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FEASIBILITY STUDY OF A LAMB
SLAUGHTERING, PROCESSING AND PACKAGING
FACILITY LOCATED IN KANSAS

by

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CHAPTER I

INTRODUCTION

U.S. Sheep Production, Marketing and Slaughter

Sheep and lamb production for the United States declined during the 30 year period of 1946 to 1976. According to Engelman, Stoddard and Maetzold:

"This decline has been attributed to (1) less demand for wool, (2) management and herder problems, (3) increasing producer problems, (4) competing demands for Government-owned range lands, and (5) declining demand for lamb in consumer markets."¹

About 80 percent of the sheep in the United States are raised in the 17 western states. Of the west's total, Texas has 25.2 percent, Wyoming 12.1 percent, California 9.2 percent, South Dakota 7.4 percent, Utah 6.7 percent, Montana 6.3 percent, Idaho 5.7 percent, Colorado 5.6 percent, New Mexico 5.6 percent, Arizona 3.8 percent, Oregon 3.6 percent, North Dakota 2.6 percent, Nebraska 1.7 percent, Kansas 1.6 percent, Nevada 1.4 percent, Washington 0.8 percent and Oklahoma 0.7 percent.²

¹ U.S. Department of Agriculture, Packers and Stockyards Administration, Economic Research Service, The Lamb Industry: An Economic Study of Marketing Structure, Practices, and Problems, by Gerald Engelman, Everett Stoddard and James Maetzold, P and SA Research Report No. 2 (Washington, D.C.: Government Printing Office, 1973), p. vi.

² U.S. Department of Agriculture, Economic Research Service, Characteristics of Sheep Production in the Western United States, by C. Kerry Gee and Richard S. Magleby, Agricultural Economic Research Report No. 345 (Washington D.C.: Government Printing Office, 1976), pp. 4-5.

In the 17 western States the majority of commercial sheep producers market their lambs through packer buyers. During 1974, the percent of lambs marketed through packer buyers was 43 percent, order buyers 32 percent, dealers 10 percent, auction markets 10 percent, producer pools 3 percent and others 2 percent. The largest buyer handled 19 percent of the total marketings of slaughter lambs from July 1969 to June 1970. The two largest buyers handled 37 percent and the largest four purchased 61 percent of the total marketings of slaughter lambs during this same period.³

The number of plants slaughtering lambs has declined along with the declining sheep production. In 1970, there were 43 plants slaughtering 25,000 sheep and lambs annually; by 1976 the number of plants had been reduced to 28. The major sheep and lamb slaughter states were Colorado with 19 percent, California with 19 percent and Texas with 18 percent of the total slaughter. These three states account for 56 percent of the total commercial lamb slaughter and include 11 of the 20 major lamb slaughter plants.⁴

Kansas Sheep Production, Marketing, Slaughter and Prices

The number of stock sheep in Kansas reached a high of 1.27 million in 1884, the number declined to 176,000 in 1923. For the next 20 years the sheep numbers registered a steady increase to 687,000 in 1943.

³ U.S. Department of Agriculture, Farmer Cooperative Service, Cooperative Marketing Alternatives for Sheep and Lamb Producers, by David L. Holder, Marketing Research Report No. 1081 (Washington, D.C.: Government Printing Office, 1977), pp. 16-19.

⁴ Ibid, pp. 20-21.

During the next 33 years the sheep and lamb numbers steadily declined, with only slight upward movements from 1955 to 1962. The all time low was set on January 1, 1976 when there were 165,000 head of stock sheep on Kansas farms.⁵

According to Vossen, the Kansas sheep industry had improved by 1977:

"The total number of sheep and lambs in Kansas, at 173,00 head, on January 1, 1977, was 6 percent above the previous year. Total value was \$6,315,000, up 29 percent. Average value per head, at \$36.50, compared with \$30.00 in 1976, thus, both numbers on hand and higher average value per head contributed to the increase in total value. Stock sheep and lambs, at 140,000 head, were up 8 percent, while sheep and lambs on feed, at 33,000 head, were at the same level as a year earlier. Operations with sheep in Kansas numbered 2,500, unchanged from 1975."⁶

Vossen and Ropel reported that the situation of the Kansas sheep industry achieved even greater gains by 1978:

⁵ U.S. Department of Agriculture, Kansas State Board of Agriculture, Crop and Livestock Reporting Service, "Historic Farm Facts, Livestock, 1867-1978," 61st Annual Report and Farm Facts (Washington, D.C.: Government Printing Office, 1978), pp. 233-234.

⁶ U.S. Department of Agriculture, Kansas State Board of Agriculture, Crop and Livestock Reporting Service, "Cattle, Hogs and Sheep," by Robert L. Vossen, 60th Annual Report and Farm Facts (Washington, D.C.: Government Printing Office, 1977), p. 104F.

"Sheep and lambs in Kansas on January 1, 1978 totaled 195,000 head, 13 percent above a year earlier. Stock sheep showed no change from a year earlier, however the number of sheep on feed jumped 67 percent. The lamb crop was 5 percent above an all time low crop of 1976. The number of farms and ranches keeping sheep numbered 2,500, unchanged from a year earlier. The total value of the January 1, 1978 sheep inventory was \$10.4 million, up 65 percent from the previous year. Value per head, at \$53.50 was up 47 percent and an all time high. Wool production during 1977 was 15 percent above a year earlier, and the value was 26 percent higher."⁷

Sheep and lambs marketed in Kansas were 284,000 head during 1972, 250,000 in 1973, 223,000 head in 1974, 220,000 in 1975 and 151,000 in 1976. The downward trend was reversed in 1977 when 158,000 head were marketed. The 4.6 percent increase in marketings is directly related to the increase in sheep and lamb numbers on Kansas farms of 5 percent in 1977⁸ (Figure 1).

⁷ U.S. Department of Agriculture, Kansas State Board of Agriculture, Crop and Livestock Reporting Service, "Cattle, Hogs and Sheep," by Robert L. Vossen and Stephen Ropel, 61st Annual Report and Farm Facts (Washington, D.C.: Government Printing Office, 1978), p. 208.

⁸ Data provided by U.S. Department of Agriculture, Kansas State Board of Agriculture, Crop and Livestock Reporting Service, Topeka, Kansas, 1978.

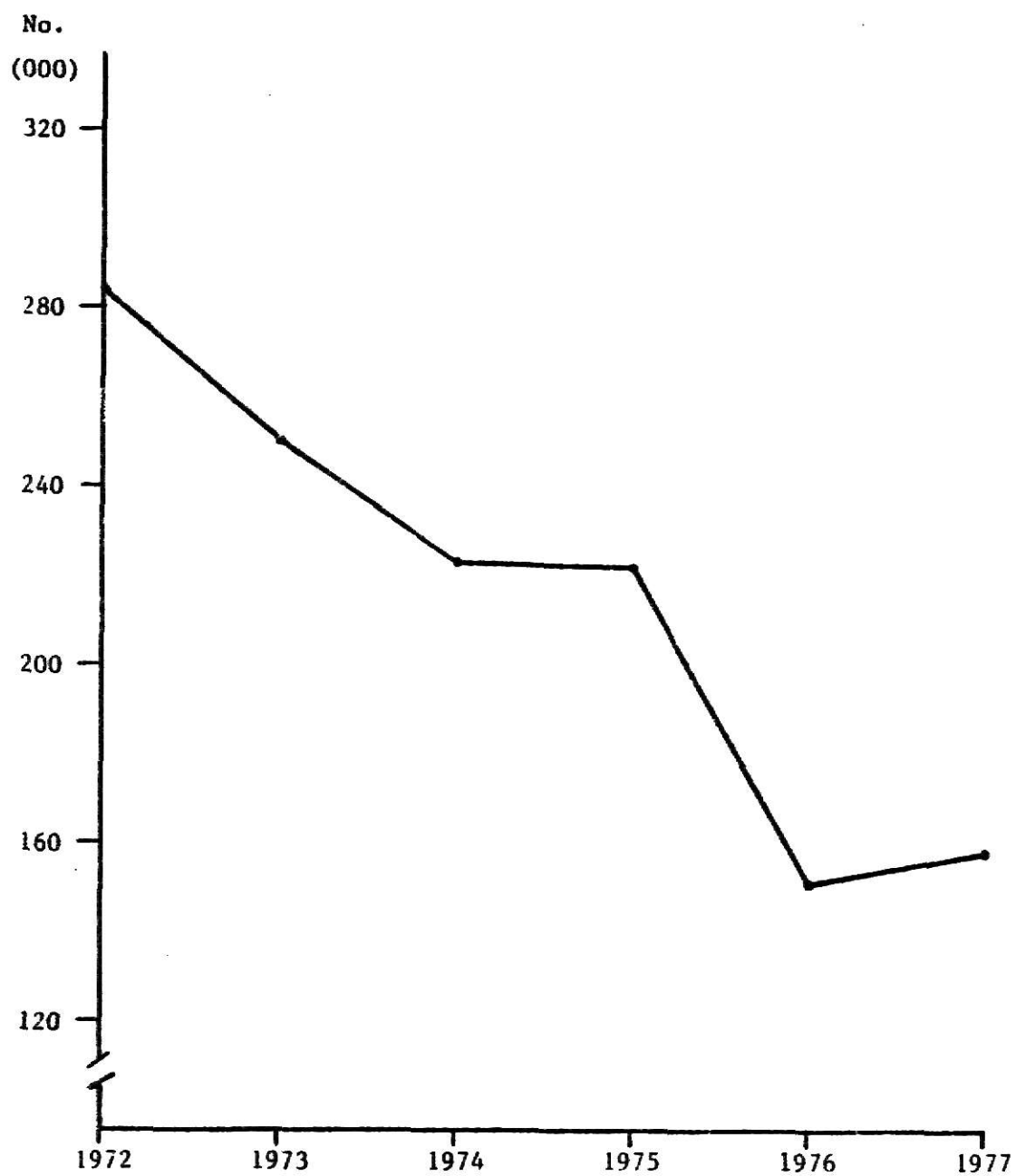


Figure 1. Kansas Sheep and Lamb Marketings, 1972 - 1977.

The commercial slaughter of sheep and lambs in Kansas has been between 4,100 to 6,400 head per year since 1972. The year with the largest slaughter of sheep and lambs was 1975, the year with the lowest number of slaughter was 1977.⁹ The commercial slaughter of sheep and lambs in Kansas was extremely small, representing only 1 to 2.5 percent of the total marketings per year. The greatest portion of sheep and lambs produced and marketed in Kansas leave the state destined for packing plants in other states.

Since 1972, the general trend of the prices received by Kansas farmers for lambs has been increasing (Figure 2). The annual average prices received per hundred-weight were \$28.79 in 1972, \$34.82 in 1973, \$37.07 in 1974, \$40.88 in 1975, \$45.08 in 1976, \$49.32 in 1977 and \$59.79 for the first 9 months of 1978. The months where the highest prices generally have been received were during the May to June period; the lowest prices generally occur during January, August and September.¹⁰ The average price increased 20.9 percent in 1973, 6.5 percent in 1974, 10.3 percent in 1975, 10.3 percent in 1976, 9.4 percent in 1977 and 21.2 percent during the first 9 months of 1978. This amounted to about a 13.1 percent increase per year when the annual increases were averaged. The increasing prices are one reason for the renewed interest in the lamb industry in the state of Kansas.

⁹ Ibid.

¹⁰ Ibid.

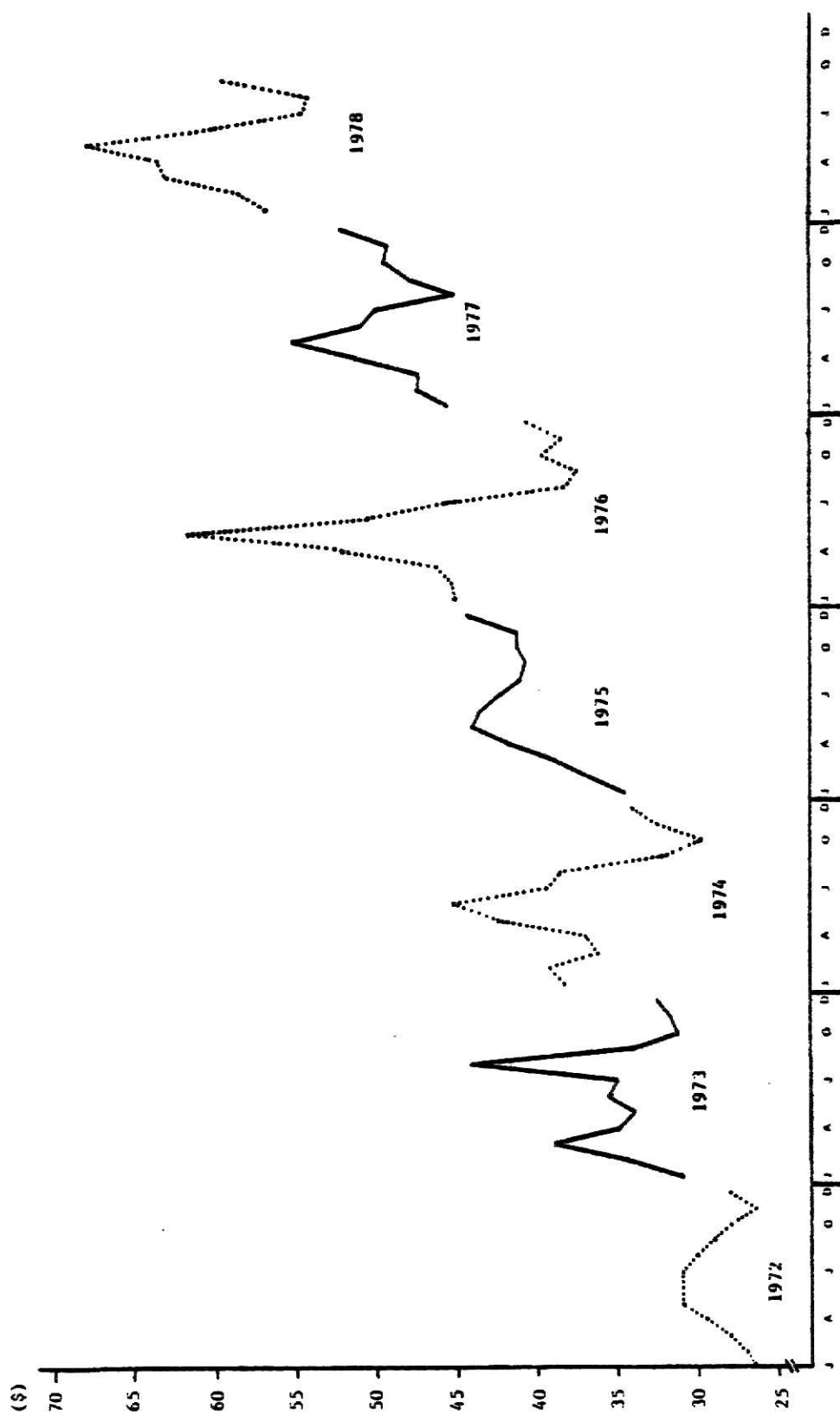


Figure 2. Monthly Prices Received by Kansas Farmers for Lambs, 1972 - 1978.

CHAPTER II

PROBLEM

Kansas Sheep Producers have expressed the concern that shipping lambs out of the state reduces their income. By having a slaughter facility in Kansas near their area of production there would be less transportation and shrinkage expenses. The present commercial slaughter of sheep and lambs in Kansas is approximately 2.5 percent of the total sheep and lambs in the state. Kansas produced lambs leave the state destined for slaughter facilities located in other states. Thus, interest has been expressed concerning the feasibility of establishing a lamb slaughter facility in Kansas. An analysis of the supply of sheep and the economic feasibility of a lamb slaughtering, processing and packaging facility located in Kansas is presented in this report.

Objective of Study

One objective of this report was to analyze the historical Kansas sheep supply situation. Regional and county production of sheep and lambs were examined to determine the present situation in the industry and whether the producers in Kansas could supply enough slaughter lambs to keep a slaughter plant in operation year-round. The potential supply areas were studied through the use of sheep and lamb numbers data provided by the Kansas State Board of Agriculture Annual Reports. The seasonality of lamb production and the marketing channels in Kansas both play important roles in the movement of slaughter lambs from the producers to the slaughtering plant. Both of these areas were eval-

uated to determine the effect they would have upon the number of lambs available for slaughter in Kansas.

The second objective was to analyze the cost and returns of a lamb slaughtering, processing and packaging facility. Before investment in a proposed plant could be realized the venture would have to prove to be a financially sound operation. Based on the available data, reasonable costs and realistic returns were estimated for a proposed plant located in Kansas.

Review of Literature and Previous Work

There are a number of benefits to be gained from the location of a slaughtering plant in rural areas near the production of livestock. As pointed out by H. Ronald Smalley:

"The meatpacking industry is rapidly changing. Obsolete slaughter plants in large cities are being shut down as packers shift their operations to rural areas, where livestock is abundant and substantial savings are being realized. Livestock procurement is less complicated and expensive when packers can obtain animals directly from farms and feedlots. Live animals deteriorate in value through shrinkage, bruising, crippling, and death while enroute to distant markets. Meat can usually be shipped more economically than live animals. Capital investments in land and facilities tend to be lower in rural areas, as well as labor, taxes and maintenance costs. Many packers, both those entering the industry and well-es-

established firms, have already participated in decentralizing and updating their facilities."¹¹

In a 1971 feasibility study conducted by Erickson, Tuma and MacAdams a survey was mailed to sheep producers in Kansas to determine the present and potential lamb production in the state. The results of the questionnaire indicated that there was a sufficient number of market lambs available for a slaughter facility. However, there was not a uniform supply provided throughout the year. The period of October through December was a time when, based upon the respondents replies, the number of slaughter lambs would not be in a sufficient supply to keep a proposed 60,000 head per year facility operating at 100 percent capacity.¹²

In 1975, the Blueprint for Expansion of the American Sheep Industry was formulated by the American Sheep Producers Council (ASPC), National Wool Growers Association, ASPC Sheep Industry Development Program, Inc. and the National Lamb Feeders Association. The group's objective was to improve the industry by increasing sheep production. The 10-year goals of the "Blueprint for Expansion" are to increase the weaned lamb crop by 25 percent, increase ewe numbers by 50 percent, increase the market weight of lambs by 15 percent and increase wool pro-

¹¹ U.S. Department of Agriculture, Science and Education Administration, Guidelines for Establishing Beefpacking Plants in Rural Areas, by H. Ronald Smalley, Agricultural Handbook Number 513 (Washington, D.C.: Government Printing Office, 1978), p. 1.

¹² Donald B. Erickson, Harold J. Tuma and V. E. MacAdams. Feasibility Study of a Lamb Slaughter and Processing Facility. Manhattan, Kansas: Kansas State University, (1971), pp. 1-4. (Typewritten)

duction by 50 percent.¹³

According to a study by Engelman, Stoddard and Maetzold: during 1971, the largest 4 firms slaughtered 53.7 percent of the total U.S. commercial sheep and lamb slaughter. The study stated that changes in the share of the market controlled by the 4 largest slaughterers of sheep and lambs have been higher than either cattle or hogs since 1920. The study also pointed out that within most states there are fewer slaughterers of sheep and lambs than there are for cattle and hogs.¹⁴

In 1970, there were 43 plants slaughtering 25,000 or more head per year, 31 plants slaughtering 100,000 head or more per year, and 12 plants slaughtering 300,000 head or more per year. The sheep and lamb slaughter has declined along with the decline in production. By 1976 there were 28 plants slaughtering 25,000 head or more per year, 20 plants slaughtering 100,000 head or more per year and 8 plants slaughtering 300,000 head or more per year. Two main reasons the plants closed were obsolescence and/or lack of adequate volume causing them to be inefficient.¹⁵

¹³ American Sheep Producers Council. Blueprint: Clearing Hurdles to Profit With Sheep (Denver, Colorado: Mountain Empire Publishing, 1976), pp. 4-5.

¹⁴ U.S. Department of Agriculture, Packers and Stockyards Administration, Economic Research Service, The Lamb Industry: An Economic Study of Marketing Structure, Practices, and Problems, by Gerald Engelman, Everett Stoddard and James Maetzold, P and SA Research Report No. 2 (Washington, D.C.: Government Printing Office, 1973), pp. 21-26.

¹⁵ U.S. Department of Agriculture, Farmer Cooperative Service, Cooperative Marketing Alternatives for Sheep and Lamb Producers, by David L. Holder, Marketing Research Report No. 1081 (Washington, D.C.: Government Printing Office, 1977), pp. 18-20.

It has been estimated that of the 20 packing plants slaughtering 1,000 head per week, 8 to 10 could actually handle the current 100,000 head weekly supply.¹⁶ David L. Holder has stated that:

"The number of major plants in the United States has declined from 31 in 1970 to 20 in 1976 in response to declining sheep numbers. Even in 1970, the 2 largest packers in each Western and Midwestern state bought 50 to 75 percent of all lambs and in each Eastern and Southern state bought 75 to 100 percent. Because plants are currently operating at only 40 percent of capacity, more plants will close in the future and competition will be further restricted."¹⁷

Holder also pointed out another important development which could have a drastic effect on the number of slaughter plants. The method that the "Blueprint for Expansion" takes to achieve its goals can provide an inadequate supply of slaughter lambs for the packers. During 1975, of the 84 percent of the lamb crop that was saved, 10 percent was kept for replacements and 74 percent was marketed. To accomplish the "Blueprint for Expansion" goals of 1985, which call for 50 percent more ewes producing 125 pound lambs, if there are gradual increases in the number of lambs saved per ewe and in lamb weights at slaughter, a

¹⁶ "Decline in Sheep Numbers Imperils More Lamb Plants," Livestock Weekly, San Angelo, Texas, 23 March 1977, p. 16.

¹⁷ U.S. Department of Agriculture, Farmer Cooperative Service, Cooperative Marketing Alternatives for Sheep and Lamb Producers, by David L. Holder, Marketing Research Report No. 1081 (Washington, D.C.: Government Printing Office, 1978), p. ii.

30 percent increase in replacement ewes would be required. The effect of this increase in replacements would cause a drop of about 2.136 million lambs available for slaughter in 1978. After a drop, market lambs would not recover to the 1975 level until late 1980 or early 1981 (Table 1).¹⁸

If the "Blueprint for Expansion" goals are achieved through mainly using more efficient sheep production to double lamb production the drop in market lambs is not as great as in the previous case. By 1985, the number of lambs saved per ewe would be 1.25 and the increase in slaughter weights is again assumed to be gradual. With the same slaughter statistics as before, by 1978 the reduction in lambs marketed is 1.371 million. The previous level of 1975 would not be regained until after 1980 (Table 2).¹⁹

Since most plants killing 100,000 head or more per year are already operating well below capacity, a 2 million head reduction in lambs could force at least 5 of the plants to close. In both illustrations the number of lambs available for slaughter dropped to a low point in 1978, with the second illustration the drop in market lambs is less severe.²⁰

There are a number of methods packers could use to assure a steady flow of slaughter lambs to their plants. Holder has found that:

¹⁸ Ibid, pp. 11-14

¹⁹ Ibid.

²⁰ Ibid.

TABLE 1

An Illustration of How to Double Lamb Production
in 10 Years by Increasing Ewe Flock by 50 Percent*

Year	Ewes on farms	Ewes as % of 1975	Lambs as % of ewes			Lambs marketed		Pounds marketed		
			Saved	Replace- ment	Marketed	Total	As % of 1975	Average	Total	As % of 1975
	1,000					1,000			1,000	
1975	10,062	100	84	10	74	7,460	100	104	775,840	100
1976	9,156	91	86	16	70	6,409	86	105	672,966	87
1977	8,699	87	88	23	65	5,654	76	106	599,361	77
1978	8,873	88	90	30	60	5,324	71	108	574,970	74
1979	9,583	95	93	30	63	6,037	81	110	664,102	86
1980	10,349	103	96	30	66	6,830	92	112	764,998	99
1981	11,177	111	99	30	69	7,712	103	114	879,183	113
1982	12,072	120	102	30	72	8,692	116	116	1,008,253	130
1983	13,037	130	105	30	75	9,778	131	119	1,163,552	150
1984	14,080	140	108	30	78	10,982	147	122	1,339,853	173
1985	15,207	151	112	30	82	12,470	167	125	1,558,718	201
1986	16,423	163	116	28	88	14,452	194	128	1,849,887	238
1987	17,409	173	120	25	95	16,539	222	130	2,150,012	277
1988	17,931	178	124	22	102	18,290	245	132	2,414,230	311

TABLE 2

An Illustration of How to Double Lamb Production in 10 Years
by Increasing Lambs Saved Per Ewe to 125 Percent*

Year	Ewes on farms	Ewes as % of 1975	Lambs as % of ewes			Lambs marketed		Pounds marketed		
			Saved	Replace- ment	Marketed	Total	As % of 1975	Average	Total	As % of 1975
	1,000					1,000			1,000	
1975	10,062	100	84	10	74	7,460	100	104	775,840	100
1976	9,156	91	88	16	72	6,592	88	105	692,194	89
1977	8,699	87	92	20	72	6,263	84	106	663,908	86
1978	8,699	87	96	26	70	6,089	82	108	657,644	85
1979	9,047	90	100	28	72	6,514	87	110	716,522	92
1980	9,590	95	104	28	76	7,288	98	112	816,301	105
1981	10,165	101	108	28	80	8,132	109	114	927,048	120
1982	10,775	107	112	28	84	9,051	121	116	1,049,916	135
1983	11,422	114	116	28	88	10,051	135	119	1,196,112	154
1984	12,107	120	120	28	92	11,138	149	122	1,358,890	175
1985	12,833	128	125	28	97	12,448	167	125	1,556,043	201
1986	13,602	135	130	26	104	14,146	190	128	1,810,698	233
1987	14,147	141	135	24	111	15,703	211	130	2,041,412	263
1988	14,430	143	137	22	115	16,595	223	132	2,190,474	282

*Source: U.S. Department of Agriculture, Farmer Cooperative Service, Cooperative Marketing Alternatives for Sheep and Lamb Producers, by David L. Holder, Marketing Research Report No. 1081. (Washington, D.C.: Government Printing Office, 1977), p. 14.

"A large number of lambs are placed on feed by packers to assure a sufficient supply for slaughter in the off-season. In 1975, 9 packers fed 1 million lambs, almost 15 percent of all lambs slaughtered. . . . Of the estimated 4 million lambs fed in 1975, packers fed about one-third. Almost half of these packer-fed lambs were fed in Colorado and another 12 percent were fed in Texas. . . . Packers also contract thousands of lambs for future delivery. Usually in the spring, packers buy entire bands of lambs for summer and fall delivery."²¹

Holder also stated that:

"In addition to lambs placed on feed or contracted in advance by packers, thousands of other lambs are fed by owners, officers, and other packer-associated interests. The net result of all advanced packer purchases is a reduction in the effectiveness of traditional competitive markets for slaughter lambs."²²

The entry of new firms into the lamb slaughtering industry could be restricted by the decreasing lamb production and the increase of advanced packer purchases of slaughter lambs.

In an effort to help justify the need for an increase in the production of sheep, the American Sheep Producers Council reported that:

²¹ Ibid, pp. 7-12.

²² Ibid.

"Foremost among the situations existing today is the fact that current supplies do not begin to meet the demand for lamb and wool in the U.S. For example, a survey of meat directors of major food chains, conducted by ASPC's Lamb Council, found that during a week when 130,000 sheep were slaughtered in the U.S., New York City grocers alone could have sold 120,000 of these carcasses."²³

Retailer request for domestic lamb and the available supply for one week during 1975 can be broken down as follows:²⁴

1. New York, Massachusetts, Rhode Island, Pennsylvania, Maryland, West Virginia, Delaware and New Jersey which represents 45.8 percent of the domestic lamb consumption had a shortage of 35,295 head weekly.
2. California, Washington and Oregon which represents 18.52 percent of domestic lamb consumption had a shortage of 7,750 head per week.
3. Wisconsin, Michigan, Illinois, Indiana and Ohio which represents 14.4 percent of the domestic lamb consumption had a shortage of 7,155 head per week.
4. The 32 remaining states in the continental United States which represents about 21.4 percent of the domestic lamb consumption

²³ American Sheep Producers Council. Blueprint: Clearing Hurdles to Profit With Sheep (Denver, Colorado: Mountain Empire Publishing, 1976), p. 5.

²⁴ Ibid, p. 4.

had a shortage of 86,197 carcasses per week. The total retailer shortage for the 48 states was around 136,400 carcasses of lamb per week during 1975.

The Co-operative Extension Service of Purdue University states:

"In the final analysis, it appears likely large quantities of lamb will be marketed as a frozen product. The fundamental reasons being that it is a low volume meat item; it has a relatively small per capita consumption; and it will require a wider distribution as metropolitan areas grow and expand."²⁵

Researchers at Purdue summarized certain advantages to central cutting, fabricating and freezing meat in the following manner:

"Freezing products facilitates control of product flow, brand identification, improved cost accounting and inventory control; transit and handling savings; and great extension of shelf life."²⁶

The Purdue researchers also stated the disadvantages of central cutting, fabricating and freezing meat as:

"There is a variety of resistance to frozen meats by processors, retailers, and consumers, including higher cost; poor appearance; lack of convenience; union

²⁵ Co-operative Extension Service. "Sheep and Lamb Slaughtering and Processing," Sheep and Lamb Marketing Lafayette, Indiana: Purdue University, (n.d.), p. 4. (Mimeographed)

²⁶ Ibid, p. 5.

resistance; and additional investment needed."²⁷

Summary

One of the major concerns facing Kansas Sheep Producers is the loss of slaughtering facilities located near their area of production. The loss of lamb slaughter plants in Kansas translates into reduced income for the Kansas sheep producers. Transportation and shrinkage expenses could be reduced if a lamb slaughtering plant was located in Kansas near the areas of production.

In 1971 there was a sufficient supply of slaughter lambs in the state to maintain a plant killing 60,000 head per year. A problem arose when it was discovered that in the last quarter of the year the number of slaughter lambs available was not of a sufficient supply for the plant. The marketing cycle would have to be adjusted to smooth out the flow of slaughter lambs in the state.

A movement to improve the sheep industry in the U.S. by increasing sheep production is presently underway. It was estimated that during 1975 there was a shortage of 136,400 lamb carcasses per week in the United States. The "Blueprint for Expansion" of the sheep industry is trying to double lamb production by 1985. When the goals are reached the present shortages could be sufficiently reduced.

In the U.S. there are a number of plants that are presently operating at less than full capacity. The number of plants slaughtering lambs has declined over the last few years because of inefficiency due

²⁷ Ibid.

to obsolescence and lack of adequate volume. Without an increase in sheep production a number of the plants presently operating at less than full capacity could be forced to close in the near future. Although the "Blueprint for Expansion" goals would in the long run benefit the lamb slaughter industry, the methods used to achieve the goals could hasten the demise of some of the present plants. The critical periods for the plants, years when the number of market lambs are drastically reduced, would be from 1977 to 1979.

One of the major obstacles to a lamb slaughter plant in Kansas could be the present marketing system. In the U.S. during 1975, packers fed about 15 percent of the total lambs slaughtered. The packer-fed lambs represented about 33 percent of all the lambs fed during that year. To be able to acquire an adequate supply of slaughter lambs a new packer would have to disrupt the present marketing system. An increase in sheep production could facilitate the packer in his acquisition of market lambs.

An analysis of the present sheep and lamb supply situation in Kansas was one objective of this report. The potential supply areas were evaluated and a determination as to the ability of Kansas sheep producers supplying enough slaughter lambs to keep a moderate sized plant, 60,000 head per year, in operation year round.

Another objective of this report was to analyze the costs and returns of a lamb slaughtering, processing and packaging facility located in Kansas. The plant was evaluated and a decision made as to whether the venture was economically feasible based upon the available data. Since

there are disagreements as to whether the finished product would be best in a fresh or frozen form, the costs and returns of both methods were given.

CHAPTER III

SUPPLY OF SHEEP AND LAMBS IN KANSAS

To evaluate the sheep production in Kansas, the state was divided into 9 regions or districts. The districts were actually the 9 crop and livestock reporting districts in Kansas (Figure 3). Each districts' sheep and lamb numbers were analyzed to determine the changes in sheep production that occurred from 1972 to 1978. The 9 districts' numbers were also examined to determine the major sheep and lamb producing counties of the state. The county sheep and lamb numbers data were received from the Kansas Crop and Livestock Reporting Service, Kansas Board of Agriculture.

Regional Production

The January 1 total sheep and lamb numbers in Kansas were 357,000 head in 1972, 331,000 head in 1973, 290,000 head in 1974, 220,000 head in 1975, 165,000 head in 1976, 173,000 head in 1977 and 195,000 head in 1978. The 4.9 percent increase in 1977 and 12.7 percent increase in 1978 indicated a turn around in the annually declining sheep and lamb numbers in Kansas (Figure 4).

On January 1, 1972, the South Central district contained the largest number of sheep and lambs with 124,200 head, followed by the Central district with 49,500 head, the North Central district with 47,600 head, the Southeast district with 30,900 head, the Southwest district with 27,800 head, the East Central district with 26,600 head, the Northeast district with 20,900 head, the Northwest district with

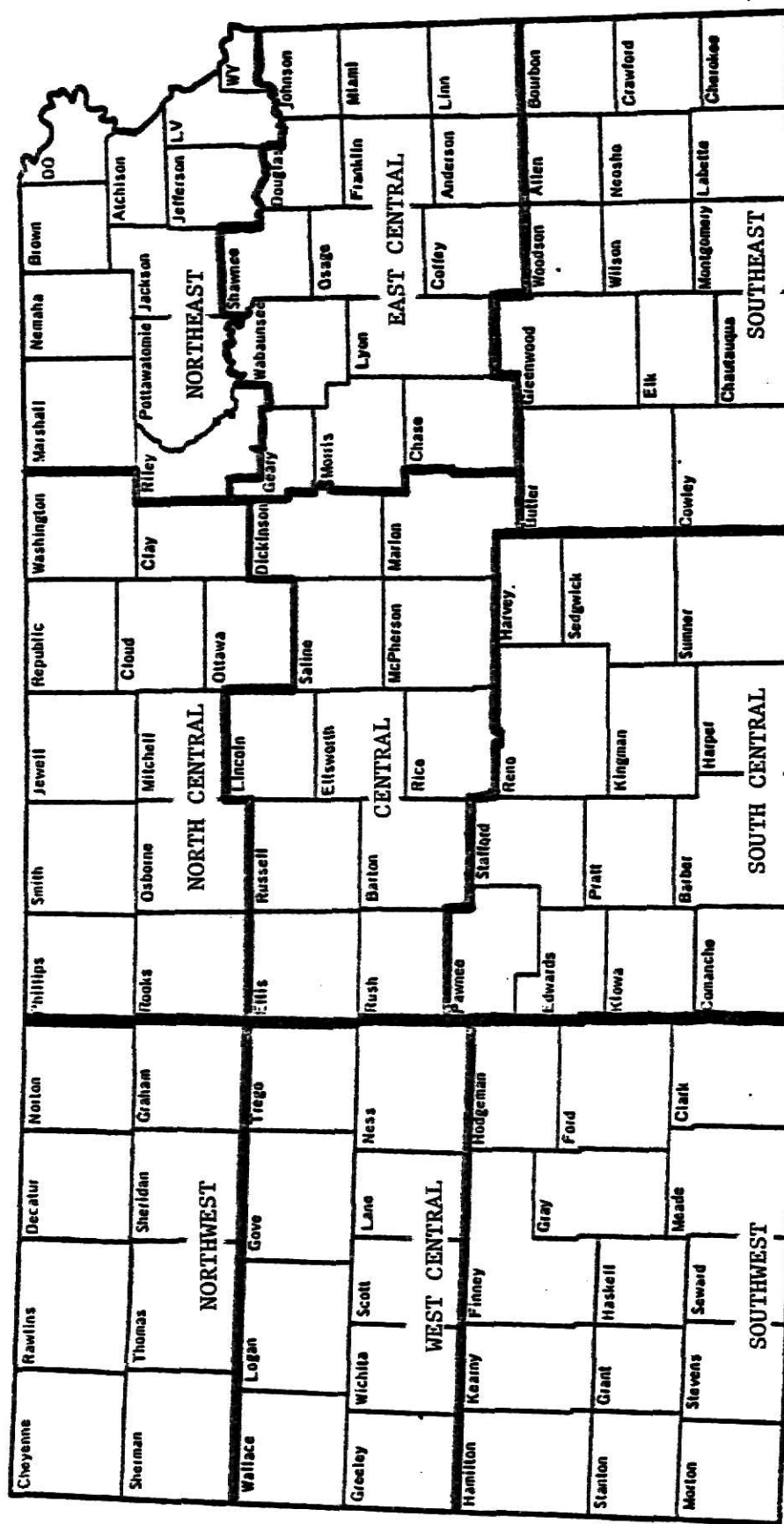


Figure 3. Map of the 9 Districts in Kansas.*

*Source: U.S. Department of Agriculture. Kansas State Board of Agriculture, Crop and Livestock Reporting Service. Topeka, Kansas, 1978

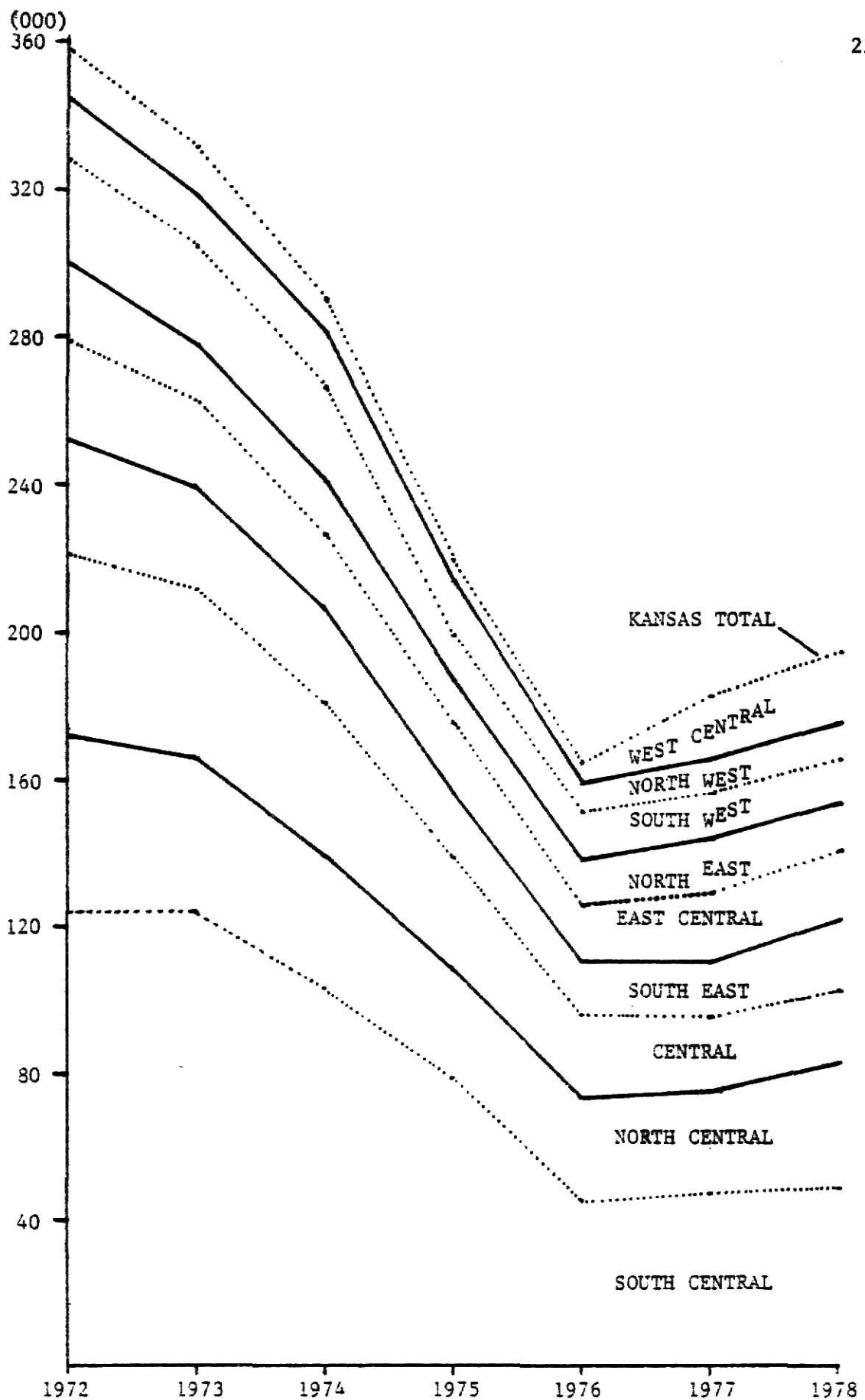


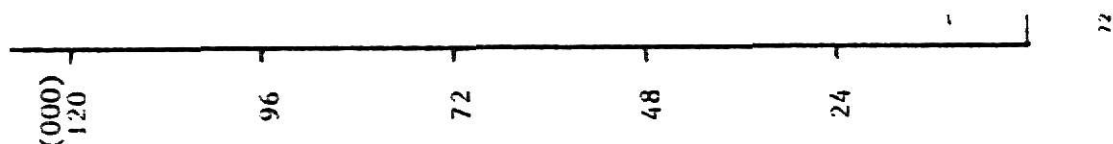
Figure 4. Cumulative Sheep and Lamb Numbers by Kansas Districts, 1972 - 1978.

16,800 head, and the West Central district with 12,700 head (Figure 5).

On January 1, 1978, the ranking of the 9 districts in Kansas from highest to lowest number of sheep and lambs was as follows: the South Central district with 49,600 head, the North Central district with 34,300 head, the Southeast district with 19,500 head, the West Central district with 19,400 head, the Central district with 19,100 head, the East Central district with 18,900 head, the Northeast district with 12,800 head, the Southwest district with 11,900 head; and the Northwest district with 9,500 head.

A comparison of the January 1, 1978 sheep and lamb numbers to the 1972 numbers revealed a 52.8 percent increase in the West Central district. All of the other districts in Kansas experienced a decrease in sheep and lamb numbers over the same seven year period. The other 8 districts' sheep and lamb numbers on January 1, 1978 in relation to the 1972 numbers were: Northwest, 56.6 percent as large; Southwest, 42.8 percent as large; Northeast, 61.2 percent as large; East Central, 71.1 percent as large; Southeast, 63.1 percent as large; Central, 38.6 percent as large; North Central, 72.1 percent as large; and South Central, 39.9 percent as large.

The 9 districts in Kansas did not experience gradual changes in sheep and lamb numbers over the seven year period; the changes tended to fluctuate from year-to-year. The annual percentage changes for the 9 districts from 1972 to 1978 were respectively: West Central 3.2, -37.4, -31.7, -8.9, 41.2, and 169.4; Northwest -18.5, 10.2, -2.7, -41.5, 8.1 and 2.2; Southwest -7.2, .39, -50.6, .78, -4.65 and -3.25; North Central -13.0, -12.6, -19.3, -2.1, -1.8 and 22.1; Central -6.9, -9.8, -26.0,



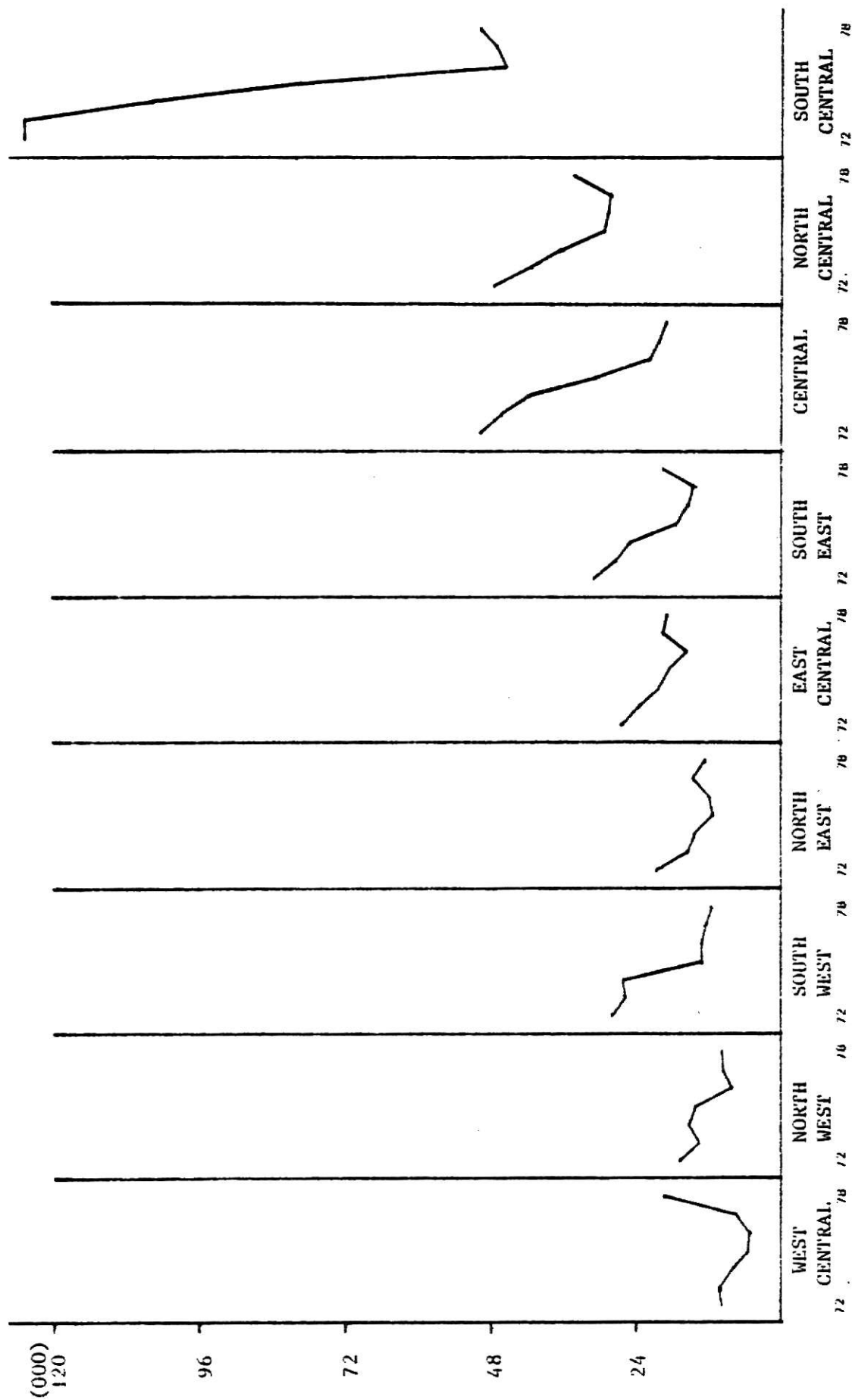


Figure 5. Sheep and Lamb Numbers by Kansas Districts, 1972-1978.

-29.6, -6.9 and -5.5; South Central 0.0, -16.8, -23.2, -42.6, 3.3 and 5.3; Northeast -25.8, -7.7, -18.2, 2.6, 21.7 and -12.3; East Central -10.9, -13.5, -10.7, -15.3, 25.2 and -2.6; and Southeast -11.0, -9.5, -29.3, -14.2, -2.0 and 31.8 (Figure 6)

There were 5 districts which registered a gain in sheep and lamb numbers during 1976: Northwest, West Central, South Central, Northeast and East Central. During 1977, the Northwest, West Central, North Central, South Central and Southeast districts had gains in sheep and lamb numbers. All of the districts in Kansas had gains in either 1976 or 1977 except for the Southwest and Central districts.

The turn around in sheep and lamb numbers can be attributed to the steadily increasing prices Kansas farmers and ranchers were receiving for their lambs and a commitment from Kansas sheep producers to improve the situation of the sheep and lamb industry in Kansas by striving to attain the "Blueprint for Expansion" goals by 1985.

County Production by Districts

The West Central district was the only district in Kansas where the January 1, 1978 sheep and lamb numbers were greater than the 1972 numbers. On January 1, 1972, the major sheep and lamb producing counties and their numbers were: Wallace 2,500 head, Logan 2,400 head, Scott 1,700 head, Gove 1,400 head, and Greeley 1,300 head. Sheep and lamb numbers in 1978 were 52.8 percent greater than the 1972 numbers. The major sheep and lamb producing counties and their numbers on January 1, 1978 were: Wichita 8,000 head, Wallace 6,000 head, Gove 1,200 head, Ness 1,000 head, and Trego 1,000 head (Figure 7). The top 5 sheep and

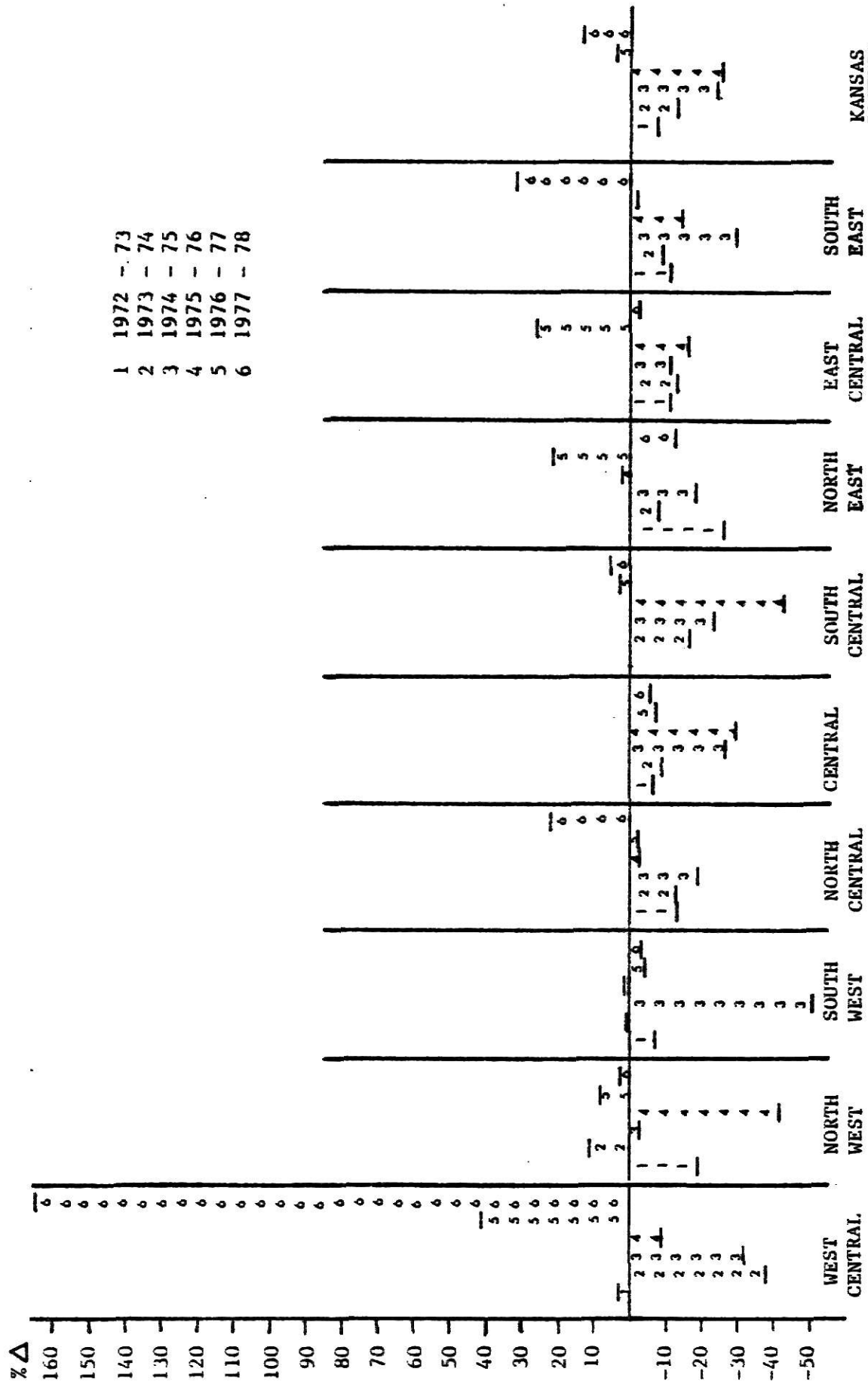


Figure 6. Annual Percent Change in Sheep and Lamb Numbers, by Kansas Districts, 1972-1978.

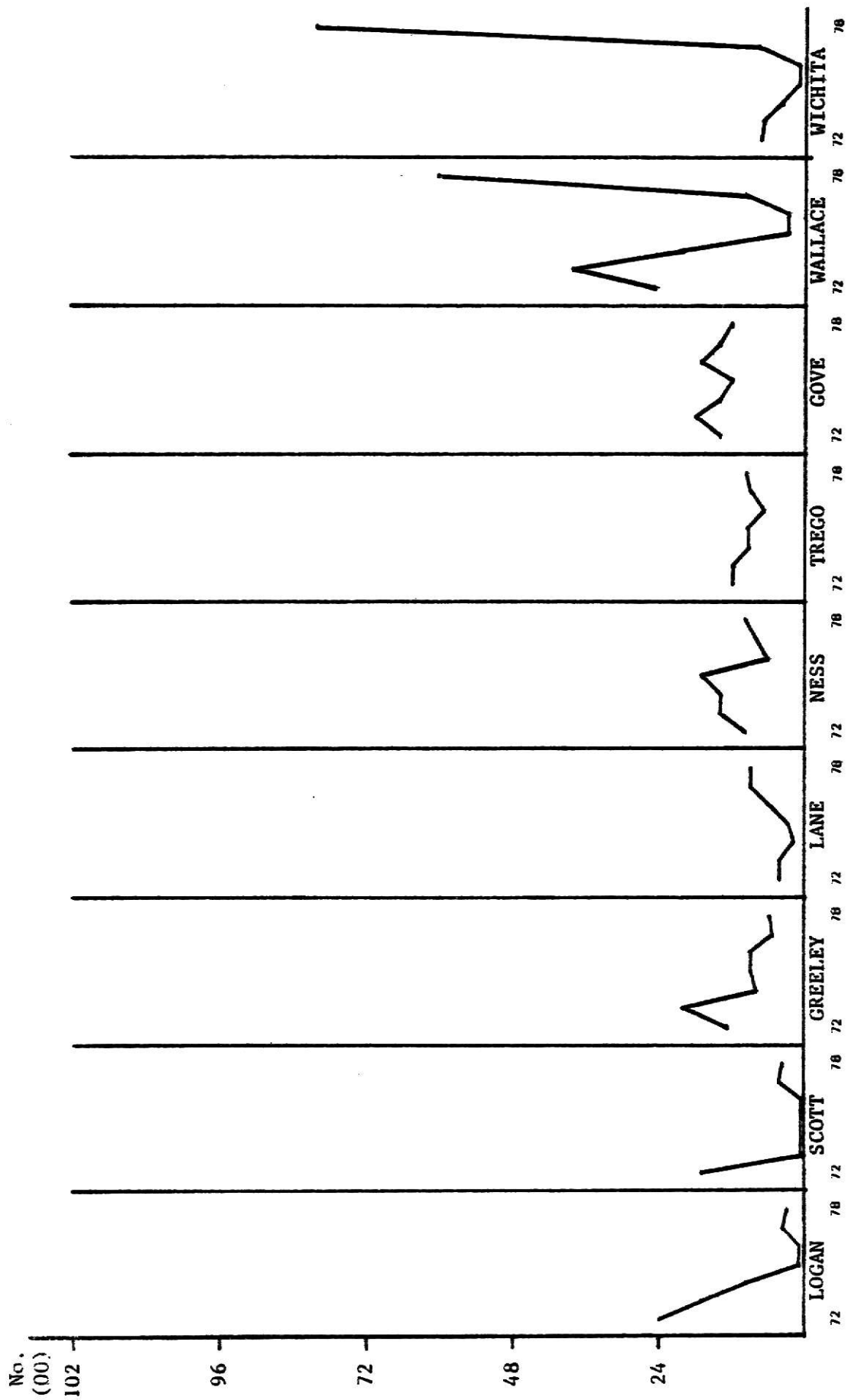


Figure 7. Sheep and Lamb Numbers by Counties, West Central District, 1972 - 1978.

lamb producing counties contained over 88 percent of the total sheep and lamb numbers in the 9-county district. In 1972, the West Central district was the smallest of the 9 districts in the production of sheep and lambs; by 1978, the West Central district ranked as the 4th largest producer.

The sheep and lamb numbers in the Northwest district on January 1, 1978 were only 56 percent as large as the district's 1972 numbers. The major sheep and lamb producing counties in the Northwest district and their numbers for 1972 were: Rawlins 5,000 head, Sherman 4,200 head, Cheyenne 3,200 head, Thomas 2,000 head, and Norton 1,200 head. By 1978, the major sheep and lamb producing counties and their numbers were: Rawlins 2,400 head, Sherman 2,300 head, Thomas 1,500 head, Sheridan 1,300 head, and Norton 1,200 head (Figure 8). These 5 counties accounted for over 91 percent of the total sheep and lamb numbers in the 8-county district on January 1, 1978. The Northwest district was next to the lowest producing district in 1972; by 1978 it had fallen to the lowest sheep and lamb producing district in the state.

The sheep and lamb numbers in the Southwest district on January 1, 1978 were 42 percent as large as the district's 1972 numbers. The counties with the most sheep and lambs and their numbers in 1972 were: Hamilton 13,100 head, Gray 2,900 head, Stanton 2,500 head, and Kearny 2,100 head. By 1978, the top producing counties and their numbers were: Gray 3,800 head, Hamilton 3,000 head, Clark 1,500 head, and Kearny 1,000 head (Figure 9). These top 4 counties contained over 78 percent of the total sheep and lamb numbers in the 14-county district on January 1,

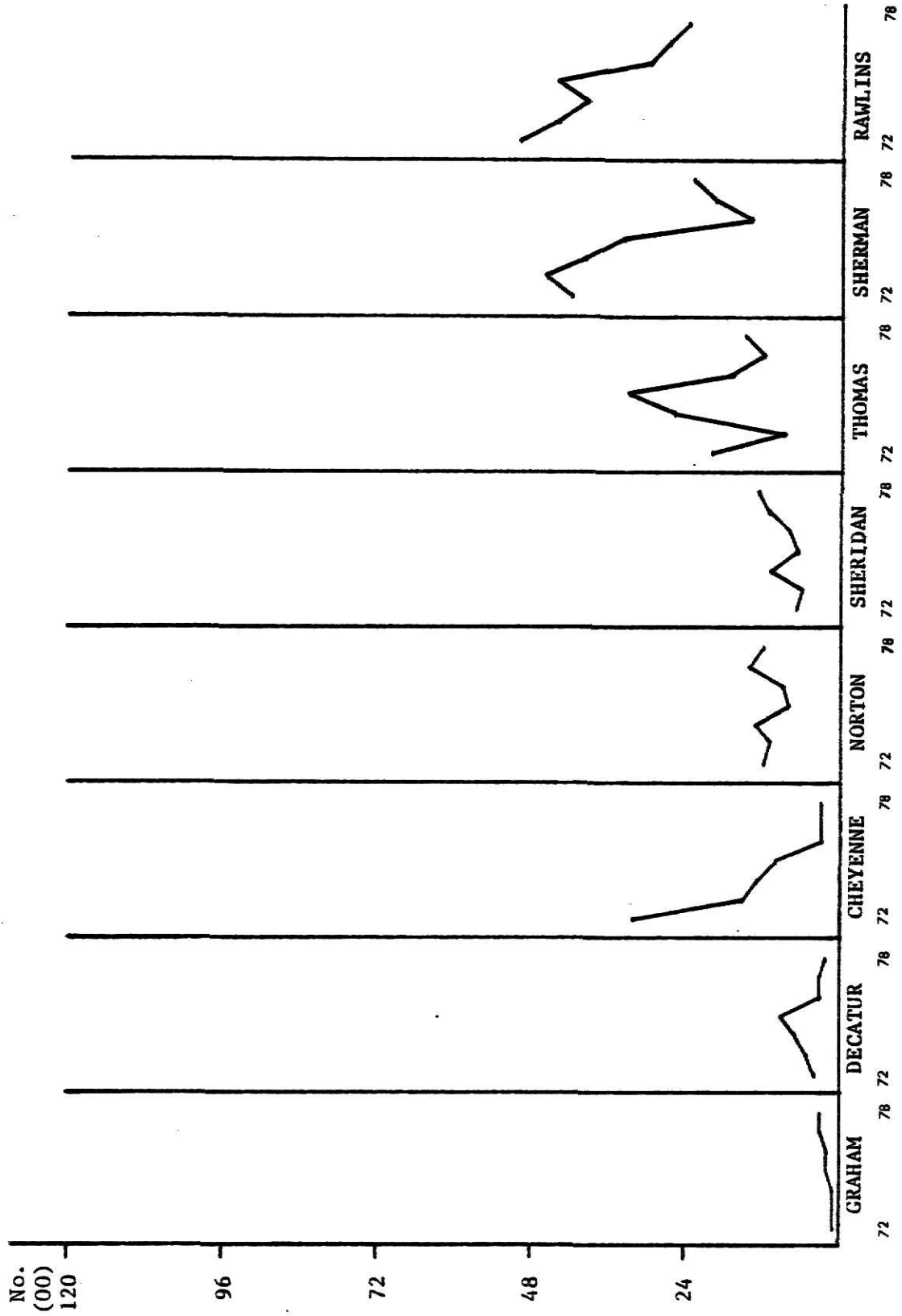


Figure 8. Sheep and Lamb Numbers by Counties, Northwest District, 1972 - 1978.

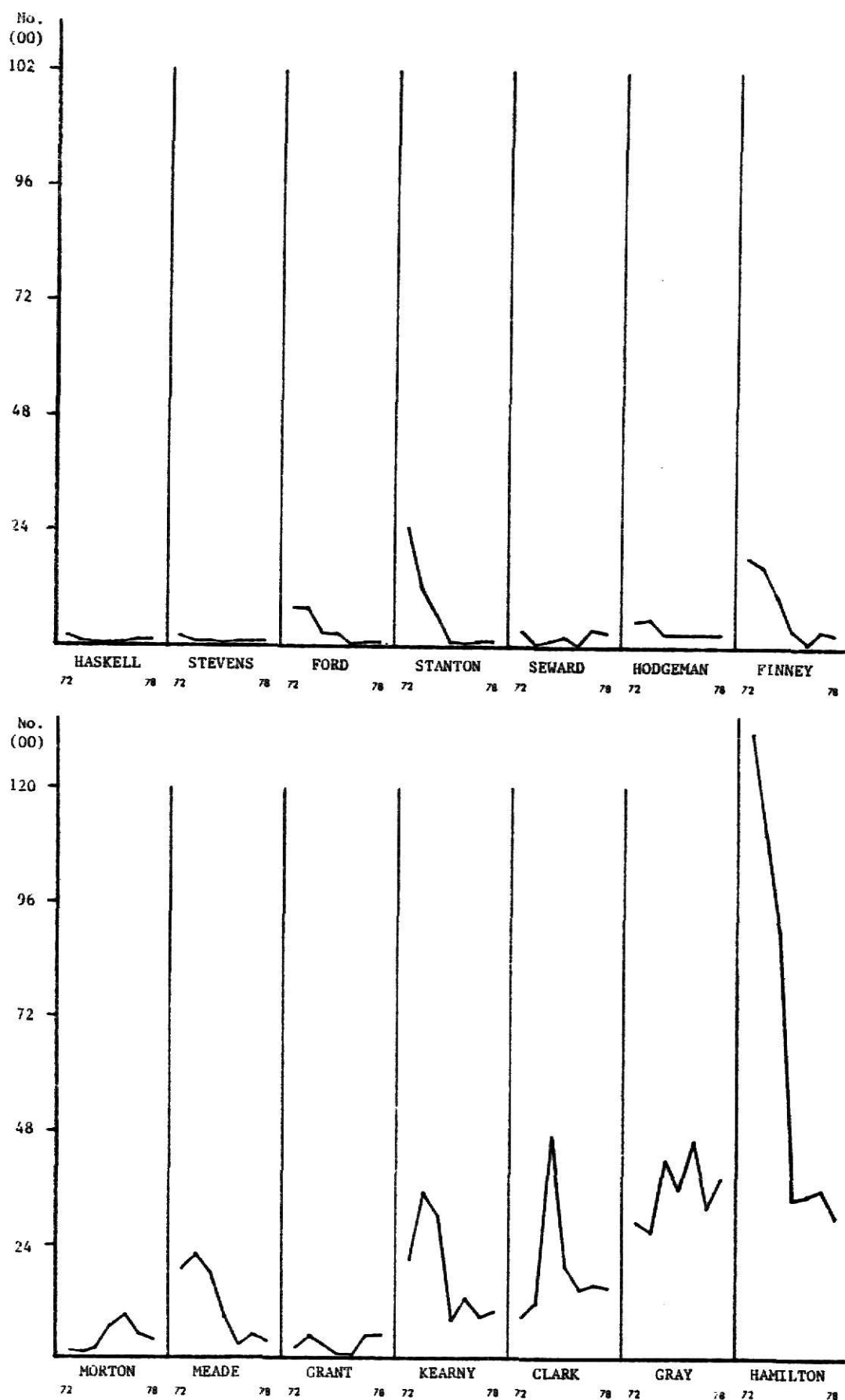


Figure 9. Sheep and Lamb Numbers by Counties, Southwest District, 1972 - 1978.

1978. The Southwest district was ranked as the 5th largest sheep and lamb producing district in 1972; by 1978 it had fallen to the 8th largest producing district in the state.

The sheep and lamb numbers in the Northeast district for 1978 were 61.2 percent as large as the 1972 numbers in the district. In the Northeast district, the counties with the largest production of sheep and lambs and their numbers on January 1, 1972 were: Brown 4,000 head, Pottawatomie 4,000 head, Riley 3,200 head, Jackson 2,700 head, and Marshall 1,800 head. By 1978, the ranking of the largest producing counties in the district and their numbers were: Riley 5,000 head, Jackson 1,800 head, Brown 1,000 head, and Marshall 1,000 head (Figure 10). The top 4 producing counties accounted for over 68 percent of the sheep and lamb numbers in the 11-county district. Riley, the largest producing county contained 39 percent of the district's total sheep and lamb numbers. The Northeast was ranked as the 7th largest sheep and lamb producing district in 1972 and 1978.

The East Central district's sheep and lamb numbers in 1978 were 71.1 percent as large as the district's 1972 numbers. On January 1, 1978, the largest sheep and lamb producing counties in the district and their numbers were: Wabaunsee 7,200 head, Franklin 3,500 head, Lyon 2,200 head, Morris 2,100 head, and Shawnee 1,700 head. By 1978, the ranking of the largest producing counties in the district and their numbers were: Wabaunsee 7,100 head, Shawnee 3,000 head, Osage 2,500 head, Douglas 1,000 head, and Franklin 1,000 head (Figure 11). Wabaunsee accounted for 37 percent of the sheep and lamb numbers in the

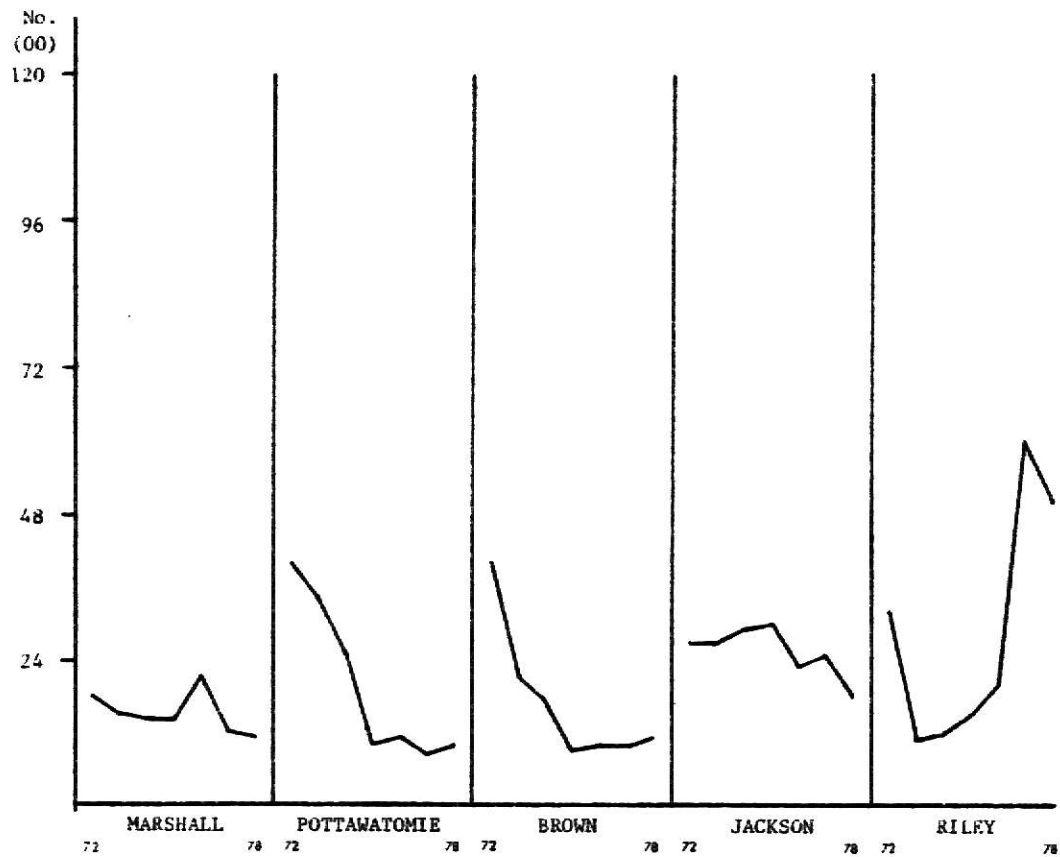
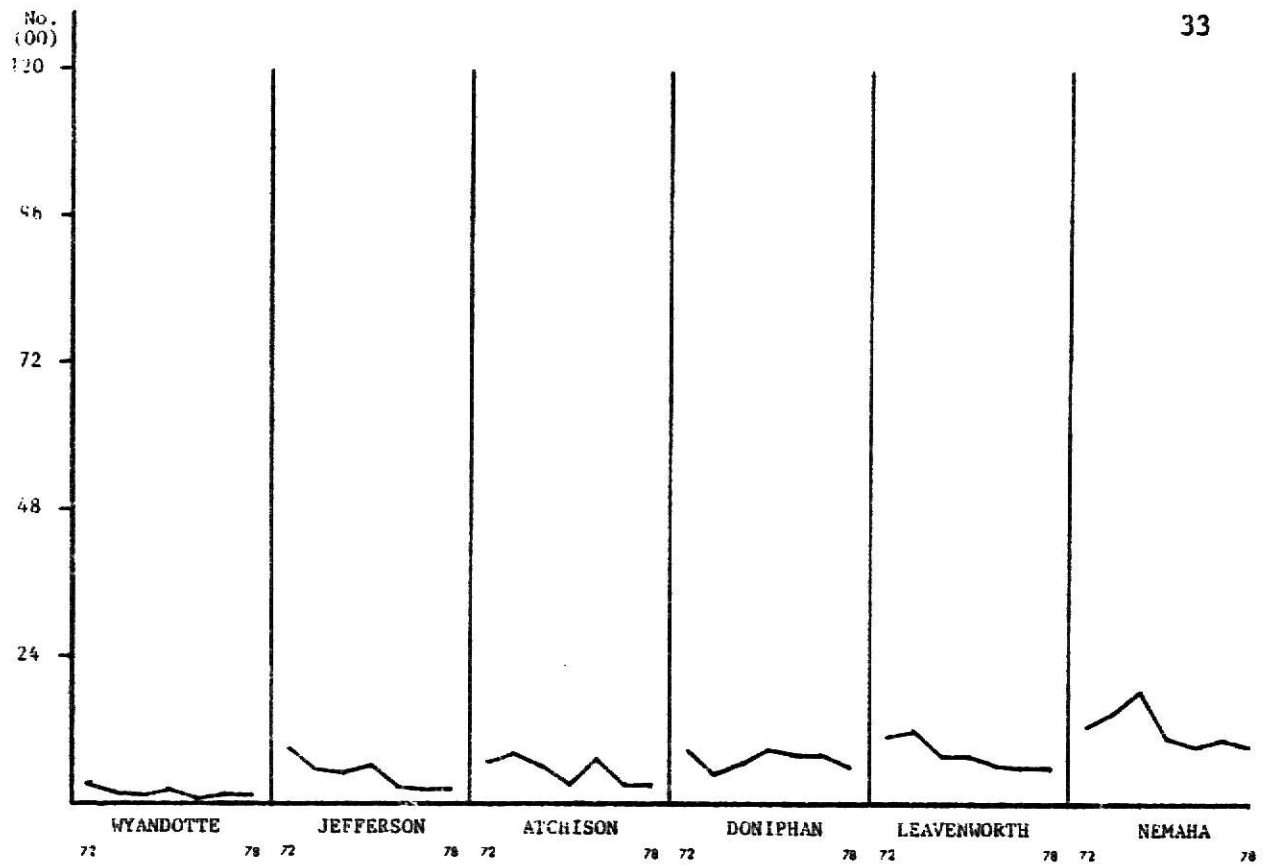


Figure 10. Sheep and Lamb Numbers by Counties, Northeast District, 1972 - 1978.

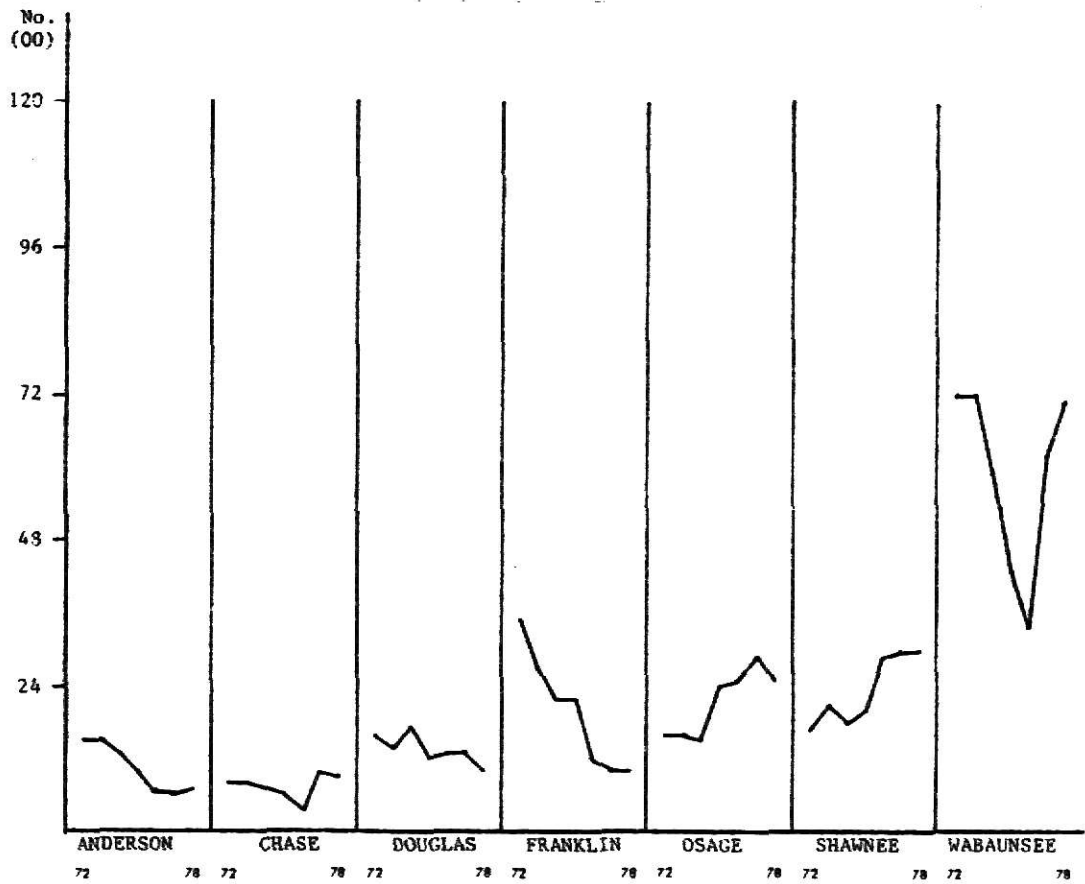
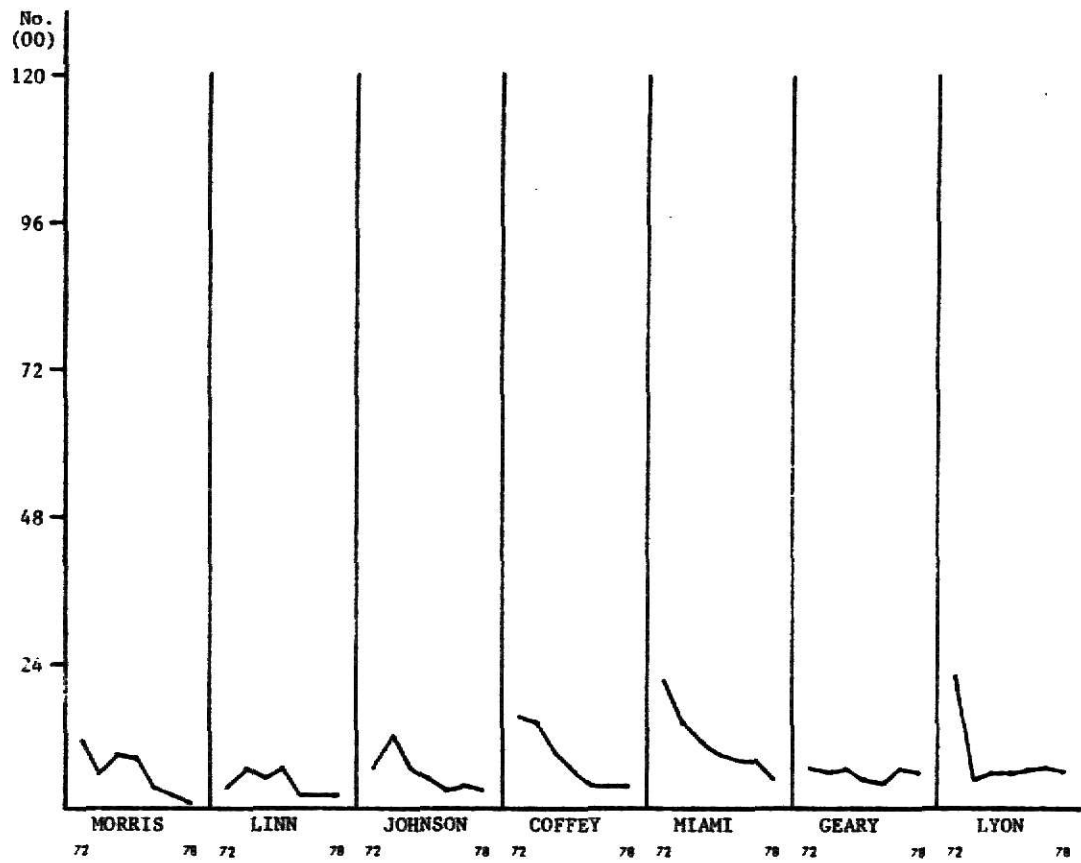


Figure 11. Sheep and Lamb Numbers by Counties, East Central District, 1972-1978.

district on January 1, 1978. In 1978, the top 5 producing counties contained over 77 percent of the total sheep and lamb numbers in the 14-county East Central district. The East Central district was the 6th largest sheep and lamb producing district in the state in 1972 and 1978.

The 1978 sheep and lamb numbers in the Southeast district amounted to 63.1 percent of the 1972 numbers. On January 1, 1978, the ranking of the largest sheep and lamb producing counties in the district and their numbers were: Cowley 10,000 head, Butler 4,500 head, Montgomery 2,300 head, Labette 1,900 head, and Woodson 1,700 head. Almost 49 percent of the district's total sheep and lamb numbers were located in Cowley and Butler counties. By 1978, the rank of the largest sheep and lamb producing counties in the district and their numbers were: Cowley 4,500 head, Butler 4,100 head, Wilson 2,300 head, and Crawford 2,000 head (Figure 12). The 1978 numbers placed 44 percent of the district's total sheep and lamb numbers in Cowley and Butler counties. The top 4 counties accounted for over 66 percent of the total sheep and lamb numbers in the 14-county Southeast district. The Southeast was the 4th largest sheep and lamb producing district in the state in 1972; by 1978, the district had risen to the 3rd largest in Kansas.

The Central district contained 38.6 percent as many sheep and lambs in 1978 as it had in 1972. McPherson, with 11,800 head, was the largest sheep and lamb producing county in the district in 1972. The other top producing counties included: Dickinson, with 8,100 head; Marion, with 6,500 head; Rice, with 6,000 head; and Lincoln, with 5,800 head. In 1972, the 5 top sheep and lamb producing counties contained 77 percent

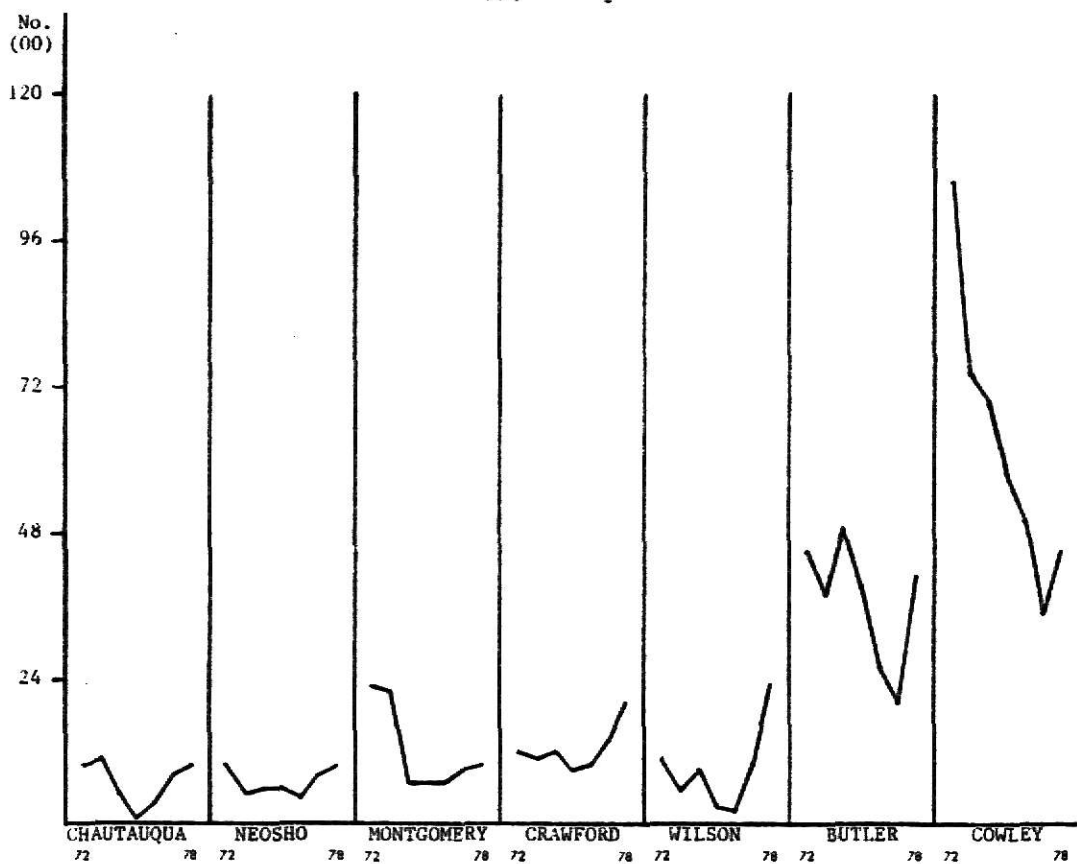
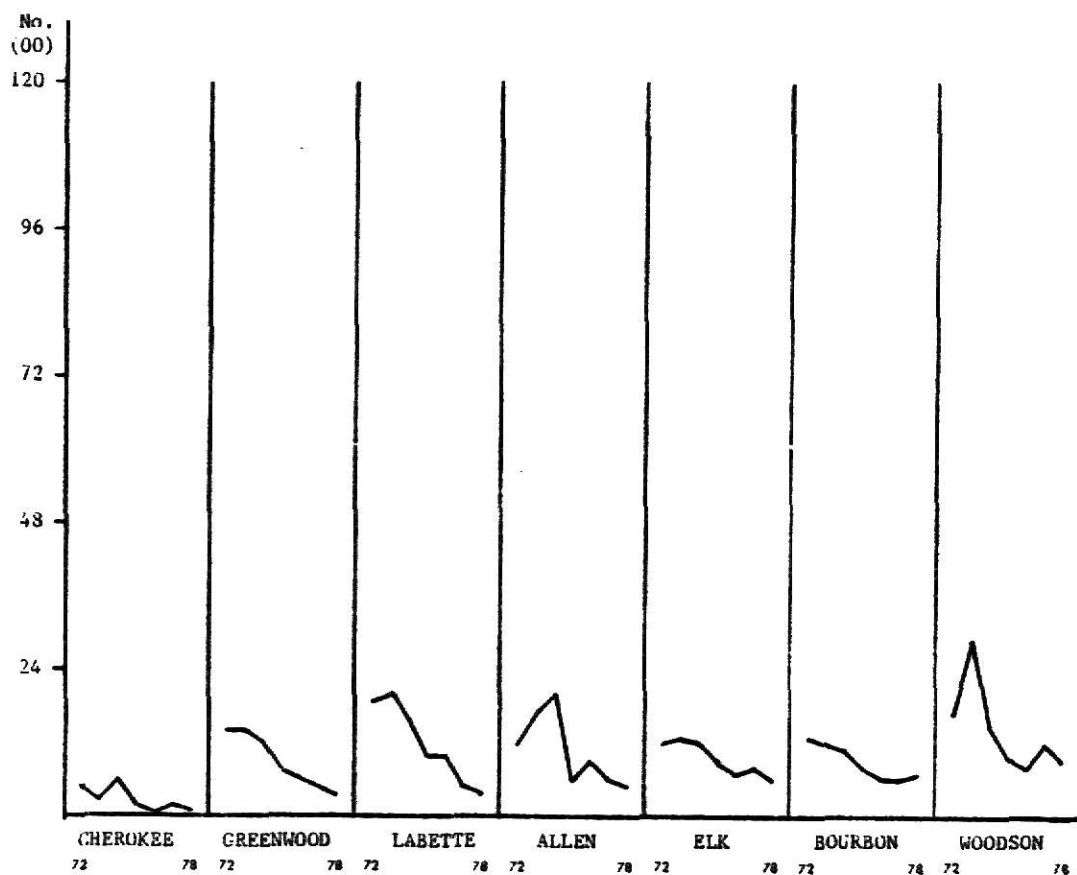


Figure 12. Sheep and Lamb Numbers by Counties, Southeast District, 1972 - 1978.

of the total sheep and lamb numbers in the 11-county district. On January 1, 1978; McPherson, with 5,000 head, was again the largest sheep and lamb producing county in the district. The other major producing counties included: Dickinson, with 3,600 head; Lincoln, with 3,300 head; and Marion, with 2,100 head (Figure 13). The top 4 producing counties contained 73 percent of the total sheep and lambs in the 11-county Central district during 1978. In 1972, the Central district was the 2nd largest sheep and lamb producing district in Kansas. By 1978, the district ranked as the 5th largest sheep and lamb producing district in Kansas.

The sheep and lamb numbers of the North Central district in 1978 were 72.1 percent as large as the district's total in 1972. On January 1, 1972; Republic, with 11,500 head, was the largest sheep and lamb producing county in the district. In addition to Republic, the other major producing counties in the district included: Mitchell, with 7,700 head; Jewell, with 5,500 head; Cloud, with 4,400 head; and Washington, with 4,400 head. The 5 counties represented 70 percent of the 11-county North Central district's total sheep and lambs in 1972. By 1978; Republic, with 8,100 head, was the largest sheep and lamb producing county in the district. Washington, with 7,400 head; Jewell, with 6,100 head; Ottawa, with 4,500 head; and Osborne, with 3,000 head, were the other major producing counties in the district (Figure 14). In 1978, the 5 major producing counties in the district represented almost 85 percent of the total sheep and lamb numbers in the North Central district. In 1972, the North Central was the 3rd largest sheep and lamb producing

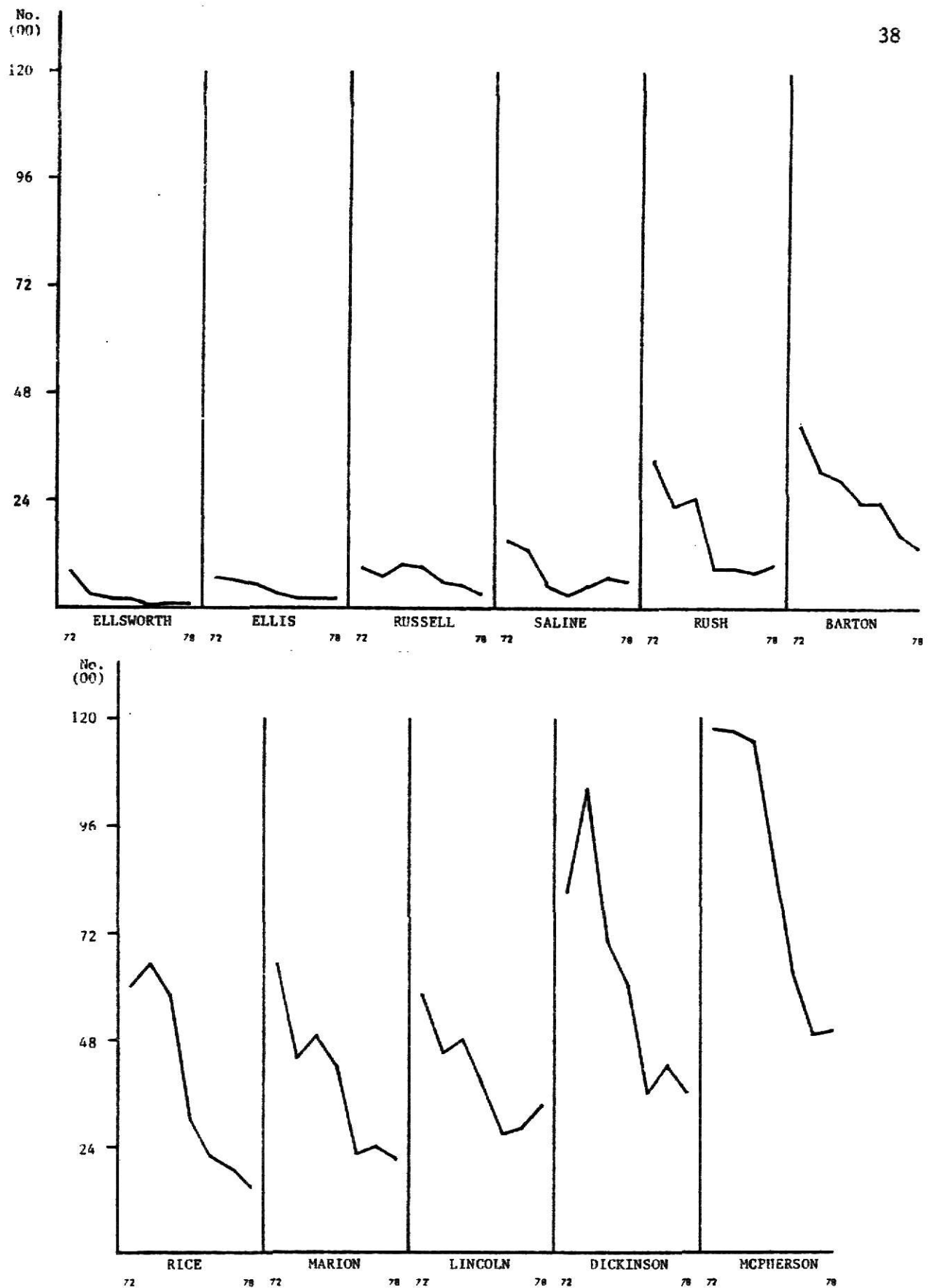


Figure 13. Sheep and Lamb Numbers by Counties, Central District, 1972-1978.

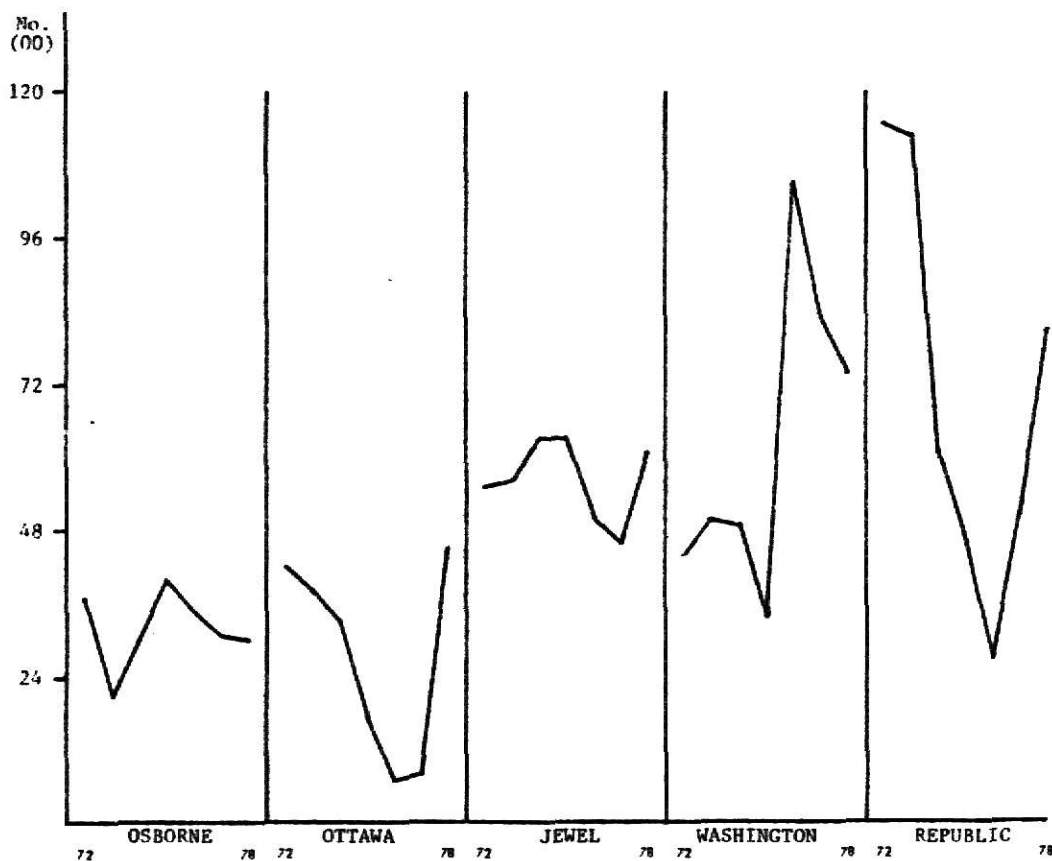
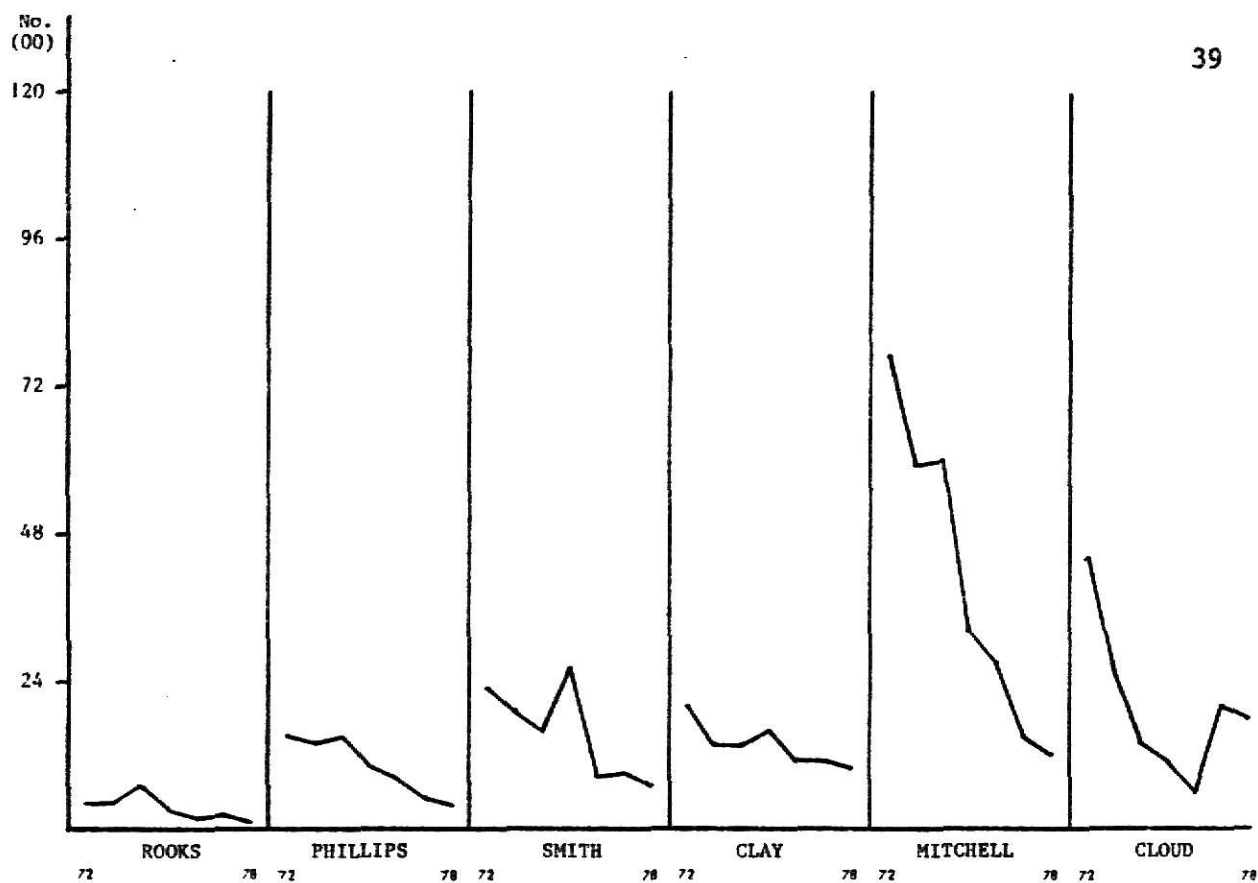


Figure 14. Sheep and Lamb Numbers by Counties, North Central District, 1972-1978.

district in the state. By 1978, the North Central district was the 2nd largest producing district in Kansas.

The sheep and lamb numbers of the South Central district in 1978 were 39.9 percent as large as the 1972 numbers for the district. On January 1, 1972, there were more sheep and lambs in Sedgwick county than in 6 of the 9 districts. In the South Central district, Sedgwick county was the largest producer of sheep and lambs with 41,700 head, followed by Reno with 25,600 head, Harvey with 15,700 head, and Sumner with 11,500 head. The 4 largest producing counties contained 76 percent of the 13-county South Central district's total sheep and lambs. In 1972, 26.5 percent of the total sheep and lambs in Kansas were located in Sedgwick, Reno, Harvey and Sumner counties. By January 1, 1978, Sedgwick county with 19,000 head remained the largest producing county in the South Central district followed by Reno with 13,000 head, Harvey with 6,100 head and Sumner with 3,000 head (Figure 15). The 4 largest producing counties in 1978 contained almost 83 percent of the 13-county South Central district's total sheep and lambs. The South Central district has been the largest sheep and lamb producing district in Kansas every year since 1972.

In 1978, the 4 largest sheep and lamb producing counties in each district represented 85.5 percent of the total in the West Central district, 78 percent in the Northwest district, 78 percent in the Southwest district, 70 percent in the Northeast district, 72 percent in the East Central district, 66 percent in the Southeast district, 73 percent in the Central district, 76 percent in the North Central district, and 83

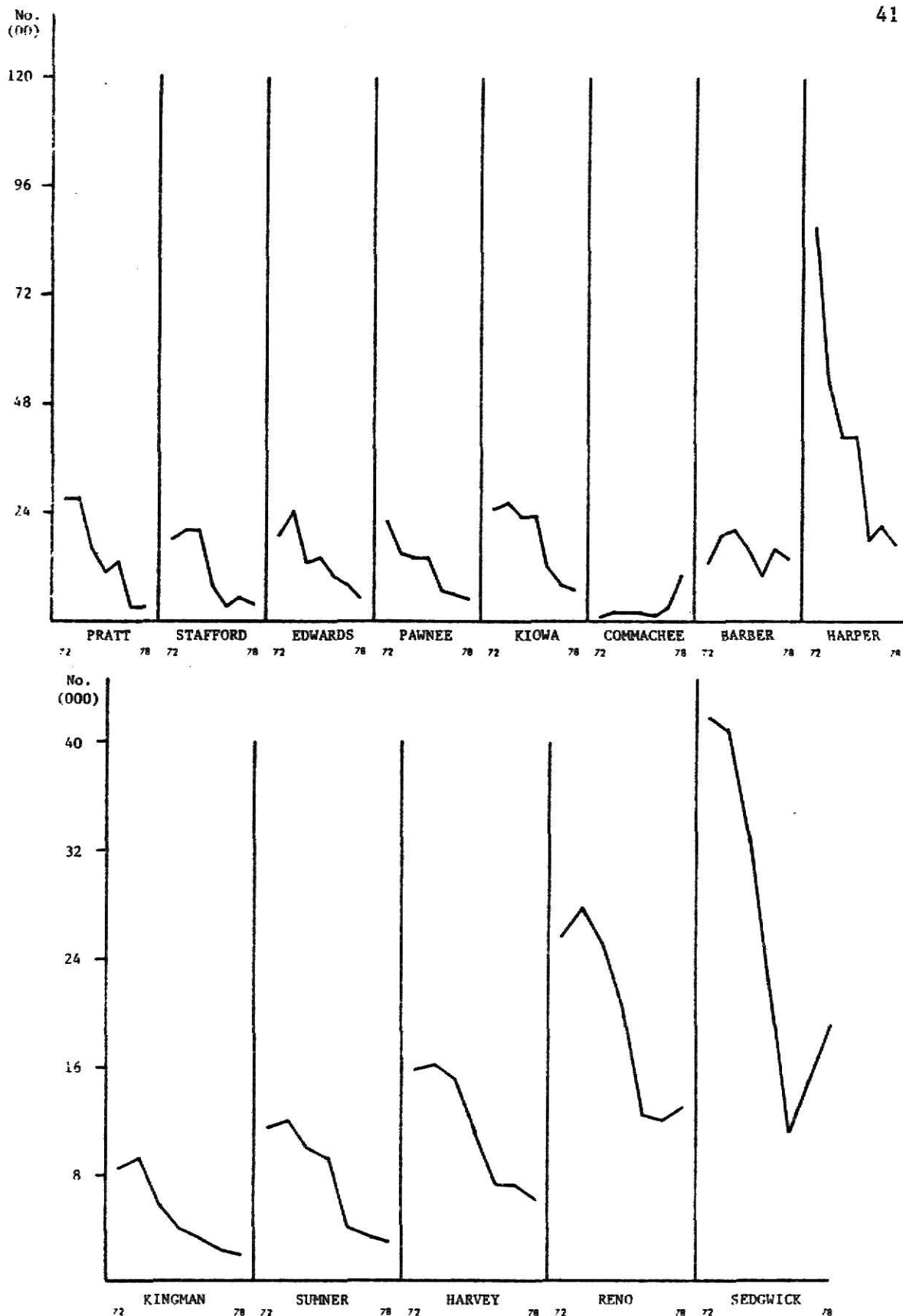


Figure 15. Sheep and Lamb Numbers by Counties, South Central District, 1972-1978.

percent in the South Central district.

There are a number of counties that were the major source of sheep and lambs in the state of Kansas. In Kansas, 28 counties contained 2,000 or more sheep and lambs on January 1, 1978. The total number from these counties was 142,000 head. With this in mind, it can be stated that 27 percent of the counties contained 73 percent of the total sheep and lambs in Kansas.

The 1978 sheep and lamb numbers of each county in Kansas were divided by the number of square miles in the county to get the density of sheep and lambs per square mile by county. The highest number of sheep and lambs per square mile lies in a band just to the east of an imaginary line drawn north to south through the center of the state. The area begins in the Jewell, Republic and Washington county area and continues south to the Harper, Sumner and Cowley county area. The highest numbers per square mile were found in Sedgwick, Reno, Republic, Riley and Wabaunsee counties. Another area of high numbers per square mile was found in the western part of the state in Wichita, Wallace and Gray counties (Figure 16). The density per square mile data can be of use when the location of the slaughter plant is determined. This assumes that the plant would be located in or near an area of the state where the density of sheep and lamb numbers is fairly large.

The population density per square mile can be determined in a similar manner. The population of each county on January 1, 1977 was divided by the number of square miles in the county; this gives the population density per square mile of the county. This information can be

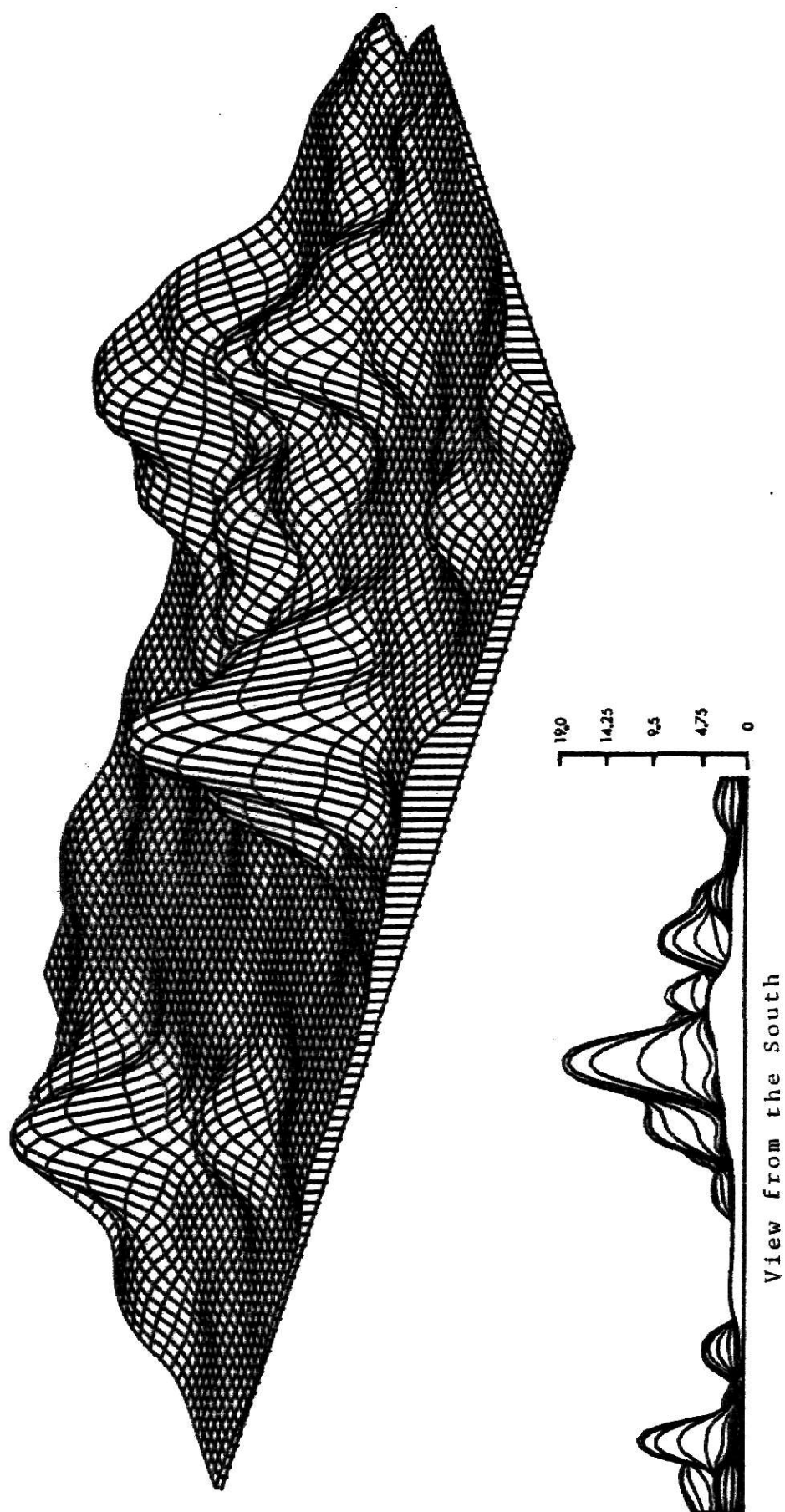


Figure 16. Sheep and Lambs Per Rural Square Mile by Counties, 1978.

of use in the marketing of retail cuts of lamb, with the lamb products moving from the processing plant to the areas of Kansas with the highest population densities. The areas of Kansas with the most people per square mile included Wyandotte, Shawnee, Sedgwick and Johnson counties. These counties with the highest population densities would provide the greatest potential marketing area in Kansas (Figure 17).

Slaughter Lamb Availability

There is a seasonality characteristic of sheep production. The majority of lambing occurs within a 2 or 3 month time span, spring lambs are marketed for another 2 to 4 months and fed lambs for another 2 to 4 months. Lamb producers market their lamb crop at 4 to 6 months of age. Lambs that do not possess the desired slaughter finish and weight are sorted out and sold as feeder lambs. The feeders either go to feedlots or are finished on wheat, alfalfa or regular grass pastures.²⁸

The milk-fat marketing season in Kansas begins in March and by June 77 percent of the milk-fat lambs are marketed. The fed marketing season in Kansas starts in December and by April 76 percent of all feeder lambs have been marketed.²⁹

²⁸ U.S. Department of Agriculture, Farmer Cooperative Service Cooperative Marketing Alternatives for Sheep and Lamb Producers, by David L. Holder, Marketing Research Report No. 1081 (Washington, D.C.: Government Printing Office, 1977), p. 5.

²⁹ U.S. Department of Agriculture, Packers and Stockyards Administration, Economic Research Service, The Lamb Industry: An Economic Study of Marketing Structure, Practices, and Problems, by Gerald Engelman, Everett Stoddard and James Maetzold, P and SA Research Report No. 2 (Washington, D.C.: Government Printing Office, 1973), p. 90.

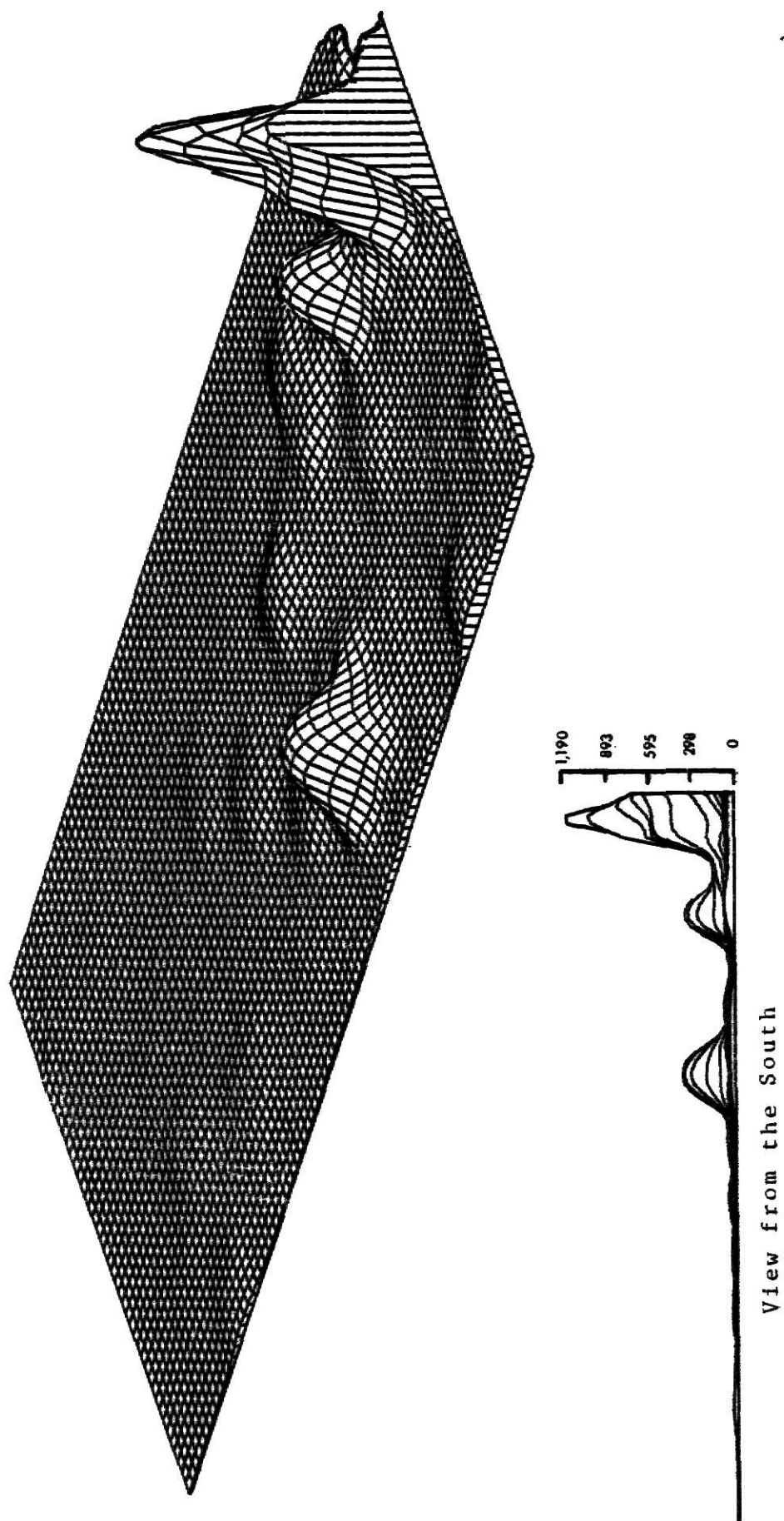


Figure 17. Population Density Per Rural Square Mile, 1977.

In any one area of the U.S. there may be a period of the year when there are not enough slaughter lambs coming to the market and the steady flow of lambs to the packer is disrupted. The packer can modify the effect of seasonal production in a specific region by either of 2 means: the packer can truck in lambs from other areas which have a different seasonal pattern or the packer can implement vertical integration into the operation by feeding lambs for himself.³⁰

When the seasonality of production is examined on a national level the seriousness of supply is nearly eliminated. Lambing in Texas, Arizona and California begins in October, while most other areas of the nation begin lambing in February or March. The spring lambs go to market from April through October and the lambs that are fed go to market from November through March (Figure 18).³¹

Glifford Spaeth, Kansas Sheep Extension Specialist, stated that as a rough guess, 75 to 85 percent of the sheep and lambs marketed in Kansas are handled by 3 main marketers. Two of the 3 are independent dealers who buy and sell all kinds of sheep and lambs; the other one is an operator of a livestock market.³² This information would suggest that over three-fourths of the supply of sheep and lambs in Kansas is handled by 3 main dealers. A proposed plant could be faced with a

³⁰ Holder, Cooperative Marketing Alternatives, p. 5.

³¹ Engelman, et al., The Lamb Industry, pp. 18-19.

³² Interview with Clifford Spaeth, Kansas Sheep Extension Specialist, Kansas State University, Manhattan, Kansas, 12 October 1978.

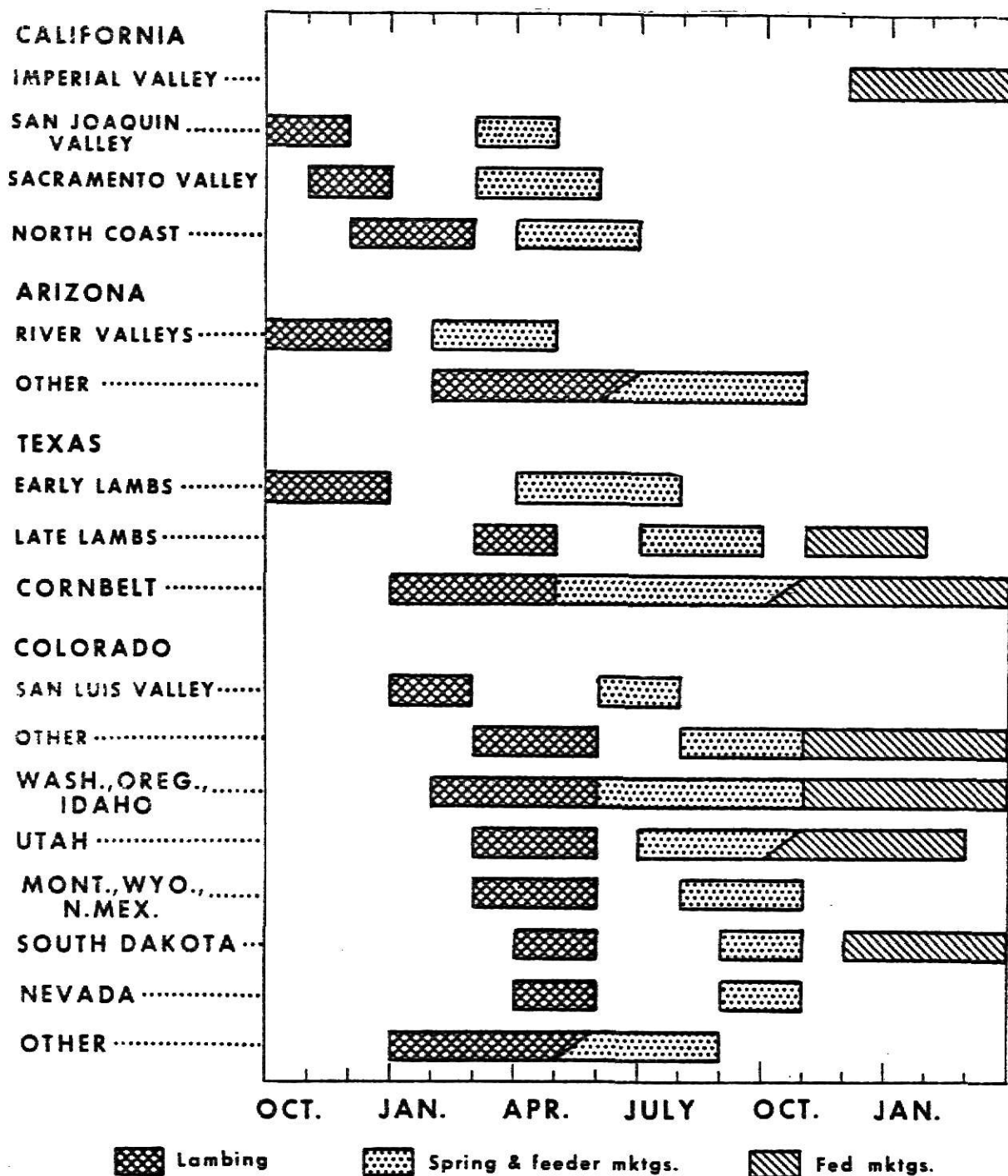


Figure 18. Lambing and Marketing Schedule, 18 Month Cycle.*

*Source: U.S. Department of Agriculture. Packers and Stockyards Administration, Economic Research Service. The Lamb Industry: An Economic Study of Marketing Structure, Practices, and Problems, by Gerald Engelman, Everette Stoddard and James Maetzold. P and S A Research Report No. 2. Washington, D.C.: Government Printing Office, 1973, p. 20.

small number of instate suppliers of market lambs. If 2 of the marketers have already contracted the future delivery of market lambs, the proposed plant may be forced to buy lambs out of state.

Adequate supply of slaughter lambs is a major concern of a packer, whether located in Kansas, Texas or Colorado. Even though there may be an ample supply of Kansas lambs for the 60,000 head kill plant, being able to acquire the needed number to operate at optimum capacity may prove to be a problem. To be able to acquire the number of lambs for the plant in Kansas, there may be a need to contract with producers for later delivery and or the packer may need to operate its own feedlot. The operation of a feedlot would be in direct competition with lamb feeders in the state, but may be necessary if alternative arrangements or contracts for orderly flow of lambs throughout the year can not be arranged.

According to Holder, the statistics of the 1975 sheep industry in Kansas were as follows:³³

1. Of the 129,000 lamb crop, 96,700 were feeder lambs, 16,800 replacements and 15,500 represented spring lambs.
2. Of the 96,700 feeder lambs, 68,000 were fed in the state and 28,700 were exported to other states for feeding.
3. Of the 91,300 sheep and lambs available for slaughter, 7,800 were sheep and 83,500 were lambs.

³³ U.S. Department of Agriculture, Farmer Cooperative Service, Cooperative Marketing Alternative for Sheep and Lamb Producers, by David L. Holder, Marketing Research Report No. 1081 (Washington, D.C.: Government Printing Office, 1977), p. 7.

4. With the actual slaughter of 6,400 sheep and lambs, there were 84,900 exported animals.

During 1975, the lamb crop represented 58.6 percent of the total sheep and lambs in Kansas. Of the 129,000 head lamb crop 74.96 percent were feeder lambs, 13.02 percent were replacements and 12.02 percent were spring lambs. Of the 96,700 total feeder lambs 70.32 percent were fed in the state and 29.68 percent were exported to other states for feeding. The total number of lambs available for slaughter was 83,500, this represented all spring lambs and all lambs fed in the state.

The total number of lambs available for slaughter in 1978 could be estimated by using 1975 sheep statistics and 1978 sheep and lamb numbers. The 1978 lamb crop estimated to represent 58.6 percent of the total sheep and lambs in Kansas, would be 114,270. The 114,270 head lamb crop of 1978 would be made up of 74.96 percent or 85,657 feeder lambs, 13.02 percent or 14,878 replacement lambs and 12.02 percent or 13,735 spring lambs. The 85,657 feeder lambs would be made up as 70.32 percent or 60,234 lambs fed in the state and 29.68 percent or 25,423 lambs exported to other states for feeding. Adding the 13,735 spring lambs to the 60,234 feeder lambs in the state equals 73,969 lambs available for slaughter in Kansas during 1978.

A plant slaughtering 60,000 lambs per year would have an ample supply of slaughter lambs available. Expansion of the lamb feeding facilities in Kansas to handle the 25,423 lambs exported for feeding would provide about 99,392 available lambs for slaughter in the state.

Summary

The 1978 ranking of Kansas districts from highest to lowest production of sheep and lambs was as follows: South Central, North Central, Southeast, West Central, Central, East Central, Northeast, Southwest, and Northwest. By 1978, all but 2 districts in Kansas increased their sheep and lamb numbers from their 1976 levels. On January 1, 1978, the top 3 producing districts, South Central, North Central and Southeast, contained 53 percent of the total sheep and lamb numbers in the state.

On January 1, 1978, there were 28 counties in Kansas that contributed about 73 percent of the total sheep and lambs. A comparison of 1976 county sheep and lamb numbers to 1978 numbers revealed that 47 counties increased their numbers, 46 counties decreased their numbers, and 12 counties numbers were unchanged. By 1978, the major supply of sheep and lambs were found in a group of counties beginning with Jewell, Republic and Washington in the north and moving south to Harper, Sumner and Cowley counties. Wallace and Wichita were also major producing counties in the western part of the state.

The present marketing seasons of slaughter lambs would have to be altered to allow an even flow of lambs to the slaughter plant throughout the year. From October until the fed marketing season begins in December, the supply of market lambs available could be interrupted. During this period, the packer could, if available and economically feasible buy lambs from states already in the fed lamb seasons; such as, Texas, Iowa, Missouri, and Arkansas. Spreading out the lambing season over a longer period of time would expand the milk-fat and fed-lamb marketing

seasons.

In Kansas, 3 main marketers handle over 75 percent of the sheep and lamb marketed. Slaughter lambs presently leave the state destined for slaughter in other states; therefore, a change in present marketing channels would be necessary to allow a steady flow of lambs to the slaughter plant. Before a plant could begin operation, lambs which presently pass through the main marketers on the way to other states would have to be channeled to the plant.

Based upon the estimates, there were 73,969 lambs available for slaughter in Kansas during 1978. Since a plant slaughtering 60,000 lambs per year would need approximately 81 percent of the available Kansas supply, a lamb slaughter plant in Kansas would require the support of the state's sheep producers and marketers. Expanding the feeder lamb facilities in Kansas, to accommodate the 25,423 feeder lambs estimated to be exported to other states for feeding, would provide 99,392 lambs available for Kansas slaughter.

CHAPTER IV

LAMB SLAUGHTER PLANT FEASIBILITY

Slaughter Capacity

Before any investment in a lamb slaughtering, processing and packaging facility could take place the undertaking would have to prove to be profitable. An analysis of the total investment and capital required in addition to the costs of labor, live lambs and other expenses incurred would have to be estimated. The location of the plant would be near a city that is able to supply adequate water, sewage and fire protection in order to meet health and insurance requirements.

Based upon data that indicates the availability of 60,000 slaughter lambs in Kansas annually, the analysis of the plant will consider the operation of a plant with an annual kill of 60,000 slaughter lambs. The plant would operate year round and the flow of lambs would have to be constant throughout the year.

The estimates of the slaughtering, processing and packaging operations were determined for both fresh and frozen products. The total operation and per lamb estimates of the costs and returns were for a plant that slaughters lambs, processes and packages retail cuts of lamb, and transports the finished products to the areas of consumption.

The following assumptions were made to develop the costs and returns of the lamb slaughtering, processing and packaging plant:

1. Ten acres of land would be needed.
2. The capacity of the plant would be 30 head per hour or 60,000 head per year. There would be 2,000 hours of operation per

3. Live lambs weights would average 113 pounds.
4. The carcass weights would average 56.5 pounds.
5. The cutability would average 69 percent.
6. The average retail cuts would weigh 37.91 pounds, the heart 1 pound, the liver 2.5 pounds and other offal 45.09 pounds.
7. The plant would employ one manager, 2 foremen, 1 buyer, 1 salesman, 11 employees on the kill floor, 10 meat cutters, 5 meat wrappers, 3 people moving carcasses and finished products, 3 people for sanitation and 2 secretaries.
8. The building would contain 8,720 square feet of working space. Building costs would be \$55.00 per square foot.

Investment and Costs

Fresh Product

Fixed Costs

The cost of land within a city's industrial park with the required services available was estimated to be \$6,250 per acre. The 10 acres of land would cost \$62,500. The annual cost of land would be included in the interest costs of investment capital.

At a cost of \$55 per square foot, the 8,720 square foot building would cost \$479,600 to construct. The annual depreciation would amount to \$15,987. The building would be built according to regulations and specifications of the United States Department of Agriculture. Although this planned building would be constructed in the conventional manner, i.e., concrete blocks, insulation, etc., recent developments in pre-engineered and pre-fabricated buildings with nearly the same ini-

tial cost can be operated at reduced energy costs.

Equipment costs were taken from price quotations, per specifications, on October 23, 1978.³⁴ The estimated cost of equipment for a plant with an hourly kill of 30 head would be \$146,190 (Table 3). The annual depreciation expense for equipment would be \$7,430.

The amount of property tax assessed the plant depends upon the appraised value of the land, building, and equipment; and the area's mill levy. The formula used to determine the appraised value of property and the mill levy tends to vary throughout the state. The plant could also be financed through the issuance of industrial revenue bonds, this would result in little if any property tax for the duration of the bonds. The property tax assessed the plant was estimated to be \$13,146 for the first year of operation. The property tax was estimated based upon the following assumptions: the land and building would be assessed at 15.5 percent of actual value, the equipment would be assessed at 30.0 percent of purchase price minus depreciation, and the mill levy would equal \$106.21 per \$1,000 of assessed value.

The managerial staff for the plant could include 1 manager at an annual salary of \$31,500, a foreman for the slaughter and a foreman for the processing operations at annual salaries of \$23,500 each, a buyer of live lambs and a salesman for the finished products at annual salaries of \$23,500 each. Two secretaries would also be employed at annual salaries of \$8,960 each. The total cost of the managerial staff would

³⁴ Information pertaining to equipment costs was obtained from Alvin Whitmer, Koch Supplies Inc., Kansas City, Missouri, 23 October 1978.

EQUIPMENT COSTS FOR THE 30 HEAD PER HOUR PLANT

Fresh Product			
Qty.	Description	Annual Depreciation	Total Price
1	Refrigeration System for Processing Room	\$ 183.33	\$ 5,500.00
1	Refrigeration System for Cooler or Freezer	416.67	12,500.00
1	Overhead Rail for Entire Plant	166.67	5,000.00
1	Band Saw	200.00	2,000.00
1	Boning Table	75.00	1,500.00
1	Hydraulic Press	900.00	18,000.00
1	Cleaner	1,000.00	20,000.00
1	Sink	35.00	350.00
1	Conveyor	150.00	3,000.00
1	Vacuum Packing Machine	500.00	10,000.00
1	Table	25.00	500.00
1	Table	30.00	600.00
1	Grinder	133.33	2,000.00
1	Mixer	333.33	5,000.00
1	Grinder	133.33	2,000.00
1	Conveyor	150.00	3,000.00
1	Patty Machine	350.00	7,000.00
1	Finished Product Racks	600.00	12,000.00
1	Entrance Door	22.50	450.00
1	Hoist	95.00	950.00
1	Lander	65.00	650.00
6	Shackles for the Lander	24.00	240.00
1	Bleed Rail	33.17	995.00
1	Blood and Water Drain	3.33	100.00
1	Sticking Platform	6.33	190.00
1	Transfer Platform	33.17	995.00
1	Evisceration Platform	66.50	1,995.00
1	Inspection Platform	76.50	2,295.00
5	Lavatories and Knife Boxes	150.00	1,500.00
1	Head Cabinet	22.50	450.00
1	Viscera Table	44.50	890.00
1	Head Table	80.00	800.00
1	Viscera Inspection Table	95.00	950.00
1	Pluck and Gullet Table	34.50	690.00
1	Track Scale	150.00	1,500.00
200	Trollies, Heavy Duty	80.00	1,600.00
50	Sheep Logs	500.00	5,000.00
1	Refrigeration System for Chill Cooler	266.67	8,000.00
1	Refrigeration System for Holding Cooler	200.00	6,000.00
TOTAL FOR FRESH PRODUCT		\$7,430.33	\$146,190.00
Frozen Product			
Addition of			
1	Freezer Tunnel	4,000.00	80,000.00
TOTAL FROZEN PRODUCT		\$11,430.33	\$226,190.00

would amount to \$143,420 per year.

Variable Costs

The labor requirements for the plant includes 11 kill floor employees at \$7.33 per hour, 10 meat cutters at \$7.53 per hour, 5 wrappers at \$6.44 per hour, 3 product movers at \$6.44 per hour and 3 sanitation employees at \$5.25 per hour. The hourly wages were estimates of average wages that prevail in Kansas. The wages would have to be adjusted depending upon the area of the state the plant is located. The given wages per hour reflect an average of the pay scales for the Wichita area Amalgamated Meat Cutters and Butcher Workmens' Union of North America, Number 340 and pay scales at various rural areas in Kansas. The wages fairly well represent a composite average between union metropolitan and non-union rural areas of Kansas pay scales.

The total wages of the employees represent hourly wages and benefits provided by the employer. Benefits which are equal to an additional 28 percent of the base wage, include 2 weeks vacation, FICA, Federal and State unemployment insurance, workmens' compensation, health and pension plans. The annual cost of labor per job type would be: \$161,260 for the kill floor employees, \$150,600 for the cutters, \$64,400 for the wrappers, \$38,640 for the product movers and \$31,500 for the sanitation employees (Table 4). The total annual cost of labor would be \$446,400.

The utilities required for the plants' operation were estimated from the annual utility requirements for a beef slaughtering plant. An adjustment was made to the requirements for the smaller animals and the

TABLE 4
LABOR COST SCHEDULE

	Employee Job Type				
	Kill Floor	Cutters	Wrappers	Movers	Sanitation
Hourly Wage	\$5.73	\$5.88	\$5.03	\$5.03	\$4.10
Benefits	<u>1.60</u>	<u>1.65</u>	<u>1.41</u>	<u>1.41</u>	<u>1.15</u>
Total Wage	\$7.33	\$7.53	\$6.44	\$6.44	\$5.25
Annual per Employee	\$14,660	\$15,060	\$12,880	\$12,880	\$10,500
Number of Employees	11	10	5	3	3
ANNUAL PER JOB TYPE	\$161,260	\$150,600	\$64,400	\$38,640	\$31,500
TOTAL FOR ALL LABOR	\$446,400				

absence of inedible rendering and hide-curing operations with the lamb plant. The annual cost for gas and electricity was estimated to be \$17,788.24, the water and sewage annual cost estimate was \$6,883.76. The total utilities cost per year would be \$24,672.

Legal fees will depend upon the amount of work required of an attorney, an estimate would be an average of \$300 a month or \$3,600 per year. The annual cost of insurance for the operation would be \$8,062. This estimate is based upon the following breakdown: building \$5,800, equipment \$1,392, finished product \$620, and miscellaneous equipment and supplies \$250 per year.

The telephone expense was estimated to be \$300 a month or \$3,600 per year. The travel expense allows for the buyer and salesman to be on the road and away from the plant 2.5 days per week. At a cost of \$30 per day per employee, the annual cost of travel for both employees would be \$7,800 and covers traveling expenses, meals and overnight accommodations.

Office equipment expense covers office equipment, supplies and services for an estimated annual cost of \$3,572. Miscellaneous equipment costs per year, includes equipment for the laborers, such as helmets, safety guards, frocks, hooks, knives and supplies, were estimated to be \$5,141.

To provide transportation for the manager, buyer, salesman and/or other employees, two mid-size cars and a pickup truck with standard equipment would be leased on an annual basis. The base lease for the 3 vehicles was estimated to be \$8,280 per year, with the addition of insur-

ance and maintenance of \$900 per year, the total annual cost would amount to \$9,180.

The last step in processing the lamb involves packaging and placing the product in a box for shipping. The packaging pouches average \$.0443 per bag. Each lamb requires 19 bags, the annual cost for the packaging material would be \$50,502. A waxed packing box large enough to hold all retail cuts from one lamb would cost \$.70, in addition, for safety of the product a cardboard support divider costing \$.20 would be used. The total cost of the box for the meat at \$.90 per lamb would amount to \$54,000 annually.

Working capital, the firm's investment in cash, accounts receivable and inventories was estimated to be \$400,000. Assuming that all working capital was borrowed at 9.0 percent, the annual interest cost would be \$36,000. The estimated interest on investment capital of \$688,290 for the land, building, and equipment at 11.1 percent would be \$76,400 per year. The rates of interest were believed to fairly well represent the present rates at commercial lending institutions. Evaluators should work with community leaders, lenders and others to find the most advantageous basic plan to finance the project.

Analysis of Costs

The analysis of costs based upon the available data were computed as total costs and as per head costs of the operation. The per head costs were based upon an annual slaughter of 60,000 lambs.

The total cost of the land, building, and equipment would be \$688,290. The building and equipment would have an annual depreciation expense of \$23,417 or \$.39 per head. The property tax for land, building,

and equipment for the first year of operation would be \$13,146 or \$.22 per lamb. Managerial staff would cost \$143,420 annually or \$2.39 per head. The total fixed costs would amount to \$179,983 annually or \$3.00 per lamb.

The labor would be required to slaughter, process, and package 60,000 lambs per year would cost \$446,400 or \$7.44 per head. The utilities for the plant would cost \$24,672 annually or \$.41 per lamb. Legal fees of \$3,600 annually would cost \$.06 per lamb. Insurance for the building, equipment, supplies, and finished products would amount to \$8,062 annually or \$.13 per head. The estimated telephone expense of \$3,600 per year would cost \$.06 per lamb. Travel expenses estimated at \$7,800 annually would cost \$.13 per head.

Office equipment with an estimated cost of \$3,572 annually would cost \$.06 per lamb. Miscellaneous equipment costs estimated to be \$5,141 annually would cost \$.09 per head. The 3 vehicles estimated to cost \$9,180 per year would cost \$.15 per lamb. Annual packaging costs of \$50,502 were estimated to cost \$.84 per lamb. Finished product boxes would cost \$54,000 annually or \$.90 per head. The interest on working capital, estimated to be \$36,000 annually, would have a per head cost of \$.60. Interest on investment capital, estimated to be \$76,400 annually, would have a per head cost of \$1.27.

The total variable costs of the operation would be \$728,929 annually or \$12.15 on a per lamb basis. The total fixed and variable costs of the operation were estimated to be \$908,912 annually or \$15.15 per lamb (Table 5).

ANALYSIS OF COSTS FOR THE OPERATION

Fresh Product		
Fixed Costs	Annual Cost	Per Head Cost
LAND (10 acres @ \$6,250/A.)	*	*
BUILDING (8,720 ft. ² @ \$55/ft. ²)	\$ 15,987	\$.2665
EQUIPMENT	<u>7,430</u>	<u>.1238</u>
Subtotal	23,417	.3903
PROPERTY TAX	13,146	.2191
MANAGERIAL STAFF		
MANAGER	31,500	.5250
2 FOREMEN	47,000	.7833
BUYER	23,500	.3917
SALESMAN	23,500	.3917
2 SECRETARIES	<u>17,920</u>	<u>.2986</u>
Subtotal	\$143,420	\$ 2.3903
TOTAL FIXED COSTS	\$179,983	\$ 2.9997
Variable Costs		
LABOR		
11 KILL FLOOR EMPLOYEES	\$161,260	\$ 2.6877
10 CUTTERS	150,600	2.5100
5 WRAPPERS	64,400	1.0733
3 PRODUCT MOVERS	38,640	.6440
3 SANITATION EMPLOYEES	<u>31,500</u>	<u>.5250</u>
Subtotal	446,400	7.4400
UTILITIES	24,672	.4112
LEGAL FEES	3,600	.0600
INSURANCE	8,062	.1344
TELEPHONE	3,600	.0600
TRAVEL EXPENSE	7,800	.1300
OFFICE EQUIPMENT	3,572	.0595
MISCELLANEOUS EQUIPMENT	5,141	.0857
2 CARS AND A TRUCK	9,180	.1530
PACKAGING	50,502	.8417
PRODUCT BOXES	<u>54,000</u>	<u>.9000</u>
Subtotal	170,129	2.8355
INTEREST ON WORKING CAPITAL (@ 9.0%)	36,000	.6000
INTEREST ON INVESTMENT CAPITAL (@ 11.1%)	<u>76,400</u>	<u>1.2733</u>
Subtotal	112,400	1.8733
TOTAL VARIABLE COSTS	\$728,929	\$12.1488
TOTAL FIXED AND VARIABLE COSTS	\$908,912	\$15.1485

* The annual and per head costs of land were accounted for in the annual interest costs of investment capital.

TABLE 5-continued

Frozen Product		
	Annual Cost	Per Head Cost
ADDITIONAL EQUIPMENT	\$ 4,000	\$.0667
ADDITIONAL INTEREST (@ 11.1%)	<u>8,880</u>	<u>.1480</u>
Subtotal	12,880	.2147
TOTAL FIXED AND VARIABLE COSTS - FROZEN	\$921,792	\$15.3632

Frozen Product

The processing plant could be adapted to produce frozen retail cuts of lamb when equipment to freeze the product after packaging is required. The other operations of the facility would easily adjust to the production of frozen lamb products.

A retail marketing analysis would be required to determine whether the retail cuts of lamb should be in a fresh or frozen form. There would be differences in consumer and retailer preferences depending upon the location of the sales area or the condition of the sale. East coast buyers may desire to use the retail cuts soon after purchase, where as midwestern buyers may desire to keep the lamb for a longer period.

To convert the fresh lamb processing operation into one which produces frozen lamb products would require the addition of an \$80,000 freezer tunnel, with an annual depreciation expense of \$4,000 or \$.06 per lamb. The additional capital required to purchase the freezer tunnel would be borrowed at 11.1 percent, annual interest costs would be \$8,880 or \$.15 per lamb. The addition of the freezing process to the plant's

operation adds \$.21 to the per lamb costs of production. The total fixed and variable costs for slaughtering, processing, packaging and freezing would be \$921,792 or \$15.36 per lamb (Table 5).

Income

Retail Cuts

The value of retail cuts of lamb varies over the time and in different sales areas of the United States. In order to develop data for this study, the value of the lamb cuts was received from a northeast Kansas retail grocery outlet on October 4, 1978. The plant would be selling its' products on a wholesale basis where as the retailer's prices were on a retail basis. The retail price of the cuts have been adjusted since a retailer pointed out that the prices included a 17.5 percent markup on the total cuts. The markup was the percentage the retailer added to the price of the lamb carcass to cover his costs and profit of processing the lamb into retail cuts. In the case of the northeast Kansas retailer, he added 17.5 percent to the lamb carcass value to cover his costs of processing the lamb and the profit he expected to receive.

A live lamb weighing 113 pounds would have an estimated carcass weight of 56.5 pounds. The processed carcass would yield 37.91 pounds of retail cuts. Depending upon the way it is processed, the lamb carcass would yield 14.08 pounds of leg, 3.43 pounds of loin chops, 3.4 pounds of rib chops, 2.52 pounds of arm chops, 5.58 pounds of blade chops, 2.11 pounds of boneless stew, 1.45 pounds of bone-in-neck, 1.3 pounds of shank, 2.42 pounds of spare ribs and 1.62 pounds of lean trim.

Based upon the retailer's data, the 37.91 pounds of retail cuts would have a value of \$87.88. The retailer's 17.5 percent markup on the total cuts equalled \$13.08. Subtraction of the markup from the value of the retail cuts would give an adjusted value for the retail cuts of \$74.80.

Other Products

The prices for the heart, liver, pelt and other offal were estimated by the Department of Animal Science at Kansas State University. The value of these products represent what a small packer in Kansas would receive if he did not maintain an inedible rendering and pelt curing operation.

The estimated value of 1 pound of heart at \$.45 per pound would be \$.45; 2.5 pounds of liver at \$.72 per pound would be worth \$1.80; the 45.09 pounds of offal at \$.055 a pound would have a value of \$2.48; and the pelt is estimated to have a value of \$5.75. The total value of these products would be \$10.48.

A packer in Kansas could expect to receive \$74.80 for the retail cuts and \$10.48 for the other products, this would amount to a total value of \$85.28 for each processed lamb (Table 6).

Net Return

Kansas

Transportation rates from a location in central Kansas to the area of the state with the highest population density per square mile would need to be added to the cost of processed lamb. The Motor Carriers rate for transporting boxed meat 191 to 200 miles would be \$.92 per hun-

TABLE 6

POUNDS OF SALABLE PRODUCTS PER SLAUGHTER LAMB, VALUE OF
EACH PRODUCT AND TOTAL VALUE OF EACH PROCESSED LAMB

Retail Cuts			
<u>Salable Pounds/Lamb</u>	<u>Product</u>	<u>Price/Pound</u>	<u>Total Value</u>
14.08	Leg	\$2.79	\$39.28
3.43	Loin Chops	3.16	10.84
3.40	Rib Chops	2.99	10.17
2.52	Arm Chops	2.19	5.52
5.58	Blade Chops	2.09	11.66
2.11	Boneless Stew	1.79	3.78
1.45	Bone-in-Neck	.69	1.00
1.30	Shank	1.19	1.55
2.42	Spare Ribs (Riblets)	.89	2.15
1.62	Lean Trim	1.19	1.93
37.91	Total Retail Cuts		\$87.88
MARKUP ADJUSTMENT OF 17.5 PERCENT			<u>-13.08</u>
RETAIL CUTS VALUE			\$74.80
Other Products			
1.00	Heart	\$.45	\$.45
2.50	Liver	.72	1.80
45.09	Other Offal	.055	2.48
11.30	Pelt @ \$5.75 each		5.75
59.89	Total Other Products		\$10.48
97.80	TOTAL VALUE OF PROCESSED LAMB		\$85.28

dredweight for 38,000 pounds.³⁵ It would require almost 4 days production of 918 boxes of lamb products to fill a transport trailer. A 41.4 pound box consists of 37.91 pounds of retail lamb cuts, 1 pound of heart, and 2.5 pounds of liver. The cost of transportation would be \$.38 per processed lamb.

Based upon the available data, a summary of the costs and returns for the lamb slaughtering, processing, and packaging facility could be determined. The cost of a 113 pound live lamb at \$60.50 per hundred-weight would be \$68.36; plus \$15.15 for slaughtering, processing, and packaging; and \$.38 for transportation; for a total cost of \$83.89 per lamb.³⁶ The total processed value of the lamb was estimated to be \$85.28. The before tax return of the operation would be \$1.39 per lamb or \$83,400 annually.

The amount of federal and state income taxes paid by the plant would depend upon the type of tax structure the firm operates under. For purposes of this study, it was assumed that the firm would operate in the 30 percent tax bracket. The income taxes paid by the plant would be \$25,200 annually or \$.42 per lamb. The net return after taxes, for the operation, would be \$58,200 or \$.97 per lamb (Table 7).

Freezing the lamb products adds \$.22 per head to the costs of production, this reduces the before tax return to \$1.17 per lamb or \$70,200

³⁵ Information pertaining to transportation costs was obtained from Curt Kreutzer, Kansas Motor Carriers Association, Topeka, Kansas, October 1978

³⁶ Costs were rounded to the nearest cent; however management should be aware that exact costs and returns could have a major impact on total profit or loss, given a large volume.

TABLE 7

SUMMARY OF COSTS AND RETURNS FOR LAMB MARKETING IN KANSAS

	Value Per Head
LIVE LAMB (113# @ \$60.50/cwt.)	\$68.3650
SLAUGHTERING, PROCESSING AND PACKAGING COST	15.1485
TRANSPORTATION COST (191 to 200 miles)	.3809
TOTAL COST	83.8944
TOTAL RETAIL VALUE	85.2800
BEFORE INCOME TAX RETURN	1.3856
INCOME TAX ON RETURN	.4156
NET RETURN PER LAMB	.9700
NET RETURN FOR THE OPERATION	\$58,200

annually. The estimated income taxes would amount to \$.35 per lamb or \$21,000. The after tax return from the production of frozen lamb would be \$.82 per lamb or \$49,200 annually.

New York

In the event the packer could not find an adequate sales area in Kansas to market the finished product, the boxed lamb products would have to be shipped to an area with a higher per capita consumption of lamb. The transportation rate from Kansas City, Kansas to the New York City area for boxed meat would be \$3.43 per hundredweight for 38,000 pounds on a truck transport.³⁷ This would amount to a cost of \$.03 per

³⁷ Information pertaining to transportation costs was obtained from Curt Kreutzer, Kansas Motor Carriers Association, Topeka, Kansas, October 1978.

pound or \$1.42 per box of lamb products. Before any shipment to New York could be feasible, the packer would have to receive an additional \$1.42 per lamb. To maintain the same net return, the Kansas packer would have to receive \$78.47 for each box of fresh lamb products or \$78.69 for each box of frozen lamb products shipped to New York. This assumes that the offal and pelt would still be marketed at the same price as before.

CHAPTER V

FINANCIAL ANALYSIS

Breakeven Analysis

In a breakeven analysis, the breakeven point can be defined as that period of production when all costs incurred from the operation are equal to the revenue received. Operation of the plant above the breakeven point would return a profit, this occurs since all annual fixed costs are paid and the production for the rest of the year would incur only variable costs.

The breakeven point would be found by dividing the annual fixed costs of \$179,983 by the difference between the processed lamb value of \$85.28 and the variable costs per lamb of \$80.89. A plant slaughtering, processing and packaging 240 lambs per day and shipping the finished products to a sales area in Kansas would have a breakeven point of 41,042 lambs or 171 days of production (Table 8).

TABLE 8

BREAKEVEN ANALYSIS

<u>Fresh Lamb Sold in Kansas</u>	
F = ANNUAL FIXED COSTS	= \$23,417 + 13,146 + 143,420 = \$179,983
V = VARIABLE COSTS PER LAMB	= \$68.3650 + 12.1488 + .3809 = 80.8947
P = PRICE PER LAMB	= 85.2800
X = VOLUME OF OUTPUT	= 41,042 Lambs

X = F / (P-V)	
X = \$179,983 / (\$85.28 - 80.8947)	
X = \$179,983 / \$4.3853	
X = 41,042.346	

In the New York market, with transportation charges of \$1.42 added to the price of a box of fresh lamb products, the breakeven point would be the same. Operation of the plant above the breakeven point up to 60,000 lambs would return a before tax profit of \$4.39 per lamb or \$83,400 annually. The addition of income taxes to the variable costs of production would increase the breakeven point for fresh products to 45,339 lambs or 189 days of production.

Freezing the lamb products adds \$.15 to the variable costs of the plant's operation and \$4,000 to the annual fixed costs. This increases the before tax breakeven point to 43,420 lambs or 181 days of production for the Kansas and New York markets. This assumes that the lamb products would be \$1.42 higher in New York. With frozen lamb products, operation of the plant above the breakeven point up to 60,000 lambs would return a before tax profit of \$4.24 per lamb or \$70,200 annually. The addition of income taxes to the variable costs of production would increase the breakeven point for frozen products to 47,345 lambs or 197 days of production.

Financial Ratios

To evaluate the plant with financial ratios, an estimate of current assets would be required. Since a cash flow analysis was not determined for the firm, it was assumed that the plant would have an average of \$400,000 in working cash, accounts payable, and inventories throughout the year. Total assets of \$1,088,290 would be made up of \$688,290 as fixed assets and \$400,000 as current assets. The total annual sales of the plant would equal 60,000 lambs times \$85.28 or

\$5,116,800.

The ratio of sales to fixed assets measures the turnover of plant and equipment. Total sales of \$5,116,800 were divided by net fixed assets of \$688,290 to get the fixed asset turnover which equals 7.43 times. Each dollar spent on fixed assets generates \$7.43 in sales. This indicates that the fixed assets were generating a sufficient amount of sales for the plant.

The total asset turnover ratio measures the turnover of all the plant's assets. It was calculated by dividing total sales of \$5,116,800 by the total assets of \$1,088,290 which equals 4.7 times. Each dollar invested in total assets generates \$4.70 in sales. Most firms try to maintain a ratio between 4 to 8. The plant's ratio was within the acceptable range and indicates that the total assets were generating a sufficient amount of sales. Since the current assets were estimated, a cash flow analysis would be required to verify the ratio's value.

The return on sales was computed by dividing the after tax return of \$58,200 by the \$5,116,800 of total sales, this equalled 1.14 percent. Most meat packing companies maintain a 1 to 2.5 percent return on sales. The plant's 1.14 percent return was within the industry's normal range.

The ratio of net profit to total assets measures the return on total investment in the plant. Profits of \$195,800 before interest and income taxes was divided by total assets of \$1,088,290, this equalled 18.00 percent. The return on total investment value indicated that the plant had a good profit margin on sales and an adequate turnover of total assets.

The return on total investment after interest deductions was 7.66 percent. The rate of return dropped substantially when interest charges were subtracted from the returns. This indicated that the firm was heavily financed with debt capital. The financial structure of the investment capital can have a major impact on the profits of a firm.

The rate of return on total investment after interest and income tax deductions was 5.35 percent. This ratio represents the return on total investment after all deductions and could be referred to as the return for management of the operation.

It was assumed in the analysis of costs of operation for the plant that all working capital and all investment capital were provided by creditors. Any change in financing from all debt capital to another mix would change the amount of interest charges, the before tax return, and the after tax return. The owners would have to adjust their financing to contain a combination of common and preferred stocks, debt financing, and owner's equity. Generally firms acquire less than 50 percent of their financing from creditors any greater percentage would place control of the firm in the hands of the creditors.

CHAPTER VI

SUMMARY

In 1977, over 97 percent of the sheep and lambs marketed in Kansas left the state destined for slaughter plants in other states. The transportation and shrinkage expenses incurred reduced the income of Kansas sheep producers. A lamb slaughter plant located in Kansas near the areas of production would eliminate the expense of shipping lambs out of state and increase the income of the state's sheep producers.

Before a lamb slaughter plant could be realized there would have to be an adequate supply of lambs available for slaughter. The first objective of the report was to study the historical supply situation and determine whether there was an adequate supply of lambs available for Kansas slaughter.

The prices Kansas farmers and ranchers received for lambs have averaged an annual increase of 13.1 percent since 1972, while the number of sheep and lambs in the state reached an all time low in 1976 and then increased the next two years. Prices were only partially responsible for increasing the interest in the state's sheep industry, the "Blueprint for Expansion" goals of 1985 were also credited with increasing sheep production.

On January 1, 1978, there were 28 counties in Kansas that contained 73 percent of the state's sheep and lamb production; 16 of these increased their number from 1976 to 1978. A group of counties in central Kansas beginning with Jewell, Republic and Washington and contin-

uing south to Harper, Sumner and Cowley contained one-fourth of the total area of the state. This same area contained 52 percent of the total sheep and lambs in the state. Location of a slaughter plant within this region would place it nearest the area of greatest production, thus transportation and shrinkage expenses could be reduced and sheep producers income increased.

The declining trend in sheep production has adversely affected lamb slaughtering plants in the United States, which need a steady supply of lambs to operate at peak efficiency. It was estimated that the large plants, over 1,000 head kill per week, were operating at 50 percent capacity or less. The "Blueprint for Expansion" goals, which in the long run would provide more lambs for slaughter, could in the short run withhold 1 to 2 million lambs from the market. Increasing the production of lambs could help to lower the estimated 136,400 weekly shortage of lamb carcasses.

The 1978 lamb crop was estimated to be 114,270 head, it would be made up of 85,657 feeder lambs, 14,878 replacement lambs and 13,735 spring lambs. The estimated lambs available for slaughter throughout the year would equal 99,392 head. Without an expansion of lamb feeding facilities, 25,423 lambs would be exported to other states for feeding. This would lower the number of lambs available for slaughter in Kansas to 73,969 head. With either situation, a plant slaughtering 60,000 lambs per year would have an adequate supply of lambs available in Kansas.

The seasonality of lamb production in Kansas could disrupt the steady flow of lambs to the plant from October through December. During

this period lambs could be purchased in Texas, Iowa, Missouri and Arkansas. These states would be marketing fed lambs during this period. To further assure a steady flow of lambs to the packer, present marketing channels would need to direct the supply of lambs to the plant.

The second objective analyzes the estimated costs and returns of a facility slaughtering, processing, and packaging 30 lambs per hour or 60,000 head per year. Before any investment in a proposed plant could be realized the venture would have to prove to be financially sound.

An analysis of the estimated costs of production revealed that land, building and equipment would cost \$.39 per head, property taxes would amount to \$.22 per lamb, and managerial staff \$2.39 per head, for a total fixed cost of \$3.00 per head. Estimated variable costs per head were: labor \$7.44, utilities \$.41, legal fees \$.06, insurance \$.13, telephone \$.06, travel expense \$.13, office equipment \$.06, miscellaneous equipment \$.09, 2 cars and a truck \$.15, packaging \$.84, product boxes \$.90, interest on working capital \$.60, and interest on investment capital \$1.27. Total variable costs would be \$12.15 per head. The total fixed and variable costs of production would be \$15.15 per lamb.

The value of a 113 pound live lamb at \$60.50 per hundredweight was \$68.36; plus \$15.15 for slaughtering, processing, and packaging; and \$.38 for transportation of the finished product to a sales area in Kansas. The total costs of producing fresh lamb products would be \$83.89 per lamb. The total value of each processed lamb was estimated to be \$85.28. The after tax net return would be \$.97 per processed lamb. The annual after tax net returns for a plant processing 60,000 lambs would be \$58,200. A plant processing 240 lambs per day would reach the breakeven

point at 189 days or 45,339 lambs. Operation of the plant above this point returns a profit, annual fixed costs would be paid and the variable costs of production would be the only costs the plant incurs for the rest of the year.

Freezing the lamb products adds \$.22 per head to the costs of production. The after tax returns would be \$.82 per lamb or \$49,200 annually. The additional costs of producing frozen lamb products increases the breakeven point to 47,345 lambs or 197 days of production.

The packer could also ship the lamb products to areas of greater per capita lamb consumption, such as New York City. Transportation to New York would add \$1.42 to the per lamb costs. In order to maintain at least the same net return, regardless of which market, the packer would have to receive \$1.42 more for each box of lamb products shipped to New York.

Financial ratios of the plant indicated that the firm would make efficient use of its' fixed assets and total assets. The return on net sales of the firm were nearly equivalent to the return of most meat packing companies. The return on total investment, after interest and income tax deductions, was estimated to be about 5.35 percent. This would be the return for management of the operation.

In summary, based upon the available data there would be 60,000 lambs available to a lamb slaughtering, processing and packaging facility located in Kansas. Given good management practices and the present price relationship, investment in the plant would be financially sound with either fresh or frozen production. The highest return would be available to the fresh lamb production. Locating a lamb processing

plant in Kansas near the areas of production would eliminate the expenses incurred from shipping live lambs to other states for slaughter. This would increase the income of Kansas sheep producers, and as the incomes rise, additional interest in expansion of the state's sheep would be generated.

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APPENDIX

CUMULATIVE SHEEP AND LAMB NUMBERS
BY DISTRICTS, 1972-1978

No.
(000)

82

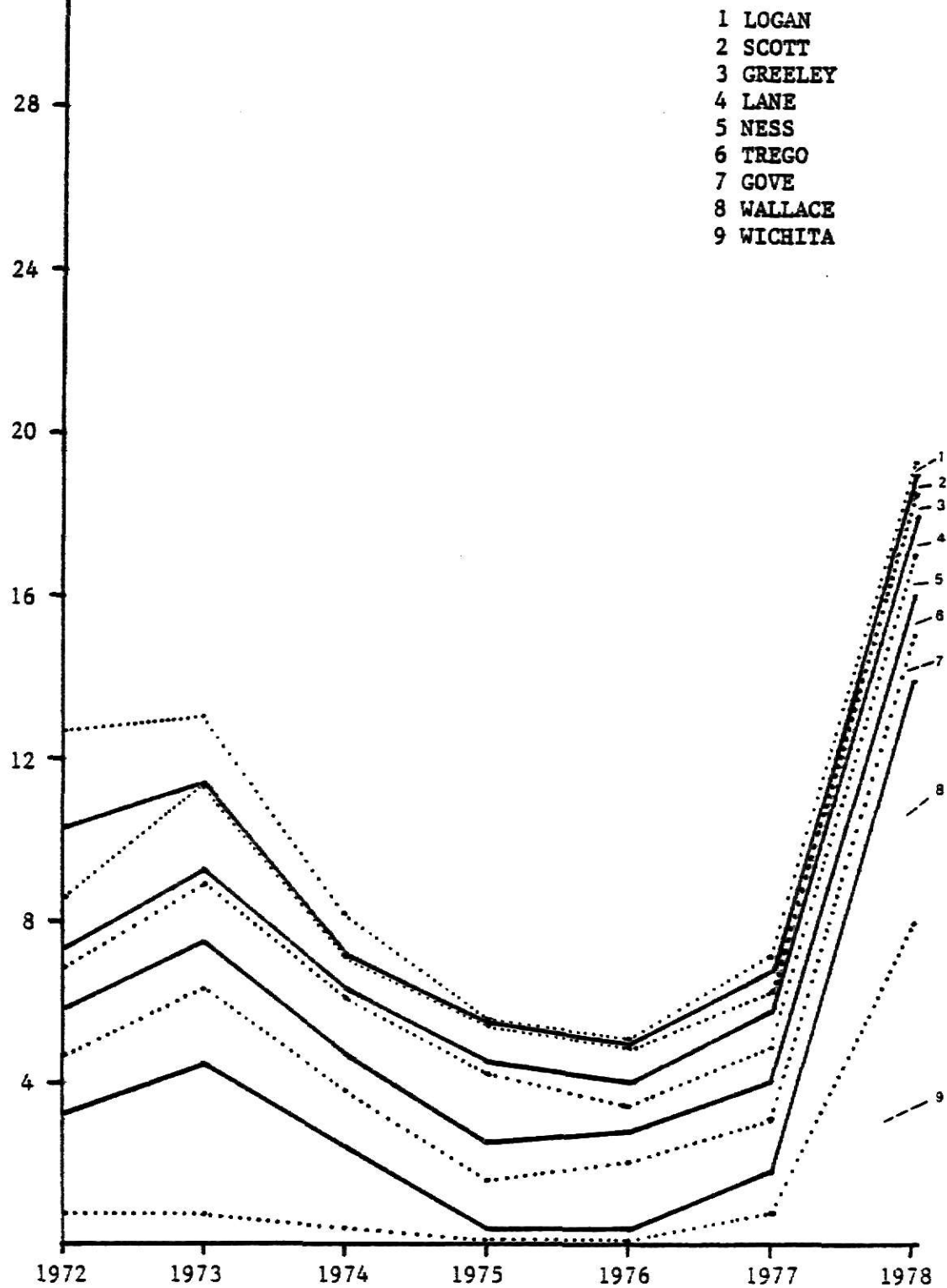


Figure 19. Cumulative Sheep and Lamb Numbers, West Central District, 1972 - 1978.

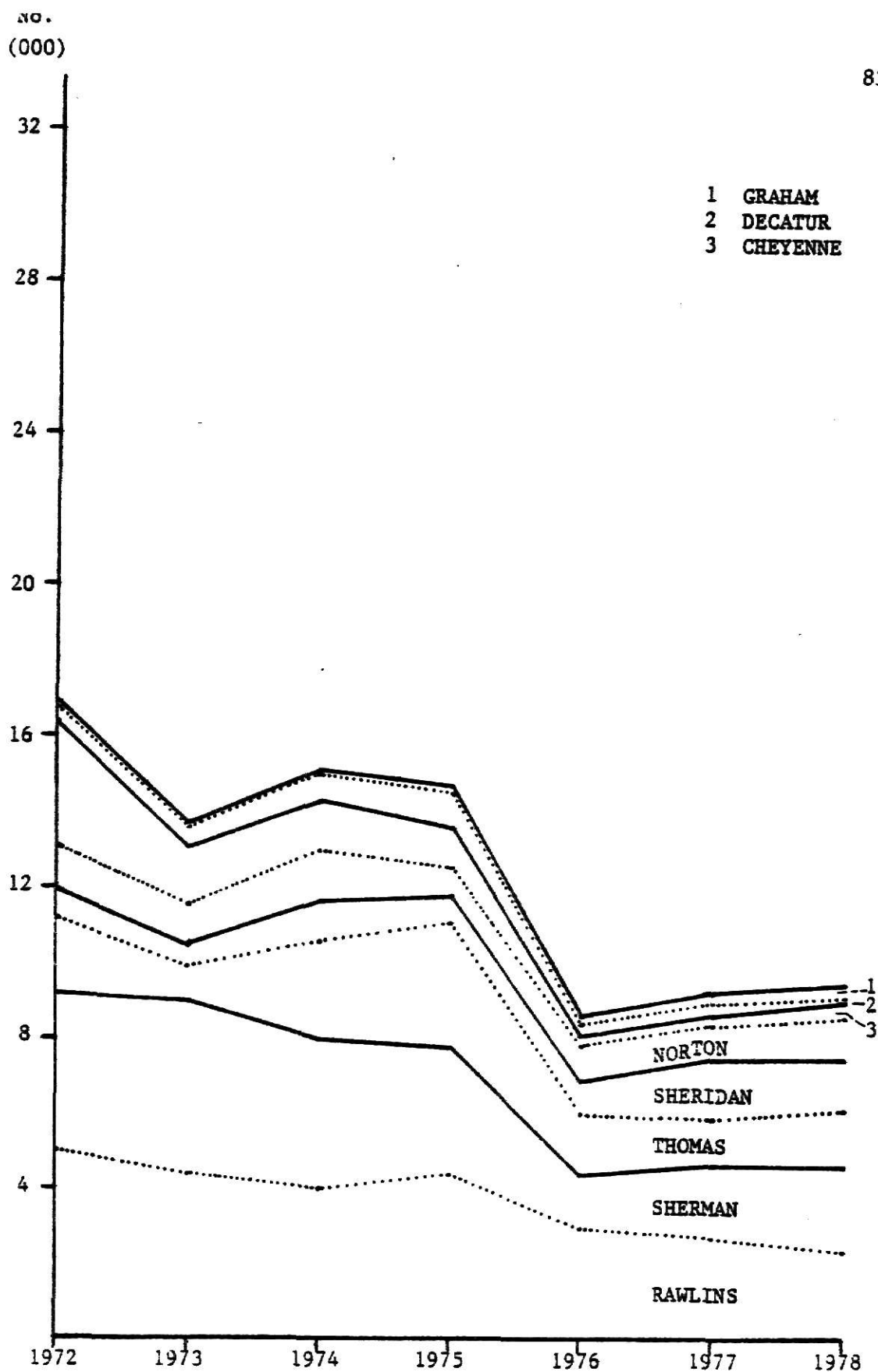


Figure 20. Cumulative Sheep and Lamb Numbers, Northwest District, 1972 - 1978.

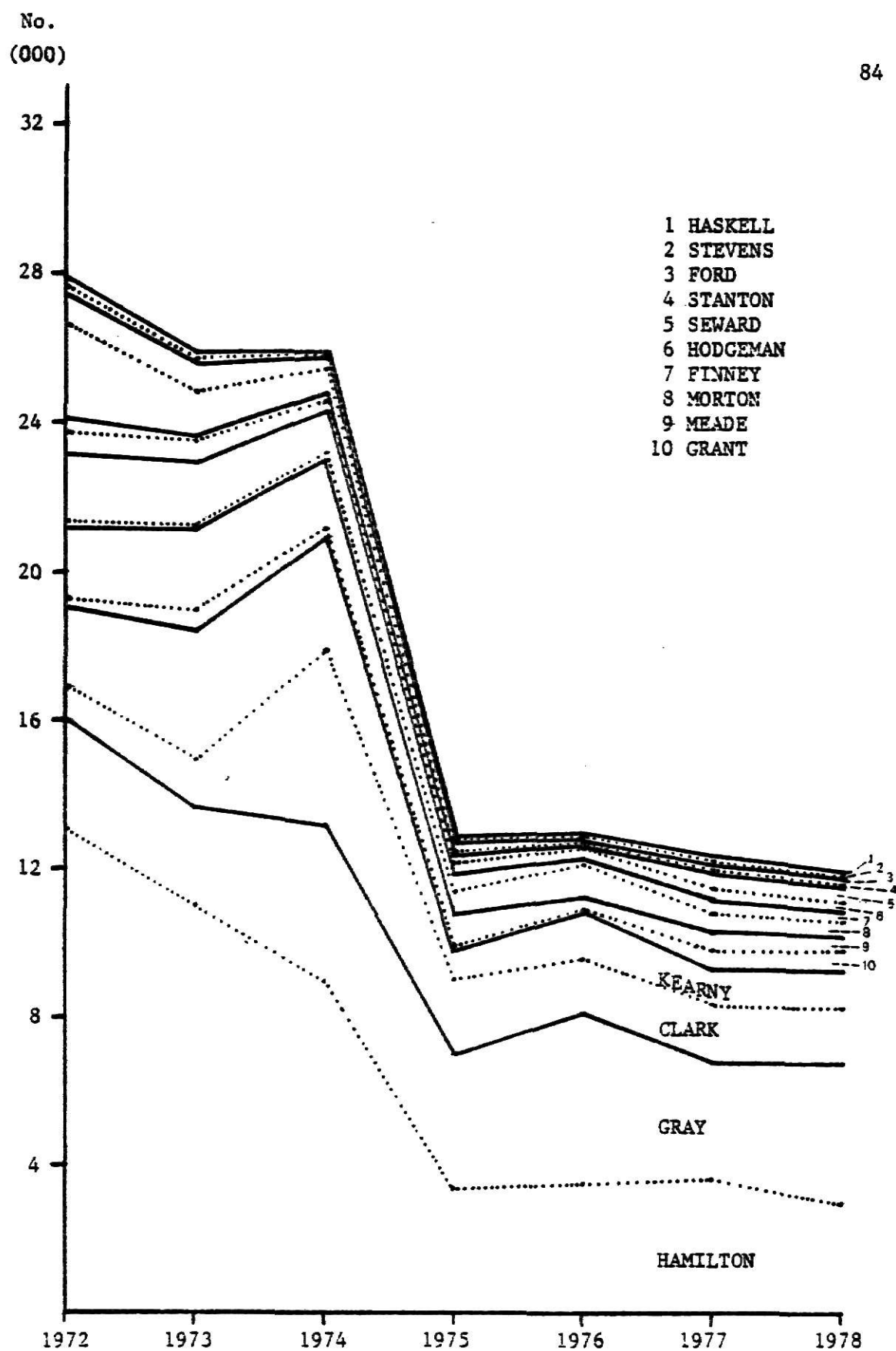


Figure 21. Cumulative Sheep and Lamb Numbers, Southwest District, 1972 - 1978.

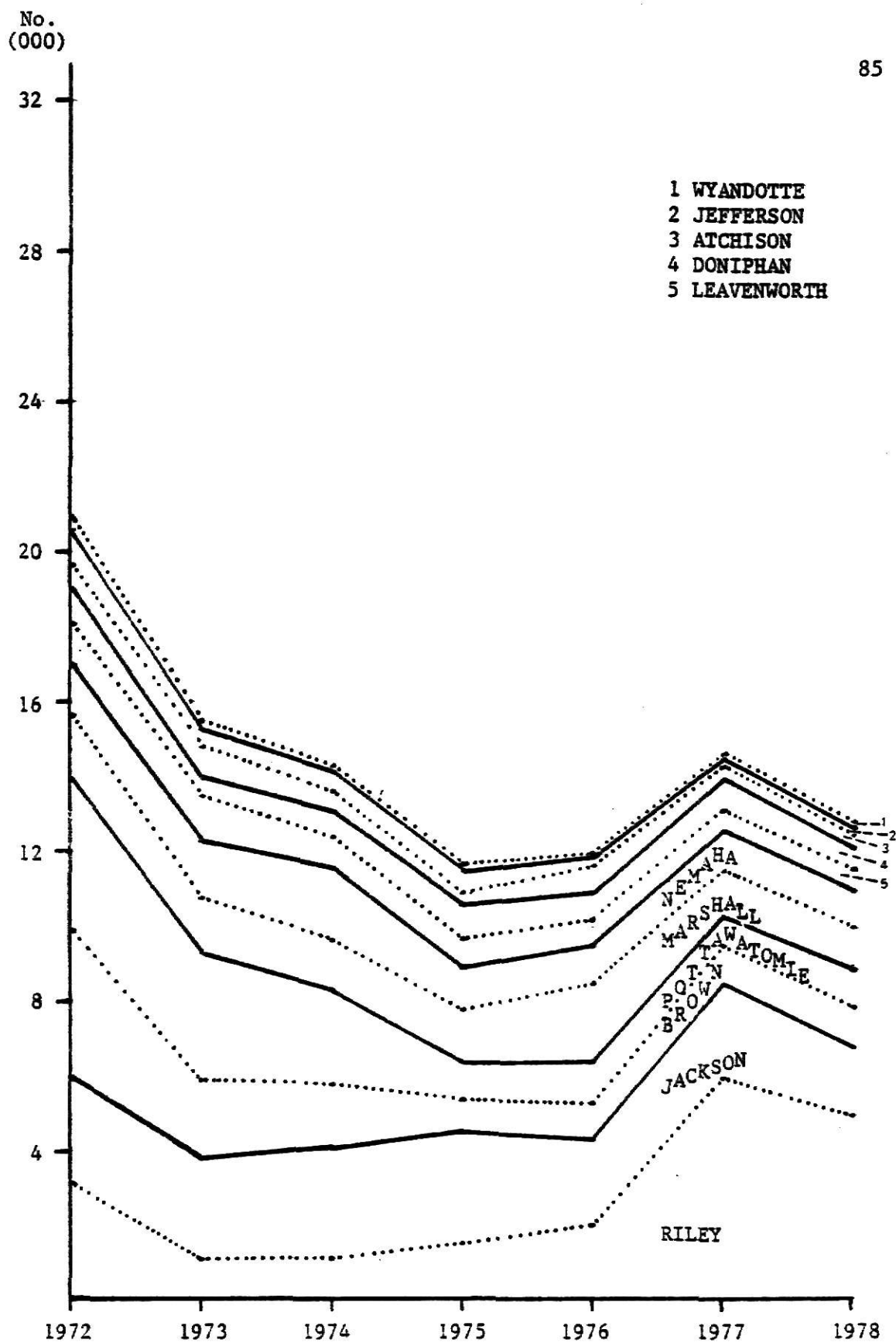


Figure 22. Cumulative Sheep and Lamb Numbers, Northeast District, 1972 - 1978.

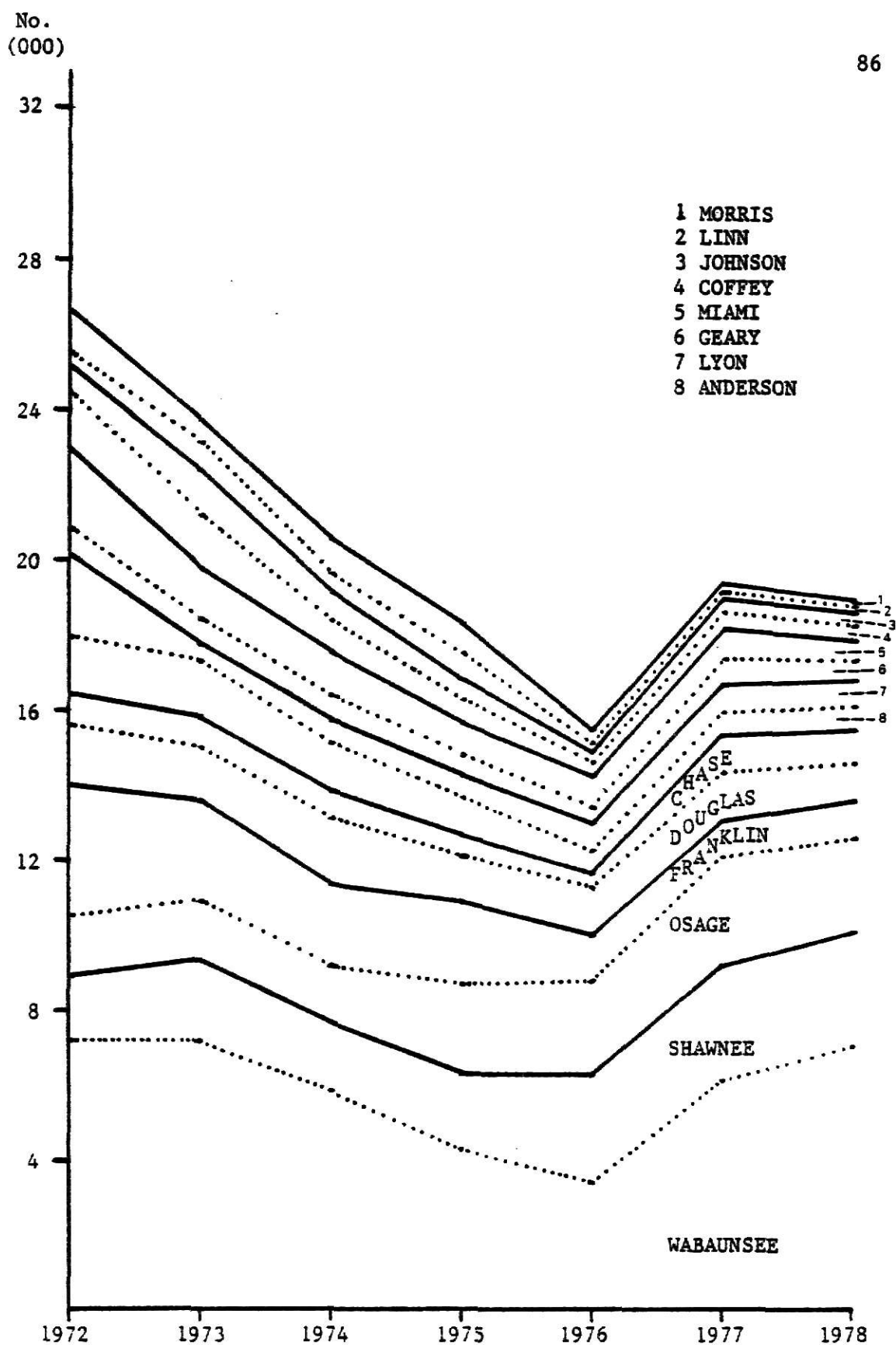


Figure 23. Cumulative Sheep and Lamb Numbers, East Central District, 1972 - 1978.

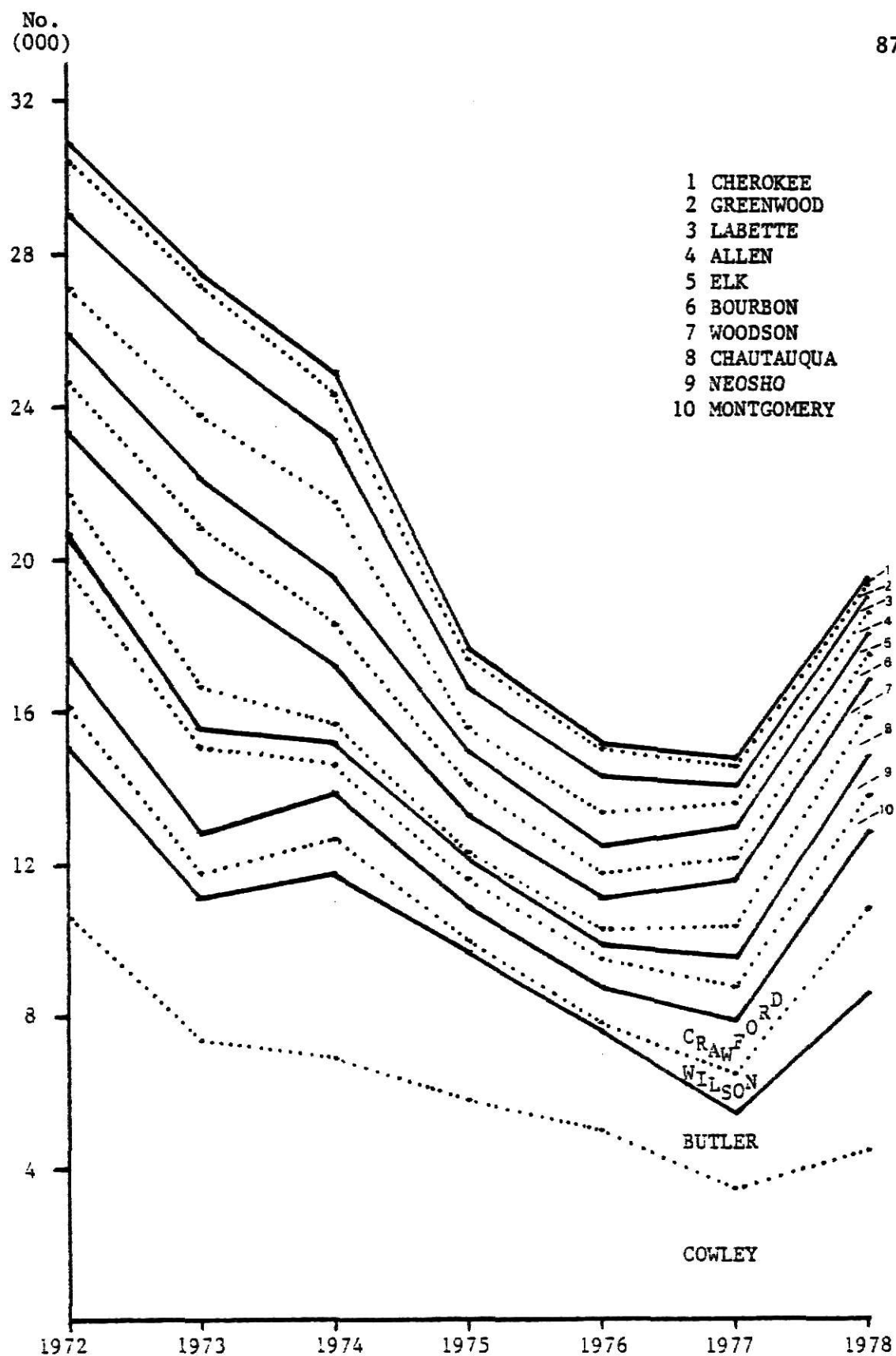


Figure 24. Cumulative Sheep and Lamb Numbers, Southeast District, 1972 - 1978.

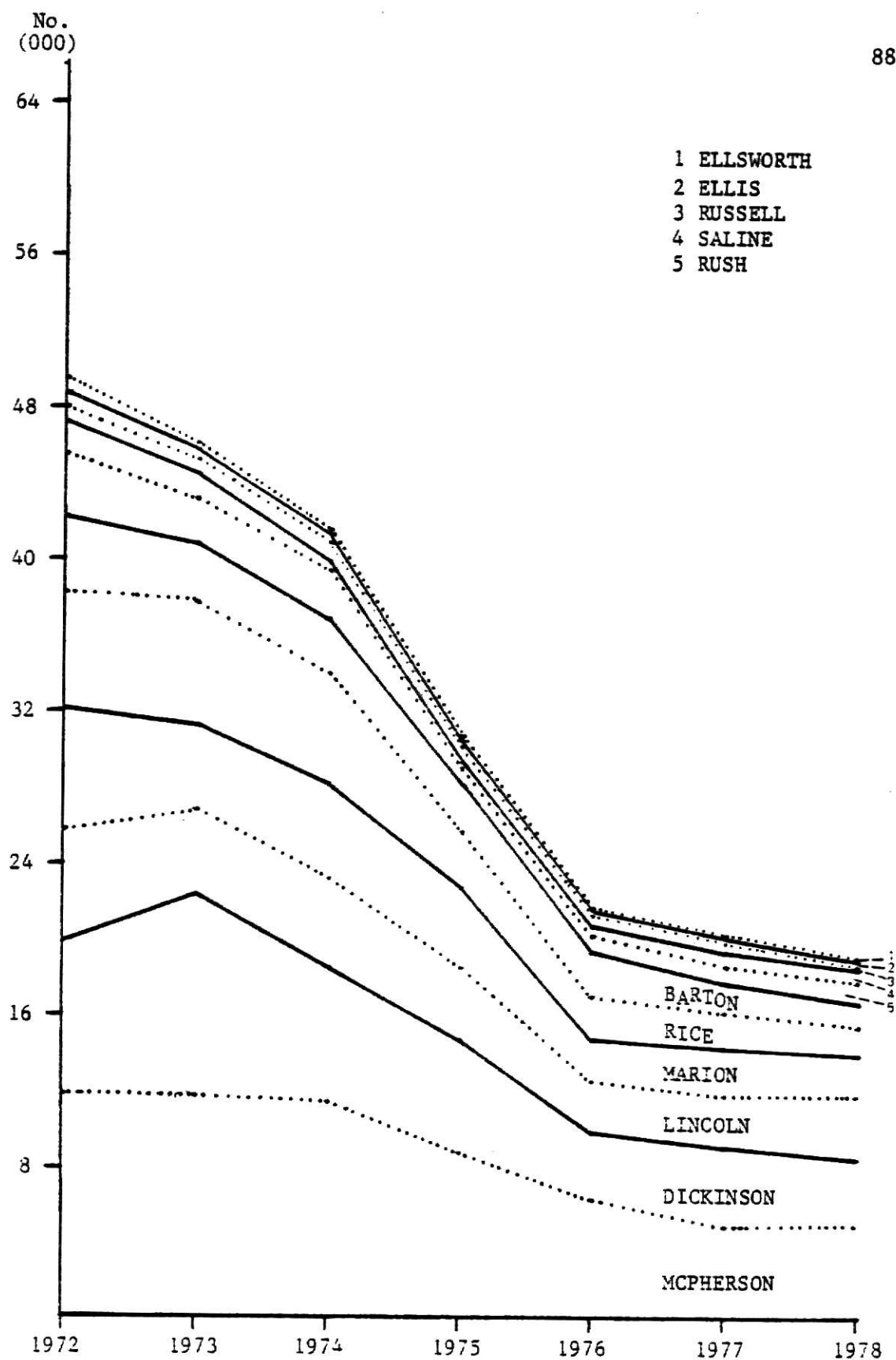


Figure 25. Cumulative Sheep and Lamb Numbers, Central District, 1972 - 1978.

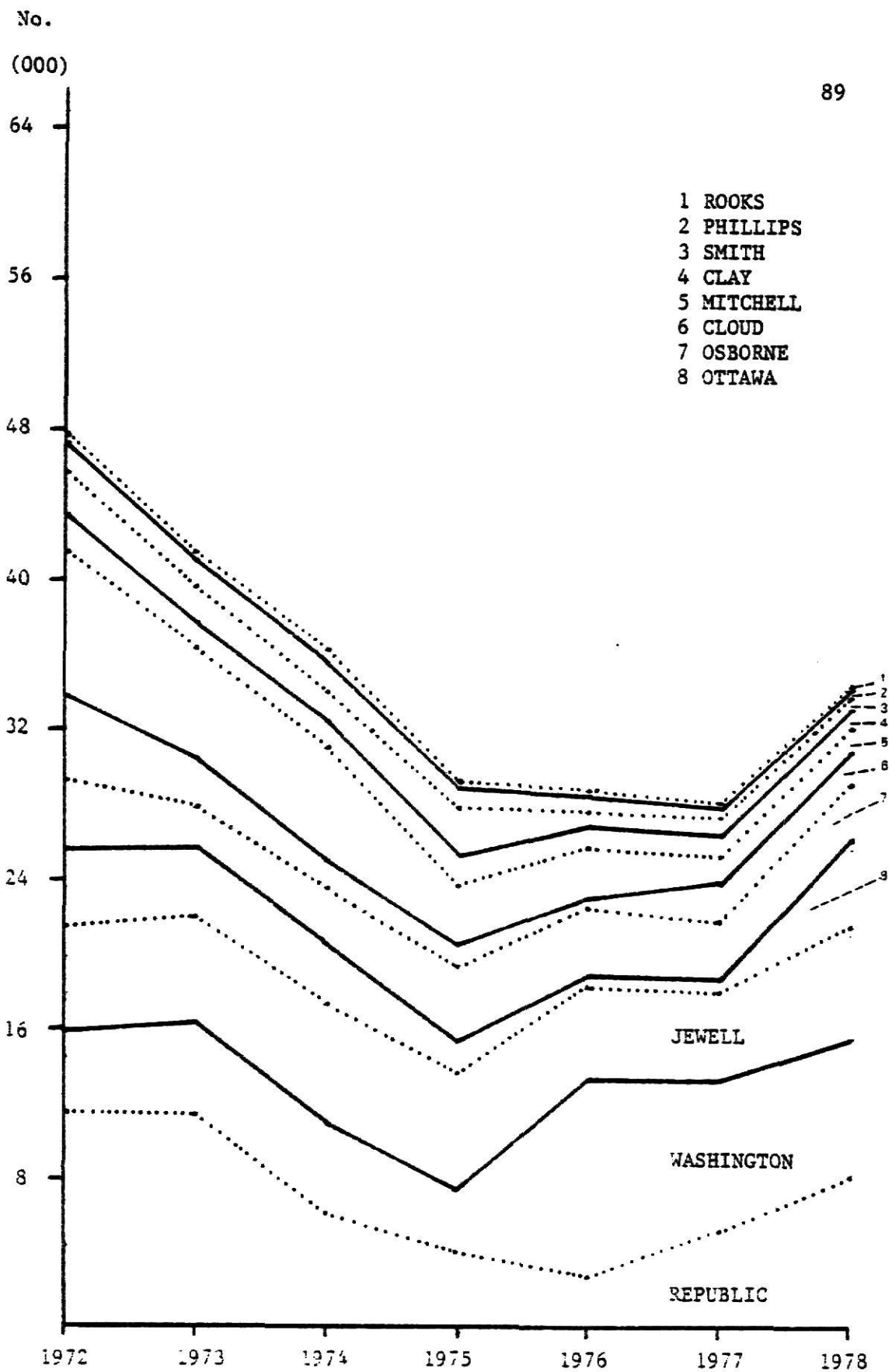


Figure 26. Cumulative Sheep and Lamb Numbers, North Central District, 1972 - 1978.

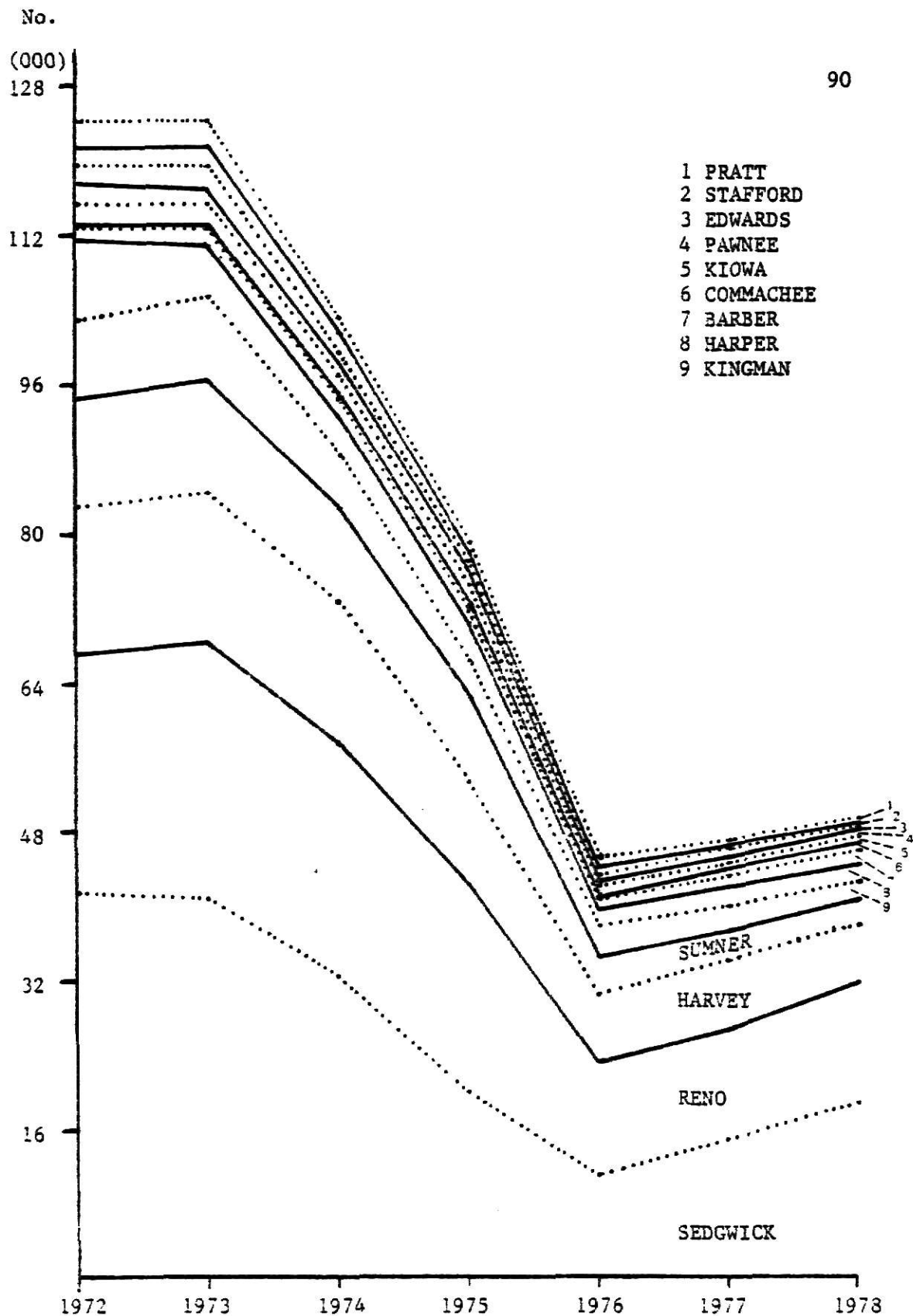


Figure 27. Cumulative Sheep and Lamb Numbers, South Central District, 1972 - 1978.

FEASIBILITY STUDY OF A LAMB
SLAUGHTERING, PROCESSING AND PACKAGING
FACILITY LOCATED IN KANSAS

by

ROBERT EUGENE HEIMERMAN

B.S. Kansas State University, 1977

AN ABSTRACT OF A MASTER'S REPORT

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Agricultural Economics

KANSAS STATE UNIVERSITY

Manhattan, Kansas

1979

ABSTRACT

In 1977, over 97 percent of the total sheep and lambs marketed in Kansas were exported to other states for slaughter. The transportation and shrinkage expenses from exporting sheep and lambs out of state reduces Kansas sheep producers' incomes. A lamb slaughter plant located in Kansas would eliminate the expenses of exporting lambs, thus, Kansas sheep producers' income would be increased.

Before a slaughter plant could be realized there would need to be an adequate supply of lambs available for slaughter. One objective of this report was to study the historical supply situation to determine whether there would be an adequate supply of lambs available for Kansas slaughter.

Sheep and lamb numbers reached an all time low of 165,000 head on January 1, 1976, then increased 18 percent by 1978. The renewed interest in the state's sheep industry stems from: an average increase of 13.1 percent annually since 1972 in the prices Kansas farmers receive for their lambs, and the attempts of sheep producers to achieve the "Blueprint for Expansion" goals of 1985.

The production of sheep was not spread evenly across the state. On January 1, 1978, 27 percent of the counties contained 73 percent of the total sheep and lamb numbers in Kansas. The 1978 lamb crop was estimated to be 114,270 head; of this number, 73,969 lambs would be available for Kansas slaughter. In Kansas, 3 main marketers handle over 75 percent of the sheep and lambs marketed. Since a plant slaughtering 60,000 lambs per year would need approximately 81 percent of the available Kansas supply, a lamb slaughter plant in Kansas would re-

quire the support of the state's sheep producers and marketers.

The seasonality of lamb production in Kansas could disrupt the steady flow of lambs to the plant from October until the fed marketing season begins in December. During this period fat lambs could be purchased in Texas, Iowa, Missouri and Arkansas.

Another objective of this report analyzed the estimated costs and returns of a facility slaughtering, processing, and packaging 30 head per hour or 60,000 lambs per year. Based upon the available data, the after tax return for the plant would be \$.97 per lamb or \$58,200 annually for production of fresh lamb products. Production of frozen lamb products reduced the after tax return to \$.82 per lamb or \$49,200 annually.

Given good management practices and the present price relationships, investment in the lamb processing plant would be a financially sound venture. Locating a plant in Kansas would eliminate the expense of exporting lambs to other states for slaughter. Kansas sheep producers' income would be increased and additional interest in the expansion of the state's sheep industry would be generated.