1982. In South Dakota this ratio declined from 77.3 percent to 56.7 percent in the same period. These figures provide an example of the rapid decline in beef farm numbers compared to all farms, both on a national and state level.

While farm numbers declined dramatically, 44.1 percent in South Dakota from 1950 to 1982, land in farms declined by only 2.2 percent annually. As a result average farm size increased. The United States average farm size increased 103.7 percent from 216 acres in 1950 to 440 acres in 1982 and South Dakota farm size increased 74.9 percent from 674 acres to 1,179 acres over the same time period. Comparing South Dakota numbers to the United States numbers it is demonstrated that South Dakota farm size change followed the national trend but was not as dramatic.

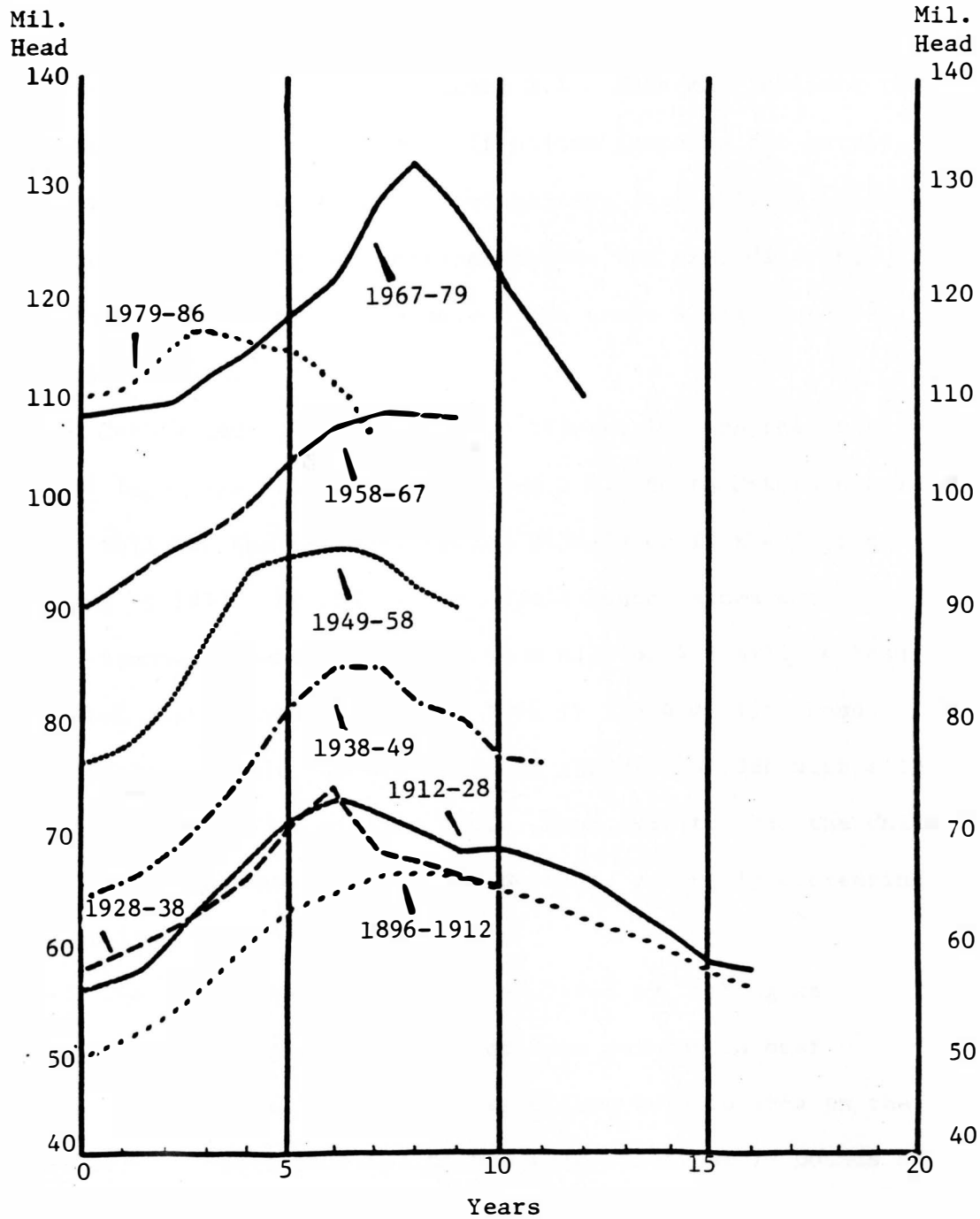
Cattle Inventory Cycles and Beef Consumption

The decline in beef farm numbers has been demonstrated. There is still a question regarding the factors which may have caused the decline. Cattle inventory cycles and consumer consumption figures are provided in the following section to determine their impact on cattle production.

A distinguishing feature of the meat economy is the cattle cycle, a repetitious pattern of increases and decreases in cattle numbers. The cattle cycle occurs because of the biological lag in production, and the effects of production decisions in reaction to economic forces. Prices for cattle also fluctuate cyclically, and inversely to cattle numbers. The United States cattle cycles from 1896 to 1986 are presented in Figure 3.1.

Cycles have two phases, expansion and reduction. In the expansion phase the outlook for prices is good so cattlemen hold back heifers for breeding instead of slaughtering them. This reduces slaughter numbers and current supplies of beef, raising prices further and herd expansion continues. Due to the biological lag in production, it may take 3 1/2 to 5 1/2 years before expanded supplies reach the consumer. Once that happens, cattle numbers and supplies are so large that prices fall and producers begin to liquidate herds, thus starting the reduction phase. This reduction continues until marketings drop to a point where prices begin to rise and the cycle begins anew.

Figure 3.1
Cattle Inventory Cycles, 1896-1986



Source: The Cattle-Beef Subsector in the United States, Kenneth G. Nelson, Feb. 1984.

Presently, the cattle cycle is in a reduction phase, probably in the tail end of a cycle because cattle numbers are very low. U.S. cattle numbers in 1986 were at 105.5 million head, the lowest number since 1963, see Figure 3.1. This may indicate the beginning of the expansion phase if prices increase for cattle. Other factors such as weather, feed prices, availability of credit, the national farm program, consumer income and expenditures, inflation, and consumer preference could cause a continued decline in cattle numbers.

Cattle and calf numbers from 1930 to 1986 on the state and national level are presented in Figure 3.4. South Dakota cattle numbers followed the national cycles closely until the last cycle beginning in 1979. In the present cycle South Dakota cattle numbers trended upward until 1984 to a high of 4.2 million head. The United States cycle peaked in 1982 at 115.4 million head. South Dakota's cattle numbers declined rapidly in 1986 with a 13.5 percent decline to 3.6 million head. From 1982 to 1986 the United States cattle numbers declined 8.7 percent, gradually decreasing to 105.4 million head.

The demand for beef can be analyzed by looking at consumption. Figure 3.2 and 3.3 indicate per capita beef consumption and total meat consumption from 1970 to 1985 in the United States. Beef consumption has held steady at 79 pounds of retail beef per capita from 1983 to 1985, while total meat consumption has been increasing, mainly due to increased poultry

Figure 3.2
PER CAPITA BEEF CONSUMPTION
 RETAIL WEIGHT EQUIVALENT

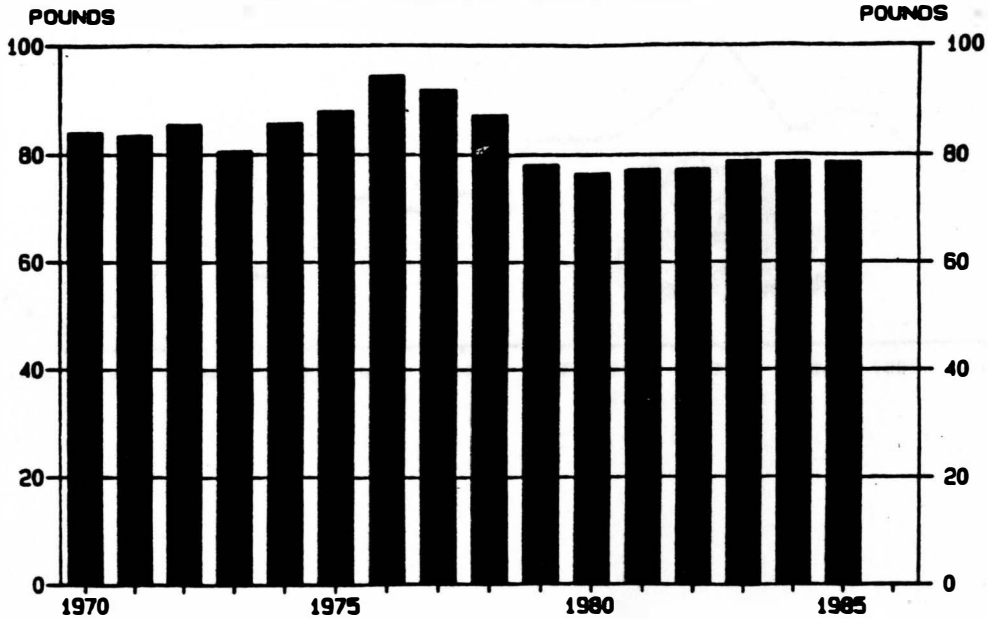


Figure 3.3
PER CAPITA TOTAL MEAT CONSUMPTION
 RETAIL WEIGHT EQUIVALENT

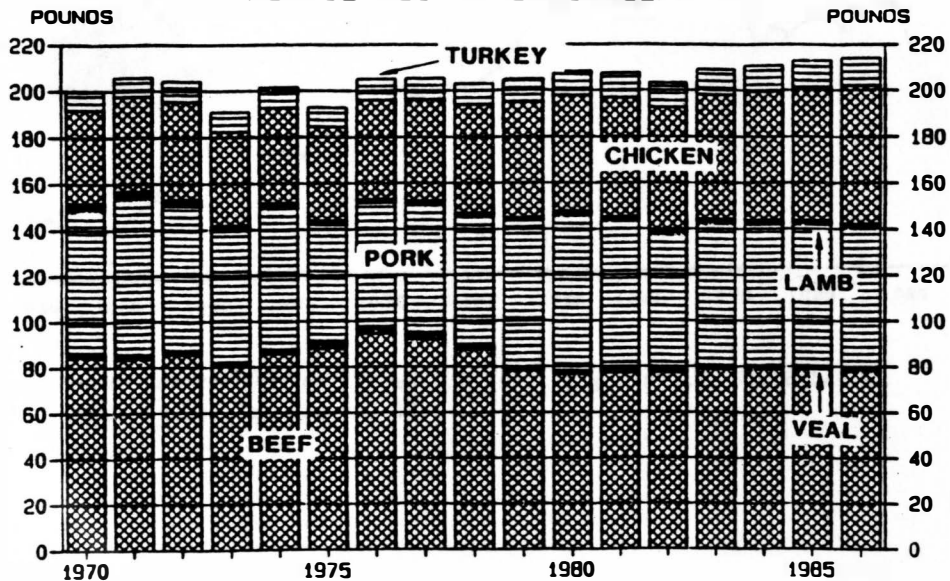


Figure 3.4

CATTLE AND CALVES, UNITED STATES, 1930-1986



CATTLE AND CALVES, SOUTH DAKOTA, 1930-1986



Source: South Dakota Crop and Livestock reporting service, South Dakota Agricultural Statistics, 1986.

consumption. Beef consumption reached a peak in 1976 of 94 pounds per capita, see Figure 3.2. A cyclical low appears to have been set in 1980 at 77 pounds of beef per capita. The trend before 1976 had been upward, from 1976 to 1980 beef consumption declined and since then consumption has held fairly constant.

Total meat consumption has continued to trend upward with occasional declines as shown in Figure 3.3. Increases in the consumption of other meats has offset the decreases in beef consumption since 1976. Pork consumption fluctuated around 60 pounds per capita for two decades while chicken consumption has increased in most years.

Consumers spent \$52 billion for domestic beef and veal in 1982. This represents 17 percent of expenditures for domestic farm-produced food and 60 percent of expenditures for domestically produced meats.(43) Relative prices are a major determining factor of consumption. Poultry and fish consumption are increasing as their prices are lower in comparison to beef and pork. Other factors, such as the health implications of cholesterol in beef and pork, have further reduced meat consumption. If beef consumption is to increase, price must be kept at competitive levels with poultry and pork.

Characteristics of South Dakota Cattle Farms

Selected characteristics of South Dakota cattle farms from 1959 to 1982 are provided in Table 3.2.

Part ownership is the most common type of land tenure, increasing from 45 percent in 1959 to 52 percent in 1982. Full ownership of the cattle farm by the operator also increased continually from 27.7 percent in 1959 to 35 percent in 1982. Tenant operated cattle farm numbers declined from 27.3 percent in 1959 to 13 percent in 1982. Most cattle farmers, 87 percent in 1982, have some ownership of their land compared to 72.8 percent in 1959.

The age distribution of the operator has changed over this 23 year period. The 65 and older group has continually increased from 6.5 percent of all farm operators in 1959 to 18.9 percent in 1982. For the same time frame, the 55-64 years age group also increased continually from 21.2 percent to 27.6 percent. The only other category to show an increase was the under 25 age group, increasing from 1.9 percent in 1959 to 3.3 percent in 1982.

The other three age categories, in the 25 to 54 years range all fluctuated downward over this time span. This demonstrates that more cattle farmers are in the older age categories with 46.5 percent of the states cattle producers being 55 years or older in 1982 compared to 27.6 percent in 1959.

Sole proprietorship is the most common type of farm

Table 3.2 South Dakota Cattle Farm Characteristics, 1959, 1969, 1978, 1982

Farm Characteristic:	1959	1969	1978	1982
	-----Percent-----			
All Farms				
Raising Beef	73.6	61.2	56.8	56.5
Tenure:				
Full Owner	27.7	31.9	33.6	35.0
Part Owner	45.0	52.7	53.4	52.0
Tenant	27.3	15.4	13.0	13.0
Total	100.0	100.0	100.0	100.0
Age of Operator:				
Under 25	1.9	1.8	3.7	3.3
25 - 34	17.3	11.5	13.3	13.6
35 - 44	26.7	23.0	17.3	15.5
45 - 54	26.5	29.4	26.6	21.1
55 - 64	21.1	24.4	26.9	27.6
64 & older	6.5	9.9	12.2	18.9
Total	100.0	100.0	100.0	100.0
<i>Ranch</i> Organization:				
Sole Proprietorship	NA	86.5	87.9	86.7
Partnership	NA	12.5	9.6	10.5
Corporation	NA	.6	2.3	2.5
Other	NA	.4	.2	.3
Total		100.0	100.0	100.0

Source: U.S. Department of Commerce, Bureau of Census, U.S. Census of Agriculture, South Dakota, Vol. 1, 1983, 1978, 1969, and 1959 reports.

organization, ranging from 86.5 percent of all farm operations in 1969 to 87.9 percent in 1982. At the same time, the percentage of partnerships declined from 12.5 percent to 10.5 percent and the number of corporations increased from 0.6 percent to 2.5 percent.

The size of South Dakota cattle farms can be obtained from Table 3.3 which lists gross farm sales, number of head sold, and acres per farm. Gross farm sales information was available only from 1969 to 1982, while number of head sold and farm acreage includes 1959 data.

In 1969, 83 percent of South Dakota cattle farmers had gross sales of less than \$20,000, while in 1982 only 26.6 percent were in that category. The \$20,000-39,999 category increased from 10.5 percent in 1969 to 27 percent in 1978 and then declined to 22.5 percent in 1982. All the other categories from \$40,000 and up increased from 1969 to 1982. Inflation's influence on price also caused gross sales to increase, inflation must be included when looking at sales growth.

In 1969 the average price paid for beef was 26.5 cents/pound while the consumer price index was 109.8 (1967 = 100). From 1969 to 1982 the price paid for beef cattle increased to 58.6 cents per pound, while the consumer price index increased to 289.1. (38) Adjusting the 1969 figure to 1982 dollars, \$20,000 in 1969 would be equal to \$44,226 in 1982 and \$40,000 in 1969 would inflate to \$88,453 in 1982. So to compare gross sales on a constant dollar basis after adjusting for inflation, \$40,000 in 1969 and \$100,000

Table 3.3 Size of South Dakota Cattle Farms by Sales Volume and Acreage

	1959	1969	1978	1982
	-----Percent-----			
Gross Sales by Value of Products Sold:				
Less than \$20,000	NA	83.0	31.4	26.6
\$20,000 - \$39,999	NA	10.5	27.0	22.5
\$40,000 - \$99,999	NA	6.5	31.8	33.4
\$100,000 - \$199,999 ^{A/}	NA		7.4	14.3
\$200,000 & over ^{B/}	NA		2.4	3.2
Total		100.0	100.0	100.0
Farms Selling:				
1 - 19 head	64.4	23.6	27.8	26.1
20 - 49 head	23.1	38.1	32.2	30.7
50 - 99 head	8.3	23.3	20.8	21.5
100 - 199 head	3.0	12.4	11.7	13.2
200 - 499 head ^{C/}	1.2	5.3	5.9	6.5
500 & over		1.3	1.6	2.0
Total	100.0	100.0	100.0	100.0
Size (in acres):				
1 - 99 acres	2.7	3.8	.0	8.5
100 - 499 acres	54.7	40.9	30.4	28.9
500 - 999 acres	24.4	26.9	25.5	24.8
1000 - 1999 acres	12.2	16.4	20.4	20.4
2000 and over acres	6.0	12.0	15.7	17.4
Total	100.0	100.0	100.0	100.0

A) Figures for 1982 include sales from \$100,000 to \$250,000.

B) Figures for 1982 begin at \$250,000 and over.

C) Figures for 1959 represent sales for 200 head and over.

Source: U.S. Department of Commerce, Bureau of Census, U.S. Census of Agriculture, South Dakota, Vol. 1, 1982, 1978, 1969, and 1959 reports.

in 1982 would be comparable.

In 1969, 93.5 percent of all cattle farmers had gross sales of \$40,000 or less compared to 82.5 percent in 1982 with sales of \$100,000 or less. This demonstrates that even after adjusting for inflation, cattle farm gross sales are getting larger, indicating that cattle farm size is increasing in South Dakota.

Looking at cattle farms by the number of head sold also indicates a trend toward larger farms. In 1959, 64.6 percent of South Dakota cattle farms sold less than 149 head, while in 1982 only 26.1 percent were in that category. Farms in the 100 or more head sold categories increased from 4.2 percent in 1959 to 21.7 percent in 1982. The percentage increased in all categories except the under 20 head from 1959 to 1982.

The trend toward larger cattle farms also is indicated by looking at farm size in acres. While the proportion of small farms of less than 100 acres increased from 2.7 percent to 8.5 percent from 1959 to 1982, the proportion of farms between 100 to 999 acres declined from 79.1 percent in 1959 to 53.7 percent in 1982. From 1959 to 1982 the larger farms of 1000 acres or more increased from 18.2 percent to 37.8 percent, see Table 3.3. South Dakota cattle farms are trending larger on both a sales and acre basis. However, not all regions of the state follow this pattern.

South Dakota's agricultural area is divided into nine Crop Reporting Districts (CRD) used by the Crop Reporting Service when reporting state data. Information on beef farm numbers, cattle

farm numbers, beef cow numbers and all cattle numbers was summarized from county census data from 1978 and 1982 and combined into Table 3.4. The districts are indicated on the South Dakota state map (Figure 3.5).

The trend in the number of beef cow farms from 1950 to 1982 in South Dakota and the United States was down, see Table 3.1. But looking closer at 1978 to 1982 a slight increase was recorded in United States beef cow farms and all cattle farms. South Dakota CRD districts one and seven from followed the national trend with increases in the number of beef cow farms of 5.7 and 2.8, respectively, see Table 3.4. Decreases in beef cow farms occurred in all the other districts and the state. The largest decline in farm numbers of all districts occurred in district nine with a decline of 10.4 percent. State farm numbers declined 4.4 percent overall.

All cattle farms increased slightly, 0.7 percent from 1978 to 1982, on the national level. Districts one, four and seven had increases of 5.9, 5.3, and 3.1 percent, respectively, while state total cattle farm numbers declined 3.0 percent. District nine again had the largest percentage loss of 8.9 percent.

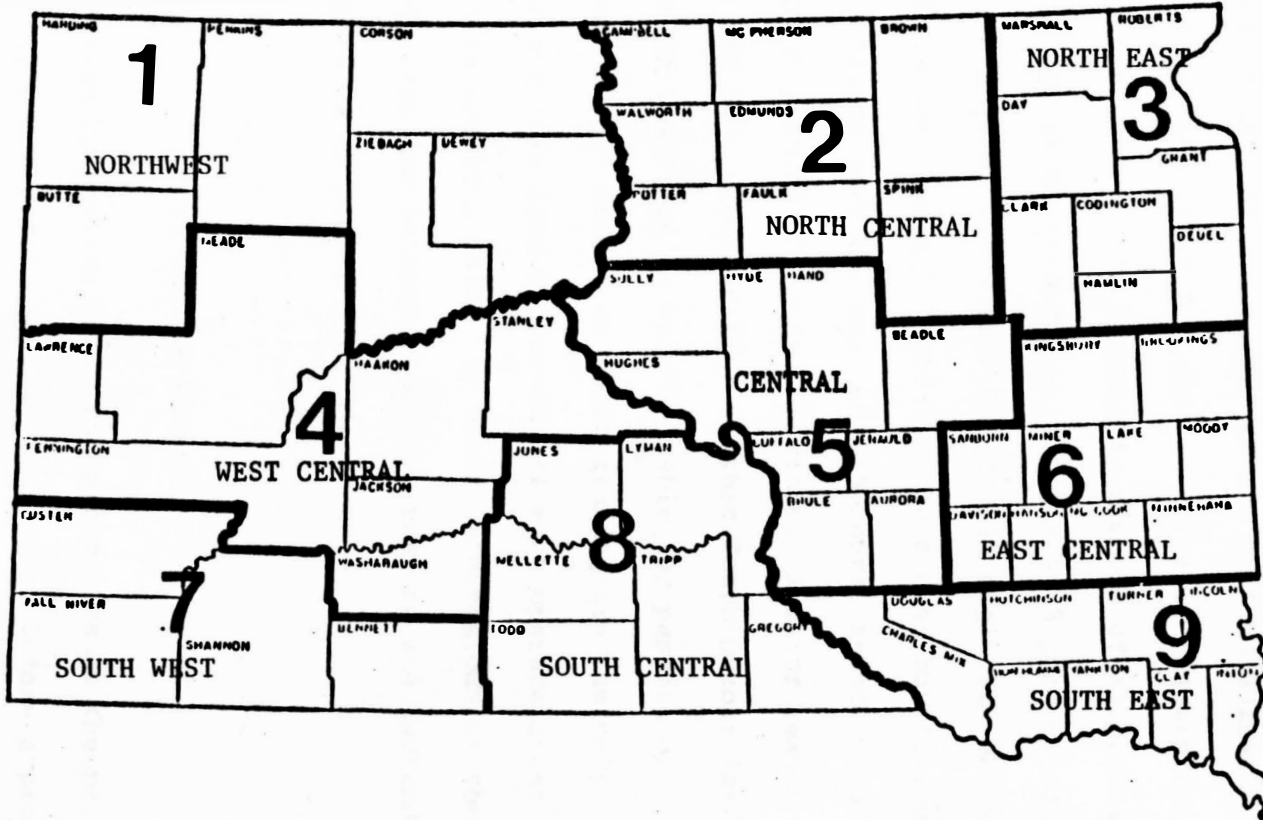
South Dakota's state trend was opposite the United States trend in beef cow numbers. South Dakota beef cow numbers increased 6.5 percent from 1978 to 1982 while the United States numbers declined 0.4 percent. Eight districts recorded increases with only district nine recording a loss of 7 percent. Districts eight and

Table 3.4 South Dakota Cattle Farm Numbers and Inventories by Crop Reporting District for 1978 and 1982

CRD	Beef Farms			All Cattle Farms			Beef Cow Numbers			All Cattle Numbers		
	----Number----	1978	Percent Change	----Number----	1978	Percent Change	-----Number-----	1978	Percent Change	-----Number-----	1978	Percent Change
1	1,699	1,607	+5.7	1,945	1,836	+5.9	210,309	186,457	+12.8	390,337	351,289	+10.9
2	2,766	2,862	-3.4	3,238	3,344	-3.2	211,669	200,218	+5.7	524,074	502,695	+4.3
3	2,716	2,824	-3.8	4,009	4,161	-3.6	136,184	125,178	+8.8	423,139	381,160	+11.0
4	1,633	1,634	-0.1	1,920	1,823	+5.3	181,160	168,288	+7.6	364,848	328,094	+11.2
5	2,397	2,535	-5.4	2,778	2,929	-5.2	231,229	218,264	+5.9	551,895	518,333	+6.5
6	3,873	4,118	-5.9	5,378	5,474	-1.8	194,475	183,944	+5.7	570,312	544,716	+4.7
7	732	712	+2.8	823	798	+3.1	77,509	75,903	+2.1	226,169	156,699	+44.3
8	1,748	1,810	-3.4	2,007	2,068	-2.9	195,474	171,039	+14.3	398,559	378,824	+5.2
9	3,777	4,217	-10.4	5,179	5,687	-8.9	157,679	169,539	-7.0	531,536	541,487	-1.8
S.D. Totals	21,341	22,319	-4.4	27,277	28,120	-3.0	1,595,688	1,498,830	+6.5	3,980,869	3,703,837	+7.5
U.S. Figures	957,698	954,360	+0.3	1,354,992	1,346,106	+0.7	34,202,607	34,326,274	-0.4	43,110,000	42,018,166	+2.6

Figure 3.5

South Dakota Crop Reporting Districts



one recorded large increases of 14.3 and 12.8 percent, respectively.

From 1978 to 1982 the number of all cattle increased on the state and national levels at 7.5 and 2.6 percent, respectively. Only district nine recorded a decline in numbers of all cattle, 1.8 percent. District seven recorded a dramatic 44.3 percent increase while district one, three and four had double digit increases.

South Dakota trends in cattle numbers have not followed the United States trends very closely. Furthermore, trends within the state vary greatly among the nine districts. A major reason why South Dakota and U.S. trends differ is that South Dakota land use in many areas of the state is only suitable for pasture or rangeland production. Cattle or sheep grazing are the only means of production for this land and producers must operate under low margins or leave the land idle. In other land regions of the United States, land can be converted from pasture and hayland to cropland, depending on profit margins.

Marketing Channels

The following section contains information on the marketing channels used by South Dakota cattle producers. Before a producer decides which market channel to use, information is collected on which channel will benefit the producer most by achieving the highest price for his produce. The information sources used by

South Dakota cattle producers are listed in Table 3.5 based on Clausen's 1980 producer survey. (8)

The most often used market information source for decision making concerning the marketing and purchasing of cattle was the radio. Of 2,910 producer responses, 1,965 listed radio as their first, second, or third choice for market information. Television was the second most often used market information source. The local newspaper was the third most often used market information source. Clausen noted the significance that 1,758, or 60 percent, of the respondents indicated "no response" to the third source of information used. This suggests that most producers use less than three sources of marketing information when making decisions concerning the marketing and purchasing of cattle. (8)

Once the producer decides when and where to market the cattle, he or she must decide how to get the cattle to market. The major method of transportation to market was based on Clausen's 1980 producer survey, Table 3.6. Hiring a truck was the most frequent method of transporting cattle to market as 63 percent of the respondents used trucks. Twenty-nine percent of the producers hauled the cattle to market themselves. Other methods and buyer hauling accounted for the other eight percent. Trucks were the major tool used for hauling cattle for all of the above methods.

Before the producer hires a trucker, he must determine what market channel to use. The major market channels available to producers include public stockyards, auction/sales barn, and direct

Table 3.5 South Dakota Producer Sources of Information for Marketing and Purchasing, 1979

	First Choice	Second Choic	Third Choice
1. Radio	818	656	221
2. Television	688	608	286
3. Sales bills /reports	379	164	104
4. Local paper	358	402	325
5. Magazine	199	182	134
6. Other	108	85	51
7. Commission Rep.	28	22	22
8. USDA	17	15	9
9. No response	315	776	1,758

Table 3.6 Major Method of Transportation to Market, 1979

Major Method	Number of Respondents	Percent of Total
1. Hired Truck	1,769	63%
2. Self Hauled	808	29%
3. Buyer Hauled	189	7%
4. Other	14	1%

Source: Clauson, Annette L., Market Structure and Conduct of the South Dakota Beef Industry. Unpublished Masters Thesis, South Dakota State University, 1983.

shipments to the buyer. Public stockyards located mainly in seven west north-central states were of major importance during the 1920's and 1930's. In the 1920's 80 public stockyards handled over 90 percent of the cattle and calves purchased by packers. In 1982 the 28 remaining public stockyards accounted for less than 10 percent of the cattle and calves purchased by the packers. (33)

Auction markets are the major channel used for the marketing of cull cattle and feeder cattle. Few slaughter animals are marketed through auctions. Auction or sales barns are located across the United States. About 40 million head, or 71 percent of all cattle and calves that were marketed, were marketed through 1,832 posted auction markets in 1980. The number of auction markets is declining; in 1949 there were 2,472 auctions compared to 2,065 auction markets in 1960 and 1,832 in 1980. (33)

A USDA survey was conducted in 1976 with U.S. cow-calf operators. Results of the survey indicated that over 81 percent of the operators used auction markets as their marketing channel. Direct sales was used by 12 percent of the operators and 4 percent used public stockyards for marketing their cattle. (6)

Direct sales are used mainly by packers who purchase cattle directly from producers. Price is negotiated and a hauling date is determined. This allows the packer to keep cattle lined up for slaughter operations and the producer to lock in a price. This market channel accounted for 87 percent of slaughter steers and heifers purchased by the packers in 1980. (33)

An overview of United States market channels has been provided. The following is a more intensive look at the market channels being used by South Dakota cattle producers. The channels of farm and ranch marketing in South Dakota are listed in Table 3.7A-D, by classes of cattle sold from 1957 to 1985. The classes listed for South Dakota cattle and calves are slaughter (Table 3.7A), stocker and feeder (Table 3.7B), breeding, dairy and other (Table 3.7C), and all classes (Table 3.7D). The 1957, 1964 and 1972 information was provided by the South Dakota Crop and Livestock Reporting Service. The 1980 information was taken from a cattle producer survey conducted by Clausen and 1985 data was collected as a part of this thesis study.

The information in the 1985 column was not based on all cattle marketings of South Dakota, but on a sampling of livestock sanitary board data which recorded all outshipments of cattle from the state. All the years data were based on the point of first sale. The stockyard cattle sales for 1985 could not be credited to the county from which the cattle originated. Therefore, the percentages of slaughter for district six are too high. Also, the percentages of auction and direct sales use will be larger in all other districts because stockyard use cannot be traced to the originating counties (the S.D. stockyards are located in CRD number six).

Marketing channels used by South Dakota producers for slaughter cattle and calves are given in Table 3.7A. The use of

Table 3.7A Marketing Channels of South Dakota Slaughter Cattle and Calves.

District	Percent of all cattle and calves sold to or through																			
	Public Stockyards					Auction ¹					Direct ²					Total				
	1957	1964	1972	1980	1985	1957	1964	1972	1980	1985	1957	1964	1972	1980	1985	1957	1964	1972	1980	1985
1 Northwest	4	2	*	*	*	9	11	13	9	1	3	3	12	*	*	16	16	25	9	1
2 N. Central	16	21	1	2	*	13	12	10	11	*	11	14	22	8	*	40	38	33	21	*
3 Northeast	26	21	10	10	*	11	7	5	14	1	16	17	19	8	*	53	45	34	32	1
4 W. Central	5	2	1	*	*	12	11	13	11	1	2	2	11	2	*	19	15	25	13	1
5 Central	15	13	7	5	*	7	8	11	11	4	9	16	12	6	*	31	37	30	22	4
6 E. Central	60	52	31	24	.31	5	3	5	6	*	10	14	7	24	*	75	69	43	54	31
7 Southwest	9	6	3	*	*	9	8	9	9	*	2	6	26	1	*	20	20	38	10	*
8 S. Central	17	13	12	1	*	7	7	7	9	1	3	4	7	4	*	27	24	26	14	*
9 Southeast	68	54	33	21	*	5	5	6	11	*	5	15	11	21	*	78	72	50	53	*
State	28	21	13	9	9	8	8	8	10	1	7	12	14	10	*	3	41	35	29	10

¹/Method of marketing is first point of sale by South Dakota farm and ranch operators. Does not reflect resales by dealers and traders.

²/All other methods include interfarm sales, contract sales, sales to order buyers, direct to packers, etc.

*Very few or none marketed by this method.

Source: Clauson, Annette L., Market Structure and Conduct of the South Dakota Beef Industry. Unpublished Masters Thesis, South Dakota State University, 1983.

public stockyards decreased while the use of auction and direct channels fluctuated from 1957 to 1980. Auction use increased slightly from 8 to 10 percent from 1957 to 1980 on the state level. Data for districts 3,5,6,8 and 9 indicated increased auction market use. The use of direct sales fluctuated in all districts with the east central and southwest districts recording significant increases from 10 to 24 percent and 5 to 21 percent, respectively, from 1957 to 1980. All other districts recorded decreases in auction market use over this period of time.

The overall use of direct marketing increased from 7 to 10 percent from 1957 to 1980. This is much lower than at the national level, where direct marketing is the most frequently used method of purchase by packers. The final columns on Table 4.3A, where public stockyard, auctions and direct channel are combined, demonstrate a steady decrease in slaughter animals marketed as a percent of all cattle and calves marketed, from 43 percent in 1957 to 29 percent in 1980. This indicates fewer cattle are being marketed in South Dakota for slaughter. The use of public stockyards for slaughter cattle marketing has declined from 28 percent in 1957 to 9 percent in 1980.

Only 10 percent of the outshipments in 1985 were slaughter animals. This indicates that most slaughter cattle marketed in South Dakota are slaughtered in state. Also indicated is that public stockyards are the major source of out-of-state buyer's slaughter cattle purchases.

Market channels used for marketing stocker and feeder cattle are listed in Table 3.7B. The use of public stockyards for stocker and feeder cattle marketing declined in all districts except for district six from 1957 to 1980. District six recorded an increase from 12 to 16 percent. All nine districts recorded increased use of auctions over this time period. Auction usage on a statewide basis increased from 25 percent in 1957 to 45 percent in 1980.

Usage of the direct marketing channel for stocker and feeder cattle marketing declined in all nine districts except for nine from 1957 to 1980. District nine recorded an increase from 3 to 6 percent from 1957 to 1980. There was a gradual increase from 52 to 57 percent of total South Dakota cattle marketed as stocker and feeder cattle and calves from 1957 to 1980. All districts except one, four and eight recorded increased marketing of stocker and feeder cattle as a percent of all cattle and calves marketed.

Stocker and feeder cattle and calves were the main type of cattle outshipments in South Dakota, accounting for 70 percent of all cattle outshipments in 1985. Sixteen percent of all cattle outshipments are marketed through public stockyards as feeder cattle. Fifty-three percent of all South Dakota cattle outshipments are marketed through auctions and one percent through direct channels as stocker and feeder cattle.

Breeding, dairy and other types of cattle and calves marketed by marketing channel use is provided in Table 3.7C. The

Table 3.7B Marketing Channels of South Dakota Stock and Feeder Cattle and Calves.

District	Percent of all cattle and calves sold to or through																			
	Public Stockyards					Auction ¹					Direct ²					Total				
	1957	1964	1972	1980	1985	1957	1964	1972	1980	1985	1957	1964	1972	1980	1985	1957	1964	1972	1980	1985
1 Northwest	11	9	3	7	*	29	45	41	54	59	38	25	22	10	1	78	79	66	71	60
2 N. Central	9	7	6	3	*	31	41	44	59	62	15	9	10	4	2	55	57	60	66	64
3 Northeast	9	8	6	5	*	21	35	30	47	79	10	7	24	6	1	40	50	60	58	80
4 W. Central	9	6	4	2	*	34	51	39	63	73	33	26	23	9	1	76	83	66	74	74
5 Central	7	4	2	1	1	35	44	44	57	74	20	10	17	5	*	62	58	63	63	75
6 E. Central	12	13	12	16	57	6	12	11	19	4	5	4	28	2	*	23	29	51	37	61
7 Southwest	6	2	1	2	*	34	55	43	66	83	34	19	10	9	*	74	76	54	77	83
8 S. Central	6	6	4	3	*	40	58	45	56	87	25	10	17	6	1	70	74	66	65	88
9 Southeast	7	8	11	6	*	9	16	15	27	78	3	2	19	6	*	19	26	45	39	78
State	9	8	6	6	16	25	38	33	45	53	18	10	19	6	1	52	56	58	57	70

¹/Method of marketing is first point of sale by South Dakota farm and ranch operators. Does not reflect resales by dealers and traders.

²/All other methods include interfarm sales, contract sales, sales to order byers, direct to packers, etc.

*Very few or non marketed by this method.

Source: Clauson, Annette L., Market Structure and Conduct of the South Dakota Beef Industry. Unpublished Masters Thesis, South Dakota State University, 1983.

use of public stockyards as a marketing channel for this type of cattle is almost non-existent. Stockyards were used to market two percent or less of breeding and dairy cattle in all nine districts through all the years. The use of auctions to market dairy and breeding cattle increased from 1 to 8 percent on the state level from 1957 to 1980. Each district recorded increased marketings through auctions for this time period. Direct market channel use increased slightly from 3 to 4 percent from 1957 to 1980.

Dairy and breeding cattle outshipments from South Dakota increased from 5 to 13 percent of total state exports from 1957 to 1980. This eight percentage point increase indicates significantly more breeding and dairy cattle are being marketed as a proportion of all cattle marketings. Twenty percent of all cattle outshipments in 1985 were dairy and breeding cattle and calves. Direct marketing was the major channel used in 1985, accounting for eleven percent. Auction usage accounted for eight percent and the use of public stockyards for the marketing of breeding and dairy cattle outshipments was only 1 percent in 1985.

Marketing channels used for the marketing of all cattle and calves are presented in Table 3.7D. All cattle and calves is a totaling of slaughter, feeder, stocker, breeding and dairy cattle and calves from Tables 3.7A-3.7C into one group. Use of each market channel is listed by state and district. The use of auctions for marketing cattle and calves in South Dakota increased from 34 to 64 percent from 1957 to 1980. Auction was the major

Table 3.7C Marketing Channels of Breeding, Dairy and Other Cattle and Calves.

District	Percent of all cattle and calves sold to or through																			
	Public Stockyards					Auction ¹					Direct ²					Total				
	1957	1964	1972	1980	1985	1957	1964	1972	1980	1985	1957	1964	1972	1980	1985	1957	1964	1972	1980	1985
1 Northwest	*	*	*	*	*	3	3	3	15	24	3	2	6	3	15	6	5	9	19	39
2 N. Central	*	1	*		*	1	2	4	10	5	4	2	3	2	31	5	5	7	13	36
3 Northeast	2	1	*	*	*	1	2	4	5	5	4	2	2	3	14	7	5	6	9	19
4 W. Central	*	*	*	*	*	2	1	3	10	16	3	1	6	3	9	5	2	9	13	25
5 Central	1	1	*	*	*	2	3	5	9	7	4	1	2	8	14	7	5	7	15	21
6 E. Central	1	*	1	2	2	*	1	2	3	1	1	1	3	4	5	2	2	6	9	8
7 Southwest	*	*	*	*	*	2	2	5	9	4	4	2	3	5	13	6	4	8	14	17
8 S. Central	*	*	*	*	*	*	1	4	9	3	3	1	4	2	8	3	2	8	11	11
9 Southeast	1	*	*	2	*	1	1	3	4	12	1	1	2	2	10	3	2	5	8	22
State	1	*	*	1	1	1	2	4	8	8	3	1	3	4	11	5	3	7	13	20

¹/Method of marketing is first point of sale by South Dakota farm and ranch operators. Does not reflect resales by dealers and traders.

²/All other methods include interfarm sales, contract sales, sales to order buyers, direct to packers, etc.

*Very few or none marketed by this method.

Source: Clauson, Annette L., Market Structure and Conduct of the South Dakota Beef Industry. Unpublished Masters Thesis, South Dakota State University, 1983.

Table 3.7D Marketing Channels of All Cattle and Calves.

District	Percent of all cattle and calves sold to or through																			
	Public Stockyards					Auction ¹					Direct ²					Total				
	1957	1964	1972	1980	1985	1957	1964	1972	1980	1985	1957	1964	1972	1980	1985	1957	1964	1972	1980	1985
1 Northwest	15	11	3	7	*	41	59	57	80	84	44	30	40	13	16	100	100	100	100	100
2 N. Central	25	20	7	5	*	45	55	58	80	67	30	25	35	15	33	100	100	100	100	100
3 Northeast	37	30	16	15	*	33	44	39	68	85	30	26	45	17	15	100	100	100	100	100
4 W. Central	14	8	5	2	*	48	63	55	84	90	38	29	40	14	10	100	100	100	100	100
5 Central	23	18	9	6	1	44	55	60	77	85	33	27	31	17	14	100	100	100	100	100
6 E. Central	73	65	44	42	90	11	16	18	27	5	16	19	38	31	5	100	100	100	100	100
7 Southwest	15	8	4	2	*	45	65	57	84	87	40	27	39	14	13	100	100	100	100	100
8 S. Central	23	19	16	5	*	47	66	56	81	91	30	15	28	14	9	100	100	100	100	100
9 Southeast	76	60	44	29	*	15	22	24	41	90	9	18	32	30	10	100	100	100	100	100
State	38	29	19	16	26	34	48	45	64	62	28	23	36	20	12	100	100	100	100	100

¹/Method of marketing is first point of sale by South Dakota farm and ranch operators. Does not reflect resales by dealers and traders.

²/All other methods include interfarm sales, contract sales, sales to order byers, direct to packers, etc.

Source: Clauson, Annette L., Market Structure and Conduct of the South Dakota Beef Industry. Unpublished Thesis, South Dakota State University, 1983.

channel used in all nine districts, except for district six where the public stockyard is located.

Direct marketing was the next most often used market channel, accounting for 20 percent of cattle sales in 1980. The use of direct marketing fluctuated over the years, but has declined from 28 percent in 1957 to 20 percent of cattle marketings in 1980. All districts except six and nine recorded decreases in the percentage of cattle marketed through public stockyards from 1957 to 1980. The use of public stockyards to market South Dakota cattle has steadily declined from 38 percent in 1957 to 16 percent in 1980. All nine districts recorded a decrease in the usage of public stockyards.

A majority, 62 percent, of South Dakota cattle outshipment marketings in 1985 flowed through auctions. Public stockyards were next in cattle outshipment marketing at 26 percent in 1985, a significant difference from 16 percent for 1980. Direct marketing accounted for the remaining 12 percent of South Dakota cattle outshipment marketings. Direct marketing was used less for cattle marketed for export than for all cattle marketings combined.

This thesis section included an analysis of the market channels used by South Dakota cattle producers. Market channels used for exporting cattle from South Dakota were included in the analysis. The next chapter includes a more in depth look at the composition of South Dakota's cattle outshipments and inshipments.

CHAPTER IV

SOUTH DAKOTA CATTLE MOVEMENTS

Cattle movement refers to cattle shipments into and out of South Dakota. Cattle coming into South Dakota are referred to as cattle inshipments. Cattle originating in South Dakota and going out of state are referred to as cattle outshipments. Cattle outshipments are an important component of South Dakota's beef industry. South Dakota is a surplus beef producing state, producing more cattle than can be currently consumed or processed in the state. South Dakota must rely on out-of-state demand to absorb this excess production.

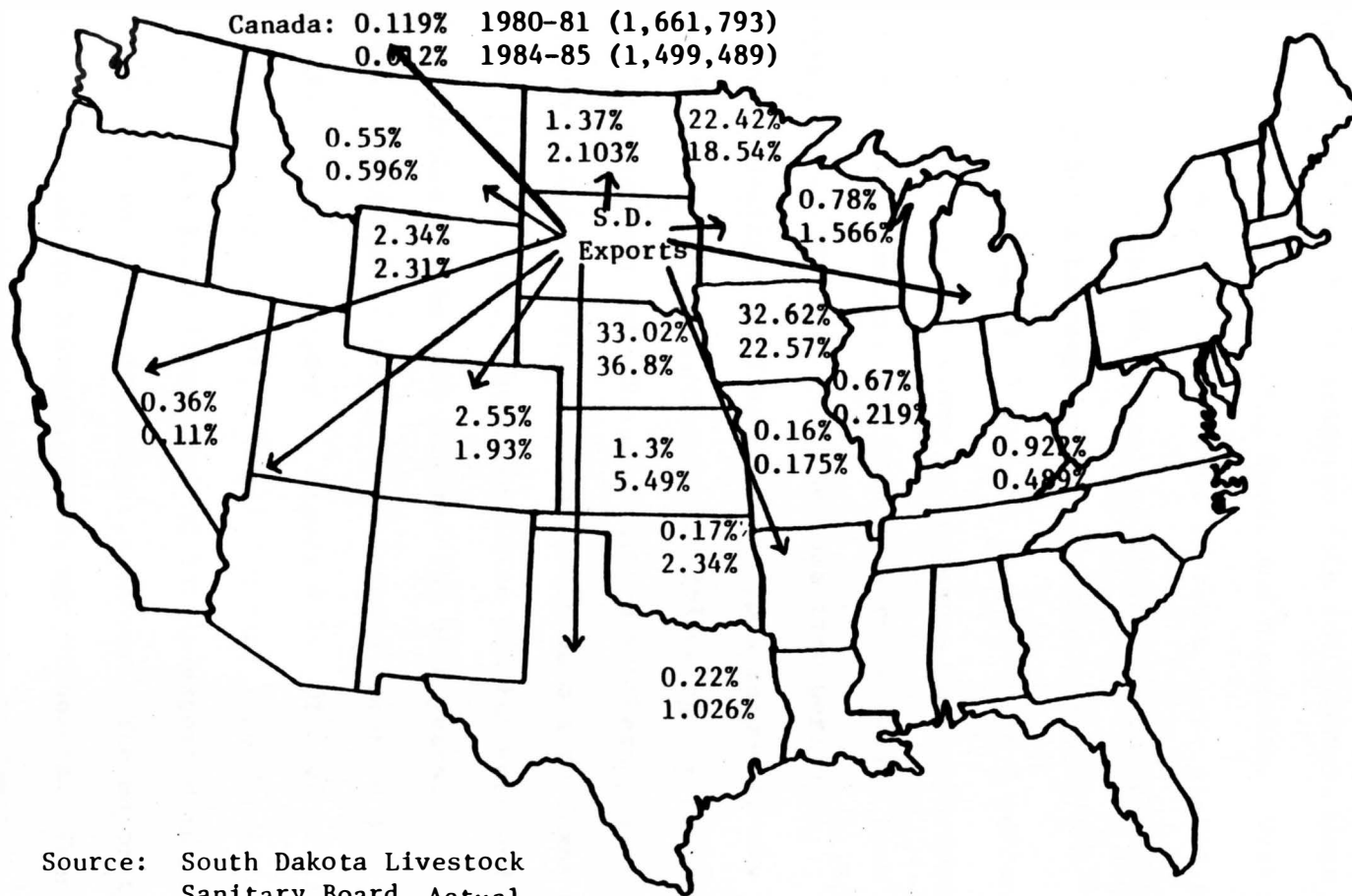
South Dakota collects data on the movement of South Dakota cattle. A random sampling of the data on all South Dakota cattle outshipments and inshipments was collected from the state Livestock Sanitary Board. The data was processed and summarized with the following results.

Total South Dakota Cattle Outshipments

All cattle outshipments for fiscal year 1981 and 1985 are indicated in Figure 4.1 in total and by state of destination. Total outshipments declined from over 1.66 million head in 1981 to 1.5 million head in 1985. The top number in Figure 4.1 indicates

Figure 4.1

All Cattle Outshipments From South Dakota to State of Destination



Source: South Dakota Livestock Sanitary Board, Actual Shipments 1981, 1985.

1981 figures and the lower number is for 1985. This format allows a direct comparison to be made.

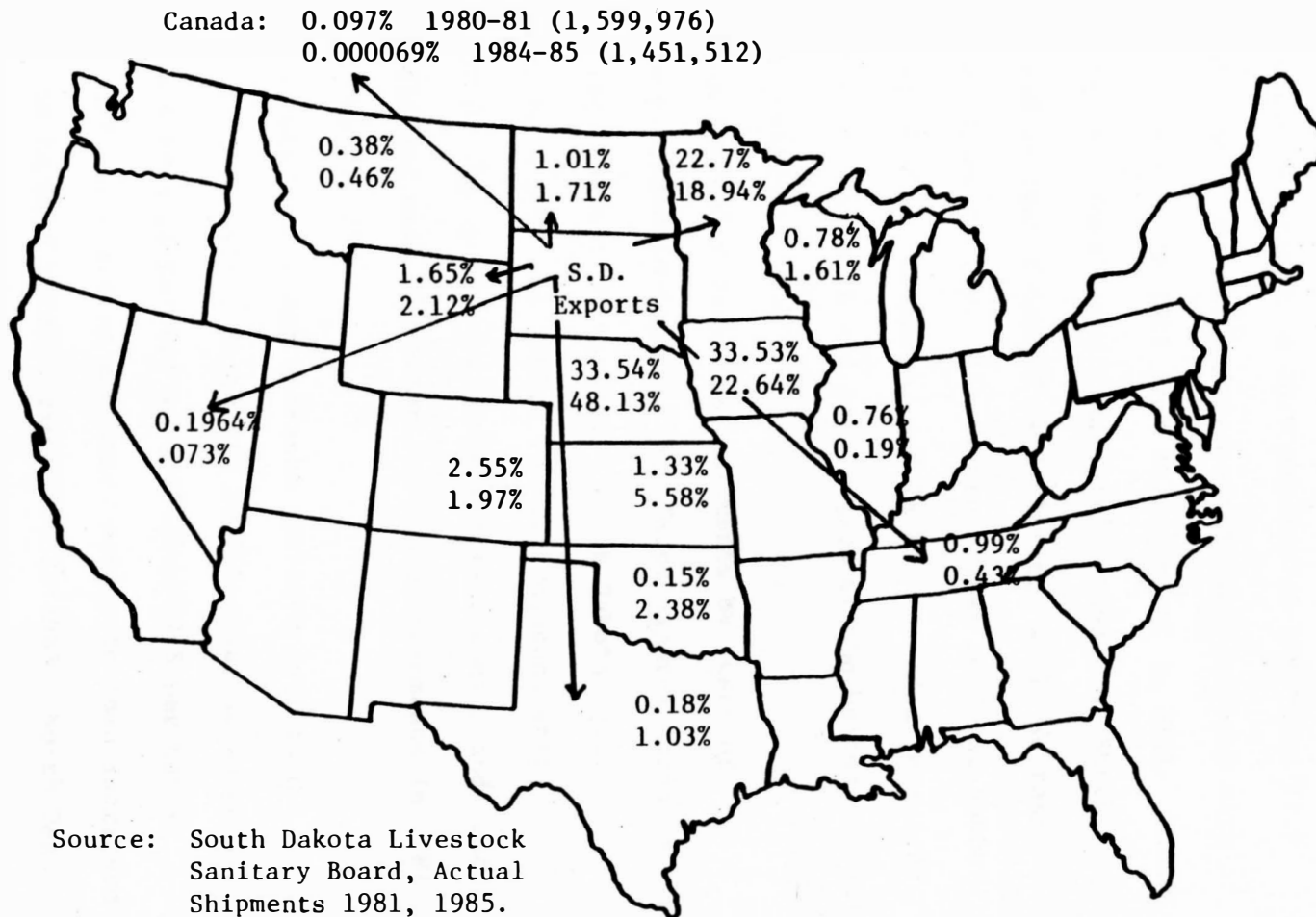
The majority of cattle exported from South Dakota went to three neighboring states: Nebraska, Iowa, and Minnesota. Over 88 percent of all cattle outshipments went to these three states in 1981, while in 1985 almost 78 percent of the cattle outshipments went there. Only Nebraska recorded an increased share of shipments, increasing from 33.02 percent in 1981 to 36.8 percent in 1985. Meanwhile, Minnesota's share of shipments decreased from 22.42 percent to 18.54 percent and Iowa's share decreased from 32.82 percent to 22.57 percent over the same time period.

The large declines in Minnesota and Iowa shipments may indicate South Dakota cattle shipments are following the national trend of cattle movements into the central and southern plains. Outshipments to states directly south of South Dakota to Texas all increased from 1981 to 1985. Outshipments to the far west and east regions of the United States were minimal for both years.

Feeder and slaughter cattle outshipments comprise a majority of the cattle outshipments, Figure 4.2. Of 1.66 million head of cattle exported in 1981, 1.6 million head were feeder or slaughter cattle. Of 1.5 million head of cattle exported in 1985, 1.45 million head were feeder or slaughter cattle. The majority of these outshipments went to Nebraska, Iowa, and Minnesota. These three states accounted for almost 90 percent of South Dakota's cattle outshipment in 1981 and 1985.

Figure 4.2

South Dakota Feeder/Slaughter Cattle Outshipments by State of Destination



Source: South Dakota Livestock Sanitary Board, Actual Shipments 1981, 1985.

Outshipments of feeder and slaughter cattle to Nebraska increased to over 48 percent in 1985 from 33.5 percent in 1981. Minnesota shipments decreased to 18.9 percent in 1985 from 22.7 percent in 1981. South Dakota cattle outshipments to Iowa also declined to 22.6 percent in 1985 from 33.5 percent in 1981. These figures indicate that Iowa's and Minnesota's demand for South Dakota feeder and slaughter cattle is declining, while Nebraska's demand increased dramatically. All of the states south of South Dakota; Nebraska, Kansas, Oklahoma, and Texas, recorded increased shipments, while the far west and east region of the United States recorded small declines.

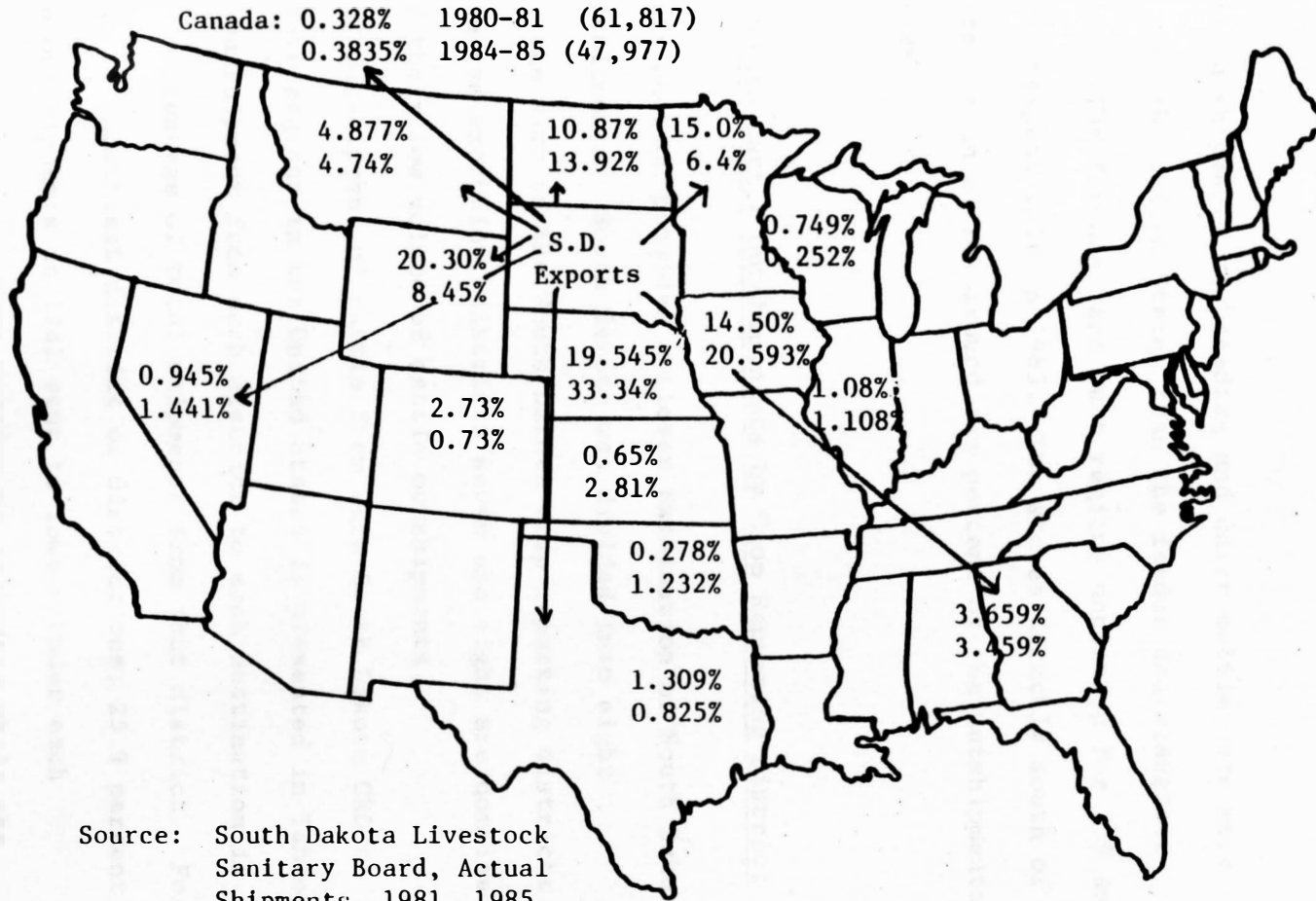
Breeding and dairy cattle outshipments by state of destination are provided in Figure 4.3. These exports accounted for less than four percent of the total South Dakota cattle outshipments in both 1981 and 1985. The six adjacent states contribute most of the demand for South Dakota breeding and dairy cattle accounting for over 85 percent of the outshipments in 1981 and over 87 percent in 1985.

North Dakota, Iowa, and Nebraska recorded increased shipments from 1981 to 1985. Shipments to Nebraska increased 14 percentage points to 33.3 percent in 1985 from 19.5 percent in 1981. Outshipments of breeding and dairy cattle to Iowa increased from 14.5 percent to 20.6 percent from 1981 to 1985. North Dakota shipments increased from 10.9 to 13.9 percent for the same period.

Outshipments to Minnesota declined from 15 to 6.4 percent

Figure 4.3

South Dakota Breeding/Dairy Cattle Outshipments by State of Destination



Source: South Dakota Livestock Sanitary Board, Actual Shipments, 1981, 1985.

from 1981 to 1985, while Wyoming shipments declined from 20.3 to 8.5 percent, respectively. The large changes in outshipments may be caused by product demand changes in various regions of the country.

The outshipments of breeding and dairy cattle were more dispersed over the United States than the feeder and slaughter outshipments. The far west and east regions accounted for 3.9 and 3.7 percent, respectively in 1985. The states directly south of South Dakota accounted for around one percent of the outshipments in both years.

South Dakota Cattle Outshipments by Crop Reporting District

This section provides a closer examination of South Dakota cattle outshipments. South Dakota was divided into eight districts, the same as the South Dakota crop reporting districts (CRD), with one exception, districts seven and eight are combined because of their low volume of cattle outshipments.

The outshipment of cattle from each South Dakota CRD to various state/regions in the United States is presented in Table 4.1. The outshipment from each district to each destination is given as a percentage of total shipments from that district. For example, in the northwest district or district one, 25.9 percent of all cattle outshipments in 1981 went to Iowa. Under each state/region, the first column represents 1981 data while the

Table 4.1 Percentage of South Dakota Crop Reporting District Cattle Outshipments by State of Destination

CRD	IA		MN		MT		NE		ND		WI		WY		East		West		Totals		Number	
	'81	'85	'81	'85	'81	'85	'81	'85	'81	'85	'81	'85	'81	'85	'81	'85	'81	'85	'81	'85	'81	'85
NW1	25.9	15.1	12.7	8.6	6.2	1.4	26.7	22.2	5.1	6.8	1.1	0.0	13.7	5.0	6.5	0.0	2.1	40.9	100%	100%	152,879	184,437
NC2	21.5	12.5	28.9	6.9	0.0	0.1	35.0	44.7	5.5	12.2	0.0	0.0	0.0	0.0	1.4	1.3	7.7	19.9	100%	100%	113,002	154,447
NE3	13.1	10.7	55.5	44.3	0.0	0.0	29.0	28.2	1.3	2.6	0.0	2.4	0.0	0.0	1.1	0.5	0.0	2.3	100%	100%	113,002	121,459
WC4	30.3	21.3	19.6	8.4	1.5	0.7	28.0	43.0	0.8	0.7	1.1	11.4	5.8	6.5	0.6	1.1	12.3	19.3	100%	100%	269,210	349,381
CENT5	41.2	26.4	31.2	13.5	0.0	0.1	15.8	33.1	0.7	0.0	3.4	0.0	1.2	0.5	3.1	4.0	3.4	19.3	100%	100%	269,210	179,939
EC6	25.7	18.8	25.6	36.8	0.0	0.0	43.3	17.3	2.2	0.5	0.0	3.1	0.0	0.0	2.1	0.0	1.1	4.9	100%	100%	390,521	245,916
SW & SC																						
7&8	43.6	29.4	7.3	5.6	0.0	0.0	40.8	52.0	0.0	0.1	1.8	0.0	2.0	1.5	0.0	1.2	4.5	10.2	100%	100%	181,135	170,942
SE9	26.3	20.9	4.3	0.1	0.0	2.3	67.2	70.3	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	1.3	6.4	100%	100%	167,841	92,968

Footnote:

First column under each state represents 1980-81 sample data from each crop reporting district.

Second column under each state represents 1984-85 data.

Number is

based on sample data revised to total LSB shipments.

CRD 7&8 District 8 was major exporter of region in 1985.

second column represents 1985 data.

The number of cattle shipped out of Northwest South Dakota increased from 1981 to 1985. The west region of the United States recorded the majority of the increased shipments, increasing from 2.1 to 40.9 percent. All the other state/regions, except North Dakota, recorded decreased outshipments. North Dakota's imports from district one increased from 5.1 percent in 1981 to 6.8 percent in 1985. District two also increased cattle outshipments to the west region of the United States from 7.7 percent in 1981 to 19.9 percent in 1985. The North central district's shipments to Nebraska, Wisconsin, and North Dakota also increased. Nebraska's percent of this district's outshipments increased from 35 percent in 1981 to 44.7 percent in 1985.

District three cattle outshipments, from Northwest South Dakota, go mainly to Minnesota and Nebraska which accounted for 84.5 percent in 1981 and 72.5 percent in 1985. Shipments to Wisconsin increased from zero to 11.4 percent from 1981 to 1985. West central South Dakota, district four, cattle outshipments go mainly to Iowa, Minnesota, Nebraska, and the west region. Nebraska's share of the shipments from district four increased to 43 percent in 1985 from 28 percent in 1981.

District five outshipments go mainly to the same four state/ regions as district four. The combined shipments to Iowa and Minnesota dropped from 72.4 percent in 1981 to 39.5 percent in 1985. Meanwhile, shipments to Nebraska and the West region

increased from 19.2 percent in 1981 to 52.4 percent in 1985.

Outshipments from district six, the east central district, mainly go to Iowa, Minnesota, Nebraska, and the west region. Iowa, Minnesota, and the west region all recorded increased percentage shipments from district six. Shipments to Nebraska declined from 43.3 percent in 1981 to only 17.3 percent in 1985.

Districts seven and eight, combined, ship cattle mainly to Iowa and Nebraska. These two states accounted for over 80 percent of these two district's outshipments in both years. Iowa recorded a decrease in outshipments from district seven and eight, while Nebraska shipments increased to 52 percent in 1985 from 40.8 percent in 1981. Over 90 percent of the outshipments from District nine went to Iowa and Nebraska in both years. Nebraska shipments increased from 67.3 percent in 1981 to 70.3 in 1985, while Iowa shipments declined from 26.3 percent to 20.9 percent for the same period.

The data presented in Table 4.1 indicates the number of cattle which leave each district. Districts one, two, three, and four recorded increased outshipment numbers from 1981 to 1985, while the other districts recorded declining outshipments. Also indicated was which state/regions received the majority of outshipments from each district. Data provided in Table 4.2 presents another perspective on cattle outshipments, indicating what percent of total South Dakota outshipments to each state/region of the United States originate in each CRD.

Table 4.2 South Dakota Crop Reporting District Cattle Exports as a Percent of Total Shipments to each Destination

CRD	IA		MN		MT		NE		ND		WI		WY		East		West	
	'81	'85	'81	'85	'81	'85	'81	'85	'81	'85	'81	'85	'81	'85	'81	'85	'81	'85
NW1	6.2	8.1	5.3	6.8	71.1	33.7	7.1	7.4	28.0	32.4	9.0	0.0	48.9	25.9	32.9	0.0	4.8	30.6
NC2	4.9	5.6	8.8	4.6	0.0	2.2	6.8	12.6	22.1	48.9	0.0	13.7	0.0	0.0	5.2	12.7	12.7	12.5
NE3	3.0	3.8	16.9	23.1	0.0	0.0	5.6	6.3	5.4	8.4	0.0	50.5	0.0	0.0	4.0	4.0	0.0	1.1
WC4	16.4	20.6	14.1	12.5	28.6	34.0	12.8	27.2	7.8	6.6	16.2	0.0	35.7	64.0	5.0	24.4	47.7	27.31
CENT5	22.4	13.9	22.6	10.4	0.0	2.0	7.3	10.8	6.9	0.1	48.7	20.7	7.3	2.7	26.4	45.4	13.3	14.1
EC6	20.2	27.7	26.8	38.4	0.0	0.0	28.7	7.7	29.8	3.4	0.0	15.1	0.0	0.0	26.5	0.3	6.5	4.9
SW & SC																		
7&8	16.0	14.6	3.5	4.1	0.3	0.0	12.5	16.1	0.0	0.2	17.7	0.0	8.1	7.4	0.0	13.2	11.8	7.1
SE9	8.9	5.7	2.0	0.1	0.0	28.1	19.2	11.9	0.0	0.0	8.4	0.0	0.0	0.0	0.0	0.0	3.2	2.4
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Number	495,214	343,383	372,241	233,920	13,294	7,497	588,274	550,312	28,250	38,987	18,280	26,991	44,868	35,988	31,574	16,444	69,795	245,916
	(29.8%)	(22.9%)	(22.4%)	(15.6%)	(.8%)	(.5%)	(35.4%)	(36.7%)	(1.7%)	(2.6%)	(1.1%)	(1.8%)	(2.7%)	(2.4%)	(1.9%)	(1.1%)	(4.2%)	(16.4%)

Footnote:

First column under each state represents 1980-81 sample data listed as a percent of sample.
 Second column under each state represents 1984-85 sample data.
 Number is based on actual total South Dakota Outshipment from the Livestock Sanitary Board data.
 CRD Region 8 was major portion of CRD 7&8; CRD 7 had very little activity in 1985.
 Sioux Falls terminal accounts for 96% of CRD 6 EC District in 1981 data.

Cattle shipments to Iowa originate mainly from districts 4 through 8, accounting for 76.8 percent of South Dakota cattle outshipment to Iowa in 1985. Districts 3 through 6 supplied the majority of cattle outshipments to Minnesota, accounting for 84.4 percent in 1985 and 80.4 percent in 1981. District six accounted for the largest portion of outshipments to both states in 1985.

Districts one and four provided 99.3 percent of the outshipments to Montana in 1981. District nine shipments to Montana in 1981 increased from zero to 28.1 percent in 1985 and district one shipments decreased to 33.7 percent in 1985 from 71.1 percent in 1981. All nine districts ship cattle to Nebraska. The only district to account for over 20 percent of outshipments to Nebraska was district six in 1981 and district four in 1985.

Districts one, two, and six accounted for 79.9 percent of South Dakota cattle outshipment to North Dakota in 1981, increasing to 84.2 percent in 1985. The significance of district six shipments to North Dakota declined in 1985 as districts one and two accounted for 80.3 percent alone. Outshipments of cattle to Wisconsin shifted from districts one, four, five, seven, eight and nine in 1981, to districts two, three, five and six in 1985.

Wyoming cattle outshipments came from districts one, four, five, seven and eight, in both years. District one shipments declined from 48.9 percent in 1981 to 25.9 percent in 1985, while district four increased from 35.7 percent to 64 percent over the same time period. The majority of cattle outshipments to the east

region in 1981 came from districts one, five and six, accounting for 85.8 percent. The situation changed in 1985, when districts two, four, five, seven and eight accounted for 95.7 percent of outshipments to the eastern United States.

All districts, except district three, in 1981 recorded outshipments to the west region. A major shift in volume was recorded as district one increased from 4.8 percent to 30.6 percent from 1981 to 1985, while district four declined from 47.7 percent to 27.3 percent over the same time period. It should be noted that district 8 accounted for the majority of the combined districts seven and eight shipments. Also note that in 1981 the Sioux Falls terminal market accounted for 96 percent of district six's outshipments.

The type of animal shipped from each crop reporting district are presented in Tables 4.3A and 4.3B. The proportion of slaughter, feeder and breeding outshipments that come from each district is provided in Table 4.3A. Because all public stockyard transactions do not list the original county of shipment, district six is credited more volume than originated in the district. This bias is presented by looking at the slaughter columns where district six accounted for the majority of the outshipments. The data does indicate, however, that the terminal market in Sioux Falls is a major collection point for slaughter cattle shipped out of state.

The number row in Table 4.3A indicates that slaughter

Table 4.3A South Dakota Outshipments by Type of Animal by Crop Reporting District

CRD	Slaughter		Feeder		Breeding	
	'81	'85	'81	'85	'81	'85
NW 1	4.6	0.3	8.4	12.8	29.0	18.8
NC 2	3.0	0.0	7.4	10.5	9.0	21.6
NE 3	0.6	0.9	8.5	8.9	3.1	3.2
WC 4	5.5	0.1	17.4	25.1	26.1	21.9
CEN 5	5.4	3.1	18.7	12.3	14.2	20.1
EC 6	77.8	95.1	14.2	11.0	2.9	5.8
SW & SC 7 & 8	0.3	0.5	13.3	12.6	9.6	4.7
SE 9	2.8	0.0	12.1	6.8	6.1	3.9
Total	100%	100%	100%	100%	100%	100%
Number	265,887 (16%)	98,966 (6.6%)	1,262,963 (76%)	1,327,047 (88.5%)	132,943 (8%)	73,475 (4.9%)

Footnote: Breakdown by type divided between Crop Reporting Districts based on sample data. Number based on actual shipments.

Table 4.3B Crop Reporting District Outshipments by Animal Type Based on CRD & Type.

CRD							Total	Number		Percent	
	Slaughter		Feeder		Breeding			1981	1985		
	'81	'85	'81	'85	'81	'85					
NW 1	7.9	0.2	67.6	92.4	24.5	7.4	100%	152,870	9.5	184,437	12.3
NC 2	7.0	0.0	82.5	89.8	10.5	10.2	100%	113,002	6.8	154,447	10.3
NE 3	1.3	0.7	95.0	97.4	3.7	1.9	100%	113,002	6.8	121,459	8.1
WC 4	5.5	0.0	81.6	95.4	12.9	4.6	100%	269,210	16.2	349,381	23.3
CEN 5	5.3	1.7	87.7	90.2	7.0	8.1	100%	269,210	16.2	179,939	12.0
EC 6	53.1	38.7	45.9	59.6	1.0	1.7	100%	390,521	23.5	245,916	16.4
SW & SC											
7 & 8	0.4	0.3	92.6	97.7	7.0	2.0	100%	181,135	10.9	170,942	11.4
SE 9	4.4	0.0	90.8	96.9	4.8	3.1	100%	167,841	10.1	92,968	6.2

Footnote: Numbers based on actual shipment volume data obtained from South Dakota Livestock Sanitary Board.

cattle outshipments declined dramatically, from 265,887 head in 1981 to 98,966 head of cattle in 1985. Sixteen percent of all outshipments were slaughter cattle in 1981 declining to 6.6 percent in 1985. At the same time feeder cattle outshipments increased from 76 to 88.5 percent of total outshipments. Breeding cattle outshipments declined from 8 percent in 1981 to 4.9 percent in 1985. Feeder cattle shipments were distributed evenly among the CRD districts in both years. Only district four accounted for over 20 percent of the feeder outshipments in 1985.

A breakdown by cattle type for each district's outshipments for 1981 and 1985 is presented in Table 4.3B. A significant decline in slaughter cattle outshipments was recorded in all of the districts. All districts recorded increased outshipments of feeder cattle from 1981 to 1985. Feeder cattle were the major type of cattle outshipment for each district in 1985. The outshipment of breeding animals declined in all districts except for five and six which recorded slight increases. These figures indicate that the majority of cattle outshipments from South Dakota are feeder cattle and the proportion is increasing. The importance of South Dakota cattle outshipments is further demonstrated by comparing it to production. South Dakota exported 1.5 million head of cattle in 1985 while producing 1.58 million calves.

South Dakota Cattle Inshipments

Total South Dakota inshipments increased from 466 thousand in 1981 to 477 thousand in 1985. (Figure 4.4). In both years, Montana and North Dakota combined accounted for over 50 percent of the cattle inshipments into South Dakota. The four other adjacent states each accounted for over four percent of inshipments to South Dakota both years. Inshipments from Canada doubled from 2.25 to 4.49 percent from 1981 to 1985. Texas also recorded a large increase in shipments to South Dakota from 1.6 percent in 1981 to 3.05 percent in 1985. Cattle inshipments from the east region increased and imports from the west region of the United States decreased.

South Dakota feeder and slaughter cattle inshipments are indicated in Figure 4.5. Feeder and slaughter cattle accounted for over 92 percent of all South Dakota cattle inshipments in 1985 or 422 thousand head. The results are very similar to those for all cattle presented in Figure 4.4 with Montana and North Dakota accounting for over 50 percent of cattle inshipments in both years. Wyoming, Nebraska, Iowa, Minnesota, Texas and Canada each accounted for over 3 percent of South Dakota feeder/slaughter cattle inshipments in 1985.

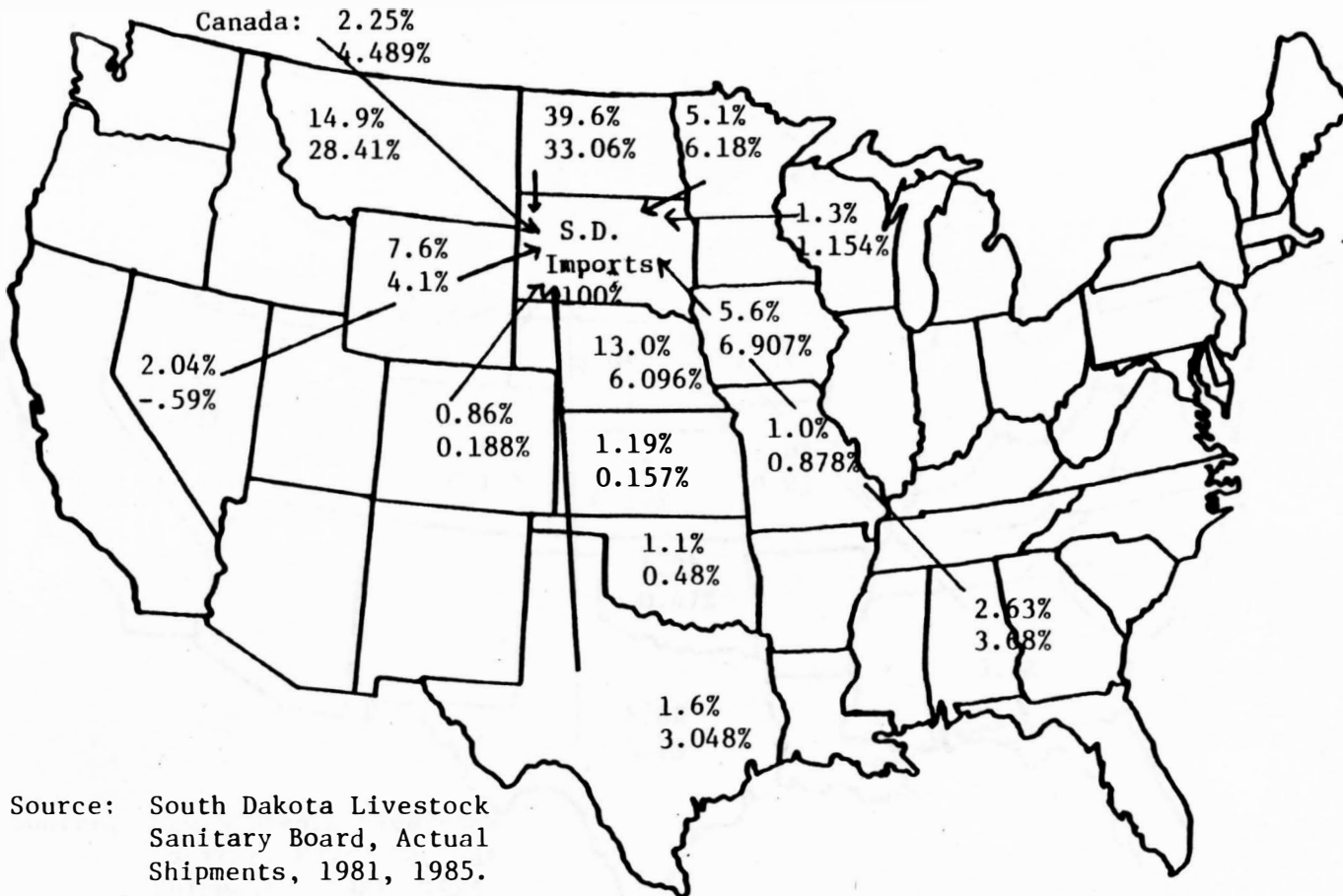
Inshipments from the east region of the United States increased from 2.52 percent in 1981 to 3.6 percent in 1985. Inshipments from the west region decreased from 2.17 percent in

Figure 4.4

Total South Dakota Cattle Inshipments

All Cattle (465,768) 1980-81

Imports (477,167) 1984-85



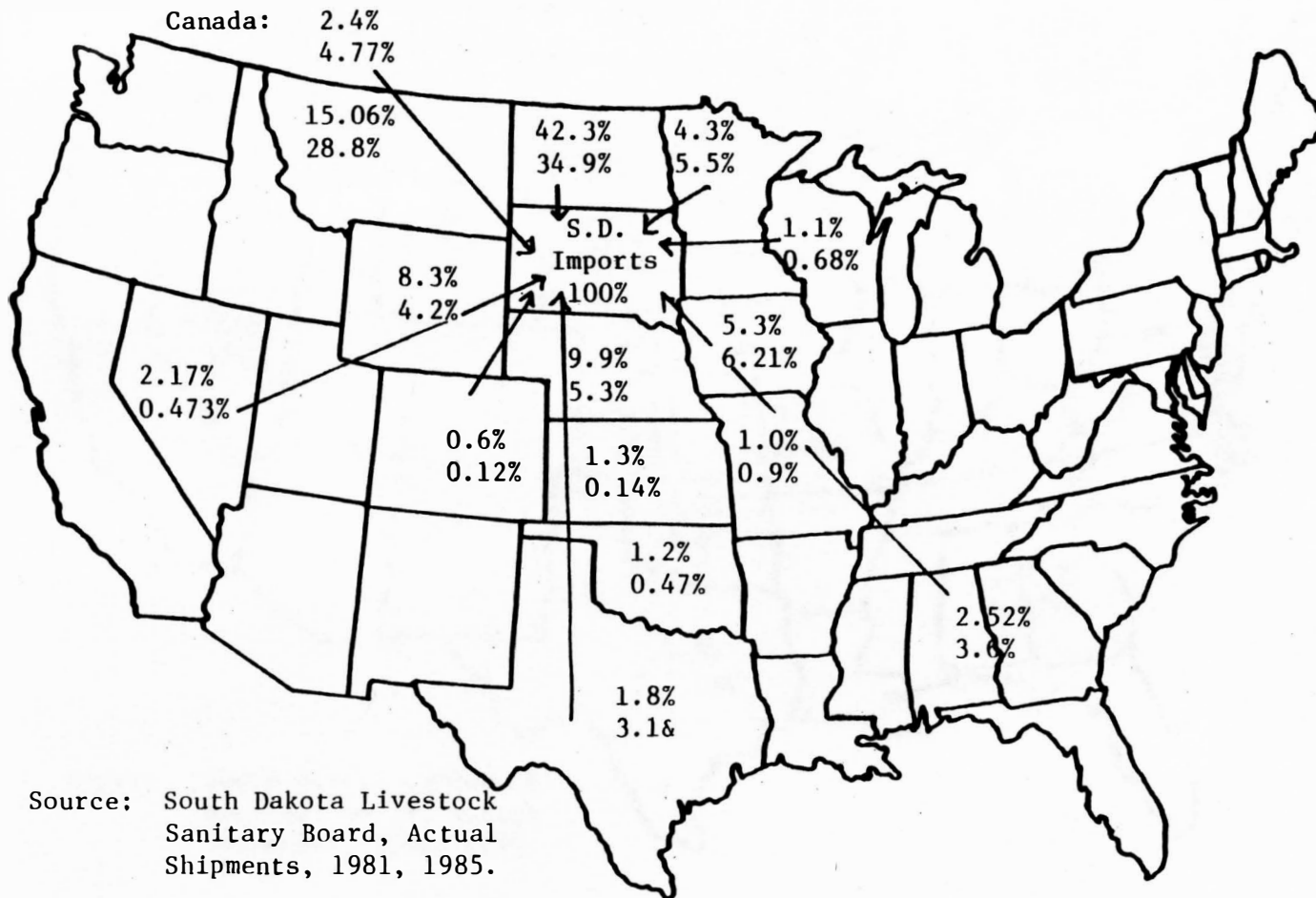
Source: South Dakota Livestock Sanitary Board, Actual Shipments, 1981, 1985.

Figure 4.5

South Dakota Feeder/Slaughter Cattle Inshipments

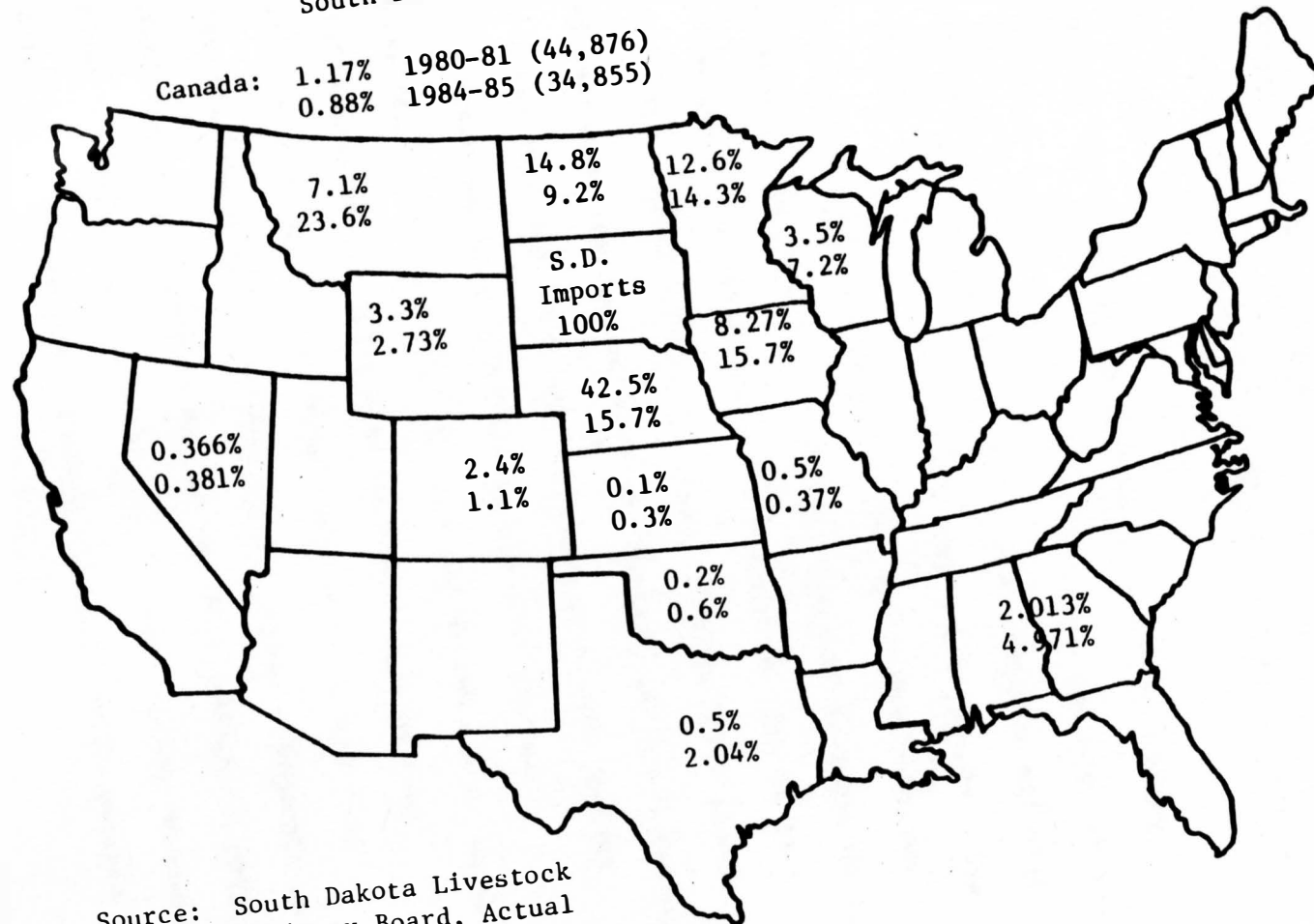
1980-81 (420,892)

1984-85 (442,312)



Source: South Dakota Livestock Sanitary Board, Actual Shipments, 1981, 1985.

Figure 4.6
 South Dakota Breeding/Dairy Cattle Inshipments



Source: South Dakota Livestock Sanitary Board, Actual Shipments, 1981, 1985.

1981 to .47 percent in 1985. Both Texas and Canada recorded large gains from 1981 to 1985 (Figures 4.4 and 4.5). Montana also increased shipments but North Dakota decreased shipments of feeder/slaughter cattle, Figure 4.5, while increasing all cattle inshipments, Figure 4.4.

Breeding and dairy cattle inshipments to South Dakota accounted for only seven percent of all cattle inshipments, shown in Figure 4.6 at 34,855 head in 1985. In 1981 breeding and dairy cattle accounted for 9.6 percent of all cattle inshipments. The share of inshipments of breeding and dairy cattle from Nebraska declined from 42.5 percent in 1981 to 15.7 percent in 1985, while Montana inshipments increased from 7.1 percent in 1981 to 23.6 percent in 1985. North Dakota, Wyoming, Colorado and Missouri recorded decreased inshipments to South Dakota, while all the other state/regions recorded increased shipments from 1981 to 1985.

A breakdown of cattle inshipments from various state/regions to each district is provided in Table 4.4. Each district's inshipments are listed as percentages of what state/region they originated from. For example, combined inshipments from Montana and Wyoming increased inshipments to district one from 20 percent in 1981 to 90.7 percent in 1985. Combined Nebraska, North Dakota, and the west region inshipments to district one declined dramatically, falling from 76 percent in 1981 to 8.9 percent in 1985.

North Dakota alone accounted for over 70 percent of the

inshipments into district two in 1981 and 1985. The east region and Nebraska inshipments to district two declined, while Montana and Wisconsin shipments increased.

A majority of district three inshipment originated in North Dakota. Over 64 percent of the inshipments to district three in 1985 originated in North Dakota, increasing from 46.7 percent in 1981. Montana and Wisconsin inshipments to district three declined dramatically from 33.3 percent in 1981 to 14.3 percent in 1985. This could be due to lower dairy inshipments.

District four inshipments originated mainly in Montana, Nebraska, North Dakota, Wyoming and in the west region in 1981. In 1985, Wyoming and the west region inshipments declined, while the east region inshipments increased to 35.2 percent from 0.0 in 1981. District five's, the central district, major inshipments originated in North Dakota. The east and west region inshipments to district five increased in significance from 10.9 percent in 1981 to 28.8 percent in 1985.

District six recorded large increases in inshipments from Montana and North Dakota. Montana shipments increased from 4.4 percent in 1981 to 46.9 percent in 1985. The North Dakota shipments increased from 15.9 to 23 percent. All the other state/regions recorded decreases except for Wisconsin. The combined districts of seven and eight received the majority of their inshipments from Montana, Nebraska, North Dakota and Wyoming. Nebraska percentage of inshipments decreased from 40.6 percent in

1981 to 12.1 percent in 1985, while Montana shipments increased from 24.3 to 55 percent.

In district nine, Nebraska, North Dakota, and the west region percentage of inshipments declined from 1981 to 1985. Iowa, Montana, and the east region recorded increases in shipments to district nine. The number column in Table 4.4 reveals that all districts, except six and nine, recorded increased inshipments from 1981 to 1985.

The percentage of each crop reporting district inshipments from each state/region of origin are listed in Table 4.5. Iowa cattle inshipments to South Dakota traveled mainly to districts six and nine in 1981, comprising 87.3 percent of all inshipment from Iowa. In 1985, the combination of district three, five, and nine accounted for 95.2 percent of the inshipments from Iowa.

The majority of Minnesota inshipments (88 percent in 1981) go to districts three, six, and nine. Montana ships cattle into all districts, with districts seven and eight receiving the major portion of the inshipments, over 27 percent in both 1981 and 1985. Nebraska cattle came into all districts, with a shift in significance from districts nine and six to four and five. Shipments to districts nine and six declined from 38.1 percent in 1981 to 15.7 percent, while shipments to districts four and five increased from 23.7 percent to 49.7 percent of shipments from Nebraska in 1981 and 1985.

Decreased inshipments from North Dakota were recorded in

Table 4.5 Percentage of Crop Reporting District Cattle Inshipments by State of Origin

CRD	IA		MN		MT		NE		ND		WI		WY		East		West		CN	
	'81	'85	'81	'85	'81	'85	'81	'85	'81	'85	'81	'85	'81	'85	'81	'85	'81	'85	'81	'85
HW1	0.0	0.0	2.0	0.2	10.3	13.3	9.1	0.8	7.7	1.7	0.0	0.0	7.2	40.5	0.0	0.2	15.8	0.0	N.A.	9.7
HW2	0.0	0.6	6.0	8.1	0.0	11.6	1.8	0.1	16.1	27.6	0.0	23.9	0.0	0.0	17.7	0.4	0.0	0.0	N.A.	0.0
HW3	2.1	9.2	20.0	39.0	12.8	9.5	0.0	5.7	14.7	33.9	50.0	0.0	0.0	4.2	5.9	0.0	10.5	11.0	N.A.	0.0
HW4	2.1	0.0	2.0	0.1	17.9	9.2	7.3	16.4	4.9	4.2	0.0	0.0	21.4	0.6	0.0	40.6	10.5	1.8	N.A.	10.8
CEW5	6.4	11.6	7.0	10.9	10.3	0.1	16.4	33.3	14.0	16.5	30.0	0.0	7.1	0.0	23.5	25.8	5.3	76.3	N.A.	34.1
FC6	34.1	3.7	46.0	30.7	7.7	17.3	10.9	5.7	7.7	6.3	10.0	21.0	14.3	0.0	17.6	0.2	21.1	0.0	N.A.	24.1
SW & SC 768	2.1	0.5	0.0	0.0	23.1	28.2	27.3	30.4	6.3	3.3	0.0	1.8	31.4	21.9	0.0	0.0	0.0	10.9	N.A.	21.3
SE9	53.2	74.4	22.0	11.0	17.9	10.8	77.2	9.5	28.5	6.5	10.0	53.3	28.6	15.4	35.3	32.8	36.8	0.0	N.A.	0.0
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	N.A.	100%
Number	55,566	28,153	59,106	31,970	46,111	121,678	65,021	24,813	169,027	163,668	11,878	6,203	16,534	36,265	20,075	30,062	22,450	16,224	N.A.	18,609

Footnote:

First column under each state or region is based on 1980-81 sample data, listed as a percent of sample.

Second column represents 1984-85 sample data.

Number is based on actual total shipped from Livestock Sanitary Board data.

CRD Region 7 was major portion of CRD 768 inshipments, accounting for 89% of the shipments.

all districts except two, three and five, from 1981 to 1985. Wisconsin shipped the fewest number of cattle to South Dakota of all state/regions presented. In 1981, district three, five, six, and nine accounted for 100 percent of the cattle inshipments from Wisconsin, while in 1985 districts two, six, and nine accounted for 98.2 percent.

Wyoming inshipments go mainly to districts one, seven, eight, and nine. In 1985 these four districts accounted for 95.4 percent of the inshipments from Wyoming. District four increased to 40.6 percent of Wyoming inshipments in 1985 from zero percent in 1981. The west region inshipments were reduced from six districts to five from 1981 to 1985 with district five alone accounting for 76.3 percent of the inshipments.

Canadian data was available only for fiscal year 1985. Canada shipped cattle to districts 1, 4, 5, 6, 7, & 8 in 1985, with districts five and six accounting for 58.2 percent of all inshipments. All state/regions except Montana, Wyoming, and the east region recorded decreased inshipments from 1981 to 1985. This is illustrated in the number row on Table 4.5.

The composition of cattle inshipments to each district is listed on Table 4.6. Feeder and slaughter cattle values were combined because of the small amount of slaughter cattle inshipments (less than 4 percent in 1985). All districts recorded an increase in feeder/slaughter inshipments and a decline in the breeding/dairy inshipments from 1981 to 1985. With the small

Table 4.6 Composition of Cattle Inshipments to each Crop Reporting District

	NW 1	NC 2	NE 3	WC 4	CEN 5	EC 6	SW&SC 7&8	SE 9	State Totals
Breeding/ dairy 1985	68.0	56.7	46.7	52.0	26.1	63.8	29.7	17.1	39.3%
Breeding/ dairy 1985	23.7	4.6	10.3	27.3	17.6	12.3	4.1	13.9	12.7%
Feeder/ slaughter 1985	32.0	43.4	53.3	48.0	73.9	36.2	70.3	82.9	60.7%
Feeder/ slaughter 1985	76.3	95.4	89.7	72.7	82.4	87.7	95.9	86.1	87.3%
Total	100%	100%	100%	100%	100%	100%	100%	100%	

Footnote: Feeder and slaughter categories were combined because of the small amount of slaughter inshipment, less than 4 percent of the state total in 1985.

amount of slaughter shipments, the feeder/slaughter numbers can be counted mainly as feeder cattle. In 1985 each district recorded over 72 percent of all cattle inshipments as feeder/slaughter cattle.

Total state inshipments exhibited the same trend as the districts. The percent of breeding and dairy cattle inshipments decreased from 39.3 percent in 1981 to 12.7 percent in 1985. The percent of feeder/slaughter cattle inshipments increased from 60.7 percent in 1981 to 87.3 percent in 1985.

In summary, South Dakota cattle outshipments and inshipments were examined in this chapter on a state and regional level. A two year comparison was completed to indicate the trends in South Dakota cattle movements. Results indicated that an increasing number of cattle flow from South Dakota to the states directly south. The composition of these outshipments has an increasing percentage of feeder cattle over time.

A large proportion of cattle inshipments to South Dakota originate in Montana and North Dakota with the remaining adjacent states also contributing significant numbers. The composition of cattle inshipments has had an increasing percentage of feeder cattle over time. The following chapter will discuss the cattle feeding, slaughter and processing industry on both the South Dakota and national levels.

CHAPTER V

SOUTH DAKOTA CATTLE FEEDLOTS AND SLAUGHTER FACILITIES

Where cattle go as they leave or come into South Dakota was examined in the previous chapter. What happens in South Dakota as cattle leave the producer and move to feedlots or to slaughter and processing plants is examined in this chapter. Characteristics of South Dakota cattle feedlots and the slaughter and processing industry are presented and discussed.

South Dakota Cattle Feedlots

The number of South Dakota fed cattle marketed, divided by size of feedlots, is presented in Table 5.1. Data in the table lists cattle marketings by capacity of feedlots, with several trends indicated. The larger capacity feedlots of 4,000 head or more have continually increased cattle marketings from 30 thousand head in 1969 to 300 thousand head in 1985.

Cattle feedlots under 1,000 head capacity recorded two cycles from 1968 to 1985. Cattle numbers in these small feedlots dropped from 540 thousand head in 1968 to 286 thousand head in 1976. From 1976, numbers increased to 466 thousand head in 1981, then cattle numbers in these small capacity feedlots declined to the present low of 275 thousand head.

Table 5.1 South Dakota Fed Cattle Marketed by Size of Feedlot

	Under 1000	1000- 1999	2000- 1999	4000- 7999	8000- 31999	32000 & over	Total all feedlots	Number of feedlots
1968	540	36	80				656	9700
1969	459	37	25	30*			551	9400
1970	438	35	25*	--	54		552	9100
1971	458	46	28	--	70		602	9100
1972	429	31	15	11	75		561	9100
1973	376	50	32	17	84		559	9200
1974	382	50	30	31	92*		585	9200
1975	338	46	30	36	111*		561	9200
1976	286	43	32	47	171		579	8000
1977	323	40	33	53	123*		572	7700
1978	404	44	34	73*	---		555	7200
1979	378	53	60	18	66*		575	6700
1980	422	42	33	30	73		600	6000
1981	466	37	35	112*	--		650	6000
1982	459	39	37	110*			645	5500
1983	446	51	24	144*	--		665	5000
1984	356	34	34	201*	--		625	4800
1985	275	51	59	300*			685	4400

*/Includes larger farms which could not be listed because of disclosure.

Source: Western Livestock Marketing Information Project,
April 28, 1986 Letter #15.

Feedlots with capacities between 1,000-3,999 head fluctuated in the number of fed cattle marketed over the years. The total number of South Dakota fed cattle marketings also fluctuated over the years, but in 1985 marketings reached a high of 685 thousand head. The most significant trend indicated on Table 5.1 is the continual and dramatic decline in the number of feedlots from 9,700 in 1968 to 4,400 in 1985. This represents a 54.6 percent decline in feedlot numbers, while the number of fed cattle marketings was increasing. This indicates a trend toward fewer but larger feedlots.

The number of South Dakota fed cattle marketed by crop reporting district is presented in Table 5.2. The table lists South Dakota cattle marketed that were fattened on grain or concentrates. The data was collected from United States Census publications from 1978 and 1982, which listed cattle marketings for each South Dakota county. Farms that fatten cull cows and bulls are included in this table, which increases both farm numbers and total cattle marketings when compared to the previous feedlot table.

District six and nine accounted for a majority of all South Dakota farms feeding cattle, 64 percent in 1978 and 62 percent in 1982. District seven had the fewest number of farms in both years. Districts one and five recorded the next fewest farm numbers, but had the largest percentage increases in farms feeding cattle of over 52 and 32 percent, respectively. Districts five, eight, and

Table 5.2 Number of South Dakota Cattle on Feed Marketed by Crop Reporting District

	NW 1	NC 2	NE 3	WC 4	CEN 5	EC 6	SW7	SC9	SE9	Total
Cattle Farms										
Feeding Grain										
Concentrate:										
1978	67	445	774	65	499	1643	43	221	2134	5890
1982	102	449	815	86	477	1642	47	211	1986	5865
Percent Change 1978 to 1982	+52.2	+9.7	+5.3	+32.3	-4.4	0.0	+11.9	-4.5	-6.9	-4.9
Cattle Fattened on Grain and Concentrate Sold in 1978	5,023	79,623	69,341	9,534	53,975	153,569	7,176	17,693	220,520	616,454
Cattle Sold in 1982	8,677	109,352	94,821	15,856	72,257	171,377	11,792	20,352	227,586	732,070
Percent Change 1978 to 1982	+72.7	+37.3	+36.7	+66.3	+33.9	+11.6	+64.3	+15.0	+3.2	

Footnote: Minnehaha county accounted for the largest number of farms, 401 in 1978, 360 in 1982.

Source: U.S. Department of Commerce, Bureau of Census, U.S. Census of Agriculture, South Dakota Vol. 1 1978, 1982.

nine all recorded declines in farms that feed cattle from 1978 to 1982.

Minnehaha county had the largest number of farms feeding cattle of all South Dakota counties, 401 farms in 1978 and 360 farms in 1982. Even with the decline in Minnehaha county farm numbers, district six, which includes Minnehaha county, recorded no change in farms that feed cattle between 1978 and 1982.

All nine districts recorded increased numbers of marketed cattle fed grain and concentrates. District one, four, and seven recorded increases of more than 60 percent. These districts all are located in western South Dakota, an area known for cow-calf range production. If the large percentage increase in fed cattle marketed are cows and heifers being fed in these districts, herd reduction is indicated. The increased number of cattle marketings in these districts had little impact on South Dakota total marketings. All three districts accounted for only 5 percent of all fed cattle marketed in 1982 in South Dakota.

Districts nine and six recorded the largest number of fed cattle marketings, over 150 thousand head each in 1978 and 1982. District nine recorded the smallest increase in marketing volume, only 3 percent. Districts two, three, and five recorded increases in marketings of cattle fed grain of over 30 percent from 1978 to 1982.

Cattle Slaughter and Processing Industry in the U.S. and South
Dakota

The movement of cattle from producer to the feedlot or point of first sale has been discussed. The next phase in the beef industry is cattle slaughter and processing. The slaughter function is simply one of converting live animals into dressed carcasses. Often slaughter and processing are combined, but also they are found individually. Several types of firms are involved in the processing of cattle and plants vary greatly in the amount of processing done.

Today, meat packers generally slaughter, chill and break a carcass into quarters. Many firms break down the carcass further into primals and subprimal cuts. These wholesale cuts are vacuum packaged and put into cartons for sale as boxed beef. Retailers break the quarters, primals, and subprimals into the final retail cuts. Processing firms operate between packers and retailers, especially to manufacture sausage products and to produce portion-controlled products for food service firms.

The most dramatic and relatively recent development in the beef packing industry is boxed beef. Previously, all beef left the packer as forequarters and hindquarters. Today, more than half of all beef slaughter is fabricated (cut-up) into primal and subprimal cuts by the packer, sealed in vacuum-packed bags, and shipped out in cardboard boxes. (32) By trimming and deboning the meat at the

packing plant, shipping and labor costs are reduced on the wholesale and retail level.

The farm value, marketing costs by function, and retail price of choice beef are listed in Table 5.3. Farm value accounted for the major portion of the retail price, accounting for over 50 percent from 1980 to 1984. The second largest portion of the retail price comes from the cutting and merchandising function. The warehousing and store delivery function accounted for the third largest portion of the retail price, around 15 cents per retail

Table 5.3 Farm Value, Marketing Costs by Function, and Retail Price of Beef Processed in the United States

Item	1980	1981	1982	1983	1984
	Cents per retail pound				
Beef:					
Farm value	145.0	138.5	140.5	136.2	140.0
Slaughtering	6.8	7.0	6.8	5.4	3.8
Intercity transportation	3.7	3.8	3.8	3.8	3.8
Warehousing and store delivery	14.8	14.9	15.2	14.9	15.0
Breaking carcass	9.4	10.4	11.0	11.4	11.8
Cutting and merchandising	57.9	64.1	65.6	66.4	65.2
Retail price	237.6	238.7	242.5	238.1	239.6

Source: USDA, ERS, Food Cost Review 1984, Ag Econ Report No. 537.

pound from 1980 to 1984.

Beef processing functions recorded no increase in value since the peak year of 1982. Even the price of a retail pound of choice beef declined from 242.5 cents in 1982 to 239.6 cents in

1984. The decrease in retail beef prices came mainly from a decline in slaughter cost, from 6.8 cents in 1982 to 3.8 cents in 1984. This cost decrease can be explained by examining the slaughter industry; an industry that is undergoing changes allowing the lowest cost and best financed firms to survive.

The overall number of packing plants in the United States is decreasing. Many small and some large beef plants have either temporarily or permanently closed in recent years. Plant closings and firm shutdowns result from several forces. Reduced slaughter cattle numbers has caused excess slaughter capacity and forced packers to compete for livestock in order to maintain efficient levels of output.

The surviving lowest cost firms tend to be newer and larger than their competitors, enabling these firms to capture economies of size. These firms also tend to incorporate more processing within the packing plant (i.e., boxed beef) and maintain lower wage rates than competitors. Some large, old-breakline packers have filed for chapter 11 reorganization, sold, or closed plants, primarily to escape labor contracts which lock the firms into a wage structure \$3 to \$4 per hour above competitors.

In 1972, there were 6,156 commercial livestock slaughter plants in the United States. Plant numbers peaked in 1976 at 6,225 and dropped to 5,558 at the end of 1983. The number of nonfederally inspected plants, which include small lockers, declined from 5,172 in 1972 to 3,982 in 1984. The number of

federally inspected plants, which tend to be larger in size and ship products across state lines, increased from 984 in 1972 to 1,666 in 1984. (31)

Nationally, 94 percent of the 36 million cattle slaughtered in 1982 were slaughtered in one of the 1,506 federally inspected plants. About 85 percent of the federally inspected plant's slaughter was completed in 134 large plants, slaughtering 50,000 or more head of cattle each year. (32)

The number of plants with annual slaughter of more than 500,000 head of steers and heifers increased from 3 to 12 between 1972 and 1982. These 12 plants accounted for 36 percent of the Packers and Stockyards Administration recorded slaughter in 1982. (31)

With declining plant numbers and increased size, market concentration has become a national concern. A 1980 study completed by Schnittker Associates for the American Meat Institute examined the concentration ratios of the meat processing industry. The top four slaughter firms in 1977 were Iowa Beef Processors, Swift, Missouri Pack and Spencer. All four combined accounted for 26 percent of the national steer and heifer slaughter. A breakdown of the United States by regions found these four firms concentration ratio varied from zero to 59 percent market share. The 59 percent market share occurred in the region of north Texas and the state of Oklahoma. (36)

Other studies also indicate high concentration ratios, but

with plant closings and changing ownership the largest four firms have changed from the traditional big four of Armour, Cudahy, Swift, and Wilson. The national trends indicate increasing size and reduced numbers of plants. If the concentration ratios increase for the larger firms, such as IBP, regional monopoly power might become a concern for both beef producers and consumers. The following section provides a closer look at South Dakota beef slaughter/processing firms.

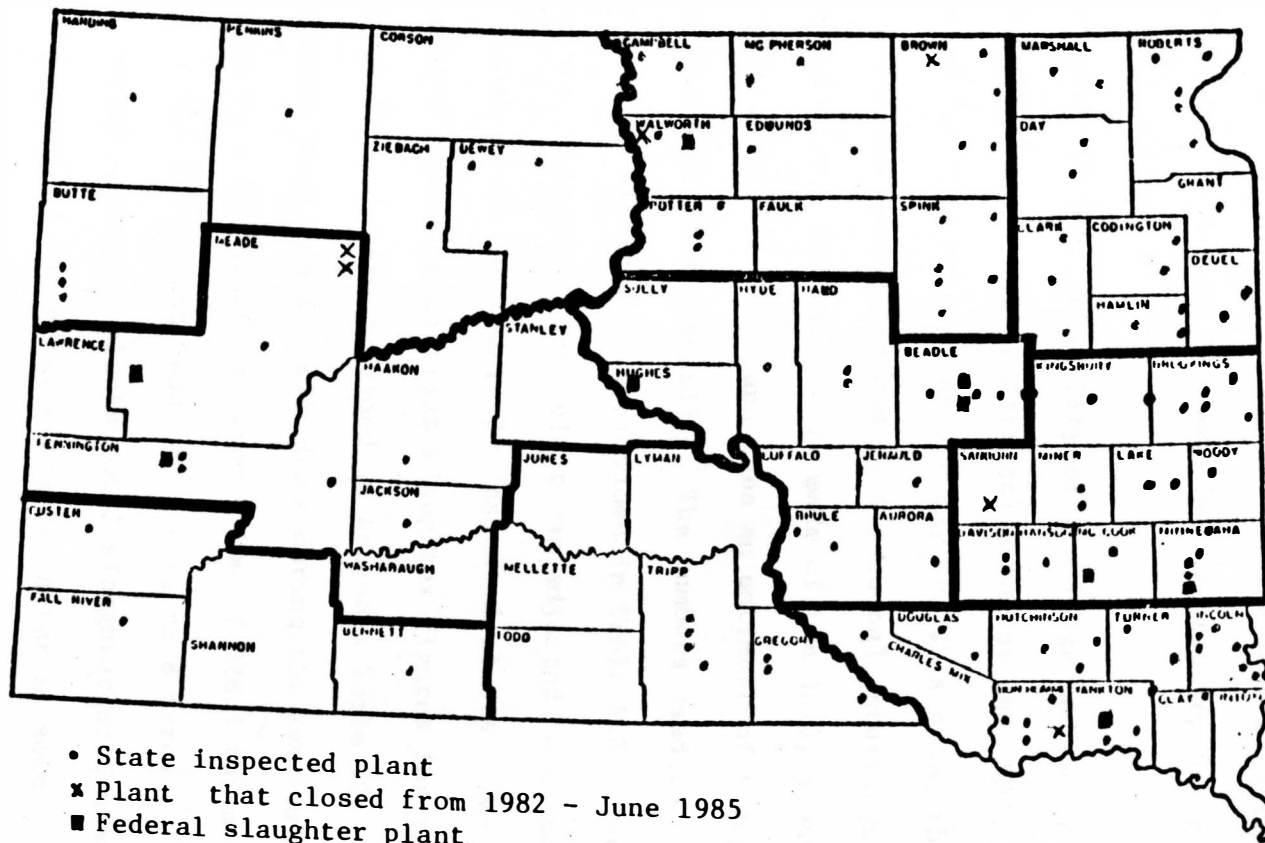
South Dakota's cattle slaughter plant locations are provided in Figure 5.1. Dots indicate small volume state inspected plants in operation on July 1, 1985. These firms tend to be small lockers or processing plants, operating solely within South Dakota. A total of 123 of these small plants are located in the state.

An X on Figure 5.1 indicates a state inspected plant that has gone out of business between January 1, 1983 and July 1, 1985. A total of six state inspected firms closed their doors in South Dakota during this period. Of the 123 surviving state inspected plants, eleven changed ownership. The boxes on Figure 5.1 represent federally inspected slaughter plants. A total of nine federally inspected plants able to ship products out-of-state existed in South Dakota before mid 1985. Since July 1, 1985 one of these firms has shutdown; Cedar Breaks in Hughes county is closed at the present time. This indicates South Dakota plants are following the national trend toward fewer plants.

South Dakota's total commercial slaughter is listed

Figure 5.1

South Dakota Cattle Slaughter Plants



- State inspected plant
- × Plant that closed from 1982 - June 1985
- Federal slaughter plant

semi-annually from January 1, 1983 to July 1, 1985 on Table 5.4. The total volume figures are broken down into state inspected plants slaughter and federally inspected plant slaughter volume. The slaughter volume is listed by South Dakota crop reporting district for each period.

Because of the confidentiality of the large federally inspected plants slaughter volume data collected by the USDA, it was not released for this study. As a proxy for this data, the capacity of each plant was determined from personal interviews with people in the industry. Estimates were made of the daily slaughter at each federally inspected plant and then an estimate of slaughter was determined for each plant annually. The numbers used to estimate each plant's slaughter are provided in Table 5.5. The estimated slaughter volume for each plant was adjusted to match the actual total slaughter of the federally inspected plants. The individual and crop reporting district slaughter figures for the federally inspected plants are provided in Appendix Table II.

Total South Dakota cattle slaughter during the semi-annual periods from 1983 to 1985 fluctuated from a low of 328.2 thousand head to a high of 354.2 thousand head of cattle, an 8 percent range. The 129 state inspected plants total slaughter accounted for less than 5 percent of the total state slaughter in each period. Slaughter volume for these smaller plants fluctuated 6 percent, from 15.3 thousand head to 16.2 thousand head of cattle.

The nine federally inspected plants accounted for over 95

Table 5.4 South Dakota Cattle Slaughter by Crop Reporting District (Federal and State Inspected)

Slaughter	1st	2nd	1st	2nd	1st
	Half	Half	Half	Half	Half
	1983	1983	1984	1984	1985
	number of head --- thousands ---				
Total SD Commercial	328.2	354.2	351.0	337.3	347.2
Total SD State Inspected	15.6	16.2	15.8	15.3	15.5
Total SD Federal Inspected	312.6	338.0	335.2	322.0	331.7
Federal Inspected Plants Percent of Total	95.2	95.4	95.5	95.5	95.5
CRD 1	.8	.8	1.0	1.0	1.0
CRD 2	2.9	3.2	3.2	3.2	3.1
CRD 3	2.4	2.8	2.2	2.3	2.2
CRD 4	40.9	43.9	43.9	43.0	43.5
CRD 5	98.7	106.5	105.7	101.6	104.7
CRD 6	143.4	155.0	153.3	146.3	151.5
CRD 7	.6	.5	.7	.6	.8
CRD 8	.9	.8	.9	.7	.8
CRD 9	37.6	40.7	40.1	38.6	39.6

Individual South Dakota federally inspected slaughter plants capacity were determined from interviews with people in the industry. the capacity figures provided in Appendix I were adjusted on a percentage basis to correspond to actual federal inspected slaughter volume.

- a/ Farm slaughter not included above was 5,000 head/year from 1983-85.
- b/ Total South Dakota commercial slaughter from South Dakota Agriculture, 1985-86.
- c/ Total South Dakota state inspected slaughter from South Dakota Livestock Sanitary Board data collected on local lockers across state.
- d/ Federally inspected plant slaughter is figured individually from figures assumed from interviews with people associated with the plants.

Table 5.5 Estimated Slaughter Volume for each Federally Inspected South Dakota Plant

John Morrell--Sioux Falls		
180 head/hr x 8 hrs/day		
x 126 days/half year	=	181,440
 Bridgewater		
6 head/day x 126 days	=	756
 Cedar Breaks Beef--Pierre		
20 cows/day x 126 days	=	2,520
 Dakota Beef Industries--Huron		
30 head/hr x 8 hrs/day		
x126 days/half year	=	30,240
 Huron Dressed Beef		
90 head/hr x 8 hrs/day		
x 126 days/half year	=	90,720
 Black Hills Pack		
50 head/hr x 8 hrs/day		
x 126 days/half year	=	50,400
 Smith Red Barn--Selby		
16 head/week x 26 weeks	=	416
 Sturgis Meat Service		
30 head/week x 26 weeks	=	780
 Cimpls--Yankton		
45 head/hr x 8 hrs/day		
x 126 days/half year	=	45,360

		406,632

percent of South Dakota's total commercial slaughter in each semi-annual period. These figures demonstrate the large slaughter volume of the nine federally inspected plants compared to the small slaughter volume of the 129 state inspected plants. South Dakota slaughter data also follows the national trend of federally

inspected plants slaughtering a high percentage of the total cattle slaughtered.

The state data is divided into nine crop reporting districts. Districts five and six, the central and east central districts, had the largest slaughter volume. These two districts account for over 73 percent of total South Dakota commercial slaughter in each semi-annual period. Districts four and nine had the next highest slaughter volume, between 37 and 44 thousand head of cattle in each period.

The five other districts individually recorded slaughter volumes of less than 3.3 thousand head slaughtered for any period. The combined slaughter of these five districts was 2.3 percent of the total slaughter in 1984. Only one of these five districts contains a federally inspected plant and that plant has the smallest estimated volume of all the federally inspected plants in South Dakota, see Table 5.5.

Several of these slaughter plants also process beef. The type of beef being processed in South Dakota is presented in Table 5.6. Only 40 of the 129 state inspected plants recorded any degree of breakdown by type of beef slaughtered from January 1983 to July 1985. The other plants custom slaughtered only. Custom slaughter refers to animals brought in for slaughter and processed for individuals. Total slaughter at these 40 plants was 37,344 head, including custom slaughter. Over 52 percent of the total slaughter, 19,525 head, was listed by type of animal slaughtered.

Table 5.6 Type of Beef Being Processed in South Dakota

	Cow	Bull	Steer	Heifer	Calves	Total
Number slaughtered	2720	672	7965	8081	87	19,525
Percent of total slaughtered	13.9%	3.4%	40.8%	41.4%	0.5%	100%

Footnotes: (1) Based on Livestock Sanitary Board collected data for state inspected plants.

(2) Total slaughter including custom at these 40 plants was 37,344 head.

Steer and heifer slaughter account for the largest percentage of total cattle slaughter at 40.8 and 41.8 percent, respectively. Cows accounted for 13.9 percent, bulls 3.4 percent, and calves 0.5 percent of the total beef slaughtered. These figures provided an indication of what type of beef is being slaughtered and processed at the state inspected plants. Data for federally inspected plants by type of beef animal slaughtered was not available.

Meat processing also is done at grocery stores and warehouses across the state, with no actual slaughter taking place in the facility. South Dakota has seven federally inspected firms of this type and numerous smaller state inspected retailers.

The structural characteristics of the slaughter and processing firms has been examined. The following section examines the costs associated with slaughter and processing firms.

Total sales, raw material costs, operating expenses and net earnings of the United States meat packing industry from 1964 to

1984 are listed in Table 5.7. Total operating expenses continually increased from 1964 to 1983 from \$3,833 million to \$9,805 million. Then in 1984 a slight decrease in operating expense was recorded to \$9,723 million. Total sales have almost tripled from \$15,900 million in 1964 to \$49,475 million in 1984. The cost of livestock and raw materials increased, partly due to inflation, from \$11,735 million in 1964 to \$39,025 million in 1985.

Wages, salaries, and employee benefits continually have increased to a combined total of \$4,845 million in 1982. Then the trend reversed and the labor costs declined to \$4,562 million in 1984. As a percentage of total sales, wages and benefits have declined from 13 percent in 1964 to 9.3 percent in 1984. In dollar amounts, the other operating expenses also increased, but in proportion to total sales, they have changed little.

Depreciation expense was only 0.7 percent of total sales in 1984 and was the largest of the remaining expense after labor for all expenses that were individually listed. Supplies and containers and all other expenses accounted for 3.3 and 5.7 percent of total sales, respectively, in 1984. These expenses were not broken down into more specific costs. The net income or profit has declined as a percent of total sales from 1.2 percent in 1964 to 0.8 percent in 1984.

Feedlot characteristics were examined at the beginning of this chapter. A trend toward fewer and larger feedlots was found. Total feedlot marketings fluctuated from 1968 to 1985, but reached

Table 5.7 Sales, Raw Material Costs, Operating Expenses and Net Earnings of the Meat Packing Industry, 1964-1984

Item	Millions of Dollar						
	1964	1969	1974	1978	1982	1983	1984
Total Sales	\$15,900	\$23,125	\$35,500	\$43,625	\$49,500	\$48,950	\$49,475
Cost of Livestock and Other Raw Materials	<u>11,745</u>	<u>17,830</u>	<u>28,165</u>	<u>34,425</u>	<u>38,950</u>	<u>39,425</u>	<u>40,025</u>
Gross Margin	<u>4,155</u>	<u>5,295</u>	<u>7,335</u>	<u>2,200</u>	<u>10,550</u>	<u>10,425</u>	<u>10,450</u>
Operating Expenses:							
Wages and Salaries	1,785	2,215	2,770	3,465	3,660	3,581	3,495
Employee Benefits:							
Retirement Expense	44	86	130	207	184	171	123
Social Security Taxes	68	102	172	242	293	290	283
Insurance & Hospitalization	64	92	154	264	373	380	367
Vacation, Holiday & Sick Leave	117	140	184	252	281	251	242
All Other Benefits*	--	29	44	54	54	71	52
Total Benefits	293	449	684	1,019	1,185	1,163	1,067
Interest	34	70	142	139	162	161	151
Depreciation	124	170	215	307	328	344	357
Rents	54	69	109	129	131	157	154
Taxes**	43	59	74	93	62	67	63
Supplies & Containers	375	745	1,015	1,290	1,570	1,574	1,620
All Other Expenses	<u>925</u>	<u>1,125</u>	<u>1,650</u>	<u>2,190</u>	<u>2,680</u>	<u>2,758</u>	<u>2,816</u>
Total Operating Expenses	<u>3,833</u>	<u>4,902</u>	<u>6,659</u>	<u>8,632</u>	<u>9,778</u>	<u>9,805</u>	<u>9,723</u>
Earnings Before Taxes	332	393	676	568	772	720	727
Income Taxes	<u>150</u>	<u>188</u>	<u>302</u>	<u>335</u>	<u>344</u>	<u>325</u>	<u>308</u>
Net Earnings	<u>182</u>	<u>205</u>	<u>374</u>	<u>233</u>	<u>428</u>	<u>395</u>	<u>419</u>
-----Percent of Total Sales -----							
Total Sales	100%	100%	100%	100%	100%	100%	100%
Cost of Livestock and Other Raw Materials	<u>73.8</u>	<u>77.1</u>	<u>79.3</u>	<u>78.9</u>	<u>78.7</u>	<u>78.5</u>	<u>78.9</u>
Gross Margin	<u>26.2</u>	<u>22.9</u>	<u>20.7</u>	<u>22.1</u>	<u>21.3</u>	<u>21.5</u>	<u>21.1</u>
Operating Expenses:							
Wages and Salaries	11.2	9.6	7.8	7.9	7.4	7.3	7.1
Employee Benefits:							
Retirement Expense	.3	.4	.4	.5	.4	.4	.3
Social Security Taxes	.4	.4	.5	.6	.6	.6	.6
Insurance & Hospitalization	.4	.4	.4	.6	.7	.8	.7
Vacation, Holiday & Sick Leave	.7	.6	.5	.6	.6	.5	.5
All Other Benefits*	--	.1	.1	.1	.1	.2	.1
Total Benefits	1.8	1.9	1.9	2.4	2.4	2.4	2.2
Interest	.2	.3	.4	.3	.3	.3	.3
Depreciation	.8	.7	.6	.7	.6	.7	.7
Rents	.3	.3	.3	.3	.3	.3	.3
Taxes**	.3	.3	.2	.2	.1	.1	.1
Supplies & Containers	3.6	3.2	2.9	3.0	3.2	3.2	3.3
All Other Expenses	<u>5.8</u>	<u>4.9</u>	<u>4.6</u>	<u>5.0</u>	<u>5.4</u>	<u>5.6</u>	<u>5.7</u>
Total Operating Expenses	<u>24.0</u>	<u>21.2</u>	<u>18.7</u>	<u>18.8</u>	<u>19.7</u>	<u>20.0</u>	<u>19.7</u>
Earnings Before Taxes	2.2	1.7	2.0	1.3	1.6	1.5	1.4
Income Taxes	<u>1.0</u>	<u>.8</u>	<u>.9</u>	<u>.5</u>	<u>.7</u>	<u>.7</u>	<u>.6</u>
Net Earnings	<u>1.2</u>	<u>.9</u>	<u>1.1</u>	<u>.8</u>	<u>.9</u>	<u>.8</u>	<u>.8</u>

*Not reported separately until 1969.

**Other than Social Security and Income Taxes.

Source: American Meat Institute.

a high of 685 thousand head of cattle marketed in 1985. Then structural characteristics of the slaughter/processing industry were examined on a national and state level. National data indicated a shift to fewer and larger facilities. South Dakota data also indicated fewer plants, but a size comparison was not available. Both national and South Dakota data indicated the significance of federally inspected plants by proportion of total slaughter.

In the last section, national meat packing plant costs were examined on a combined level. Total sales and the cost of livestock and raw materials continually increased, while operating expenses and net income have declined since 1982. The operating cost of a slaughter plant in South Dakota today will be examined in the following chapter.

CHAPTER VI

CATTLE SLAUGHTER PLANT COSTS FOR SOUTH DAKOTA

The importance of the meat packing industry to the South Dakota economy was demonstrated in a study completed by the Midwest Association of State Departments of Agriculture. This 1977 study stated that 13 meat packing plants in South Dakota accounted for 4,400 jobs, a payroll of \$70.1 million, a value added by manufacturing of \$128.5 million, and total volume of product shipments of \$716.3 million. (30)

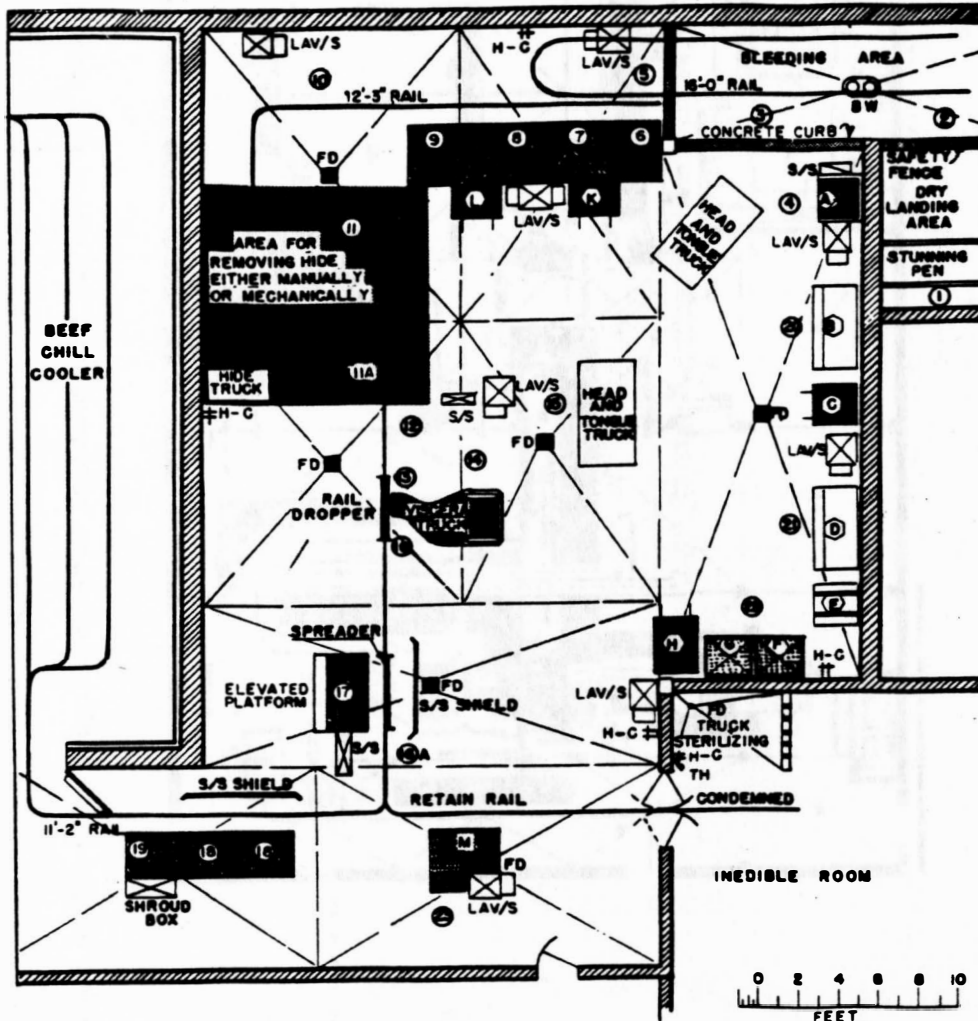
The following information is not a feasibility study, but a presentation of the construction and operating costs for a South Dakota beef slaughter plant. Two plant sizes are examined, a plant capable of slaughtering 20 head of cattle per hour or 160 head per day and a plant capable of slaughtering 120 head per hour or 960 head per day.

The plant costs are provided for slaughter only facilities. A guide to the construction and layout of the 20 head of cattle per hour plant is provided in Figure 6.1. The layout of the 120 head per hour plant is provided in Figure 6.2. These figures came from a United States Department of Agriculture meat and poultry inspection publication. (45) Both plants meet present federal inspection requirements.

The layout of the 20 head per hour plant in Figure 6.1

Figure 6.1

Construction and Layout of Beef Packing Plant Able to Slaughter 20 Head Per Hour



KEY TO EQUIPMENT		
A - HEAD FLUSHING BOOTH	G - FAT WASHING TABLE	BW - BLOOD AND WATER DRAIN
B - HEAD TRIM TABLE	H - FAT TRUCK	FD - FLOOR DRAIN
C - HEAD MEAT TRUCK	K - TRUCK FOR FEET	H-C - HOT AND COLD WATER OUTLET
D - PLUCK TABLE	L - UDDER AND PIZZLE TRUCK	LAV/S - LAVATORY AND KNIFE STERILIZER
E - OFFAL TRUCK	M - INSPECTION PLATFORM	S/S - SAW STERILIZER
F - FAT RECEIVING TABLE		TH - THERMOMETER

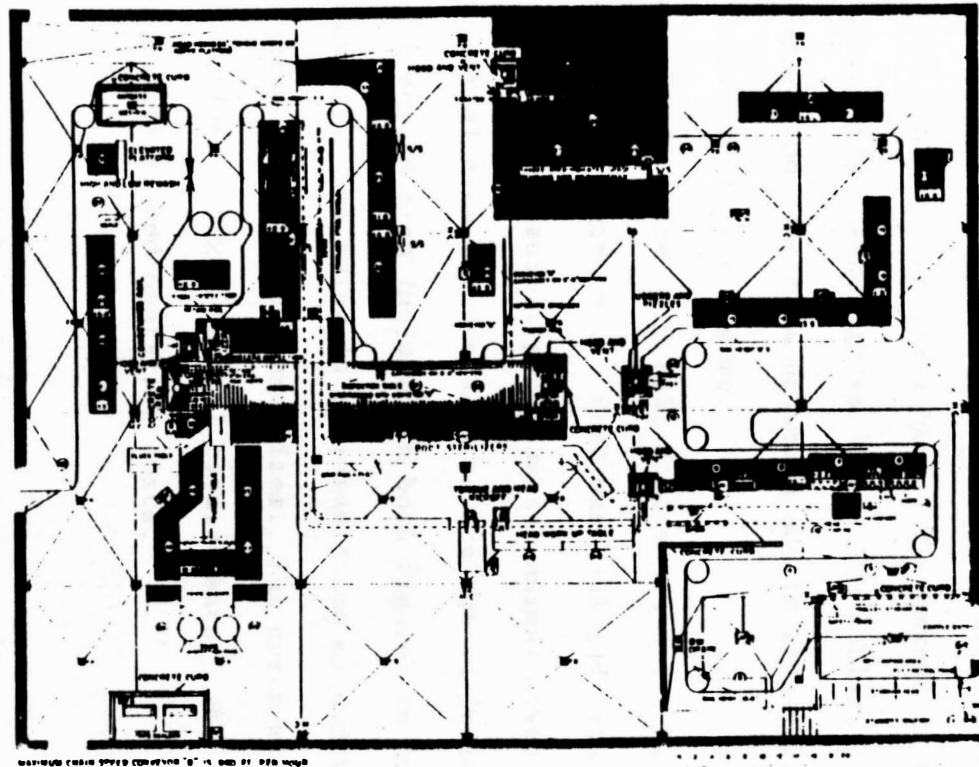
KEY TO OPERATIONS		
1 - DRIVE AND STUN	9 - RIM OVER	16A - LOW RAIL INSPECTION
2 - SHACKLE, HOIST, AND STICK	10 - CLEAR SHOULDERS	17 - SPLIT AND FINAL TRIM
3 - SKIN HEAD AND DEMORN	11 - REMOVE HIDE AND TRIM GRUBS	18 - HIGH AND LOW WASH
4 - FLUSH HEAD AND REMOVE TONGUE	11A - REMOVE HIDE AND DROP BUNG	19 - SHROUD
5 - REMOVE FRONT FEET	12 - SAW BRISKET	20 - TRIM HEAD
6 - SKIN FIRST HINDLEG AND TRANSFER	13 - EVISCERATE	21 - SEPARATE AND WASH PLUCKS
7 - SKIN SECOND HINDLEG	14 - INSPECT VISCERA	22 - WASH FAT
8 - REMOVE UDDER AND PIZZLE	15 - INSPECT HEAD AND TONGUE	23 - RETAINED CARCASS INSPECTION
	16 - HIGH RAIL INSPECTION	

Source: Guidelines for Establishing Beef Packing Plants in Rural Areas, Ronald H. Smalley, July 1978 (37).

Figure 6.2

Construction and Layout of Beef Packing Plant Able to Slaughter 120 Head Per Hour

- KEY TO OPERATIONS
- 1 STUN
 - 2 SHACKLE
 - 3 STICK AND SCALP
 - 4 SKIN HEAD
 - 5 SKIN HEAD
 - 6 SKIN FIRST HINDLES AND SAW OFF
 - 7 BUTT, INSERT FIRST TROLLEY
 - 8 REMOVE SHACKLE, SKIN, AND REMOVE SECOND HINDLES
 - 9 BUTT, INSERT SECOND TROLLEY
 - 10 TAG, CUTOFF NEAR, AND OTHERS
 - 11 TRIM AND FLUSH HEAD
 - 12 PLACE HEAD ON CONVEYOR, REMOVE TONGUE AND GLANDS, HANG TONGUE ON HOOK
 - 13 SKIN AND BREAK FRONT FEET
 - 14 SKIN AND BREAK FRONT FEET
 - 15 REMOVE UNDER AND PIZZLE, SPLIT RITCHBONE
 - 16 CLEAR CROTCH AND FLANK
 - 17 CLEAR CROTCH AND FLANK
 - 18 LOW OPEN AND RIM BRISSET
 - 19 LOW OPEN AND RIM BRISSET
 - 20 CLEAR RUMP
 - 21 RUMP AND DORN BUNG
 - 22 TIE BUNG AND PULL TAIL
 - 23 CLEAR ROSETTE, SHOULDER, AND NECK
 - 24 CLEAR ROSETTE, SHOULDER, AND NECK
 - 25 SAW BRISSET
 - 26 PULL HIDE
 - 27 PULL HIDE
 - 28 PULL HIDE
 - 29 TRIM SAUS
 - 30 Eviscerate
 - 31 Eviscerate
 - 32 SAW RUMP AND LOIN
 - 33 SAW BACK AND NECK
 - 34 TRIM BRISSET
 - 35 REMOVE PASSED VISCERA
 - 36 REWASH, CUT OFF TAIL
 - 37 SCALE, SCRIB, AND TAG
 - 38 HIGH SHROUD
 - 39 HIGH SHROUD
 - 40 LOW SHROUD
 - 41 LOW SHROUD
 - 42 PUSH CARCASS INTO COOLER
 - 43 WORK UP HEAD
 - 44 WORK UP HEAD
 - 45 TRIM PUNCH
 - 46 TRIM PUNCH
 - 47 OPEN AND DUMP PUNCH
 - 48 OPEN AND DUMP PUNCH
 - 49 WASH AND TRIM TRIF
 - 50 WASH AND TRIM TRIF
 - 51 END AND TIE UP STAND



indicates the track an animal follows as it is slaughtered. Stations 1-23 are explained on the figure. The layout is not the complete building, only the slaughter line. The cooler, inedible room, holding area, and loading area would add to the space requirements indicated in the figure.

The layout of on-the-rail kill floors for a 120 head per hour plant is given in Figure 6.2. Stations 1-51 indicate what happens to the animal and animal parts as the animal moves along the rail. The corral area and cooler area are not included in Figure 6.2. The shroud area included in both figures is no longer used in the industry. Following is a presentation of construction and operating costs for the two plant sizes. The costs will be given in four sections: fixed capital requirements, labor requirements, utilities, and operating costs.

Fixed Capital Requirements

Financial requirements for establishing beef packing plants are presented in two parts: fixed capital and operating capital. Fixed capital is needed for the construction of the building and procurement of equipment. Operating capital is required for business activities, such as purchasing cattle, labor costs, supplies and merchandising.

The fixed capital requirements are presented in Tables 6.1 and 6.2. Total costs of construction are given for two plant sizes

Table 6.1 Estimated Capital Investment Requirements for 20 and 120 Head/Hour Cattle Slaughter Plants in 1986

Item	Capital Investment by Plant Size	
	20 Head	120 Head
Land ¹	\$ 16,000	\$ 40,000
Site Work ²	15,000	25,000
Buildings	615,480	2,826,612
Equipment ³	350,000	940,000
Sewage-treatment system ⁴	159,500	383,900
Paved areas	10,125	50,000
Corrals	88,000	501,600
Architect's fee ⁵	<u>42,816</u>	<u>202,693</u>
Total	\$1,426,921	\$5,517,005

1/Land at \$800 for unimproved land, 20 acres required for 20 head plant.

2/Estimated bid by construction firms, minimal cost.

3/Equipment includes all needed for on-the-rail kill floor, also includes refrigeration, heating, and plumbing.

4/Based on 1986 study by Lawrence Duewer and 1976 study by Smalley.

5/This fee is based on 6 percent of the construction costs for building, paved areas, and corrals.

in Table 6.1. The total building construction costs in Table 6.1 are broken down further in Table 6.2 into the various areas of the building. The information was based on several time and observational studies of beef slaughter plants. The construction costs for 1986 also came from interviews with existing South Dakota plant operators, industrial engineers, construction contractors, and equipment salesmen.

Land requirements were estimated at 20 acres for the 20 head plant and 50 acres for the 120 head plant. A value of \$800 per acre was estimated by local realtors for unimproved farmland on the edge of a city. The acreage required for both size plants include a sewage treatment lagoon for the plant wastewater.

Site work preparation was estimated by Svennes Construction Company, Incorporated of Brookings, South Dakota. The cost is minimal unless the acreage involved has old buildings or trees. For this study it was assumed to be unimproved, bare farmland.

Building costs are listed specifically in Table 6.2. The facility space requirements were estimated based on industrial standards. The building total cost and the individual station area construction costs were based on information provided by Zuber Engineering Incorporated in Minneapolis, Minnesota, Krack Manufacture, Chicago, Illinois, Globe Engineering, Chicago, Illinois and a study by Lawrence Deuwer. (11)

Quoted building construction costs, including equipment and refrigeration, ranged from \$80 per square foot to \$120 per square

Table 6.2 Estimated Facility Requirements and Construction Costs for 20 Head and 120 Head/Hour Cattle Slaughter Plants in 1986

Facility Area	----- 20 Head -----			----- 120 Head -----		
	Construction Cost Dollars /sq. ft.)	Floor Area sq. ft.	Total Cost	Construction Costs Dollars / sq. ft.	Floor Area sq. ft.	Total Costs Dollars
Kill Floor	72	1,750	126,000	66	8,970	592,000
Chill Cooler	80	1,710	136,000	73	8,964	654,372
Sale Cooler	80	2,200	176,000	73	10,527	768,471
Refrigeration	38	240	9,120	35	800	28,000
Boiler	38	200	7,600	35	540	18,900
Hide curing	--	--	--	37	5,500	203,500
Rendering	40	1,500	60,000	44	5,000	220,000
Equipment Clean up	32	220	7,040	29	224	6,496
Dry Storage	32	150	4,800	29	681	19,923
Welfare & Cafeteria	32	450	14,400	29	2,740	79,465
Office	40	1,150	46,000	38	4,800	182,400
Refrierated Area	60	420	25,200	55	870	41,850
Average Subtotal	61.36	9,990	612,960	56.86	49,822	2,821,392
Dock up run	3	840	2,520	3	1,740	5,220
Parking Lots ¹	1.5	6,750	10,125	1.25	40,000	50,000
Corrals ²	10	8,800	88,000	9.5	52,800	501,600
Totals	--	26,380	713,605	--	144,162	3,378,212

Foot notes: Floor area requirements came from reference (37) by Ronald Smalley and from reference (11) by Lawrence Duewer.

Construction costs were based on studies and quotes from Zaber Engineering, Minneapolis, MN and Globe Engineering, Chicago, IL.

¹Area for parking lots based on 225 sq ft/employee.

²Area for corrals based on 55 sq ft/head handled each day.

foot. For the 20 head per hour plant, the value of building, equipment and refrigeration from Table 6.2 equals \$1,095,480 divided by 9990 square feet, or \$109.66 per square foot. For the 120 head per hour plant, the construction and equipment costs equaled \$86.44 per square foot.

Equipment costs were determined on a total dollar basis and were based on quotes provided by Hanover, Incorporated, Kansas City, Missouri. Refrigeration costs were estimated by Krach Manufacture, Chicago, Illinois and a study by Duewer. (11) Equipment costs were combined into one sum, based on the requirements for each size plant.

Modern packing plants have kill floors with on-the-rail slaughter systems which are fitted with mechanical hoists and overhead conveyors and are equipped with such devices as hydraulically operated deboners, hock cutters, hide pullers, and lift platforms. Electrically operated splitting saws, air-powered knives, and other labor saving devices are also used. The larger plant would also use a moving-top viscera table positioned directly below the moving chain conveyor supporting the carcasses.

A sewage-treatment system using lagoons and enzyme treatment was set up for each plant assuming 0.24 cubic yards capacity needed per head killed annually. Costs were based on the Duewer (11) and Smalley (37) studies. Paved area cost were based on a requirement of 225 square foot per employee and constructed at a rate of \$1.50/sqft for the smaller plant and \$1.25/sqft for the

larger plant. (11)

Corral area required was based on 2 1/2 times the daily slaughter rate and 55 square foot per head handled. Construction cost for corrals was \$10 per square foot for the small plant and \$9.50 for the larger plant. The architect's fee is based on six percent of the construction costs for the building, paved areas, and corrals.

Total construction costs for a facility able to slaughter 20 head of cattle per hour in South Dakota is \$1,426,921. Total construction costs for a 120 head per hour packing plant is \$5,517,005.

These plants with kill capacities of 20 and 120 head of cattle per hour are designed as kill-and-chill operations to produce carcass quartered beef. Facilities for offal workup on the kill floor and the rendering of the inedible products are included. For the small plant, all hides were expected to be sold daily on a "green" or fresh basis. In the large plant, hide curing facilities and equipment have been included in the plant construction estimates given in Tables 6.1 and 6.2.

The area requirements for each section of the slaughter plant facility are determined on a square foot basis, Table 6.2. Costs for the building shell for each part of the facility are based on the Smalley study (37) and multiplied times the total square footage to determine each areas construction costs.

The unique buying and selling practices of the meat

industry requires substantial amounts of operating capital. Cattle are bought and paid for 48 hours in advance of slaughter and the investment is not turned over until the finished product is delivered and the money received. This time lag averages about three weeks. Current benchmark ratios of "fixed capital" to "operating capital" requirements for cattle kill-and-chill operations are about 1 to 0.95 for small operators and 1 to 1.50 for larger operators. (37) Operating capital requirements are examined in further detail later in the chapter.

Labor and Management Requirements

Despite significant technological improvements in labor-saving equipment and plant design, meatpacking remains a labor-intensive industry. The bulk of this industry's employment is classified as production-line work where needed skills are easily acquired through training. Both labor and management requirements are proportionate to plant size. Combined personnel needs average 27 and 148 employees for a 20 and 120 head per hour cattle slaughter plant, respectively.

The specific kinds of employment needs for these small and large plants in South Dakota are summarized by occupation in Table 6.3. The amount of labor required for various parts of the plant facility were based on telephone interviews with existing slaughter plant managers in South Dakota and Minnesota.

Table 6.3 Labor Requirements for Two Sizes of Cattle Slaughter Plants

Occupation	Employees Required By Plant	
	20 Head	120 Head
	--Number --	
Hourly Personnel:		
Kill floor	12	63
Hot offal	1	18
Cold Offal	1	2
Cooler	2	12
Dock	1	5
Rendering	1	4
Hide Curing	-	4
Maintenance	2	10
Clean up	1	5
Yard	<u>1</u>	<u>3</u>
Total Hourly Personnel	22	126
Salaried Personnel:		
General Manager	1	1
Senior Cattle Buyer	-	1
Beef Sales Manger	-	1
Plant Superintendant	-	1
Asst. Superintendant	-	1
Cattle Buyer	1	7
Beef Salesmen	1	2
Office Manager	-	1
Credit Manager	-	1
Bookkeeper	-	3
Payroll & Billing Clerk	1	1
Secretary	1	1
Switchboard Operator	-	<u>1</u>
Total Salaried Personnel	<u>5</u>	<u>22</u>
Total Labor Force	27	148

Footnote: Based on interviews with plant operators in existing South Dakota plants.

With the most up-to-date technologies available today, direct kill-line efficiency, as measured by the number of cattle killed and dressed per man-hour, average about 1.6 and 24 head at line speeds of 20 and 120 head per hour or better, respectively (3). This also indicates the amount of labor required to operate these slaughter plants.

Wage rates vary in the industry and often determine plant profitability. Packing plant labor rates and fringe benefits can be obtained from the nearest local office of the Amalgamated Meat Cutters and Butcher Worker's Union of North America. The wage rates for this study were based on interviews with existing South Dakota plant operators. Quoted rates ranged from \$16 per hour to \$4.50 per hour depending on type of skill required, years of service, and whether the plant was union or non-union.

Average rates quoted for the kill floor personnel ranged from \$5-\$10 per hour in most South Dakota plants. For this study, an average wage rate of \$7.50 for kill floor personnel was used. Base wage, benefit rates, hours on the job, and total average employee wage and benefits are listed in Table 6.4.

The FICA, state unemployment insurance and federal unemployment rates were determined by government agencies for 1986. Workman's compensation, health and welfare plan, and the pension plan were estimated by Jim Long and Associates, Incorporated of Brookings, South Dakota. These rates were variable depending on plant safety features, average age of employee, and extensiveness

Table 6.4 1986 Base Wage and Benefit Rates for Kill Floor Workers
in Beef Slaughter Plants in South Dakota

Average Annual Wage (\$7.50 x 2,040 hrs.)	\$15,300
Employee Benefits:	
FICA (7.15% x 15,300)	1,094
State Unemployment Insurance (3.5% x 7000)	245
Federal Unemployment Insurance (.8% x 7000)	56
Workman's Compensation ¹ (\$5.15 per \$100)	789
Health and Welfare Plan (Family plan--\$165/mo.)	1,980
Pension Plan (10% of base salary)	<u>1,530</u>
Total Average Annual Wages and Benefits	20,994
Basic Straight-time Compensation per Employee:	
Weekly Benefits and Wages Before Taxes	\$403.73
Weekly Wage Before Taxes	294.23
Hourly Wage Rate Before Taxes	7.50
Annual Scheduling: ²	Hours
Production Working Time	1,777
Vacation (2 weeks)	80
Holidays (10 days)	80
Coffee breaks	59
Sick Leave	32
Miscellaneous	<u>12</u>
Total Per Year	2,040
Employee Cost =	
<u>Total Wage & Benefits</u>	<u>\$20,994</u>
Annual Productive Hours	1,777
	= \$11.81/productive hour

Footnotes: ¹Workmans compensation, health and welfare plan, and pension plans vary among the industry, but these were quoted South Dakota commercial slaughter plant rates.

²Annual scheduling format provided by Smalley, p. 40.

the health and pension plans.

Base wage for the average kill floor worker was \$15,300 with total annual wages and benefits of \$20,994. Using an annual productive working time of 1,777 hours, the employee cost per productive hour equals \$11.81. For the salaried personnel, wages ranged from \$7,000 to \$50,000 with an average base salary of \$25,000 based on current wage conditions in South Dakota. Adjusting the base of \$25,000 to include benefits worked out to \$32,856 per salaried employee.

The entire management staff, including senior cattle buyers and sales managers, must be able to work together as a team to efficiently coordinate cattle procurements, slaughter scheduling, use of labor and facilities, product inventory, merchandising, and distribution. Sound management and good labor policies are essential for maximizing a firm's profit potential.

Utilities

The beef packing industry is an energy intensive industry. The energy required to operate the equipment and chill the meat from 105 degrees fahrenheit to 47 degrees is considerable. High usage of water for cleaning and waste is also required for beef packing plants. The utility requirements for gas, electricity, and water and their total annual costs are listed in Table 6.5.

Utility rates were determined for a plant located in

Table 6.5 Estimated Annual Utility Requirements and Costs for Two Different Sizes of Cattle/Slaughter Plants in South Dakota, 1986

Plant Size by Capacity per Hour	Gas Cu .Ft.	Gas Costs in Dollars	Electricity kwh	Electricity Costs in Dollars	Water Gallons	Water Costs	Total Costs
20 Head	14,450,400	43,351	761,429	25,869	22,674,960	24,116	93,336
120 Head	86,704,800	225,432	3,742,034	127,132	135,051,840	138,696	491.260

Footnote: All Costs are on an annual basis.

Rates were provided by Brookings Utilities, Brookings, SD.

Requirements rates provided by Smalley Conference, page 45.

How Figured:

Electricity

$$3,742,034 \times .0317 = 118,622.48 + 8,509.27 = 127,131.75$$

[peak demand = 1079 x 4.73/kwh = 8,509.27]

$$761,429 \times .0317 = 24,137.30 + 1,731.18 = 25,868.48$$

[peak demand = 366 x 4.73/kwh = 1,731.18]

Water

$$18,055,058 \text{ cu.ft.} \times .756/100 \text{ cu.ft.} = 136,496.24 + 2,200 = 137,696$$

$$3,031,412 \text{ cu.ft.} \times .756/100 \text{ cu.ft.} = 22,915.96 + 1,200 = 24,116$$

Gas

30 cents/100 cu. ft. - small plant
26 cents/100 cu. ft. - large plant

Brookings, South Dakota in the east central district of the state. The annual demands for gas, electricity and water for a 20 head per hour and 120 head per hour plant were extracted from the Smalley study. (37) Gas rates charged to a Brookings commercial customer would be .30 cents per 100 cubic feet of gas for the small plant and .26 cents per 100 cubic feet for the large plant.

Water rates are \$0.756/100 cubic feet of water. There are 7.48 gallons per cubic foot. Thus, by taking usage times the rate, total annual costs are determined. A meter size charge of \$1,200 for the small plant and \$2,200 for the large plan was included in the total annual costs.

Electricity rates for commercial firms were 0.317 cents per kwh (kilowatt hour), plus a peak demand charge of \$4.73/kw at the peak of demand. The peak demand charge was estimated at \$1,731.18 for the small plant and \$8,509.27 for the large plant. Total annual utilities costs were determined by adding the gas, water and electricity costs for each size plant.

Total utility costs are \$93,336 for a 20 head per hour plant, slaughtering 160 head of cattle daily. Total utility costs were \$491,260 dollars for a 120 head per hour plant slaughtering 960 head of cattle daily. Per unit utility costs were \$2.32 per head for the 20 head per hour plant which was determined using yearly total slaughter volume and dividing into the total utility costs. Per unit utility costs for the 120 head per hour plant were \$2.03 per head indicating that economies of size are present in the

beef slaughter industry.

Total Plant Costs

Annual fixed costs and operating costs estimated for a 20 head per hour and a 120 head per hour beef slaughter plant are listed in Table 6.6. The fixed and operating costs are combined to form the annual total plant costs for these two sizes of plants in South Dakota.

The annual fixed costs totaled \$153,545 dollars for the small plant and \$662,037 for the large plant. Depreciation, interest, property taxes and insurance compose the fixed costs.

Depreciation was determined for each size plant by taking total building construction costs and the architect's fee and dividing the total by 31.5 years. Depreciation for equipment and refrigeration was using an average 10 years life. Various pieces of equipment have different life spans of 3 to 15 years, see Table 6.6.

Interest on the fixed capital required for the plant was based on half of the total building and equipment costs, plus 100 percent of the land value. The interest rate charged for 1986 was set at 9 percent. Property taxes were 3.286 percent of the original cost of the land, building, refrigeration, and paved area listed in Table 6.1. The rate, provided by the Brookings County Auditor, Brookings, South Dakota, was the state average rate for

Table 6.6 Estimated Total Annual Costs for Two Model Plants,
South Dakota, 1986

Cost Item	Plant Size, Head Killed Per Hour	
	20	120
Annual Fixed Costs	\$ 153,545.17	\$ 662,037.08
Depreciation	53,943.20	244,888.41
Interest	52,663.32	206,842.72
Taxes	25,687.65	115,463.86
Insurance	22,691.00	143,207.00
Labor ¹		
Kill Floor	336,600.00	1,927,800.00
Salaried Personnel	125,000.00	550,000.00
Tax & Benefits	208,548.00	1,142,276.00
Utilities ²	93,336.00	491,260.00
Other Supplies	127,328.00	687,814.44
Interest on Operating Capital	189,604.80	1,137,628.80
Total Annual Cost	<u>\$1,250,355.99</u>	<u>\$6,644,181.23</u>

1/Labor, see Tables 6.3 and 6.4.

2/Utilities, see Table 6.5.

property taxes in South Dakota.

The insurance for the two plants was based on data provided by Long and Associates of Brookings, South Dakota. Product liability, premise liability, property insurance, loss of income insurance, bonding and vehicle and transit insurance were determined to be \$22,691 for the small plant and \$143,207 for the large plant (see Appendix Table II). The total annual insurance costs are also listed in Table 6.6.

The costs of labor is broken down into three parts: kill floor labor, salaried personnel, and tax and welfare benefits. These annual labor costs were determined from Tables 6.3 and 6.4 which list the total labor force required and the various wages and benefits paid for each employee.

Total labor costs were \$670,148 for a 20 head per hour plant and \$3,620,076 for a 120 head per hour plant. Individual utilities costs are given in Table 6.5 and the sum of the annual gas, water, and electricity costs are listed in Table 6.6. Total annual utility costs were \$93,336 for the small plant and \$491,260 for the large plant. Other supplies, which includes containers, repairs, telephone, and advertising, were calculated as 19 percent of total labor costs. This cost can also be estimated using six cents per 100 pounds of meat output. (14)

Interest cost for operating capital was determined based on a 21 day lag between the purchase of livestock for slaughter and the income received from product sales. (11) The cost was based on

the daily meat cost, times 21 days, times 9 percent interest. For this small plant the daily meat cost was 160 head per day, times 1100 pounds average weight, times 57 cents per pound which was the average price for slaughter steers and heifers in South Dakota in 1986.

All these costs combined make up the total annual costs of \$1,250,356 for the small plant and \$6,644,181 for the large plant. The ratio of fixed costs to total costs was 12.28 for the 20 head per hour plant and 9.96 for the 120 head per hour plant.

These costs are based on the plants operating at full capacity. The costs per animal decrease the higher the capacity level. The unit costs of cattle slaughter for a plant operating in 1976 with a 206,250 head annual capacity are provided in Table 6.7. The cost per head slaughtered decreased continually as capacity levels approach 100 percent. The costs presented for the two model plants in this study were derived under the assumption of plant operation at 100 percent of capacity. If the plants were operating at less than full capacity, higher costs would be incurred.

The increase in cost per head slaughtered as plant utilization continually decreased increased plant utilization went from 100 to 50 percent. For the small plant slaughtering an estimated 40,320 head annually at full capacity, total costs would be \$1,250,356 (from Table 6.6). Unit costs for the small plant were \$31.01 per head. This was determined by dividing total operating costs by the annual slaughter ($\$1,250,356 / 40,320$ head)

Table 6.7 Unit Total Costs of Cattle Slaughter - Synthesized Costs for 206,280 Head

Plant Utilized (%)	Output (Head)	Unit Cost (\$/Head)	Percent increase in costs compared to percent capacity
50	103,125	24.38	12.28
55	113,438	23.88	10.45
60	123,750	23.46	8.51
65	134,063	23.10	6.85
70	144,375	22.80	5.46
75	154,688	22.54	4.26
80	165,000	22.31	3.19
85	175,313	22.11	2.27
90	185,625	21.93	1.43
95	195,938	21.76	0.65
100	206,250	21.62	0.00

Source: Cothorn James H., R. Mark Peard, and John L. Weefes. Beef Cattle Economics Series: Economies of Scale in Beef Slaughtering; Northern California 1976. Division of Agricultural Sciences. University of California. Leaflet 21040. August 1976.

Note: Costs are in 1976 dollars and are based on economic engineering generated costs, not actual plant costs. These cost should not be used in calculations of current marketing bills for beef. Faminow (19)

assuming 100 percent plant utilization. Annual slaughter volume and unit costs are provided for various percentages of plant utilization, Table 6.8. If the plant were operating at 50 percent of capacity, or 20,160 head, unit cost would be \$34.82. For the large plant, capable of slaughtering 120 head of cattle per hour unit costs were \$27.46 for 100 percent plant utilization and \$30.83 per head at 50 percent utilization.

The information in this chapter provides an estimate of the construction and operating costs for beef slaughter plants located in South Dakota. The capital requirements for the large plant are great, but the costs per beef animal slaughtered are lower than for the small plant. Economies of size are indicated with increased plant size. Unit costs were lower for the large plant at all levels of plant utilization compared to the unit costs for the small plant. The utilization of plant capacity is an important factor in reducing per unit operating costs in South Dakota's beef slaughter industry.

Table 6.8 Unit Costs of Cattle Slaughter for 20 Head Per Hour
and 120 Head Per Hour Plants

-----20 Head Per Hour-----				
Plant Utilized (%)	Output (Head)	Unit Cost \$/Head	Output (Head)	Unit Cost \$/Head
50	20,160	34.83	120,960	30.83
55	22,176	34.25	133,056	30.33
60	24,192	33.65	145,152	29.80
65	26,208	33.13	157,248	29.34
70	28,224	32.70	169,344	28.96
75	30,240	32.33	181,440	28.63
80	32,356	32.00	193,536	28.34
85	34,272	31.71	205,632	28.08
90	36,288	31.45	217,728	27.85
95	38,304	31.21	229,824	27.64
100	40,320	31.01	241,920	27.46

Footnote: The unit costs were determined using the percent increase in costs compared to percent capacity presented in Table 6.7.

CHAPTER VII

SUMMARY, IMPLICATIONS, LIMITATIONS AND RECOMMENDATIONS

Introduction - Objectives and Procedures

This study was conducted to enhance the amount of information available about the South Dakota cattle industry at the producer, feeder, slaughter and processor levels and to examine slaughter plant construction and operating costs. The general objective of this thesis was to identify the structure and conduct of South Dakota beef production, marketing, slaughter and processing industries. Specific objectives were:

- 1) To examine characteristics of South Dakota beef producers and farms.
- 2) To identify South Dakota marketing channels used for marketing feeder and slaughter cattle.
- 3) To determine the composition and magnitude of flows of cattle to and from South Dakota.
- 4) To review trends and recent developments in the beef packing and processing industries of South Dakota and the United States.
- 5) To develop construction and operating costs for a model beef slaughter plant located in South Dakota.

Data was collected from several state and national publications to achieve the objectives. A random sampling of South Dakota cattle shipment data from the South Dakota Livestock Sanitary Board was completed to determine direction and type of cattle movements. Interviews were conducted with plant operators, industrial engineers, contractors, and equipment dealers to determine slaughter plant construction and operating costs.

Statistical procedures used to analyze data included frequency counts, cross-tabulations, general linear models, and chi-square. These procedures were used to analyze the Livestock Sanitary Board cattle shipments. Frequency counts and cross tabulations were used in all sections of this study. Engineering cost models for two sizes of slaughter plants was included in chapter six.

Findings

Characteristics of South Dakota Cattle Producers and Farms

The number of cattle farms in the United States declined from 4.06 million in 1950 to 1.35 million in 1982, a decline of 66.7 percent. South Dakota cattle farms declined 50.9 percent from 55 thousand in 1950 to 27 thousand in 1982. The number of all farms, livestock farms, and beef farms recorded large declines on both the national and state level. Farm size in the United States

increased from an average of 216 acres in 1950 to 440 acres in 1982. In South Dakota average farm size increased from 674 acres in 1950 to 1,179 acres in 1982.

South Dakota cattle numbers have followed the national cycles from 1930 to 1986. Presently cattle inventories are at their lowest number since 1963.

South Dakota farms raising beef declined from 73.6 percent in 1959 to 56.5 percent in 1982. An increasing percentage of the farm operators own their land, 72.7 percent in 1959 and 87 percent in 1982.

The percentage of producers over 55 years of age has continually increased from 1959 to 1982. Sole proprietorship was the most common type of farm organization at 86.7 percent in 1982. Farm sales volume on a dollar and per head basis continually increased from 1959 to 1982. Farms under 100 acres and over 2000 acres were the only two categories to increase continuously from 1959 to 1982.

South Dakota beef farm numbers reported by crop reporting district and for the state for 1982 and 1978 declined in all districts except in the Northwest and Southwest districts. Beef cow numbers and all cattle numbers increased from 1978 to 1982 in all districts except in the South East district.

Marketing Channels

The most often used information source for marketing and purchasing cattle was radio, with television the second most often used. Trucking was the major method of transportation to market.

Sales barns or auctions was the preferred market channel for the selling of all cattle and calves, slaughter cattle and calves, stocker and feeder cattle and calves, and for selling breeding and dairy cattle and calves. The use of public stockyards for all cattle and calves marketings in South Dakota declined from 38 percent in 1957 to 16 percent in 1980. The use of direct marketing fluctuated but also declined from 1957 to 1980. The proportion of slaughter cattle and calves and breeding and dairy cattle and calves directly marketed increased over the same time period.

The use of the auction marketing channel increased for all cattle and calves and each type of animal. The largest number of cattle sold in 1980 were stocker and feeder cattle. The largest number of cattle outshipments in 1985 were stocker and feeder cattle.

Cattle Movements

The number of cattle exported from South Dakota declined from 1.66 million head to 1.5 million head from 1981 to 1985. Nebraska, Iowa and Minnesota received over 88 percent of all South

Dakota cattle outshipments in 1981. The percent shipped to these three states declined to 78 percent in 1985; only shipments to Nebraska increased.

Feeder and slaughter cattle outshipments comprise a majority of cattle outshipments, over 96 percent in 1981 and 1985. States directly south of South Dakota all the way to Texas recorded increased outshipments. When the outshipments were broken down by crop reporting districts, shipments to various state/regions from each district fluctuated greatly from 1981 to 1985.

Feeder and slaughter cattle accounted for over 92 percent of all cattle inshipments. Slaughter cattle accounted for less than 4 percent of the feeder and slaughter cattle inshipments. The majority of cattle inshipments to South Dakota originated in an adjacent state.

The number of cattle inshipments into South Dakota increased from 466 thousand head in 1982 to 477 thousand head in 1985. Montana and North Dakota combined accounted for over 50 percent of all cattle shipped into South Dakota. The inshipment percentages increased dramatically for Texas and Canada from 1981 to 1985.

South Dakota is a net exporter of cattle. Net exports ranged from 1.02 million head in 1985 to around 1.2 million head per year in the early 1980's.

Cattle Feeding, Slaughter and Processing Industry Characteristics

The number of feedlots in South Dakota declined dramatically from 9700 in 1968 to 4400 in 1985. The total marketings of the feedlots increased from 650 thousand in 1968 to 685 thousand in 1985. A trend toward fewer and larger feedlots was indicated by these facts.

Districts six and nine or the east central and south east crop reporting districts accounted for 64 and 62 percent of South Dakota fed cattle marketed for 1978 and 1982, respectively. From 1978 to 1982 all districts in South Dakota recorded increased marketings of cattle fed grain and concentrate.

The number of commercial beef slaughter plants in the United States and South Dakota is declining. There were 6,156 commercial slaughter plants in 1972 and 5,558 slaughter plants in 1983 in the United States. In South Dakota the number of federally inspected slaughter plants has declined from 9 in 1984 to 8 in 1985 and the number of state inspected plants has decreased from 129 in 1983 to 123 in 1985. Surviving firms tend to be newer and larger and thus able to capture economies of size and the lowest costs.

Total South Dakota commercial beef slaughter ranged from between 328.2 thousand and 354.2 thousand head of cattle per semi-annual period from January of 1983 to January of 1985. Federally inspected plants account for a majority of the slaughter volume, over 95 percent in South Dakota. Districts four, five, six

and nine combined accounted for over 97.7 percent of all commercial slaughter in South Dakota. The type of beef slaughtered at small processing plants is mainly steers and heifers accounting for 82.2 percent of slaughter.

Beef Packing Construction and Operating Costs

Models for 20 head/hour and 120 head/hour beef kill and chill plants were established for South Dakota. Total construction cost for the small plant is \$1,426,921 and \$5,519,005 for the large plant. Construction costs per square foot indicated economies of size are present in the industry. The average per square foot construction costs were \$61.36 for the small plant and \$56.86 for the large plant.

Labor requirements and costs would be equal to or less than national averages. Personnel requirements decreased with increasing technology. Low wage rates are a part of the South Dakota economy; this is an area where a plant operating in South Dakota could achieve lower costs than other locations in the United States.

Utilities, depreciation, taxes, insurance, interest and supply costs were incorporated into the two size plants. Lower rates were charged the larger customer which increases the effect of economies of size. Capacity utilization is an important factor in reducing cost per animal and increasing profits. By operating at higher capacity levels per unit slaughter costs are reduced.

Units cost per slaughter animal were \$31.01 for the 20 head per hour cattle slaughter plant and \$27.46 for 120 head per hour cattle slaughter plant, assuming 100 percent plant utilization. Again, economies of size in the beef slaughter industry are indicated.

Conclusions and Implications

The structure of South Dakota farms is changing. The number of all farms, livestock farms, cattle farms and beef farms has declined dramatically in South Dakota and nationally. With the average farm size continually increasing, a trend toward fewer and larger sized farms is indicated.

Cattle inventories are at their lowest number since 1963. This could indicate the end of one cattle cycle and the beginning of an expansion phase.

South Dakota cattle producers are increasingly owning the operation and sales volume is increasing. With the average age increasing to over 55 years of age, the number of cattle operations in South Dakota could decline significantly when these older producers retire.

Radio and television were the major sources of market information, yet over 60 percent of the survey respondents used only two sources of information to make marketing decisions. This indicates the importance of television and radio broadcasting market information accurately. Otherwise, a majority of the

farmers will not receive proper market information at the appropriate time.

Sales barn or auction is the major market channel used by South Dakota cattle producers. Stocker and feeder cattle and calves are the major type of animal marketed.

Cattle outshipments declined to 1.5 million head of cattle in 1985, while inshipments increased to 477 thousand head. The majority of both outshipments and inshipments were feeder and slaughter cattle. The percentage of slaughter cattle inshipments is less than 4 percent of all cattle inshipments in 1985. South Dakota has a large feeder cattle production surplus, cattle feeding could expand if economically feasible in the state.

Feedlot numbers are declining while total marketings of cattle are increasing. This may indicate that a trend to fewer family farm cattle operations in South Dakota. Concentration of cattle production in South Dakota is definitely increasing.

The beef packing industry has over capacity at present with several plant closings in recent years. The surviving plants are newer and larger and have low operating costs, capturing economies of size. Over 95 percent of South Dakota commercial slaughter was done at nine federally inspected plants.

Construction and operating costs for a South Dakota beef slaughter plant in 1986 dollars were lower than costs derived in a national study done in 1978 (Duewer). This indicates a South Dakota beef packing plant could be competitive. However,

profitability of new beef slaughter facilities in South Dakota would have to be determined in a complete feasibility study.

Over a million head of surplus cattle are annually shipped out of South Dakota for further feeding and processing. If a beef packing plant is feasible for South Dakota, this would reduce shipping costs and may result in greater marketing efficiency in South Dakota's beef industry.

Limitations

There were three major limitations encountered in this study.

In the marketing channels chapter, the outshipment data for 1985 was biased. All transactions were recorded based on the point of first sale. But because all public stockyard transactions did not list the shipment's county origin, district six was credited with shipments that came to the stockyards from all over the state. These effects are demonstrated by looking at the public stockyard 1985 column in Table 3.7A and Table 3.7B.

The second limitation arose when the actual federally inspected plant slaughter volume data was not released because of confidentiality. The slaughter volume for the nine federally inspected plants was estimated based on interviews with plant operators, meat inspectors and other people familiar with the industry. These estimated annual slaughter rates were adjusted to

match the actual federally inspected slaughter for each period.

The third limitation was in the type of animal slaughtered. Only 40 of the small state inspected plants had any type of breakdown of slaughter by type of animal. Data was not available for the other state inspected plants and the large federal plants. If available, these figures would be very beneficial when examining what type of slaughter plant to build; one that slaughters cows and bulls, one that slaughters steers and heifers, or one that slaughters both.

Recommendations for Further Research

This study has provided much of the base data necessary for extended research. Using the information from this study, a feasibility study for a beef slaughter plant in South Dakota could be conducted.

If a feasibility study is done in follow-up to this thesis project, the size of plants considered should be large enough to capture the economies of size present in the industry if at all possible. Boxed beef is the major type of processing done in the beef packing industry and should also be included in a feasibility study.

Further studies should examine whether it is efficient to feed more cattle in-state and slaughter out-of-state or to feed more cattle in-state and construct more slaughter and processing

facilities in South Dakota. Different models should be set up for different business organization, such as cooperative, corporation, or use of integration in the beef industry, to determine the most efficient and profitable situation for South Dakota.

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- | | | |
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Sanborn, MN |
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Yankton, SD |
| 53. | Cogne, Bob | Cogne Meat Market
Webster, SD |
| 54. | Costello, Bill | Professor Animal Science
South Dakota State University |

A P P E N D I C E S

APPENDIX I

Slaughter Volume for Crop Reporting Districts by Federal and State Inspection

	1st Half of 1983		2nd Half of 1983		1st Half of 1984		2nd Half of 1984		1st Half of 1985	
	<u>Federal</u>	<u>State</u>	<u>Federal</u>	<u>State</u>	<u>Federal</u>	<u>State</u>	<u>Federal</u>	<u>State</u>	<u>Federal</u>	<u>State</u>
CRD 1	---	817	--	777	---	1,037	---	1,007	---	981
CRD 2	320	2,595	346	2,867	343	2,834	329	2,854	339	2,718
CRD 3	---	2,354	---	2,737	---	2,156	---	2,310	---	2,718
CRD 4	39,445	1,486	42,641	1,274	42,489	1,483	41,588	1,441	42,049	1,505
CRD 5	96,925	1,822	104,639	1,787	103,788	1,881	99,781	1,808	102,727	2,045
CRD 6	141,064	2,400	152,444	2,519	151,190	2,144	144,276	2,001	149,622	1,988
CRD 7	---	553	---	505	---	657	---	609	---	784
CRD 8	---	868	---	742	---	856	---	691	---	788
CRD 9	34,871	2,768	37,704	2,994	37,392	2,703	36,019	2,552	37,001	2,623

APPENDIX II

Insurance Cost for Slaughter Plants in South Dakota

Product Liability	.27/\$100 sales	\$5000	\$ 30,000
Premise Liability	.30/100 sq.ft.	300	1,500
Property Insurance	\$1/\$100 value	11,383	45,165
Loss of Income Insurance	3 months 50 cents/\$100 total monthly income	1,000	6,042
Vehicle & Transit Insurance	10 x 60 vehicles	9,800	37,500
Bonding		<u>500</u>	<u>3,000</u>
		\$ 22,691	\$143,207