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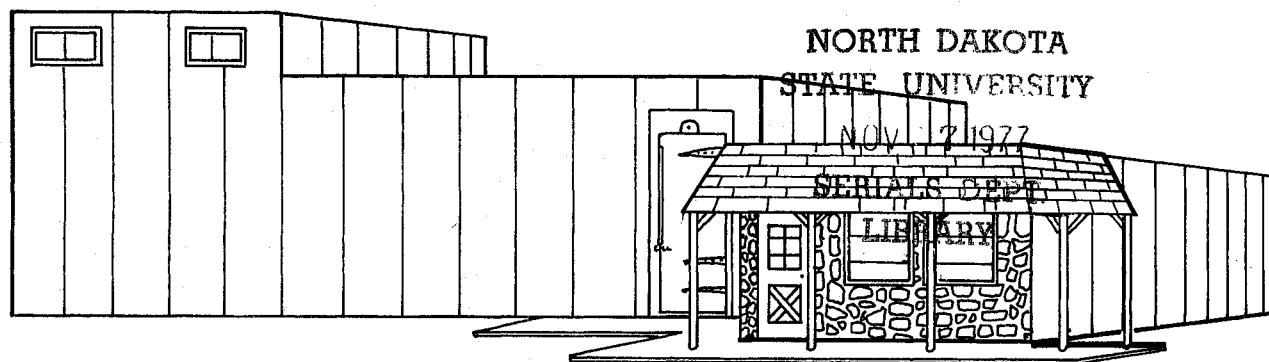
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Costs & Returns for Small Livestock Slaughter Plants in North Dakota



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RESEARCH-EXTENSION RURAL DEVELOPMENT PROJECT REPORT

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and
Cooperative Extension Service
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FOREWORD

This report is one of a series being conducted under a special Research and Extension Rural Development Project at North Dakota State University as authorized by Title V of the Rural Development Act of 1972. The study was endorsed by the North Dakota Freezer and Meat Processors Association.

The authors wish to extend their appreciation to the people who provided information for this publication, especially Mr. Alvin Whitmer, Vice President, Engineering Division of Koch Supplies, Inc.; Mr. Don McDowell, president of McDowell Market, Flat River, Missouri; and Mr. Bill Breeden, president of Beef Processors Inc., Grove, Oklahoma for their assistance in developing and reviewing investment and operating cost data. The authors gratefully acknowledge the valuable assistance and suggestions received from the faculty and staff of the Department of Agricultural Economics, North Dakota State University.

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Highlights

The feasibility of three multi-species livestock slaughter plants were examined in this study. Annual slaughter and processing capacities were: 1,500 beef in the small plant; 2,750 beef and 1,250 hogs in the medium plant; and 4,500 beef and 2,000 hogs in the large plant.

The initial investment required to establish the slaughter and processing facilities were: \$97,043 for the small plant; \$177,170 for the medium plant; and \$295,146 for the large plant. The small plant was assumed to operate only as a custom slaughter facility. The medium and large plants were assumed to slaughter and process one-third of their capacity each for custom slaughter, wholesale sales, and retail sales.

Projected operating costs, financial analysis, and cash flows were included for operating at both the 100 percent and 70 percent capacity levels. The 70 percent capacity level was included because available national and state data indicated that small slaughter plants frequently operate at less than design capacity. North Dakota plants, in the 1976 survey, were found to be operating at 63.3 percent of their design capacity.

The estimated annual operating costs for the plants operating at 70 percent capacity were: \$70,284 for the small plant; \$691,232 for the medium plant; and \$1,131,640 for the large plant. Profits were projected to range from a low of \$16,775 a year for the small plant operating at 70 percent capacity, to a high of \$89,134 for the largest plant operating at 100 percent capacity. Return on investment ranged from a low of 14 percent for the large plant operating at 70 percent capacity, to a high of 39 percent for the small plant at 100 percent capacity.

The cash flow analysis, based on the assumptions stated in the text, indicated that all three plants at both capacity levels operated at a loss in the first year. However, all plants recovered the first year's loss in year two and completed the second year with a profit.

Based on the findings of this research, and in accordance with the estimated investment and operating costs, pricing structures, capacity levels, and other assumptions specified in the analysis, it is concluded that the operation of each of the three multi-species livestock slaughter and processing plants are feasible in North Dakota.

COSTS AND RETURNS FOR SMALL
LIVESTOCK SLAUGHTER PLANTS IN NORTH DAKOTA

by
Arlyn R. Staroba,
G.M. Bedker, and E.V. Dunn*

The meat packing industry is the United States' largest food industry. The industry reported sales of \$36.8 billion with net earnings of \$374 million in 1975. It employed 232,500 people with total salaries and wages of \$2.9 billion. (1:5-7)**

The sale of livestock and livestock products in North Dakota of \$452.8 million accounted for about 23 percent of the total \$2 billion annual cash farm income of farmers and ranchers in 1975. Cattle and hogs provided the two largest receipts with \$329.5, and \$58.1 million dollars, respectively. State inventory totals were 2.4 million cattle, 330 thousand hogs, and 262 thousand sheep at the end of 1976.

In 1975, 962,000 head of cattle, 469,000 hogs, and 232,000 sheep were marketed in North Dakota. During the same time period 283,200 cattle were commercially slaughtered and 12,000 were slaughtered on the farm for a total of 295,200. Total hog slaughter was 40,900, consisting of 21,900 commercial slaughter and 19,000 farm slaughter. A total of 2,300 head of sheep were slaughtered in North Dakota during 1975. Thus, total in-state slaughter required only 31 percent of the cattle, 9 percent of the hogs, and less than 1 percent of the sheep marketed in North Dakota during 1975. (2:47-61)

A study of nonfederally inspected plants conducted by Dunn in 1967 (3:V) indicated that the majority of the meat industry in North Dakota was made up of a large number of relatively small firms, none of which possessed a significant share of the market. The smallness of the meat plants was due primarily to the sparse population in the state and the relatively small trade in area that each plant served.

*Staroba is Research Assistant, Bedker, Research Associate, and Dunn is Associate Professor.

**The underscored numbers in parentheses refer to the source of information as listed in the Literature Cited section of this report. The numbers following the colon refer to specific pages in the reference cited.

This study examines the cost and returns associated with the construction and operation of small multi-species slaughter plants. It was conducted at the request of several North Dakota communities that are interested in building a slaughter plant as a means of expanding the economic base, and/or services offered by the community. Interest was also expressed by the North Dakota Freezer and Meat Processors Association, County Extension Agents, and various community development groups throughout the state.

Data for the study were obtained from industry sources, slaughter equipment suppliers, meat wholesalers and retailers, existing slaughter plants, USDA agencies, two surveys taken of existing slaughter plants in 1976, and similar studies conducted in other states. The data were updated and adjusted, where necessary, to apply to the North Dakota livestock economy for the year 1976.

The study examines three small slaughter plants designed to slaughter hogs and cattle. Sheep were excluded from the operations due to the relatively small number slaughtered in North Dakota. The plant capacities chosen for analysis were those appropriate to the needs of small to medium sized communities. Plant sizes chosen for analysis were:

Plant Size	Capacities	
	Daily	Annual
Small	6 Beef	1,500 Beef
Medium	11 Beef and 5 Hogs	2,750 Beef and 1,250 Hogs
Large	18 Beef and 8 Hogs	4,500 Beef and 2,000 Hogs

Throughout the study the plants will be referred to as outlined above: small, medium, and large, with large referring to the highest capacity plant considered in this report.

It was assumed that the three plants would operate under the following conditions: 1) the small plant is a custom slaughtering and processing plant which would operate under a custom exempt status, slaughtering and processing cattle brought in by the customer. Hogs could also be slaughtered in the plant with small design and equipment modifications, 2) the medium and large plants would operate under federal inspection and would slaughter

and/or process one-third of the animals on a custom basis for customers, one-third for wholesale sales, and 1/3 for retail sales.

The Wholesome Meat Act of 1967

Legislation regarding meat inspection has existed for over 85 years. The first comprehensive federal meat inspection act was passed in 1891 (4:261). This act became necessary due to the increasing animal disease problems in the United States. It provided for inspection of the animal and meat prior to and after slaughter.

In 1906 a meat inspection act extended the provisions of the 1891 Act to include sanitation standards for slaughtering and processing plants trading in interstate commerce. It became the basis for all federal meat inspection until December 15, 1967, when the Wholesome Meat Act of 1967 became law. The Wholesome Meat Act of 1967 amended the meat inspection act of 1906 to include the inspection of meat plants that formerly only sold meat within the state (5:1).

The 1967 Law gave state legislatures until December 15, 1969 to initiate state inspection of livestock slaughter and meat processing plants that were not previously federally inspected (3:1). Federal inspection was to become mandatory in those states not having an acceptable state inspection program prior to December 15, 1969. Individual states were allowed an additional year beyond the December 15 deadline, if the state could demonstrate satisfactory progress in establishing a meat inspection program which met federal standards.

The North Dakota legislature passed a state inspection bill. However, because of insufficient funds allocated by the state legislature to implement the inspection program, federal inspection was initiated in North Dakota on April 16, 1970.

The Curtis Amendment, passed on July 16, 1970, amended the Wholesome Meat Law of 1967 to allow custom firms which sold federally inspected meat, to be exempt from federal inspection in slaughtering and processing uninspected meat for the customer's own consumption*.

*Additional information concerning the Wholesome Meat Act of 1967, the Curtis Amendment, and the governing regulations may be obtained from the U.S.D.A. Animal and Plant Health Inspection Service, Room 211, 655 First Avenue North, Fargo, North Dakota, 58102.

Federal Inspection Regulations

According to present meat acts and regulations (Wholesome Meat Act, Sections 1-10; Poultry Products Inspection Act, Sections 1-9; and Meat Inspection Regulations, Part 301.2) the term "federally inspected" refers to:

Any meat product or poultry product that is identified by an official mark or official inspection legend, as prescribed by regulation of the Secretary of Agriculture, has been inspected and passed by inspectors appointed for that purpose in establishments at which inspection is maintained. At the time the product is prepared it is inspected, passed and identified and found to be wholesome, not adulterated and not mislabeled.

To assure that the meat and poultry products are distributed into commerce as wholesome, not adulterated or misbranded, these products are subjected to examination and inspection during antemortem, postmortem, upon entry into any department wherein the products shall be treated or prepared for meat food and poultry products (processing).

The establishment at which inspection is maintained shall maintain sanitation according to the prescribed rules and regulations of sanitation, and permit access by inspectors at all times to every part of said establishment for the purposes of any examination and inspection.

Custom Exempt Regulations

The Wholesome Meat Act and Federal Meat Inspection Regulations (Wholesome Meat Act, Section 23, and Meat Inspection Regulations, Part 303.1) define provisions for plants operating under custom exempt status in the following terms:

The provisions for "federally inspected" requiring the inspection of the slaughter of animals and the preparation of the carcasses, parts thereof, meat and meat food products at establishments conducting such operations for commerce shall not apply to the slaughtering by any person or animals of his own raising, and the preparation by him and transportation in commerce in the carcasses, parts thereof, meat and meat food products of such animals exclusively for use by him and members of his household and his nonpaying guests and employees; not to the custom slaughter by any person, firm or corporation of cattle, sheep, swine or goats delivered by the owner thereof for such slaughter, and the preparation by such slaughter and transportation in commerce of the carcasses, parts thereof, meat and meat food products of such animals, exclusively for use, in the household of such owner by him, and members of his household and his nonpaying guests and employees.

The adulteration and misbranding provisions, other than the requirement of the inspection legend, shall apply to the articles which are exempted from inspection.

The custom prepared products are plainly marked "NOT FOR SALE" immediately after being prepared by the custom operator and are kept so identified until delivered to the owner.

Retail Exempt Regulations

Meat plants subject to retail exempt status are to follow the prescribed guidelines and definitions as set forth by the Wholesome Meat Act and the Meat Inspection Regulations (Wholesome Meat Act, Section 301(c), and (2) Meat Inspection Regulations, Part 303.1(d):

The provisions of this Act requiring inspection of the slaughter of animals and the preparation of carcasses, parts thereof, meat and meat food products shall not apply to operations of types traditionally and usually conducted at retail stores and restaurants, when conducted at any retail store or restaurant or similar retail-type establishment for sale in normal retail quantities or service of such articles to consumers at such establishments.

Operations of types traditionally and usually conducted at retail stores and restaurants are the following:

- (a) Cutting up, slicing, and trimming carcasses, halves, quarters, or wholesale cuts into retail cuts such as steaks, chops, and roasts, and freezing such cuts;
- (b) Grinding and freezing products, made from meat;
- (c) Curing, cooking, smoking, rendering or refining of livestock fat, or other preparation of products, except slaughtering or the retort processing of canned products;
- (d) Breaking bulk shipments of products;
- (e) Wrapping or rewrapping products.

Any quantity or product purchased by the consumer from a particular retail supplier shall be deemed to be a normal retail quantity if the quantity so purchased does not in the aggregate exceed one-half carcass.

A retail store is any place of business where the sales of product are made to consumers only; at least 75 percent, in terms of dollar value, of total dollar value of sales of product to household consumers and the total dollar value of sales of product to consumers other than household consumers does not exceed \$18,000 per calendar year (i.e., January 1 through December 31); only Federally or State inspected and passed product is handled or used in the preparation of any retail product.

A restaurant is an establishment where product is prepared only for sale or service, in meals, or in entrees, directly to individual consumers or such product prepared at a retail exempt store is handled or used in the preparation of any product.

North Dakota Slaughter and Meat Processing Plants

This section includes a discussion of the number, location and inspection status of slaughter and meat processing plants in North Dakota. Discussion will center on existing plants and the changes in the number and statuses which have occurred since 1967 when the Wholesome Meat Act became law.

The actual effect of the 1967 Wholesome Meat Law on the meat industry in North Dakota can not be measured by itself. It is extremely difficult to differentiate meat law effects from changes in business names, discontinuations and the establishment of new plants that would have occurred even if the Wholesome Meat Act had not been passed. Any discussion about changes in numbers or location of plants does not imply that these changes were the direct result of the implementation of the Wholesome Meat Act of 1967.

Existing Plant Locations and Inspection Status

The North Dakota livestock slaughter and meat processing industry is composed of both federally inspected and custom exempt plants. Many plants also operate with a retail exempt status.

There was a total of 205 livestock slaughter and meat or poultry processing plants operating in the state in January, 1977. Fifty of the 205 plants operated under federal inspection and 155 plants operated exclusively under custom exempt status. Of the 50 federally inspected plants, 10 meat processing plants also had a grant of inspection for processing poultry.*

There were 27 federally inspected plants that also had custom exempt status. Three of the plants having federally inspected and custom exempt status were capable of simultaneously operating under both federally inspected and custom exempt status through physical separation of the slaughter and processing functions.

*Number, location, and inspection status of slaughter and meat plants were obtained from the North Dakota Animal and Plant Health Inspection Service, U.S.D.A.

The North Dakota livestock slaughtering and meat processing plants were quite evenly dispersed throughout the state (Figure 1). Morton County had the largest number of firms with 13, followed by Ward and Cass with 11 and 9, respectively. Divide, Sioux, and Slope were the only counties in the state that did not have a meat firm.

One-half of the federal inspected plants were located in larger communities while the majority of the custom exempt plants were located in communities with populations of less than 2,500. A total of 25 of the 50 federal inspected plants but only 22 of the 155 custom exempt plants (less than 15 percent) were located in 13 cities with populations over 2,500.

Ninety-two cities with an average population of 565 contained one slaughter or meat processing facility in January, 1977 (Table 1). These cities contained approximately 60 percent (71) of the state's custom exempt plants, and 44 percent (22) of the state's federally inspected plants.

In January 1977, 39 cities in North Dakota had more than one slaughter or meat processing facility (18 + 13 + 5 + 3 = 39). These cities contained 113 of the 205 facilities in the state with 28 of the plants under federal inspected status.

TABLE 1. NUMBER OF NORTH DAKOTA PLANTS UNDER EACH INSPECTION STATUS BY CITIES CONTAINING SINGLE PLANTS AND MULTIPLE PLANT NUMBERS, JANUARY, 1977

ITEM	Cities with				
	1 Plant	2 Plants	3 Plants	4 Plants	5 or More Plants
Towns:					
Number of Cities	92	18	13	5	3
Average Population	565	3,610	9,421	4,900	18,211
Federally Inspected Plants:					
Number of FI Plants	22 ^a	4	12 ^b	5	7
Number of Cities with FI Plants	22	4	6	2	3
Custom Exempt Plants:					
Number of Custom Exempt Plants	71 ^a	32	29 ^b	15	11
Number of Cities with Custom Exempt Plants	71	18	13	4	3

^aOne plant in this category has simultaneous custom exempt and federally inspected status.

^bTwo plants in this category have simultaneous custom exempt and federally inspected status.

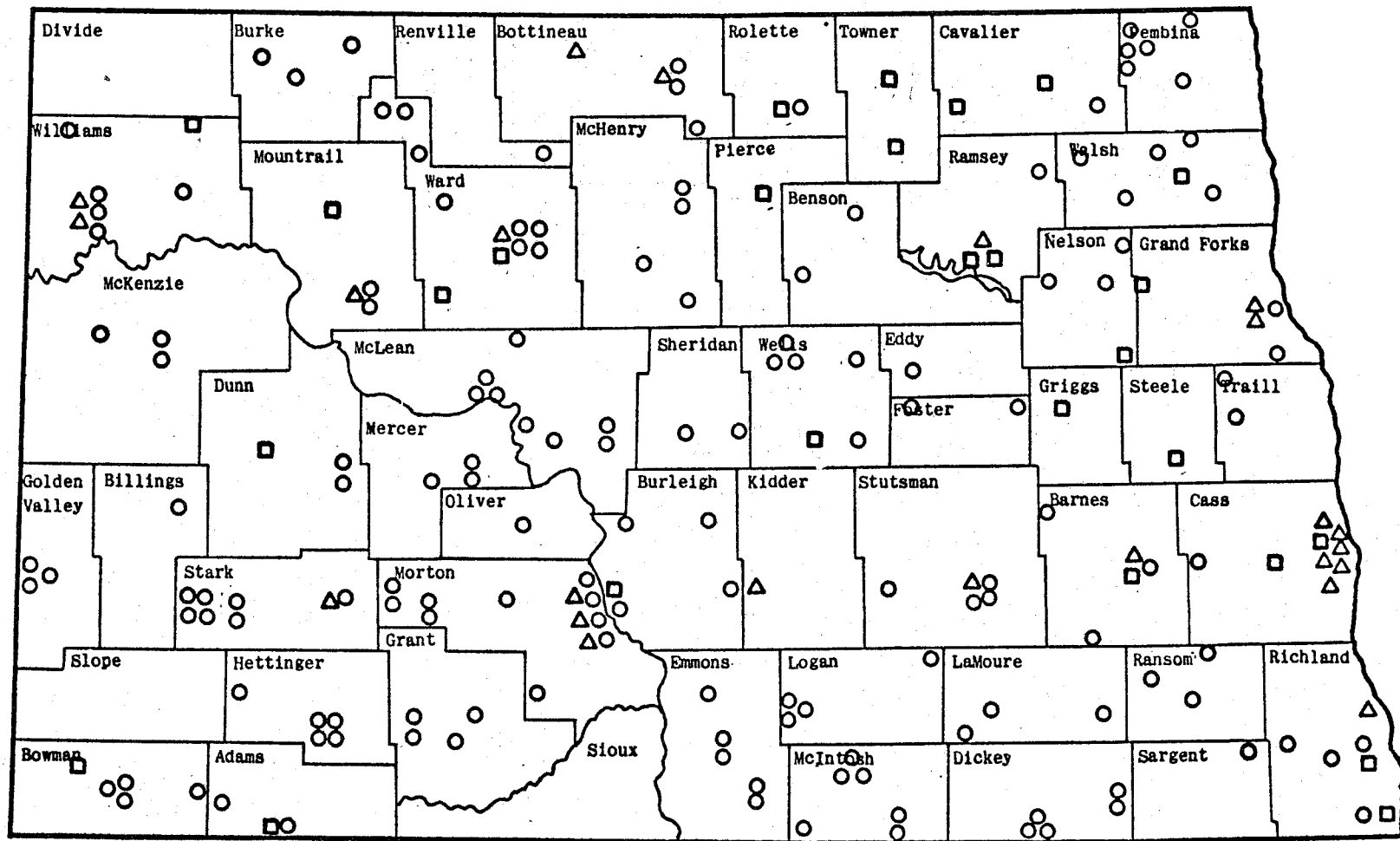


Figure 1. Distribution of Federally Inspected and Custom Exempt Slaughtering and Meat Processing Firms in North Dakota, January, 1977

Key:

- Federally Inspected Plants. **▲**
- Custom Exempt Plants. **○**
- Plants Having Both Federally Inspected and Custom Exempt Status. **◻**

Changes Since 1967

Total plant numbers have changed little over the past ten years-- from 201 plants in 1967 (3) to 205 in 1977. Significant changes, however, have occurred in the geographic location of plants within the state as well as a substantial increase in the number of plants having federal inspected status.

The largest increase in the number of plants occurred in the southwestern and south central portion of the state; State Economic Areas (SEA) 1 and 2B (see Figure 2). These areas experienced an increase of 34 percent in the number of meat plants from 1967 to 1976. Conversely, the decrease in the number of meat plants appears to be almost exclusively in the northern and eastern range of counties in North Dakota. State Economic Areas 3A, 3B, and 4 have experienced a decline of 19 percent in plants numbers between 1967 and 1976.

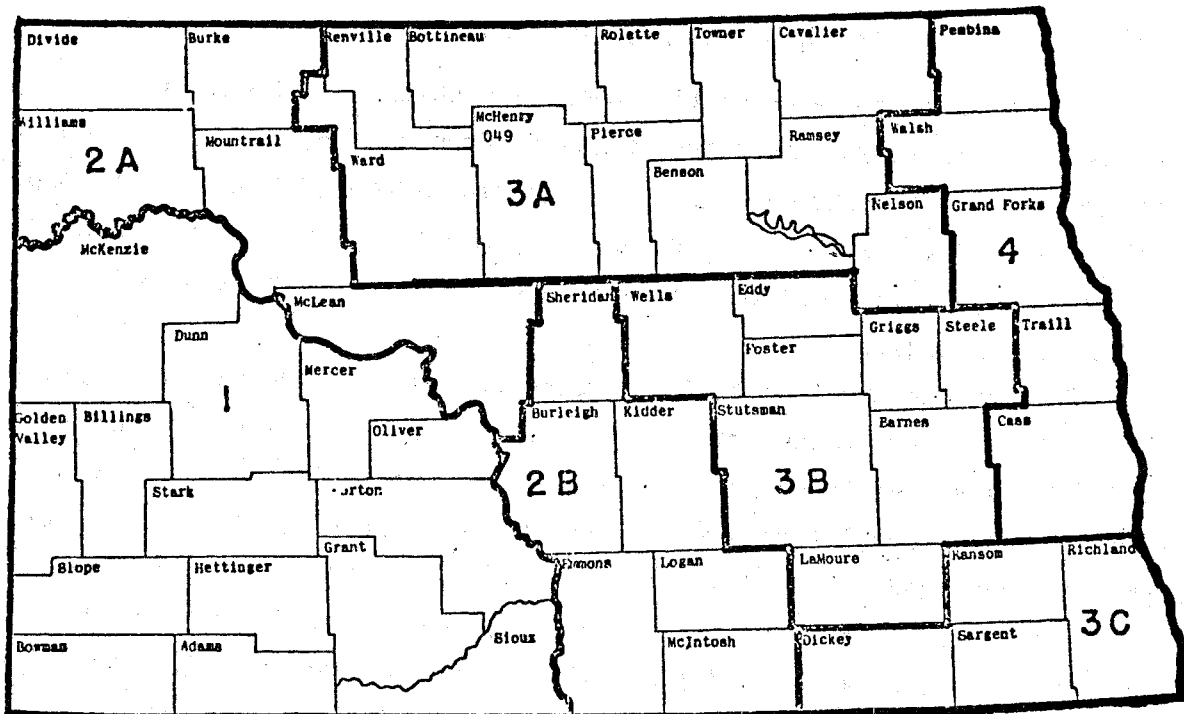


Figure 2. ECONOMIC AREAS, NORTH DAKOTA
No. 1, Western ranch-wheat area
No. 2A, Northwestern wheat area
No. 2B, South-central livestock-grain area
No. 3A, Northern wheat area
No. 3B, East-central grain-livestock area
No. 3C, Wheat-corn transition area
No. 4, Red River Valley grain and specialty crops area

The geographic concentration of plants, measured by the number of plants per 1,000 square miles, has become more uniform throughout the state since 1967 (Table 2). The relatively high concentration of plants located in the northeastern portion of the state has declined, while the

relatively low concentrated area of the southwest has realized a significant increase in the number of plants since 1967.

TABLE 2. AVERAGE NUMBER OF PLANTS PER THOUSAND SQUARE MILES BY STATE ECONOMIC AREA, 1967 AND 1976

State Economic Area	Average number of plants/1000 square miles	
	1967	1976
	-----Number-----	
No. 1, Western Ranch-Wheat	1.9	2.7
No. 2, Northwestern Wheat	2.0	2.9
No. 2B, So. Cent. Lvst.-Grain	2.7	3.1
No. 3A, Northern Wheat	3.3	2.6
No. 3B, East-central Grain-Lvst.	3.4	2.7
No. 3C, Wheat-corn Transition	3.5	3.7
No. 4, R.R.V. Grain & Sp. Crops	<u>5.3</u>	<u>4.3</u>
State Average	2.90	2.96

North Dakota Livestock Supply

County marketings of cattle, hogs, and sheep are illustrated in Figures 3-5. Data were taken from the 1974 Census of Agriculture which contains the most recent county marketing information available. The maps (Figure 3-5) illustrate livestock marketing concentration per rural square mile through the use of contour lines connecting areas with similar livestock densities.

The map construction follows procedures used by Fraase and Erlandson in 1969 (6). County concentrations were obtained by dividing the number of animals marketed per county, as reported in the Agricultural Census, by the number of rural square miles within the county. County rural square miles were obtained by dividing Census "Land in Farms" for each county by 640 (the number of acres in a square mile). The county concentrations were then plotted on maps, and lines similar to those used in topographical maps were drawn to connect areas which fall into the same marketing density class. Judgement was used to draw these lines and, consequently, their locations are necessarily arbitrary. They do, however, identify areas which display similar densities of marketings per rural square mile, and identify areas which may experience shortages of supply in slump seasons.

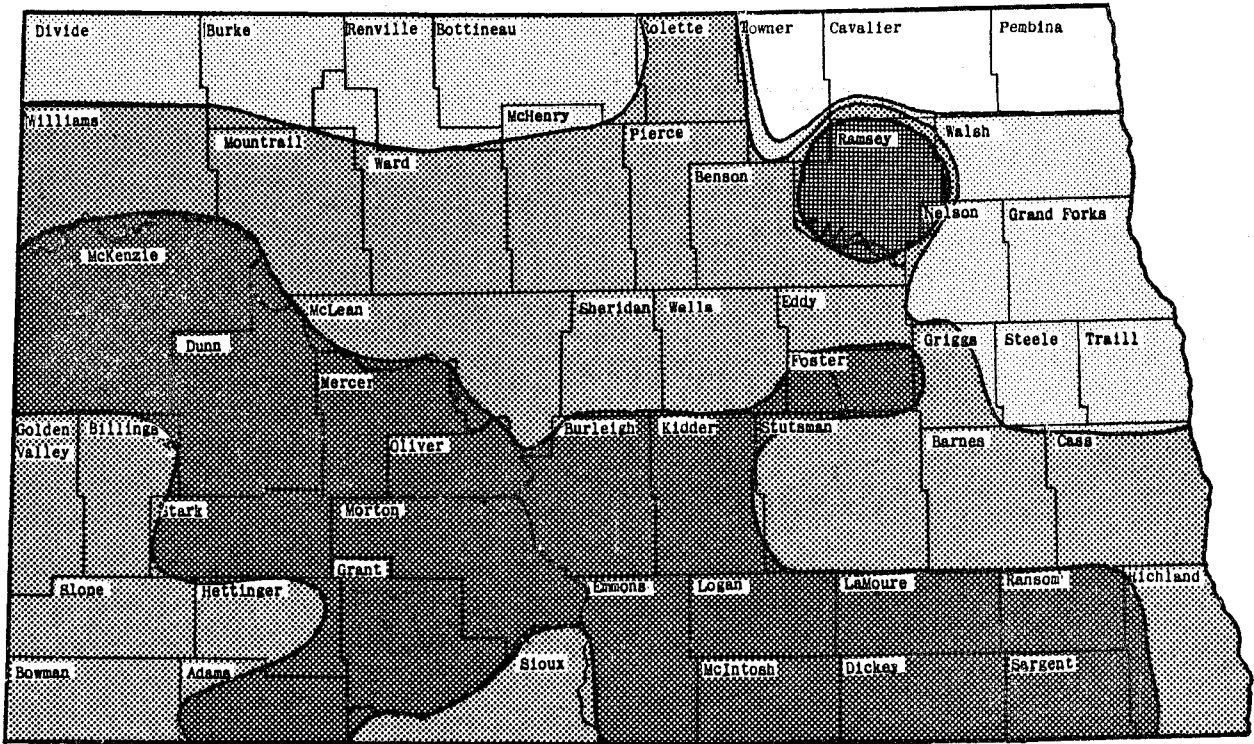


Figure 3. Number of Cattle and Calves Sold Per Rural Square Mile, North Dakota, 1974

Key

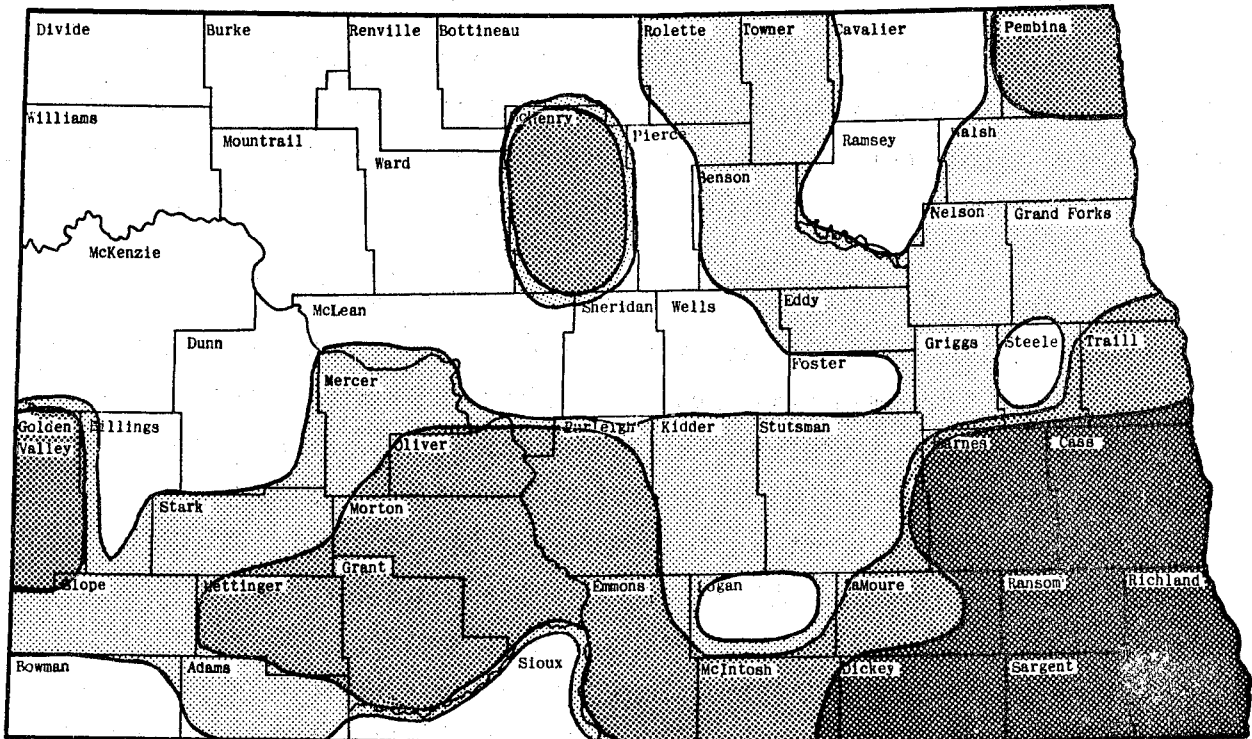
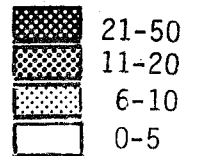
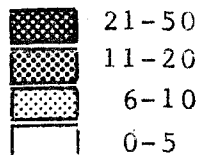


Figure 4. Number of Hogs Sold Per Rural Square Mile, North Dakota, 1974

Key



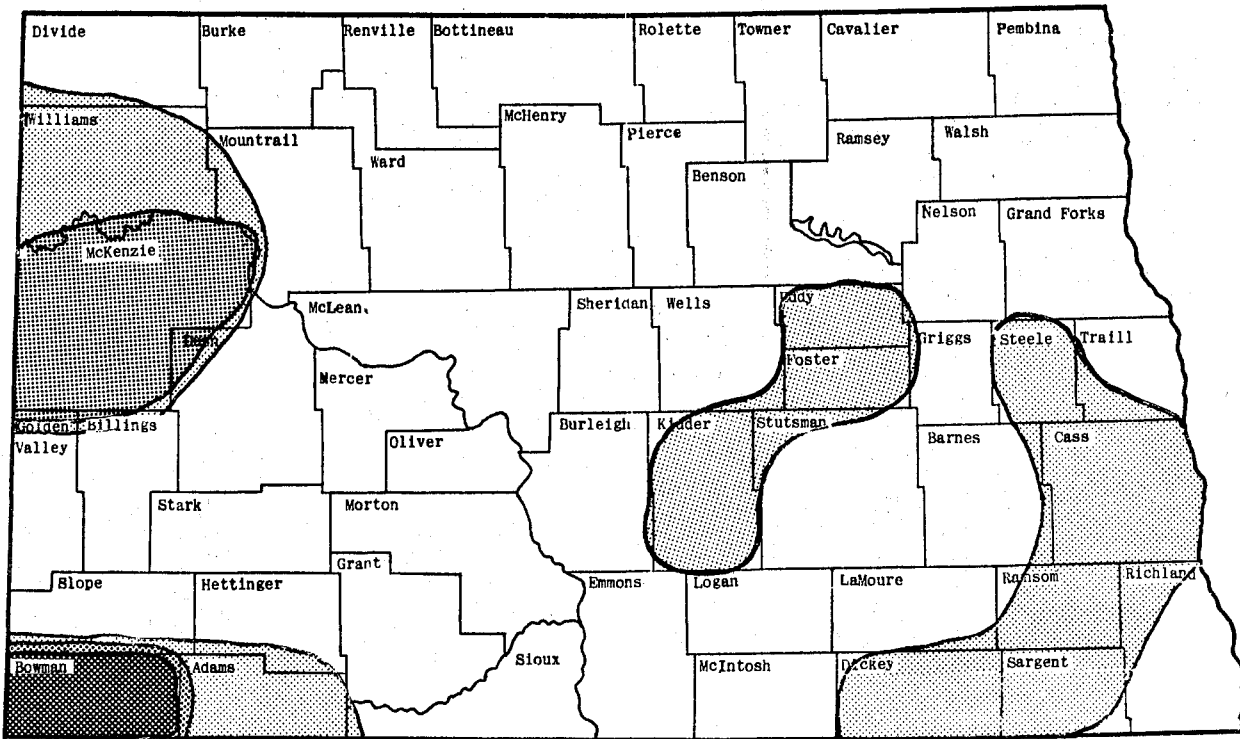
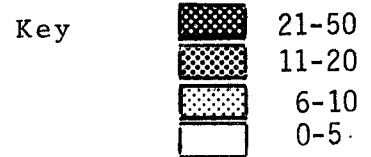


Figure 5. Number of Sheep Sold Per Rural Square Mile, North Dakota, 1974



A total of 1,209,754 (Table 3) cattle and calves were marketed in North Dakota in 1974, according to the Agricultural Census. The marketings were dispersed throughout the state with the highest concentration occurring on either side of a line drawn between Sargent County and McKenzie County (Figure 3).

Producers in Morton County marketed the largest number of cattle and calves in 1974 with 57,533 head sold and a marketing ratio of 29 per rural square mile. While Morton County producers marketed the most animals, Morton did not have the highest marketing concentration. Stark and Foster counties had the highest marketing concentrations with 33 animals per rural square mile. Cattlemen in Stark County marketed 43,001 cattle and calves and Foster County sold 20,729. Towner County producers marketed the smallest number of cattle with 3,941 or four head per square mile.

The largest concentrations of hogs sold in 1974 were in southeastern North Dakota (Figure 4). Hog producers in Richland County recorded the largest concentration of hogs and pigs sold with 42 animals per rural

TABLE 3. LIVESTOCK MARKETED IN NORTH DAKOTA IN 1974, BY COUNTY

NORTH DAKOTA	LAND IN FARMS	CATTLE & CALVES SOLD	HOGS SOLD	SHEEP SOLD
	-----Acres-----	-----Number-----		
ADAMS	615,746*	25,497*	8,314	5,999
BARNES	937,424*	24,375*	30,649	2,845*
BENSON	914,338	19,670*	7,870	4,420*
BILLINGS	786,728	18,016	992*	134*
BOTTINEAU	1,084,200	14,438	6,628	2,914*
BOWMAN	724,791*	19,354	3,665*	27,165
BURKE	636,286*	9,952	1,433*	3,062
BURLEIGH	990,005*	41,118*	21,342	2,327*
CASS	1,038,518*	25,960*	54,765	14,834*
CAVALIER	899,033*	5,326*	5,135*	720*
DICKEY	672,718*	30,227*	26,704	7,668*
DIVIDE	773,063*	11,295	3,894	1,575*
DUNN	1,388,721*	56,517	7,333	1,917
EDDY	378,602*	10,761*	3,594	4,964*
EMMONS	854,583*	35,842*	15,274	1,438
FOSTER	405,294	20,729	3,408*	4,671
G VALLEY	500,030*	15,598	8,855	2,197*
G FORKS	865,713*	10,542*	9,318*	4,042*
GRANT	1,006,699*	41,703	29,362	4,293
GRIGGS	447,235	13,014	6,291	2,983*
HETTINGER	759,226*	21,785	18,113	847*
KIDDER	760,594*	35,691	10,417	7,851*
LAMOURE	724,248*	31,253	19,826	5,309*
LOGAN	602,268*	26,988*	4,210	1,945*
MCHENRY	1,160,801	36,933	22,758	2,891*
MCINTOSH	609,104	27,187*	10,183	1,759*
MCKENZIE	1,236,738*	51,868	7,014	30,002*
MCLEAN	1,224,303*	30,219*	9,470	2,998*
MERCER	600,077*	28,521	7,211	1,701*
MORTON	1,279,000	57,533	26,949	4,156*
MOUNTRAIL	1,088,818*	21,765	3,388	4,192
NELSON	644,726	8,954*	7,452	3,119*
OLIVER	413,155*	19,144*	9,037	1,427*
PEMBINA	670,512*	5,544*	12,265	1,949*
PIERCE	615,837*	16,992*	4,316	1,464*
RAMSEY	738,685*	5,195*	5,136	2,668*
RANSOM	540,358*	19,990*	18,270*	6,217*
RENVILLE	517,763*	6,190	2,655	1,400
RICHLAND	874,000	28,002*	57,775	3,377*
ROLETTE	511,424	10,173*	4,524*	2,078*
SARGENT	512,092*	21,928*	31,465	5,615
SHERIDAN	542,258*	16,508*	4,369	283*
SIOUX	852,600	23,232	3,641	1,805
SLOPE	793,709	18,894	7,020	4,684
STARK	840,338*	43,001	12,205	4,573
STEELE	463,707	4,725*	2,584*	4,505
STUTSMAN	1,308,257*	38,678*	13,892*	11,092*
TOWNER	652,740*	3,941*	6,345	3,942*
TRAILL	523,853*	6,137*	13,595	1,279*
WALSH	800,033*	9,557*	9,836*	1,897*
WARD	1,233,894*	28,811	8,484	2,496*
WELLS	828,590*	24,610*	6,613	4,570*
WILLIAMS	1,235,472*	29,871	4,338	11,624*
N.D. TOTALS	42,080,077*	1,209,754*	640,182	245,883*

*Astrik indicates a decrease in numbers since 1969.

SOURCE: U.S. Census of Agriculture, 1974, preliminary reports.

square mile. Richland County producers also marketed the largest number of hogs and pigs with 57,775, followed by Cass County with 54,765. The smallest number of hogs marketed was 992 in Billings County with a marketing concentration of less than one animal per rural square mile.

North Dakota producers marketed 245,883 sheep and lambs in 1974. The highest concentration of sheep was found in Bowman and McKenzie Counties (Figure 5). These two counties accounted for 15 percent of the total number of sheep and lambs marketed in the state.

The asterisks (*) in Table 3 designate counties that realized a decrease in the number of livestock marketed between the 1969 and 1974 Census periods. Caution must be taken when viewing the changes because of movements of the production cycles for each species of livestock. The Census of Agriculture is taken at a set time every five years. However, livestock production cycles are less regular and do not coincide with the five year Census periods. The periodic wavelike patterns in livestock supply are the result of many factors, including producer and consumer responses to price changes, availability of feed, and the number of livestock slaughtered. Production cycles for hogs historically run three to six years, cattle cycles range from 10-16 years, and sheep production cycles are irregular. Since the Census records livestock marketings at different points on the various production cycles, some of the changes in marketings between Census periods can be explained by the variations in the production cycle. (4:541-550)

Hog marketings, on a statewide basis, was the only category that increased between 1969 and 1974. Hog marketings increased by 28 percent, from 499,822 in 1969 to 640,182 in 1974. The counties that experienced a decrease in hog marketings were scattered throughout the state and were most often counties with a low concentration of animals. Of the eleven counties that experienced a decline, six were in the lowest concentration class of 0-5 hogs per square mile, four were in the next lowest classification of 6-10, with the remaining county (Ransom) in the highest classification. However, Ransom county only experienced a decline in marketing of 1,120 hogs between the two Census periods.

The number of cattle marketed declined by 2 percent between the Census periods, from 1,235,824 head in 1969 to 1,209,754 in 1974. Twenty-nine

counties experienced a decrease in marketings with the majority of these counties being in the two higher concentration classes and the eastern one-half of the state. Only Oliver and Adams counties in the western part of the state realized a decline. Two of the counties were in the highest concentration class of 21-50 head per rural square mile, 11 were in the 11-20 head class, 5 were in 6-10, and 3 were in the lowest classification.

The number of sheep and lambs sold declined by 53 percent from 377,059 in 1969 to 245,883 in 1974. Of the 12 counties that had a concentration above 5 head per rural square mile, seven experienced a decrease in the marketings of sheep and lambs between the two Census periods.

Plant Location and Size Factors

Selecting the exact location for a livestock slaughtering plant requires consideration of many factors. Cox and Taylor (7:25-26) compiled the following list of questions concerning locational factors to consider when selecting a plant site:

1. Supply of animals in desired numbers and quality. Will competing firms outbid the plant buyer for the available supply? Will the supply be sufficiently uniform throughout the year so that unused capacity will be at a minimum at all times?
2. Labor. Is there an adequate supply of labor with proper skills available at a satisfactory cost? Can an experienced manager be obtained who possesses the skills, experience, and other qualifications needed for a successful operation?
3. Water. Are quantity, quality, and cost of water required satisfactory?
4. Sewage disposal. Are present facilities adequate to properly dispose of wastes and sewage from the plant or will additional sewage facilities have to be constructed?
5. Power. Is sufficient electric power available at satisfactory rates?
6. Transportation. Are facilities adequate and rates reasonable for shipping animals to the plant from the primary supply areas and for shipping meat from the plant to the markets where it will be sold?

7. Industrial fuel. Are coal, oil, and/or gas available at reasonable rates?
8. Construction costs. How do these compare with costs at alternative locations?
9. Plant site. Is the suggested site adequate in size for buildings, storage, and desired expansion at reasonable cost? Are drainage, groundwater level, and soil-bearing capacity satisfactory? Are utilities and transportation facilities available at the site?
10. Livestock markets. Are nearby markets available which provide for concentration of selling and buying activities?
11. Others. Have the other factors related to the selection of an appropriate location of a slaughtering plant, such as technical services, repair services, fire protection, local taxes and laws, community characteristics, weather, and the like, been considered?

Not all factors listed will apply to every potential plant situation, but all should be evaluated to determine present and future impact upon the operation before the location and size of plant is selected.

Plant Investment and Operating Costs

The estimated investment and operating costs for the three plant alternatives considered in this study were based on budgets developed with the assistance of Koch Supply Inc. The prefabricated, pre-engineered facilities were designed and equipped to meet all USDA inspection standards and cover an area of 1,080 square feet for the small plant, 1,908 square feet for the medium sized plant, and 3,350 square feet for the largest plant. The plants were assumed to be operated eight hours per day, 250 days per year, and operate with separate slaughtering and processing crews. A clean-up and maintenance person was also included in the budget for the two larger plants.

One, three, and five acres of land were included for the small, medium, and large plants, respectively, to provide adequate space for the slaughter facility, future expansion, and control of the immediately adjacent area. It was assumed the facilities would be connected to existing water and sewage systems.

A delivery truck was budgeted for the large and medium capacity plants for delivering one-half of the retail meat sold to customers.

Estimated Investment Costs

Total investment costs (Table 4) for the small, medium, and large facilities were estimated at \$97,043, \$177,170, and \$295,146, respectively. The investment costs were broken down into three general categories for each of the plants: 1) Land and Improvements, 2) Building and General Equipment, and 3) Operating Equipment. The most expensive category for all three plants was building and general equipment, requiring 61 to 67 percent of the total investment for each plant. The building was the single most expensive item for all three plants, accounting for 41 percent of the total investment in the small plant, 35 percent in the medium sized plant, and 32 percent of the total investment in the larger capacity plants.

TABLE 4. ESTIMATED INVESTMENT COSTS, 1976

ITEM	Small	Medium	Large
	-----dollars-----		
<u>Land and Improvements</u>			
Land	\$ 800	\$ 2,400	\$ 4,000
Excavating, Concrete Work, Holding Pens, Roof	8,000	20,000	36,600
<u>Building and General Equipment</u>			
Building	39,972	62,185	94,500
Refrigeration	14,927	22,720	38,400
Plumbing and Heating	7,000	10,000	32,000
Electrical	6,500	7,000	23,000
Office and Retail Equipment	1,500	6,172	9,146
<u>Operating Equipment</u>			
Kill Floor and Processing Equipment	14,144	30,493	41,300
Delivery Truck	--	12,000	12,000
<u>Building and Equipment Delivery Charge</u>	4,200	4,200	4,200
TOTAL INVESTMENT	\$97,043	\$177,170	\$295,146

Investment per animal unit* at full capacity averaged \$64.70 for the small plant, \$59.06 in the medium plant, and \$60.23 for the larger plant.

*One animal unit is equal to one beef or five hogs (8:V-16)

Estimated Annual Operating Expenses

Estimated annual operating expenses at 100 percent capacity totaled \$82,058 for the small plant, \$944,989 for the medium capacity plant, and \$1,544,595 for the largest plant (Table 5). Costs were developed from North Dakota data when available and from surveys taken of existing North Dakota and northern United States slaughtering and processing operations by the Department of Agricultural Economics, North Dakota State University. After the estimated costs were compiled they were reviewed and verified by three slaughter plant managers who operated similar sized operations. The basis of estimation for each expense item is listed below.

Expense Item:

1. Depreciation. Depreciation was estimated by assigning a life expectancy to each building and equipment item and depreciating it by the straight line depreciation method (Appendix Table 1). Zero salvage value was assumed for all depreciable items.
2. Insurance. General insurance costs were budgeted at one percent of total investment, excluding land valuation. An additional allowance of \$201.60 per employee was included for North Dakota Workmen's Compensation.
3. Repairs and Maintenance. Maintenance and repair expenses were budgeted at three percent of total investment.
4. Interest On Average Investment. Interest on average investment was calculated at an interest rate of 8½ percent on 100 percent of the land valuation and on 50 percent of the remainder of the total investment items. Only one-half of nonland items were included to take into account depreciable items.
5. Interest On Operating Capital. Interest on operating capital was budgeted at a nine percent interest rate on 1½ months live animal purchases and on 1½ months operating expenses. It was assumed that the plant would carry operating capital sufficient to cover the costs of 1½ months of hog and cattle purchases and 1½ months of the total operating expenses.

TABLE 5. ESTIMATED ANNUAL OPERATING EXPENSES, 1976

EXPENSE ITEMS	Small Plant Capacity		Medium Plant Capacity		Large Plant Capacity	
	100%	70%	100%	70%	100%	70%
-----Dollars-----						
1. Depreciation	\$ 6,128	\$ 6,128	\$ 13,211	\$ 13,211	\$ 20,541	\$ 20,541
2. Insurance	1,970	1,769	4,167	3,764	6,742	6,137
3. Repairs and Maintenance	2,911	2,911	5,315	5,315	8,854	8,854
4. Interest on Average Investment	4,192	4,192	7,734	7,734	12,884	12,884
5. Interest on Operating Capital	866	735	10,416	7,620	17,045	12,464
6. Salaries	54,880	44,800	122,080	101,920	197,120	166,880
7. General Travel, Dues, Convention	400	400	800	800	1,500	1,500
8. General Office Expense	700	700	2,300	2,300	4,400	4,400
9. Advertising	500	500	1,400	1,400	2,000	2,000
10. Property Taxes	970	970	1,772	1,772	2,951	2,951
11. Electricity, Water, Natural Gas	4,500	4,050	7,210	6,489	11,750	10,575
12. Laundry	500	500	900	900	1,200	1,200
13. Slaughter and Processing Supplies	3,000	2,250	7,000	5,250	15,000	11,250
14. Miscellaneous	541	379	1,027	708	1,650	1,174
15. Delivery Expense	-	-	2,144	1,697	4,949	3,464
SUBTOTAL	\$82,058	\$70,284	\$187,476	\$160,880	\$ 308,586	\$266,274
16. Beef Purchase	-	-	677,296	474,181	1,107,700	755,530
17. Hog Purchase	-	-	80,217	56,171	128,309	89,836
TOTAL	\$82,058	\$70,284	\$944,989	\$691,232	\$ 1,544,595	\$1,131,640

6. Salaries. The number of employees for each plant was based on operations of similar size and type in the two slaughter plant surveys conducted in 1976. Slaughter and processing employees were salaried at \$4.50/hour, with a 12 percent fringe benefit allowance for all employees (Appendix Tables 2-4).
7. General Travel, Dues, Conventions. Allowance was included for business travel, professional dues, and conventions.
8. General Office Expense. General office expense includes the cost of telephone, supplies, and other related office expenditures.
9. Advertising. Advertising expenses are difficult to estimate due to the many advertising methods and media available. Figures used were averages of similar sized plants obtained in the slaughter plant surveys.
10. Property Taxes. Property taxes were estimated at one percent of total investment.
11. Electricity, Water, and Natural Gas. Utility costs were based upon utility expenses incurred by similar capacity slaughter plants, obtained from the slaughter plant surveys.
12. Laundry. Laundry expense was obtained from the two slaughter plant surveys.
13. Slaughter and Processing Supplies. Supply averages were obtained from existing plant operations of similar capacity and type of operation.
14. Miscellaneous Expenses. Miscellaneous expenses were estimated at 6¢ per 100 pounds of meat output.
15. Delivery Expense. A delivery cost was included for the delivery of one-half of the total amount of retail meat in the medium and large plants. The small plant is operated as a custom slaughter and processing plant and, therefore, does not sell meat retail. The medium sized plant was budgeted at 1¢ per pound for delivery within a 50 mile radius, and the large plant was budgeted at 1¼¢ per pound for delivery up to 75 miles.
16. Beef Purchase. Beef purchase expense was included for the purchase of animals for wholesale and retail slaughter in the medium and large plants. The 1976 average price of \$36.93 per hundredweight for choice slaughter steers, weighing from 900 to 1,000 pounds at the West Fargo Livestock Market, was used.

17. Hog Purchase. Hog purchase expense was included for the purchase of animals for wholesale and retail slaughter in the medium and large plants. The 1976 average price of \$43.72 per hundredweight for Barrows and Gilts, grading U.S. 1-2, and weighing 200 to 240 pounds at the West Fargo Livestock Market, was used.

Operating costs, thus far in this report, have been discussed from the standpoint of the various plants operating at 100 percent of design capacity. However, many slaughter and processing facilities operate seasonally or perhaps continuously at less than design capacity due to seasonality of animal supplies, changes in demand patterns, narrow price margins, bottlenecks in the operation, and other economic and physical factors. This fact was pointed out by Baker (9:56) who reported that the U.S. federally inspected plants slaughtering cattle, with a design capacity of up to 9,562 head per year, were utilizing only 38.8 percent of their engineered capacity in 1973. In 1970 and 1973 the figure was 53.2 percent and 26.2 percent, respectively. The North Central Region of the U.S. averaged 55.2, 11.6, and 26.0 percent of engineered capacity for the years 1970, 1972, and 1973, respectively.

The 1976 survey of North Dakota livestock slaughter plants, conducted by the Department of Agricultural Economics at North Dakota State University (10) indicated that North Dakota plants on the average, were operating nearer to design capacity than were the plants in the U.S., as indicated by the figures presented earlier. However, the North Dakota plants are also not achieving 100 percent capacity. The survey respondents reported that, on the average for the entire state, the design slaughter capacity was 21.5 for cattle, 20.5 for hogs, and 7.8 for sheep per week. However, the actual average weekly slaughter by the respondents totaled 13.6 head of cattle, 11.3 hogs, and 1.7 sheep, thus utilizing only 63.3 percent of the plants engineered capacity for cattle, 55.1 percent of the capacity for hog slaughter, and 21.7 percent of the capacity for sheep.

The operating costs and financial analysis of the three plants, operating at 70 percent of design capacity, is included to provide a more realistic economic analysis of the three plants under normal conditions.

At 70 percent capacity, the variable costs including insurance, interest on operating capital, salaries, utilities, supplies, animal purchases, and miscellaneous expenses were all lower (see Table 5). Annual capacities at 70 percent utilization decreased to 1,050 beef in the small plant, 1,925 beef and 875 hogs in the medium plant, and 3,150 beef and 1,400 hogs in the large plant. Estimated operating expenses at the lower capacity for the small plant totaled \$70,284; \$691,232 for the medium plant; and \$1,131,640 for the largest facility.

Financial Analysis

Tables 6-8 present the financial summaries for the three slaughter plants analyzed. The 1976 profits were estimated to range from a low of \$16,775 a year for the small plant operating at 70 percent capacity, to a high of \$89,134 for the largest plant operating at 100 percent of engineered capacity. Return on investment ranged from a low of 14 percent for the large plant operating at 70 percent capacity, to a high of 39 percent for the small plant at 100 percent capacity. It is emphasized, again, that the more realistic operating capacity for a small slaughtering and processing plant, especially a new operation, is the 70 percent figure.

The financial analysis was developed with pricing methods and rates similar to those used by many small North Dakota slaughter and processing plants in late 1976. Rates used for the custom, wholesale, and retail slaughtering and processing in the plants were as follows:

A. Custom slaughter:

1. Beef: the income for custom slaughter were based on a 1976 survey of North Dakota slaughter plants taken by the the Department of Agricultural Economics, North Dakota State University (10). A slaughter charge of \$9.73 per head was used with a charge of 10 3/8¢ per pound of carcass weight for cooling, cutting, and wrapping the meat.

Carcass and retail weights used in the financial analysis for beef and hogs were equal to the standard USDA breakdown as summarized in Appendix Figures 1 and 2, and as described in the livestock conversion ratios presented in Appendix Figure 3.

2. Hogs: income for hogs were based on the state averages reported by slaughter plants in the North Dakota slaughter

TABLE 6. FINANCIAL SUMMARY FOR SMALL PLANT PROVIDING CUSTOM SLAUGHTER AND PROCESSING SERVICES, 1976^a

ITEM	Capacity	
	100%	70%
Receipts:		
1. Slaughter	\$14,595	\$10,216
2. Cool, Cut, Wrap	93,593	65,515
3. Hides	13,065	9,146
4. By-products	<u>9,840</u>	<u>6,888</u>
TOTAL RECEIPTS	\$131,093	\$ 91,765
Expenses:		
Estimated Annual Operating Expenses	<u>\$ 82,058</u>	<u>\$ 70,284</u>
Profit Before Taxes	\$ 49,035	\$ 21,481
Taxes ^b	<u>10,788</u>	<u>4,726</u>
Profit	\$ 38,247	\$ 16,755
Return on Investment ^c	39%	17%

^aAn interest charge of 8.5 percent on average investment was included as a fixed cost.

^bTaxes were computed as 22 percent on the first \$50,000 of profit and 48 percent on the remainder of profit before taxes.

^cRefers to total estimated investment.

TABLE 7. FINANCIAL SUMMARY FOR MEDIUM PLANT, 1976^a

ITEM	Capacity	
	100%	70%
Receipts:		
A. Custom Slaughter		
1. Beef - Slaughter	\$ 8,913	\$ 6,237
- Cool, Cut, Wrap	57,154	39,995
2. Hogs - Slaughter	2,500	1,749
- Cool, Cut, Wrap	6,524	4,563
B. Wholesale		
1. Beef	413,613	289,574
2. Hogs - Slaughter	2,506	1,755
- Cool, Cut, Wrap	6,539	4,579
C. Retail		
1. Beef	448,299	313,858
2. Hogs	45,189	31,643
D. Miscellaneous		
1. Beef Hides	23,953	16,767
2. Beef By-products	18,040	12,628
3. Pork By-products	1,888	1,321
TOTAL RECEIPTS	\$1,035,118	\$ 724,669
Estimated Expenses:	944,989	691,232
Profit Before Taxes	90,129	33,437
Taxes ^b	30,262	7,356
Profit	59,867	26,081
Return On Investment ^c	34%	15%

^aAn interest charge of 8.5 percent on average capital investment was included as a fixed cost.

^bTaxes were computed as 22 percent on the first \$50,000 of profit, and 48 percent on the remainder of profit before taxes.

^cRefers to total estimated investment.

TABLE 8. FINANCIAL SUMMARY FOR LARGE PLANT, 1976^a

ITEM	Capacity	
	100%	70%
Receipts:		
A. Custom Slaughter		
1. Beef - Slaughter	\$ 14,595	\$ 10,217
- Cool, Cut, Wrap	93,593	65,515
2. Hogs - Slaughter	4,003	2,801
- Cool, Cut, Wrap	10,444	7,308
B. Wholesale		
1. Beef - Cool, Cut, Wrap	676,575	473,603
2. Hogs - Slaughter	4,009	2,807
-	10,460	7,323
C. Retail		
1. Beef	733,313	513,319
2. Hogs	72,280	50,607
D. Miscellaneous		
1. Beef Hides	39,195	27,437
2. Beef By-products	29,520	20,664
3. Pork By-products	<u>3,020</u>	<u>2,114</u>
TOTAL RECEIPTS	\$1,691,007	\$1,183,715
Estimated Expenses	<u>1,544,595</u>	<u>1,131,640</u>
Profit Before Taxes	\$ 146,412	\$ 52,075
Taxes ^b	<u>57,278</u>	<u>11,996</u>
Profit After Taxes	\$ 89,134	\$ 40,109
Return On Investment ^c	30%	14%

^aAn interest charge of 8.5 percent on average capital investment was included as a fixed cost.

^bTaxes were computed as 22 percent on the first \$50,000 of profit, and 48 percent on the remainder of profit before taxes.

^cRefers to total estimated investment.

plant survey. The slaughter charge used equaled \$6.01 per head, with 10.86¢ per pound charged for cooling, cutting, and wrapping.

B. Slaughter for Wholesale Sales:

1. Beef: a slaughter charge of 75¢ per pound of carcass weight was used. This rate was equal to the average price being charged in early 1977 in eastern North Dakota.
2. Hogs: due to the lack of a wholesale pricing method or formula for pork by the slaughter plant managers interviewed, the cost of slaughtering and processing of hogs for wholesale sales were assumed to be identical to hog custom slaughter charges.

C. Slaughter For Retail Sales:

1. Beef: the retail price used for beef equaled the 1976 Wholesale Dressed Beef Price as reported from the National Provisioner, Midwest River Area Yellow Sheet, multiplied by a 33 percent markup.* The 33 percent markup equals a 24.8 percent gross margin, which was comparable to the 24 to 27 percent gross margin reported by several North Dakota slaughter plant operators in late 1976. The margin is also similar to the 22 percent gross margin reported by Dietrich (11.33) in his 1974 study of Texas retailers.
2. Hogs: a weighted average retail price per hog was calculated by using 1976 Wholesale Dressed Pork Prices and the USDA Retail Pork Cut breakdown (see Appendix Figure 2). The weighted price was then multiplied by a 34 percent markup to arrive at the retail price of pork. The 34 percent markup is based on levels cited by North Dakota packers and the study of meat retailers in Texas.

The estimated operating expenses and financial summaries represent the projected income and expenses of plants in operation. However, during construction, and initial start-up, some of the costs will be higher and receipts will be lower. The financial losses realized in the initial start-up period may take several years to recapture. Tables 9 through 14 illustrate the cash flow for plants during the first five years of

*Percent markup = (sales - cost of goods sold) divided by the cost of goods sold.

Gross Margin = (sales - cost of goods sold) divided by sales.

TABLE 9. PROJECTED CASH FLOW FOR SMALL PLANT OPERATING AT 70 PERCENT CAPACITY

ITEM	Year 1	Year 2	Year 3	Year 4	Year 5
Profit (Loss) Carryover From Previous Year	\$ X	\$(-1,244)	\$ 0	\$ 0	\$ 0
Expenditures:					
Principal Payment & Land Payment	X	6,160	6,160	6,160	6,160
Insurance	1,769	1,769	1,769	1,769	1,769
Repairs and Maintenance	1,941	2,911	2,911	2,911	2,911
Interest on Investment	6,874	8,249	7,373	6,286	5,126
Interest on Operating Capital	521	738	X	X	X
Salaries	34,720	44,800	44,800	44,800	44,800
General Travel, Dues, Convention	400	400	400	400	400
General Office Expense	700	700	700	700	700
Advertising	1,000	750	500	500	500
Property Taxes	970	970	970	970	970
Electricity, Water, Natural Gas	2,700	4,050	4,050	4,050	4,050
Laundry	333	500	500	500	500
Slaughter and Processing Supplies	1,500	2,250	2,250	2,250	2,250
Miscellaneous Expense	253	379	379	379	379
Interest on Previous Year's Loss	X	112	X	X	X
Total Expenditures ± Previous Years					
Profit of Loss	53,681	75,982	72,762	71,675	70,515
Receipts	52,437	91,765	91,765	91,765	91,765
Profit (Loss) Before Taxes	(-1,244)	15,783	18,997	20,090	21,250
Less Taxes	X	3,472	4,175	4,420	4,675
Profit (Loss) After Taxes	(-1,244)	12,311	14,802	15,670	16,575
Less Machinery Replacement	X	X	X	X	2,801
Profit (Loss)	(-1,244)	12,311	14,802	15,670	13,774
Profit Used as Next Years Operating Capital	X	8,174	8,174	8,174	8,174
Profit Used as Additional Long-term Loan Payment	X	4,137	6,628	7,496	6,600
Profit (Loss) Carryover	\$(-1,244)	\$ 0	\$ 0	\$ 0	\$ 0

TABLE 10. PROJECTED CASH FLOW FOR SMALL PLANT AT 100 PERCENT CAPACITY

ITEM	Year 1	Year 2	Year 3	Year 4	Year 5
Profit (Loss) Carryover From Previous Year	\$ X	\$(-1,244)	\$ 0	\$ 0	\$ 0
<u>Expenditures</u>					
Principal Payment	X	6,160	6,160	6,160	6,160
Insurance	1,769	1,970	1,970	1,970	1,970
Repairs and Maintenance	1,941	2,911	2,911	2,911	2,911
Interest on Investment	6,874	8,249	5,670	2,757	203
Interest on Operating Capital	521	869	X	X	X
Salaries	34,720	54,880	54,880	54,880	54,880
General Travel, Dues, Convention	400	400	400	400	400
General Office Expense	700	700	700	700	700
Advertising	1,000	750	500	500	500
Property Taxes	970	970	970	970	970
Electricity, Water, Natural Gas	2,700	4,500	4,500	4,500	4,500
Laundry	333	500	500	500	500
Salughter and Processing Supplies	1,500	3,000	3,000	3,000	3,000
Miscellaneous Expense	253	541	541	541	541
Interest on Previous Years Loss	X	112	X	X	X
Total Expenditures ± Previous Years Profit or Loss	\$ 53,681	\$ 87,756	\$ 82,702	\$ 79,789	\$ 73,909
<u>Receipts</u>	52,437	131,093	131,093	131,093	131,093
Profit (Loss) Before Taxes	(-1,244)	43,337	48,391	51,304	57,184
Less Taxes	X	9,534	10,646	11,626	14,448
Profit (Loss) After Taxes	(-1,244)	33,803	37,745	39,678	42,736
Less Machinery Replacement	X	X	X	X	2,801
Profit (Loss)	(-1,244)	33,803	37,745	39,678	39,935
Profit Used as Next Years Operating Capital	X	9,629	9,629	9,629	9,629
Profit Used as Additional Long-term Loan Payment	X	24,174	28,116	30,049	X
Profit (Loss) Carryover	\$(-1,244)	\$ 0	\$ 0	\$ 0	\$ 37,134

TABLE 11. PROJECTED CASH FLOW FOR MEDIUM PLANT OPERATING AT 70 PERCENT CAPACITY

ITEM	Year 1	Year 2	Year 3	Year 4	Year 5
Profit (Loss) Carryover From Previous Year	\$ X	\$(-6,838)	\$ X	\$	\$
<u>Expenditures</u>					
Principal Payment	X	10,907	10,907	10,907	10,907
Insurance	3,764	3,764	3,764	3,764	3,764
Repairs and Maintenance	3,543	5,315	5,315	5,315	5,315
Interest on Investment	12,550	15,059	14,132	13,205	13,000
Interest on Operating Capital	4,546	7,584	6,140	5,414	5,298
Salaries	76,160	101,920	101,920	101,920	101,920
General Travel, Dues, Convention	800	800	800	800	800
General Office Expense	2,300	2,300	2,300	2,300	2,300
Advertising	2,500	2,000	1,400	1,400	1,400
Property Taxes	1,772	1,772	1,772	1,772	1,772
Electricity, Water, Natural Gas	4,326	6,489	6,489	6,489	6,489
Laundry	600	900	900	900	900
Slaughter and Processing Supplies	3,500	5,250	5,250	5,250	5,250
Miscellaneous Expense	472	708	708	708	708
Delivery Expense	1,131	1,697	1,697	1,697	1,697
Beef Purchase	271,066	474,181	474,181	474,181	474,181
Hog Purchase	32,125	56,171	56,171	56,171	56,171
Interest on Previous Years Loss	X	615	X	X	X
Total Expenditures + Previous Years Profit or Loss	\$421,155	\$704,270	\$693,846	\$692,193	\$691,872
<u>Receipts</u>					
Receipts	414,317	724,669	724,669	724,669	724,669
Profit (Loss) Before Taxes	(-6,838)	20,399	30,823	32,476	32,797
Less Taxes	X	4,488	6,781	7,145	7,215
Profit (Loss) After Taxes	(-6,838)	15,911	24,042	25,331	25,582
Less Machinery Replacement	X	X	X	X	4,152
Profit (Loss)	(-6,838)	15,911	24,042	25,331	21,430
Profit Used as Next Years Operating Capital	X	15,911	24,042	25,331	21,430
Profit Used as Additional Long-term Loan Payment	X	X	X	X	X
Profit (Loss) Carryover	\$(-6,383)	\$ 0	\$ 0	\$ 0	\$ 0

TABLE 12. PROJECTED CASH FLOW FOR MEDIUM PLANT OPERATING AT 100 PERCENT CAPACITY

ITEM	Year 1	Year 2	Year 3	Year 4	Year 5
Profit (Loss) Carryover From Previous Year	\$ X	\$(-6,838)	\$ 0	\$ 0	\$ 0
Expenditures					
Principal Payment	X	10,907	10,907	10,907	10,907
Insurance	3,764	4,167	4,167	4,167	4,167
Repairs and Maintenance	3,543	5,315	5,315	5,315	5,315
Interest on Investment	12,250	15,059	14,132	13,205	13,000
Interest on Operating Capital	4,546	10,407	5,624	4,980	4,907
Salaries	76,160	122,080	122,080	122,080	122,080
General Travel, Dues, Convention	800	800	800	800	800
General Office Expense	2,300	2,300	2,300	2,300	2,300
Advertising	2,500	2,000	1,400	1,400	1,400
Property Taxes	1,772	1,772	1,772	1,772	1,772
Electricity, Water, Natural Gas	4,326	7,210	7,210	7,210	7,210
Laundry	600	900	900	900	900
Slaughter and Processing Supplies	3,500	7,000	7,000	7,000	7,000
Miscellaneous Expense	472	1,027	1,027	1,027	1,027
Delivery Expense	1,131	2,144	2,144	2,144	2,144
Beef Purchase	271,066	677,296	677,296	677,296	677,296
Hog Purchase	32,125	80,217	80,217	80,217	80,217
Interest on Previous Years Loss	X	615	X	X	X
Total Expenditures ± Previous Years					
Profit or Loss	\$ 421,155	\$ 958,054	\$ 944,291	\$ 942,720	\$ 942,442
Receipts	414,317	1,035,118	1,035,118	1,035,118	1,035,118
Profit (Loss) Before Taxes	(-6,838)	77,064	90,827	92,398	92,676
Less Taxes	X	23,990	30,597	31,351	31,484
Profit (Loss) After Taxes	(-6,838)	53,074	60,230	61,047	61,192
Less Machinery Replacement	X	X	X	X	4,152
Profit (Loss)	(-6,838)	53,074	60,230	61,047	57,040
Profit Used as Next Years Operating Capital	X	53,074	60,230	61,047	57,040
Profit Used as Additional Long-term					
Loan Payment	X	X	X	X	X
Profit (Loss) Carryover	\$ (-6,838)	\$ 0	\$ 0	\$ 0	\$ 0

TABLE 13. PROJECTED CASH FLOW FOR LARGE PLANT OPERATING AT 70 PERCENT CAPACITY

ITEM	Year 1	Year 2	Year 3	Year 4	Year 5
Profit (Loss) From Previous Year	\$ X	\$(-17,201)	\$ X	\$ X	\$ X
<u>Expenditures</u>					
Principal Payment	X	18,301	18,301	18,301	18,301
Insurance	6,137	6,137	6,137	6,137	6,137
Repairs and Maintenance	5,903	8,854	8,854	8,854	8,854
Interest on Investment	20,907	25,087	23,532	21,976	20,421
Interest on Operating Capital	7,481	12,426	12,220	12,035	12,020
Salaries	127,680	166,880	166,880	166,880	166,880
General Travel, Dues, Convention	1,500	1,500	1,500	1,500	1,500
General Office Expense	4,400	4,400	4,400	4,400	4,400
Advertising	3,000	2,500	2,000	2,000	2,000
Property Taxes	2,951	2,951	2,951	2,951	2,951
Electricity, Water, Natural Gas	7,050	10,575	10,575	10,575	10,575
Laundry	800	1,200	1,200	1,200	1,200
Slaughter and Processing Supplies	7,500	11,250	11,250	11,250	11,250
Miscellaneous Expense	783	1,174	1,174	1,174	1,174
Delivery Expense	2,309	3,464	3,464	3,464	3,464
Beef Purchase	443,160	775,530	775,530	775,530	775,530
Hog Purchase	51,780	89,836	89,836	89,836	89,836
Interest on Previous Years Loss	X	1,548	X	X	X
Total Expenditures ± Previous Years					
Profit or Loss	\$ 693,341	\$1,160,814	\$1,139,804	\$1,138,063	\$1,136,493
Receipts	676,140	1,183,715	1,183,715	1,183,715	1,183,715
Profit (Loss) Before Taxes	(-17,201)	22,901	43,911	45,652	47,222
Less Taxes	X	5,038	9,660	10,043	10,389
Profit (Loss) After Taxes	(-17,201)	17,863	34,251	35,609	36,833
Less Machinery Replacement	X	X	X	X	5,222
Profit (Loss)	(-17,201)	17,863	34,251	35,609	31,611
Profit Used as Next Years Operating Capital	X	17,863	34,251	35,609	31,611
Profit Used as Additional Long-term					
Loan Payment	X	X	X	X	X
Profit (Loss) Carryover	\$ (-17,201)	\$ 0	\$ 0	\$ 0	\$ 0

TABLE 14. PROJECTED CASH FLOW FOR LARGE PLANT OPERATING AT 100 PERCENT CAPACITY

ITEM	Year 1	Year 2	Year 3	Year 4	Year 5
Profit (Loss) Carryover From Previous Year	\$ X	\$(-17,201)	\$ 0	\$ 0	\$ 0
<u>Expenditures</u>					
Principal Payment	X	18,301	18,301	18,301	18,301
Insurance	6,137	6,742	6,742	6,742	6,742
Repairs and Maintenance	5,903	8,854	8,854	8,854	8,854
Interest on Investment	20,907	25,087	23,532	21,976	20,421
Interest on Operating Capital	7,481	17,020	10,359	9,073	8,940
Salaries	127,680	197,120	197,120	197,120	197,120
General Travel, Dues, Convention	1,500	1,500	1,500	1,500	1,500
General Office Expense	4,400	4,400	4,400	4,400	4,400
Advertising	3,000	2,500	2,000	2,000	2,000
Property Taxes	2,951	2,951	2,951	2,951	2,951
Electricity, Water, Natural Gas	7,050	11,750	11,750	11,750	11,750
Laundry	800	1,200	1,200	1,200	1,200
Slaughter and Processing Supplies	7,500	15,000	15,000	15,000	15,000
Miscellaneous Expense	783	1,650	1,650	1,650	1,650
Delivery Expense	2,309	4,949	4,949	4,949	4,949
Beef Purchase	443,160	1,107,700	1,107,700	1,107,700	1,107,700
Hog Purchase	51,780	128,309	128,309	128,309	128,309
Interest on Previous Years Loss	X	1,548	X	X	X
<u>Total Expenditures + Previous Years</u>					
Profit or Loss	\$ 693,341	\$1,573,782	\$1,546,317	\$1,543,475	\$1,542,287
<u>Receipts</u>	676,140	1,691,007	1,691,007	1,691,007	1,691,007
Profit (Loss) Before Taxes	(-17,201)	117,225	144,690	147,532	148,720
Less Taxes	X	43,268	56,451	57,815	58,386
Profit (Loss) After Taxes	(-17,201)	73,957	88,239	89,717	90,334
Less Machinery Replacement	X	X	X	X	5,222
Profit (Loss)	(-17,201)	73,957	88,239	89,717	85,112
Profit Used as Next Years Operating Capital	X	73,957	88,239	89,717	85,112
Profit Used as Additional Long-term					
Loan Payment	X	X	X	X	X
Profit (Loss) Carryover	\$(-17,201)	\$ 0	\$ 0	\$ 0	\$ 0

operation. The cash flows were based on the assumption that the facility would be constructed during the first four months of the first year; operate at 50 percent capacity during the fifth through the eighth month; and increase to 70 percent capacity the remainder of the year. Calculations for plants operating at 100 percent capacity were based on the assumption that the plants would reach the 100 percent level at the beginning of the second year. Also, it was assumed that the principal payment would be equal to the annual depreciation expense plus a land payment, and that only interest on investment (no principal payment) be scheduled to be paid during the first year. It was further assumed that various cost items would vary during the construction and establishment of the plant, and that any profit realized during any year would be programmed to be available as operating capital during the following year and any additional profit would be applied to long-term loan pay back. Under these assumptions, the three plants would operate at a loss at all capacity levels in year one. However, all plants are projected to recover the first years' loss in the second year and complete the second year with a profit. Profits are anticipated to increase until year five, when a small decrease in profits is expected because of equipment replacement requirements.

Problems Facing Small Meat Plants

A mail survey taken in August of 1976 of existing North Dakota livestock slaughter plants provided the information reported in this section. The manager of each operation was asked to classify a list of items as to whether he viewed each item as a major problem, minor problem, seldom a problem, or no problem to his business. He was also asked to reply only to statements that applied to his operation. The problem statements are listed below and the responses to each statement are summarized in Table 15:

- A. *Seasonality in livestock production and marketing.*
- B. *Difficulty in obtaining necessary financing for remodeling or building new plant facilities.*
- C. *Difficulty in obtaining qualified labor for meat business.*
- D. *Difficulty in obtaining qualified labor to perform changes required by inspectors.*

- E. The \$18,000 limitation for retail exempt business to non-household consumers.
- F. Lack of uniformity in inspectors interpretation of the law.
- G. Requirements of the Environmental Protection Act.
- H. Requirements of the Occupational Safety and Health Act.
- I. Inspector's schedule limits the capacity of other segments of your business.
- J. Declining demand for custom slaughtering and processing.
- K. Federal inspection requirements are too stringent for your particular operation.
- L. Too many slaughter plants.
- M. Federally inspected plants cannot compete with custom exempt plants when custom slaughtering.
- N. Lack of information available to assess how change in plant location, size, and services offered could increase your net income.
- O. Other Problems: (specify)

The lack of uniformity in inspector's interpretation of the Wholesale Meat Law was cited most often by the livestock slaughter and processing plant managers as a major problem. The managers complained that meat, cleanliness, and general procedures that meet acceptable standards at a neighboring plant were rejected at their operation.

The second major problem identified was difficulty in obtaining qualified labor for the meat business. Thirty-eight managers responded to this statement with 23 citing it as a major problem, seven as a minor problem, and the remaining eight as seldom or never a problem.

Managers felt, and identified as the third major problem area, that inspection requirements were too stringent for their operation. The fourth area cited as major problem by 16 plants managers was that federally inspected plants cannot compete with custom exempt plants when custom slaughtering. This may be due to the extra overhead costs for items required by inspection that must be passed on to the customer by the federally inspected plants.

The \$18,000 limitation for retail exempt business to non-household consumers was the fifth most often mentioned problem. Respondents reported turning customers away because of the limitation, and receiving poorer quality meat from federally inspected plants than they were able to offer when allowed to buy, slaughter, and process locally. Fifteen managers

TABLE 15. SUMMARY OF RESPONDENTS VIEWS TO POTENTIAL PROBLEMS FACING OWNERS OF SMALL NORTH DAKOTA MEAT PLANTS, 1976

Statement	Degree of Problem				Total Response To Statement
	Major Problem	Minor Problem	Seldom A Problem	No Problem	
-----Number of Responses-----					
A. Seasonality	9	2	4	5	20
B. Availability of Financing	2	5	3	8	18
C. Availability of Qualified Labor	23	7	2	6	38
D. Availability of Remodeling Labor	4	5	4	10	23
E. \$18,000 Limit	15	1	2	9	27
F. Lack of Uniformity In Interpretation of the Law	24	6	1	5	36
G. EPA	11	6	2	4	23
H. OSHA	9	7	4	5	25
I. Inspector's Schedule	10	6	4	6	26
J. Declining Demand	9	4	2	11	26
K. Stringent Federal Inspection Requirements	20	4	4	4	32
L. Too Many Slaughter Plants	7	1	1	16	25
M. FI and CE Competition	16	2	4	5	27
N. Lack of Information	5	3	4	7	19
O. Other Problems Not Listed (Please Specify)	4	3	0	0	7

were of the opinion that the \$18,000 limitation was a major problem, and nine felt it was no problem. Federally inspected plants, as well as custom exempt plants, listed this aspect of the law as a problem. Although the limitation does not affect federally inspected plants, it may be considered a problem because the limitation may have caused the plant managers to adopt federal inspection even though they would have preferred to operate under exempt status.

The least important problem, according to 16 managers, was the potential problem of too many slaughter plants. Seven managers disagreed, listing it as a major problem.

Declining demand was considered to be no problem by 11 managers and a major problem by 9.

Other problems listed by the North Dakota slaughter and meat processing plant managers included: high overhead costs, unable to afford wages for full time employees, problems in collecting from customers, and problems with the disposal of offal.

Thirteen managers stated that they had no problems at this time.

APPENDIX TABLES

APPENDIX TABLE 1. ESTIMATED ANNUAL DEPRECIATION

ITEM	Estimated Life	Small	Medium	Large
	--Years--	-----Dollars-----		
<u>Land and Improvements</u>				
Land	-	-	-	-
Excavating, Concrete Work, Holding Pens, Roof	15	\$533	\$1,333	\$2,440
<u>Building and General Equipment</u>				
Building	25	1,599	2,487	3,780
Refrigeration	10	1,493	2,272	3,840
Plumbing and Heating	15	467	667	2,133
Electrical	25	260	280	920
Office and Retail Equipment	10	150	617	915
<u>Operation's Equipment</u>				
Kill Floor and Processing Equipment	5	560	830	1,044
	10	1,000	1,958	2,515
	15	30	241	322
	25	36	126	232
Delivery Trucks	5	-	2,400	2,400
TOTAL ANNUAL DEPRECIATION		<u>\$6,128</u>	<u>\$13,211</u>	<u>\$20,541</u>

APPENDIX TABLE 2. BUDGETED SALARIES FOR SMALL CAPACITY SLAUGHTER PLANT AT 100 PERCENT CAPACITY

Job	Number of Workers	Base Salary	Base + Fringe*	Total for All Workers
	Number	-----Dollars-----		
Manager	1	\$13,000	\$14,560	\$14,560
Slaughter/Processing	4	9,000	10,080	40,320
TOTAL	5			\$54,880

*Fringe Benefits estimated at 12 percent of Base Salary.

APPENDIX TABLE 3. BUDGETED SALARIES FOR MEDIUM CAPACITY SLAUGHTER PLANT AT 100 PERCENT CAPACITY

Job	Number Of Workers	Base Salary	Base + Fringe*	Total For All Workers
	Number	-----Dollars-----		
Manager	1	\$16,000	\$17,920	\$17,920
Slaughter/Processing	9	9,000	10,080	90,720
Office/Retail	1	6,000	6,720	6,720
Cleanup	<u>1</u>	6,000	6,720	<u>6,720</u>
TOTAL	12			\$122,080

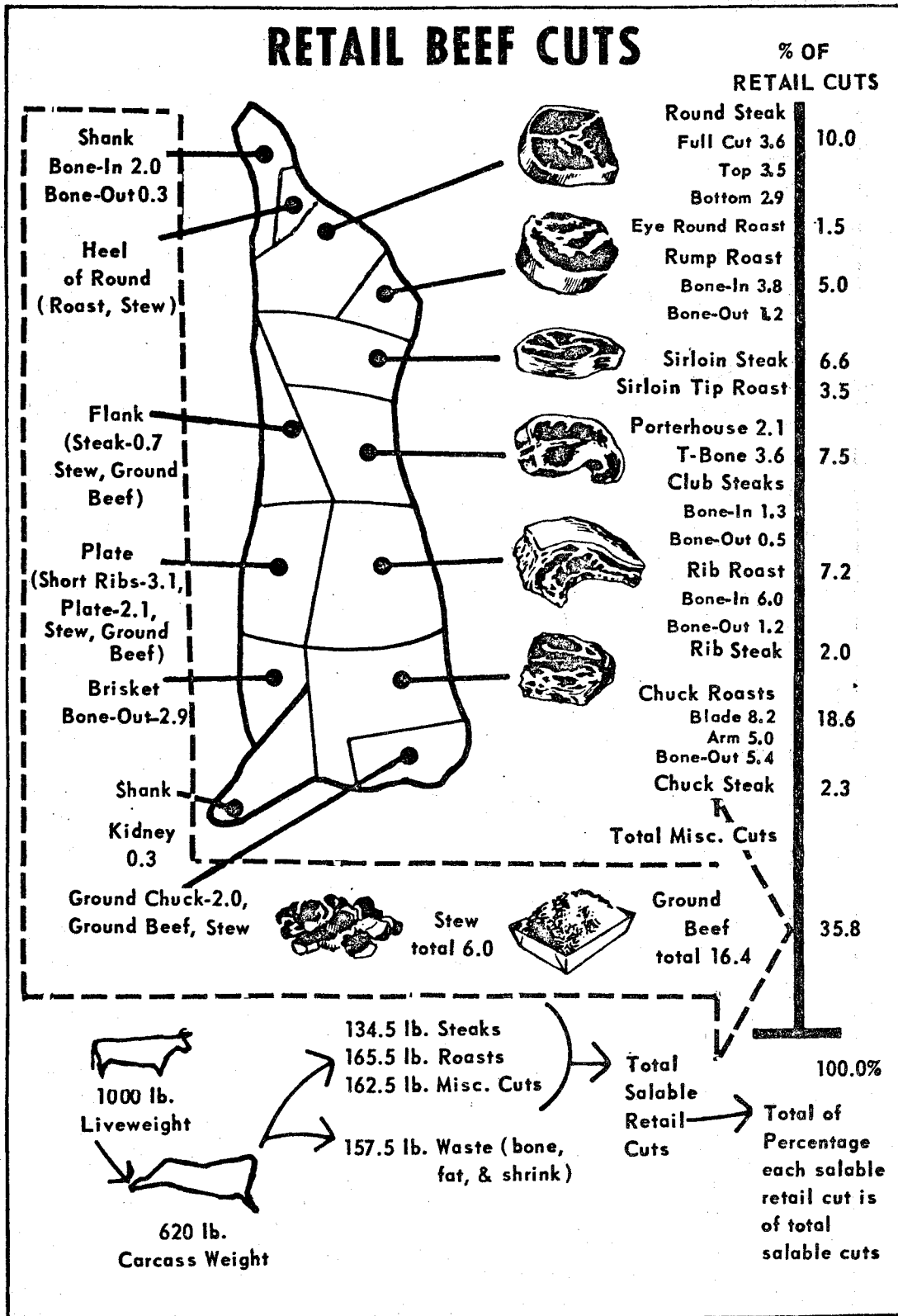
*Fringe Benefits estimated at 12% of Base Salary.

APPENDIX TABLE 4. BUDGETED SALARIES FOR LARGE CAPACITY SLAUGHTER PLANT AT 100 PERCENT CAPACITY

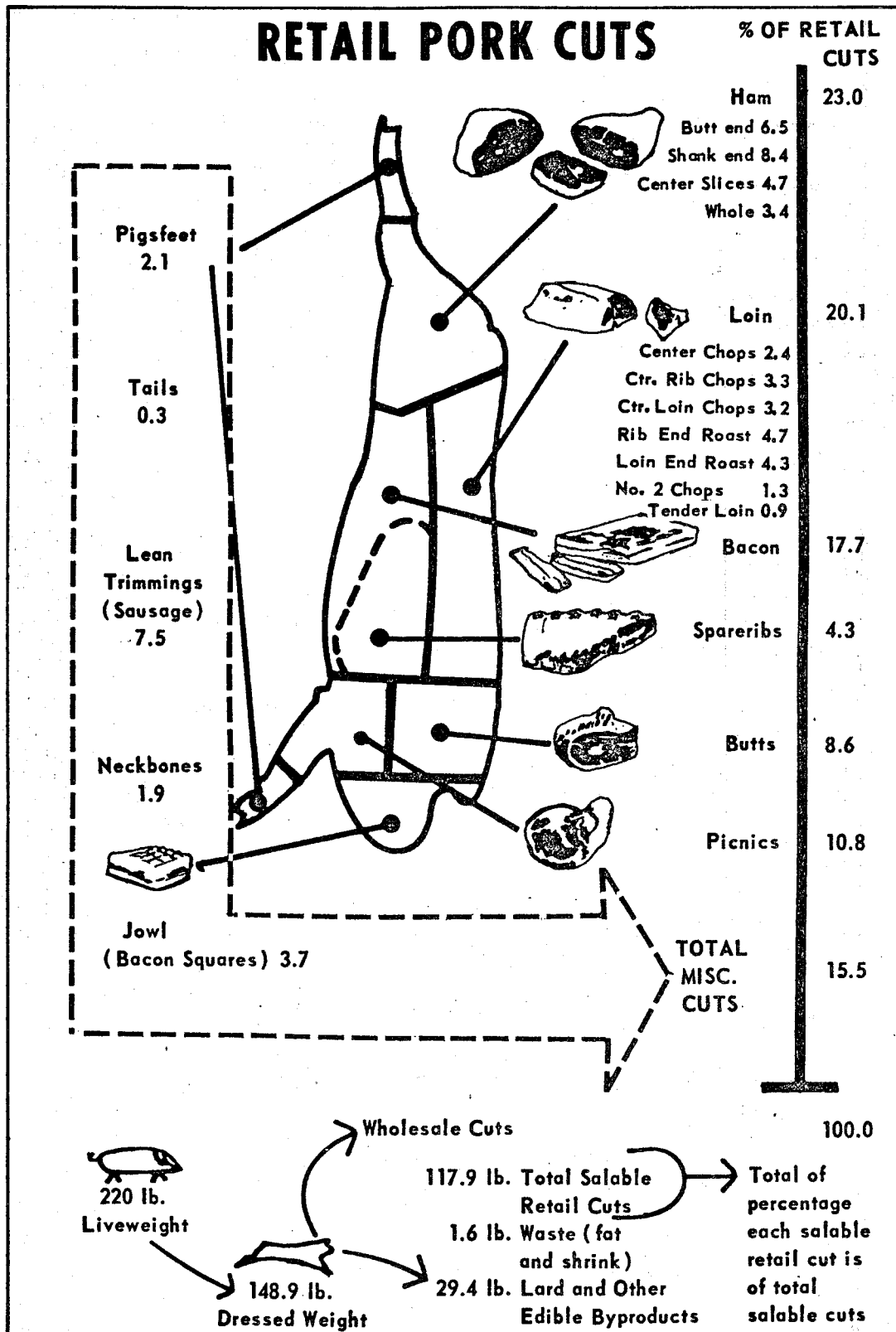
Job	Number Of Employees	Base Salary	Based + Fringe*	Total For All Workers
	Number	-----Dollars-----		
Manager	1	\$20,000	\$22,400	\$22,400
Assistant Manager	1	12,000	13,440	13,440
Slaughter/Processing	14	9,000	10,080	141,120
Office/Retail	2	6,000	6,720	13,440
Cleanup	<u>1</u>	6,000	6,720	<u>6,720</u>
TOTAL	19			\$197,120

*Fringe Benefits estimated at 12% of Base Salary.

APPENDIX FIGURES



U.S. DEPARTMENT OF AGRICULTURE ■ NEG. ERS 7112-69 (12) ■ ECONOMIC RESEARCH SERVICE
 Appendix Figure 1: USDA Retail Beef Cuts.



U. S. DEPARTMENT OF AGRICULTURE ■ NEG. ERS 7113-69 (12) ■ ECONOMIC RESEARCH SERVICE

Appendix Figure 2. USDA Retail Pork Cuts.

The Missing \$1.60*

"Farm-retail price spreads" may sound like gobbledygook to you, but they do exist and your grocery bill reflects them.

For example, if you bought a T-bone steak at \$2.00 a pound, a large part of what you paid falls between the farmer and your shopping bag. The farmer received only about 40 cents a pound for that steer from whence your T-bone came.

Why the gap? That's where farm-retail price spreads come into the picture. There are a lot of costs involved in transforming the animal on the hoof into steaks and other cuts in your supermarket.

Your T-bone starts out as part of a live animal—usually about a 1,000-pound steer. When the farmer sells the steer, let's say he gets 40 cents a pound or \$400.

Then the animal goes to the packer and is dressed out to a 620-pound carcass. Not including any value added by the packer's services, the carcass is now worth 64.5 cents a pound.

The carcass must be cut and packaged for retailing, however. By the time some bone and fat are removed and some moisture and meat are lost during the process, only about 440 pounds of salable meat are left. This meat now has a value of about 91 cents a pound.

Processing, transportation, and marketing costs also have to be figured. Add to that 91 cents per pound about 8 cents for slaughtering; 4 cents for transportation from slaughter house to retail store; another 21 cents for labor to cut the carcass into retail cuts and package it for sale; about 5 cents for packaging material; and about 2 cents for advertising.

Add on a little profit for each of the firms along the line and you come up with a figure of about \$1.40 a pound for the 440 pounds of usable meat.

But how did that T-bone get up to \$2.00 a pound?

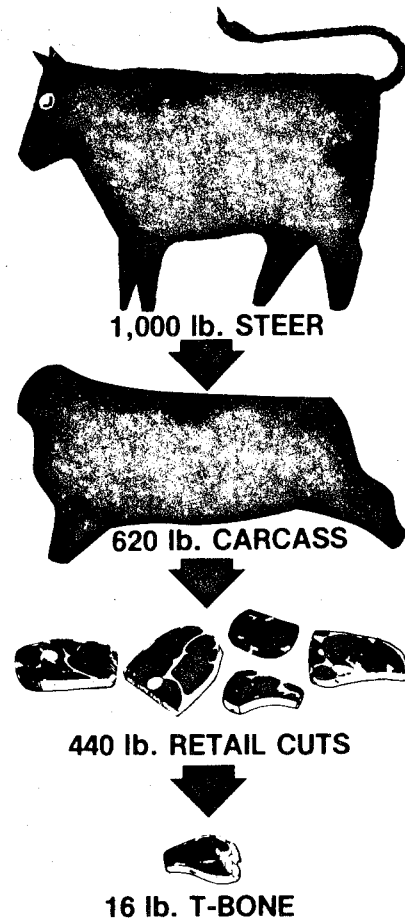
Well, that steer we started with produced a mere 16 pounds of T-bone steak in the first place. The

other 424 pounds of meat were mostly cuts that sell at lower prices than T-bone. Chuck steaks and roasts, ground beef, shanks, short ribs, and stew meat are good examples.

If you average out all the hamburger at, let's say 84 cents a pound, the T-bone at \$2.00 a pound, and all other cuts at various prices, you come out with \$1.40 per pound.

That's why the price the farmer receives per pound of live animal is so far from the price the consumer pays for meat in the supermarket. But then again, the conveniently packaged, ready-to-cook cuts of meat you buy in the supermarket are a far cry from that 1,000-pound live animal.

[Based on special material from Larry Duewer, Commodity Economics Division.]



APPENDIX Figure 3. Beef Slaughter Conversion Ratio's.

SOURCE: The Farm Index, USDA, March, 1976.

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