

KANSAS LIVESTOCK-FEED BALANCE
AND RELATED INDUSTRY TRENDS

by

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INTRODUCTION

The state and local supply of feed and its utilization is of great concern to most consumers, producers, and agribusiness firms. It constitutes one of the many determinants of the status of the United States economy. Feed availability directly and indirectly affect investment decisions of farm and non-farm enterprises as well as the cost of goods and services used daily.

Investments of considerable size are not generally undertaken without some knowledge of the cost and availabilities of relevant inputs. This information must be made available if a state or region is expected to attract business investment. For example, livestock producers must be informed of feed situations in specific areas in order to be reasonably assured that feed is available at a reasonable cost and in large enough quantity to make an investment feasible. Accordingly, processors need information concerning size and concentration of livestock to be willing to initiate or relocate a plant in a new area.

The information most desirable to many agribusiness firms is related closely to feed and livestock conditions. Livestock not only supply significant amounts of food and fiber, but also utilize many feedstuffs not suitable for human consumption. The concentration, location, and magnitude of feed production in relation to livestock marketings and slaughter are essential elements in gaining a true perspective of the existing feed and livestock situations. Specific state and local conditions may depend on climate, capital availability, managerial talents,

transportation costs, or governmental regulations and levies. However, one of the most restrictive elements in the location and current or future supply of livestock is availability of feed.

This study examined the characteristics of the livestock-feed situation in Kansas as it existed in the last thirty years, with emphasis on the livestock-feed balance during 1969-74. Given livestock-feed balances, the potential expansion of beef and pork production within the state was also considered. Specifically, the objectives were:

- (1) to determine the direction of trends in the livestock and feed industries,
- (2) to formulate meaningful and quantitative estimates of feed availability in specific geographical locations,
- (3) to estimate potential livestock expansion based on feed availability.

CHAPTER I

FEED AND LIVESTOCK TRENDS

The availability of feed in a specific area depends upon size of feed production as well as magnitude of feed use. Production minus utilization of feed is termed the livestock-feed balance. The principal factor involved in feed consumption (i.e. consumption of feed grains or roughages) is livestock. An understanding of the size and trends of feed production, concentration of livestock marketings, and the relationship of slaughter to marketings are important foundation blocks in a discussion of livestock-feed balances.

Feed Grain Production

The two most important feed grains in Kansas during the 1944-74 period were corn and grain sorghum. Together they constituted approximately 85 to 95 percent of the total feed grains produced annually (excluding wheat). Oats and barley comprised only 5 to 15 percent annually.

As Figure 1 indicates, corn and grain sorghum alternated as leading feed grains several times during the 1944-74 period. Until the dry summers of the mid 1950's, corn production exceeded grain sorghum production. In 1954, grain sorghum regained the leading role and maintained it until 1974. During that twenty year interval, grain sorghum and corn production increased nearly six times 1953 levels.

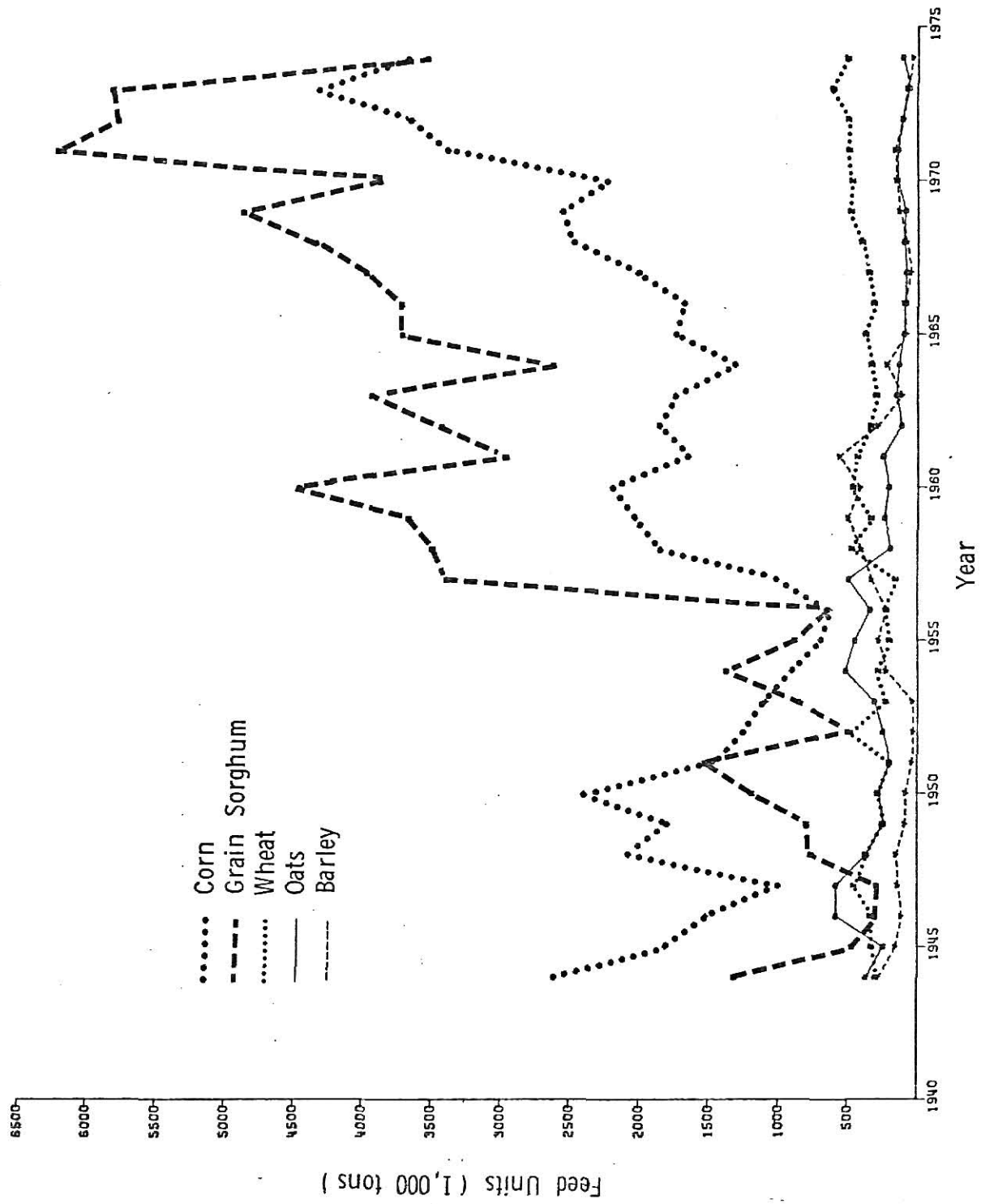


Fig. 1. Feed grain production and 5 percent of wheat production expressed in feed unit tons, Kansas, 1944-74.

The 'small grains' (i.e. oats and barley) have declined in importance as feed grains since the late 1950's. Prior to that time, oats were more abundant than barley. This trend reversed during the 1957-63 interval as the production of both grains continued to decline.

Wheat production, in so far as it can be considered a source of livestock feed, has been in a steady upward trend since 1963. Wheat production fluctuated less than did sorghum or corn. However, wheat production has expanded at a slower rate than either corn or grain sorghum.

Weather, technology, acreage in production, and changing economic conditions have been some of the factors influencing these long term trends. It is difficult to determine the most important factor, but the improvements in sorghum, corn, and wheat varieties and hybrids rank high on the list. Each grain has been bred for drought and disease resistance while still maintaining the ability to produce high yields. That has enabled Kansas farmers to expand farming and livestock enterprises.

The second most important reason for the rapid feed grain development was irrigation. Acres under irrigation have expanded rapidly, especially in southwest Kansas. That has reduced the possibility of drought to a large degree in an area where rainfall is often quite limited. This has helped to insure a steady supply of feed for feeding operations.

The final explanation of these trends concerns the drop in 'small grain' production. Higher costs of input factors (i.e. land, labor, and capital) have forced the agricultural sector to maintain large cash flows in all enterprises. Production acreage of less profitable crops, such

as oats and barley, may have diminished to allow for land, labor, and capital to be reallocated into more productive ventures.

Harvested Roughage Production

As indicated in Figure 2, the most important roughage in Kansas during the 1944-74 period was alfalfa hay which comprised almost 40 percent of the annual harvested roughage production. Roughage production fluctuated considerably from year to year primarily because of its dependence upon a constant moisture supply throughout the summer months.

Alfalfa and corn silage production have trended upward since 1944. Wild hay, other tame hay, and sorghum forage have remained relatively constant throughout the same time period. Of all the roughages, only sorghum silage has gone through a complete reversal in trend during the last 30 years. Sorghum silage production increased at about the same rate as alfalfa until about 1963. However, it has been in a decreasing pattern since that time.

The explanation of these trends are closely related to the cattle industry. The thirty year period from 1944-74 witnessed a rapid expansion in the numbers of cattle and calves in Kansas. The January 1, 1974 inventory of cattle and calves was approximately 63 percent¹ greater than three decades earlier. During this same time period, alfalfa production increased almost 75 percent. That suggested alfalfa production has kept pace with actual expansion of the cattle industry.

¹Kansas State Board of Agriculture, Farm Facts, (Topeka, Kansas: State Printers Office, 1944-1974). Annual series.

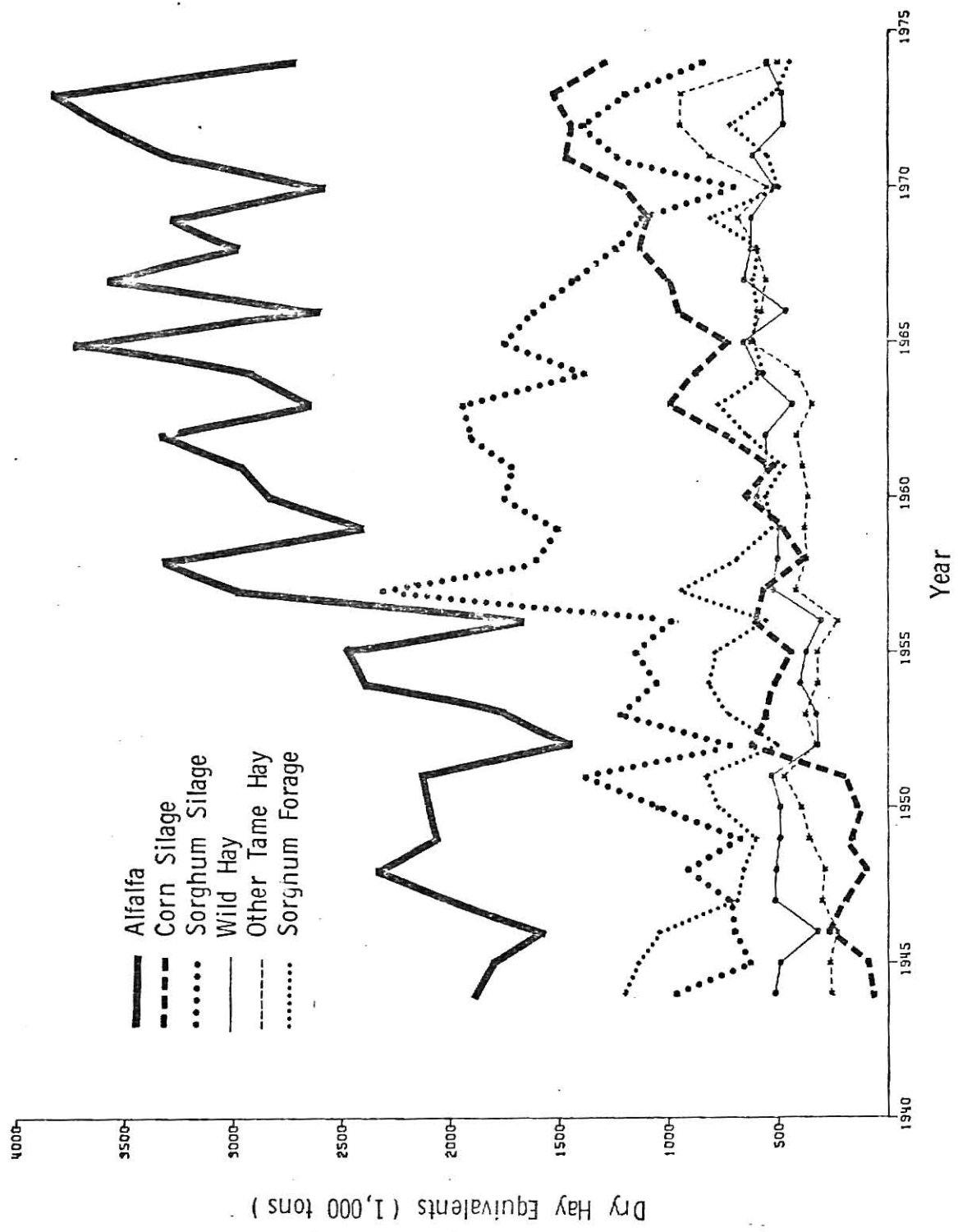


Fig. 2. Harvested roughage production expressed in dry hay equivalent tons, Kansas, 1944-74.

A development which reversed the roles of sorghum and corn silage was the advent of large commercial feedlots in Kansas. Grain fed cattle production has moved from the small farm feedlots to the large commercial feedlots of 1,000 head or more capacity where approximately 84 percent of all grain fed cattle were produced during 1973.¹ These highly concentrated areas of cattle production demanded a large and constant supply of harvested roughages, especially silages and hays. Corn silage satisfied that requirement more easily than sorghum silage because of its greater yield response under irrigated conditions. That was demonstrated by examining the 1960 situation versus 1970. In 1960, the combined tonnage of corn and sorghum silage, expressed in dry hay equivalent tons, was 2,393,000. Sorghum silage constituted 73 percent of that total. In 1974, the combined total was 2,138,000 dry hay equivalent tons. Corn silage made up over 60 percent of it. This trend should continue as long as the structure of the cattle industry does not change dramatically.

Wild hay, other tame hay, and sorghum forage were the three smallest contributors to the total roughage production. Each has maintained a fairly constant production level throughout the 1944-74 time period.

Density of Hog Marketings

Hog production in Kansas reached a peak in the early 1930's, then declined. Drought, depression, and adaptation of hybrid corn in the corn belt contributed to subsequent declines until the late 1950's. The

¹Kansas State Board of Agriculture, Farm Facts, (Topeka, Kansas: State Printers Office, 1973-74), p. 7F.

trend then reversed and production has more than doubled since the mid 1950's. The technique used to measure hog supplies and concentration was marketings per rural square mile, commonly referred to as marketing densities. As Table 1 indicates, the counties with the highest hog densities were located in the northeast portion of the state. The same distribution pattern was evident in 1960, but has greatly expanded and intensified since. Figures 3 and 4 illustrate this transition. The highest concentration of hog marketings in recent years has been in the eastern half of the northern tier of Kansas counties. In 1974, the top 10 counties (i.e. Jewell, Republic, Washington, Marshall, Nemaha, Brown, Doniphan, Clay, Riley, and Atchison) averaged 130 head marketed per rural square mile. In direct contrast, the counties in the Southwest and West Central districts averaged less than 10 head marketed per rural square mile. Figure 5 illustrates in graphic form the magnitude and location of the density of hogs marketed on a district basis during the 1960-74 period.¹

Density of Grain Fed Cattle Marketings

The cattle industry in Kansas has also experienced a rapid rate of growth in recent years. Grain fed cattle marketings nearly tripled since 1960² and beef production as a whole ranked fourth nationally in 1974. In addition, grain fed cattle production has tended to shift

¹Number of hogs marketed in Kansas on a crop reporting district and state basis for the 1960-74 period is in Appendix A, Table A-1.

²Number of grain fed cattle marketed in Kansas on a crop reporting district and state basis for the 1960-73 period is located in Appendix A, Table A-2. Grain fed cattle marketings were not available on a county basis for 1974 at the time of this study.

Table 1. Number of hogs marketed per rural square mile by county, crop reporting district, and Kansas 1960-74.

County, crop reporting district, and state	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
Northwest:															
Cheyenne	8.59	6.78	8.17	8.40	6.30	6.31	6.13	4.94	5.92	8.87	9.51	14.24	13.51	13.35	16.77
Decatur	19.35	22.43	24.78	28.79	28.03	28.65	22.06	28.66	28.89	27.35	20.15	31.20	31.22	25.99	28.02
Graham	6.75	6.77	6.15	7.08	7.86	6.94	5.77	9.87	10.67	9.21	8.88	12.14	12.15	8.75	8.16
Nowton	22.43	25.74	31.86	32.92	28.11	25.71	22.71	24.58	25.08	30.15	26.25	32.48	28.68	28.66	28.36
Rawlins	11.20	12.77	15.73	18.90	18.42	17.31	18.22	17.44	18.63	18.44	18.74	24.94	22.18	18.18	20.56
Sheridan	13.04	13.63	16.73	19.59	21.40	22.40	19.00	26.81	28.23	28.95	32.58	44.03	38.56	30.95	34.14
Sherman	4.91	4.53	6.50	8.27	8.06	7.89	5.77	8.46	8.95	9.55	8.36	12.10	13.73	11.34	9.02
Thomas	5.74	4.27	5.47	7.41	7.78	9.37	8.95	10.72	9.83	11.61	10.25	13.16	18.02	12.98	19.86
District Average	9.77	11.54	13.79	13.81	15.22	15.10	13.26	13.44	16.44	17.47	17.02	22.40	21.80	18.32	20.35
West Central:															
Gove	4.90	6.10	7.31	7.19	6.84	5.13	5.12	6.05	6.59	9.21	7.07	12.91	10.12	10.21	13.45
Greeley	5.89	6.57	8.26	8.48	9.66	4.73	6.75	5.97	8.06	7.01	8.22	14.00	15.57	13.54	8.59
Lane	2.44	2.49	2.24	3.00	2.55	2.72	3.24	3.58	4.69	4.11	2.55	6.57	8.77	6.16	4.23
Logan	3.73	3.98	3.76	5.52	5.13	3.29	3.99	5.64	6.43	7.14	7.47	8.96	9.49	8.89	5.61
Ness	3.32	2.85	3.95	3.77	3.32	2.68	3.26	4.16	5.55	7.82	7.92	10.38	9.38	8.11	5.13
Scott	3.50	2.53	2.51	3.17	4.15	2.32	3.18	3.66	4.79	6.39	7.89	10.80	11.79	12.88	10.58
Trego	3.32	4.07	4.40	5.46	5.29	5.17	4.84	5.24	5.94	7.40	7.14	9.76	8.45	7.91	4.96
Wallace	6.42	4.63	4.37	5.56	4.38	2.86	4.71	4.73	5.28	6.39	6.85	6.48	6.88	6.44	4.59
Wichita	6.96	5.77	7.47	7.45	7.71	7.33	7.10	6.58	7.35	8.18	7.55	9.22	8.07	8.64	8.67
District Average	4.96	3.84	3.94	4.59	5.34	3.97	4.59	4.92	6.06	7.18	6.64	9.98	9.78	9.16	7.36
Southwest:															
Clark	1.37	1.22	1.21	1.09	0.96	0.94	1.21	0.99	1.14	3.50	2.04	2.90	3.23	5.29	5.24
Finney	3.66	4.33	3.66	3.63	4.54	3.14	3.59	2.89	3.51	3.30	4.49	6.44	5.16	4.83	5.63
Ford	5.70	7.13	10.28	10.95	10.99	9.82	12.39	15.35	17.83	19.31	19.22	25.88	28.00	27.54	34.70
Grant	1.76	3.59	5.81	7.30	6.86	6.71	6.67	9.41	9.90	8.97	8.01	14.85	12.13	12.78	8.32
Gray	5.47	3.59	3.20	4.01	5.08	3.26	3.76	4.69	4.96	5.78	4.84	7.14	4.58	5.15	4.65
Hamilton	2.16	2.41	2.39	2.63	2.80	1.71	1.69	2.16	2.65	2.12	2.27	3.93	3.58	4.19	2.91
Haskell	3.18	2.66	3.22	3.61	2.95	3.41	2.59	2.76	3.80	5.20	3.90	5.80	11.88	9.89	7.24
Hodgeman	2.44	2.72	2.70	3.76	4.39	4.69	4.07	5.13	4.64	3.63	5.33	6.21	3.88	5.45	5.91
Kearny	2.83	2.60	4.04	4.72	4.83	3.97	3.74	3.98	4.69	5.21	5.99	7.55	9.45	7.96	9.40
Meade	3.67	4.72	4.05	6.25	6.08	5.49	5.02	5.13	6.62	7.94	8.51	11.27	9.67	9.06	10.97
Morton	1.26	0.84	1.11	0.86	0.44	0.65	0.71	0.68	0.89	2.62	3.03	3.27	3.07	2.88	3.12
Seward	1.75	2.44	2.90	4.47	4.01	4.71	3.16	6.60	6.22	8.32	15.16	10.69	15.48	14.50	22.31
Stanton	3.17	3.35	3.13	2.46	3.34	3.88	1.79	1.07	1.48	2.05	3.07	5.40	5.19	3.89	5.91
Stevens	3.01	4.79	4.03	3.41	3.19	2.89	1.85	2.02	1.74	1.69	3.17	7.06	5.36	4.01	4.79
District Average	3.13	3.51	4.68	4.40	4.01	4.17	4.12	4.65	5.17	5.87	6.44	8.67	8.67	8.50	9.68

Table 1. Continued

North Central:															
Clay	40.54	47.57	61.24	67.76	58.00	56.05	61.56	66.32	77.24	104.83	104.34	129.09	119.06	125.74	121.21
Cleud	23.85	25.18	34.64	37.96	36.23	30.88	32.65	36.08	35.46	35.77	37.15	135.26	131.77	27.63	26.97
Jewell	53.23	65.70	76.55	82.58	75.05	80.98	74.46	85.16	97.32	111.15	115.17	135.26	133.50	121.50	115.37
Mitchell	15.24	21.50	23.42	24.50	24.78	18.80	19.98	25.51	27.16	39.72	47.06	63.60	59.41	55.64	56.26
Osborne	14.41	16.96	21.21	24.52	25.69	22.45	23.67	23.61	25.98	29.48	26.95	31.65	33.44	34.61	34.86
Ottawa	9.30	8.25	11.20	13.91	16.33	16.21	18.06	21.00	23.07	27.30	28.05	39.23	32.33	34.61	30.50
Phillips	22.32	28.38	31.39	34.68	34.75	32.21	33.41	39.52	42.54	49.89	55.32	68.05	66.36	71.96	77.52
Republic	50.98	59.51	70.90	75.12	79.79	70.38	70.05	85.58	86.38	101.97	99.79	132.63	114.74	99.03	106.28
Rooks	6.44	7.35	9.92	11.04	12.98	9.95	11.31	14.44	13.30	17.70	16.12	17.95	17.96	15.14	15.51
Smith	28.19	29.98	39.35	39.51	45.38	40.78	41.80	47.66	59.95	66.26	69.16	83.11	81.41	74.59	71.02
Washington	58.40	69.07	80.58	93.83	92.51	89.62	91.46	106.62	114.14	137.98	136.22	171.22	169.52	162.22	176.90
District Average	29.14	34.29	41.53	45.60	45.49	42.52	43.35	55.66	54.70	65.13	66.37	81.08	77.88	74.46	75.53
Central:															
Barton:	9.13	9.69	11.04	10.85	11.01	9.63	8.97	10.30	12.66	14.87	17.71	28.49	18.45	15.71	20.27
Dickinson	30.72	31.79	37.19	39.10	37.66	36.00	38.59	41.46	49.61	55.74	54.14	68.89	63.64	61.26	69.14
Ellis	4.53	3.43	4.47	4.96	4.75	3.93	3.53	4.14	4.06	4.41	5.11	8.06	8.96	10.07	12.02
Ellsworth	4.96	4.87	6.57	8.55	8.58	8.63	5.98	8.83	10.56	9.89	10.84	19.39	15.61	12.53	9.29
Lincoln	12.34	16.81	18.60	21.33	18.97	15.29	14.39	18.37	18.06	23.19	24.85	30.99	34.23	28.05	32.60
McPherson	22.52	23.77	29.63	33.49	31.33	29.83	25.48	34.86	35.97	40.88	43.82	62.19	60.51	55.05	51.11
Marion	23.02	28.67	32.94	39.32	42.99	42.07	42.90	53.73	57.46	75.24	76.89	101.14	87.02	86.49	85.69
Rice	16.17	19.09	23.10	28.70	29.22	26.47	23.26	28.96	30.65	40.16	39.64	51.44	45.05	42.19	44.02
Rush	3.63	4.26	5.27	5.42	5.53	4.55	2.62	3.19	4.03	6.23	4.80	9.27	9.87	7.40	10.43
Russell	5.17	5.95	7.80	7.62	7.23	6.71	6.55	6.07	7.70	11.01	7.94	9.87	10.74	10.06	7.64
Saline	12.40	10.72	11.56	13.09	12.87	8.47	9.54	10.51	13.47	17.63	23.37	32.94	40.03	39.69	44.25
District Average	12.82	15.12	17.90	20.16	20.08	18.45	17.63	19.91	22.20	28.13	29.02	39.69	36.70	34.37	36.04
South Central:															
Barber	6.99	7.94	9.72	9.25	9.60	8.08	8.87	9.57	9.56	6.85	6.76	7.79	7.65	9.12	8.06
Comanche	3.58	5.24	4.36	6.19	5.30	4.39	3.51	5.04	5.77	7.37	9.88	12.90	11.23	8.76	5.70
Edwards	3.24	3.61	3.93	4.16	3.70	2.17	3.45	3.05	3.00	4.26	7.53	8.90	7.64	7.15	7.50
Harper	6.95	6.78	9.59	8.87	7.77	6.04	7.92	12.30	10.08	9.98	12.41	15.18	14.18	20.87	20.58
Harvey	28.35	34.45	39.47	45.77	48.19	42.87	48.65	63.12	59.03	76.37	78.71	104.25	95.40	86.55	95.10
Kingman	15.85	18.21	23.44	25.94	24.00	28.00	24.80	29.25	29.37	39.89	38.87	59.77	55.21	49.99	47.49
Kiowa	3.91	4.77	5.55	5.70	6.44	5.46	5.08	7.07	9.77	11.19	9.05	14.98	13.92	18.06	18.06
Pawnee	6.56	8.46	10.85	9.39	8.35	7.57	8.75	11.31	12.36	13.66	12.55	24.73	21.78	18.54	18.91
Pratt	8.00	11.26	14.72	17.72	16.31	16.62	18.01	21.16	24.86	38.31	34.21	53.95	58.32	60.69	56.39
Reno	21.71	22.57	23.59	28.70	26.00	24.20	23.17	27.40	28.52	31.21	29.97	41.54	38.28	33.38	45.59
Sedgwick	35.16	33.26	27.72	25.13	27.99	22.09	48.51	52.03	46.57	39.57	45.18	52.34	55.88	47.43	53.04
Stafford	8.61	10.19	15.14	15.95	16.67	10.55	11.36	12.56	14.40	16.61	18.92	25.27	23.18	21.71	20.77
Sumner	15.93	15.35	19.17	21.19	19.45	15.09	15.86	20.70	19.94	21.50	22.03	32.70	36.82	31.93	29.92
District Average	13.47	14.29	16.37	17.39	16.88	14.82	17.36	20.78	20.72	22.83	22.96	33.30	32.47	30.41	31.53

Table 1. Continued

Northeast:															
Atchison	90.86	77.49	79.78	89.77	83.37	79.64	72.53	93.96	88.33	90.42	84.27	111.63	91.77	85.95	100.12
Brown	84.06	88.19	90.06	108.23	96.27	83.12	91.29	101.99	105.96	112.16	105.19	147.86	136.60	125.27	154.10
Doniphan	130.39	136.49	139.75	143.58	150.68	143.24	124.92	132.92	134.98	130.93	135.66	128.35	106.31	103.71	108.90
Jackson	46.86	49.36	59.48	66.43	60.67	50.33	53.86	61.35	64.03	61.80	59.89	66.59	67.95	66.09	66.64
Jefferson	66.53	70.70	79.35	86.32	82.42	82.17	70.19	80.02	81.79	89.33	74.47	97.30	83.95	72.33	78.11
Leavenworth	95.56	95.38	74.78	78.85	75.62	73.99	67.58	90.11	84.53	93.71	81.44	92.04	81.40	78.25	72.25
Marshall	46.81	56.22	62.63	68.64	65.83	66.16	68.84	80.57	80.98	86.90	86.62	105.75	97.01	97.47	106.62
Nemaha	97.80	114.52	130.85	140.05	134.52	120.48	134.76	145.47	149.88	162.88	157.12	186.41	179.48	172.52	200.08
Pottawatomie	45.73	50.97	56.78	64.82	56.88	61.84	65.66	71.54	72.44	76.82	82.34	89.81	93.13	93.31	98.79
Riley	44.66	52.70	60.89	72.99	67.23	65.79	68.97	72.34	73.25	99.19	94.04	112.19	112.28	101.53	112.10
Wyandotte	107.61	106.62	105.59	54.24	41.58	27.12	35.75	39.94	36.45	47.14	50.52	66.39	53.16	37.34	24.30
District Average	70.69	76.08	81.18	89.57	84.07	79.57	75.34	91.06	92.00	99.37	94.94	114.31	106.61	101.74	112.41
East Central:															
Anderson	37.53	47.76	49.54	56.08	50.88	48.40	42.53	52.36	57.17	64.04	57.20	62.24	70.42	78.63	82.26
Chase	10.85	14.71	18.56	21.53	19.13	13.88	12.09	17.37	20.49	19.28	19.93	30.27	25.63	21.82	24.38
Coffey	34.85	38.33	43.02	46.80	45.22	41.91	42.88	46.54	48.42	60.55	62.10	74.11	60.92	57.06	59.47
Douglas	53.05	57.00	59.97	70.68	64.60	59.60	61.49	56.99	56.00	80.71	82.39	105.23	89.72	94.98	89.16
Franklin	37.64	44.25	54.07	58.48	63.14	57.48	48.92	69.51	68.32	70.76	74.27	74.75	68.83	78.47	65.97
Geary	28.16	37.48	34.80	45.28	40.01	24.10	22.05	29.04	33.72	39.62	44.89	57.39	63.18	53.79	62.44
Johnson	75.55	71.29	79.42	88.40	85.92	84.08	69.25	83.51	67.59	70.69	66.56	76.80	56.37	57.59	69.47
Linn	51.88	54.05	61.87	69.48	67.42	61.03	63.83	67.24	69.09	83.75	81.61	99.73	103.04	105.55	97.80
Lyon	33.12	34.56	34.22	35.16	37.66	36.86	34.41	36.82	41.90	53.62	53.21	68.47	66.51	60.41	56.72
Miami	67.53	70.35	77.41	78.06	79.44	73.42	63.24	72.67	71.42	87.39	66.91	83.46	79.20	74.17	63.08
Morris	28.30	31.10	37.40	40.68	44.67	43.71	40.43	50.81	52.32	68.92	76.95	93.19	93.27	101.00	96.82
Osage	33.75	34.79	35.53	40.93	35.73	33.02	30.93	36.77	36.14	49.52	47.77	65.28	62.82	54.13	61.27
Shawnee	34.96	38.02	40.78	35.46	39.41	27.84	29.47	31.74	29.46	32.64	33.04	44.14	40.49	37.92	44.87
Wabawnee	19.49	22.31	25.93	35.53	34.69	40.74	36.22	36.72	44.11	62.23	64.40	65.28	71.87	69.35	59.07
District Average	34.80	36.39	43.87	48.07	46.46	42.88	40.91	47.01	48.57	59.37	55.80	70.35	67.44	66.73	65.08
Southeast:															
Allen	38.71	40.86	42.40	49.88	44.44	41.87	42.45	54.20	53.27	58.67	52.41	69.42	56.24	43.38	55.45
Bourbon	41.11	45.01	53.07	49.07	51.05	44.70	47.65	52.54	48.92	53.08	47.91	62.33	53.88	45.15	53.00
Butler	21.43	24.70	28.14	33.28	34.48	30.13	35.73	40.55	44.84	52.81	52.65	64.14	62.33	57.20	60.78
Chautauqua	18.23	14.87	17.67	17.65	22.90	18.17	17.77	19.64	16.73	15.77	14.64	21.32	24.00	19.98	25.20
Cherokee	23.74	20.72	20.52	22.70	27.63	21.31	27.95	33.46	41.10	45.83	45.61	51.45	43.19	31.11	24.30
Cowley	17.62	19.93	23.26	27.52	29.00	26.84	33.69	45.17	49.14	55.98	57.43	78.66	86.03	76.01	70.09
Crawford	44.97	36.23	37.38	36.87	32.24	28.68	31.50	34.69	38.54	40.01	47.83	56.18	59.35	46.81	47.60
Elk	31.34	33.84	40.22	34.44	36.04	31.19	31.28	31.38	36.45	37.84	41.23	51.16	70.40	59.94	56.24
Greenwood	13.77	13.71	16.97	17.57	17.46	14.35	14.26	17.25	19.78	24.87	28.23	30.42	26.73	23.64	22.48
Labette	35.56	33.94	36.07	40.33	38.47	30.12	35.83	42.23	38.91	39.89	41.33	48.54	51.28	40.44	51.82
Montgomery	38.12	37.01	46.15	51.60	53.29	52.15	60.13	71.29	78.15	100.32	82.95	116.27	98.92	92.64	79.50
Neosho	47.80	43.96	47.57	47.40	53.44	48.05	54.32	56.48	58.43	72.00	75.57	89.75	91.35	79.85	72.38
Wilson	29.08	27.25	25.56	27.14	25.58	23.91	33.59	38.02	43.11	38.85	35.23	48.49	39.43	36.93	42.83
Woodson	19.94	20.95	25.15	28.75	29.32	23.29	27.81	31.95	34.89	37.52	35.09	50.15	45.00	35.66	34.46
District Average	27.64	27.57	30.99	36.14	33.70	29.86	34.05	39.47	41.99	47.40	46.85	59.26	57.55	49.64	50.11
State Average	20.21	25.69	25.44	27.96	27.46	25.25	25.72	29.81	31.35	35.38	35.26	44.71	42.67	39.96	41.28

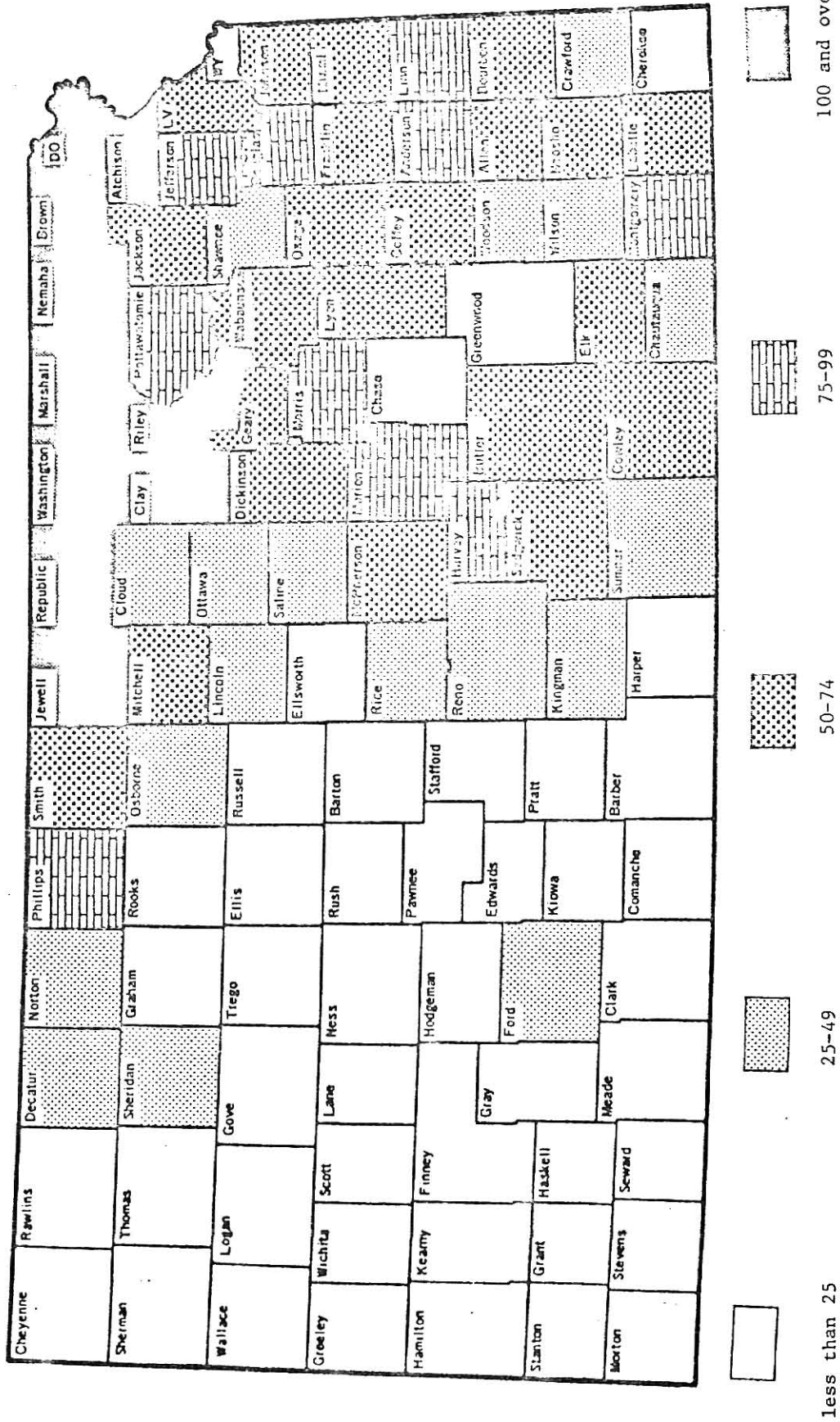


Fig. 4. Number of hogs marketed per rural square mile, Kansas 1974.

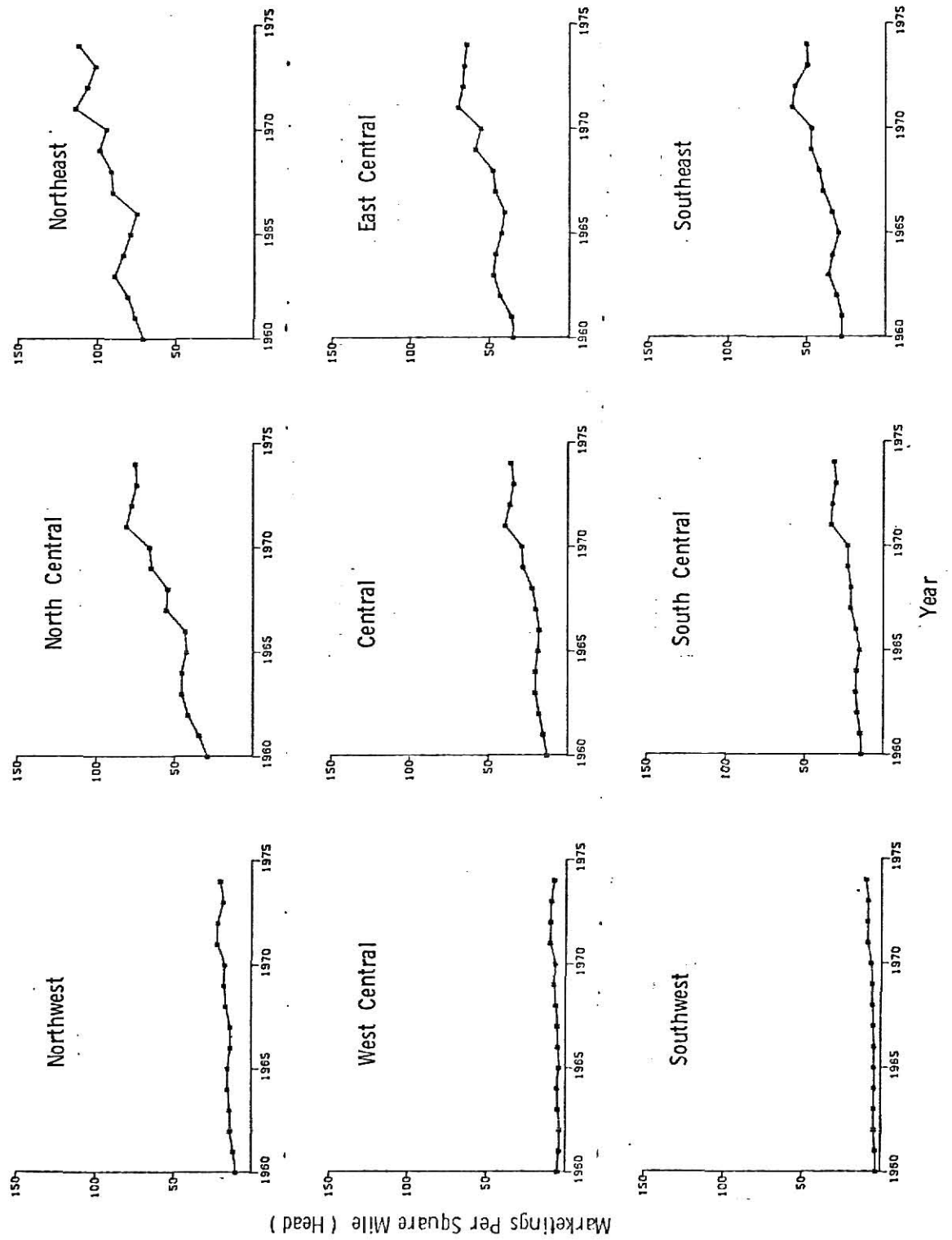


Fig. 5. Number of hogs marketed per rural square mile, Kansas 1960-74.

away from the east and northeast regions of Kansas. Table 2 and Figures 6 and 7 show the development of these cattle marketing densities during the last fourteen years.

The nine counties with the highest densities in 1973 were: Haskell, Wichita, Seward, Barton, Scott, Finney, Kearny, Gray, and Pratt. These nine counties averaged 162 head marketed per rural square mile. Haskell was the leader in grain fed cattle density (316.5) while Pratt contributed 105.79 head per rural square mile. From a district viewpoint, the Southwest had the highest density (82.97 head) in 1973 while the East Central had the low of 13.36. Figure 8 indicates the magnitudes and locations of the densities of grain fed cattle on a district basis during the 1960-73 period.

Marketings and Slaughter of Hogs

As indicated earlier, Kansas has experienced a significant upward trend in pork production since the mid 1950's. Traditionally, packing plants have followed increases in production. However, that pattern has not held true recently in Kansas. Figure 9 reflects these trends in graphic form.

Prior to the mid 1960's, the number of hogs slaughtered had been in excess of the number marketed. That suggests packing plants in Kansas were drawing hogs from out of state locations. However, since the late 1960's marketings have exceeded slaughter, i.e. outshipments increased. The gap between marketings and slaughter has widened to the point that in 1974 nearly 951,000 head of hogs were shipped out of the state to be slaughtered.

This trend may be due to several factors. For instance, pork slaughtering capacity may not be available to process the increasing

Table 2. Number of grain fed cattle marketed per rural square mile by county, crop reporting district, and Kansas 1960-73.

County, crop reporting district, and state	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973
Northwest:														
Cheyenne	9.86	12.38	16.68	20.88	15.38	10.45	10.73	10.16	8.26	5.74	7.18	5.74	4.88	4.98
Decatur	14.13	17.75	19.08	20.87	19.77	13.56	14.69	11.30	10.17	9.96	8.74	11.06	13.61	34.73
Graham	2.08	3.60	2.55	2.31	2.67	0.97	1.46	1.94	1.21	1.19	1.19	1.19	1.55	1.43
Norton	7.62	13.27	9.99	7.73	5.81	4.53	4.19	4.53	3.14	2.44	1.59	2.44	2.68	2.80
Rawlins	1.67	3.39	3.12	3.85	3.45	2.99	4.76	2.61	3.73	1.95	4.51	3.98	3.45	3.01
Sheridan	8.48	13.22	14.34	21.50	18.26	12.60	14.49	19.67	17.67	19.91	26.93	47.31	53.16	63.58
Sherman	5.30	7.12	7.08	8.19	5.70	4.20	3.70	3.70	4.40	2.37	4.94	9.06	15.04	15.65
Thomas	6.61	10.54	12.74	9.90	10.72	7.38	5.01	4.57	3.69	5.57	6.10	4.77	11.85	10.61
District Average	6.89	10.03	10.73	11.81	10.15	7.06	7.28	7.11	6.38	5.95	7.47	10.15	12.76	16.24
West Central:														
Cove	4.70	15.47	16.82	10.28	33.20	30.18	37.22	47.28	47.89	50.65	50.65	53.53	79.25	64.65
Greeley	1.70	4.85	3.43	1.47	4.59	7.34	14.83	15.29	22.17	15.32	19.15	18.87	26.81	42.84
Lane	4.90	6.26	8.65	9.09	8.96	7.78	13.80	11.45	10.28	25.73	27.97	29.51	33.01	50.63
Logan	1.38	1.46	2.57	3.98	4.36	3.58	5.15	4.47	5.03	3.30	3.96	2.64	1.98	7.70
Ness	1.99	1.65	1.47	1.66	3.38	2.28	3.93	3.65	2.92	3.13	1.47	1.01	1.20	1.84
Scott	19.45	23.58	25.47	38.46	33.88	34.63	38.13	54.63	62.50	71.43	99.00	109.15	135.21	141.60
Trego	0.66	0.97	0.84	1.08	0.87	0.74	1.61	1.24	1.24	1.20	1.20	1.20	4.19	10.30
Wallace	2.37	3.86	1.90	1.77	1.85	1.32	2.25	1.72	3.04	2.51	5.01	7.27	5.64	4.89
Wichita	4.10	5.34	6.17	7.03	9.62	5.30	11.02	21.62	56.35	80.88	80.88	133.53	198.53	216.76
District Average	4.52	7.06	7.52	8.24	11.60	10.66	14.33	18.11	23.04	26.76	30.36	36.70	49.95	54.87
Southwest														
Clark	0.49	1.20	1.97	1.38	2.64	3.05	7.01	7.51	8.53	7.20	8.54	8.23	20.99	23.56
Finney	18.13	20.34	23.91	37.10	42.27	39.56	61.71	73.54	76.08	94.57	97.86	104.44	125.99	139.39
Ford	29.75	33.98	37.42	50.67	47.21	44.46	59.23	55.79	65.24	94.64	94.64	86.25	88.04	98.04
Grant	0.72	6.75	11.81	14.56	11.98	7.85	12.81	13.84	20.66	77.37	81.24	74.66	96.71	93.23
Gray	2.42	3.75	8.47	16.59	15.85	15.96	19.96	20.84	37.69	70.09	93.46	107.48	105.14	121.73
Hamilton	3.06	2.15	2.34	3.01	1.55	0.44	0.55	0.22	0.66	1.14	2.97	17.12	27.74	36.53
Haskell	0.36	0.36	0.76	0.96	7.81	15.28	22.92	21.39	33.96	90.91	107.74	210.44	329.12	316.50
Hodgeman	4.25	11.07	11.32	11.70	10.73	9.85	14.90	5.43	12.88	11.14	17.33	14.85	14.85	30.57
Kearny	1.52	2.34	1.80	2.40	2.57	1.71	3.79	3.92	3.06	12.05	54.22	95.66	131.69	124.22
Meade	1.51	1.82	2.85	1.73	3.55	10.95	16.17	23.96	16.96	26.72	20.55	27.44	29.50	20.97
Morton	0.29	0.96	2.00	2.54	0.84	0.28	0.28	0.28	0.84	1.57	3.39	1.31	0.65	0.52
Seward	1.83	3.29	2.21	3.00	4.23	3.38	3.72	2.37	2.54	46.68	98.74	107.72	144.17	150.99
Stanton	1.11	4.66	6.02	4.93	9.91	6.87	9.78	9.91	10.83	12.58	39.74	57.22	79.47	69.80
Stevens	0.74	1.83	1.24	1.39	0.31	0.62	0.47	1.87	1.56	1.37	1.37	1.37	1.23	0.14
District Average	6.30	8.31	9.84	13.32	13.75	13.63	19.79	20.77	24.27	40.24	50.94	62.69	79.82	82.97

Table 2. Continued

North Central:														
Clay	19.88	22.66	21.69	22.15	21.15	17.98	20.69	22.66	21.15	21.81	21.00	15.99	17.77	11.63
Cloud	4.36	5.61	5.28	4.83	4.59	3.55	6.51	5.47	7.10	7.24	7.09	6.51	4.34	3.62
Jewell	8.34	10.77	10.88	11.38	9.26	9.74	12.67	13.64	14.25	14.15	14.39	13.55	13.07	10.07
Mitchell	6.11	5.22	6.54	7.23	6.93	5.10	7.97	9.41	9.41	10.01	12.04	25.44	34.51	28.15
Osborne	2.51	4.84	4.16	6.00	5.92	3.37	5.81	4.53	4.88	5.05	4.04	7.07	7.07	5.72
Ottawa	2.39	3.09	2.90	4.57	3.80	4.10	5.78	4.10	3.80	3.24	3.83	2.21	3.68	1.91
Phillips	5.05	7.95	5.84	6.56	6.48	4.51	5.79	7.18	5.21	3.67	4.34	2.78	2.90	3.56
Republic	16.51	18.80	17.51	23.15	23.33	24.18	45.52	53.06	58.61	35.87	38.74	37.45	33.00	44.33
Rooks	3.06	3.40	2.92	3.02	3.22	2.55	3.66	3.77	2.22	3.44	2.29	3.78	1.26	4.93
Smith	12.01	14.88	11.92	14.84	13.95	8.56	13.36	14.07	16.76	16.93	16.93	18.17	20.09	20.54
Washington	19.53	21.75	20.58	23.51	26.11	22.37	27.99	35.95	39.11	41.13	44.65	39.48	30.32	27.14
District Average	8.93	10.70	9.86	11.41	11.22	9.45	13.81	15.47	16.22	14.52	15.12	15.47	14.96	14.44
Central:														
Barton	7.08	4.33	7.11	6.27	5.91	25.24	36.64	34.85	42.45	69.52	117.65	117.65	110.80	142.57
Dickinson	21.15	22.46	28.47	37.18	36.59	30.49	41.13	47.67	41.69	27.06	33.82	33.03	35.40	28.18
Ellis	0.89	0.92	1.17	1.87	1.73	1.62	0.81	1.27	2.89	35.43	25.14	42.29	53.14	54.51
Ellsworth	1.47	2.43	1.43	2.86	1.91	4.55	5.87	4.55	1.76	2.84	2.13	1.99	2.99	2.56
Lincoln	8.19	8.15	6.50	9.60	10.45	7.91	10.59	10.03	9.46	6.14	7.23	5.18	6.82	3.96
McPherson	14.72	18.45	13.87	19.89	16.18	12.33	11.36	20.69	16.83	14.33	20.95	22.05	19.40	21.28
Marion	18.63	22.05	18.75	18.65	14.48	13.99	14.87	11.37	10.69	12.91	8.04	8.61	8.15	5.44
Rice	11.43	11.28	11.11	12.07	12.60	9.18	17.12	11.92	14.33	15.05	15.05	17.10	21.89	16.83
Rush	1.78	2.11	2.20	1.65	1.68	0.98	1.96	2.38	2.24	1.64	1.64	3.15	2.90	2.90
Russell	1.35	0.82	1.12	0.87	1.33	0.96	2.41	1.81	2.41	2.74	3.15	3.29	2.60	1.37
Saline	6.96	8.77	6.78	8.32	8.99	6.88	7.58	8.15	8.15	6.46	7.66	21.02	23.27	27.18
District Average	9.02	9.79	9.53	11.48	10.68	11.10	14.50	15.03	14.89	19.17	24.27	27.19	28.17	30.36
South Central:														
Barber	2.46	1.75	1.68	2.71	3.23	1.04	1.99	3.32	2.37	3.11	2.66	1.06	1.51	1.60
Comanche	1.41	1.25	2.85	2.44	2.71	2.06	0.65	1.29	1.29	2.86	2.74	1.79	0.48	0.48
Edwards	3.22	4.14	6.53	3.27	4.06	5.31	9.38	5.31	5.94	10.88	38.96	39.29	47.24	52.27
Harper	4.29	3.60	4.39	4.26	3.40	2.90	3.15	2.90	3.03	4.52	2.20	4.26	1.81	1.94
Harvey	36.76	37.48	30.94	40.52	36.97	22.74	26.25	29.21	29.39	34.22	30.42	27.76	28.14	17.49
Kingman	3.58	3.62	4.48	5.65	4.44	3.15	3.15	2.92	4.32	3.52	4.23	3.52	2.93	4.23
Kiowa	2.20	2.87	1.07	1.74	1.77	2.72	3.94	4.76	1.63	3.42	3.01	3.55	2.32	5.87
Pawnee	4.70	6.67	8.08	9.45	11.73	9.79	18.04	29.64	24.36	32.83	35.35	40.66	74.49	70.33
Pratt	4.30	5.26	6.04	3.98	24.75	29.00	60.82	51.63	63.65	66.12	96.42	89.53	90.77	105.79
Reno	6.12	5.56	5.60	5.68	6.10	5.06	5.94	4.01	4.33	4.21	4.46	2.69	4.46	6.73
Sedgwick	12.44	10.06	9.37	9.69	8.46	7.43	7.54	7.89	9.71	17.82	16.70	10.13	11.92	13.59
Stafford	7.62	8.21	4.69	7.22	8.37	3.73	6.56	7.08	6.69	6.72	6.85	7.66	8.47	6.72
Sumner	9.02	9.84	8.81	13.90	10.44	7.72	10.53	10.02	11.04	13.04	9.57	10.87	13.74	9.39
District Average	6.92	7.00	6.66	7.86	8.79	7.15	10.90	11.02	11.55	14.10	17.08	16.25	19.57	20.20

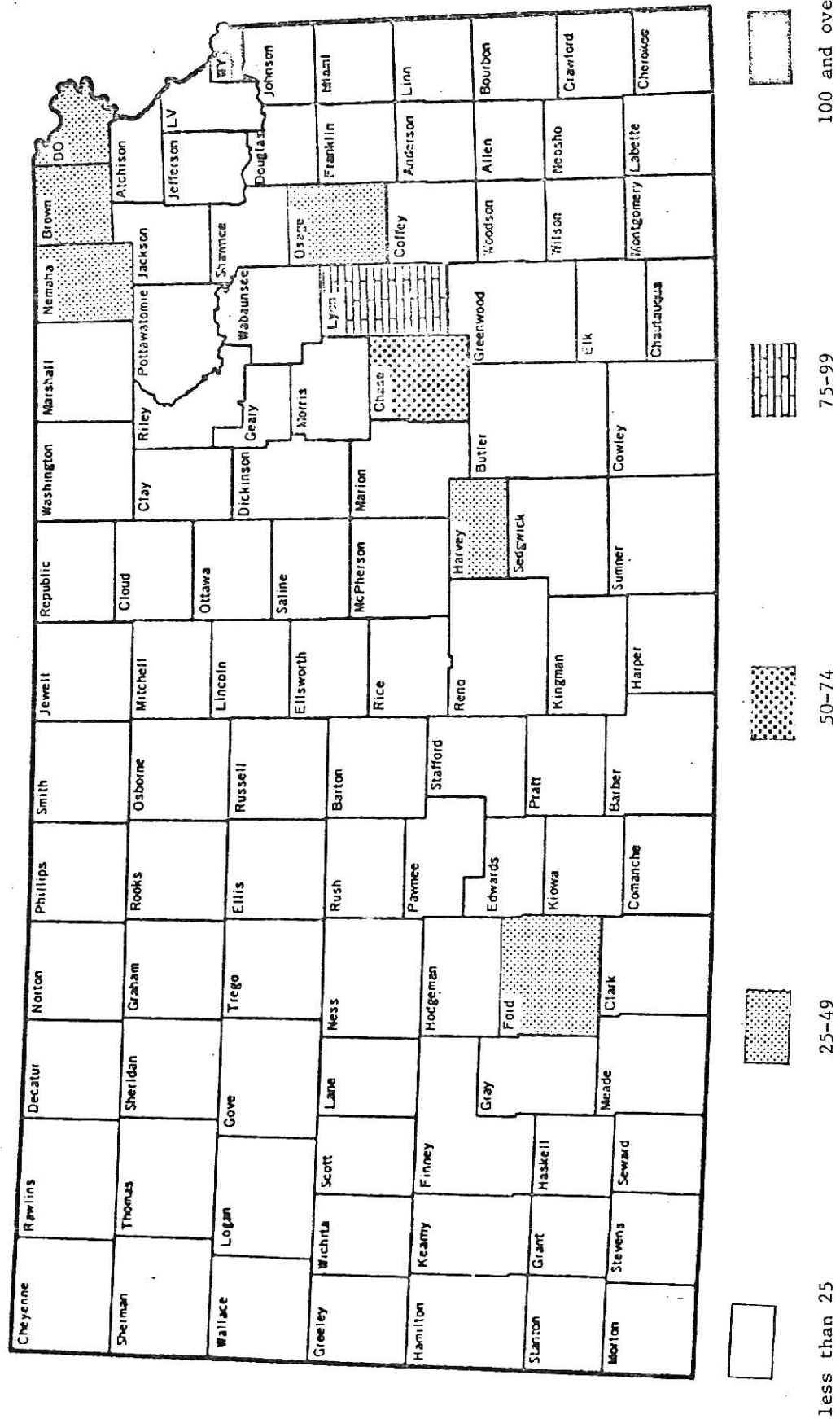


Fig. 6. Number of grain fed cattle marketed per rural square mile, Kansas 1950.

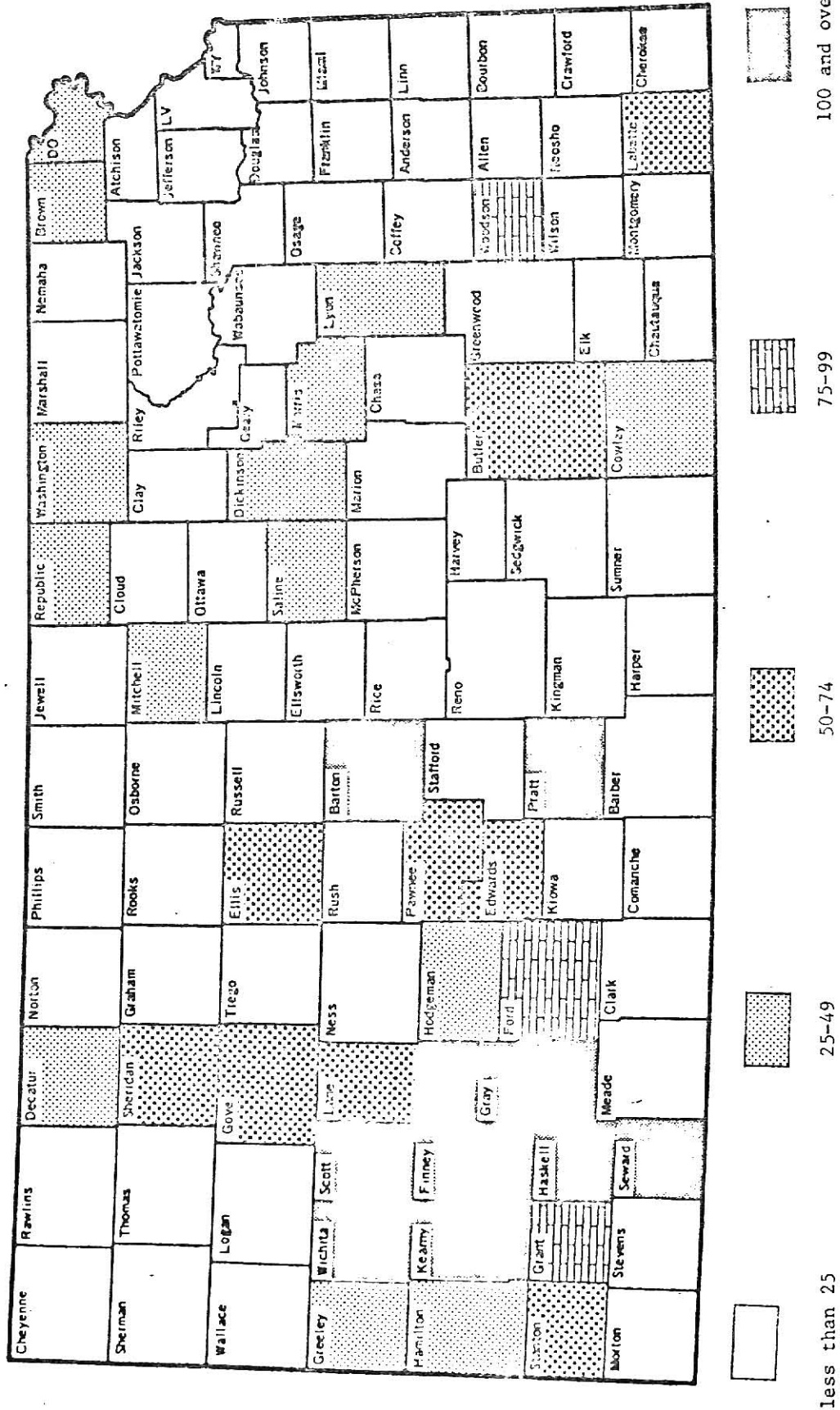


Fig. 7. Number of grain fed cattle marketed per rural square mile, Kansas 1973.

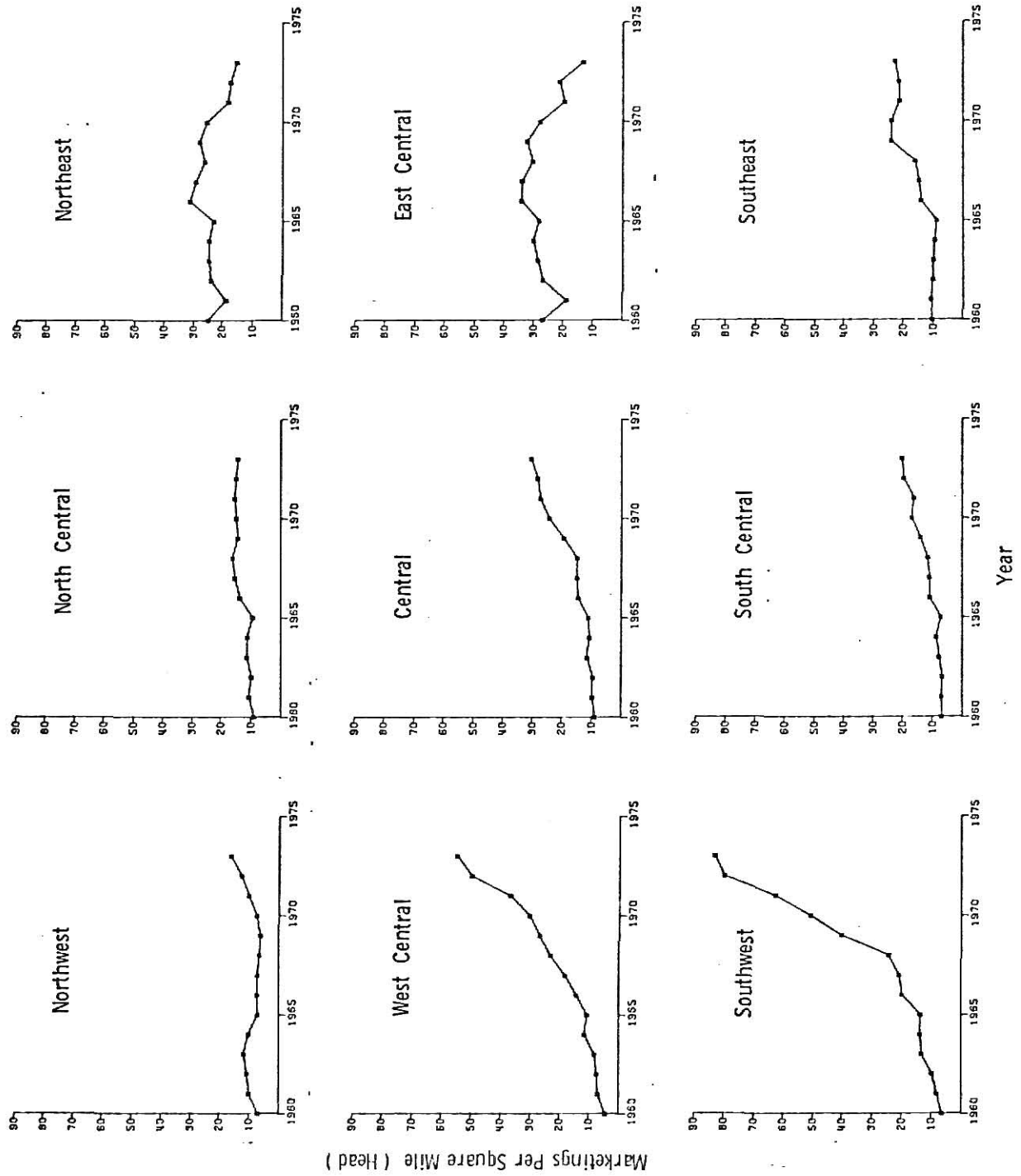


Fig. 8. Number of grain fed cattle marketed per rural square mile, Kansas 1960-73.

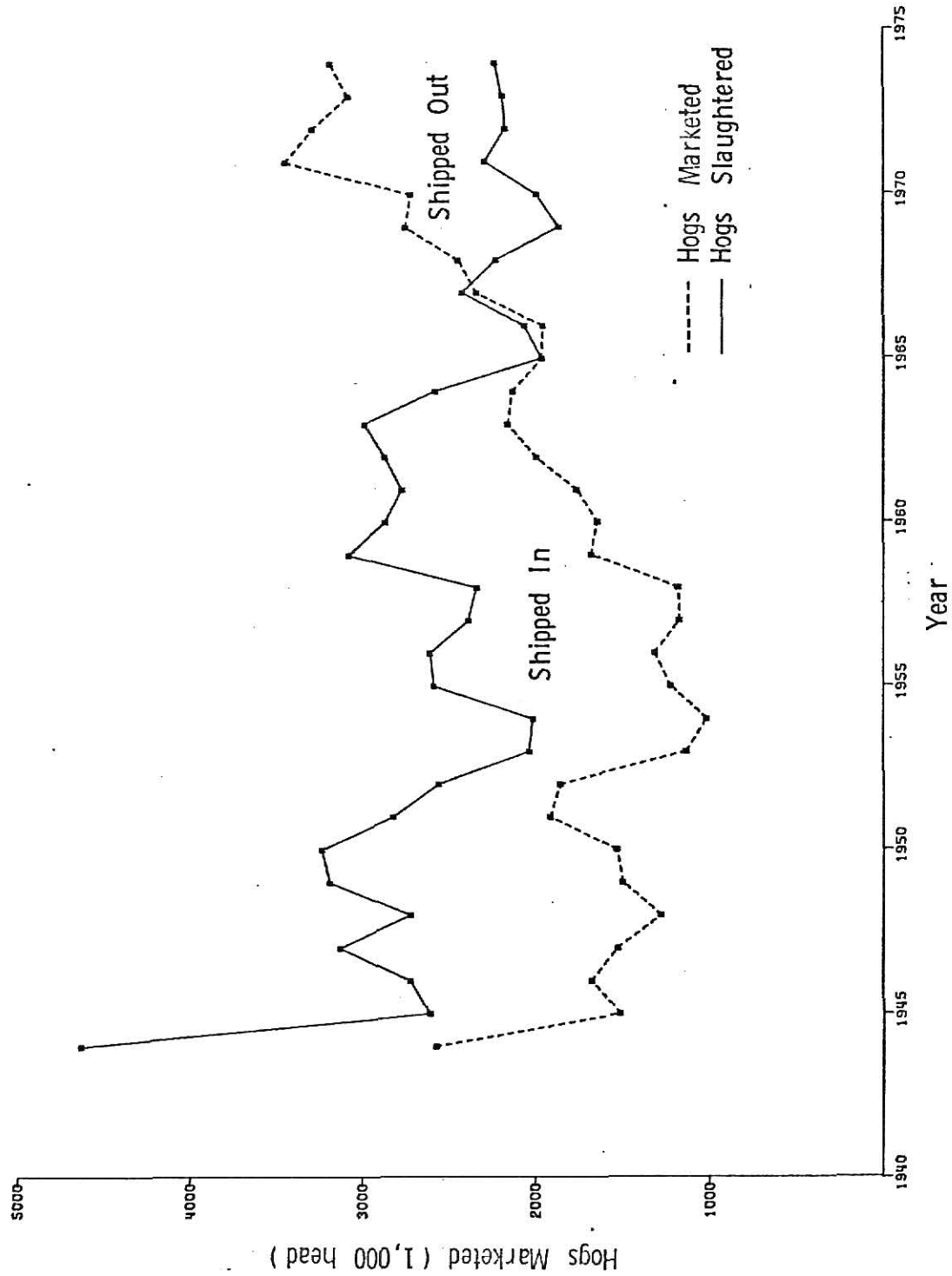


Fig. 9. Marketings and slaughter of hogs in Kansas, 1944-74.

Sources: U.S. Department of Agriculture, Meat Animals, (Washington D.C.: Government Printing Office, 1944-74).

U.S. Department of Agriculture, Livestock Slaughter, (Washington D.C.: Government Printing Office, 1944-74).

numbers of market hogs. This could be a possibility since slaughter figures have decreased nearly 30 percent while marketings have increased over 112 percent during the 1949-74 period. Another possible explanation is that additional slaughter capacity may exist, but because of improper location, technological obsolescence, or prohibitively high operating costs, packing plants cannot compete with out of state rivals. This could be a possibility since some plants have closed down operations in recent years even though pork supply was relatively large in comparison to previous years.

Whatever the case may be, it would appear that Kansas is experiencing a severe drain on an important industry which has in the past exerted a significant impact on the Kansas economy.¹

Marketings and Slaughter of Cattle

The same sort of trend that has developed recently in the pork industry has been characteristic of the cattle scene for a much longer time. Since 1944, numbers of cattle and calves marketed² in Kansas have exceeded slaughter.³ As production increased so did slaughter, but at a much slower rate as exemplified in Figure 10.

To illustrate these various rates of increase, the 1957 situation was compared to that of 1974. In 1957, marketings of cattle and calves

¹Emerson, M. J. et al., "The Interindustry Structure of the Kansas Economy," Kansas Department of Economic Development Planning Division, State of Kansas, Report No. 21, Manhattan, Kansas, January 1969.

²Marketings of cattle and calves includes only Kansas cattle slaughtered in Kansas packing plants plus all cattle shipped out of Kansas for any reason. This also includes custom slaughter for use on farms where produced, but excludes interfarm sales within the state.

³Slaughter includes both federally inspected and non federally inspected, but excludes animals slaughtered on farms.

exceeded slaughter by 380,000 head. By 1974 this figure had grown to 1,380,000 head, over two and one-half times the 1957 level. During this same time period, marketings of cattle and calves increased 148 percent while numbers slaughtered in Kansas increased 113 percent.

Slaughter of cattle and calves has shown a tendency to follow increased production. This relationship has taken place in spite of the fact that the heaviest concentration of grain fed cattle production has shifted from the eastern to the western part of Kansas. The widening gap between marketings and slaughter is undoubtedly the result of some of the same implications sighted for the hog industry.

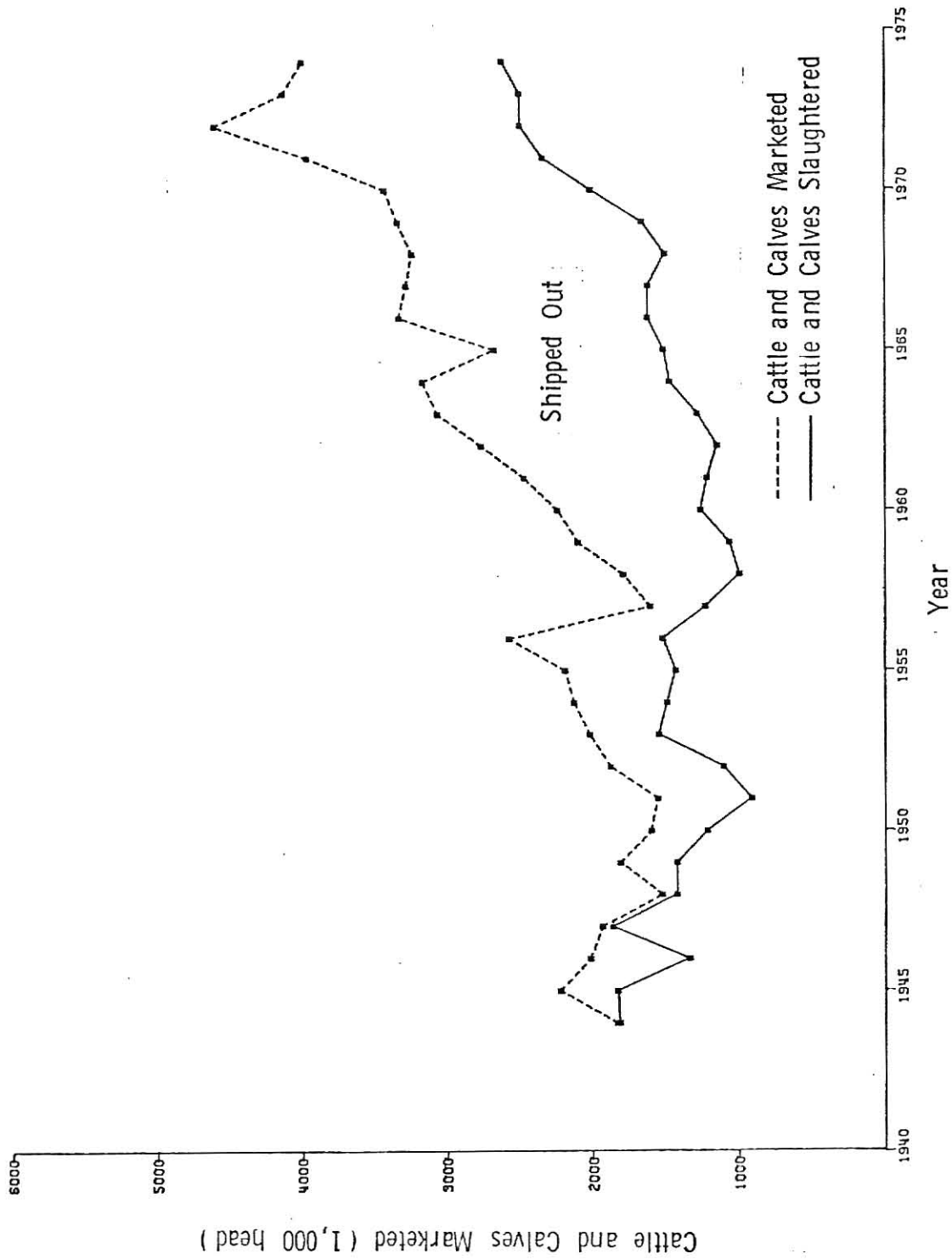


Fig. 10. Marketings and slaughter of cattle and calves in Kansas, 1944-74.

Sources: U.S. Department of Agriculture, Meat Animals, (Washington D.C.: Government Printing Office, 1944-74).

U.S. Department of Agriculture, Livestock Slaughter, (Washington D.C.: Government Printing Office, 1944-74).

CHAPTER II

LIVESTOCK-FEED BALANCE METHODOLOGY

The livestock-feed balance is the difference between production and consumption of feeds in a specified area during a specified time period. However, estimates of feeding rates, livestock numbers, and available feed may differ drastically due to alternative hypotheses. This study attempted to present a precise and consistent approach to resolve that dilemma.

Approach Used

This livestock-feed balance study endeavored to apply the most current U.S.D.A. methodology¹ to existing state and county data. When the methodology dictated use of unavailable county data, estimates were devised to account for the missing data. Much of the county data were obtained from the Kansas State Board of Agriculture publication Farm Facts.² Production, disposition, inventory numbers, and animals on feed information was acquired from other governmental publications.³

¹Allen, G. C. et al., Livestock-Feed Relationships National and State, U.S. Department of Agriculture, Statistical Bulletin No. 530 (Washington, D.C.: U.S. Government Printing Office, 1974).

²Kansas State Board of Agriculture, Farm Facts, (Topeka, Kansas: State Printers Office, 1944-74). Annual series. County estimates of crop production and selected livestock numbers were obtained from this publication.

³Note bibliography.

The Animal Unit Concept

The animal unit concept was devised by U.S.D.A. to permit aggregation of different kinds of livestock and poultry on a feed basis. This was accomplished by defining a certain quantity of feed as the numeraire on which all livestock and poultry feeding rates were compared. This method enabled set amounts of feed consumption to be summed and also provided a consistent procedure to consider different feeding rates of various states and regions. For example, the classification of 'grain fed cattle'¹ in Texas may differ considerably from that used in Nebraska by types and quantities of feed consumed depending upon age at time of placement, time on feed, and finishing weights. By using the animal unit concept, these differences can be considered in a more valid way than would be possible by a class aggregation of livestock.

One animal unit was defined to be the dry-weight quantity of feed consumed by the average United States milk cow² during a base period. Animal units were subdivided into grain consuming animal units and harvested roughage consuming animal units. The grain consuming animal units used in this study were based on the 1969-71 feeding period and an annual consumption of 4,293 feed unit³ pounds of concentrates by the average United States milk cow. The harvested roughage consuming animal units were based on the 1959-60 feeding period and

¹Grain fed cattle are those cattle being fattened for slaughter on feed grains.

²Milk cows are dairy cattle that have calved on or before January 1 of a given year.

³The quantity of any feed that is equivalent to the feeding value of a pound of corn containing 78.6 percent TDN.

an annual consumption of 4.1 tons of dry hay equivalent roughages by the average U.S. milk cow.

The Feed Unit Concept

The feed unit concept was developed by U.S.D.A. to reflect feed values of various types and qualities of feeds. It enabled feeds to be compared on a common basis and also provided a method to relate feed requirements of livestock to various feed values. That was accomplished by expressing feed value and livestock requirements in terms of nutrition.

The feed unit value of each feed grain and roughage was based on feed data used in calculating minimum feed requirements for all classes of livestock.¹ The feed values assigned to each feed in this study were defined to be the average over all classes of livestock in the United States.² The feed unit concept uses total digestible nutrients (TDN) as the yardstick for classifying each feed in terms of feed units. One feed unit was defined to be the feeding value of a pound of corn containing 78.6 percent TDN.

Feed Production

Feed production for any particular feeding year³ was defined as that feed which was harvested the summer prior to or the fall immediately

¹The minimum feed requirements have been calculated by the Committee on Animal Nutrition, Agricultural Board, National Research Council, National Academy of Sciences, Washington D.C.

²Allen, G. C. et al., Livestock-Feed Relationships National and State, U.S. Department of Agriculture, Statistical Bulletin No. 530 (Washington D.C.: U.S. Government Printing Office, 1974), pp. 188-89.

³A feeding year was defined to be the period from October 1 of one year to September 30 of the following year.

following the start of the feeding year. For example, feeds produced and harvested for the 1972-73 feeding year beginning October 1, 1972 were those crops produced during the calendar year of 1972. Feed production was divided into two groups; feed grain production and harvested roughage production. Production was calculated on county, crop reporting district, and state levels.

Feed grains were defined to be corn, grain sorghum, oats, and barley. County production estimates of each feed grain¹ (published in bushels) were converted into gross tonnage on the basis of official weight per bushel.² The gross tonnage of each feed grain was then transformed into feed unit tons by multiplying each by the appropriate conversion factor.³ The four feed grains were then aggregated at the county, district, and state levels. Equation (1) indicates this process at the state level:

$$(1) \quad FGP_{fu} = \sum_{i=1}^{105} \sum_{j=1}^4 (FG_{ij} \times SW_j \times FU_j) / 2,000$$

where: FGP_{fu} = feed grain production expressed in feed unit tons
at the state level.

FG_{ij} = production of feed grain "j" in bushels for
county "i".

¹Kansas State Board of Agriculture, Farm Facts, 1944-74, (Topeka, Kansas: State Printers Office, 1944-74). County estimates of corn, grain sorghum, oats, and barley production were taken from this publication.

²The official weight per bushel is as follows: corn = 56 pounds, grain sorghum = 56 pounds, oats = 32 pounds, and barley = 48 pounds.

³Allen, G. C. et al., Livestock-Feed Relationships National and State, U.S. Department of Agriculture, Statistical Bulletin No. 530 (Washington D.C.: U.S. Government Printing Office, 1974), pp. 188-89. The conversion factors are: 1.00 for corn, 0.95 for grain sorghum, 0.90 for oats, and 0.90 for barley.

SW_j = standardized weight per bushel for feed grain "j".

FU_j = feed unit conversion factor for feed grain "j".

i = "specified" county.

j = the four feed grains.

Harvested roughages¹ include alfalfa hay, other tame hay², wild hay, corn silage, sorghum silage, and sorghum forage. County production estimates of each harvested roughage (published in tons) were converted to equal feed value and moisture content by multiplying each roughage by its appropriate conversion factor; alfalfa hay = 1.00, other tame hay = 0.75, wild hay = 0.67, corn silage = 0.33, sorghum forage = 0.50.³ The six harvested roughages were then aggregated at the county, district, and state levels. Equation (2) indicates this process at the state level:

$$(2) \quad HRP_{dhe} = \sum_{i=1}^{105} \sum_{j=1}^6 (HR_{ij} \times FU_j)$$

where: HRP_{dhe} = harvested roughage production expressed in dry hay equivalent tons at the state level.

HR_{ij} = production of harvested roughage "j" in tons for county "i".

¹Roughage feeds are those feedstuffs with high fiber content and low digestibility.

²Other tame hay is the residual of 'all hay' minus 'alfalfa' and 'wild hay'. Other tame hay consists primarily of clover and timothy hay. Estimates of all categories of roughages were obtained or derived from the publication Farm Facts.

³Allen. G. C. et al., Livestock-Feed Relationships National and State, U.S. Department of Agriculture, Statistical Bulletin No. 530 (Washington D.C.: U.S. Government Printing Office, 1974), pp. 188-89. Alfalfa hay was considered to be the base with all other roughages compared to it on a feed value or moisture basis.

FU_{ij} = feed unit or dry hay equivalent factor for harvested roughage "j".

i = "specified" county.

j = the six harvested roughages.

Feed Consumption

Two elements were necessary to calculate feed consumption in a specified area. The first was to estimate the number of animals in an area during any particular time period. The second was to estimate consumption per head during the same time period.

This study partitioned five types of livestock and poultry into nine major classes (see Table 3). The number of animals in each of the nine classes were obtained from published sources¹ or were estimated using state data prorated to the county level.² The quantity of livestock in each class was then converted to either feed grain or harvested roughage animal units by applying the appropriate factor (Table 3). The animal units could then be aggregated at the county, district, and state levels and multiplied by feed grain disappearance per animal unit to arrive at a total feed grain consumption figure (Table 4). The feed grain disappearance per animal unit changed annually³ for feed grains,

¹Kansas State Board of Agriculture, Farm Facts, (Topeka, Kansas: State Printers Office, 1944-74). Annual series. The classes 'milk cows', 'all sheep and lambs', and 'turkeys raised' were obtained directly from this publication.

²See Appendix B.

³Allen, G. C. et al., Livestock-Feed Relationships National and State, U.S. Department of Agriculture, Statistical Bulletin No. 530 (Washington D.C.: U.S. Government Printing Office, 1974), p. 181. Consumption of feed grains per animal unit in 1969-70 was 1.814 tons; 1970-71, 1.9729 tons; 1971-72, 1.861 tons; 1972-73, 1.972 tons; 1973-74, 1.972 tons. The 1973-74 figure was assumed to be equal to the 1972-73 rate since no data was available for that year.

TABLE 3

GRAIN AND ROUGHAGE CONSUMING ANIMAL UNIT FACTORS^a FOR EACH
LIVESTOCK CLASS IN KANSAS FOR THE BASE PERIOD^b

Livestock class	Grain consuming animal unit factors	Roughage consuming animal unit factors
1. Milk cows ^c	1.0926	0.9512
2. Dairy replacements ^c	0.1511	0.5756
3. Cattle on feed ^c	1.4213	0.5512
4. Other beef cattle ^c	0.0610	0.2073
5. All sheep and lambs	0.0359 ^d	0.0561
6. Hogs fed	0.2523
7. Hens and pullets	0.0224
8. Chickens raised	0.0049
9. Turkeys raised	0.0172

SOURCE: Allen, G. C. et al., Livestock-Feed Relationships National and State, U.S. Department of Agriculture, Statistical Bulletin 530 (Washington D.C.: U.S. Government Printing Office, 1974), pp. 188-89. All grain consuming animal unit factors were obtained from this publication.

Allen, G. C. et al., Feed Consumed by Various Classes of Livestock by States, 1949-50 and 1959-60, U.S. Department of Agriculture, Statistical Bulletin No. 379 (Washington D.C.: U.S. Government Printing Office, 1966), pp. 16-29. All roughage consuming animal unit factors except milk cows were calculated from this publication.

^aGrain consuming animal unit factors were derived in Appendix C and roughage consuming animal unit factors were derived in Appendix D.

^bThe base period for grain consuming animal unit factors is 1969-71. The roughage consuming animal unit factors are based on the 1959-60 feeding period with the exception of milk cows, which is based 1970-71. U.S.D.A. Bulletin No. 530 includes pasture consumption in its roughage consuming animal factors. No estimates were available on a state or county level to permit the use of these factors.

^cThese factors are calculated for January 1 inventory numbers. Each factor includes enough feed to compensate for turnover in the livestock class.

^dThe factors for 'stock sheep on farms Jan. 1' and 'sheep and lambs on feed' were combined to form one class. Note Appendix C.

TABLE 4
FEED GRAIN CONSUMPTION PER ANIMAL IN KANSAS FOR FEEDING YEARS 1969-74

Livestock class	Consumption of feed grains per animal per year ^a				
	1969-70	1970-71	1971-72	1972-73 ^b	1973-74 ^c
	(feed unit pounds) ^d				
1. Milk cows	3964	3778	4067	4309	4309
2. Dairy replacements	548	523	562	596	596
3. Cattle on feed	5156	4915	5290	5606	5606
4. Grain fed cattle ^e	2583	2462	2650	2808	2808
5. Other beef cattle	221	211	227	241	241
6. All sheep and lambs	130	124	134	142	142
7. Hogs fed	915	872	939	995	995
8. Hens and pullets	81	77	83	88	88
9. Chickens raised	18	17	18	19	19
10. Turkeys raised	62	59	64	68	68

^aConsumption of feed grains was expressed in feed unit pounds for easier reference.

^bU.S. Department of Agriculture, Agricultural Statistics 1974, pp. 33-57, reported that 79.2 million animal units were fed during the 1972-73 feeding year at the national level. During the same time period, almost 156.18 million tons of the four feed grains were consumed. This column was based on 1.972 tons of feed grain disappearance per animal unit.

^cThe 1973-74 feed consumption rates were assumed to be equal to those of 1972-73.

^dFeed consumption per animal unit at the state level was assumed to be the same as that at the national level.

^eFeed consumption per head of grain fed cattle. See Appendix C.

but was assumed to be constant (4.1 tons) during all years in the case of harvested roughages.

Equation (3) illustrates the steps for calculating consumption of feed grains at the state level:

$$(3) \quad FGC_t = \sum_{i=1}^{105} \sum_{k=1}^9 (LC_{ikt} \times GCAUF_k \times FGD_t)$$

where: FGC_t = feed grain consumption in tons by all classes of livestock in the state during feeding year "t".

LC_{ikt} = number of head in livestock class "k" for county "i" during time period "t".

$GCAUF_k$ = the grain consuming animal units factor for livestock class "k".

FGD_t = feed grain disappearance in tons per animal unit for feeding year "t".

1,972 — 72-73

i = "specified" county.

k = livestock class.

t = feeding year.

The corresponding calculations for harvested roughages are represented by equation (4):

$$(4) \quad HRC_t = \sum_{i=1}^{105} \sum_{k=1}^5 (LC_{ikt} \times RCAUF_k \times 4.1 \text{ tons})$$

where: HRC_t = harvested roughage consumption in tons by the five leading ruminant consuming classes of livestock during feeding year "t".

LC_{ikt} = number of head in livestock class "k" for county "i" during time period "t".

$RCAUF_k$ = the harvested roughage consuming animal unit factor
for livestock class "k".

4.1 = one roughage consuming animal unit expressed in
dry hay equivalent tons.

i = "specified" county.

k = livestock class.

t = feeding year.

Feed Balance

The calculation of either the feed grain balance or the harvested roughage balance was accomplished by subtracting feed consumption from feed production at the county, district, or state level. The feed grain balance for any specific area resulted from subtracting equation (3) from equation (1). The harvested roughage balance was derived by subtracting equation (4) from equation (2).

The feed balance can be positive or negative in any particular year for any specific area. A positive balance indicates a feed surplus. A negative balance indicates that feed may have been shipped into an area or that existing inventories were reduced or depleted. If neither condition holds, then some of the livestock assumed to be fed in that area were actually shipped out to be fed elsewhere or fed less than the assumed amount.

Potential Expansion

Potential expansion of livestock was based on the feed balance available in any particular year and area. A negative feed balance for any given area ordinarily would indicate a zero expansion potential. However, in so far as it was assumed that a negative balance reflected

a drain on surrounding feed supplies, it was treated in this study as negative 'potential' expansion. The sum of all positive and negative expansion 'potentials' for the state as a whole, therefore, reflected more closely the true expansion potential.

Potential expansion for any one class of livestock was calculated by dividing per head consumption into the existing feed balance. In the case of grain fed cattle expansion, per head annual feed intake varied from 2,462 to 2,808 feed unit pounds of feed grains during the five years. For hogs, it varied from 872 to 995 feed unit pounds of feed grains (see Table 4).

CHAPTER III

1969-74 LIVESTOCK-FEED BALANCES

Feed Grain Balances

The size and location of feed grain balances are the immediate concerns of livestock and feed related enterprises. Favorable surplus feed balances indicate livestock enterprises are able to maintain and even expand their production positions. Table 5 illustrates the feed grain balance as it existed in Kansas during the 1969-74 feeding period.

State

The feed grain balance in Kansas did not increase every year during the 1969-74 feeding period, but it has trended upward. In fact, the 1973-74 feed grain balance (4.3 million tons) reflects a 51 percent increase over the 1969-70 figure (2.8 million tons). The lowest feed grain balance (1.6 million tons) occurred during the 1970-71 feeding year. That resulted from a combination of plant disease and drought conditions which decreased grain sorghum and corn production 20 and 13 percent respectively from the previous year levels.

Crop Reporting District

The Northeast and Southwest crop reporting districts were responsible for the greatest amount of surplus feed grains. Each of these districts exhibited surpluses in excess of 725,000 tons in four out of the five years under consideration. The Central and South Central districts

TABLE 5

FEED GRAIN BALANCES BY CROP REPORTING DISTRICT AND
KANSAS, 1969-74 AND 5 YEAR AVERAGE

Crop reporting district and state	1969-70	1970-71	1971-72	1972-73	1973-74	5 year average
(1,000 feed unit tons) ^a						
Northwest	265	316	359	341	461	349
West Central	130	223	148	41	68	122
Southwest	768	849	750	476	784	725
North Central	492	96	411	553	814	473
Central	9	-107	100	-9	274	54
South Central	111	-19	177	4	121	79
Northeast	775	369	921	1,144	1,109	864
East Central	338	-48	863	568	518	448
Southeast	-45	-118	494	154	150	127
State Total ^b	2,843	1,562	4,223	3,272	4,298	3,240

^aOne feed unit ton is equivalent to 2,000 pounds of corn.

^bState total may not sum exactly from district totals due to rounding.

were at the opposite end of the spectrum. Both districts had negative feed grain balances during the 1970-71 feeding year. On the basis of the five year average, the Central district possessed the smallest average surplus among all districts in the state. The greatest one year deficit of feed grains was -118,000 tons which occurred in the Southeast district during the 1972-73 feeding year. The North Central district showed the most consistent growth in its feed grain balance, increasing over 65 percent during the five year period.

The following districts ranked from largest to smallest on the basis of the five year average balance: Northeast, Southwest, North Central, East Central, Northwest, Southeast, West Central, South Central, and Central.

County

The leading feed grain surplus county was Stevens in southwest Kansas. It was followed closely by Brown and Doniphan counties in extreme northeast Kansas. Stevens averaged 226,986 feed unit tons of surplus grain during the five year period. Brown and Doniphan averaged 177,059 and 162,004 feed unit tons respectively. Other counties which averaged over 100,000 tons, listed in descending order, were: Stanton, Marshall, Republic, Morton, and Grant. Of these top eight counties, four were in the Southwest district, three were in the Northeast, and one was in the North Central.

Two counties which showed the largest average feed grain deficits were Ford and Barton with -104,999 and -102,290 feed unit tons respectively. Other counties which had large deficits, ranging from -69,795 to -37,263 feed unit tons, were: Chase, Pratt, Gove, Cowley, Butler, and Ellis. There was little pattern to the distribution of these eight counties throughout the state since they were located in six different districts in the southern two-thirds of the state. However, with the exception of Chase and Cowley, each of the remaining six counties had marketed over 50 grain fed cattle per rural square mile in 1973. That indicated deficit balances were closely related to areas of intensified cattle feeding.

Table 6 and Figure 11 give a more detailed account of the five year period feed grain balance.

Harvested Roughage Balances

The harvested roughage balance is of equal importance to the livestock industry. For many years roughages were produced and harvested for the purpose of wintering ruminant animals. Recently this practice

has been undergoing change. The soaring costs of feed grains and moderate cattle prices induced some cattlemen to use a less concentrated ration in finishing cattle in the last two years. Whether that remains a common practice will depend on relative prices. However, this changing attitude, coupled with the growing number of cattle in Kansas has placed a greater emphasis on the harvested roughage supply.

Ordinarily, roughage production is geared to utilization intentions with only small allowances for the variance in short run production goals. As a result, adverse weather conditions have a greater impact on the harvested roughage balance than on the feed grain balance. This has been the primary reason why the harvested roughage balance has appeared so volatile during the five year period under examination. Generally, areas of consistently large roughage deficits will in the long run have a pronounced negative impact on the potential expansion of livestock in the immediate area. Those livestock classes with the highest consumption rates would feel the impact initially.

Table 7 indicates the harvested roughage balance as it existed in Kansas during the 1969-74 feeding years.

State

Kansas experienced a fluctuating harvested roughage balance over the 1969-74 period. It has, however, increased since the relatively dry 1970-71 feeding year and has averaged out near the zero mark (-99,000) over the five year period.

The 1970-71 feeding year illustrates the impact of dry weather conditions on the harvested roughage balance. The 1.9 million tons balance decrease from the previous year was primarily the result of

Table 6. Feed grain balances in feed unit tons by county, crop reporting district, and Kansas for feeding years 1969-74 and 5 year average.

County, crop reporting district, and state	Feeding Year					5 year average
	1969-70	1970-71	1971-72	1972-73	1973-74 ^b	
(feed unit tons)						
Northwest:						
Cheyenne	43,297	48,246	66,222	71,487	73,525	60,556
Decatur	12,814	17,411	29,543	15,208	4,461	15,888
Graham	14,622	16,394	14,783	22,999	30,929	19,945
Norton	21,721	20,807	20,186	24,219	35,063	24,399
Rawlins	1,794	19,795	14,281	13,949	32,802	16,524
Sheridan	18,947	38,634	28,368	49,899	68,776	40,925
Sherman	97,338	90,752	101,159	64,930	114,671	93,770
Thomas	54,801	64,392	84,476	78,561	100,511	76,548
District Total	265,335	316,432	359,017	341,252	460,738	348,555
West Central:						
Cove	-32,808	-38,045	-47,673	-84,433	-45,751	-49,742
Greeley	24,177	16,155	12,247	23,605	9,711	17,179
Lane	-3,332	11,110	2,924	-11,261	-8,619	-1,836
Logan	10,057	15,017	22,380	18,810	21,615	17,576
Ness	4,259	6,538	19,858	15,932	9,459	11,209
Scott	8,073	18,950	-6,457	-29,731	-9,262	-3,685
Trego	1,468	7,537	13,299	-1,505	-4,065	3,347
Wallace	49,411	65,059	65,789	83,999	97,708	72,393
Wichita	68,930	120,768	66,021	25,902	-2,905	55,743
District Total	130,235	223,090	148,389	41,318	67,891	122,185
Southwest:						
Clark	-11,503	-9,030	-13,584	-32,442	-31,721	-19,656
Finney	-2,281	71,360	32,822	32,958	35,456	34,063
Ford	-111,767	-93,738	-103,832	-104,136	-111,522	-104,999
Grant	125,878	113,052	121,498	87,043	121,961	113,886
Gray	34,479	85,853	50,358	71,096	85,372	65,432
Hamilton	41,170	33,582	13,862	2,346	3,076	18,807
Haskell	73,395	124,602	93,814	-6,838	70,685	71,131
Hodgeman	397	-4,550	-2,256	-7,031	-17,010	-6,099
Kearny	62,628	-626	-38,292	-95,217	-60,698	-26,441
Meade	25,241	32,808	66,412	39,520	66,647	46,126
Morton	122,268	100,049	108,388	121,306	154,468	121,296
Seward	61,712	32,290	38,077	25,198	26,086	36,672
Stanton	143,796	148,480	151,802	110,424	185,149	147,930
Stevens	202,309	214,388	230,659	231,955	255,619	226,986
District Total	767,722	848,519	749,727	476,181	783,566	725,143
North Central:						
Clay	35,750	19,866	43,708	74,320	100,269	54,783
Cloud	73,356	55,088	80,666	100,586	123,867	86,713
Jewell	55,704	4,409	43,004	53,723	71,884	45,745
Mitchell	17,815	-10,050	21,140	6,205	46,431	16,308
Osborne	16,863	4,287	13,605	18,591	26,264	15,922
Ottawa	-888	-1,605	17,541	6,293	28,246	9,917
Phillips	22,949	1,691	13,906	-9,118	11,204	8,127
Republic	127,994	30,766	125,670	169,094	193,256	129,356
Rooks	-5,169	-7,388	602	-1,381	-1,179	-2,903
Smith	22,062	-12,332	35,270	30,777	70,238	29,203
Washington	125,830	11,190	15,935	103,889	143,979	80,164
District Total	492,267	95,922	411,045	552,980	814,459	473,334
Central:						
Barton	-62,253	-109,203	-111,523	-107,774	-120,696	-102,290
Dickinson	16,576	-140	37,343	28,094	78,403	32,055
Ellis	-31,554	-25,970	-32,412	-52,676	-43,705	-37,263
Ellsworth	5,473	-1,884	10,532	5,335	16,287	7,149
Lincoln	-6,478	-11,119	11,450	4,646	20,456	3,791
McPherson	34,335	12,960	48,203	42,318	102,966	48,156
Marion	2,557	5,053	77,693	49,491	79,645	42,888
Rice	24,505	13,054	26,786	5,433	78,664	29,688
Rush	20,825	10,117	20,433	20,698	29,658	20,346
Russell	4,659	1,121	11,471	8,656	18,284	8,838
Saline	781	-770	291	-12,965	13,934	254
District Total	9,426	-106,780	100,267	-8,745	273,896	53,613

Table 6. Continued

South Central:						
Barber	4,142	1,164	-11,607	-13,377	-8,357	-5,607
Comanche	-7,489	-7,076	-7,488	-2,262	-6,604	-6,184
Edwards	18,308	-1,320	5,426	-9,606	7,387	4,039
Harper	-10,569	-6,231	-7,514	-12,200	-18,212	-10,945
Harvey	16,343	-11,196	44,229	49,590	51,330	30,059
Kingman	1,687	-16,083	-16,476	-15,204	-14,245	-12,064
Kiowa	1,191	2,447	13,693	-725	12,346	5,790
Pawnee	8,573	4,513	8,793	-22,191	12,614	2,461
Pratt	-40,324	-58,555	-45,555	-66,453	-78,781	-57,934
Reno	40,852	23,370	69,473	30,168	42,394	41,251
Sedgwick	19,965	-3,119	44,283	37,134	70,990	33,851
Stafford	47,677	33,703	50,149	33,283	46,074	42,177
Sumner	10,171	19,547	29,768	-4,413	3,607	11,736
District Total	110,527	-18,836	177,174	3,745	120,543	78,630
Northeast:						
Atchison	70,898	30,495	69,350	120,290	99,229	78,052
Brown	163,070	79,191	203,581	232,322	207,131	177,059
Doniphan	113,064	104,177	207,465	195,543	189,772	162,004
Jackson	57,525	16,500	58,733	73,785	64,231	54,155
Jefferson	63,353	32,941	68,992	99,903	78,947	68,827
Leavenworth	25,634	21,880	49,402	57,140	54,033	41,618
Marshall	143,397	57,198	138,003	183,861	206,008	145,694
Nemaha	62,869	23,032	63,832	107,099	112,373	73,841
Pottawatomie	25,835	2,491	32,657	34,139	45,810	28,186
Riley	42,210	187	20,234	26,022	40,751	25,881
Wyandotte	7,132	1,013	8,422	13,728	10,682	8,196
District Total	774,988	369,105	920,670	1,143,832	1,108,968	863,513
East Central:						
Anderson	45,062	3,822	69,698	58,516	44,031	44,226
Chase	-126,051	-98,669	-55,639	-59,183	-9,432	-69,795
Coffey	19,034	-14,022	53,816	52,437	25,415	27,336
Douglas	29,606	-549	85,854	58,551	48,239	44,340
Franklin	28,847	-157	88,399	60,856	37,049	42,999
Geary	13,980	-438	25,235	19,646	27,295	17,144
Johnson	45,503	21,810	81,863	88,696	47,888	57,152
Linn	27,938	6,743	101,873	32,690	42,342	42,317
Lyon	-5,578	-30,990	34,913	19,192	730	3,653
Miami	63,983	5,157	85,473	61,104	54,677	54,079
Morris	-2,439	-12,453	32,780	-8,057	20,848	6,136
Osage	93,814	37,796	141,049	98,535	70,928	88,424
Shawnee	95,916	54,568	112,847	90,204	98,758	90,458
Wabaunsee	8,154	-20,133	4,815	-5,210	9,542	-566
District Total	337,769	-47,515	862,976	567,978	518,310	447,903
Southeast:						
Allen	25,554	15,520	53,365	44,511	35,350	34,860
Bourbon	15,615	341	66,997	39,317	25,993	29,653
Butler	-48,525	-82,276	-6,132	-34,989	-33,624	-41,109
Chautauqua	-704	-5,748	-6,583	-7,700	-8,469	-5,841
Cherokee	9,963	18,056	46,023	23,339	37,966	27,069
Cowley	-40,132	-41,791	-34,925	-64,250	-42,372	-44,694
Crawford	28,522	27,010	121,208	65,175	69,994	62,382
Elk	-10,906	-10,178	-997	-11,058	-12,021	-9,032
Greenwood	-19,045	-13,381	3,022	2,680	-7,925	-6,930
Labette	-32,626	-31,002	19,684	-17,930	-9,364	-14,247
Montgomery	1,599	8,338	54,355	17,620	39,970	24,377
Neosho	16,823	7,930	89,837	40,353	42,534	39,495
Wilson	16,182	16,127	79,773	47,998	30,772	38,171
Woodson	-7,240	-27,088	7,976	8,709	-18,906	-7,310
District Total	-44,920	-118,140	493,603	153,774	149,898	126,843
State Total	2,843,346	1,561,794	4,222,866	3,272,311	4,298,264	3,239,716

^aTotals may not sum exactly due to rounding.

^bPreliminary. Cattle on feed were estimated from 1973 grain fed marketings and feeding rates were the same as in 1972.

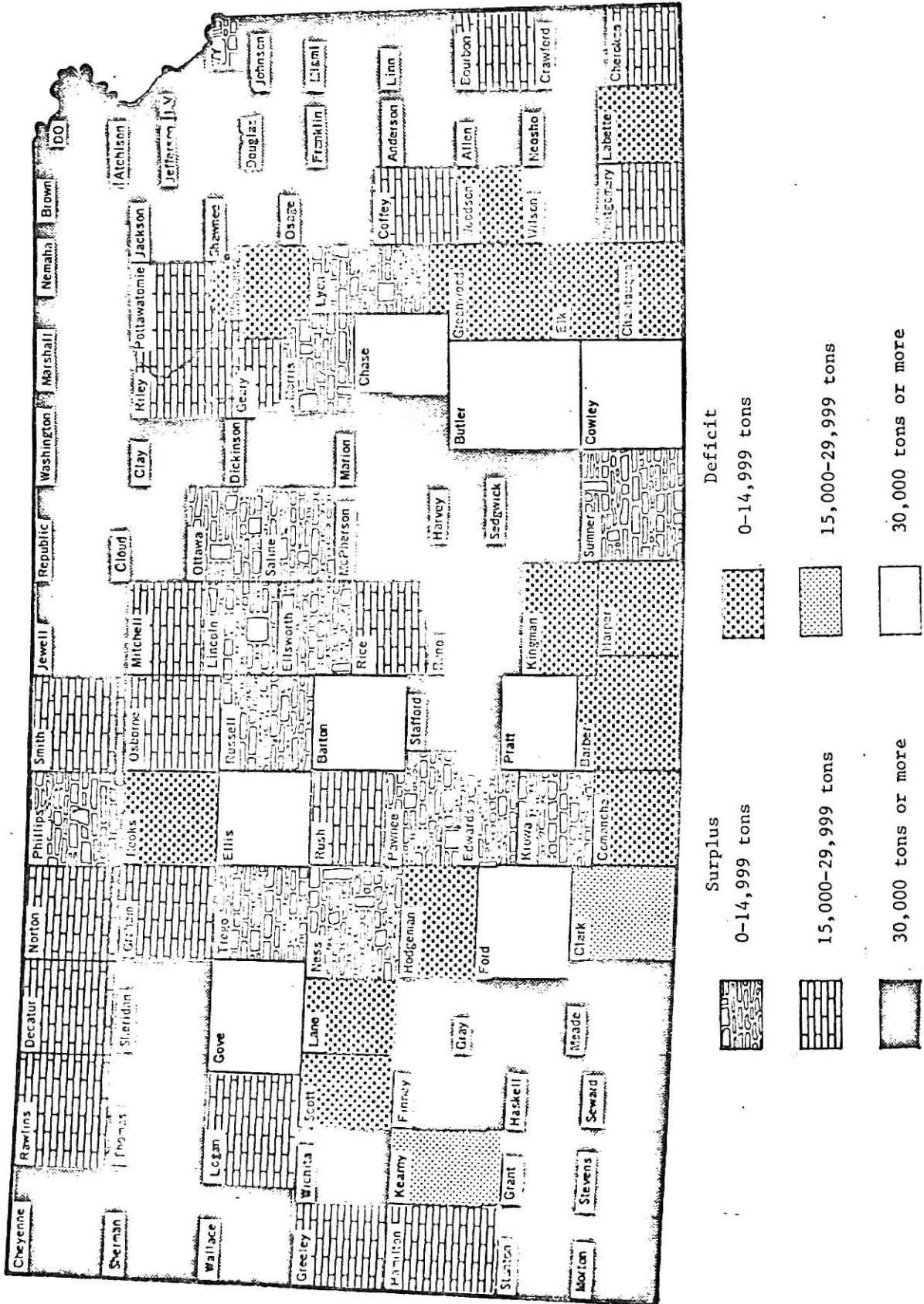


Fig. 11. Feed grain balances on the basis of the 5 year average.

TABLE 7

HARVESTED ROUGHAGE BALANCES BY CROP REPORTING DISTRICT
AND KANSAS, 1969-74 AND 5 YEAR AVERAGE

Crop reporting district and state	1969-70	1970-71	1971-72	1972-73	1973-74	5 year average
(1,000 tons) ^a						
Northwest	58	- 12	27	185	21	56
West Central	- 59	-204	-129	- 88	-163	-129
Southwest	-224	-434	-592	-654	-506	-482
North Central	267	- 49	227	275	347	214
Central	191	-114	140	244	203	133
South Central	150	-105	89	128	214	95
Northeast	125	- 47	95	203	128	101
East Central	89	-147	198	198	277	123
Southeast	-177	-400	-116	-139	-216	-210
State Total ^b	422	-1,513	- 62	352	304	- 99

^aDry hay equivalent tons. Three tons of silage or two tons of forage are equivalent to one ton of dry hay.

^bState total may not sum exactly from district totals due to rounding.

a 21 percent drop in alfalfa production which generally constitutes nearly 40 percent of all harvested roughages.

It is difficult to draw any conclusions from the absolute size of the roughage balance without first noting the growth in livestock numbers. Even though the roughage balance decreased nearly 28 percent during the 1969-70 to 1973-74 periods, numbers of cattle and calves increased almost 20 percent. That suggests that roughage production in Kansas has expanded adequately to facilitate increased livestock production.

From an area standpoint, the northeast one-fourth of the state generally possesses the largest harvested roughage balance.

Crop Reporting District

On the basis of the five year average, the North Central district led the state with an annual average surplus of 214,000 dry hay equivalent tons during 1969-74. The Central, East Central, Northeast, South Central, Northwest, West Central, Southeast, and Southwest districts followed in descending order. The Southwest district had the largest deficit average (-482,000 tons). The East Central district showed the largest and most consistent rate of growth. Its balance more than tripled over the five year period.

County

The eleven counties with the largest harvested roughage balance surpluses were as follows: Reno, Marion, Phillips, Stafford, Ottawa, Dickinson, Sedgwick, Sherman, Cloud, Lincoln, and Jewell. Reno ranked first with a five year average of 46,196 dry hay equivalent tons and Marion and Phillips averaged 45,358 and 43,858 tons respectively. Jewell county had the smallest average surplus (31,087 tons) of the eleven counties mentioned. All eleven counties, with the exception of Sherman, were located in the three central crop reporting districts.

The eleven counties possessing the largest roughage deficits were: Haskell, Ford, Pratt, Wichita, Gray, Seward, Labette, Barton, Butler, Stanton, and Scott. The deficits ranged from -109,724 to -44,560 dry hay equivalent tons. Haskell had the greatest deficit, but Ford and Pratt ranked second and third with -85,085 and -66,420 tons respectively.

The largest deficit areas were located in the southern part of the state. The southwest quarter of the state contained the bulk of

the deficit counties, but the Southeast district did have three of the eleven deficit counties listed.

Table 8 and Figure 12 illustrate the estimates of the county, district, and state harvested roughage balances for the 1969-74 feeding period.

Table 8. Harvested roughage balances in dry hay equivalent tons by county, crop reporting district, and Kansas for feeding years 1969-74 and five year average.

County, crop reporting district, and state	Feeding Year					5 year average
	1969-70	1970-71	1971-72	1972-73	1973-74	
	(tons)					
Northwest:						
Cheyenne	9,849	-9,801	-4,035	1,772	5,989	755
Decatur	7,322	-6,324	-3,208	3,122	-10,589	-1,935
Graham	13,073	14,384	6,780	42,160	24,937	20,267
Norton	19,518	5,664	-1,184	23,713	7,384	11,019
Rawlins	7,912	-1,871	28,697	36,645	8,747	16,026
Sheridan	-11,825	-3,711	-32,958	-8,716	-44,730	-20,388
Sherman	20,015	-992	44,282	76,869	31,995	34,434
Thomas	-7,807	-9,635	-10,948	9,601	-3,026	-4,363
District Total	58,057	-12,285	27,425	165,167	20,707	55,814
West Central:						
Gove	-25,502	-61,480	-17,988	-26,292	-29,875	-32,227
Greeley	7,742	10,096	-3,834	-14,055	-16,077	-3,226
Lane	-15,458	-33,585	-7,107	16,298	-27,178	-13,406
Logan	6,853	-8,083	-5,673	4,678	-1,797	-804
Ness	10,384	-17,417	711	25,442	10,993	6,023
Scott	-41,683	-40,971	-42,010	-44,512	-53,624	-44,560
Trego	7,096	-7,630	4,217	34,586	13,601	10,374
Wallace	16,299	10,303	20,982	9,178	2,550	11,862
Wichita	-24,505	-55,197	-78,353	-92,878	-61,805	-62,548
District Total	-58,775	-203,964	-129,055	-87,554	-163,212	-128,512
Southwest:						
Clark	-32,217	-32,272	-33,524	-40,716	-42,385	-36,223
Finney	31,115	-4,425	3,581	-61,582	3,719	-5,518
Ford	-112,648	-121,021	-78,570	-53,348	-59,836	-85,085
Grant	-42,968	-48,633	-47,664	-55,374	-3,211	-39,570
Gray	17,495	-68,947	-70,108	-80,343	-102,788	-60,938
Hamilton	31,389	10,557	-15,577	-19,605	-13,118	-1,271
Haskell	-16,189	-34,533	-147,390	-203,607	-146,903	-109,724
Hodgeman	-1,898	-16,852	-5,239	20,077	19,871	3,192
Kearny	-7,905	4,026	-48,114	-36,850	-71,123	-31,993
Meade	-21,679	-16,437	-29,261	11,511	4,524	-10,268
Morton	4,901	-2,476	-1,807	-1,345	5,877	1,030
Seward	-45,091	-63,379	-62,210	-73,363	-48,259	-58,460
Stanton	-25,950	-39,337	-62,108	-55,606	-48,593	-46,319
Stevens	-1,900	-742	6,139	-4,170	-4,208	-976
District Total	-223,545	-434,472	-591,853	-654,320	-506,432	-482,124
North Central:						
Clay	2,986	10,790	-2,762	-2,233	18,444	5,445
Cloud	33,753	15,924	28,574	42,732	49,192	34,035
Jewell	45,528	-4,868	47,782	24,048	42,947	31,087
Mitchell	16,454	-13,551	-3,172	-238	15,389	2,976
Osborne	40,192	-9,396	10,576	25,093	37,121	20,717
Ottawa	38,712	8,577	42,423	61,872	30,610	36,439
Phillips	31,072	7,753	43,080	56,536	80,850	43,858
Republic	1,278	-13,432	11,817	-10,866	-4,212	-3,083
Rooks	22,575	-58	23,290	20,802	41,058	21,533
Smith	34,157	-2,053	10,013	33,738	5,878	16,347
Washington	779	-48,651	15,498	23,685	29,798	4,222
District Total	267,485	-48,964	227,119	275,169	347,076	213,577
Central:						
Barton	-20,590	-89,469	-68,857	-40,453	-33,502	-50,574
Dickinson	36,635	8,116	53,823	36,823	41,612	35,402
Ellis	1,627	-25,683	-31,724	-22,081	-15,304	-18,633
Ellsworth	28,204	71	13,584	13,124	15,366	14,070
Lincoln	30,315	1,191	39,956	46,243	44,932	32,527
McPherson	23,408	-9,056	26,973	27,956	17,345	17,325
Marion	10,814	8,736	40,241	91,737	75,260	45,358
Rice	22,599	-441	13,413	16,570	25,360	15,500
Rush	7,180	-9,705	16,485	10,443	3,692	5,619
Russell	23,502	-8,380	15,072	17,008	15,844	12,609
Saline	27,782	10,564	20,618	46,178	12,417	23,512
District Total	191,478	-114,057	139,584	243,548	203,022	132,715

Table 8. Continued

South Central:						
Barber	9,318	-39,777	-9,265	-1,822	-21,645	-12,638
Comanche	-4,601	-18,752	-8,897	-1,771	-10,325	-8,869
Edwards	15,382	-1,426	2,208	18,194	35,322	13,936
Harper	12,352	-17,308	-28,324	-19,999	-6,102	-11,876
Harvey	4,157	6,625	21,035	39,533	19,499	18,170
Kingman	9,402	3,965	5,748	-84	18,471	7,500
Kiowa	-4,679	-10,633	-10,181	7,038	11,360	-1,419
Pawnee	9,475	8,897	23,427	26,882	42,464	22,229
Pratt	-46,610	-82,026	-66,002	-69,915	-67,548	-66,420
Reno	57,292	23,042	40,184	54,940	55,521	46,196
Sedgwick	24,707	12,881	60,276	43,677	33,384	34,985
Stafford	33,201	17,939	45,960	20,552	79,865	39,503
Sumner	30,646	-7,966	12,550	11,139	23,743	14,022
District Total	150,043	-104,541	88,720	128,364	214,008	95,319
Northeast:						
Atchison	11,826	-579	-4,149	21,513	16,599	9,042
Brown	-26,176	-28,310	-31,586	624	-8,064	-18,703
Doniphan	-1,517	-7,239	-2,057	-2,752	-10,726	-4,858
Jackson	27,126	5,416	35,392	23,099	22,901	22,787
Jefferson	4,268	240	4,687	22,742	8,815	8,150
Leavenworth	29,640	13,244	33,683	30,423	17,856	24,969
Marshall	36,115	-31	16,998	24,556	28,957	21,319
Nemaha	-10,056	-49,245	-1,324	38,593	-6,476	-5,702
Pottawatomie	42,784	17,284	25,522	30,060	30,750	29,280
Riley	11,266	4,269	14,464	13,466	22,597	13,212
Wyandotte	-43	-2,294	2,994	1,048	4,866	1,314
District Total	125,233	-47,246	94,623	203,372	128,076	100,812
East Central:						
Anderson	18,277	14,661	12,767	6,698	21,889	14,858
Chase	-80,126	-74,509	-42,289	-17,640	14,866	-39,939
Coffey	30,474	-10,706	19,093	4,336	15,747	11,789
Douglas	15,965	6,750	16,863	30,745	24,216	18,908
Franklin	-2,855	-16,786	29,328	17,790	20,908	9,677
Geary	8,436	-125	19,432	6,568	10,728	9,008
Johnson	13,892	-155	11,560	8,341	3,035	7,335
Linn	21,848	-6,886	30,277	17,447	-1,470	12,243
Lyon	-31,725	-41,552	26,179	-13,959	51,935	-1,824
Miami	31,392	-19,240	-9,982	5,879	14,723	4,555
Morris	17,057	6,516	10,725	27,386	7,456	13,828
Osage	11,672	-5,532	20,932	15,461	14,731	11,453
Shawnee	17,895	-564	34,041	49,854	27,804	25,806
Wabaunsee	16,662	671	18,824	38,998	50,822	25,195
District Total	88,865	-147,457	197,752	197,905	277,389	122,891
Southeast:						
Allen	21,544	2,798	33,875	24,854	16,270	19,868
Bourbon	18,826	-1,618	-2,347	23,836	19,131	11,565
Butler	-30,572	-89,176	-54,620	-38,551	-30,416	-48,667
Chautauqua	-14,086	-24,594	-18,066	-18,384	-23,815	-19,789
Cherokee	-4,893	-15,329	5,118	-2,610	-6,061	-4,755
Cowley	-46,756	-68,411	-25,474	-49,617	-32,186	-44,489
Crawford	-4,961	-9,171	-7,882	-11,885	-18,473	-10,474
Elk	-10,104	-22,172	2,515	-9,649	-18,520	-11,586
Greenwood	-22,063	-37,165	-16,743	-13,968	-22,190	-22,426
Labette	-64,293	-53,284	-46,698	-57,912	-55,200	-55,477
Montgomery	-5,469	-12,114	11,613	8,918	9,100	2,410
Neosho	-7,836	-14,087	-849	4,344	-20,248	-7,735
Wilson	4,836	-2,664	18,006	21,552	13,914	11,129
Woodson	-10,971	-52,560	-14,757	-20,252	-47,801	-29,268
District Total	-176,798	-399,546	-116,308	-139,324	-216,495	-209,694
State Total	422,043	-1,512,530	-61,992	352,326	304,139	-99,203

^aTotals may not sum exactly due to rounding.

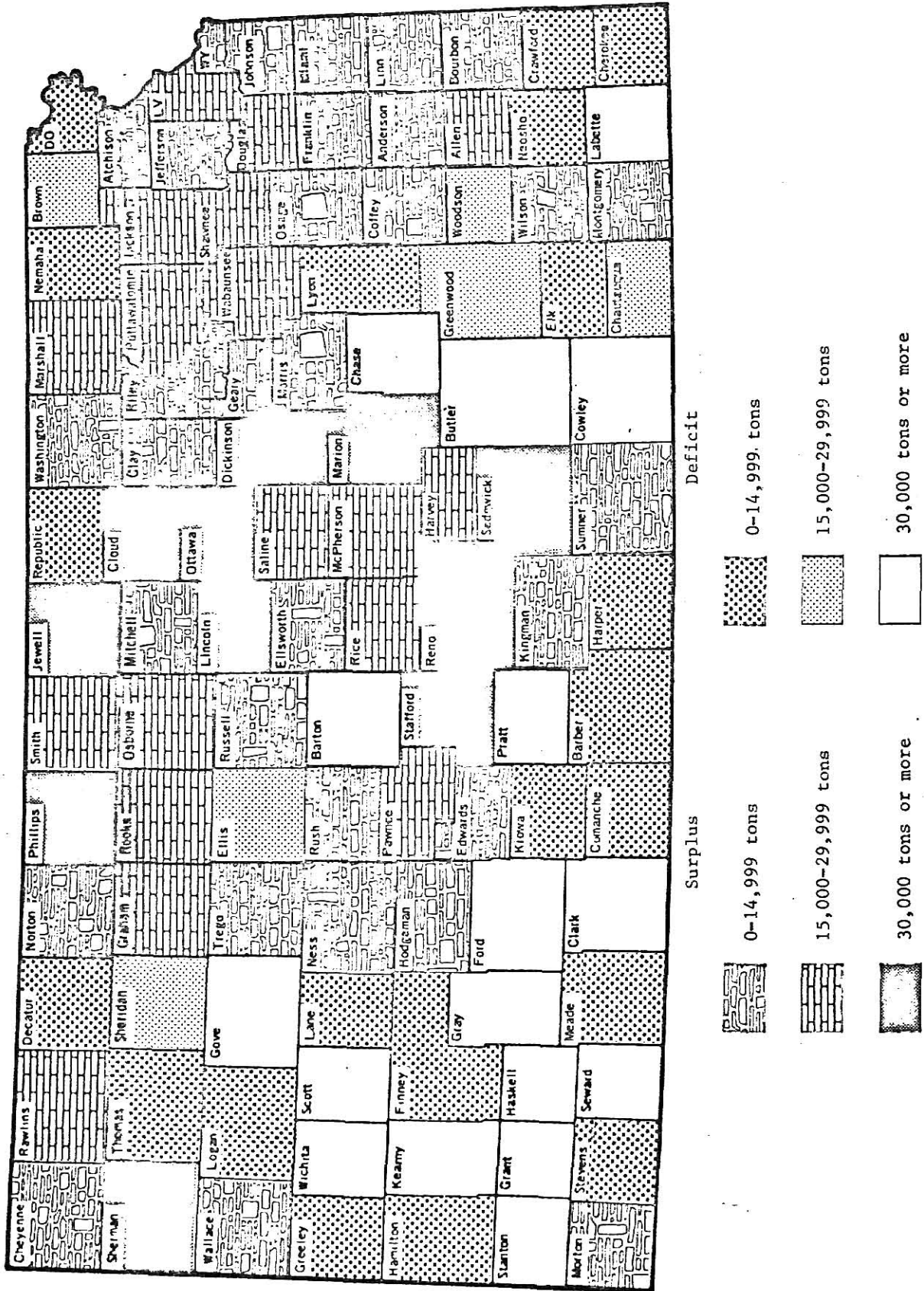


Fig. 12. Harvested roughage balances on the basis of the 5 year average.

CHAPTER IV

POTENTIAL FOR LIVESTOCK EXPANSION

The ability to expand the livestock industry of any state is a concern of both the farm and non-farm economic sectors. Expansion will mean increased revenues and possible income and investment opportunities. In the case of a farmer or a packing plant, a venture that may not have been profitable may now become viable, thus decreasing unemployment and increasing incomes.

From the viewpoint of feed availability, Kansas appears to be in a favorable position for livestock expansion. Although adequate harvested roughages may be doubtful in extremely dry years, it appears that they are above average in normal situations. Feed grain production is more than enough to facilitate further expansion and may even enable more corn and grain sorghum to be diverted into silages and forages.

Potential livestock expansion is a combination of many factors. This study considered only one--the expansion made possible by diverting surplus feeds into livestock utilization.

The two most prominent livestock enterprises in Kansas over the last several decades have been cattle and hogs. In 1974, Kansas ranked fourth in the production of beef and eighth in the production of pork nationally. Figure 13 graphically illustrates the number of animal units attributed to grain fed cattle, hogs, and other classes of livestock in Kansas during the feeding years 1969-74. Grain fed cattle

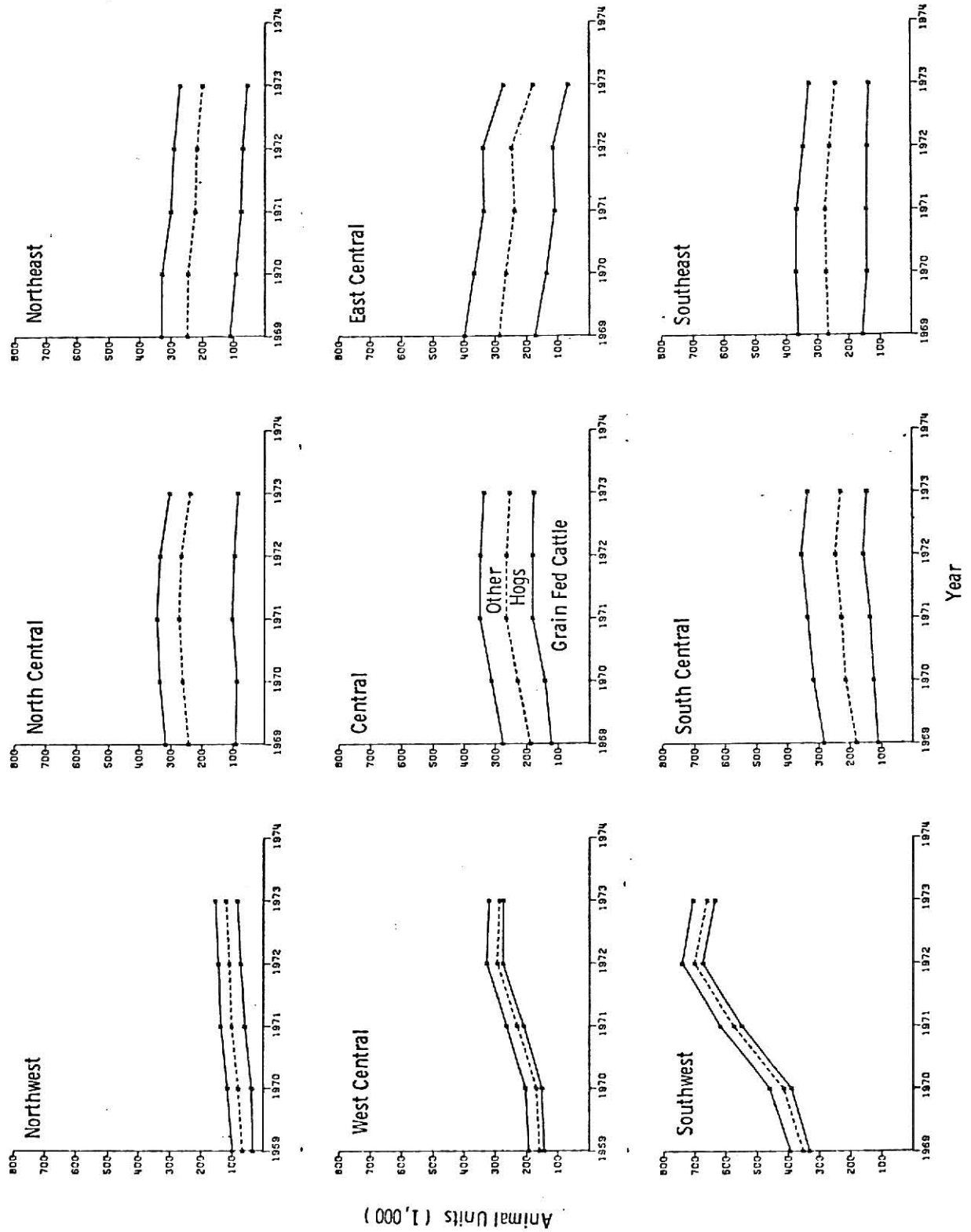


Fig. 13. Grain consuming animal units attributed to grain fed cattle, hogs, and other livestock classes, Kansas 1969-74.

and hog production dominate the Kansas livestock industry to such a degree that potential expansion was calculated for only those two classes of livestock.

The potential expansion for grain fed cattle and hogs was calculated for each class separately. This was accomplished by dividing the annual consumption per head of either grain fed cattle or hogs into the feed grain or roughage feed balances¹ during each of the five years under observation. Using the results of these calculations, it was possible to indicate the combinations of both hogs and cattle that could be produced in lieu of available feed.

Hog Expansion

The potential expansion of hogs was calculated by using the annual feeding rates in Table 4 and the feed grain balances in Table 6. As indicated in the section on feed grain balances in Chapter 3, the areas of greatest feed grain surpluses corresponded directly with the areas of greatest hog expansion potential in Table 9.

If all surplus grain could have been devoted to hog production during the 1969-74 period, Kansas could have produced an average of 6.8 million more head annually. That can be compared to the 3.1 million head that actually were marketed. This indicates that more than three times as many hogs could have been produced, but were not.

The Southwest and Northeast districts were the leaders in the expansion areas, just as they were the highest feed grain surplus

¹The potential expansion of hogs based on the harvested roughage balance were not calculated since hogs are not considered to be ruminant animals.

TABLE 9

POTENTIAL ADDITIONAL HOG PRODUCTION BASED ON THE FEED
GRAIN BALANCE BY CROP REPORTING DISTRICT AND
STATE, FEEDING YEARS 1969-74 AND 5 YEAR AVERAGE

Crop reporting district and state	1969-70	1970-71	1971-72	1972-73	1973-74	5 year average
(1,000 head)						
Northwest	580	726	765	686	926	736
West Central	285	512	316	83	136	266
Southwest	1,678	1,946	1,597	957	1,575	1,551
North Central	1,076	220	875	1,112	1,637	984
Central	21	-245	214	-18	551	104
South Central	242	-43	377	8	242	165
Northeast	1,694	847	1,961	2,299	2,299	1,806
East Central	738	-109	1,838	1,142	1,042	930
Southeast	-98	-271	1,051	309	301	259
State total ^a	6,215	3,582	8,994	6,578	8,640	6,802

^aState total may not sum exactly from district totals due to rounding.

areas. Each could have produced an average of 1.6 and 1.8 million head more respectively. The Southwest district actually did market an average of 97,000 hogs annually during the 1969-74 period and the Northeast averaged 577,000 hogs annually. These figures stress the fact that the Northeast district used much more of its feed grains for the production of hogs than did the Southwest. That suggests the expansion of a certain class of livestock may be influenced by factors other than the location and magnitudes of surplus feeds.

The county analysis of expansion potential parallels the discussion in Chapter 3. The magnitude and location of the expansion is indicated in Table 10. The areas of greatest expansion potential correspond

directly with areas of greatest feed grain surplus indicated by Figure 11.

Grain Fed Cattle Expansion

The computations of grain fed cattle expansion also used the data from Tables 4 and 6, dividing annual consumption per head into the feed grain balance for each area. The areas most favorable for grain fed cattle expansion were the same as those which showed positive feed grain balances. Table 11 summarize the results of these computations.

On the basis of the five year average, Kansas could have produced 2.4 million more grain fed cattle annually. The average annual marketings that did take place was approximately 2.2 million head. Therefore, feed grain surpluses, when fed only to grain fed cattle, were large enough to feed out over twice as many cattle during the same time period.

The Southwest and Northeast districts have the greatest potential for expansion. The Southwest could have fed out about 549,000 more head while the Northeast district could have produced 640,000 more. In reality, the Southwest actually did feed out nearly 800,000 head annually while the Northeast produced only 104,000 head annually, during the 1969-74 feeding years.

The analysis by county in Table 12 parallels the discussion of feed grain surplus discussed in connection with Chapter 3.

Simultaneous Livestock Expansion

Any discussion concerning the potential expansion of livestock would not be complete without considering the expansion of more than

Table 10. Potential additional hog production based on the feed grain balance by county, crop reporting district, and Kansas for feeding years 1969-74 and 5 year average.^a

County, crop reporting district, and state ^b	Feeding Year					5 year average
	1969-70	1970-71	1971-72	1972-73	1973-74	
(number of head)						
Northwest:						
Cheyenne	94,639	110,656	141,048	143,693	147,790	127,565
Decatur	28,010	39,934	62,925	30,569	8,967	34,081
Graham	31,962	37,601	31,486	46,229	62,170	41,889
Norton	47,478	47,723	42,994	48,681	70,478	51,471
Rawlins	3,921	45,402	30,417	28,038	65,934	34,742
Sheridan	41,413	68,610	60,421	100,300	138,244	85,798
Sherman	212,761	208,148	215,460	130,512	230,494	199,475
Thomas	119,784	147,687	179,927	157,912	202,031	161,468
District Total	579,967	725,761	764,679	685,934	926,107	736,489
West Central:						
Gove	-71,711	-87,259	-101,540	-169,715	-91,962	-104,437
Greeley	52,847	37,054	26,086	47,448	19,519	36,591
Lane	-7,284	25,481	6,229	-22,636	-17,324	-3,107
Logan	21,983	34,443	47,668	37,809	43,447	37,070
Ness	9,309	14,996	42,295	32,024	19,012	23,527
Scott	17,646	43,463	-13,752	-59,761	-18,618	-6,204
Trego	3,209	17,287	28,325	-3,025	-8,170	7,525
Wallace	108,001	149,218	140,126	168,842	196,398	152,517
Wichita	150,667	276,991	140,619	52,064	-5,838	122,901
District Total	284,667	511,674	316,057	83,051	136,465	266,382
Southwest:						
Clark	-25,143	-20,710	-28,933	-65,210	-63,760	-40,751
Finney	-4,985	163,669	69,908	66,247	71,269	73,221
Ford	-244,299	-214,995	-221,154	-209,319	-224,166	-222,786
Grant	275,143	259,293	258,781	174,961	245,147	242,665
Gray	75,365	196,910	107,259	142,907	171,601	138,808
Hamilton	89,989	77,022	29,524	4,715	6,183	41,487
Haskell	160,425	285,784	199,816	-13,744	142,080	154,872
Hodgeman	868	-10,436	-4,804	-14,133	-34,192	-12,539
Kearny	136,892	-1,436	-81,559	-191,391	-122,006	-51,900
Meade	55,172	75,247	141,452	79,438	133,963	97,054
Morton	267,252	229,471	230,858	243,831	310,488	256,380
Seward	134,889	74,059	81,102	50,649	52,433	78,626
Stanton	314,308	340,551	323,326	221,957	372,159	314,460
Stevens	442,205	491,715	491,287	466,240	513,806	481,051
District Total	1,678,081	1,946,144	1,596,861	957,148	1,575,005	1,550,647
North Central:						
Clay	78,142	45,564	93,095	149,388	201,546	113,547
Cloud	160,342	126,349	171,811	202,183	248,979	181,933
Jewell	121,758	10,113	91,595	107,985	144,490	95,188
Mitchell	38,941	-23,051	45,027	12,472	93,328	33,343
Osborne	36,859	9,833	28,977	37,368	52,792	33,166
Ottawa	-1,941	-3,681	37,361	12,649	56,775	20,233
Phillips	50,163	3,878	29,619	-18,327	22,521	17,571
Republic	279,769	70,564	267,667	339,887	388,455	269,268
Rooks	-11,298	-16,946	1,282	-2,775	-2,369	-6,421
Smith	48,222	-28,284	75,122	61,864	141,182	59,621
Washington	275,037	25,665	33,940	208,822	289,404	166,574
District Total	1,075,993	220,005	875,496	1,111,516	1,637,102	984,022
Central:						
Barton	-136,072	-250,465	-237,535	-216,631	-242,605	-216,661
Dickinson	36,231	-321	79,538	56,470	157,594	65,902
Ellis	-68,971	-59,563	-69,035	-105,882	-87,849	-78,260
Ellsworth	11,964	-4,321	22,433	10,724	32,739	14,708
Lincoln	-14,160	-25,502	24,387	9,338	41,117	7,036
McPherson	75,048	29,724	102,668	85,060	206,967	99,894
Marion	5,588	11,590	165,481	99,479	160,090	88,445
Rice	53,563	29,939	57,052	10,921	158,118	61,919
Rush	45,520	23,205	43,521	41,604	59,615	42,693
Russell	10,183	2,571	24,433	17,400	36,751	18,268
Saline	1,708	-1,766	620	-26,061	28,008	502
District Total	20,602	-244,909	213,562	-17,578	550,544	104,444

Table 10. Continued

South Central:						
Barber	9,054	2,669	-24,721	-26,887	-16,797	-11,337
Comanche	-16,369	-16,230	-15,949	-4,547	-13,274	-13,274
Edwards	40,018	-3,027	11,558	-19,310	14,847	8,817
Harper	-23,101	-14,291	-16,004	-24,523	-36,607	-22,905
Harvey	35,722	-25,679	94,204	99,678	103,175	61,420
Kingman	3,687	-36,889	-35,092	-30,561	-28,632	-25,497
Kiowa	2,604	5,612	29,164	-1,457	24,816	12,148
Pawnee	18,739	10,351	18,729	-44,604	25,355	5,714
Pratt	-88,140	-134,301	-97,030	-133,573	-158,354	-122,280
Reno	89,293	53,600	147,972	60,640	85,215	87,344
Sedgwick	43,639	-7,153	94,320	74,642	142,694	69,629
Stafford	104,211	77,301	106,813	66,901	92,611	89,567
Sumner	22,232	44,833	63,403	-8,870	7,250	25,770
District Total	241,589	-43,202	377,367	7,527	242,297	165,116
Northeast:						
Atchison	154,968	69,942	147,710	241,789	199,455	162,773
Brown	356,436	181,632	433,613	466,980	416,343	371,001
Doniphan	247,134	238,937	441,886	393,052	381,452	340,492
Jackson	125,739	37,843	125,098	148,312	129,108	113,220
Jefferson	138,476	75,553	146,947	200,809	158,688	144,095
Leavenworth	56,031	50,184	105,222	114,855	108,609	86,980
Marshall	313,437	131,189	293,935	369,571	414,086	304,443
Nemaha	137,419	52,827	135,957	215,274	225,876	153,471
Pottawatomie	56,470	5,713	69,556	68,620	92,080	58,488
Riley	92,263	430	43,096	52,306	81,912	54,001
Wyandotte	15,590	2,323	17,938	27,595	21,471	16,983
District Total	1,693,958	846,572	1,960,956	2,299,159	2,229,080	1,805,944
East Central:						
Anderson	98,497	8,766	148,452	117,621	88,506	92,368
Chase	-275,522	-226,305	-118,507	-118,960	-18,958	-151,650
Coffey	41,605	-32,160	114,625	105,402	51,086	56,111
Douglas	64,713	-1,258	182,862	117,690	96,963	92,194
Franklin	63,053	-360	188,284	122,324	74,471	89,554
Geary	30,557	-1,004	53,748	39,490	54,865	35,531
Johnson	99,461	50,024	174,363	178,284	96,256	119,677
Linn	61,067	15,465	216,981	65,709	85,109	88,866
Lyon	-12,192	-71,079	74,362	38,577	1,467	6,227
Miami	139,853	11,828	182,051	122,821	109,903	113,291
Morris	-5,331	-28,562	69,820	-16,195	41,905	12,327
Osage	205,057	86,689	300,424	198,059	142,568	186,560
Shawnee	209,652	125,155	240,355	181,314	198,509	190,997
Wabaunsee	17,823	-46,177	10,256	-10,472	19,180	-1,878
District Total	738,292	-108,979	1,838,073	1,141,663	1,041,829	930,175
Southeast:						
Allen	55,856	35,596	113,664	89,470	71,055	73,128
Bourbon	34,132	783	142,698	79,028	52,247	61,778
Butler	-106,066	-188,705	-13,060	-70,330	-67,586	-89,149
Chautauqua	-1,539	-13,184	-14,020	-15,478	-17,024	-12,249
Cherokee	21,777	41,414	98,025	46,912	76,314	56,888
Cowley	-87,721	-95,850	-74,388	-129,147	-85,169	-94,455
Crawford	62,344	61,949	258,165	131,006	140,691	130,831
Elk	-23,838	-23,344	-2,124	-22,228	-24,162	-19,139
Greenwood	-41,628	-30,690	6,437	5,386	-15,930	-15,285
Labette	-71,314	-71,104	41,925	-36,040	-18,822	-31,071
Montgomery	3,496	19,124	115,772	35,418	80,341	50,830
Neosho	36,772	18,188	191,346	81,111	85,495	82,582
Wilson	35,371	36,989	169,910	96,478	61,854	80,121
Woodson	-15,825	-62,129	16,987	17,505	-38,001	-16,293
District Total	-98,185	-270,964	1,051,337	309,093	301,303	258,517
State Total	6,214,963	3,582,097	8,994,385	6,577,510	8,639,728	6,801,734

^a Assumes entire surplus or deficit was fed only to hogs.

^b Totals may not sum exactly due to rounding.

TABLE 11

POTENTIAL ADDITIONAL GRAIN FED CATTLE PRODUCTION BASED ON THE
FEED GRAIN BALANCE BY CROP REPORTING DISTRICT AND STATE,
FEEDING YEARS 1969-74 AND 5 YEAR AVERAGE

Crop reporting district and state	1969-70	1970-71	1971-72	1972-73	1973-74	5 year average
(1,000 head)						
Northwest	205	257	271	243	328	261
West Central	101	181	112	29	48	94
Southwest	594	689	566	339	558	549
North Central	131	78	310	394	580	349
Central	7	-87	76	-6	195	37
South Central	86	-15	134	3	86	59
Northeast	600	300	695	815	790	640
East Central	262	-39	651	405	369	330
Southeast	-35	-96	373	110	107	92
State total ^a	2,202	1,269	3,187	2,331	3,061	2,410

^aState total may not sum exactly from district totals due to rounding.

one class of livestock at a time. Theoretically, expansion could occur in any or all classes of livestock simultaneously. Historical records indicated that this was exactly what has happened in at least two of the most prominent livestock classes in Kansas during the last fifteen years. Grain fed cattle production has nearly tripled (847 to 2,500 thousand head) and hog production has more than doubled (1,584 to 3,186 thousand head). It would be reasonable to assume that this expansion would continue in years to come, though not necessarily at the same rate.

In order to consider this phenomenon, the concurrent expansion of the grain fed cattle and hog industries were calculated on the basis of the five year average feed grain balance. This process assumed that

Table 12. Potential additional grain fed cattle production based on the feed grain balance by county, crop reporting district, and Kansas for feeding years 1969-74 and 5 year average.^a

County, crop reporting district, and state ^b	Feeding Year					5 year average
	1969-70	1970-71	1971-72	1972-73	1973-74	
(number of head)						
Northwest:						
Cheyenne	33,525	39,193	49,979	50,917	52,369	45,196
Decatur	9,922	14,144	22,297	10,832	3,177	12,074
Graham	11,322	13,318	11,157	16,381	22,029	14,841
Norton	16,819	16,903	15,235	17,250	24,974	18,236
Rawlins	1,389	16,081	10,778	9,935	23,363	12,309
Sheridan	14,670	31,384	21,410	35,541	48,986	30,398
Sherman	75,368	73,723	76,346	46,246	81,674	70,672
Thomas	42,432	52,308	63,755	55,955	71,589	57,208
District Total	205,447	257,053	270,956	243,057	328,161	260,935
West Central:						
Gove	-25,403	-30,906	-35,980	-60,138	-32,586	-37,002
Greeley	18,720	13,124	9,243	16,813	6,916	12,963
Lane	-2,580	9,025	2,207	-8,021	-6,139	-1,102
Logan	7,787	12,199	16,891	13,398	15,395	13,134
Ness	3,298	5,311	14,987	11,348	6,737	8,336
Scott	6,251	15,394	-4,873	-21,176	-6,597	-2,200
Trego	1,137	6,123	10,037	-1,072	-2,895	2,666
Wallace	38,258	52,851	49,652	59,828	69,593	54,036
Wichita	53,372	98,106	49,827	18,449	-2,069	43,537
District Total	100,840	181,227	111,991	29,429	48,356	94,368
Southwest:						
Clark	-8,907	-7,335	-10,252	-23,107	-22,593	-14,439
Finnney	-1,766	57,969	24,771	23,474	25,254	25,940
Ford	-86,540	-76,148	-78,364	-74,171	-79,432	-78,931
Grant	97,467	91,837	91,696	61,996	86,867	85,973
Gray	26,697	69,742	38,006	50,638	60,806	49,178
Hamilton	31,878	27,280	10,462	1,671	2,191	14,696
Haskell	56,829	101,220	70,803	-4,870	50,345	54,865
Hodgeman	308	-3,696	-1,702	-5,008	-12,116	-4,443
Kearny	48,493	-509	-28,900	-67,818	-43,232	-18,393
Meade	19,544	26,651	50,122	28,148	47,469	34,387
Morton	94,671	81,275	81,802	86,400	110,020	90,834
Seward	47,783	26,231	28,738	17,947	18,579	27,856
Stanton	111,340	120,618	114,567	78,649	131,873	111,409
Stevens	156,646	174,157	174,083	165,210	182,064	170,432
District Total	594,442	689,292	565,831	339,160	558,095	549,364
North Central:						
Clay	27,681	16,138	32,987	52,935	71,417	40,232
Cloud	56,799	44,751	60,880	71,642	88,224	64,459
Jewell	43,132	3,582	32,456	38,264	51,199	33,726
Mitchell	13,794	-8,164	15,955	4,419	33,070	11,815
Osborne	13,057	3,483	10,268	13,241	18,707	11,751
Ottawa	-688	-1,304	13,238	4,482	20,118	7,169
Phillips	17,770	1,374	10,495	-6,494	7,980	6,225
Republic	99,105	24,993	94,845	120,437	137,647	95,405
Rooks	-4,002	-6,002	454	-983	-839	-2,274
Smith	17,082	-10,018	26,619	21,921	50,027	21,126
Washington	97,429	9,090	12,026	73,995	102,549	59,018
District Total	381,159	77,922	310,223	393,860	580,099	348,652
Central:						
Barton	-48,202	-88,711	-84,168	-76,762	-85,966	-76,762
Dickinson	12,834	-114	28,183	20,010	55,843	23,351
Ellis	-24,432	-21,096	-24,462	-37,519	-31,129	-27,728
Ellsworth	4,238	-1,530	7,949	3,800	11,601	5,211
Lincoln	-5,016	-9,033	8,641	3,309	14,570	2,494
McPherson	26,585	10,528	36,379	30,141	73,338	35,394
Marion	1,980	4,105	58,636	35,250	56,727	31,339
Rice	18,974	10,604	20,216	3,870	56,028	21,938
Rush	16,125	8,219	15,421	14,742	21,124	15,126
Russell	3,607	911	8,658	6,165	13,022	6,473
Saline	605	-625	220	-9,234	9,924	178
District Total	7,298	-86,743	75,673	-6,228	195,082	37,017

Table 12. Continued

South Central:						
Barber	3,207	945	-8,760	-9,527	-5,952	-4,017
Comanche	-5,798	-5,748	-5,651	-1,611	-4,704	-4,703
Edwards	14,176	-1,072	4,095	-6,842	5,261	3,124
Harper	-8,183	-5,062	-5,671	-8,690	-12,972	-8,115
Harvey	12,654	-9,095	33,380	35,320	36,560	21,764
Kingman	1,306	-13,065	-12,434	-10,829	-10,146	-9,034
Kiowa	922	1,988	10,334	-516	8,793	4,304
Pawnee	6,638	3,666	6,637	-15,805	8,984	2,024
Pratt	-31,223	-47,567	-34,381	-47,331	-56,112	-43,323
Reno	31,631	18,984	52,432	21,487	30,195	30,946
Sedgwick	15,459	-2,533	33,421	26,449	50,563	24,672
Stafford	36,916	27,379	37,848	23,706	32,816	31,733
Sumner	7,875	15,879	22,466	-3,143	2,569	9,129
District Total	85,580	-15,302	133,716	2,667	85,857	58,504
Northeast:						
Atchison	54,896	24,772	52,340	85,677	70,676	57,672
Brown	126,264	64,331	153,646	165,472	147,529	131,448
Doniphan	87,545	84,628	156,578	139,276	135,166	120,638
Jackson	44,542	13,403	44,327	52,554	45,749	40,115
Jefferson	49,054	26,760	52,069	71,156	56,230	51,054
Leavenworth	19,848	17,774	37,284	40,698	38,485	30,818
Marshall	111,032	46,465	104,153	130,955	146,729	107,867
Nemaha	48,679	18,710	48,175	76,281	80,038	54,377
Pottawatomie	20,004	2,023	24,647	24,315	32,628	20,723
Riley	32,683	152	15,271	18,534	29,025	19,133
Wyandotte	5,523	823	6,356	9,778	7,608	6,018
District Total	600,068	299,842	694,845	814,696	789,863	639,862
East Central:						
Anderson	34,891	3,105	52,602	41,678	31,361	32,728
Chase	-97,601	-80,154	-41,992	-42,153	-6,718	-53,723
Coffey	14,738	-11,390	40,616	37,349	18,102	19,883
Douglas	22,924	-446	64,795	41,703	34,358	32,667
Franklin	22,336	-128	66,716	43,345	26,389	31,732
Geary	10,824	-356	19,045	13,993	19,441	12,590
Johnson	35,233	17,718	61,784	63,174	34,108	42,403
Linn	21,632	5,478	76,885	23,284	30,158	31,487
Lyon	-4,319	-25,175	26,349	13,670	520	2,209
Miami	49,541	4,189	64,508	43,521	38,943	40,141
Morris	-1,888	-10,116	24,740	-5,739	14,849	4,369
Osage	72,639	30,704	106,452	70,181	50,518	66,099
Shawnee	74,267	44,328	85,167	64,248	70,341	67,670
Wabaunsee	6,314	-16,355	3,634	-3,711	6,796	-664
District Total	261,532	-38,598	651,303	404,542	369,166	329,589
Southeast:						
Allen	19,786	12,607	40,276	31,703	25,178	25,910
Bourbon	12,091	277	50,563	28,003	18,513	21,890
Butler	-37,573	-66,836	-4,628	-24,921	-23,949	-31,581
Chautauqua	-545	-4,670	-4,988	-5,485	-6,032	-4,340
Cherokee	7,714	14,668	34,734	16,623	27,041	20,156
Cowley	-31,074	-33,949	-26,359	-45,762	-30,179	-33,465
Crawford	22,085	21,941	91,478	46,421	49,853	46,356
Elk	-8,444	-8,268	-752	-7,876	-8,562	-6,781
Greenwood	-14,746	-10,870	2,281	1,909	-5,645	-5,414
Labette	-25,262	-25,184	14,856	-12,771	-6,669	-11,006
Montgomery	1,238	6,773	41,023	12,550	28,468	18,011
Neosho	13,026	6,442	67,801	28,741	30,295	29,261
Wilson	12,530	13,101	60,206	34,187	21,918	28,388
Woodson	-5,606	-22,005	6,019	6,203	-13,466	-5,771
District Total	-34,781	-95,971	372,530	109,525	106,765	91,614
State Total	2,201,583	1,268,719	3,187,067	2,330,706	3,061,440	2,409,903

^a Assumes entire surplus or deficit was fed only to grain fed cattle.

^b Totals may not sum exactly due to rounding.

the feed intake of both grain fed cattle and hogs could be represented in a linear fashion with complete substitutability. The iso-product curve denoting this relationship was as follows:

$$3,240,000 \text{ tons} = 1.33 X_1 + 0.47 X_2$$

where: 3,240,000 tons = the five year average for the feed grain balance.¹

1.33 = the consumption of feed grains per head by grain fed cattle, expressed in tons.²

0.47 = the consumption of feed grains per head by hogs, expressed in tons.²

X_1 = grain fed cattle.

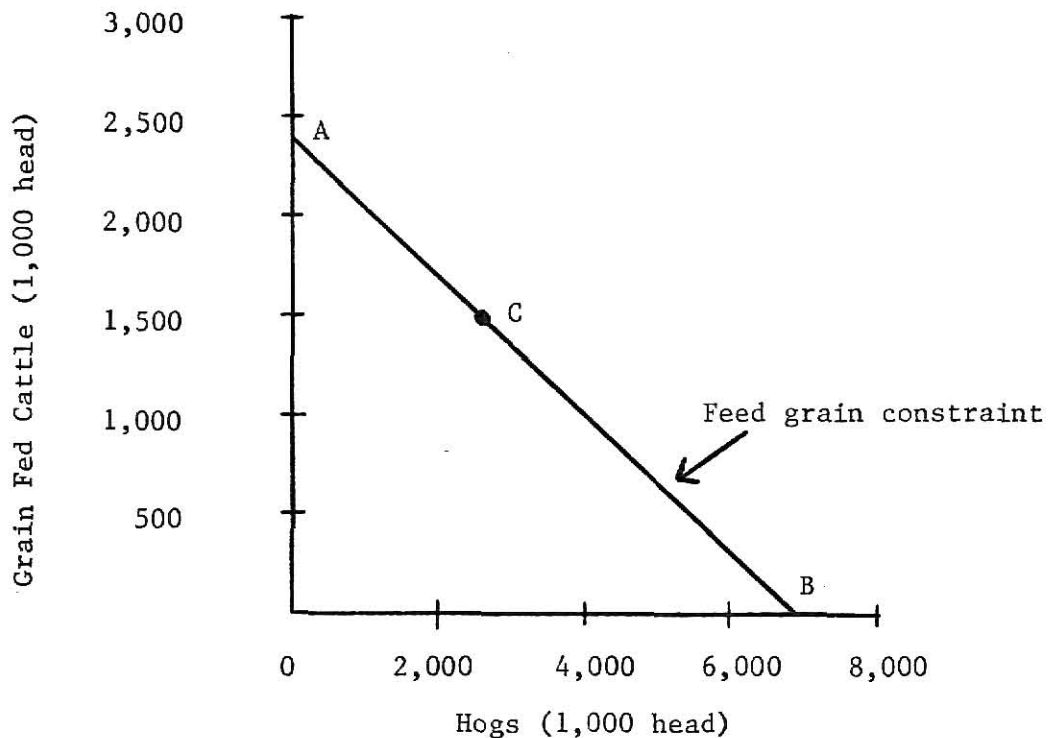
X_2 = hogs.

Figure 14 illustrates this equation in graphic form.

Any combination of grain fed cattle and hogs was possible on or inside the feed grain constraint line AB. If all feed grain surpluses were fed to one class, the point of reference would be either A or B, the same results indicated earlier. If, however, cattle expanded more rapidly than hogs, location of the relevant point may occur at C, where 1.5 million grain fed cattle could be produced along with approximately 2.65 million hogs. The same procedure could be applied to any district or county area and arrive at similar types of results.

¹Obtained from Table 5.

²Obtained from Table 4 by averaging the annual consumption per head over the five specified feeding years and then dividing by 2,000.



A = 2,409,903 head of grain fed cattle

B = 6,801,734 head of hogs

Fig. 14. Possible combinations of additional grain fed cattle and hog production, as limited by feed grains, 5 year average.

Expansion Based on Roughages

Harvested roughages may also be a restrictive factor in the expansion of livestock, especially cattle. Although this constraint may be more imaginary than real, it is necessary to state the situation as it exists. Table 13 indicates the number of additional grain fed cattle that the harvested roughage balance could have maintained during the 1969-74 feeding years.¹

¹A complete table showing county, crop reporting district, and state figures is located in Appendix E, Table E-1.

TABLE 13

POTENTIAL ADDITIONAL GRAIN FED CATTLE PRODUCTION BASED ON THE
HARVESTED ROUGHAGE BALANCE BY CROP REPORTING DISTRICT
AND STATE, FEEDING YEARS 1969-74 AND 5 YEAR AVERAGE

Crop reporting district and state	1969-70	1970-71	1971-72	1972-73	1973-74	5 year average
(1,000 head)						
Northwest	79	- 17	37	252	28	76
West Central	-80	-278	-176	-119	-222	-175
Southwest	-305	-592	-807	-892	-690	-657
North Central	365	- 67	310	375	473	291
Central	261	-155	190	332	277	181
South Central	204	-142	121	175	292	130
Northeast	171	- 64	129	277	175	137
East Central	121	-201	269	270	378	167
Southeast	-241	-544	-159	-190	-295	-286
State total ^a	575	-2,061	- 84	480	414	-135

^aState total may not sum exactly from district totals due to rounding.

The relatively dry 1970-71 feeding year distorted the overall five year average, but ample roughages did exist for over 400,000 head in three out of the five years. Importation of roughages into the West Central, Southwest, and Southeast districts probably did take place repeatedly and in large quantities. These districts were heavily concentrated in cattle feeding operations and absorbed much of the roughage production of surrounding areas. The North Central, Central, and East Central districts had the greatest surplus supplies of roughages and therefore were in the best position to expand cattle operations. Although it was not considered in this study, areas of surplus feed grain and deficit harvested roughage balances, may be

able to expand cattle production by taking acreage out of grain and putting it into roughage production.

Feeding Wheat

Wheat has traditionally been thought of as a food grain, but the late 1960's and early 1970's witnessed its growing importance as a feed grain. That change in attitude was a result of low wheat prices relative to feed grain prices. Livestock feeders reacted to this situation and fed as much as 3.3 percent of the 1971 wheat crop to livestock (see Table 14).

In an effort to quantify the impact of feeding wheat, the potential expansion of grain fed cattle and hogs was calculated during the 1969-74 feeding years. Calculations were based on the assumptions that 5 percent of the wheat produced was fed and that wheat had 105 percent the feed value of corn.¹ In addition to these assumptions, wheat was assumed to make up no more than 50 percent of a feed ration. Tables 15 and 16 show the number of hogs and grain fed cattle that could have been fed using 5 percent of the available wheat (over and above those numbers already calculated using feed grain surpluses).

All counties indicated an increase in the potential for livestock expansion. Sumner, Reno, Harper, Thomas, Ford, and Sedgwick counties were the leading producers of wheat and therefore the most eligible candidates for further expansion. All were located in south central Kansas. Wyandotte, Doniphan, Greenwood, Johnson, Leavenworth

¹Allen, G. C. et al., Livestock-Feed Relationships National and State, U.S. Department of Agriculture, Statistical Bulletin No. 530 (Washington D.C.: U.S. Government Printing Office, 1974), pp. 188-89.

TABLE 14

WHEAT RAISED AND FED TO LIVESTOCK, KANSAS 1960-74

Year	Wheat Raised (million bushels)	Wheat Fed (million bushels)	Percentage Fed
1960	294.4	0.87	0.3
1961	273.7	0.82	0.3
1962	211.7	0.85	0.4
1963	185.5	0.74	0.4
1964	208.8	2.09	1.0
1965	236.4	3.07	1.3
1966	200.1	2.00	1.0
1967	221.6	2.66	1.2
1968	253.5	5.07	2.0
1969	305.3	6.72	2.2
1970	299.0	6.72	2.2
1971	312.6	10.32	3.3
1972	314.9	3.78	1.2
1973	384.8	1.92	0.5
1974 ^a	319.0	1.60	0.5

SOURCE: U.S. Department of Agriculture, Field Crops, (Washington D.C.: U.S. Government Printing Office, 1960-74).

^aPreliminary.

and Woodson counties were the smallest producers of wheat and were located in the eastern one-third of the state.

By using 5 percent of the wheat crop, Kansas could have fed approximately 1.1 million more hogs or 382,283 more grain fed cattle. These figures, coupled with the potential expansion resulting from the use of feed grain surpluses, indicated that Kansas could have produced approximately 7.9 million more hogs or 2.79 million more grain fed cattle annually. Actual production of cattle and hogs during the 5 year period averaged 2.2 and 3.1 million head respectively.

It should be noted that the major wheat producing areas were predominantly located in regions where cattle production was more

Table 15. Additional number of hogs that could have been fed using 5 percent of wheat production by county, crop reporting district, and Kansas feeding years 1969-74.

County, crop reporting district, and stated	Feeding Year					5 year average
	1969-70	1970-71	1971-72	1972-73	1973-74	
(number of head)						
Northwest:						
Cheyenne	12,782	13,102	15,445	14,959	17,472	14,752
Decatur	10,638	9,920	12,717	11,258	15,848	12,076
Graham	10,238	11,310	11,919	11,904	14,183	11,911
Norton	10,906	10,909	12,164	9,770	14,344	11,619
Rawlins	13,595	12,148	17,981	16,697	18,599	15,804
Sheridan	11,075	12,607	13,435	11,340	15,858	12,863
Sherman	17,330	20,421	17,015	11,293	21,170	17,446
Thomas	20,088	25,261	22,365	21,043	27,375	23,226
District Total	106,652	115,679	123,041	108,262	144,849	119,697
West Central:						
Gove	13,299	12,564	11,802	11,634	16,557	13,171
Greeley	12,872	21,501	17,454	11,115	14,832	15,555
Lane	13,956	15,353	12,811	14,360	18,204	14,937
Logan	11,949	14,283	13,952	11,448	16,896	13,706
Ness	19,974	20,497	14,358	16,725	22,104	18,731
Scott	13,901	16,129	12,164	12,071	17,472	14,348
Trego	10,562	12,853	10,933	12,556	14,357	12,252
Wallace	6,221	7,983	7,702	4,989	8,348	7,049
Wichita	12,349	13,673	11,168	8,842	11,144	11,435
District Total	115,083	134,836	112,343	103,741	139,914	121,183
Southwest:						
Clark	9,243	8,229	7,420	6,126	10,767	8,357
Finney	23,947	21,505	23,217	22,803	22,898	22,874
Ford	26,474	25,955	20,168	23,022	27,340	24,592
Grant	9,274	10,053	8,145	8,548	8,997	9,004
Gray	18,711	19,402	17,048	19,258	21,335	19,151
Hamilton	12,046	20,475	17,437	13,252	14,230	15,488
Haskell	13,998	14,973	13,304	12,176	15,142	13,919
Hodgeman	14,617	12,734	15,042	12,613	14,889	13,979
Kearny	8,176	11,433	11,369	8,890	11,998	10,373
Meade	13,485	14,670	13,355	14,455	16,272	14,447
Morton	3,439	7,293	6,719	3,489	8,146	5,817
Seward	8,631	7,543	7,058	7,813	9,846	8,178
Stanton	9,061	10,230	10,460	7,810	11,821	9,876
Stevens	8,562	9,107	8,276	8,111	9,877	8,787
District Total	179,663	193,602	179,020	168,365	203,559	184,842
North Central:						
Clay	9,970	8,865	9,594	7,778	10,286	9,299
Cloud	14,342	12,553	14,881	12,242	15,972	13,998
Jewell	13,729	11,433	13,650	10,460	15,918	13,038
Mitchell	17,489	16,335	18,068	15,839	21,107	17,767
Osborne	12,393	13,456	13,264	10,745	16,760	13,324
Ottawa	14,882	12,130	12,023	14,417	14,930	13,677
Phillips	9,144	10,469	10,252	8,472	11,046	9,876
Republic	10,321	9,389	10,909	8,513	11,992	10,225
Rooks	11,154	13,052	12,399	11,106	14,113	12,365
Smith	12,053	12,387	11,617	9,960	14,462	12,096
Washington	10,207	8,453	10,309	5,543	8,494	8,601
District Total	135,684	128,521	136,966	115,075	155,078	134,265
Central:						
Barton	20,129	16,621	23,080	20,249	23,858	20,787
Dickinson	14,521	12,990	12,560	13,936	16,269	14,055
Ellis	12,776	11,690	10,124	10,577	13,572	11,748
Ellsworth	10,252	10,519	9,601	10,843	13,746	10,992
Lincoln	11,533	10,797	9,846	11,657	14,512	11,669
McPherson	17,833	22,310	17,753	23,145	24,602	21,129
Marion	9,956	13,590	9,473	13,211	13,714	11,989
Rice	17,151	17,860	17,072	16,576	19,590	17,650
Rush	13,740	14,966	14,130	12,828	20,562	15,245
Russell	14,345	12,455	13,050	11,752	16,231	13,567
Saline	13,457	13,062	10,037	11,182	14,575	12,463
District Total	155,692	156,860	146,725	155,955	191,232	161,293

Table 15. Continued

South Central:						
Barber	13,048	11,524	10,594	10,814	15,468	12,290
Comanche	8,675	6,643	5,988	6,408	7,772	7,097
Edwards	13,419	12,622	10,876	12,144	13,230	12,458
Harper	22,463	23,004	18,551	19,957	31,354	23,066
Harvey	10,954	11,964	11,409	11,894	12,625	11,769
Kingman	20,800	19,330	18,581	20,169	20,325	19,841
Kiowa	10,676	9,327	9,685	10,536	11,378	10,320
Pawnee	17,351	18,575	19,517	16,291	18,501	18,047
Pratt	16,583	16,447	14,458	16,532	17,909	16,386
Reno	33,438	31,984	32,376	32,760	32,026	32,517
Sedgwick	22,484	22,270	20,691	23,057	26,403	22,981
Stafford	17,578	16,657	17,008	16,389	17,646	17,056
Sumner	41,983	38,627	37,498	38,509	50,745	41,472
District Total	249,452	238,973	227,232	235,461	275,382	245,300
Northeast:						
Atchison	1,897	1,719	1,962	1,672	1,425	1,735
Brown	2,668	3,555	3,251	2,925	2,928	3,665
Doniphan	1,198	1,264	1,288	912	1,111	1,155
Jackson	1,980	2,265	2,657	2,460	1,994	2,271
Jefferson	1,463	1,821	1,275	1,292	1,358	1,442
Leavenworth	1,033	1,214	1,057	1,038	912	1,051
Marshall	7,952	7,153	8,642	7,091	7,408	7,649
Nemaha	3,181	3,157	3,241	3,191	3,242	3,202
Pottawatomie	3,202	2,912	3,942	2,811	2,659	3,105
Riley	3,160	2,688	3,469	2,476	3,210	3,000
Wyandotte	320	260	268	241	228	263
District Total	28,054	28,007	31,050	26,109	26,476	27,939
East Central:						
Anderson	2,272	1,886	2,415	1,937	2,226	2,147
Chase	1,208	1,691	996	937	1,874	1,341
Coffey	1,897	2,016	2,476	1,722	2,165	2,055
Douglas	2,097	2,016	2,338	2,207	1,672	2,066
Franklin	1,921	1,517	1,657	1,640	1,520	1,651
Geary	2,238	2,731	3,019	2,647	3,039	2,735
Johnson	1,494	1,362	1,342	1,108	776	1,216
Linn	1,814	1,416	2,147	1,440	1,152	1,594
Lyon	2,231	2,543	2,231	2,659	2,992	2,531
Miami	1,897	1,676	1,369	1,523	1,285	1,550
Morris	3,312	3,468	4,539	3,657	4,736	3,942
Osage	1,859	2,146	2,295	1,937	2,460	2,139
Shawnee	2,410	2,493	2,731	2,716	2,735	2,617
Wabaunsee	1,928	1,904	2,476	1,991	2,343	2,128
District Total	28,577	28,863	32,030	28,122	30,974	29,713
Southeast:						
Allen	2,134	2,059	2,550	1,899	1,767	2,082
Bourbon	1,463	1,416	1,449	1,406	712	1,289
Butler	5,164	6,701	7,977	7,636	9,507	7,397
Chautauqua	1,343	1,503	1,926	1,567	1,937	1,655
Cherokee	6,390	6,141	5,736	5,983	2,137	5,277
Cowley	12,724	12,896	13,754	12,632	16,754	13,752
Crawford	3,095	3,006	3,489	2,840	1,399	2,766
Elk	1,446	1,344	1,973	1,551	1,520	1,567
Greenwood	1,119	1,257	1,439	883	1,114	1,163
Labette	4,957	5,126	4,790	6,050	3,609	4,907
Montgomery	4,847	4,913	4,562	4,673	3,122	4,423
Neosho	3,511	3,468	4,334	3,533	2,387	3,447
Wilson	3,098	3,930	5,049	4,100	3,767	3,989
Woodson	947	1,048	1,238	1,076	1,013	1,064
District Total	52,238	54,807	60,266	55,829	50,745	54,777
State Total	1,051,096	1,080,148	1,048,673	996,918	1,218,207	1,079,008

^a Totals may not sum exactly due to rounding.

Table 16. Additional number of grain fed cattle that could have been fed using 5 percent of wheat production by county, crop reporting district, and Kansas, feeding years 1969-74

County, crop reporting district, and state ^a	Feeding Year					5 year average
	1969-70	1970-71	1971-72	1972-73	1973-74	
(number of head)						
Northwest:						
Cheyenne	4,528	4,641	5,473	5,300	6,191	5,227
Decatur	3,768	3,513	4,506	3,989	5,616	4,279
Graham	3,627	4,006	4,223	4,218	5,026	4,220
Norton	3,863	3,864	4,310	3,462	5,083	4,116
Rawlins	4,816	4,303	6,371	5,916	6,591	5,599
Sheridan	3,923	4,465	4,761	4,018	5,619	4,557
Sherman	6,139	7,233	6,029	4,001	7,501	6,181
Thomas	7,116	8,947	7,925	7,457	9,700	8,229
District Total	37,780	40,972	43,598	38,362	51,327	42,408
West Central:						
Gove	4,711	4,450	4,182	4,123	5,867	4,666
Greeley	4,560	7,615	6,185	3,939	5,256	5,511
Lane	4,944	5,438	4,540	5,088	6,450	5,292
Logan	4,233	5,059	4,944	4,056	5,987	4,856
Ness	7,076	7,260	5,088	5,926	7,832	6,636
Scott	4,924	5,713	4,310	4,277	6,191	5,083
Trego	3,741	4,552	3,874	4,449	5,087	4,341
Wallace	2,204	2,828	2,729	1,768	2,958	2,497
Wichita	4,374	4,843	3,957	3,133	3,949	4,051
District Total	40,767	47,757	39,808	36,760	49,578	42,934
Southwest:						
Clark	3,274	2,915	2,629	2,171	3,815	2,961
Finney	8,483	7,617	8,227	8,080	8,114	8,104
Ford	9,378	9,193	7,146	8,158	9,688	8,713
Grant	3,285	3,561	2,886	3,029	3,188	3,190
Gray	6,628	6,872	6,011	6,824	7,560	6,785
Hamilton	4,267	7,252	6,179	4,696	5,042	5,487
Haskell	4,959	5,303	4,714	4,314	5,366	4,931
Hodgeman	5,178	4,510	5,330	4,469	5,276	4,953
Kearny	2,896	4,049	4,028	3,150	4,252	3,675
Meade	4,777	5,196	4,732	5,122	5,766	5,119
Morton	1,218	2,583	2,381	1,236	2,886	2,061
Seward	3,057	2,671	2,501	2,769	3,489	2,897
Stanton	3,210	3,623	3,706	2,767	4,189	3,499
Stevens	3,033	3,225	2,932	2,874	3,500	3,113
District Total	63,644	68,571	63,434	59,659	72,130	65,488
North Central:						
Clay	3,532	3,140	3,400	2,756	3,645	3,294
Cloud	5,080	4,446	5,273	4,338	5,659	4,959
Jewell	4,863	4,049	4,837	3,706	5,640	4,619
Mitchell	6,195	5,786	6,402	5,612	7,479	6,295
Osborne	4,390	4,766	4,700	3,807	5,939	4,720
Ottawa	5,272	4,296	4,260	5,109	5,290	4,846
Phillips	3,239	3,708	3,633	3,002	3,914	3,499
Republic	3,656	3,325	3,866	3,017	4,249	3,623
Rooks	3,951	4,623	4,393	3,935	5,001	4,381
Smith	4,270	4,387	4,116	3,529	5,124	4,285
Washington	3,616	2,994	3,653	1,964	3,010	3,047
District Total	48,065	45,520	48,533	40,776	54,951	47,569
Central:						
Barton	7,130	5,887	8,178	7,175	8,454	7,365
Dickinson	5,144	4,601	4,450	4,938	5,765	4,980
Ellis	4,526	4,140	3,587	3,748	4,809	4,162
Ellsworth	3,632	3,726	3,402	3,842	4,871	3,894
Lincoln	4,085	3,824	3,489	4,130	5,142	4,134
McPherson	6,317	7,902	6,290	8,201	8,717	7,486
Marion	3,527	4,813	3,357	4,681	4,860	4,248
Rice	6,076	6,326	6,049	5,874	6,942	6,253
Rush	4,867	5,301	5,007	4,546	7,286	5,401
Russell	5,082	4,412	4,624	4,164	5,751	4,807
Saline	4,767	4,626	3,557	3,962	5,165	4,415
District Total	55,152	55,557	51,990	55,262	67,762	57,145

Table 16. Continued

South Central:						
Barber	4,622	4,081	3,754	3,832	5,481	4,354
Comanche	3,073	2,353	2,122	2,271	2,754	2,514
Edwards	4,754	4,470	3,854	4,303	4,688	4,414
Harper	7,957	8,148	6,573	7,072	11,110	8,172
Harvey	3,880	4,238	4,043	4,215	4,474	4,170
Kingman	7,368	6,846	6,584	7,147	7,202	7,030
Kiowa	3,782	3,304	3,432	3,733	4,032	3,656
Pawnee	6,146	6,579	6,916	5,773	6,556	6,394
Pratt	5,874	5,825	5,123	5,858	6,346	5,805
Reno	11,845	11,328	11,472	11,608	11,348	11,520
Sedgwick	7,965	7,888	7,332	8,170	9,356	8,142
Stafford	6,227	5,900	6,027	5,808	6,253	6,043
Sumner	14,872	13,681	13,287	13,646	17,981	14,693
District Total	88,366	84,641	80,517	83,435	97,580	86,908
Northeast:						
Atchison	672	609	695	592	505	615
Brown	945	1,259	1,152	1,037	1,038	1,086
Doniphan	424	448	456	323	394	409
Jackson	701	802	941	872	707	805
Jefferson	518	645	452	458	481	511
Leavenworth	366	430	374	368	323	372
Marshall	2,817	2,533	3,062	2,513	2,625	2,710
Nemaha	1,127	1,118	1,148	1,131	1,149	1,135
Pottawatomie	1,134	1,031	1,397	996	942	1,100
Riley	1,120	952	1,229	877	1,137	1,063
Wyandotte	113	92	95	85	81	93
District Total	9,938	9,920	11,002	9,251	9,382	9,899
East Central:						
Anderson	805	668	856	687	789	761
Chase	428	599	353	332	664	475
Coffey	672	714	877	610	767	728
Douglas	743	714	829	782	592	732
Franklin	680	537	587	581	538	585
Geary	793	967	1,070	938	1,077	969
Johnson	529	482	475	393	275	431
Linn	643	502	761	510	408	565
Lyon	790	901	790	942	1,060	897
Miami	672	594	485	540	455	549
Morris	1,173	1,228	1,608	1,296	1,678	1,397
Osage	659	760	813	687	872	758
Shawnee	854	883	968	962	969	927
Wabaunsee	683	674	877	706	830	754
District Total	10,123	10,223	11,349	9,965	10,976	10,527
Southeast:						
Allen	756	729	903	673	626	738
Bourbon	518	502	514	498	252	457
Butler	1,829	2,373	2,827	2,706	3,369	2,621
Chautauqua	476	532	682	555	687	586
Cherokee	2,263	2,175	2,033	2,120	757	1,870
Cowley	4,507	4,568	4,874	4,476	5,937	4,872
Crawford	1,096	1,065	1,236	1,006	496	980
Elk	512	476	699	550	538	555
Greenwood	396	445	510	313	395	412
Labette	1,756	1,816	1,697	2,144	1,279	1,738
Montgomery	1,717	1,740	1,617	1,656	1,106	1,567
Neosho	1,244	1,228	1,536	1,252	846	1,221
Wilson	1,098	1,392	1,789	1,453	1,335	1,413
Woodson	335	371	439	381	359	377
District Total	18,505	19,412	21,355	19,783	17,981	19,407
State Total	372,340	382,571	371,587	353,253	431,666	382,283

^aTotals may not sum exactly due to rounding.

highly concentrated as opposed to hogs. In addition, many of the counties showing feed grain deficits were generally large wheat producers.

CHAPTER IV

SUMMARY

Livestock-feed balances provide a useful tool in analyzing and estimating many of the quantitative factors relating to livestock production. Given ample feed supplies and adequate profit expectations, livestock operations will expand. However, the speed of the expansion will by no means be instantaneous. It may depend on many qualitative as well as quantitative factors.

Capital availability, economic expectations, inflexibility of resources (land, labor, and capital), and environmental conditions are some of the determinant factors in the expansion process. In addition, expansion is further restricted by natural barriers to entry. These include such things as excessive facility, transportation, and procurement cost, large quantities of working capital, limited knowledge of health and nutrition problems, lengths of gestation cycles, and many more. Each of these factors may not completely prohibit entry, but they do limit the speed and extent to which new producers (firms) can initiate and cease operations as market conditions permit.

In reality, Kansas cannot be considered a closed economy. The outshipments of cattle and hogs to be slaughtered was an example of this. Accordingly, local feed availability cannot rigidly limit livestock expansion. Feed and livestock units are mobile. Feed and/or livestock can be transported to areas of deficit and surplus feeds to better utilize available resources. This buying, selling, and

transporting of feed and livestock occurs between states as well as within states constantly.

Although the livestock-feed balance has several shortcomings, it should be emphasized that it is a highly efficient yardstick to measure future production trends. Feed availability is a primary concern to all potential livestock producers.

On the basis of this livestock-feed balance study, Kansas appears to be in a desirable position to expand livestock production. Feed grain and harvested roughage supplies were more than adequate under normal conditions to promote growth. Provided there are adequate quantities of other inputs available to permit the maximum use of feed and also sufficient profit incentives, Kansas can be expected to continue the rapid expansion of its livestock industries in years to come.

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APPENDIX A

HOG AND GRAIN FED CATTLE PRODUCTION
IN KANSAS SINCE 1960

Table	Title	Page
A-1	Number of hogs marketed in Kansas by crop reporting district and state for calendar years 1960-74.	76
A-2	Number of grain fed cattle marketed in Kansas by crop reporting district and state for calendar years 1960-73.	77

Table A-1. Number of hogs marketed in Kansas by crop reporting district and state for calendar years 1960-74.

Crop reporting district and state	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
	(1,000 head)														
Northwest	76	90	107	107	117	116	102	103	126	134	126	172	168	141	157
West Central	36	28	29	33	40	29	34	36	45	54	50	75	74	69	55
Southwest	36	40	54	50	46	48	48	54	60	68	75	100	100	98	112
North Central	248	292	354	389	392	366	374	480	471	564	575	702	674	645	654
Central	114	135	159	179	182	167	160	258	161	249	257	351	325	304	319
South Central	149	158	181	192	185	162	190	228	227	250	252	365	356	333	346
Northeast	402	433	462	510	482	456	431	522	527	541	517	622	580	554	612
East Central	283	296	357	391	376	347	331	380	393	440	414	522	500	495	483
Southeast	264	263	295	345	698	283	323	374	398	425	420	531	516	445	449
State ^a	1,584	2,013	1,993	2,191	2,157	1,984	2,021	2,341	2,463	2,730	2,721	3,450	3,293	3,084	3,186

^a State total may not sum exactly from district totals due to rounding.

Table A-2. Number of grain fed cattle marketed in Kansas by crop reporting district and state for calendar years 1960-73.

Crop reporting district and state	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973
	(1,000 head)													
Northwest	54	78	83	92	78	54	56	55	49	46	58	78	98	125
West Central	33	51	55	60	86	79	106	134	171	202	229	277	376	413
Southwest	72	95	113	153	159	157	229	240	280	466	590	726	923	960
North Central	76	91	84	97	97	81	119	133	140	126	131	134	130	125
Central	80	87	85	102	97	101	131	136	135	170	215	241	249	269
South Central	76	77	74	87	96	78	119	121	127	155	187	178	215	222
Northeast	141	145	135	141	141	132	180	168	150	153	139	99	94	84
East Central	218	234	219	233	244	228	276	275	246	241	207	145	157	99
Southeast	97	102	97	96	90	84	134	141	153	217	214	189	192	204
State ^a	847	961	943	1,059	1,087	995	1,351	1,403	1,450	1,773	1,968	2,065	2,435	2,500

^aState total may not sum exactly from district totals due to rounding.

APPENDIX B

COUNTY ESTIMATES OF LIVESTOCK

The following procedures were used to estimate the numbers of livestock in each class for a given area and feeding year. Each of these numbers were then used in animal unit calculations.

DAIRY REPLACEMENTS^a

Dairy replacements on farms January 1 were estimated as follows:

$$\begin{array}{rclcl} \text{Dairy replacements on} & \text{Milk cows on farms} & & \text{Dairy replacements} & \\ \text{farms in a county} & = \text{in a county} & \times & \text{in Kansas Jan. 1}^c & \\ \text{January 1} & \text{January 1}^b & & \text{Milk cows in} & \\ & & & \text{Kansas Jan. 1}^b & \end{array}$$

CATTLE ON FEED

Cattle on feed in a county January 1 were estimated as follows:

$$\begin{array}{rclcl} & \text{Grain fed cattle} & & \text{Cattle and calves on} & \\ & \text{marketed by county} & & \text{feed in Kansas Jan. 1}^d & \\ \text{Cattle on feed in} & = \text{in the calendar} & \times & \text{Grain fed cattle} & \\ \text{a county Jan. 1} & \text{year prior to Jan. 1}^d & & \text{marketed in Kansas in} & \\ & & & \text{the calendar year prior} & \\ & & & \text{to Jan. 1}^d & \end{array}$$

OTHER BEEF CATTLE

$$\begin{array}{rclcl} \text{Other beef cattle} & \text{All cattle} & \text{Milk cows on} & \text{Dairy replacements} & \\ \text{on farms in a} & = \text{on farms in a} & - \text{farms in a} & - \text{on farms in a} & \\ \text{county Jan. 1} & \text{county Jan. 1}^a & \text{county Jan. 1} & \text{county Jan. 1} & \\ & & & & \\ & - \text{Cattle on feed} & & & \\ & \text{in a county Jan. 1} & & & \end{array}$$

HOGS FED

Hogs fed in a
county during the =
feeding year

Hogs and pigs
on farms in a
county Jan. 1^b

Hogs fed during a feeding
year^e in Kansas

X Hogs and pigs on farms in
Kansas Jan. 1^b

HENS AND PULLETS

Hens and pullets
in a county
Dec. 1

Chickens on farms
in a county
Dec. 1^b

X All hens and pullets on farms in Kansas Dec. 1^f
Chickens on farms in Kansas on Dec. 1^b

CHICKENS RAISED

Chickens raised in
a county during a =
feeding year

Chickens on farms
in a county
Dec. 1^b

Chickens raised in Kansas
during a feeding year^g
X Chickens on farms in
Kansas Dec. 1^b

^a Defined to be heifer calves 500 pounds and over that are replacements for milk cows.

^b Kansas State Board of Agriculture, Farm Facts, (Topeka, Kansas: State Printers Office, 1944-74). Annual series. 41523

U.S. Department of Agriculture, Cattle, (Washington D.C.: Government Printing Office, 1969-74).

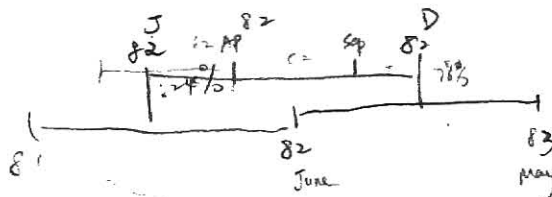
^d Kansas Department of Agriculture, Kansas Livestock Outshipments and Marketings, (Topeka, Kansas: State Printers Office, 1960-74). Annual Series.

^eHogs fed during feeding year 1969-70 were calculated as follows:

Spring pig crop of 1969	X	0.24	=	335,760
Fall pig crop of 1969	X	1.00	=	1,259,000
Spring pig crop of 1970	X	0.76	=	1,235,760
<hr/>				
Hogs fed during the feeding year				2,830,520

^f U.S. Department of Agriculture, Eggs, Chickens, and Turkeys,
(Washington D.C.: Government Printing Office, 1969-74).

⁸U.S. Department of Agriculture, Chickens, Eggs, and Broilers, (Washington D.C.: Government Printing Office, 1969-74).



APPENDIX C

GRAIN CONSUMING ANIMAL UNIT FACTORS AND LIVESTOCK FEEDING RATES

Grain consuming animal unit factors were based on 1969-71 feeding rates for all classes of livestock divided by the quantity of feed grains consumed by the average United States milk cow. Feeding rates for Kansas livestock classes were derived from the grain consuming animal unit factors for Kansas calculated by U.S.D.A.¹ Grain consuming animal unit factors for all classes of cattle were calculated for inventories on farms January 1. Feeding rates per head were calculated by using 1969-71 inventory numbers for Kansas. The grain consuming animal unit factors and corresponding feeding rates were computed as follows:

$$\begin{aligned}\text{Milk cows} &= \frac{\text{average annual consumption of concentrates by a Kansas milk cow}}{\text{average annual consumption of concentrates by the average U.S. milk cow}} \\ 1.0926 &= \frac{4691 \text{ feed unit pounds}}{4293 \text{ feed unit pounds}} \quad \begin{array}{l} \text{--- P. 1977} \\ \text{--- P. 2} \end{array} \\ \text{Dairy replacements} &= \frac{\text{average annual consumption of concentrates on dairy replacements on Kansas farms Jan. 1}}{\text{average annual consumption of concentrates by the average U.S. milk cow}} \\ 0.1511 &= \frac{649 \text{ feed unit pounds}}{4293 \text{ feed unit pounds}}\end{aligned}$$

¹ Allen, G. C. et al., Livestock-Feed Relationships National and State, U.S. Department of Agriculture, Statistical Bulletin No. 530 (Washington D.C.: U.S. Government Printing Office, 1974), p. 183.

Cattle on feed ^a	=	$\frac{\text{average annual consumption of concentrates by cattle on feed on Kansas farms Jan. 1}}{\text{average annual consumption of concentrates by the average U.S. milk cow}}$
1.4213	=	$\frac{6102 \text{ feed unit pounds}}{4293 \text{ feed unit pounds}}$
Other beef cattle	=	$\frac{\text{average annual consumption of concentrates by other beef cattle on Kansas farms Jan. 1}}{\text{average annual consumption of concentrates by the average U.S. milk cow}}$
0.610	=	$\frac{262 \text{ feed unit pounds}}{4293 \text{ feed unit pounds}}$
Hogs fed	=	$\frac{\text{average annual consumption of concentrates per head by hogs in Kansas}}{\text{average annual consumption of concentrates by the average U.S. milk cow}}$
0.2523	=	$\frac{1083 \text{ feed unit pounds}}{4293 \text{ feed unit pounds}}$
All sheep and lambs ^b	=	$\frac{\text{average annual consumption of concentrates by all sheep and lambs in Kansas Jan. 1}}{\text{average annual consumption of concentrates by the average U.S. milk cow}}$
0.0359	=	$\frac{154 \text{ feed unit pounds}}{4293 \text{ feed unit pounds}}$
Hens and pullets	=	$\frac{\text{average annual consumption of concentrates by all hens and pullets sheep and lambs in Kansas Jan. 1}}{\text{average annual consumption of concentrates by the average U.S. milk cow}}$
0.0224	=	$\frac{96 \text{ feed unit pounds}}{4293 \text{ feed unit pounds}}$
Chickens raised	=	$\frac{\text{average annual consumption of concentrates fed to chickens raised in Kansas Jan. 1}}{\text{average annual consumption of concentrates by the average U.S. milk cow}}$
0.0049	=	$\frac{21 \text{ feed unit pounds}}{4293 \text{ feed unit pounds}}$
Turkeys raised	=	$\frac{\text{average annual consumption of concentrates fed to turkeys raised in Kansas}}{\text{average annual consumption of concentrates by the average U.S. milk cow}}$

$$0.0172 = \frac{74 \text{ feed unit pounds}}{4293 \text{ feed unit pounds}}$$

^a Consumption per head of grain fed cattle is computed as follows:

<u>Year</u>	<u>Cattle on feed Jan. 1</u>	<u>Grain fed cattle marketed</u>
1969	766,000	1,773,000
1970	892,000	1,968,000
<u>1971</u>	<u>916,000</u>	<u>2,065,000</u>
Average	858,000 = A	1,935,333 = B

$$\text{Consumption per head of grain fed cattle} = \frac{\text{average annual consumption of concentrates by cattle on feed on Kansas farms Jan. 1}}{(B)}$$

$$2706 \text{ feed unit lbs.} = \frac{(858,000) \times (6102 \text{ pounds})}{(1,935,333)}$$

^b Factors for 'stock sheep on farms January 1' and 'sheep and lambs on feed January 1' were combined to form one class. This was accomplished by the following process:

$$A = \text{average annual consumption of concentrates by stock sheep} = 156.3 \text{ feed unit pounds}$$

$$B = \text{average annual consumption of concentrates by sheep and lambs on feed} = 146.0 \text{ feed unit pounds}$$

<u>Year</u>	<u>Stock sheep on farms Jan. 1</u>	<u>Sheep and lambs on feed Jan. 1</u>
1969	286,000	100,000
1970	272,000	106,000
<u>1971</u>	<u>253,000</u>	<u>75,000</u>
Average	270,333 = C	93,667 = D

$$\text{Average annual consumption of concentrates by all sheep and lambs in Kansas Jan. 1} = \frac{(A \times C) + (B \times D)}{(C + D)}$$

$$154 \text{ feed unit pounds} = \frac{(270,333) \times (156.3) + (93,667) \times (146)}{(270,333 + 93,667)}$$

APPENDIX D

HARVESTED ROUGHAGE ANIMAL UNIT FACTORS

AND LIVESTOCK FEEDING RATES

The most recent data concerning roughage consuming animal unit factors included the consumption of pasture.¹ Data was not available on a state or county basis to use this approach. The roughage consuming animal unit factors used in this study were therefore based on 1959-60 estimates² of harvested roughage consumption. These were calculated using 4.1 tons of dry hay equivalent roughage as the average annual consumption by a United States milk cow. The roughage consuming animal unit factors were calculated by the following procedure:

$$\text{Milk cows} = \frac{\text{average annual consumption of harvested roughages by a Kansas milk cow}}{\text{average annual consumption of harvested roughages by the average U.S. milk cow}}$$

$$0.9512 = \frac{3.90 \text{ dry hay equivalent tons}}{4.10 \text{ dry hay equivalent tons}}$$

¹Allen, G. C. et al., Livestock-Feed Relationships National and State, U.S. Department of Agriculture, Statistical Bulletin No. 530 (Washington D.C.: U.S. Government Printing Office, 1974), p. 184.

²Allen, G. C. et al., Feed Consumed by Various Classes of Livestock by States, 1949-50 and 1959-60, With 1964-65 National Estimates and Comparisons, U.S. Department of Agriculture, Statistical Bulletin No. 379 (Washington D.C.: U.S. Government Printing Office, 1966), pp. 16-29.

TABLE D-1

CONSUMPTION OF HARVESTED ROUGHAGES AND ANIMAL UNIT FACTORS
FOR RUMINANT LIVESTOCK CLASSES, KANSAS

Livestock Class	Annual Consumption per head				Roughage consuming animal unit factor
	Hay	Silage ^a	Forage ^a	Total	
	(tons)				
1. Milk cows ^b	2.60	1.30		3.90	0.9512
2. Dairy replacements	1.64	0.67	0.05	2.36	0.5756
3. Cattle on feed Jan. 1	1.39	0.86	0.01	2.26	0.5512
4. Other beef cattle	0.54	0.09	0.22	0.85	0.2073
5. All sheep and lambs	0.12	0.07	0.04	0.23	0.0561

SOURCE: Allen, G. C. et al., Feed Consumed by Various Classes of Livestock by States, 1949-50 and 1959-60, With 1964-65 National Estimates and Comparisons, U.S. Department of Agriculture, Statistical Bulletin No. 379 (Washington D.C.: U.S. Government Printing Office, 1966), pp. 16-29.

^aExpressed in dry hay equivalent tons; three tons of silage equals one ton of hay and two tons of forage equals one ton of hay.

^bU.S. Department of Agriculture, Agricultural Statistics 1972, p. 431 indicated that the average Kansas dairy cow consumed 2.3 tons of hay and one ton of other forages during the 1971 October-May feeding period and U.S. Department of Agriculture, Milk Production, December, 1971, p. 5 indicated that 0.3 ton of hay and 0.3 ton of other forages were consumed during the 1971 June-September feeding period.

Dairy replacements = $\frac{\text{average annual consumption of harvested roughages by dairy replacements in Kansas}}{\text{average annual consumption of harvested roughages by the average U.S. milk cow}}$

$$0.5756 = \frac{2.36 \text{ dry hay equivalent tons}}{4.10 \text{ dry hay equivalent tons}}$$

Cattle on feed = $\frac{\text{average annual consumption of harvested roughages by cattle on feed on Kansas farms Jan. 1}}{\text{average annual consumption of harvested roughages by the average U.S. milk cow}}$

$$0.5512 = \frac{2.26 \text{ dry hay equivalent tons}}{4.10 \text{ dry hay equivalent tons}}$$

$$\begin{aligned}
 \text{Other beef cattle} &= \frac{\text{average annual consumption of harvested roughages} \\
 &\quad \text{by other beef cattle on Kansas farms Jan. 1}}{\text{average annual consumption of harvested} \\
 &\quad \text{roughages by the average U.S. milk cow}} \\
 0.2073 &= \frac{0.85 \text{ dry hay equivalent tons}}{4.10 \text{ dry hay equivalent tons}} \\
 \text{All sheep and lambs} &= \frac{\text{average annual consumption of harvested} \\
 &\quad \text{roughages by all sheep and lambs on} \\
 &\quad \text{Kansas farms Jan. 1}}{\text{average annual consumption of harvested} \\
 &\quad \text{roughages by the average U.S. milk cow}} \\
 0.0561 &= \frac{0.23 \text{ dry hay equivalent tons}}{4.10 \text{ dry hay equivalent tons}}
 \end{aligned}$$

APPENDIX E

GRAIN FED CATTLE PRODUCTION, AS LIMITED
BY HARVESTED ROUGHAGES, 1969-74

Table	Title	Page
E-1	Potential additional grain fed cattle production based on the harvested roughage balance by county, crop reporting district, and Kansas for feeding years 1969-74 and 5 year average.	87

Table E-1. Potential additional grain fed cattle production based on the harvested roughage balance by county, crop reporting district, and Kansas for feeding years 1969-74 and 5 year average.^a

County, crop reporting district, and state ^b	Feeding Year					5 year average
	1969-70	1970-71	1971-72	1972-73	1973-74	
	(number of head)					
Northwest:						
Cheyenne	13,421	-13,356	-5,499	2,414	8,161	1,028
Decatur	9,978	-8,618	-4,372	4,255	-14,430	-2,637
Graham	17,816	19,602	9,240	57,455	33,983	27,619
Norton	26,598	7,719	-1,614	32,315	10,062	15,016
Rawlins	10,782	-2,549	39,108	49,939	11,920	21,840
Sheridan	-16,114	-5,057	-44,914	-11,878	-60,956	-27,784
Sherman	27,276	-1,352	60,346	104,755	43,602	46,925
Thomas	-10,639	-13,131	-14,920	13,084	-4,123	-5,946
District Total	79,118	-16,742	37,374	252,339	28,219	76,062
West Central:						
Gove	-34,753	-83,783	-24,513	-35,829	-40,713	-43,918
Greeley	10,551	13,759	-5,225	-19,153	-21,909	-4,396
Lane	-21,066	-45,769	-9,685	22,210	-37,038	-18,270
Logan	9,339	-11,015	-7,731	6,375	-2,449	-1,096
Ness	14,151	-23,735	969	34,671	14,981	8,207
Scott	-56,805	-55,834	-57,249	-60,659	-73,077	-60,725
Trego	9,670	-10,398	5,747	47,133	18,535	14,137
Wallace	22,212	14,040	28,593	12,507	3,475	16,165
Wichita	-33,395	-75,221	-106,777	-126,571	-84,226	-85,238
District Total	-80,096	-277,955	-175,872	-119,316	-222,421	-175,132
Southwest:						
Clark	-43,904	-43,979	-45,685	-55,486	-57,761	-49,363
Finney	42,402	-6,031	4,880	-83,922	5,068	-7,520
Ford	-153,513	-164,924	-107,072	-72,701	-81,542	-115,951
Grant	-58,556	-66,276	-64,956	-75,463	-4,376	-53,925
Gray	23,842	-93,959	-95,541	-109,489	-140,076	-83,045
Hamilton	42,775	14,387	-21,227	-26,716	-17,877	-1,732
Haskell	-22,061	-47,061	-200,859	-277,469	-200,194	-149,529
Holjgeman	-2,586	-22,965	-7,139	27,361	27,079	4,350
Kearny	-10,773	5,486	-65,569	-50,218	-96,924	-43,599
Meade	-29,543	-22,400	-39,876	15,687	6,165	-13,993
Morton	6,678	-3,374	-2,463	-1,833	8,009	1,404
Seward	-61,448	-86,371	-84,779	-99,977	-65,765	-79,668
Stanton	-35,364	-53,607	-84,639	-75,779	-66,221	-63,122
Stevens	-2,590	-1,011	8,366	-5,682	-5,734	-1,330
District Total	-304,640	-592,084	-806,559	-891,687	-690,149	-657,024
North Central:						
Clay	4,069	14,704	-3,764	-3,042	25,135	7,420
Cloud	45,998	21,701	38,940	58,234	67,038	46,382
Jewell	62,044	-6,633	65,116	32,772	58,527	42,365
Mitchell	22,423	-18,466	-4,322	-325	20,971	4,056
Osborne	54,772	-12,804	14,413	34,196	50,587	28,233
Ottawa	52,755	11,689	57,813	84,317	41,715	49,658
Phillips	42,344	10,566	58,708	77,045	110,180	59,769
Republic	1,742	-18,305	16,103	-14,808	-5,740	-4,202
Rooks	30,765	-79	31,739	28,348	55,953	29,345
Smith	46,548	-2,798	13,646	45,978	8,011	22,277
Washington	1,062	-66,300	21,120	32,277	40,608	5,753
District Total	364,521	-66,726	309,511	374,992	472,984	291,056
Central:						
Barton	-28,060	-121,926	-93,836	-55,127	-45,656	-68,921
Dickinson	49,925	11,060	73,349	50,181	56,708	48,245
Ellis	2,217	-35,000	-43,233	-30,092	-20,855	-25,393
Ellsworth	38,436	96	18,513	17,885	20,940	19,174
Lincoln	41,313	1,623	54,451	63,019	61,233	44,327
McPherson	31,900	-12,341	36,758	38,097	23,637	23,610
Marion	14,737	11,905	54,839	125,016	102,562	61,812
Rice	30,798	-602	18,279	22,581	34,560	21,123
Rush	9,785	-13,226	22,465	14,231	5,031	7,657
Russell	32,028	-11,420	20,540	23,178	21,592	17,184
Saline	37,861	14,397	28,097	62,930	16,921	32,041
District Total	260,940	-155,433	190,221	331,900	276,673	180,860

Table E-1. Continued

South Central:						
Barber	12,699	-54,207	-12,626	-2,483	-29,497	-17,223
Comanche	-6,270	-25,555	-12,125	-2,413	-14,071	-12,087
Edwards	20,962	-1,944	3,009	24,794	48,135	18,991
Harper	16,833	-23,587	-38,599	-27,254	-8,316	-16,185
Harvey	5,665	9,028	28,666	53,875	26,572	24,761
Kingman	12,812	5,403	7,834	-115	25,172	10,221
Kiowa	-6,376	-14,490	-13,875	9,592	15,481	-1,933
Pawnee	12,912	12,125	31,926	36,634	57,868	30,293
Pratt	-63,518	-111,783	-89,946	-95,278	-92,052	-90,516
Reno	78,076	31,400	54,761	74,871	75,662	62,954
Sedgwick	33,670	17,553	82,143	59,521	45,495	47,676
Stafford	45,245	24,447	62,633	28,007	108,837	53,834
Sumner	41,763	-10,856	17,103	15,180	32,356	19,109
District Total	204,474	-142,465	120,905	174,930	291,643	129,897
Northeast:						
Atchison	16,116	-789	-5,655	29,317	22,621	12,322
Brown	-35,672	-38,580	-43,045	850	-10,989	-25,487
Doniphan	-2,068	-9,865	-2,803	-3,750	-14,617	-6,620
Jackson	36,967	7,381	48,231	31,478	31,209	31,053
Jefferson	5,816	327	6,388	30,992	12,013	11,107
Leavenworth	40,392	18,048	45,902	41,459	24,334	34,027
Marshall	49,216	-42	23,165	33,464	39,462	29,053
Nemaha	-13,703	-67,110	-1,304	52,594	-8,825	-7,770
Pottawatomie	58,304	23,554	34,781	40,965	41,905	39,902
Riley	15,354	5,818	19,711	18,352	30,794	18,005
Wyandotte	-59	-3,126	4,080	1,429	6,631	1,791
District Total	170,663	-64,385	128,949	277,149	174,538	137,383
East Central:						
Anderson	24,907	19,980	17,399	9,128	29,829	20,249
Chase	-109,193	-101,538	-57,630	-24,039	20,259	-54,428
Coffey	41,529	-14,589	26,019	5,908	21,460	16,065
Douglas	21,757	9,198	22,981	41,898	33,001	25,767
Franklin	-3,890	-22,876	39,967	24,244	28,493	13,188
Geary	11,496	-171	26,482	8,951	14,620	12,275
Johnson	18,932	-212	15,754	11,367	4,136	9,995
Linn	29,774	-9,384	41,261	23,776	-2,003	16,685
Lyon	-43,234	-56,626	35,676	-19,022	70,776	-2,486
Miami	42,780	-26,219	-13,603	8,012	20,065	6,207
Morris	23,244	8,880	14,616	37,321	10,160	18,844
Osage	15,906	-7,539	28,526	21,070	20,075	15,607
Shawnee	24,386	-768	46,390	67,940	37,890	35,168
Wabaunsee	22,707	914	25,653	53,145	69,258	34,335
District Total	121,102	-200,950	269,491	269,698	378,018	167,472
Southeast:						
Allen	29,359	3,813	46,164	33,871	22,172	27,076
Bourbon	25,656	-2,205	-3,199	32,483	26,071	15,761
Butler	-41,662	-121,526	-74,434	-52,536	-41,449	-66,321
Chautauqua	-19,196	-33,516	-24,619	-25,054	-32,454	-26,968
Cherokee	-6,668	-20,890	6,974	-3,557	-8,259	-6,480
Cowley	-63,718	-93,228	-34,715	-67,616	-43,862	-60,628
Crawford	-6,761	-12,497	-10,741	-16,196	-25,175	-14,274
Elk	-13,770	-30,215	3,427	-13,150	-25,239	-15,789
Greenwood	-30,067	-50,648	-22,817	-19,036	-30,240	-30,561
Labette	-87,616	-72,614	-63,639	-78,921	-75,225	-75,603
Montgomery	-7,453	-16,509	15,826	12,154	12,401	3,284
Neosho	-10,679	-19,197	-1,156	5,919	-27,593	-10,541
Wilson	6,591	-3,630	24,538	29,370	18,962	15,166
Woodson	-14,951	-71,627	-20,111	-27,599	-65,142	-39,886
District Total	-240,935	-544,489	-158,501	-189,867	-295,032	-285,765
State Total	575,147	-2,061,228	-84,481	480,138	414,471	-135,190

^a Assumes entire surplus or deficit was fed only to grain fed cattle.

^b Totals may not sum exactly due to rounding.

KANSAS LIVESTOCK-FEED BALANCE
AND RELATED INDUSTRY TRENDS

by

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The livestock-feed balance is a means of determining the size and location of available feed supplies after taking into account the feed utilized by existing livestock numbers. The balance was calculated separately for feed grains and harvested roughages during the feeding years 1969-74. Positive feed balances indicate that livestock enterprises can be expanded. Negative feed balances indicate that feed must be imported into an area, livestock numbers must contract, or feeding rates must be reduced.

Kansas increased its feed grain balance by 51 percent during the 1969-74 period. The 1973-74 feeding year had 4.3 million tons of surplus feed grains which could have fed an additional 6.8 million hogs or an additional 2.4 million grain fed cattle over current feeding levels. The largest feed grain surpluses existed in the Northeast and Southwest crop reporting districts. The smallest were located in the Central and South Central districts.

The harvested roughage balance fluctuated considerably during the 1969-74 period. Although the 1973-74 balance was 28 percent below the 1969-70 level, it still showed a 304,000 ton surplus. That represented enough roughages to feed out an additional 414,000 head of grain fed cattle. The largest roughage surpluses were in the North Central and Central districts. The greatest roughage deficits occurred in the Southwest and Southeast districts.

On the basis of the feed grain balance, livestock expansion is most likely to take place in the Northeastern and Southwestern parts

of the state. Current trends indicate that hog production would probably be intensified in the Northeast and grain fed cattle would continue to dominate in Southwest Kansas.

Although roughage surpluses are in short supply in Southwest Kansas, it is quite possible that additional numbers of grain fed cattle will be produced there because of the expansion of irrigation. In addition, the large commercialized feedlots have made it economically feasible for hays and other roughages to be profitably imported into this area.

Marketing densities of hogs and grain fed cattle were greatest in the Northeast and Southwest districts respectively. The Northeast district marketed approximately 112 head of hogs per rural square mile in 1974 as Nemaha county ranked first with 200.08. The Southwest district marketed 82.97 head of grain fed cattle per rural square mile in 1973. Haskell county ranked highest in densities of grain fed cattle marketed with 316.5 in 1973.

Marketings and slaughter trends of cattle and hogs indicate that slaughter has not kept pace with marketings since the mid 1950's. Marketings of cattle and hogs increased steadily while annual slaughter has been on a declining trend. In 1974, more hogs and cattle were marketed in Kansas than were slaughtered. This trend has been characteristic of cattle marketings since the late 1940's, but only recently (1968) has become a bench mark of the hog industry.