# DISTANCE AS A FARM MANAGEMENT PROBLEM

by

MARNA J. LINTNER

B. S., Carroll College, 1972

---

A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF ARTS

Department of Geography

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1974

Approved by:

Charles E. Bressing
Major Professor

TABLE OF CONTENTS

# LIST OF TABLES

# LIST OF FIGURES

Figure

# CHAPTER ONE

Until recently, scholarly works have all but neglected the subject of farm land concentration. The increasing size of farms has become an issue of study because scholars want to understand the enlargement process. This thesis will examine only one portion of the problem. Distance that farm operators are willing to travel for land given the nature of other determining factors in land acquisition is the central theme of this study.

Many other problems present themselves in this area of research, and among them are the problems of land management, land use, and land tenure. These problems have all been studied more widely than has the problem of land acquisition. Because the very nature of this problem is so basic to the livelihood of the farmer, it would seem it should have received more attention in the literature. Most studies dealing with the addition of land to holdings have been done by economists and sociologists. Geographers have mainly dealt with farm market areas of rural places (central place),[1] study of von Thünen's theory on a regional level,[2] and global classification systems of world agriculture.[3] And never, to the knowledge of this writer, has the enlarging farm unit size been studied by a geographer.[4]

## Historical Development of Farm Sizes

Increasing farm size has been a recent trend throughout the United States. Though it has been noted since 1900, only since World War II has enlarging farm size come to national attention. (See Table 1.) The size of farms in the United States as a whole has risen from 146.2 acres in 1900 to

389.9 acres in 1969, with the greatest increase occurring between 1950 and 1969.

TABLE 1.--Average size of farm operating units in acres

| | Year | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1880 | 1890 | 1900 | 1930 | 1950 | 1959 | 1969 |
| U.S. | 134 | 137 | 146.2 | 156.9 | 215.5 | 302.8 | 389.9 |
| North | | | 133.3 | 166.2 | 194.4 | 245.4 | 306.1 |
| South | | | 138.2 | 106.4 | 148.2 | 217.2 | 286.6 |
| West | | | 386.1 | 433.3 | 699.6 | 987.1 | 1250.4 |

Source: Barlow and Libbly, "Policy Choices Affecting Access to Farmland," Who Will Control U.S. Agriculture, p. 26.

Contrary to trends in the rest of the United States, between 1900 and 1930 the South had a decrease in farm size, which can be attributed to the tenancy situation existing there. During this period, there was a breakup of landholdings into small sharecropping units, and by 1950, many of the sharecroppers had been displaced by machines and had moved into cities.[5] Thus the farms were again being operated in single units as in the antebellum South.

Landholdings in the West have grown at very rapid rates. Many giant corporations have bought land in the West in order to take advantage of special tax shelters which are intended for the benefit of farmers, but which they use to write off some excess corporate profits made in other areas. For example, Teneco in California has purchased 100,000 acres of irrigated land where fruits and vegetables are grown.[6] However, there are large non-corporate holdings in the West because in arid regions, landholdings must be extensive in order to allow for dry farming techniques and low carrying

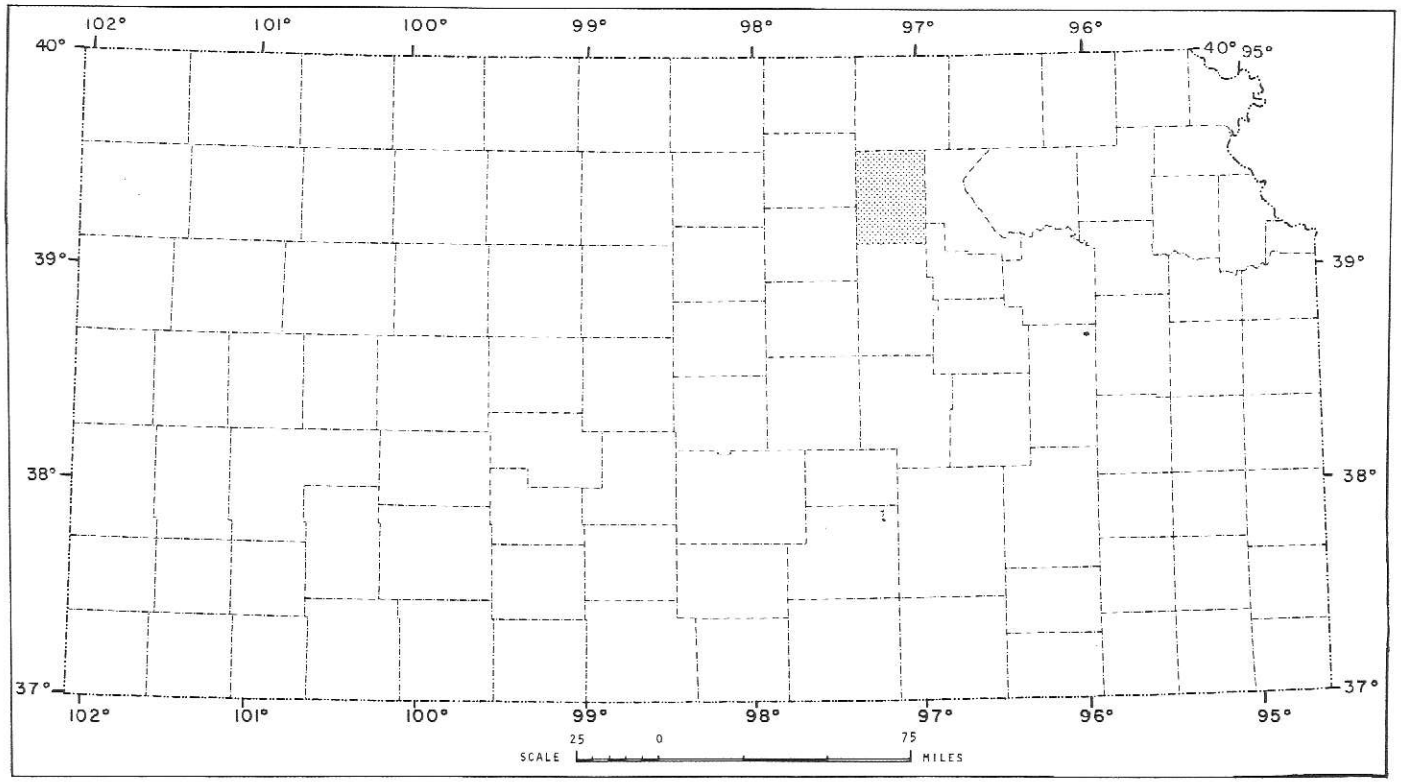
capacity of land, if it is not irrigated.

Clay County, Kansas (Fig. 1), which is the chosen study area of this thesis, lies in a transitional zone in the United States--the Great Plains. Clay County is located on the eastern edge of the Great Plains. The Great Plains have been considered to be the beginning of the West by many authors; among them, E. Cotton Mather offers this statement concerning the growth of farms in the Great Plains.

> Big developments on the Great Plains were not restricted to the good old days. They have continued to the present time. Even homestead laws were unable to restrain the cultural predilection for innovation and large scale operations.[7]

Mather goes on to state that not only is size of landholdings a function of culture, but it is independent of mechanization. "Many Americans assert that the large landholdings have resulted from farm mechanization. In this region, however, large landholdings preceded mechanization; the latter simply accelerated the process."[8] Farms on the Great Plains and West were and are more than twice the size of farms in the North and South. It was not until 1969 that the national average surpassed the acreage average for the West in 1900, even though the North and South unit averages are still below the 1900 western average. Mechanization has certainly aided the process of expanding farm sizes. It takes many additional acres to make profitable the use of the large, modern equipment that is now on the market, which was generally developed for the expansive wheat farms. Farmers with smaller farms and less even terrain thought that they had to adapt their operations to the equipment. This large equipment, they felt, forces the farmer to expand his farm operation so that he can get the maximum use of expensive machinery.[9]

The growth of farm sizes in Kansas and Clay County, which are shown in Table 2, can be compared to the enlarging farms in the United States enumerated




CLAY COUNTY, KANSAS

Figure 1

in Table 1. The transitional nature of Kansas and Clay County can be illustrated by a comparison of the tables. The fact that landholdings in the eastern portion of Kansas, of which Clay County is on the western edge, are only slightly greater than those for the North, a more humid region, but substantially below those averages for the West, a more arid area, indicates the transitional nature of Kansas in that landholdings increase in size from east to west.

TABLE 2.--Average size of farm operating units in Kansas and Clay County in acres

| | Year | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1880 | 1890 | 1900 | 1930 | 1950 | 1959 | 1969 |
| Kansas | 155 | 181 | 240.7 | 282.9 | 370.0 | 480.6 | 573.9 |
| Clay County | 161 | 169 | 181.4 | 208.4 | 266.2 | 344.4 | 433.5 |

Source: 1880-1950 U.S. Decennial Census; 1959 and 1969 U.S. Census of Agriculture.

The increase in the size of farms between 1890 and 1900 can be explained partially by land abandonment rather than enlargement as was discussed by Mather. Drought and financial depression were the causes of the abandonment of land in that decade.

## Review of the Literature

To focus the above material upon the problem at hand, an examination of the literature which has been written on farm acquisition is warranted. A great deal of literature exists about agricultural problems, but in the area of study, which concerns the distance an individual farmer is willing to travel for land, there is a dearth. Several articles and books have been written which helped in the formulation and testing of this problem, and

these sources will be summarized below. There were a number of other articles which, while not aiding in formulating a research problem, have been useful in understanding the problem. This latter group of articles is more descriptive while the former tends to be theoretical.

One mathematical technique which has been adopted to describe farm concentration is the Lorenz curve.[10] Wunderlich described the use of the curve in his effort to measure the concentration of landholdings in the Great Plains between two different time periods. The concentration of landholdings was plotted on a graph with the X-axis being the number of farms in the area and the Y-axis being the accumulated sizes of the farms in percentages. The curve does not measure "what the distribution ought to be,"[11] but compares concentration of holdings between time periods. Thus, by the use of this technique, the amount of land acquisition that has taken place over a specified time period can be illustrated. By definition, this acquisition is measured on a regional level; this thesis was done on an individual level so this technique was not of much value. It could be of value to a researcher who is working with a larger sample.

Because the research effort in this thesis is directed at the individual level of farm acquisition, more relevant theories of time and space were sought. Donald Janelle, studying the utility of a place by its relation to other places,[12] found that as the time factor increases to a place, its locational utility decreases. In other words, the more time it takes to arrive at a new location, the more it will cost in transportation, and the less desirable the location becomes. Janelle looked at the time-space connectivity of places on an intra- and inter-urban scale. He noted:

> Place utility is an individual's subjective measure of the degree to which the opportunities at a particular place permit his perceived or actual achievement level to be in

as close as possible accordance with his aspiration level.[13]

This theory of time and place can be implemented to fit an agricultural study. Farmers will evaluate each piece of property that comes on the market in accordance with their desires that the land be readily accessible to currently held land. This proximity will facilitate the movement of equipment to the fields that are acquired.

Bringing the theoretical literature closer to the topic studied here was Madden's[14] study on the scale economies of farm sizes. Examining the costs of the inputs in farming (e.g., machinery, labor, and fertilizers), Madden developed a formula, with the use of linear programming, for calculating the shape of the cost curve for farms over both the long and short run. The cost curves are not defined by time periods, but by having fixed or variable resources. In this way, "the shortrun [sic] average cost curves assume one or more resources to be fixed--available only in specified quantities--in the short run" and, alternatively, "the longrun [sic] average cost curve assumes <u>all</u> resources are variable, including those designated as fixed in the short run."[15] Using the formula in seven case studies in different regions of the country having different agricultural systems, Madden tested the size of the operations and their efficiency. He concluded that in most cases, though the acres needed varied, a one- or two-man operation using modern equipment was the most efficient size. As the farms' sizes increased, the cost of production tended to rise above the point of maximum return for each dollar of investment. The same trend was noted for farms that were below the optimum acreage level.

Michael Chisholm has written the single most important work from the standpoint of this thesis.[16] He examined rural land use patterns in many parts of the world through practical applications of von Thünen's <u>Isolated</u>

State. His arguments are based on the premise "that the real distribution of crops and livestock and of types of farming depends upon competition between products and farming systems for the use of any particular plot of land."[17] The type of agricultural crop on any given land parcel should yield the highest return per dollar of investment. The ideal situation would develop on an isolated, uniform plain with the crops and livestock which can bear the highest transportation costs planted farthest from the market center. Concentric circles of different agricultural pursuits will develop around the center. The ideal patterns formulated by von Thünen in the form of concentric circles surrounding a city are not found on the landscape, but rather land use intensity bands are manifested that fit the field patterns and physiography of the locale in question. Chisholm applied von Thünen's concept to an agricultural village in Sicily and to several European countries (e.g., Belgium and the Netherlands).

Heady and others have described the causes and effects of technological changes on farms.[18] The increasing usage of capital inputs (i.e., improved fertilizers and machinery) have raised the productivity of the land and decreased the need for labor and land. Because the amount of land remaining in production has not decreased as rapidly as it could have, there is a surplus of agricultural products on the market in the United States. Likewise, labor has not decreased rapidly enough to keep pace with the increased capital inputs resulting in decreased farm income. However, the farmer wishes to receive an adequate income for his labors and, therefore, needs to increase the amount of land he farms to meet the rising costs of farming. Heady and others have determined that the size of farms will continue to increase as long as output is deemed a cause rather than a result of capital inputs.[19] Farms are enlarging because of the increasing number of capital inputs for

the amount of land and labor already invested.

As the farming operations increase in size, the location of each newly acquired tract and its distance from the center of the operation become increasingly important. Of the several studies done on the effect of distance on crop production, the best, from the standpoint of this thesis, was written by Breimeyer and Barr *in an Illinois* Agricultural Extension bulletin.[20] Eventually the cost and time involved in moving equipment and machinery to distant fields outweighs the advantages of further enlargement. The profits of the farm may continue to rise with additional expansion, but the overall cost of production tends to level off and then rise slightly with the increasing size of the operation. The authors have found that "Scale economy in crop production is handicapped by space and distance--there are cost disadvantages in farming acreages located far from headquarters."[21] How the farmer uses the land that he has acquired can be explained in terms of the von Thünen theory of land use. No one is certain how far the farmer is willing to travel for land; though such authors as the two above and Madden have calculated the optimum distance and size on a general level, these calculations are absent on a more specific regional level.

Ball and Heady have compiled a series of papers intended to examine the growth and development of U.S. farms.[22] The decline in numbers of the family farm is viewed as a response to various economic pressures of capital outlay and income from sales. To remain in farming, the farmer must expand the farm or adequate profits cannot be earned. In that case, the farm must be sold or rented. Several of the articles view the problems of declining farm numbers from various aspects: among them are economies of scale, labor, industrialization of farms, and community services (e.g., schools and the variety of stores).

A further examination of the economies of farm enlargement was written by Raup.[23] He reassessed the data collected by Madden and from them concluded that a two-family farming operation using a corporate structure could give the farmers a flexibility that is not obtainable in either single family farms or in farms owned by large corporations. According to Raup, this type of structure may save the family farm as it is known today, keep rural communities alive, and give farmers an adequate income.

In an unpublished master's thesis, Vernon McKee discussed the farm real estate market in Clay and Dickinson counties, Kansas.[24] McKee contacted the buyers and sellers of farm land for the year 1955. If the amount of land needed by farmers is in proportion to the amount of capital they invest in their farms (as noted by Heady and others), then many farmers will be in the market for more land. It was McKee's purpose to uncover the reasons why some farmers bought land while others were selling it. The buyers of land usually stated that the price was right, they were looking for land and this met all their requirements, and the land was close to land they already owned. Thus, more land to increase earnings was not listed as a reason for increasing the size of the farm, but the fact that usually only one person had to be contacted in order for the land to be sold would tend to indicate that the farmer realizes because the land market is tight he should take advantage of opportunity. The sellers often were widows who could no longer effectively oversee the rental of the land, or farmers who were forced to sell by taxes or other debts.

Another type of literature was reviewed in the formulation of this study, that being descriptive articles about the study area. Literature on the Great Plains is plentiful and several of the applicable books and articles were used in the site and situation background material. Kraenzel, one of the

most important authors who wrote about the sociology of the Great Plains,[25] stressed the semiarid qualities of the region and the necessity to either adapt or leave; he therefore favored changing the institutions of the Plains area. The Great Plains, and its transition zone on the east, have been fitted into a semihumid and humid frame of reference often disadvantageous to the residents. Kraenzel stated, "the residents must invent the kind of institutional patterns that are suited to the [region's] prevailing environmental forces."[26] In the final analysis, Kraenzel finds the Great Plains a transition area between the humid East and the arid West. Unfortunately, the inhabitants look more to the humid East for cultural expression rather than developing their own unique semi-arid qualities to the fullest and so making a valuable contribution to the cultural background of the United States.

Another useful book was written by Otteson and others.[27] This book approached the subject of the Great Plains from a point of view similar to that which Kraenzel took. The economic situation was more heavily stressed in this book because the authors are agricultural economists. The second section of the book was the most helpful in relating the material presented to the thesis at hand. Part One focused upon the historical development of the Plains and Part Three discussed the future prospects of the agricultural base of the Great Plains. In Part Two, the current situation of the Plains was examined. The agricultural economic biases of the authors show in the topics which they have chosen for discussion. Entitled "The Transition Area Today," this section discusses the enlarging farm sizes in the region and how increasing farm size and the resultant declining numbers of farms and farm families affect the economic base of the region. Fewer people can support fewer economic enterprises in any given community. If the remaining people are to have the desired range of goods to which they have become accustomed,

there will have to be the introduction of some enterprises (likely light industry) beyond those supported directly by agriculture. Distance is related to this problem of enlarging farm sizes. If present trends continue, the local market center soon will probably contain only an elevator and a gas station. How far are people willing to travel for other essential services? The final section discusses the implications of this question and the trend that makes the question necessary and then tries to find a solution to the problem of declining market centers.

Much of the history of the Plains has been influenced by droughts. Wet periods were times of immigration, while times of drought generally created emigration from the Plains region. Borchert analyzed the variable nature of the precipitation from its occurrences in the past, and he predicted for the 1970's a drought which, fortunately, has not come about.[28] Thornthwaite has written an article on the climatic variability of the Great Plains and its relation to settlement.[29] From his study, Thornthwaite concluded that, "a stable economy can be achieved only if agriculture is adopted to the entire range of climatic conditions."[30]

The lack of precipitation is one of two features which the Plains region manifests. The other feature is a common culture. Mather discussed the Plains culture at length in terms of the "cowboy complex," the "transit region," and "megalophilia."[31] These elements of culture have been translated by the inhabitants into large farming operations and cities which display the "assumed accoutrements of urbanity."[32]

Three other studies written about the Kansas Plains examine a different area, but are useful to this study as a point of reference for the historical development of Kansas. The settlement of a large portion of Kansas took place under the Homestead Act and the several laws which followed and amended

the Homestead Act. Kollmorgan and Jenks looked at the patterns of landholdings in Sherman County, Kansas, in 1950 and found they were influenced by the section lines laid out prior to most settlement.[33] In 1950 this county was one of dry farmed wheat with enlarging farm sizes. Many of the farmers who remained lived in town as "sidewalk farmers." Further to the east, Kollmorgan and Simmonett described Chase County, Kansas,[34] primarily a ranching county in the heart of the Flint Hills. The ranching complex has many similarities to Clay County, which lies on the western edge of the Flint Hills. In Chase County, ranching occupies the uplands and a mixed farming agricultural system is found in the river and stream valleys. The rocky slopes of Clay County are also predominately in pastureland while the fertile river valleys are cultivated. Elliot described some of these similarities in her unpublished thesis, although she gave more attention to the historical development of the Republican River Valley.[35] These counties were traced through their history from the time of settlement around 1860 to the present time of a stable agricultural area of mixed farming. In the Kansas section of the Republican River Valley, Elliot found mixed farming on family operated farms.

## Statement of the Problem

This paper will study the recent acquisition and use of both owned and rented land; it will emphasize the proximity of the land to the farmstead and presently held land. Each year, as the size of farms increases, farmers who acquire land must travel greater distances. The proximity to be stressed herein is related to the distance that farmers in Clay County, Kansas, are willing to travel for land. Madden and Breimeyer and Barr discussed the economies of scale, attempting to define the optimum size for a farm to

achieve its maximum efficiency. None of these studies have determined the distance a farmer is willing to travel to operate on more land.

Distance is only one of several factors that a farmer considers when acquiring a tract of land. Among the other considerations are the price of land--either the sale price or the rental price--the soils present in the tract, the number of acres contained in the tract, and the kinds of crops which can be raised (often specified by the landlord in a rental agreement). To help centralize the locational problem of where farmers are adding land to their farms, I have formulated four hypotheses. These are: 1) that farms will develop the characteristics of varying land use intensity propounded by von Thünen and amplified by Chisholm; 2) that farmers desire to promote efficiency in their farms by having all of their land in a single tract; 3) that farmers would like to have their land extend toward the market center to minimize distance and time involved in acquiring services and selling crops; and 4) that there should be a maximum distance that farmers are willing to travel to acquire a new tract of land. Hopefully, these hypotheses will help the reader gain an insight into the problem of distance and farm size.

Farms will develop the characteristics of von Thünen's Isolated State on a microscale. Those farming operations and crops which require the most care will be located nearest to the farmstead or center of the farming operation, thus minimizing the amount of travel. Concentric circle (the ideal) or field patterns that are present on the landscape will develop so that each successively more distant field will have a less intensive use. Michael Chisholm found this to be true in Sicily:

> The fields which lie far away from these buildings [farmstead] incur higher costs of operation than do the nearer plots on account of the greater amount of time spent travelling back and forth.[36]

At a certain point cultivation will cease because there is no profit. Even with mechanization, though the distances would be greater, I hypothesize that this would be true in the United States and in Clay County. Even if the distances involved were not great, it would be more economical to sow a crop which requires the least care in the farthest field and to plant crops which require the most care in the nearest field. Of course, not all land would be suitable for any crop, in which case the crops would be planted in the fields which best suit each. Land qualities are not the only factors which might influence the placement of a crop; a system of crop rotation also could affect the fields in which a crop is planted. However, crop rotation is not used as often as it once was and chemical fertilizers are now employed to enhance or restore the fertility of the soil; under this system a farmer could arrange the crops' proximity to the farmstead according to the care each requires. I have designated this a care intensity cropping pattern.

To promote more efficiency in farming units, farm operators prefer to have all of their landholdings in a single tract. Chisholm has commented on this situation:

> . . . [T]here is a consequence important to the question of reorganizing farm holdings. Over much of the world, farms are fragmented, with numerous parcels lying at different distances from the farmstead. A particular parcel may be far removed from the farmstead from which it is operated, yielding a low or even negative Economic Rent. If this parcel lies nearer to some other farmstead, it possesses a higher potential Economic Rent for this second farmer. If some exchange can be effected which reduces the average distances of the parcels from their respective farmsteads, then the economy of the two farms will be improved and the country as a whole will be slightly better off. This is an important benefit of farm consolidation which springs straight from location principles.[37]

Having a farm in a single unit would minimize the problem of distance to some extent. However, the above opinion assumes that all of the land within an area is of equal worth; that is, that any land could be used for any crop

or system of agriculture. In fact this is not the case. Many farmers want land of different quality, some good bottom land to be used for crops, some good upland to be used for grazing or for crops in a wet year. Different types of land can be a hedge against natural hazards. Alternatively, having land in separate tracts could be an economic response in that those were the only tracts of land available for rent or sale at the time of acquisition, or the only tracts which the farmer could afford. If a farmer does have land in more than one unit, then the role of proximity to the farmstead will be increasingly important to the operator.

The location of a tract of land in relation to the market center or town will affect the distance a farmer is willing to travel to acquire land. Farmers, like the rest of the United States population, like to be near towns or cities for the amenities of life. Their children go to school, their wives go shopping, and their families go to town for entertainment. So farmers will feel that they are more a part of town life if their land extends towards town. Even if their farmstead is no closer to town than before the new acquisition, they will feel closer. Farmers also would like to be near town for ease in the transportation of their crops to market. McKee found that location of land in relation to town was not a factor in land acquisition "unless it was the first land owned or operated."[38]

The last hypothesis is that there will be a maximum distance that farmers are willing to travel to acquire more land. Tests will be performed to ascertain how far an operator is willing to travel to acquire crop and/or pasture land, and also, at each succeeding distance, whether a minimum number of acres would be necessary to make farming economically viable at that distance. A graduate student in economics found that "the location of the tract selling with respect to present operations was an important factor to many of

the farmer-buyers. Twenty-nine of the thirty-seven farmers that purchased land acquired a tract less than five miles from where they were presently living."[39] If farmers are willing to travel five or more miles to acquire another tract of land, a good all-weather road would be important to facilitate movement of equipment to the fields. Land located on a good road will command a higher price than land on a poor road.[40] If all other factors (e.g., roads and land quality) are equal, the number of acquired parcels will diminish in frequency as the distance from the farmstead increases.

## Justification and Methodology

American Geography: Inventory and Prospect has defined two types of agricultural study areas in the field of geography. These are topical studies which focus "attention on a particular commodity, such as wheat," and regional studies which focus "attention on the crop combinations and farm problems of a particular area."[41] A region (Clay County, Kansas) was chosen in which several distinctive characteristics of both the Great Plains and the Midwest could be found. Among these characteristics are physiographic province division between the Central Lowlands and the Great Plains, wheat and cattle as the major sources of income, and the transitional nature of farm sizes between the smaller Eastern farms and the semiarid to arid large Western farms.

These characteristics were explored via a questionnaire in addition to the questions asked concerning the problem of study. The questionnaire was drawn up so as to find out about the characteristics of the farmer, the farm, the farm real estate market, and finally the role distance plays in making decisions concerning farm management. After a pre-test of the questionnaire in Riley and Pottawatomie counties, Kansas, a change was made in the manner

in which the questionnaire was to be administered. In the pre-test, the farmsteads in the counties were numbered and these numbers were drawn from a table of random numbers. Driving to each farmstead became quite time-consuming and often the farmers were not home, necessitating another visit. Thus, calling on each person listed on the interview schedule was eliminated and a mailed questionnaire was used instead. Every tenth name with a rural route address in the Clay County telephone books was chosen. By using approximately every tenth person, 120 names were drawn. Of the 120 forms mailed, fifty-six were returned.

Processing of the returned questionnaires was a lengthy, but not difficult process. The first three parts of the form concerning the traits of the farmer, farm, and real estate market were usually broken down into percentages and central tendencies were found. Several portions of the questionnaire involving real estate and distance were assessed by chi square tests to determine the significance of response frequencies. Chi square was the most useful test for this portion of the thesis, given the nature of the data. Thus, some sacrifice of higher order statistics was necessary. This is unfortunate, but the varied education level among the interviewed farmers necessitated that the questionnaire be geared so that most farmers could answer the questions.

Regression-correlation was also used where continuous measures could be obtained. Since distance was employed as the dependent variable to be associated with the size of an available tract of land and with the size of a farm, product moment correlation became an appropriate test procedure. Thus, one could hypothesize and test that the larger the tract the farther a farmer would be willing to travel for land, and the larger the current operating size, the farther a farmer would be willing to travel for land.

The remaining three chapters will examine in depth the ideas set forth in this chapter. Chapter Two will study the role that the physical features play in determining the distance a farmer is willing to travel for more land; Chapter Three will study the results of the questionnaire and test the study hypotheses; and Chapter Four will summarize the conclusions to be drawn and list additional topic areas for study.

## FOOTNOTES

1. John E. Brush, "The Hierarchy of Central Places in Southwestern Wisconsin," The Geographical Review, XLIII (July, 1953), pp. 380-402; see also Brian J. L. Berry and Allen Pred, Central Place Studies: A Bibliography of Theory and Application, Bibliography Series No. 1, Regional Science Research Institute, Philadelphia: 1961.

2. Hildegard B. Johnson, "A Note on Thünen's Circles," Annals of the Association of American Geographers, LII, 2 (1962), pp. 213-220.

3. Derwent Whittelsey, "Major Agricultural Regions of the World," Annals of the AAG, XXIV (1936), pp. 199-224; see also J. E. Spencer and Norman R. Stewart, "The Nature of Agricultural Systems," Annals of the AAG, LXIII, 4 (1973), pp. 529-544.

4. Changing unit size has been included in many articles, but has not been used as a central theme. For example, Irme Sutton, "Land Tenure in the West: Continuity and Change," Journal of the West, IX, 1 (1970), pp. 1-23.

5. Merle J. Prunty, "Land Occupance in the Southeast," Geographical Review, XLII (1952), p. 446.

6. Peter Barnes, "The Great American Land Grab," Part II, The New Republic, CLXIV (June 12, 1971), p. 22.

7. E. Cotton Mather, "The American Great Plains," Annals of the AAG, LXII (1972), p. 254.

8. Ibid.

9. Personal interview with Palmer Girach, Wisconsin dairy farmer, 1968.

10. Gene Wunderlich, "The Concentration of Land Ownership," Agricultural Research Service, U. S. Department of Agriculture, Washington, D. C.: Government Printing Office, 1958, pp. 1887-1893.

11. Ibid., p. 1891.

12. Donald Janelle, "Spatial Reorganization," Annals of the AAG, LIX (1969), pp. 348-364.

13. Ibid., p. 349.

14. J. Patrick Madden, Economies of Size in Farming, Agricultural Economics Report No. 107, Economic Research Service, United States Department of Agriculture, Washington, D. C.: Government Printing Office, 1969.

15. Ibid., pp. 3-4.

16. Michael Chisholm, Rural Settlement and Land Use: An Essay in Location (New York: John Wiley and Sons, Inc., 1962).

17. Ibid., p. 20.

18. Earl O. Heady, et al., Roots of the Farm Problem: Changing Technology, Changing Capital Use, Changing Labor Needs, Iowa State Center for Agricultural and Economic Development, Ames, Iowa: Iowa State University Press, 1965.

19. Ibid., p. vi.

20. Harold F. Breimeyer and Wallace Barr, "Issues in Concentration vs. Dispersion," Who Will Control U. S. Agriculture?, Agricultural Extension Service, Special Publication 27, University of Illinois, Urbana-Champaign, Ill.: University of Illinois Press, 1972, pp. 13-22.

21. Ibid., p. 19.

22. A. Gordon Ball and Earl O. Heady, ed., Size, Structure, and Future of Farms, Iowa State University Center for Agriculture and Rural Development, Ames, Iowa: Iowa State University Press, 1972.

23. Philip M. Raup, "Economies and Diseconomies of Large-Scale Agriculture," Paper No. 7044, Minn. Agricultural Experiment Station Scientific Journal Series 1970, pp. 1274-1283.

24. Vernon C. McKee, "An Analysis of the Farm Real Estate Market in Clay and Dickinson Counties, Kansas, 1956," (unpublished master's thesis, Kansas State University, 1957).

25. Carl Frederick Kraenzel, The Great Plains in Transition (Norman, Oklahoma: University of Oklahoma Press, 1955).

26. Ibid., p. 9.

27. Howard W. Otteson, et al., Land and People in the Northern Plains Transition Area (Lincoln, Nebraska: University of Nebraska Press, 1966).

28. John R. Borchert, "The Dust Bowl in the 1970's," Annals of the AAG, LXI (March, 1971), pp. 1-22.

29. C. Warren Thornthwaite, "Climate and Settlement in the Great Plains," Yearbook of Agriculture, 1941, U. S. Department of Agriculture (Washington, D.C.: Government Printing Office, 1941), pp. 177-187.

30. Ibid., p. 186.

31. E. Cotton Mather, "The American Great Plains," Annals of the AAG, LXII (1972), pp. 237-257.

32. Ibid., p. 251.

33. Walter M. Kollmorgan and George F. Jenks, "A Geographic Study of Population and Settlement Changes in Sherman County, Kansas," Transactions of the Kansas Academy of Sciences, LIV & LV (1951, 1952), pp. 449-494, 1-37.

34. _____ and David S. Simmonett, "Grazing Operations in the Flint Hills-Bluestem Pastures of Chase County, Kansas," Annals of the AAG, LV (1965), pp. 260-290.

35. Elinor A. Elliot, "The Metamorphosis of the Family Farm in the Republican Valley Country of Kansas, 1860-1960," (unpublished master's thesis, Kansas State University, 1966).

36. Chisholm, Rural Settlement and Land Use, pp. 33-34.

37. Ibid., pp. 34-35.

38. McKee, "The Farm Real Estate Market," p. 7.

39. Ibid., p. 11.

40. Ibid., p. 9.

41. Harold H. McCarty, "Agricultural Geography," American Geography: Inventory and Prospect, Preston E. James and Clarence F. Jones, ed., (Syracuse: Syracuse University Press, 1954), p. 259.

# CHAPTER TWO

The site and situation of any area will affect the human behavioral processes which occur within the area. A study of Clay County's farm operators and how distance affects acquisition would not be complete without an understanding of the physical situation in which these farmers are operating. Clay County was chosen as the study area because it has many characteristics of both eastern and western Kansas. Even though the county is in the humid region of Kansas, wheat, which is usually grown in more arid regions, is the primary crop. One of the major rivers of the Great Plains, the Republican, traverses the county. This chapter will explore four aspects of the county. First, there is the natural setting, the location of the county, the natural vegetation, the climate, and the soils present. Second, the historical background of settlement in Kansas and Clay County will have an effect on the present land use patterns. Third, the structure of the population, past and present, has an on-going influence upon the availability of land in the county. And last, the agricultural systems which are present in the county need to be taken into consideration.

## The Physical Setting

Clay County lies in north central Kansas. The location of the county in relation to the rest of Kansas is shown in Fig. 1. This map conveys an incomplete impression about the location of Clay County. The situation of an area can be stated in terms of relations to the regions surrounding it. This relation is expressed partially in terms of physiographic similarities and/or

differences. In Clay County there are two physiographic provinces. Its land area is part of the transition between the Central Lowlands and the Great Plains. Many authors have tried to establish a definite line for the place of division with very little agreement among them. Fenneman stated that in northern Kansas the plains border is a hilly belt and a useful guide line in this area can be the edge of glacial drift.[1] Another boundary line has been given by Hunt as "a low, east-facing escarpment at the eroded east edge of Cenozoic formations."[2] The western third of Clay County is in the Great Plains and the eastern two-thirds is in the Central Lowlands. These physiographic provinces can be further broken down within the county into two sections. A rough dividing line can be given as the Republican River which traverses the county from northwest to southeast and separates the Flint Hills from the Smokey Hills. Lying in the east, the Flint Hills are about twenty miles wide extending from the northern to southern border of Kansas.[3] Muilenburg, who is with the State Geologic Society, wrote that the Flint Hills are composed of "a series of prominent scarps and dip slopes developed on weather-resistant cherty or flinty limestones."[4] While the uplands are some of the best grazing lands in the nation, the lower slopes and stream valleys contain good land for cultivation. The Smokey Hills are more irregular in formation than the Flint Hills. Shoewe has given the following explanation of the Smokey Hills:

> The Smokey Hills constitute a strip of country 20 to 40 miles wide forming the eastern part of the Dissected High Plains section and lying north of the Arkansas River Valley. . . . The Smokey Hills are a maturely dissected broad hilly belt carved essentially in the Dakota Sandstone and having a relief at places from 200 to 300 feet.[5]

The physiographic sections are important to this study because it is from the rock base present in an area on which soils are usually developed. The type

of land available in an area will affect the distance that farmers are willing to travel to acquire land.

Climatic factors include the amount and distribution of precipitation, the evaporation rate, the temperature, and the amount of leaching to which the soils will be subjected. The climate of Clay County reflects its mid-continent location (Table 3) by extreme variability of temperature. The precipitation is spread throughout the year with a majority falling from April to September with the heaviest rains generally occurring between April and June. In an average year, enough moisture is received so that in most cases agriculture can be carried on without the aid of irrigation. The table illustrates a twenty-five year average of temperature and precipitation for Clay Center with 1972 used as a comparison for a recent year. The 1931-1955 average does not reflect that there was drought around 1931-1933, and floods in the years 1935, 1941, 1944, and 1951.[6] Borchert compiled forty years of precipitation averages (1899-1938) for the eastern two-thirds of the United States and found that in the Plains area precipitation can vary up to 100 percent of the average and 80 percent of the average in the fringe areas of the eastern Plains.[7] This climatic variability has an effect on the agriculture of the area. In any given year, the farmer cannot be sure that his crop will not die from a lack of rainfall or be flooded from too much rainfall. As a hedge against this problem, farmers might want to acquire land on different types of slopes and soils. Some crops could be planted on higher slopes to avoid flooding, and other crops could be planted on flood-plains and in stream valleys where there would be more ground moisture in dry years.

As the precipitation varies, so does the natural vegetation. In drier periods the short grasses from farther west invade the county and the tall-grass prairie dies out. In wetter periods the opposite is true with the tall

TABLE 3.--Mean temperature and precipitation in Clay Center, 1931 to 1955, and including 1972 for comparison

| | J | F | M | A | M | J | J | A | S | O | N | D | Ann |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Temp | 30.0 | 34.4 | 43.0 | 55.6 | 64.5 | 75.4 | 81.2 | 79.7 | 70.9 | 59.6 | 43.2 | 32.8 | 55.9 |
| Prec | .87 | 1.07 | 1.81 | 2.32 | 4.19 | 4.19 | 3.84 | 3.82 | 2.95 | 1.99 | 1.28 | .93 | 29.53 |
| | | | | | | 1972 | | | | | | | |
| Temp | 28.3 | 34.2 | 49.2 | 56.2 | 64.2 | 75.9 | 78.4 | 77.5 | 71.2 | 54.9 | 39.8 | 27.2 | 54.8 |
| Prec | .11 | .20 | 1.25 | 3.28 | 4.36 | 1.38 | 1.94 | 7.46 | 5.36 | 1.46 | 4.15 | 1.73 | 32.68 |

Source: Climates of the States, Kansas, Climatography of the United States No. 60-14, U. S. Department of Commerce, Weather Bureau, Washington, D. C.: Government Printing Office, 1959.

U. S. Department of Commerce, National Oceanic and Atmospheric Administration, Environmental Service Data, Climatological Data, Kansas, Summary, Vol. 86, No. 13, Washington, D. C.: Government Printing Office, 1973.

grasses extending farther west. This native vegetation, which still can be seen in isolated spots, is composed of bluestem prairie in the eastern portion of the county and bluestem-grama prairie in the western portion. Along the Republican River a northern flood plain forest can be found.[8] The forest which occupied the stream valleys has been mostly removed to allow for agricultural pursuits, but many of the prairie grasses may still be seen in many pastures of the county.

Soil's ability to develop its localized characteristics is dependent on the climate and parent material present within a region. In 1950 the Kansas State Agricultural Extension Service made a reconnaissance of the county and grouped the soils by land-use capability classification. These classifications are outlined in Table 4. The classifications range from those which require no special care when tilled (class one) to those which cannot be used for agricultural purposes (class eight). Clay County has six of these eight classes within the county borders; classes five and eight are not present (Fig. 2). The divisions of these classes are based on the slope of the land, the drainage, and the fertility of the soil. Clay County's soils can be broken down into two groups for further discussion--those which can be cultivated and those which cannot.

The first four classes of soils are those which can be cultivated. Class one soils are "those best suited to cultivation and require no special practices for erosion control and fertility maintainance."[9] These soils lie along the Republican River and its tributary streams (Fig. 2) and are composed of alluvial soils. Class two soils are on slopes of two percent or less, which indicates that they, too, lie along the Republican flood plain and other gently sloping lands. These soils are clays and often have a sandy subsoil. Being river deposited and having low slopes, these soils require only minimal

TABLE 4.--Land-capability classification

| Land class | Land-capability and use precautions | Primary uses | Secondary uses |
|---|---|---|---|
| | **Group I. Lands Suitable for Cultivation** | | |
| I. | Excellent land, flat, well drained. Suited to agriculture with no special precautions other than good farming practice. | Agriculture | Recreation<br>Wildlife<br>Pasture |
| II. | Good land with minor limitations such as slight slope, sandy soils, or poor drainage. Suited to agriculture with precautions such as contour farming, strip cropping, drainage, etc. | Agriculture<br>Pasture | Recreation<br>Wildlife |
| III. | Moderately good land with important limitations caused by soil, slope, or drainage. Requires long rotation with soil-building crops, contouring or terracing, strip cropping or drainage, etc. | Agriculture<br>Pasture<br>Watershed | Recreation<br>Wildlife<br>Urban-industrial |
| IV. | Fair land with severe limitations caused by soil, slope or drainage. Suited only to occasional or limited cultivation. | Pasture<br>Tree crops<br>Agriculture<br>Urban-industrial | Recreation<br>Wildlife<br>Watershed |
| | **Group II. Lands Not Suitable for Cultivation** | | |
| V. | Land suited to forestry or grazing without special precautions other than normal good management. | Forestry<br>Range<br>Watershed | Recreation<br>Wildlife |
| VI. | Suited to forestry or grazing with minor limitations caused by danger from erosion, shallow soils, etc. Requires careful management. | Forestry<br>Range<br>Watershed<br>Urban-industrial | Recreation<br>Wildlife |

TABLE 4.--Continued

| Land class | Land-capability and use precautions | Primary uses | Secondary uses |
|---|---|---|---|
| VII. | Suited to grazing or forestry with major limitations caused by slope, low rainfall, soil, etc. Use must be limited, and extreme care taken. | Watershed<br>Recreation<br>Wildlife<br>Forestry<br>Range<br>Urban-industrial | |
| VIII. | Unsuited to grazing or forestry because of absence of soil, steep slopes, extreme dryness or wetness. | Recreation<br>Wildlife<br>Watershed<br>Urban-industrial | |

Modified from land classification system of U. S. Soil Conservation Service, Department of Agriculture (From Wohletz and Dolder, 1952.)

Source: Raymond F. Dasmann, Environmental Conservation (New York: John Wiley & Sons, Inc., 1968), p. 127.

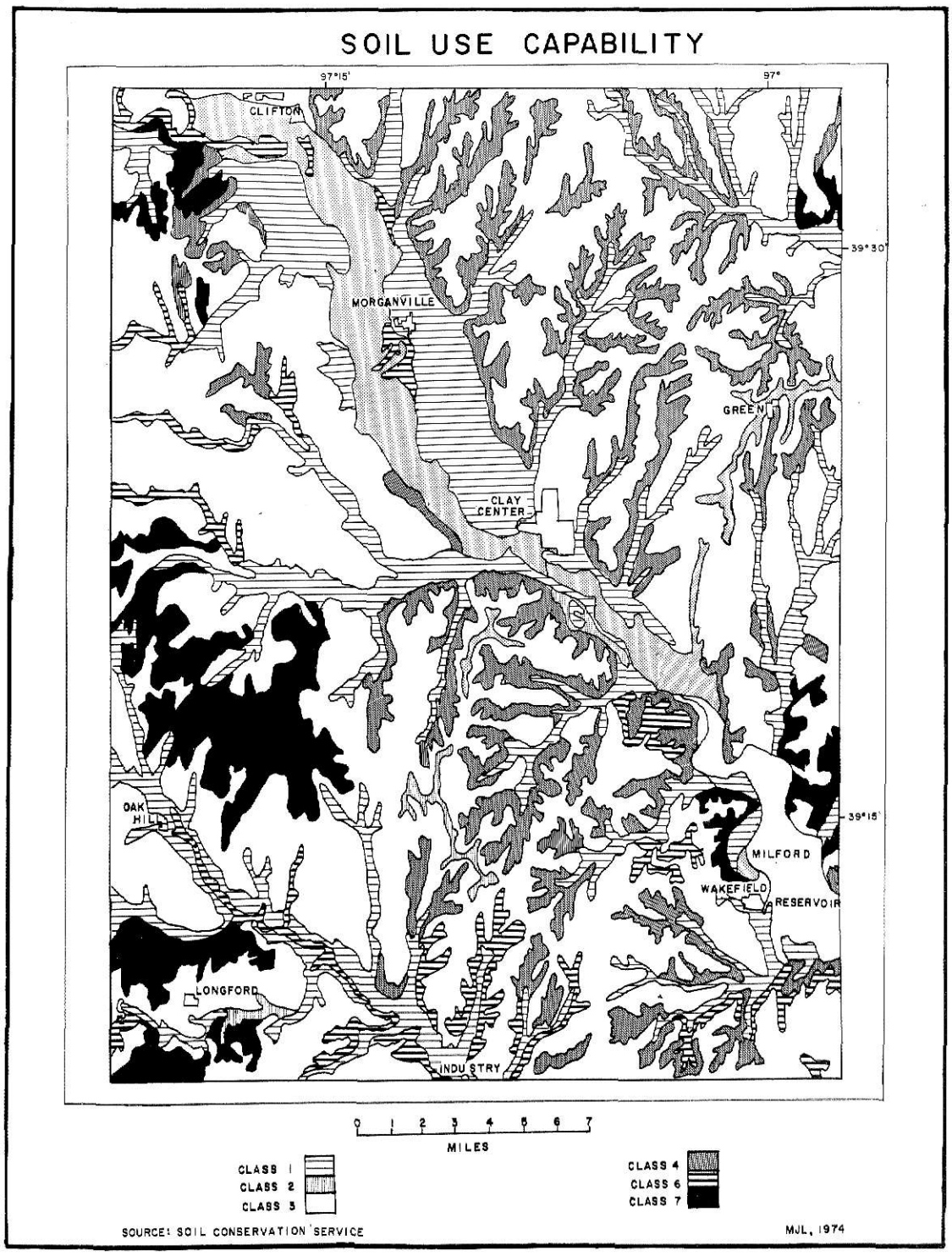

SOIL USE CAPABILITY
97°15'
97°
39°30'
39°15'
CLIFTON
MORGANVILLE
GREEN
CLAY CENTER
OAK HILL
MILFORD
WAKEFIELD
RESERVOIR
LONGFORD
INDUSTRY
0 1 2 3 4 5 6 7
MILES
CLASS 1
CLASS 2
CLASS 3
CLASS 4
CLASS 6
CLASS 7
SOURCE: SOIL CONSERVATION SERVICE
MJL, 1974

Figure 2

erosional and fertilization control practices. Class three soils are on steeper slopes of two to seven percent and thus "require more intensive or complex practices to control sheet and gully erosion."[10] Their location in the county, in contrast to the two above classes, is on the higher ground of the interfluves so that deposition from the river has not been a factor in their formation. The soils within this class are clays which have been weathered from the parent sandstones and limestones present in the county. It is these three above soil classes which the resident farmers would like to be able to acquire for the cultivation of crops such as corn, wheat, and milo.

The remaining three classes of soils are subject to severe erosion and must be managed accordingly. Only class four soils can be used for cultivation; classes six and seven are located on slopes that are far too steep for intensive agriculture. These last three classes are on the slopes surrounding the better land, with only class seven land located in concentrated areas (Fig. 2).

Class four soils are "not suitable for continuous cultivation but may be used for the limited production of cultivated crops."[11] Crop rotation with hay or pasture planted in those fields most of the time would be a good system of agriculture for these areas. The derivation of these soils from their parent material of loess, limestone, and limy shales gives a clue to their location in the Flint Hills portion of the county. These soils are located on the sides of hills having slopes of seven to fourteen percent. The soils of class six are composed of sands along the Republican River, clays with broken slopes along narrow streams, and limy shales on slopes of seven to twenty percent.[12] These soils can be used for grazing or woodland, but cannot be cultivated. The last class of soils present in the county (class seven) is "suitable for grazing or hayland with severe restrictions in use

and practices to control erosion."[13] These are shallow and stony soils derived from limestone, limy shales, sandstone, or sandy shales. Located chiefly in the western portion of the county (Fig. 2), these soils are not only stony, but are on steep slopes of twelve percent or more. In the early days of settlement, much of the county was plowed and crops were grown on all six classes of land. The past few years have brought a decrease in cultivated land because of an awareness of conservation measures and modern equipment which does not easily lend itself to working steep slopes; thus the marginal classes of land have been resown to native grasses for pasture and hay.

## History

The history of Clay County is similar to the history of many other pioneer areas settled after the 1785 Land Ordinance, even though the time sequences may vary. According to various local histories, the first settlers arrived between 1854 and 1856 and settled on Timber Creek. The land had all been surveyed and laid out in township grids after the passage of the Kansas-Nebraska Act of 1854 and before the land was technically opened for settlement. Almost as soon as they could legally settle (the first to arrive may have pre-empted the land), the first pioneers began to arrive. These early settlers bought the land at $1.25 per acre from the Federal government. The usual size of acquisition was a fraction of 640 acres, or part of a section. Before the Homestead Act, common sizes that were acquired ranged from 40 to 160 acres. An "eighty" or eighty acres of land was a common size and quite adequate for the amount of labor required to produce crops before the advent of the gasoline engine.

In 1860 the territorial legislature defined the borders of the county

and named it for Henry Clay, one of the Congressional leaders of his day. Clay County was attached to Riley and then Geary counties for administrative purposes, as none of the counties had sufficient population to warrant separate governments. In 1866 the residents of Clay County became dissatisfied with the taxation procedures of Geary County, and they held an election for separation. After the election, Clay Center was established as the permanent county seat and the county was divided into three townships (the term used by Russell to describe the division): Sherman in the north, Clay Center, and Republican in the south.[14] The other fifteen townships were carved from these three in later years.

The settlement patterns were similar to those of southeastern Wisconsin. The first settlers to arrive settled along the streams and rivers where there were trees for buildings and fires and water was easily accessible. These settlers were more familiar with the prairie soils and conditions than were the first pioneers in the prairies of Illinois and the oak openings of Wisconsin. Settlers in Wisconsin took land along the forest because they thought the grassland was less fertile than the forest.[15] The settlers who came to Clay County needed the water and wood which the streams provided. They understood the prairie soil, but not the precipitation variability that caused recurring droughts.

In the 1881 Plat Book of Clay County a short description of the early settlement was given.

> Until 1870, the settlements were nearly all made along the river and creeks. The early settlers supposed that the upland would not be farmed in their lifetime. In 1870, the English colonists settled on the prairie between Chapman's Creek and the river, and now have some of the finest farms in the county. In January, 1870, there were no houses between Clay Center and Fancy Creek, between Clay Center and Chapman's Creek, nor between the head of Chapman's Creek and Wakefield.[16]

The early settlers took the best land along the streams and left what they thought to be less desirable land to the late arrivals. By 1890, all the land had been divided into farms and the county had reached its peak population. Before 1862, the land was bought from the Federal government at $1.25 per acre. After 1862 the Homestead Act gave land (up to 160 acres) to settlers who improved and lived on the land for five years. More land could be bought from other homesteaders to add to the original holding, and this was done in a few cases. These landholdings which had an average size of between eighty and 160 acres in the 1881 Plat Book have subsequently been enlarged. However, today 160 acres is the most frequently stated size that a farmer would desire if any land were available for acquisition. This would seem to be a reflection of the past when 160 acres was a common farm size often passed from generation to generation. It may be that farmers have become used to thinking of acquiring land in 160 acre tracts because of the cultural heritage of 160 acre farms.

Although the population of Clay County was growing until 1890, there were minor fluctuations in the number of people because of natural disasters. A drought occurred in the summer of 1860 and again in 1887. The drought did not set back settlement, but only caused hardship among the residents. In 1874, a plague of locusts flew into the county and for three days ate anything that was green.[17] A $70,000 bond issue was distributed among the sufferers. Very likely it was the bond issue that saved many of the settlers from bankruptcy and starvation, which would have meant emigration from the county. Numerous Indian raids sent the people scurrying south to Fort Riley for protection. None of the raids was serious enough to deter settlement, but the residents were scared.

Because farm prices are closely tied to the economy, there was a major

problem related to the financial condition of the nation. A depression or recession in the East would cause serious repercussions in the West. Among the repercussions would be a drop in crop prices and deflation which led to "hard money," or a dollar bill being worth its value in gold. Price supports and government subsidies did not exist to cushion the blows of the fluctuations in the free enterprise system. In 1887 there was a financial "bust" and the settlers of the county were hard hit. The corn grown was worth ten cents a bushel on the market, so little that in fact many "farmers used it for fuel in their stoves."[18]

Most of the residents of the county weathered the 1887 panic. The drought of 1887 extended into the early 1890's with 1892 as the midpoint.[19] Many of the inhabitants could have survived the dry period by the introduction of some form of irrigation, but in 1893 the country was plunged into a financial panic and then depression. The prices dropped on the few crops which had been produced in the drought, and mortgage payments could not be met. Elliot found that a single loan company foreclosed on 116,000 acres of farmland in eastern and central Kansas by 1894.[20] The population of Clay County declined by 313 persons during this decade (1890 to 1900). Many people who emigrated from the county moved off of farms that had been foreclosed. Emigration from the county might have been higher except for the fact that the population of Clay Center increased by 267 persons (see Table 5). Allowing for the natural increase of population within the city, the growth of the city could be explained by farm families' moving in to find work. Many of those who had their farms foreclosed very likely had nowhere else to go and remained on the land, renting it back from the mortgage company or the bank. Because of the depression and drought, land became cheap: the price dropped because there was a surplus of land on the market and little demand for it.

TABLE 5.--Population trends in Kansas and Clay County

| | Kansas | Clay County | Clay Center |
|---|---|---|---|
| 1880 | 996,096 | 12,320 | 1,753 |
| 1890 | 1,428,108 | 16,146 | 2,802 |
| 1900 | 1,470,495 | 15,833 | 3.069 |
| 1910 | 1,690,949 | 15,251 | 3,438 |
| 1920 | 1,769,257 | 14,365 | 3,715 |
| 1930 | 1,880,999 | 14,556 | 4,386 |
| 1940 | 1,801,028 | 13,281 | 4,518 |
| 1950 | 1,905,299 | 11,697 | 4,528 |
| 1960 | 2,178,611 | 10,675 | 4,613 |
| 1970 | 2,249,071 | 9,890 | 4,963 |
| 1972 | 2,277,905 | 10,251 | 5,114 |
| 1973 | 2,301,623 | 10,163 | 5,093 |

Sources: Kansas Statistical Abstract, 1972; Kansas State Board of Agriculture, Population of Kansas, 1971, 1972, 1973; U. S. Decennial Census of the Population, 1880-1970.

There were few who could afford to invest in the land that came on the market. Those who could afford land usually took advantage of the low prices to increase the size of their farms. During the drought and depression in the 1890's, a small increase in farm size took place. Small transfers of land and some farm enlargement had taken place before this, but these were isolated cases. With the decline in the population of the county, many acres of land became available.

Population

Population trends in Clay County are representative of most rural areas of Kansas. The trends to be discussed here have occurred at other times in parts of Kansas, but for basically the same reasons--drought and depression. The population climbed steadily from the time of initial settlement in the 1850's until the time of drought and depression in the 1890's. Much of western Kansas was not settled until after 1910 so that there is a time lag between the events in Clay County and those farther west. It was the drought and depression in the 1930's that led to emigration in western Kansas. In the decade from 1890 to 1900, the first decline in the rural population in Kansas and Clay County took place.[21] Not until the past decade has the population of Clay County become relatively stable (Table 5). Clay Center's population has remained fairly constant since the 1940 census. One reason for this might be emigration to larger cities equalling migration from the farm. Another of the possible explanations is that the maximum service center size for the surrounding area has been reached by Clay Center.

The decline in rural population is in part related to the size of farms. As fewer people are required to produce food for the nation, the excess farm population has had to emigrate from the farm to cities for alternative forms of employment. The declining rural population can be illustrated by the migration of young males. For Kansas, the rate of out-migration for males between the ages of 15 and 19 in 1960 and 25 to 29 in 1970 was 10.2% for that ten-year period. This rate reflects the need of the young in Kansas to leave the state in order to find jobs. The rate for Clay County (32%) was higher than the average for the state.[22] One reason for the high emigration rate is the increasing farm size which limits the available opportunities for the young to enter farming. The absence of a city large enough to provide the

excess farm youth with jobs almost certainly necessitates their move from the county. If farm families are large, only one or two of the children are able to operate the farm after the retirement or death of the father. The other children have to move elsewhere to find jobs or acquire a new farm. Young persons who do remain in farming need larger farms in order to earn an adequate income. They thus attempt to acquire more land to increase the size of the operation and in doing so, create a further decrease in the number of rural residents.

Kellogg has estimated new farming opportunities for State Economic Area Three in which Clay County is located for 1974 and 1984.[23] He first calculated the number of farmers who would still be in farming in 1974 and 1984 from their cohort group[24] numbers in the years 1954 to 1964.

> New farming opportunities for the projected time period were calculated by subtracting the number of 1964 farmers remaining in 1974 or 1984 from the total number of farming opportunities at the end of the projected period.[25]

To obtain the number of youth available for the new farming opportunities, the total number of young entering the labor force was calculated by subtracting from the number of farm male youth, the loss of youth due to emigration using the 1954 to 1964 rate, and those dying before entering the labor force. To arrive at the surplus opportunities, "the number of new farming opportunities was subtracted from the number of farm youth available to enter the labor force."[26] Kellogg found that at the 1950 to 1964 rate of farm enlargement, with one operator per farm there would be 1,872 new farming opportunities in 1974, and 3,667 by 1984. A 50% increase in the rate of farm enlargement would leave 505 new opportunities by 1974, and 1,637 by 1984. Youth available to enter farming should be 6,384 and 11,277 in 1974 and 1984, respectively. The excess numbers of youth will migrate to the cities. This

emigration of the young is just one effect of farm enlargement on a rural area. The declining farm population affects the number of services that can be offered in a rural community and the ability of the community to draw in services of specialists such as doctors. Declining rural population also affects the land market; there are not as many people who want land, but those remaining probably are willing to pay a higher price for land because they need more.[27] Farmers' preferences in land types and location can be more easily met in a land market with fewer competitors.

## Agriculture of the County

The 1972 Statistical Abstract of Kansas illustrates how the land in the county is distributed among the different land uses (Table 6). Out of the approximately 406,400 acres of land in the county, 10,158 acres are used for towns, roads, and other non-agricultural land uses. The other 396,242 acres of land in the county are agricultural. "Woodland" and "all other land" occupy a total of 119,535 acres. This land is not available for crops but can, in some instances, be used as pasture land; these lands would be the class six and seven land capability classes. The remaining land can be used for either crops or pasture; however, a majority of the land is cropped.

The crops grown in Clay County are listed in Table 7. These crops are classified according to the number of farms out of the total farms that grow the crop. Wheat is grown on 796 farms and occupied 82,718 acres in 1969 and 76,000 acres in 1971. Wheat is the leading crop, followed by sorghum, which is grown on 683 farms. Hay, silage, and field corn are the next most numerous crops reported. In Clay County, the climate is favorable for winter wheat production and some soils are fertile enough to yield a good crop.

The cropping patterns present on the landscape are reflective of the

TABLE 6.--Clay County farm statistics, 1972

| | |
|---|---|
| Approximate land area (acres) | 406,400 |
| Land in farms (acres) | 396,242 |
| Number of farms | 914 |
| Average size of farms (acres) | 433.5 |
| Cropland harvested (acres) | 183,299 |
| Cropland used only for pasture (acres) | 34,557 |
| All other cropland[1] (acres) | 58,851 |
| Irrigated land in farms (acres) | 5,258 |
| Woodland[2] (acres) | 6,459 |
| All other land[3] (acres) | 113,076 |

[1] Includes cropland used for soil-improvement crops, crop failure, cultivated summer fallow, and idle cropland.

[2] Includes woodland pasture.

[3] Includes pastureland other than cropland and woodland pasture, rangeland, and land in house lots, barn lots, ponds, roads, wasteland, etc.

Source: Kansas Statistical Abstract, 1972, p. 201.

TABLE 7.--Crops produced in Clay County, 1969, 1971.

| | | 1969 | 1971 |
|---|---|---|---|
| Field corn for all purposes | farms | 239 | |
| for grain | farms | 217 | |
| | acres | 13,119 | 13,000 |
| Cut for silage, green or dry fodder, | farms | 53 | |
| or hogged or grazed | acres | 1,065 | 780 |
| Sorghum for all purposes except for sirup | farms | 683 | |
| For grain or seed | farms | 651 | |
| | acres | 52,452 | 66,000 |
| Cut for silage, dry forage or hay, | farms | 342 | |
| hogged, or grazed | acres | 6,653 | 1,300 |
| Wheat for grain | farms | 796 | |
| | acres | 82,718 | 76,000 |
| Oats for grain | farms | 118 | |
| | acres | 1,696 | 3,000 |
| Barley for grain | farms | 11 | |
| | acres | 326 | 100 |
| Rye for grain | farms | 5 | |
| | acres | 59 | 320 |
| Soybeans for beans | farms | 174 | |
| | acres | 22,412 | 30,600 |
| Hay, excluding sorghum hay | farms | 605 | |
| | acres | 22,412 | 30,600 |
| Irish potatoes and sweet potatoes | farms | 28 | |
| | acres | 5 | |
| Vegetables, sweet corn, or melons | farms | 1 | |
| for sale | acres | 4 | |
| Berries for sale | farms | 1 | |
| | acres | 1 | |
| Land in orchards | farms | 5 | |
| | acres | 42 | |
| Other crops | farms | 51 | |
| | acres | 612 | |

Source: U.S. Census of Agriculture, Kansas, Part 21, Section 2, and 55th Annual Report, 1972, Kansas State Board of Agriculture, pp. 21F-55F.

use capability of the soil, the slope of the land, and the choice of the farmer. In some cases, the type of crop planted may be a result of a rental agreement. Distance may also be part of the reason for certain cropping pattern; distance to a field may influence a farmer to institute an extensive agricultural system rather than an intensive system. Farmers who are in the market for more land usually take into consideration the capability of soils, the crop yields and distance of the land before they acquire a new tract.

Many farmers are looking for more pasture land rather than cropland. The crops which are grown are often fed to cattle or hogs, two of the major sources of farm income in the county (Table 8 shows the numbers of animals in the county). The cattle gain much of their market weight on grassland pastures and then are "finished off" for the market with the grains grown on the farm. While this system saves the farmer money, it is not as efficient as the commercial feed lot system in which the cattle receive only grains and become marketable in a shorter time. Cattle, hogs, and sheep are raised on the largest number of farms--747. Hogs are usually kept in pens in the barnyard and are fed the crops grown on the farm; 301 farms in the county raise hogs for sale. Cattle and hogs are the leading animals in the county. Approximately 2,000 sheep and goats are raised and a count of the other livestock raised in the county was not included in the census. The numbers of animals raised can vary greatly from year to year. Meat production is very much cyclical in nature. When the price of meat drops in the supermarket, not as much meat will be raised on the farm until the available supply drops below the demand and the price of meat once again climbs. The vicissitudes of meat production have been felt this past year for both consumers and farmers with spiralling costs, the meat boycott, price controls, and other factors which have driven the price of meat on the market up and down.

TABLE 8.--Livestock in Clay County, 1969, 1972

| | Farms reporting | Number, 1969 | Number, 1972 |
|---|---|---|---|
| Any cattle, hogs, or sheep | 747 | x | x |
| Cattle and calves | 715 | 52,202 | 63,000 |
| 1 to 4 | 17 | 54 | |
| 5 to 9 | 12 | 93 | |
| 10 to 19 | 75 | 1,093 | |
| 20 and over | 611 | 50,962 | |
| Cows and heifers that calved | 601 | 18,105 | |
| Milk cows | 120 | 1,768 | |
| Farms with-- | | | |
| 1 or 2 | 52 | 70 | |
| 3 or 4 | 6 | 18 | |
| 5 to 9 | 11 | 73 | |
| 10 and over | 51 | 1,607 | |
| Hogs and pigs | 305 | 33,713 | 48,000 |
| Farms with-- | | | |
| 1 to 4 | 13 | 32 | |
| 5 to 9 | 10 | 63 | |
| 10 to 24 | 44 | 732 | |
| 25 and over | 238 | 32,886 | |
| Sheep and lambs | 24 | 1,922 | 1,300 |
| Horses and ponies | 140 | 543 | |
| Chickens | 395 | 204,845 | |
| Other livestock and poultry | 38 | x | |

x = information does not apply.

Source: U.S. Census of Agriculture, Kansas, Part 21, Section 2, 1969; and 55th Annual Report, 1972, Kansas Board of Agriculture, p. 6F.

A mixed farming type of agricultural system is the most prevalent in the county. Wheat usually is raised as a cash crop and other crops, although they can be sold, more often are fed to livestock. Farmers do not appear to depend on any single source of farm income, perhaps because they farm several types of land or because they fear dependence on any single source of income so that crop failure or disease in livestock could ruin them financially.

FOOTNOTES

1. Nevin Fenneman, Physiography of the Western United States (New York: McGraw-Hill Book Co., Inc., 1931), pp. 3-4.

2. Charles Hunt, Physiography of the United States (San Francisco: W. H. Freeman & Co., 1961), p. 222.

3. Walter H. Shoewe, "The Geography of Kansas," Transactions of the Kansas Academy of Science, LII (1949), p. 286.

4. Grace Muilenburg, The Kansas Scene (Lawrence, Kansas: The State Geological Society, 1953), p. 19.

5. Ibid., pp. 307-8.

6. U.S., Department of Commerce, Weather Bureau, Climates of the States, Kansas, Climatography of the United States No. 60-14 (Washington, D.C.: Government Printing Office, 1959), p. 1.

7. John R. Borchert, "Climate of the Central North American Grassland," Annals of the AAG, XL (1950), p. 12.

8. Homer Socolofsky and Huber Self, Historical Atlas of Kansas (Norman, Oklahoma: University of Oklahoma Press, 1972), Map 5.

9. O. W. Bidwell, Major Soils of Kansas, Department of Agronomy No. 551 (Manhattan, Kansas: Agricultural Experiment Station, Kansas State University, 1956), p. 7.

10. Ibid., p. 9.

11. Ibid., p. 15.

12. Ibid., p. 17.

13. Ibid., p. 18.

14. Ione D. Russell, Scrap Book (Clay Center, Kansas: late 1950's), Vol. I, p. 3; and Vol. II, pp. 23, 38.

15. Joseph Shafer, Four Wisconsin Counties, Prairie and Forest, The Domesday Series, Vol. II (Madison, Wisconsin: State Historical Society, 1927), pp. 26-32.

16. Historical Plat Book of Clay County, Kansas (Chicago: The Bird and Mickle Map Co., 1881), pp. 15-16.

17. Russell, Scrap Book, Vol. II, pp. 14-15.

18. Ibid., Vol. I, p. 28.

19. Borchert, "The Dust Bowl in the 1970's," Annals of the AAG, LXI (1971), p. 2.

20. Elliot, "The Metamorphosis of the Family Farm," p. 50.

21. Forty-four of the 105 counties in Kansas reached their peak populations between 1890 and 1910. Urban counties--Wyandotte, Johnson, Shawnee, and Sedgwick--have had their peak populations in 1970, as have the counties in southwestern Kansas because of the introduction of irrigation.

22. Cornelia Flora, The Impact of Migration on Kansas, Contribution No. 31, Sociology and Anthropology Research Laboratory (Manhattan, Kansas: Agricultural Experiment Station, Kansas State University, 1971), p. 6.

23. M. Charles Kellogg, "Farm Operator Turnover and Resource Adjustment in Selected State Economic Areas in Kansas," (unpublished master's thesis, Kansas State University, 1969).

24. Cohort is an age group in the sense that its members were all born in the same time period. The range of any cohort is ten years.

25. Kellogg, p. 9.

26. Ibid.

27. McKee, "The Farm Real Estate Market," p. 15.

# CHAPTER THREE

Distance is one of the many factors which affect decisions of farm operators. This study focuses on the significance of distance, while recognizing there are dangers in isolating a single factor in a complex, multiple-factor problem. A comprehensive analysis of all forces that affect decisions to use and acquire land is beyond the scope of this effort. However, distance relationships exhibit complexity as well. The distance that a farmer is willing to travel for land will be affected by his perception of a number of variables. Among these are qualities of a land parcel; its cost, soil type, potential productivity, terrain conditions, and the degree to which a tract conforms to the type of agricultural system practiced. In a general sense, the acquisition of an additional tract of land may be viewed within the context of spatial interaction. The attraction of a parcel will be affected by its perceived qualities and the costs in time, effort or inconvenience in incorporating it in a larger farm operation.

To assess distance relationships, farm land use will be examined. Distance from the farmstead as it relates to its availability for acquisition, and its use will be inspected for regularities in Clay County, Kansas. The analysis is based upon a sample of the county's farm population.

## The Sample

There are 914 farm operators in Clay County, from which a random sample of 120 names was drawn from telephone books that cover the area of Clay County (Clay Center, Morganville-Clifton, and Junction City). Only persons in the

county with rural route and R.F.D. addresses were considered for the sample. Fifty-six (54%) replies were received from those chosen, but only forty-eight responses were usable. The forty-eight responses constituted a five percent sample of the farm operators in the county, and should represent an adequate base for generalization. Eight of the responses received were not completed as respondents were deceased, retired from farming, or had never been in farming. A copy of the questionnaire is located in Appendix A.

Characteristics of the sample population

A summary characterizing the type of farm operators who responded can be used as a basis to establish that the sample is in no way significantly different from the population of the county as a whole. The age structure for rural Kansas is becoming weighted toward the older age groups because of the emigration of the young for non-farming jobs. In general, the Great Plains have this trend with the cities in the Plains attracting the younger people. These cities are becoming larger, and the smallest towns are in danger of disappearing as market and job centers.[1] Rural population, due to emigration of the young as discussed in Chapter Two, is becoming more aged. Those perons in the 65 and over age bracket have increased thirty-three percent between 1960 and 1970 in Kansas.[2] Flora found that the aged dependency ratio (those over 65 supported by those in the economically productive years) has increased from 20.5 to 21.6 between 1960 and 1970.[3] Clay County is no exception to this trend; in fact, the median population age of the sample was 53 years. Ages of the farmers in the sample range from 23 years to 90 years. The sample is more heavily represented by those in the older age brackets than is generally true for the county (see Table 9). The median age for the county is 40.3 years. This thirteen-year gap between the median of the sample

TABLE 9.--Population structure of the U.S., Kansas, and Clay County, 1970

| Age | U.S. (000's) | Age | Kansas | Clay |
|---|---|---|---|---|
| under 5 | 17,154 | | 175,049 | 625 |
| | | 5- 9 | 212,731 | 792 |
| 5-17 | 52,490 | 10-14 | 227,198 | 916 |
| | | 15-19 | 217,212 | 815 |
| 18-24 | 23,698 | 20-24 | 188,422 | 468 |
| 25-34 | 24,907 | | 257,266 | 836 |
| 35-44 | 23,088 | | 243,772 | 1008 |
| 45-54 | 23,220 | | 247,172 | 1194 |
| 55-64 | 18,590 | | 211,555 | 1225 |
| 65-74 | 12,435 | | 154,418 | 1094 |
| over 75 | 7,630 | | 111,783 | 917 |
| | | | 2,246,578 | 9890 |

Source: U.S. Census of Population, 1970.

and the median of the county can be accounted for because there were no children who responded to the questionnaire. In the sample, the youngest respondent was 23 years old. Since youngsters are not part of the farm operator population, its median age will be above that for the county as a whole. Age groups in the county are divided almost into thirds. A third of the county (3,148) are under 25 years of age, while 3,236 are 55 years and older. The remaining third of the population is between 25 and 54 years old. Interestingly, the 20-24 age bracket in the state of Kansas and Clay County shows a significant drop from two adjacent age brackets. The author can suggest no cause for this other than perhaps the emigration of these young people for college, military service, or jobs.

As illustrated in Table 9, Kansas has a considerably older population than the United States as a whole. This could be indicative of several phenomena. Among these is the fact that throughout the United States the farming population is becoming more aged than the rest of the population who

are engaged in non-farming jobs. Another reason is that perhaps the young who would like to engage in farming cannot afford either the land or the other capital investments required. Finally, given the large acreages required to make a farming operation profitable and the large size of some farm families, it may be difficult for all of those who wish to enter farming to obtain and finance enough land to begin farming. When the family farm is taken over, only one of perhaps several children is needed to manage the operation. This is often a gradual phasing-in by the son or younger relatives. Many of the older operators who responded to the questionnaire were helping their sons work the farms and were semi-retired. A large proportion of the younger farmers responded that they were working their father's farms and did not yet have full control of their farms.

Residential history

A majority (86%) of the farmers have resided in the county most of their lives. Many came from nearby townships (ten persons or 23%) in the county or lived on the same farm (63%) all their lives. Five (10%) moved into Clay County from areas in Kansas, and only two moved into Clay County from outside of the state.

The average length of residence is 44 years on the farm where they are currently living. Movement into and within the county can be shown by the following two examples. Among those who moved into the county is a 90-year-old farmer who arrived in Clay County in 1885 from Illinois. A case of movement within the county is a 23-year-old farmer who lived his first five years in the Longford vicinity and then moved north fifteen to twenty miles to the Morganville area where he has lived ever since.

In 31% of the sample the age of the respondent correlated with his

years in farming. In other words, these people grew up on a farm. The remaining farmers have entered farming during their adult lives or did not consider their childhood years on the farm, thus lowering the average length of years spent in farming to 39 years (for complete statistics, see Appendix B). Thus, the number of years in farming is below the average age of the sample population. An example of a farmer who probably has not been in farming all his life is a 48-year-old man who moved to Clay County five years ago when he appears to have entered farming. He works thirty acres of land with hogs as his principle source of farm income. A typical farmer has been engaged in farming his whole life, is 39 years of age, and has lived in the same place all those years. He took over the family farm when he was 22; however, he did not state that he inherited the farm.

An interesting finding in the survey conflicts with a general assumption that a farm is passed from generation to generation. Question seven asked specifically if the person had inherited the farm he operated. According to the sample, only 12% of the operators inherited their farms. A figure of over fifty or sixty percent was expected. Thirty-five of the 48 respondents stated that they had not inherited their farms. One stated "not yet" and was thus included in the yes category. Four farmers responded that they had inherited a part of their farm and were also included in the yes category. It is not known if those who responded "no" have inherited a part of their farms, have not yet inherited their portion of a farm, or have purchased the farm that they operate either from the estate of the parent or from an outside individual. An older farmer who has moved into the area recently would not be likely to have inherited the farm, but would probably have bought it when he began farming. An example would be the 48-year-old farmer mentioned above

who moved into Clay County five years ago. A more detailed survey on the subject of farm inheritance could dispel widely held fallacies about the nature of inheritance, or it could prove these findings wrong in whole or in part.

Source of farm income

The final characteristic of the sample population to be examined is the primary source of farm income. Distribution of farm income is similar to the major crops and livestock raised in the county (see Chapter Two, Tables 7 and 8). Wheat, sorghum, and hay were grown on a majority of the farms, and cattle raising was the leading form of animal husbandry. Fifteen farmers mentioned two or more sources of income. In six cases wheat was combined with another crop or with livestock. A total of twelve farmers combine some type of grain with a form of livestock raising. From Table 10, one may deduce the importance of wheat and livestock to this area of the country. Kansas ranks fourth nationally in cattle production, and first in wheat, which means that on a majority of farms in the state wheat and cattle must be the primary crops.[4] Three operations with combination receipts raise wheat and corn or milo. Of the remaining 32 farms in the sample, 13 raise livestock, 11 grow grain principally, four listed that they raise crops, and corn is the primary source of income on one farm (see Table 10). Two farmers listed as their major source of income land rental and custom combining of wheat, while another said his source of income "varies." Types of crops and livestock raised will influence the type of land desired and the distance a farmer is willing to travel for land.

Characteristics of the Farm

The characteristics of the farm are just as important as the attributes

TABLE 10.--Major source of farm income

| | |
|---|---|
| Wheat | 3 |
| Grain | 8 |
| Crops | 4 |
| Corn | 1 |
| Cattle | 6 |
| Hogs | 2 |
| Livestock | 3 |
| Dairy | 2 |
| Wheat and | |
| milo | 2 |
| livestock | 1 |
| hogs | 1 |
| corn | 1 |
| milo & cattle | 1 |
| Grain and | |
| dairy | 1 |
| livestock | 6 |
| Crop and livestock | 2 |
| Other | 3 |
| | 47 |

of the farmers. The size with which the farmers began farming and the current size of the farms is an important attribute. These two sizes can be compared with respect to the distance a farmer is willing to travel for land. The current size of the operation will be broken down into the number of acres owned and rented and the number of acres planted in crop and pasture land. One further characteristic of farms to be examined is the number of tracts of land per farm.

The size of farms the respondent operators began farming with is considerably smaller than the current size of their farms. The acreages ranged from 12 to 3000 acres for beginning farmers. For the initial farm size, the

average was 230 acres with the median being 126 acres. With the median age of the farmer being 53 years, a typical farmer probably would have begun farming in his early twenties. Therefore, farm size for the years 1930 and 1950 would be appropriate comparisons for most of the beginning farmers in this survey. These average sizes for Clay County are commensurate with the sizes for the United States and Kansas (see Tables 1 and 2, Chapter One). The average size farm in the United States in 1930 was 156.9 acres, and in 1950, 215.5 acres. In Kansas the 1930 size was 289.9, and 1950 was 370. Clay County shows a similar increase in size with the 1930 and 1950 farm sizes to be 208.4 and 266.2, respectively. Although there is some variation in the sample from the actual size of farm in Clay County, it is not large enough to warrant concern. These farmers found a need for growth in their farming operations in order to meet rising fixed costs that accompany increasing mechanization. Heady and others have examined the trend of increasing farm size nationally and found that because of the rising costs of machinery and other capital goods, more land is needed to meet these costs to permit more efficient use of machinery.[5] As capital outlay has increased in relation to the amount of land and labor invested, Heady found that the substitution had its trade-offs: "The substitution of capital items for land and labor increases the proportion of inputs which are purchased. Cash costs rise relative to sales, and net income declines."[6] In this manner of more capital input and less labor, more land is needed for the farm income to remain constant or to increase. Thus the size of farms continues to grow as farmers attempt to keep pace with rising costs. Currently, average size of farms has climbed to 687.5 acres in Clay County, including both rented and owned land. Again, this proportionate gain in sizes of farms is reflected locally.

A breakdown of the land operated into owned and rented parcels shows some interesting facts about the farm operations. The average number of acres owned is 311, while the average number of rented acres is 465. There are many more land owners than farmers in Clay County. The property owner plat map of Clay County obtained from the county assessor's office indicates many smaller tracts of 160 acres or less are owned by women. These are probably rented properties. Many of the smaller tracts are owned by retired persons or widows who rent them, e.g., the one respondent in this survey who receives most of his farming income from land rental. Land is held by older, retired persons as a form of investment income to either supplement Social Security or as the sole source of income. It is the younger farmers who are renting large acreages and buying few because they cannot afford to buy land. Many farmers who responded to the questionnaire commented on the high price of land, and often stated it to be in the neighborhood of $700 to $800 per acre. In recent years, according to the respondents, the price of land has been rising beyond the reach of the farmer due to investment by high income, non-farming persons. Thus, when land does come on the market, many of the farmers cannot afford to purchase it. Other reasons exist for the increasing land prices, but this was the one suggested by the farmers. Survey findings indicate few farmers are trying to dispose of land, as will be seen below.

The number of separate tracts a farmer operates often depends on how much land he rents. Tracts in the farm operations varied from one to ten, with several farmers not answering the question. The farmers were asked to sketch the arrangement of their land and mark the farmstead so that some relationships could be drawn between the location of the farmstead and the location of the fields. This part of the survey could not be included in the analysis because of the lack of an adequate number of responses and a lack of

accuracy on the part of the respondents. Several of the farmers stated that it was impossible to sketch their farms because of the complicated configuration of holdings. It was the farmers with the largest number of tracts who also stated that they had several miles to travel to fields and spent quite a bit of time on the road with machinery going to and from fields. Eleven of the respondents had their land in one tract, nine in two tracts, and one had his in ten tracts. Three tracts per farm was average for the sample.

Many of the farmers did spend a great deal of time travelling to fields. Most of the land in farms was used as cropland, which requires more care than does pastureland. Cropland per farm averaged 454 acres, while pastureland averaged 227 acres per farm. There are about two acres of crop land for every acre of pasture in the county. Approximately 247,408 acres are cropped every year and 154,092 acres are in pasture (see Table 6, Chapter Two). The amount of crop and pasture land reported in the survey compares favorably with the known figures for the county. This gives a clue to the type of land available for acquisition and also to the type of land desired by the farmer.

Distance as a Farm Management Problem

Distance is one of the management problems of a farm, whether or not the operator recognizes it as such. This problem will be brought to the attention of many more farm operators in the coming summer months as the cost of fuel continues to rise. Fuel bought for around 30 cents a gallon last summer will cost 20 to 30 cents more a gallon this summer. Often the cost of fuel becomes a fixed part of the budget that is not considered when accounting the operating expenses because approximately the same amount is spent on it each month. It is a fixed cost that becomes invisible or no

longer perceived as a part of the operating expenditures until it comes time to write off the gas tax allowance on income-tax forms. With the rising cost of fuel, it will not be an invisible expense, but the amount of fuel burned between the farmstead and the fields will become a notable item to minimize as the budgeter finds production costs spiralling. By next summer the cost of fuel may again be a routine cost that is not figured into the cost of production as people become accustomed to the higher prices.

I have hypothesized that farmers should plant their crops in a care intensity pattern in which the crops needing the greatest amount of care and time are planted nearest the farmstead in order to minimize the travel time to fields and the costs that are incurred during the time on the highway. The average travel time to fields in this survey was thirty-one minutes, with the range varying from five to ninety minutes. Thirty minutes is a substantial amount of time to be travelling to fields. The time spent in travel must be deducted from the time that can be used to work the fields and must be added to the cost of labor and overhead used in production. As the amount of time spent in travel increases, a larger portion of the farm market sales are going to be taken up by the costs of production which are raised by the non-productive travel time. This is one aspect of the increasing size of landholdings that has not been adequately studied. The economists which this author has read almost universally failed to add travel time and costs into production costs when calculating the cost-efficiency curves of large scale operations.[7]

When asked whether distance was a factor in their arrangement of crops, farmers in the sample did not seem aware that a care-intensity planting pattern might be beneficial to them. Nine (19%) respondents said distance was a factor and 38 (81%) said that it was not. Wheat and milo were the two most

frequently reported crops. Most often wheat was reported in the farthest field and forage and silage crops were planted in the nearest fields. Table 11 provides the list of crops and their frequency of occurrence in the nearest and farthest fields.

TABLE 11.--Crops reported in the nearest and farthest fields

| | Far | Near |
|---|---|---|
| Wheat | 32 | 19 |
| Milo | 26 | 20 |
| Corn | 6 | 5 |
| Alfalfa | 2 | 11 |
| Pasture | 1 | 0 |
| Cane | 1 | 0 |
| Grains | 4 | 2 |
| Sorghum | 1 | 2 |
| Silage | 0 | 5 |
| Sorgo | 0 | 2 |
| Forage | 0 | 2 |
| Beans | 0 | 1 |

Frequencies of crop and distance categories were tested for association. The null hypothesis is that there is no significant difference between the crops planted in the nearest and the farthest fields. A chi square test (Table 12) suggests there is a significant difference at the 0.001 level between crops planted in the near and far fields. Therefore, even though the farmers do not realize it, they appear to have subconsciously chosen to plant crops on a care intensity basis. A measure of caution should be employed with respect to the implication of this association. The crops were combined so that there would be adequate cell counts for all of the cells. Because wheat has a large number and is usually sold for cash, it was left in its own category. Feed grains, such as milo and sorghums were combined,

and so were the forage crops, into two single categories as these are all similar types for grouping. A larger sample is required to infer the association holds for all crops.

TABLE 12.--Crop location

| | Far field | Near field | Total |
|---|---|---|---|
| Wheat | 34<br>(27.76) | 20<br>(26.24) | 54 |
| Feed grains | 35<br>(33.93) | 31<br>(32.07) | 66 |
| Forage | 4<br>(11.31) | 18<br>(10.69) | 22 |
| Total | 73 | 69 | 142 |

$x^2 = 14.63$ df = 2 0.001 = 13.815

Perception, again, is a key to how the farmers are reacting to a situation. The case Chisholm discussed in the context of an agricultural village in Sicily is a case in point. Its fields were planted so as to locate the crops requiring the fewest man-days of labor the farthest from the village.[8] This same method of cropping is suggested by the chi square to occur in Clay County, Kansas. These farmers apparently realize that it requires more labor to grow alfalfa than wheat, so alfalfa is planted nearest to the farmstead so that it can be more readily tended.

In order the place the remainder of the thesis in its proper context, a synoptic note on the land market and land acquisition is needed. The questionnaire asked farmers how they most often found out about land for sale

and how often they knew about land for sale. A chi square test (Table 13) was applied to assess the relationship between awareness of land availability and sources of such information. The null hypothesis was: there is no significant difference between level of awareness and the source of information on land availability. Chi square was applied in two ways to see if the significance would change. First is given a breakdown into the three methods of knowledge listed by the farmers, and the second is grouped into two categories of informal and formal methods of knowledge.

TABLE 13.--Knowledge of the land market

| | Most always know | Sometimes know | Total |
|---|---|---|---|
| Word-of-mouth | 11 (9.54) | 21 (22.46) | 32 |
| Newspaper | 3 (3.88) | 10 (9.12) | 13 |
| Land agents | 3 (3.58) | 9 (8.42) | 12 |
| Total | 17 | 40 | 57 |
| $x^2 = 0.7229$ | df = 2 | 0.05 = 5.991 | |
| Informal | 11 (9.54) | 21 (22.46) | 32 |
| Formal | 6 (7.46) | 19 (17.54) | 25 |
| Total | 17 | 40 | 57 |
| $x^2 = 0.6102$ | df = 1 | 0.05 = 3.841 | |

Word-of-mouth is the principal manner in which farmers find out about land that is available in the area. Newspapers and land agents are a more formal method of knowledge and are not as frequently used by the farmers. Many parcels of land which are placed on the market may not be sold through an agent because of the commission which must be paid to him. McKee found that farmers thought they could get as much for the land as an agent could without paying the commission.[9] In the same thesis, it was stated that only one or two potential buyers were contacted by the farmer. These were usually adjacent to or within a short distance of the tract of land for sale. An agreement was reached, often at the asking price, with one of the first persons contacted.[10] However, those who know about land for sale might not want to buy. Only 40% of the farmers stated that they were in the market for land. Four (9%) said that they might buy land and 52% (25) stated that they were not in the market for land.

In order to test the association between those in the market for land and how often they know of land for sale, two chi square tests were run. In Table 14 are listed the difference between those who wish to buy land and those who do not want to buy land, and the level of awareness of each group about land for sale. No significant difference was found at the 0.05 level. The cell count for those who might buy land is marginal, but the chi square achieved from the data is so much lower than the probability table that having a few extra persons in each cell probably would not raise the chi square value to significance. From this finding, it is concluded that whether or not a person is in the market for land generally makes no difference in his knowledge of land for sale.

TABLE 14.--The land market

| | People in the market for land | People not in the market for land | Might buy land | Total |
|---|---|---|---|---|
| Most always know of land for sale | 4 (3.2) | 6 (7.47) | 2 (1.33) | 12 |
| Sometimes know | 8 (8.8) | 22 (20.53) | 3 (3.67) | 33 |
| Total | 12 | 28 | 5 | 45 |

$x^2 = 1.1272$ df = 2 0.05 = 5.991

The second test (Table 15) assesses the relationship between the demand for land and the method used to gain knowledge of land sales. The distribution is shown of those persons desiring more land, those who do not desire more land, and those who might buy land, with how they find out about land for sale. The two rows are divided into formal methods of learning about land sales--the newspapers and land agents--while word-of-mouth is a more informal method of learning about land sales. As in the test above, the "might buy land" cell counts are marginal. However, with the great difference between the chi square and the probability of its occurrence, it would require a large number to be added to those two cells to have them affect the probability of its occurrence. The chi square equals 0.7157. This figure could be achieved five percent of the time with no relationship between the categories. The survey data suggest that whether or not a person is in the market for land, he will have knowledge of land that is for sale.

The age structure of the sample indicates another explanation of why more farmers are not in the market for land. Many of these farmers are

TABLE 15.--Knowledge of the land market

| | In the market | Not in market | Might buy land | Total |
|---|---|---|---|---|
| Talk | 9<br>(9.44) | 22<br>(22.04) | 2<br>(2.52) | 34 |
| Papers & agents | 6<br>(5.83) | 13<br>(13.6) | 2<br>(1.56) | 21 |
| Total | 15 | 35 | 4 | 54 |

$x^2 = 0.7157$ df = 2 0.05 = 5.991

reaching an age when they would like to stabilize their operations and begin to retire. The half of the sample above 53 years would be the ones who are most satisfied with the size of their operations and whose retirement is imminent. Several of the younger farmers were satisfied with the size of their operations and did not, at least for the present, care to add land to their farms. The observation that even the younger men were satisfied with the size of their farms, particularly those with large farms, is supported by the fact that 53% of the farmers preferred not to rent or buy more land. Ten (21%) preferred to rent more land rather than buy more because of the high price of land. Barlowe and Libby have found a similar trend in other parts of the country.

> Many of those who have remained in farming have found it expedient to operate farms of larger size. Farm credit policies have been devised to help keep the road to ownership open. Yet the need to acquire a larger operating unit together with the upward trend in the farm real estate prices has definitely narrowed the scope of the average farm operator's ability for acquiring ownership.[11]

Renting land appears to be one solution to the problem of high land prices. Because of the disproportionate number of farmers who preferred neither to

rent nor buy more land, it must be concluded that a majority of farmers in Clay County are satisfied with their farm sizes. They feel that they are getting the maximum use of their machinery and are earning an adequate income from the sales of farm products. However, the time of the study might affect the results of the survey because farmers were beginning to work on their tax returns and would be acutely aware of high property taxes and other taxes which are levied on them.

Response to one survey entry appears to contradict the findings above. Each farmer was asked whether he would consider buying his neighbor's farm. Twelve were not sure, and eleven said they would not, leaving twenty-one who would definitely buy the farm. The incongruity of this with earlier answers suggests farmers who do not want to further enlarge their farms reconsider when land adjacent to their own farms is involved. The time-space connectivity theory outlined by Janelle could be a useful concept when considering how farmers view the possession of land.[12] A farmer assigns a priority to land acquisition in relation to its location relative to his farmstead as modified by type and/or price of land. From the responses, when given a choice of buying any land or the adjacent land, consideration would be a matter of locational utility; that is, utility would be appraised according to the time-space connectivity. By purchasing the neighbor's farm, they could sell or drop the lease on a few or all of their more distant holdings. This consolidation of fragmented holdings would not decrease the size of the farms, but would make them more compact as Chisholm found desirable.[13] This would yield a higher Economic Rent to the farmer and would improve the efficiency of his operation. When acquiring more land, the farmer would attempt to obtain land as close to his present landholdings as possible, if he were an optimizer.

Roads are the access routes to the surrounding areas from the farmstead and are viewed as such by the farmers. Forty-one (91%) farmers stated that a good road to their fields was important. Six did not respond to the question. Several of the respondents said any type of road would be acceptable, but the bridges over the streams usually were not wide enough for modern equipment when the road was dirt. Frequently, it was the type of bridge to be found on the roadways around the farmstead that colored the response of the farmer. Interestingly, only one farmer stated that he would prefer to acquire land on a black-topped road but would accept a gravel road; this response was included under the gravel road classification in order to have adequate numbers for a chi-square test. Twenty-five farmers said that they would accept a dirt road when acquiring land, and eighteen stated that they would not accept a worse type than gravel. Several farmers commented that by the time equipment was taken to the fields the roads were dry and there was no worry over getting stuck in the mud on a dirt road. Gravel roads would be preferable for automobile traffic because they do not rut as badly and are passable in most types of weather. When asked if the land were to be rented rather than purchased would the road type have a bearing on the decision to rent, no statistical difference was found between the responses. The chi square test (Table 16) at the 0.05 level failed to show any significant difference with a value this large or larger being obtainable merely by chance.

Although McKee found that a higher price was paid for land on gravel than dirt roads, a farmer would not reject a tract of land simply because it was not located on an improved road.[14] A good road was more important to 49% of the respondents if the land were rented rather than purchased. There was no difference in 19% of the cases, with a good road equally important when renting or purchasing. Those who said that a good road was less important

pointed out that land might be rented for only one season and a different parcel might be rented the next year.

TABLE 16.--Type of road and its importance to the consideration of renting land

| | Dirt road | Gravel road | Total |
|---|---|---|---|
| Road more important | 13 (11.93) | 8 (9.07) | 21 |
| Road less important | 6 (8.52) | 9 (6.48) | 15 |
| No difference | 6 (4.55) | 2 (3.43) | 8 |
| Total | 25 | 19 | 44 |

$x^2 = 3.0191$ df = 2 0.05 = 5.991

Support for Hypothesis Three, which is that farmers would like to acquire land near town, can be taken from the response of the farmers when asked if land they were considering for acquisition should be near town. Fifty percent answered in the affirmative, 43% said "no" and 7% said it was a factor when considering a tract of land. Several of the farmers stated that since they sold their crops and livestock in town they wanted an easy, well-maintained route to the market. However, one point on which all farmers agreed was the road to town should be good. Although all farmers want a good route to market, they would not necessarily buy land closer to town for this reason.

The time-space connectivity theory of the utility of a place in relation to its location applies also to this section which considers the dis-

tances farmers are willing to travel to obtain more land. An important factor that farm operators should weigh when considering another tract of land is the distance they will have to travel to the newly acquired land. There are many factors which farmers weigh when adding land to their farms. Among these are soil type, crop yields, drainage, and terracing. These are some of the major factors in addition to the price of land which the farmers consciously weigh when acquiring land.

Location of land should also be a factor which farmers consider. As was illustrated in the explanation of the location of crops on farms, location can be a subconscious thought process. Location can also be a well-thought-out factor, as in the case of buying a neighbor's farm if it should be placed on the market. Farmers stated that they would be willing to travel between one-half and thirty miles for land. The average distance that the farmers would like to travel for land is 8.3 miles. The eight miles which farmers are willing to travel for land would lead to a very localized land market. McKee found that only one or two farmers in the immediate vicinity of the seller's farm were contacted about the sale.[15] Because most farmers are not willing to travel over ten miles, there is not much point in widely advertising a parcel of land that is for sale. In the sample, only one farmer stated that he would buy land at any distance from his farmstead, but would rent land which he owned that was more than fifteen miles. This farmer was included under the distance of fifteen miles when calculating how far farmers are willing to travel to work land.

A chi square test was applied to data on how far an operator would be willing to travel for land. The test was conducted in two different ways. A two by two table was constructed and the data were grouped by large and small holdings, which appear as the rows, and near and far distances, which

are the columns. In the first test, small holdings were considered to be less than 200 acres in size. Two hundred acres was used as the breaking point because there was a large gap in the data at that point. This gave a preponderance of large holdings and led to an undersized cell in the table. Because the chi square value is almost significant at the 0.05 level, it could become significant if the cell size were increased. In both tables the cut-off point for distances near and far from the farmstead was between six and eight miles. The first test proved to be significant at the 0.1 level and nearly significant at the 0.05 level. For the second test, the cut-off point for the acres was raised to 360. This test did not prove significant (see Table 17).

In the first test, distance can be considered an important factor to the farmer with a small holding. The farmer never has to travel far to his fields and does not want to move his equipment to far-flung fields. It appears that if a farm is larger than 200 acres, distance is of less significance to farm operators.

Another method was desired to determine if there is correlation between the size of the farmer's current operation and the distance that he is willing to travel for land; a correlation regression procedure was employed. The regression expression, $Y = a + bX$, yielded an "a" of -9.0925, and a "b" value of 93.1929. A very weak but positive correlation obtains between the size of farm and distance a farm operator is willing to travel to acquire more land (Fig. 3). As in the case of the chi square, a farmer with a small operation is not as willing to travel a long distance to acquire more land. Before a conclusive statement on distance and the size of the operation can be reached, much more research in different areas of the country is needed.

The writer further wished to test the distance that farmers were

TABLE 17.--Size of the operation and distance travelled for land

| | Near | Far | Total |
|---|---|---|---|
| Large-- over 200 acres | 18 (21.26) | 19 (15.74) | 37 |
| Small-- under 200 acres | 9 (5.74) | 1 (4.26) | 10 |
| Total | 27 | 20 | 47 |
| $x^2$ - 5.5247 | df = 1 | 0.05 = 5.991 | 0.1 = 4.605 |
| Large-- over 360 | 18 (18.96) | 15 (14.04) | 33 |
| Small-- under 360 | 9 (8.04) | 5 (5.96) | 14 |
| Total | 27 | 20 | 47 |
| $x^2$ = 0.3834 | df = 2 | 0.05 = 3.841 | |

willing to travel for land and the minimum number of acres that they thought would be necessary to make farming profitable at that distance. The weak positive association (see Fig. 4) that is again manifested points out the fact that farmers really do not include fuel costs involved in going to fields as a part of their production costs or there would be a more positive association between distance and size. There is a tendency on the part of the farmers to feel that a tract of land should be larger at a further distance to make it worth their while to haul equipment there, but there does not seem to be agreement on how large large should be. No farmer stated less than 80

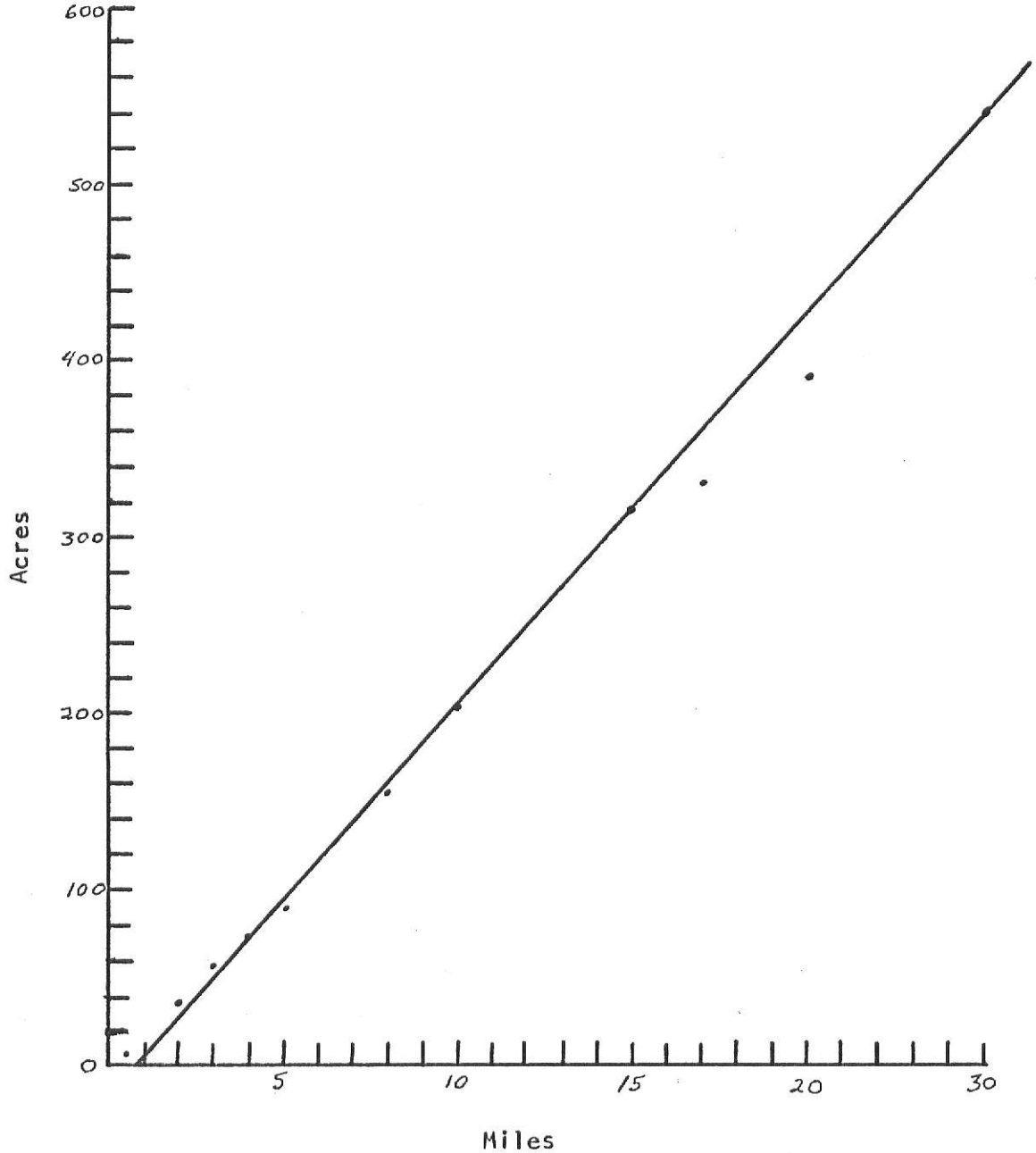



Figure 3

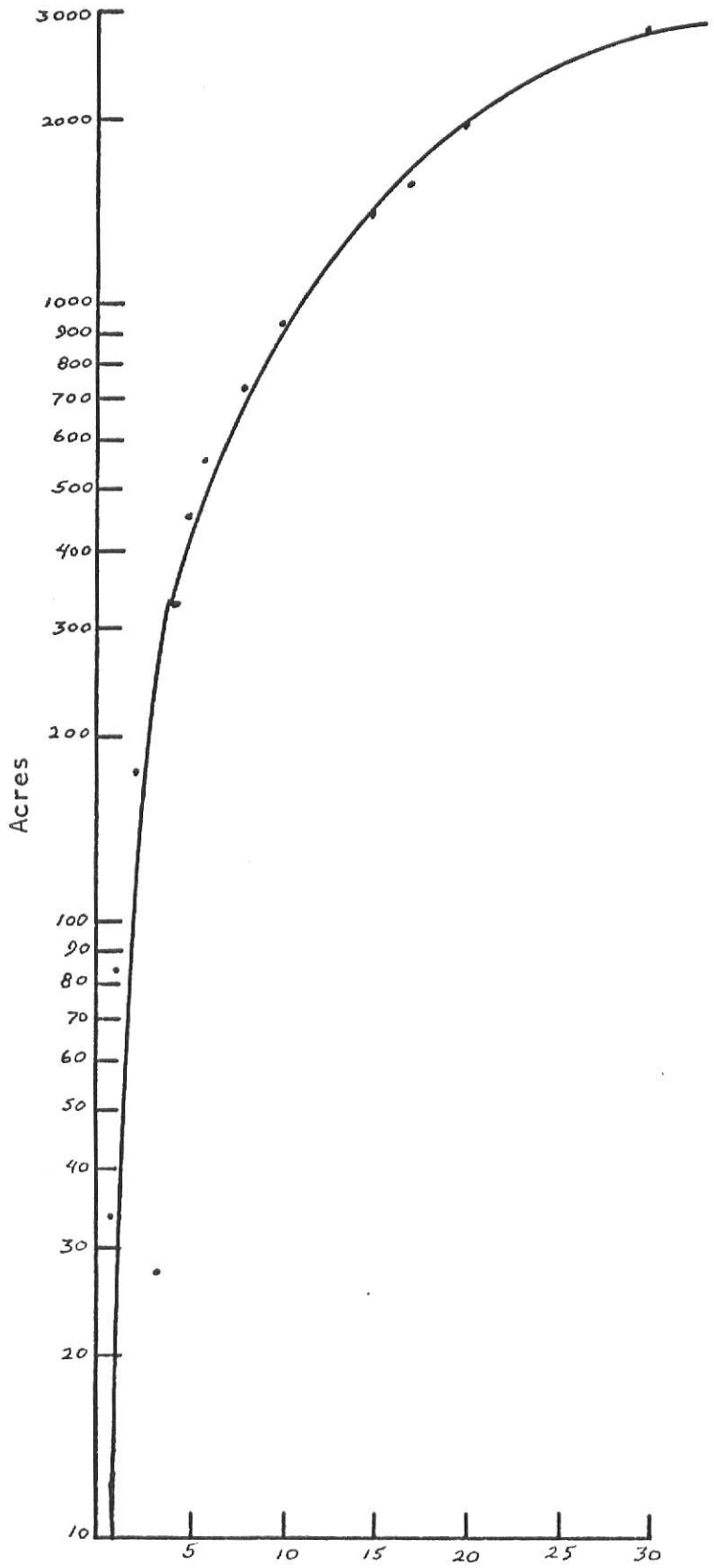

3000
2000
1000
900
800
700
600
500
400
300
200
100
90
80
70
60
50
40
30
20
10
Acres
5
10
15
20
25
30
Miles

Figure 4

acres and no one stated more than 320 acres as being satisfactory sizes. Eighty and 160 acres were most often mentioned by farmers willing to go less than six miles. Those willing to travel eight or more miles have less agreement on the size of the tract desired. Other factors affecting the tract size might be how much land is available in the tract placed on the market, how much more land the farmer wants, and the price of the land.

Many of the farmers in the sample stated that they would be willing to travel farther for pastureland than for cropland. Those willing to travel further constituted 76% of the sample. The willingness to travel farther for pastureland does relate to Hypothesis One, which is the von Thünen-like pattern to be found on the landscape in that pastures require the least amount of care and can thus absorb a higher cost, but less frequent travel to them. Even though farmers are willing to travel farther for pastureland, the size of the tract desired should not vary. A majority (95%) of the farmers said that for rented or purchased land, they would need the same size holding to make farming at the stated distance from the farmstead worth their while. The small group of operators who stated that they would accept a different size parcel for rented land, said that the tract could be smaller. As in the case of the roads where a worse road would be acceptable for rented land, a smaller tract would be acceptable for rented land because it could be exchanged for a larger tract of land in a year or two.

With the rising fuel and labor costs, these trends observed above will become more pronounced. One factor affecting these trends may be that the survey was conducted in the winter when the amount of time spent travelling to and from fields is not accurately remembered. A survey conducted in the summer when the farmer has spent more time on a tractor than he really cared

to could change the results. None of the farmers in the survey spent a great deal of time reaching his fields, which might make the farmers think a few extra miles and minutes in going to the fields would not make too much difference in the cost of production. These perceptions by the farmers of the cost of travel to fields could be significantly different in an area of very large farms such as the wheat farms of western Kansas. Studies in different areas of the country would be needed to find out how these trends apply to the areas neighboring and at a distance from Clay County.

FOOTNOTES

1. Ottoson, et al., The Northern Plains Transition Area (Lincoln, Nebraska: University of Nebraska Press, 1966), p. 167.

2. Statistical Abstract of Kansas, 1970, p. 26.

3. Flora, The Impact of Migration on Kansas, p. 12.

4. Statistical Abstract of Kansas, 1972, pp. 214, 217.

5. Heady, et al., The Roots of the Farm Problem, p. 23.

6. Ibid., p. 36.

7. For example, Madden, Economies of Size in Farming.

8. Chisholm, Rural Settlement, pp. 43-67.

9. McKee, "The Farm Real Estate Market," p. 16.

10. Ibid., p. 16.

11. Barlowe and Libby, "Policy Choices Affecting Access to Farmland," Who Will Control U.S. Agriculture?, p. 28.

12. Janelle, "Spatial Reorganization," pp. 348-64.

13. Chisholm, Rural Settlement, pp. 34-35. This concept was stated in Chapter One, that in order to promote more efficient farming operations the farmers would like to have all of their land in a single tract.

14. McKee, "The Farm Real Estate Market," p. 9.

15. Ibid., p. 15.

# CHAPTER FOUR

Farmland acquisition and farm concentration are not usually thought of as bases for geographic problems. However, in this thesis, they have been examined under a geographic paradigm. Concentration is presented as the relationship between distance and land to be acquired. As a geographic problem, farm land use has been observed on a microscale and related to von Thünen's land use patterns presented in the Isolated State.

On this microscale, land use was found to vary in use intensity with distance from the farmstead. The land nearest to the farmstead is planted in the most intensive land uses, e.g., alfalfa, silage, forage, and soybeans. Fields farther removed are often planted in crops which require less care, such as wheat, milo, and pasture. Michael Chisholm compared the use pattern of this sort which occurred in other parts of the world with an agricultural village in Sicily as the main example. The farmers of this village planted the crops so that those requiring the fewest man-days of labor were planted the farthest from the village. Within the thesis, this type of land use pattern is designated as a care-intensity pattern and is based on the amount of care required by each crop.

To help determine how distance is used by the farm operator, several factors were examined through the use of a questionnaire. These factors included the characteristics of the farmers, the characteristics of the farms, and the attributes sought by the farmers when acquiring a tract of land. The farmers were typical of Clay County farmers as a whole, and for much of the Great Plains generally. Their median age was greater than the

population of the nation--fifty-three years, as opposed to twenty-eight years. Many have been in farming all their lives. As is typical of Kansas agriculture, Clay County farmers' major source of farm income is derived from the sale of wheat and cattle. Other crops which are raised usually are fed to the livestock rather than sold on the market.

The typical Clay County farm has increased in size. Most of the land was settled in 80 or 160 acre homesteads shortly after the Civil War. During the decade 1890 to 1900, a severe drought and depression caused many farms to be abandoned or lost to a mortgage company. Farm sizes in Clay County have increased from 154 in 1890 to 433.5 acres in 1969. Although the initial increase in the farm sizes can be attributed to the loss of land by some and the acquisition of cheap land by others, later land acquisitions are based on an entirely different reason. The basis for recent land acquisitions, especially those after World War II, is the increasing cost of capital inputs (i.e., machinery and fertilizers), and the stabilized crop prices. Crop prices, until the past year, have remained almost at the same level since just after World War II. Heady, and others, have stated the problem of increased costs and stable prices to be caused by too much capital investment for the amount of land and labor used in farming operations.[1] Because of the imbalance between capital, land, and labor, more land is required to keep up the profit level of the farmer. If labor and land were decreased in proportion to the amount of capital invested, farm sales would increase in value simply because the market would not be flooded with excess agricultural products. In this light, farm concentration can be seen as a response by farmers who wish to stay on the land, as the only means of increasing their farm earnings. In order to increase the land holdings of some, others must be forced to leave farming. This can be done in two ways: 1) the farmer can

be forced out of farming by economic conditions, or 2) the farmer may retire and lease or sell his land to those desiring more land.

This thesis was concerned with how farmers acquired land and how they learned it was available. The farmers were asked how they had originally acquired their farms. Only twelve percent of the farmers in the sample stated that they had inherited their farms. Whether or not some of the other farmers bought their farms from the estate of their families or bought the farm outright from an unrelated individual was not apparent. Further study in this area could dispel widespread fallacies about the nature of farm inheritance or it could cast doubt on the findings in this thesis. In any case, it is a fruitful area for investigation.

The characteristics of the land sought by farmers who are in the market for land to add to their farms are important to the understanding of land acquisition. Most everyone would agree that the farmers look for such attributes in land as the soil type, the crop yields, drainage, terracing, improvements, and crop or pasture land. These were all mentioned by the farmers of Clay County as some of the items to be inquired into before buying a tract of land. Price, of course, is also one of the determining factors in any sale or rental agreement. One factor which should be thought about before a tract of land is acquired is the location of the land in relation to the farmstead and the presently held land. Indeed, the farmers had some idea of the distance they would be willing to travel for more land, and how the land should be located in relation to the land that they already operate. The most desirable tract of land would be located on a dirt or gravel road with bridges large enough to handle modern equipment; it would be in the direction of town for the ease of transporting crops and livestock to market; and it would be within ten miles of the farmstead. Not all land will have all of

these characteristics, but a premium would be paid for land which did have them.

From the standpoint of this thesis, the most important characteristic of an available tract of land is the distance and location of the land from the farmstead and other presently held land. Farmers were willing to travel from one-half to thirty miles for another tract of land. The median distance obtained was 8.3 miles. Because the median distance revealed by the survey was only eight miles, many of the farmers must be cognizant of the time and costs involved in moving farm machinery to their farthest field. Even though farmers seem to be cognizant of distance and its relation to costs of production, only a weak positive correlation was obtained between the size of the farm operated and the distance that a farmer would be willing to travel to the fields. The assumption was that the larger the operation, the farther the operator would be willing to travel. The only positive result obtained from the data was a chi square in which the associations were set up as near and far distances, under and over eight miles, respectively, and large and small holdings, which were over and under 200 acres. In this test, it was established at the 0.1 level of significance that small farm operators were less willing to go long distances to acquire new tracts of land than were large operators. There is a need for more study of this facet of acquisition to clarify the relationship between distance and the size of the current farm operation. Additional research is warranted in Kansas and the United States before any sweeping generalizations are made concerning the willingness of farm operators to travel various distances for land. This thesis merely opens a door for further research.

Many of the farm operators in the sample replied that they were not in the market for more land. This reluctance to acquire more land can be attri-

buted to the age of the sample population and also to the high price of land, although many farmers stated that they did not want to rent or buy more land. Renting land can be considered an alternative to buying land if the farmer cannot raise ample credit for the purchase price or if he does not wish to be saddled with debt. Even though a majority of the farmers (52%) said that they were not in the market for land, nearly all of them stated that they would consider buying the neighbor's farm if it went up for sale. The explanation indicated is that the acquisition of adjoining property would optimize the efficiency of the farming operation.

As was pointed out above, the farmers had no great desire to travel long distances to acquire more land and when the neighbor offers his land for sale it would be the ideal opportunity to add land close to that which is already worked. Two theories were introduced that help explain the desire to acquire closely associated parcels of land. The first is by Chisholm, and is the theory of Economic Rent. Simply stated, the theory says that the economic value of a tract of land is decreased as the distance from the farmstead is increased. If scattered parcels of land can be consolidated into a single holding or several closely spaced holdings, then the economic value of the land is increased and the profits obtainable from the land are increased. The second theory applicable to this situation is expressed by Janelle as time-space connectivity. The time-space connectivity of a place is its utility in relation to the location to other places. In other words, the farther a place is from other places, the less its utility to them will be. Therefore, the farther a tract of land is from the farmstead, the less utility it will have to the farmer because of the extra time and cost involved in traversing the distance between the two places. If the neighbor's farm were bought, then the farther removed plots of land could be sold or the

leases could be dropped. Thus the economic rent and the time-space connectivity would be optimized.

Distance alone is not the only factor affecting whether or not a tract of land will be acquired. A farther removed parcel may be considered and acquired if the amount of land involved is sufficient to make farming profitable after hauling equipment a longer distance. In the survey, the farmers were asked what size a tract of land would have to be to make it attractive to them at the farthest distance that they were willing to travel. Again, only a weak positive association was observed. The most uniform responses were given by those willing to travel only a short distance. These farmers generally agreed that 80 to 160 acres would be adequate if one travelled no more than ten miles for additional land. Those who were willing to travel more than ten miles for land showed less agreement on the size of the tract needed. Anywhere from 80 to 320 acres were deemed necessary to make the journey to the field worth the while of the farmer. This second group of farmers who are willing to travel over ten miles for land are the ones that weakened the correlation trend. This problem requires more study, from the local to the national level, before any clear association can be firmly established.

Many results of this thesis are tentative. It is an unfortunate fact that time and money were not in sufficient supply to make the study broader in scope and include more counties in Kansas. Though the area covered by the survey was narrow, the conclusions drawn herein can be of aid to the researcher who is studying the problems and effects of farm concentration. Economists have viewed the concentration movement from several angles which have included distance in a scale economies problem, but never have they examined the

problem of distance as part of the place utility function of a tract of land. Hopefully, this approach to the subject area of farm consolidation will shed new light on the problem and aid the farmer in making locationally wise decisions when acquiring a tract of land. These decisions can increase the economic viability of the farms involved and in turn that of the nation.

## FOOTNOTES

1. Heady, et al., The Roots of the Farm Problem, p. vi.

# APPENDIX A -- QUESTIONNAIRE

## BACKGROUND

1. Name
2. Township of residence
3. Age
4. How many years have you been in farming?
5. How long have you lived in this area?
6. Where did you come from originally?
7. Did you inherit your farm?
8. How many acres did you inherit or begin farming with?
9. How many acres are in *your farm now*?

| | | | |
|---|---|---|---|
| acres owned | _____ | crop | _____ |
| acres rented | _____ | pasture | _____ |
| | | waste | _____ |
| | | farmstead | _____ |

10. From what source do you receive the greatest portion of your farm income?

## ARRANGEMENT OF LAND

11. How far is your farmstead (house, barn & equipment) from your farthest field?
12. What is the average time it takes to get equipment to the farthest field on your farm?
13. What type of crops do you plant in that field?
14. Is distance a factor in choice of the crops planted?
15. Have those crops always been planted in that field?
16. What type of crops do you plant in your nearest field?

17. Are all parts of your farm equally easy to get to?

18. Can you list any ways that would make all parts of your farm easy to get to?

19. Sketch the arrangement of your fields and indicate your farmstead.

## THE LAND MARKET

20. Are you in the market for more land?

21. Would you consider buying land if the neighbor's farm went up for sale?

22. Do you usually know when farms are for sale in the area?

most always _____ sometimes_____ seldom _____

23. How do you learn about land that is for sale?

24. Would you prefer to rent more land rather than buy it?

25. Are you trying to sell land?

## BUYING/RENTING LAND

26. If you were in the market for buying land, what characteristics would you look for?

soil type _____ pastureland _____

drainage _____ cropland _____ other_____

crop yields _____ speculation _____

27. Would these be the same if you were renting land? If no, what would the difference be?

28. Is a good road important for access to fields? To town?

29. What is the worst type of road that you would accept?

dirt _____ Gravel _____ Black-top _____

30. Would a good road be more or less important if you were renting the land?

31. Would nearness to town be an important factor when you consider another tract of land?

32. What is the maximum distance you would be willing to travel to acquire another tract of land?

33. How many acres would you need to make a tract of land attractive at the given miles?

34. Would the use to which the land is put make a difference in how far you would be willing to travel? If yes, what would the difference be?

35. Would these vary for rented land or remain the same? If yes, how would they vary?

# APPENDIX B

## SUMMARY OF STATISTICS

Age:

| | |
|---|---|
| Mean | 53.09 years |
| Median | 53.00 |
| Mode | 52.50 |
| Standard Deviation | ± 0.07 |
| Range | 23 to 90 |

Length of Residence in Area:

| | |
|---|---|
| Mean | 44.38 |
| Median | 48.38 |
| Mode | 54.00 |
| Standard Deviation | ± 0.001 |
| Range | 5 to 85 |

Years in Farming;

| | |
|---|---|
| Mean | 39.2 |
| Median | 37 |
| Mode | 27.8 |
| Standard Deviation | ± 4.0991 |
| Range | 4 to 83 |

Inherited part of or all of farm:

| | |
|---|---|
| Yes | 12 or 25.5% |
| No | 35 or 74.5% |

Size of Farm when began Farming:

| | |
|---|---|
| Mean | 230.2083 acres |
| Median | 126.32 |
| Mode | 100.00 |
| Standard Deviation | ± 0.01 |
| Range | 12 to 3,000 |

Acres Operated Currently:

| | |
|---|---|
| Mean | 687.5 |
| Median | 556.75 |
| Mode | 160.00 |
| Standard Deviation | ±322.11 |
| Range | 30 to 3,000 |

Acres Owned:

| | |
|---|---|
| Mean | 311.4583 |
| Median | 300.00 |
| Mode | 160.00 |
| Standard Deviation | ± 3.8855 |
| Range | 0 to 1,300 |

Acres Rented:

| | |
|---|---|
| Mean | 464.5833 |
| Median | 133.33 |
| Mode | 100.00 |
| Standard Deviation | ± 0.0223 |
| Range | 0 to 3,000 |

Acres in Crops:

| | |
|---|---|
| Mean | 454.1667 |
| Median | 342.85 |
| Mode | 366.67 |
| Standard Deviation | ± 0.0223 |
| Range | 0 to 1,800 |

Acres in Pasture:

| | |
|---|---|
| Mean | 227.0833 |
| Median | 141.17 |
| Mode | 100.00 |
| Standard Deviation | ± 2.5338 |
| Range | 0 to 1,200 |

Number of Separate Tracts per Farm:

| | |
|---|---|
| Mean | 3 |
| Median | 2 |
| Mode | 1 |
| Range | 1 to 10 |

# BIBLIOGRAPHY


1. Ball, A. Gordon, and Heady, Earl O., eds. Size, Structure, and Future of Farms. Iowa State University Center for Agricultural and Rural Development, Ames: Iowa State University Press, 1972.

2. Berends, H. A. "A Study of the Farm Real Estate Market in Kansas." Unpublished master's thesis, Kansas State University, 1958.

3. Blalock, Hubert M. Social Statistics. New York: McGraw-Hill, 1960.

4. Chisholm, Michael. Rural Settlement and Land Use: an Essay in Location. New York: John Wiley and Sons, Inc., 1962.

5. Elliot, Elinor A. "The Metamorphosis of the Family Farm in the Republican Valley Country of Kansas, 1860-1960." Unpublished master's thesis, Kansas State University, 1966.

6. Fenneman, Nevin M. Physiography of Western United States. New York: McGraw-Hill Book Co., Inc., 1931.

7. Hart, John Fraser. "The Changing American Countryside." Problems and Trends in American Geography. Edited by Saul B. Cohen. New York: Basic Books, 1967.

8. Heady, Earl O.; Haroldson, Edwin O.; Mayer, Leo V.; and Tweeten, Luther G. Roots of the Farm Problem: Changing Technology, Changing Capital Use, Changing Labor Needs. Iowa State Center for Agricultural and Economic Development, Ames: Iowa State University Press, 1965.

9. Historical Plat Book of Clay County, Kansas, with Illustrations. Chicago: The Bird and Mickle Map Co., 1881.

10. Hunt, Charles B. Physiography of the United States. San Francisco: W. H. Freeman and Co., 1967.

11. McCarty, Harold H. "Agricultural Geography." American Geography, Inventory and Prospect. Edited by Preston E. James and Clarence F. Jones. Published for the Association of American Geographers by Syracuse University Press, 1954.

12. Kellogg, M. Charles. "Farm Operator Turnover and Resource Adjustments in Selected State Economic Areas of Kansas." Unpublished master's thesis, Kansas State University, 1969.

13. Kraenzel, Carl F. The Great Plains in Transition. Norman: University of Oklahoma Press, 1955.

14. McKee, Vernon C. "An Analysis of the Farm Real Estate Market in Clay and Dickinson Counties, Kansas, 1956." Unpublished master's thesis, Kansas State University, 1957.

15. Ottoson, Howard W.; Birch, Eleanor M.; Henderson, Philip A.; and Anderson, A. H. Land and People in the Northern Plains Transition Area. Lincoln: University of Nebraska Press, 1966.

16. Russell, Ione Dawes. "Clay County Scrap Book, from Various Sources and from Memory." Two vols. Unpublished manuscript prepared in the late 1950's, Clay Center, Kansas.

17. Socolofsky, Homer E., and Self, Huber. Historical Atlas of Kansas. Norman: University of Oklahoma Press, 1972.

18. _____. Kansas History in Graduate Study: A Bibliography of Thesis and Dissertations. Topeka: Kansas State Historical Society, 1970.

Periodicals

19. Barnes, Peter. "Land Reform." The New Republic, CLXIV (June 5-19, 1971).

20. Borchert, John R. "Climate of the Central North American Grassland." Annals of the Association of American Geographers, XL, 1 (1950), pp. 1-39.

21. _____. "The Dust Bowl in the 1970's." Annals of the AAG, LXI, 1 (1971), pp. 1-22.

22. Dean, Alfred; Aurbach, Herbert A.; and Marsh, C. Paul. "Some Factors Related to Rationality in Decision Making Among Farm Operators." Rural Sociology, XXIII (June, 1958), pp. 121-135.

23. Demko, Donald, and Briggs, Ronald. "A Model of Spatial Choice and Related Operational Considerations." Proceedings of the AAG, III (1971), pp. 49-52.

24. Dovring, Folke. "Distribution of Farm Size and Income: Analysis by Exponential Functions." Land Economics, XLIX (May, 1973), pp. 133-147.

25. Goldschmidt, Walter R. "Some Evidence on the Future Pattern of Rural Settlement." Rural Sociology, VIII (December, 1943), pp. 387-395.

26. Hoover, Dale M. "The Computation of Returns on Agricultural Real Estate, 1940-1960." Land Economics, XLI (February, 1965), pp. 81-86.

27. Hudson, John C. "A Location Theory for Rural Settlement." Annals of the AAG, LIX (June, 1969), pp. 365-381.

28. Hulbert, Virgil L. "Theory of Supply of Farm Land." Land Economics, XXXIV (May, 1958), pp. 161-167.

29. Institute for Social and Environmental Studies. Kansas Statistical Abstract, 1972. Lawrence, Kansas: University of Kansas Press, 1973.

30. Janelle, Donald G. "Spatial Reorgainzation: A Model and Concept." Annals of the AAG, LIX (June, 1969), pp. 348-364.

31. Kollmorgan, Walter M, and Jenks, George F. "A Geographic Study of Population and Settlement Changes in Sherman County, Kansas." Three parts. Transactions of the Kansas Academy of Science, LIV and LV (1951 and 1952), pp. 449-494, 1-37.

32. _____, and Simonett, David S. "Grazing Operations in the Flint Hills-Bluestem Pastures of Chase County, Kansas." Annals of the AAG, LV (June, 1965), pp. 260-290.

33. Lewis, G. M. "Changing Emphasis in the Description of the Natural Environment of the American Great Plains." Transactions of the Institute of British Geographers, XXX (1962), pp. 75-90.

34. Mather, E. Cotton. "The American Great Plains." Annals of the AAG, LXII (June, 1972), pp. 237-257.

35. Milk, Richard G. "The New Agriculture in the United States: A Dissenter's View." Land Economics, XLVIII (August, 1972), pp. 228-239.

36. Shoewe, Walter H. "The Geography of Kansas." Transactions of the Kansas Academy of Science, LII (1949), pp. 261-333.

37. Sutton, Imre. "Land Tenure in the West: Continuity and Change." Journal of the West, IX (January, 1970), pp. 1-23.

38. Weber, Clement. "The Flora of Clay County, Kansas." Transactions of the Kansas Academy of Science, XXXIII (1930), pp. 87-106.

39. Wishart, David J. "The Changing Position of the Frontier of Settlement on the Eastern Margins of the Central and Northern Great Plains, 1854-1890." Professional Geographer, XXI (May, 1969), pp. 153-157.

Monographs

40. Bidwell, O. W. Major Soils of Kansas. Department of Agronomy, No. 551, Manhattan, Kansas: Agricultural Experiment Station, Kansas State University, July, 1956.

41. Flora, Cornelia. Migration in Kansas. Contribution No. 31. Department of Sociology and Anthropoloty, Population Research Laboratory, Manhattan, Kansas: Agricultural Experiment Station, Kansas State University, 1971.

42. Madden, J. Patrick. Economies of Size in Farming, Theory, Analytical Procedures, and a Review of Selected Studies. Agricultural Economic Report No. 107, Economic Research Service, U.S. Department of Agriculture. Washington, D. C.: Government Printing Office, 1967.

43. Marschner, F. J. Land Use and Its Patterns in the United States. Agricultural Handbook No. 153, U.S. Department of Agriculture. Washington, D.C.: Government Printing Office, 1959.

44. Muilenburg, Grace. The Kansas Scene. State Geologic Survey of Kansas. Lawrence, Kansas: University of Kansas Press, 1953.

45. Raup, Philip M. Economies and Diseconomies of Large-Scale Agriculture. Paper No. 7044, Minnesota Agriculture Experiment Station Scientific Journal Series, 1970, pp. 1274-1283.

46. Thornthwaite, C. Warren. "Climate and Settlement in the Great Plains." Climate and Man, Yearbook of Agriculture, 1941. U.S. Department of Agriculture. Washington, D.C.: Government Printing Office, 1941.

47. Thorp, James; Davis, R. H.; and Lyons, Eugene S. Soil Survey of Clay County, Kansas. U.S. Department of Agriculture, Bureau of Chemistry and Soils, No. 26, Series 1926. Washington, D.C.: Government Printing Office, 1926.

48. United States Department of Agriculture, Soil Conservation Service, and the Kansas Agricultural Experiment Station. Physical Land Conditions Affecting Use, Conservation, and Management of Land Resources, Clay County, Kansas. Manhattan, Kansas: August, 1950.

49. U.S. Department of Commerce, Bureau of the Census. United States Census of Agriculture, 1910, 1930, 1950, 1959, and 1959.

50. _____. United States Census of the Population, 1910, 1930, 1950, 1960, and 1970.

51. U.S. Department of the Interior, Office of the Census. United States Census of Population, 1880, 1890, and 1900.

52. Barlow, Raleigh, and Libby, Lawrence. "Policy Choices Affecting Access to Farmland." Who Will Control U.S. Agriculture? Policies Affecting the Organizational Structure of U.S. Agriculture. University of Illinois at Urbana-Champaigne, Extension Service, Special Publication 27. Urbana, Illinois: August, 1972, pp. 23-28.

53. Breimeyer, Harold F., and Barr, Wallace. "Issues in Concentration Versus Dispersion." Who Will Control U.S. Agriculture? Policies Affecting the Organizational Structure of U.S. Agriculture. University of Illinois at Urbana-Champaigne, Extension Service, Special Publication 27. Urbana, Illinois: August, 1972, pp. 13-22.

54. Wunderlich, Gene. "Concentration of Land Ownership." Journal of Farm Economics, XL (1958), pp. 1887-1893.

# DISTANCE AS A FARM MANAGEMENT PROBLEM

by

MARNA J. LINTNER

B. S., Carroll College, 1972

---

AN ABSTRACT OF A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF ARTS

Department of Geography

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1974

Distance as a factor in farm management is the major problem examined in this thesis. After reviewing the literature, several questions were suggested. Among these were: what is the distance from the home farm which a farmer would be willing to travel to acquire more land; would this distance affect the cropping patterns of farms with more extensive land uses being located further from the farmstead; and, would a parcel's location to a town and roads have an effect on the acquisition process? Forty-eight farmers (five percent of the 914 farm operators) in Clay County, Kansas, responded to a questionnaire concerning their perception of the influences of distance on land acquisition and use.

Farmers were asked to state the distance from the farmstead that they would be willing to travel for land. The distances ranged from one-half to 30 miles with a median of eight miles. Many farmers added that they would be willing to travel farther for pastureland than cropland. The farmers then stated a minimum tract size, which ranged from 80 to 320 acres, that they thought would be necessary to make farming the newly acquired land profitable.

The questionnaire data were subjected to correlation-regression analysis at one step in the inquiry. Size of the farmer's current operation with the distance that he would be willing to travel to acquire more land was assessed. Small operators were found to be less willing to travel more than ten miles for land than were the large operators. Second, the distance that farmers were willing to travel for land with the minimum tract size stated by the farmer was analyzed. Best fits were observed for farmers who desired shorter distances (under ten miles) and small tract sizes (under 160 acres). Farmers who were willing to travel more than ten miles for land generally required more than 160 acres, but individuals would be satisfied with tracts ranging from 80 to 320 acres.

Distance as a factor in relation to crop patterns was also studied. Where crops were planted--whether nearer the farmstead or farther away from it--was viewed as a problem of place utility. The utility of a field becomes greater the nearer it is to the farmstead, with crops requiring the most care usually planted nearest to the center of the farming operation. This type of place utility is an expression of the von Thünen theory. The farmers in Clay County, Kansas, were found to practice this type of cropping pattern. Only 12 percent of the farmers stated that crop care was considered when planting a crop.

Town and roads in relation to a tract of land were factors to be considered when acquiring land, but they were not determining factors. Farmers stated they would like to be near town for ease in marketing their produce, but to most farmers a few extra miles would not be critical. More important to the farmer than a good road was the size of bridges. Most farmers would acquire land on dirt roads if the bridges were large enough to handle modern equipment.

Although farmers seem to be cognizant of distance as a factor in management decisions, they could become more aware of the exact role which distance plays. Examination of farmers' responses indicates a regularity or pattern in the land acquisition process. Farmers did plant their fields in such a way that the extensive land uses would be further from the farmstead, but not on a conscious level. Chi square analysis yielded weak but positive associations. Because these relationships are weak, one cannot state that farmers realize that distance can be equated with time and money in the von Thünen sense.