

South Dakota State University  
**Open PRAIRIE: Open Public Research Access Institutional  
Repository and Information Exchange**

---

Bulletins

South Dakota State University Agricultural  
Experiment Station

---

1-1-1980

## Changing Farm Numbers

K. A. Carter

R. M. Dimit

Follow this and additional works at: [http://openprairie.sdstate.edu/agexperimentsta\\_bulletins](http://openprairie.sdstate.edu/agexperimentsta_bulletins)

---

### Recommended Citation

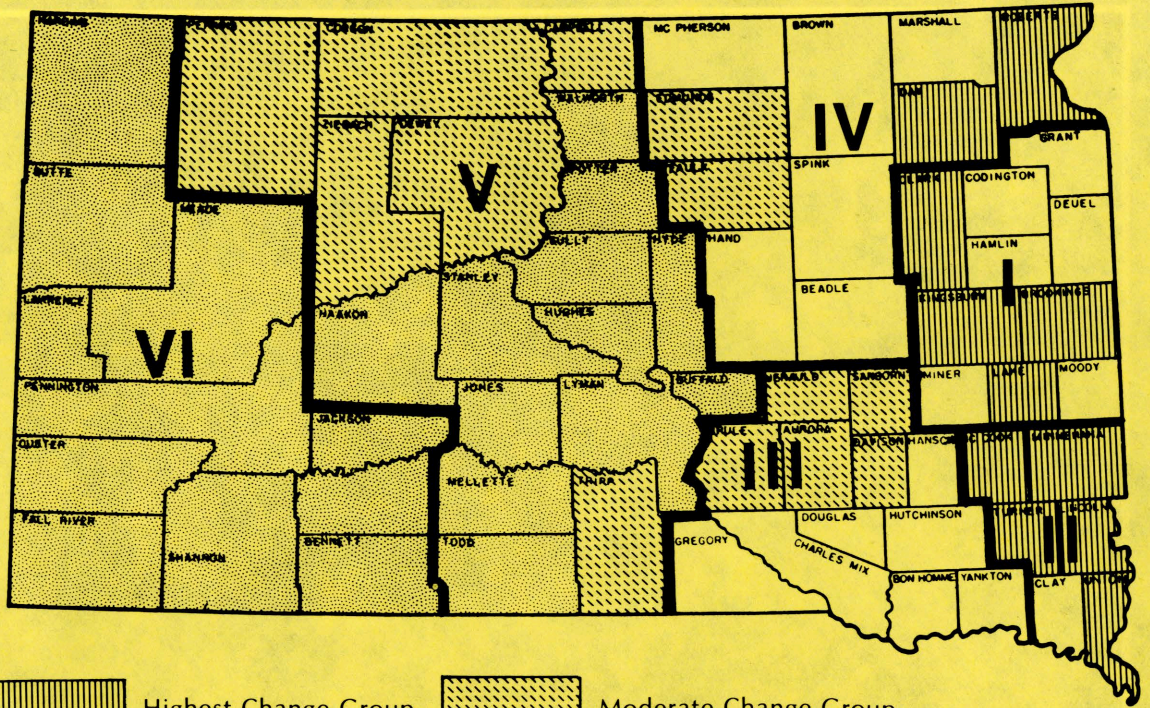
Carter, K. A. and Dimit, R. M., "Changing Farm Numbers" (1980). *Bulletins*. Paper 665.  
[http://openprairie.sdstate.edu/agexperimentsta\\_bulletins/665](http://openprairie.sdstate.edu/agexperimentsta_bulletins/665)

This Bulletin is brought to you for free and open access by the South Dakota State University Agricultural Experiment Station at Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange. It has been accepted for inclusion in Bulletins by an authorized administrator of Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange. For more information, please contact [michael.biondo@sdstate.edu](mailto:michael.biondo@sdstate.edu).

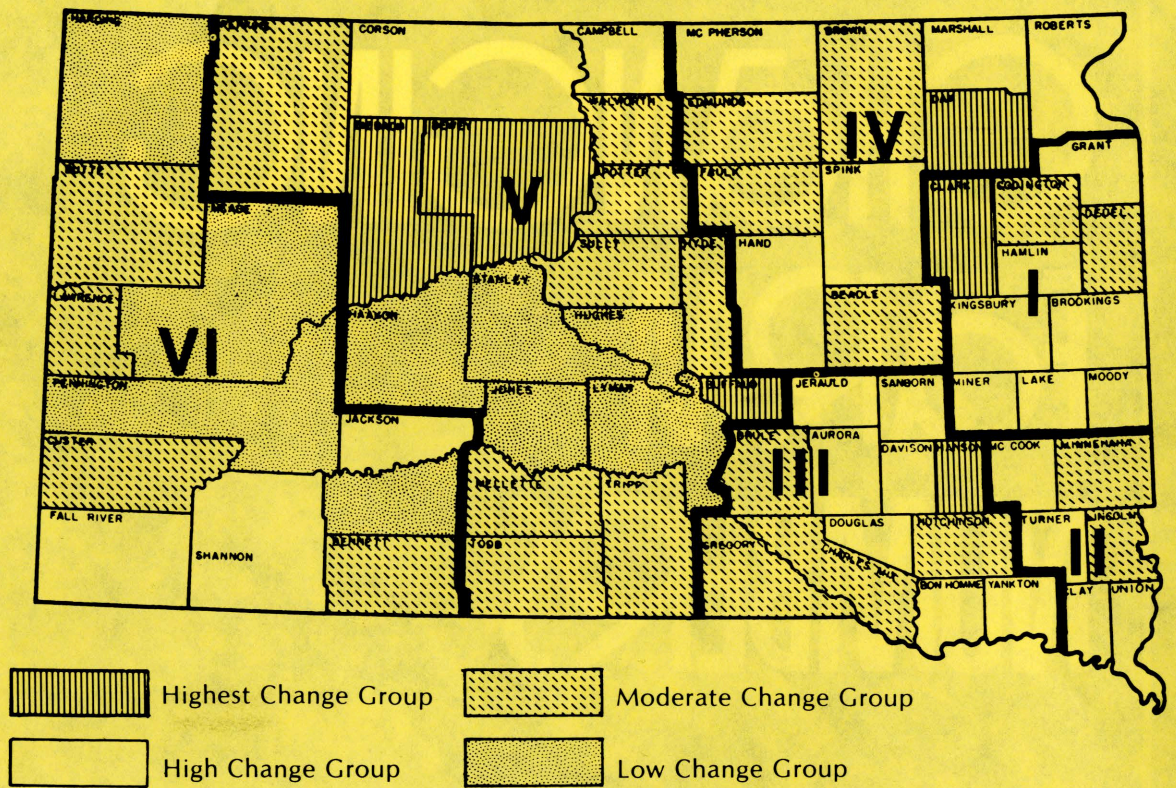
B 660

# CHANGING FARM NUMBERS





**Map 1.** Magnitude of change in the number of farm units between 1959 and 1969 in South Dakota counties.



**Map 2.** Percent change in the number of farm units between 1959 and 1969.



# CHANGING FARM NUMBERS

---

Keith A. Carter and Robert M. Dimit  
Rural Sociology Department, SDSU

## INTRODUCTION

South Dakota is a rural state with agriculture as its major industry. The number of farms in the state has been declining, but the number of acres in farms has shown an increase. United States Bureau of the Census reports indicate that between 1935 and 1970, the number of South Dakota farms declined from 83,303 to 45,726, representing an annual average decrease of more than 1,000 farm units (U. S. Bureau of the Census, 1969: 2). During this period, the total number of acres in farms has increased from slightly over 37 million acres to about 45.5 million acres (U. S. Bureau of the Census, 1969: 2). Recent figures demonstrate that the number of farms continued to decline to 43,500 for 1974, and preliminary estimates show the number of farms in South Dakota to be 43,000 in 1975 (South Dakota Crop and Livestock Reporting Services, 1975: 3). These data indicate that while these farms as individual operating units are disappearing, the land is being added to other units and continues to be used for agricultural purposes.

Much speculation has occurred regarding those who leave farming. The idea has been advanced that these are mostly marginal farmers who could not effectively compete in today's economy. Others have assumed that these are primarily farmers who have reached retirement age and have moved into rural towns or county seat towns to live out their retirement years. Another view is that these are farmers in productive working years who have been attracted to nonagricultural job markets by higher wages or income potential and are moving to the urban and industrial centers.

### Statement of the Problem

Much research on the change in the number of farm units has been concerned with rural-to-urban migration of farm youth. Considerable information is available on the socioeconomic characteristics of the migrant youth and their occupational and educational aspirations. Some

research has been concerned with the retirement plans of farmers.

However, little research data are available concerning farm or ranch operators who are selling their farming operations and thus affecting the number of farm units in the area. The major focus of this study is to explain the change in the number of farm units by investigating changes in other demographic factors of the area.

Thus, the changes in the number of South Dakota farm units and speculation regarding these changes suggested the following: What is the extent of change in the number of South Dakota farm units by county, and what sociodemographic factors are associated with this change?

### Importance of the Problem

Movement of farm families into nonfarm occupations and residential settings is not a recent phenomenon; it has been a continual process since our country was founded. The percentage of population living on farms has shown almost a steady decline since the first census of 1790, and the absolute number of people on farms has declined steadily since 1935 (Guither, 1965: 173). Census figures demonstrate general trends, but they tell nothing about families who leave farming, about factors influencing this move, or about the effect on their communities.

Such information is relevant to economic adjustment in the farm sectors, manpower retraining needs, and integration of the farm migrant into new social systems, but there have been few studies of persons who have transferred from farm to nonfarm employment (Bultena, 1969: 563). Numerous studies have dealt with the migration problems of farm youth to cities, of transient labor, and of retiring labor; but relatively few studies have dealt with the movement of established farmers from agriculture and the community factors that may be affecting this process.

Some researchers have stressed that this is a selective process (Bogue, 1969: 753). This movement of people off farms is not a mass migration but only a movement of persons with particular



characteristics. If the factors associated with this process could be identified, the work of people concerned with adjustments in the rural areas would be made easier.

Another way to understand the importance of farm-to-nonfarm movement is to examine the costs involved. Three broad categories of costs are obvious (Maddox, 1960: 395). First, there are costs to the farm people who move. Not only monetary costs, but also subjective and psychological costs—with personal and social implications which occur. Second, there are costs to areas from which farm people move. As population declines, the tax income for the area may decline, making the per capita costs of maintaining essential public services increase. Finally, there are costs to the areas to which farm people move.

While numerous researchers point to the lack of research on the movement of farm families, those studies concerned with this process appear inadequate (Bultena, 1969: 563). Many studies of farm family movement have failed to distinguish between those who left the farm as young people and those who moved as part of an occupational change. Much of the previous research is based upon samples obtained from metropolitan areas, with little attention to those locating in smaller centers. This shortcoming may be important if the majority of people leaving the farm move to smaller centers. Several studies have dealt with movement plans of farmers rather than the characteristics of ex-farmers. The few studies which have dealt with ex-farmers have used small samples, or haven't distinguished between persons retiring from farming and those transferring into nonfarm employment.

While this study does not focus on the actual individuals who are selling their farming units, it will profile the types of areas that have been experiencing large changes in the number of farm units. This profile will provide information to persons concerned with this problem, and help determine which areas of the state may experience further changes in the number of farm units. Such information should aid planning for the economic and social implications of changing numbers of farm units for an area, and will help planners understand the factors that influence changes in the number of farm units.

### Objectives of the Study

Objectives of the study are to determine:

1. the extent of the change in the number of farm units by county in South Dakota, and
2. the association between the change in the number of farm units and selected sociodemographic factors.

This section reviews other studies associated with farmers leaving their occupation. Although this study does not involve interviewing farmers, other studies using the interview technique provide information useful in selecting those sociodemographic factors that may explain the change in the number of farm units.

The Agricultural Experiment Station at Mississippi State University conducted a study of Alcorn County, Mississippi, in which a sample of farmers were interviewed in 1955, and the same sample reinterviewed in 1958. A comparison was made between those still farming and those who were in nonfarm occupations at the end of that period. Some of the findings pertinent to this study included:

1. Farmers most likely to leave tended to be the younger and the older farmers rather than those in the middle age range.
2. Farmers who shifted to nonfarm occupations tended to have lower levels of education than those who remained in farming.
3. Farmers leaving farming tended to be poorer managers of their farming operations (quality of management based upon use or nonuse of 12 recommended practices for that area).
4. The transition from farm to a nonfarm occupation involves, first, obtaining employment to supplement the farm income; second, the farm income supplementing the nonfarm income; and, finally, stopping farming altogether (Baird and Bailey, 1958: 4-5).

An article, "Potential Mobility in Agriculture: Some Reasons for the Existence of a Labor-Transfer Problem," by H.W. Baumgartner (*Journal of Farm Economics*, February, 1965) was based upon a study of farm operators in Minnesota and was concerned with potential mobility among farmers. Baumgartner found that farmers with non-farm work experience, and who had moved from the farm at some time, were less likely to move again. Baumgartner also found that favorable attitudes toward farming were associated with low potentials for moving.

The New Hampshire Agricultural Experiment Station published the bulletin, "Factors Influencing the Attitudes of Farmers toward Migration Off Farms," by J.R. Bowring and O.B. Durgin. Findings of this study indicate no significant relationship between migration off farms and the variables of income, age, education, amount of farm improvements, community participation, and farm indebtedness. Bowring and Durgin concluded that many of the factors commonly assumed to affect the rate of migration do not provide sufficient explanation of the migration process from farms.



An article, "Factors Influencing Farm Operators' Decisions to Leave Farming," by Harold D. Guither (**Journal of Farm Economics**, August, 1963) was based on a study of farmers who had left farming between October, 1960, and March, 1961, in central and northern Illinois. Guither found that the only significant difference between those who left farming and the total population was in the amount of off-farm work for the farm operators and their spouses. He also found that the majority of those leaving farming did so voluntarily; only a minority of the farmers leaving farming were forced to this action due to such factors as health, low income, and heavy debt. A majority of the farmers leaving farming had considered such action for more than one year and had not left farming sooner because of one or more of the following reasons.

1. They hoped the problem might improve.
2. The present situation had not existed earlier.
3. Sale of farm or lease termination did not occur prior to this year.
4. Attractive job or business opportunity came at this time.
5. The operator was not eligible for social security until reaching age 65.

Concerning reasons for leaving farming, Guither found that the reasons generally fell into the following categories:

1. financial problems
2. tenure problems
3. physical health
4. retirement age
5. family and similar problems (Guither, 1963: 567-576).

Another article in the **Journal of Farm Economics**, "Characteristics of the Farmers Leaving Agriculture in an Iowa County," by Lowell D. Hill concluded that the factors influencing farmers to leave agriculture were income, health, quality of farm facilities, and availability of credit. (Hill, 1962: 421).

A study completed in Poland and reported in **Studia Socjologiczne** in 1961 was "Factors of Occupational Stability and Activeness among Farmers on Private Farms" by Wacaw Makarczyk. An individual's social status and his attraction to farming were found to be associated with occupational stability for the farmers in the sample (Makarczyk, 1968: 289).

The results of another study were published in August, 1961, in the **Journal of Farm Economics**. The findings are contained in an article entitled, "Factors Related to Leaving Farming," by Prodipto Roy. The results of the study were all negative in that there was no significant association between aspirations to leave farming and farm performance, the socioeconomic factors of age, education, level of living, family income, and the amount of nonfarm occupational affiliations (Roy, 1961: 670-672).

Another study relevant to this research was published as a bulletin for the Nebraska Agricultural Experiment Station. The study by Roger Willsie was conducted in six counties of Nebraska and was concerned with the characteristics of farmers selling their farms, their reasons for selling, the extent of off-farm employment while farming, and the future plans of the seller. The major distinguishing characteristic of the individuals selling their farms was that the average farm size of the sellers was less than the average size of all farms. The major reasons given for selling the farms were financial difficulty, drought, and better opportunities outside of agriculture. It was also reported that farmers selling their farms frequently had off-farm employment prior to selling their farms. Finally, Willsie reported that the future plans of those leaving agriculture varied considerably by destination and displayed no apparent pattern (Willsie, n.d.: 5-12).

This review has shown that past studies are in considerable disagreement concerning the factors associated with farmers and ranchers leaving agriculture. Perhaps the state of our knowledge concerning this problem was best stated in **Principles of Inductive Rural Sociology**. There are certain kinds of selectivity of migration by age, by sex, by racial background, and by ethnic background; however, "...the relationships between other kinds of characteristics and rates of migration are not sufficiently known to enable many accurate conclusions to be drawn. The work necessary to deal definitively with these matters remains to be done" (Smith and Zopf, 1970: 97).

It is evident that past studies have assumed that characteristics of both farmers and their farms are important factors to be considered in a study of the change in number of farm units in an area.

## DESIGN OF THE STUDY

The demographic and socioeconomic information used for this study was derived from the 1969 and 1959 Censuses of Agriculture and the 1970 and 1960 Censuses of Population. Two assumptions were made regarding these data. It is assumed that census data (1) would represent the entire population of inquiry, and (2) would contain negligible error.

The change in the number of farm units for each county was defined as the difference in number of farm units in 1969 from 1959 in the counties of South Dakota.

The Census of Agriculture defines a farm unit as either a place of less than 10 acres if the sales of the agricultural products amounted, or normally would amount, to at least \$250 or a place of 10 acres or more if the sales of agricultural



products for the year amounted, or normally would amount, to at least \$50 (U.S. Bureau of the Census, 1969, p. V).

## OBJECTIVE ONE

The first objective was to determine the magnitude and variation in the change in number of farm units by county in South Dakota. For this objective, the county was the unit of analysis because census data relevant to the population are available on the county level.

All values were coded by county using standard coding procedures.

Using the coded data, descriptive rank-order tables were prepared for the extent of the change in number of farm units in the counties and for the percent change in the number of farm units in the counties.

Rank-ordered counties were classified into categories of various levels of change in number of farm units in the counties.

To attain classification according to the actual change in the number of farm units for counties, the following steps were performed:

1. The average change in the number of farm units per county for the State as a whole was calculated.
2. This average change in the number of farm units was inserted into the rank-order array, thereby dividing the array into two segments.
3. The range for both the upper segment and the lower segment of the array was determined by calculating the difference between the upper limit score and the average and the difference between the lower limit score and the average.
4. These two segments of the array were then each divided in half resulting in four quartiles of the array.
5. All counties in the upper quartile were labeled as the "highest change group," those in the upper-middle quartile as the "high change group," those in the lower-middle quartile as the "moderate change group," and those in the lower quartile as the "low change group."

To attain classification according to the percent change in the number of farm units for counties, the same steps were followed except that the percent change for the state as a whole was used to divide the rank-ordered array into two segments.

The counties were then coded onto a state map according to the category into which they were selected.

After tabulating the change in the number of farm units by county, the data were analyzed on area bases such as East River South Dakota versus West River South Dakota, or such as the six South Dakota Planning Districts.

## OBJECTIVE TWO

Objective two of the study was to determine the association between the change in the number of farm units and selected sociodemographic factors. As with objective one, the county was the unit of analysis.

The values for all independent variables were calculated according to the change in number in the values of those variables between 1959 and 1969 for the Census of Agriculture and between 1960 and 1970 for the Census of Population. The independent variables were the change in:

1. Total county population.
2. Number of rural farm population.
3. Number of rural nonfarm population.
4. Population density per square mile.
5. Median school years completed (persons 25 years old and over).
6. Median income for families.
7. Number of families with income of less than \$3,000.
8. Farm operators under 25 years of age.
9. Farm operators 25 to 34 years.
10. Farm operators 35 to 44 years.
11. Farm operators 45 to 54 years.
12. Farm operators 55 to 64 years.
13. Farm operators 65 years and over.
14. Average age of all farm operators.
15. Number of farm operators reporting days of off-farm work.
16. Farm operators reporting 100 or more days of off-farm work.
17. Acres of land in farms.
18. Average size of farm.
19. Average value of land and buildings per farm.
20. Average value of land and buildings per acre.
21. Acres of harvested cropland.
22. Acres of cropland used only for pasture or grazing.
23. Number of farms using irrigation.
24. Acres of irrigated land.
25. Number of class 1 farms: sales of \$40,000 and over.
26. Number of class 2 farms: sales of \$20,000 to \$39,999.
27. Number of class 3 farms: sales of \$10,000 to \$19,999.
28. Number of class 4 farms: sales of \$5,000 to \$9,999.
29. Number of class 5 farms: sales of \$2,500 to \$4,999.
30. Market value of all agricultural products sold.
31. Average market value of all agricultural products sold per farm.
32. Value of all crops sold.
33. Value of all livestock and livestock products sold.



The values for the dependent variable were the change in number of farm units for each county between the 1959 and 1969 Census of Agriculture.

### ANALYSIS METHOD

The method of analysis was the process Bogue terms, "ecological correlation," (Bogue, 1969: 537-538). Bogue states that as an explanatory device, ecological correlation involves the following process: "A set of areas may be adopted as units of observation. The phenomenon of population distribution is accepted as the dependent variable (Y), and the environmental or other observation for the same area is accepted as the independent variable (X). If we take observations concerning both X and Y for each area, we obtain a series of pairs of observations for the dependent and the independent variable. We may use conventional methods of statistical analysis, such as correlation and regression, to find out whether the two sets of observations do indeed covary in a nonrandom way" (Bogue, 1969: 537). The statistical analysis was forward solution multiple regression (see Appendix 1).

### FINDINGS

In South Dakota, the number of farm units changed from 55,727 in 1959 to 45,726 in 1969 for a net loss of 10,001 farm units during that time period. In Appendix II, counties are rank-ordered according to the change in number of farm units between 1959 and 1969. The change in the number of farm units for each county ranged from a loss of 379 farm units in Brookings and Roberts to a gain of two farm units for Pennington.

Following the methods specified earlier, Appendix II groups the rank-ordered counties into four categories: highest change group, high change group, moderate change group, and low change group.

The upper and lower limits for the change in the number of farm units were -379 to -265 for counties in the highest change group, -257 to -161 in the high change group, -147 to -90 in the moderate change group, and -72 to +2 in the low change group.

Of the 67 counties, the numbers and percentages where the size of change in the number of farm units between 1959 and 1969 were classified as highest, high, moderate, and low were 11 counties (16.4 percent) for highest, 20 counties (29.8 percent) for high, 13 counties (19.4 percent) for moderate, and 23 counties (34.3 percent) for the low change group.

In general, the data in Appendix II indicate considerable variation in the change in number of farm units between 1959 and 1969 in the counties in the State.

The variation of the change in number of farm units by geographic location in South Dakota is shown on Map 1. Map 1 was examined to determine the extent of change in the number of farm units by State Planning District (Table 1). Districts I, II, III, and IV show a high proportion of counties with change in the number of farm units classified as highest and high; six of six, ten of ten, seven of twelve, and eight of ten, respectively. However, Districts V and VI have no counties in the top three change categories.

Table 1: Number of Counties in Each Change Category, by Numerical Change and by State Planning District.

State Planning District	Change Category*			
	Highest	High	Moderate	Low
District I	4	6	0	0
District II	5	1	0	0
District III	0	7	5	0
District IV	2	6	2	0
District V	0	0	6	12
District VI	0	0	0	11

\* Classification according to numerical change of farm units.

Rather than simply examining the change in number of farm units, an examination of the percent change in number of farm units is necessary to gain further insight into the size and geographic variation in the change that has taken place. In other words, the question becomes: Are the counties showing the greatest change in number of farm units also the counties showing the greatest proportional change, or are these counties showing greater changes simply because they have greater total numbers of farm units at the beginning of the time period?

The state loss of 10,001 farm units between 1959 and 1969 equals a -17.95 percent change. Appendix III rank-orders counties according to the percent change in the number of farm units between 1959 and 1969 for each county. The percent change in number of farm units for each county ranged from -30.70 percent for Ziebach County to +0.29 percent for Pennington County.

Following the methods specified earlier, Appendix III groups the rank-ordered counties into four categories: highest change, high change, moderate change, and low change.

The upper and lower percent change limits were -30.70 to -24.34 percent for counties in the highest change group, -24.29 to -18.02 percent for the high change group, -17.73 to -8.94 percent for the moderate change group, and -7.99 to +0.29 percent for the low change group.



Of the 67 counties, the numbers and percentages where the percent change in the number of farm units was classified as highest, high, moderate, or low were: 6 counties (9.0 percent) for highest, 28 counties (41.8 percent) for high, 24 counties (35.8 percent) for moderate, and 9 counties (13.4 percent) for the low change group.

In general, Appendix III indicates that slightly over half of the counties in the state fell into the highest or high change groups in terms of percent change in the number of farm units.

The variation of the percent change in number of farm units by geographic location in South Dakota is shown on Map 2. Map 2 was examined to determine the variation in percent change by State Planning District (Table II). Districts, I, II, III, and IV show a high proportion of counties, with percent change in number of farm units classified as highest and high; eight of ten, four of six, eight of twelve, and six of ten, respectively. However, Districts V and VI have lower proportion of counties in the highest and high change categories; five of eighteen and three of eleven, respectively.

Table 2: Number of Counties in Each Change Category, by Percent Change and by State Planning District.

State Planning District	Change Category*			
	Highest	High	Moderate	Low
District I	1	7	2	0
District II	0	4	2	0
District III	1	7	4	0
District IV	1	5	4	0
District V	3	2	8	5
District VI	0	3	4	4

\* Classification according to percent change in number of farm units.

The numerical change and percent change in farm units between 1959 and 1969 can be compared by the number of counties that appear in different change categories in Maps 1 and 2. One can see in Maps 1 and 2 that 28 counties re-

mained in the same change category, 31 counties shifted one category up or down, seven counties shifted two categories up or down, and one county shifted four categories, from the low to the highest change category. Thus, 59 counties or 88.1 percent of all 67 counties either did not shift categories or shifted only one category.

State Planning Districts I, II, III, and IV, all found in East River South Dakota, have the largest proportions of counties in the highest or high change categories, using either the numerical change or percent change technique.

Table 3 reports the statistical findings relative to the forward solution regression run. Variables X28, X29, X27, and X33 were found to contribute significantly to the explanation of the observed variation in the change in number of farm units. Stated descriptively, South Dakota counties with greater decreases in the number of farm units were characterized by:

1. Greater declines in the number of Class 5 farms (sales of \$2,500 to \$4,999).
2. Greater declines in the number of Class 4 farms (sales of \$5,000 to \$9,999).
3. Greater declines in the number of Class 3 farms (sales of \$10,000 to \$19,000).
4. Greater increases in the amount of livestock and livestock products sold.

These four independent variables, taken together, explain 89.9 percent of the total variation in the change in number of farm units between 1959 and 1969. The null hypothesis that the set of independent variables, taken together, does not explain the variance of the dependent variable may therefore be rejected ( $F = 138.69$ ).

## MAJOR FINDINGS AND CONCLUSIONS

### Objective One: Findings

Summarized, the major findings related to Objective One were:

1. The change in the number of farm units for each county ranged from a loss of 379 farm units

Table 3: Sums of Squares and Proportion of Variance Accounted for by the Significant independent Variables in order of Importance as Entered into the Regression Equation

Independent Variables	Sum of Squares Accounted For	Proportion of Variation Explained	Cumulative Proportion of Variation Explained	Regression Coefficient For Significant Variables	Y Intercept
X28	574041.984	0.778	0.778	0.549	-7.936
X29	68863.189	0.093	0.871	0.821	
X27	14405.504	0.020	0.890	0.419	
X33	6699.869	0.009	0.899	-0.000*	

\* The regression coefficient is 0.000 with X33 still being significant due to the fact that the F-test<sup>33</sup> is based upon the standardized regression coefficients; in the case of X33 this standardized regression coefficient is 0.143.



in Brookings and Roberts Counties to a gain of two farm units for Pennington County. The percent change in the number of farm units for each county ranged from -30.70 for Ziebach County to +0.29 percent for Pennington County.

2. Approximately half of the counties in South Dakota experienced declines in the number of farm units that would be classified in the highest or high change categories.

3. State Planning Districts I, II, III, and IV possess high proportions of counties with change in the number of farm units classified as highest and high. District V had no counties in the highest and high change categories, and District VI had no counties in the top three change categories. In terms of percent change in the number of farm units, Planning Districts I, II, III, and IV also had high proportions of counties in the highest and high change categories when classified according to actual change in number of farm units.

#### **Objective One: Conclusions**

Based on the findings relative to Objective One, it is concluded that:

1. All counties in South Dakota have experienced changes in the number of farm units, but these changes have varied considerably by county.

2. Whether in terms of actual change or percent change, the counties comprising the planning districts in eastern South Dakota have experienced the greatest declines in the number of farm units.

#### **Objective Two: Findings**

The second objective of the study was to determine what selected socioeconomic factors were associated with variations in the change in number of farm units reported for South Dakota counties. Four independent variables in combination were found to explain significantly the variation in the change in number of farm units by counties. These four variables explained approximately 90 percent of the observed variance in the dependent variable. It was shown that greater decreases in the number of farm units were found in counties where there were greater declines in the number of Class 3, 4 and 5 farms and greater increases in the amount of livestock and livestock products sold.

#### **Objective Two: Conclusions**

Based on the findings relative to Objective Two, it is concluded that:

1. The decrease in the number of farm units for counties in South Dakota was primarily a consequence of the decrease in numbers of smaller farm units. However, this land is not taken out of production; increase in the total acreage in farms for South Dakota was shown. Thus, these smaller farm units are being consolidated into larger farm units.

2. This decrease in the number of farm units

has been accompanied by a shift from crop production enterprises to livestock operations which require more acreage for pasture and feed production.

#### **Implications**

The findings and conclusions raise questions regarding the association between the change in the number of farm units and the size of farm units in South Dakota. Some major implications are:

1. The decline in the number of farm units in South Dakota was largely explained by the declines in the number of smaller farm units and the process of shifting from primarily crop production to livestock operations which require greater amounts of land. The farm units commonly referred to as "small family farms" are included in the farm units that are being sold and added to other, larger farm units.

2. Because the decline in the number of farm units may be due to the decline of small family farms, these small farm units may not be economically appropriate to the present agricultural era.

3. If, as a matter of public policy, the maintenance of small farm units in this state is thought to be desirable, and if past trends continue, then any attempt to maintain small farm units in the face of this trend would require substantial public subsidization of such agricultural operations. Such subsidies might include the establishment of rural outreach programs to improve farm management, encouragement of research, and development of machinery more suitable to smaller farm operations, as well as direct financial expenditures.

4. The ecological correlations are not only in terms of aggregates, populations, or areas, but also have significant implications for the behavior of individuals. The contention that the decline in the number of farms is due to operators of marginal farms leaving agriculture for nonagricultural jobs is supported by the finding that the decline in the number of farms is primarily associated with a decline in the number of small farms. However, no measures of "marginality" were included in this study, and this interpretation must be tentative.

5. The age cohort variables did not explain the variation in the change in number of farm units, so the process of farm operators leaving their farms is not selective by age, with similar proportions of farm operators from each age cohort selling their farms, rather than the majority of sellers being of a particular age group. The contention that the change in the number of farm units is due to an aging rural population in which many farmers are selling their farms and retiring is not supported.



## LIMITATIONS AND RECOMMENDATIONS

### Limitations of the Study

The study had the following limitations:

1. Some variables that may have been relevant could not enter the regression equation because of differences in definition of these variables between the two census years.
2. Some variables that may have been relevant could not enter the regression equation because of differences in the categories used in the two census years.
3. Variables were not adjusted for inflation; however, this study attempted to explain changes in the number of farm units by changes in other sociodemographic variables related to the counties, the farm operators, and the farm units rather than on the basis of detailed economic analysis.

## APPENDIX I

The statistical procedure used for this study was forward solution multiple regression. This means of analysis is designed to account for the variability of the dependent variable as it might be associated with variability of the independent variables. This procedure permits the researcher to test for overall effects by assessing statistically the relative importance of each of the independent variables that help explain significantly the variation in the dependent variable.

Forward solution regression proceeds in the following manner: first, the correlations of all the independent variables with the dependent variable are calculated; second, the independent variable that has the highest zero order correlation with the dependent variable is entered first into the analysis; third, the next variable to enter is the one that produces the greatest increase in the amount of variance of the dependent variable that is explained, after controlling for the independent variable already in the equation.

The third variable to enter is the one that produces the greatest increase in the amount of explained variance, after controlling for the effects of the other variables already in the equation. This process continues for as many variables as the researcher wishes to enter and is generally terminated when the addition of another variable does not add a significant amount to the explanatory power of the regression equation.

The formula for the regression equation will assume the form:

$$Y = a + b_1X_1 + b_2X_2 + \dots + b_kX_k + e$$

## APPENDIX II

### MAGNITUDE OF CHANGE IN THE NUMBER OF FARM UNITS BETWEEN 1959 AND 1969, RANK-ORDERED BY COUNTY

County	Change in Number of Farm Units
<b>Highest Change Group</b>	
Brookings	-379
Roberts	-379
Day	-352
Minnehaha	-346
Turner	-320
Clark	-294
Union	-286
McCook	-286
Lincoln	-278
Kingsbury	-269
Lake	-265
<b>High Change Groups</b>	
Hutchinson	-257
Spink	-257
Moody	-253
Beadle	-244
Charles Mix	-244
Brown	-241
Clay	-239
Yankton	-238
Grant	-233
Bon Homme	-195
Miner	-195
Hamlin	-186
McPherson	-185
Douglas	-184
Hanson	-184
Hand	-177
Codington	-175
Deuel	-174
Gregory	-161
Marshall	-161
<b>Moderate Change Group</b>	
Beadle	-17.73
Lincoln	-17.35
Charles Mix	-17.11
Codington	-17.02
Minnehaha	-16.95
Deuel	-16.23
Hutchinson	-16.21
Gregory	-16.16
Faulk	-15.45
Todd	-15.27
Brule	-14.84
Brown	-14.63
Custer	-13.80



County	Percent Change In Number of Farm Units
Hyde	-13.54
Walworth	-12.77
Edmunds	-12.64
Lawrence	-12.62
Perkins	-12.15
Bennett	-12.08
Potter	-11.83
Tripp	-11.09
Sully	-10.24
Butte	-9.77
Mellette	-8.94
<b>Low Change Group</b>	
Hughes	-7.99
Harding	-7.88
Lyman	-6.67
Meade	-6.65
Jones	-6.11
Stanley	-5.94
Haakon	-5.45
Washabaugh	-0.60
Pennington	+0.29

APPENDIX III

PERCENT CHANGE IN THE NUMBER OF FARM  
UNITS  
BETWEEN 1959 AND 1969, RANK-ORDERED  
BY COUNTY

**Highest Change Group**

Ziebach	-30.70
Buffalo	-25.53
Clark	-24.98
Hanson	-24.76
Day	-24.63
Dewey	-24.34

**High Change Group**

Clay	-24.29
Campbell	-24.17
McCook	-23.33
Union	-23.22
Lake	-22.61
Douglas	-22.41
Brookings	-22.40
Miner	-22.06
Kingsbury	-21.80
Moody	-21.37
Roberts	-21.34
Hamlin	-20.64
Grant	-20.40
McPherson	-20.31

County	Change in Number of Farm Units
Corson	-20.06
Yankton	-19.56
Davison	-19.47
Spink	-19.40
Turner	-19.24
Aurora	-19.09
Shannon	-19.05
Jerauld	-18.87
Hand	-18.40
Marshall	-18.36
Sanborn	-18.19
Bon Homme	-18.07
Fall River	-18.05
Jackson	-18.02

**Moderate Change Group**

Davison	-147
Aurora	-139
Campbell	-138
Corson	-128
Sanborn	-127
Dewey	-120
Tripp	-114
Jerauld	-104
Ziebach	-101
Edmunds	-100
Faulk	-93
Brule	-92
Perkins	-90

**Low Change Group**

Fall River	-72
Walworth	-65
Meade	-57
Butte	-55
Potter	-55
Todd	-53
Custer	-49
Hyde	-44
Bennett	-40
Sully	-39
Lawrence	-38
Lyman	-37
Buffalo	-36
Shannon	-36
Jackson	-31
Harding	-28
Mellette	-27
Hughes	-25
Haakon	-21
Jones	-16
Stanley	-12
Washabaugh	-1
Pennington	+2



### Recommendations for Further Research

The authors recommend the following for further research:

1. An analysis of the problems and solutions to the problems confronting owners of small family farms.
2. A study of the personal characteristics of the farm operators selling their farm units and the perceived reasons of these farm operators for selling their farm units.
3. A study of the organizational structure of these consolidated farm units.

### REFERENCES

- Baird, Andrew W. and Wilfred C. Bailey  
1958 "Farmers Moving Out of Agriculture." Mississippi State University Agricultural Experiment Station, Bulletin No. 568.
- Baumgartner, H. W.  
1965 "Potential Mobility in Agriculture: Some Reasons for the Existence of a Labor-Transfer Problem." *Journal of Farm Economics* 47(February): 74-82
- Bogue, Donald J.  
1969 *Principles of Demography*. New York: John Wiley and Sons, Inc.
- Bowring, J. R. and O. B. Durgin  
n.d. "Factors Influencing the Attitudes of Farmers toward Migration Off Farms." New Hampshire Agricultural Experiment Station, Bulletin No. 458.
- Bultena, Gordon L.  
1969 "Career Mobility of Low-Income Farm Operators." *Rural Sociology* 34(December): 563-569.
- Guither, Harold D.  
1963 "Factors Influencing Farm Operators' Decisions to Leave Farming." *Journal of Farm Economics* 45(August): 567-576.
- Hill, Lowell D.  
1962 "Characteristics of the Farmers Leaving Agriculture in an Iowa County." *Journal of Farm Economics* 44(May): 419-426.
- Kerlinger, Fred N.  
1973 *Foundations of Behavioral Research*. Second edition, New York: Holt, Rinehart, and Winston, Inc.
- LaPiere, Richard T.  
1965 *Social Change*. New York: McGraw-Hill Book Company
- Maddox, James G.  
1960 "Private and Social Costs of the Movement of People Out of Agriculture." *American Economic Review* 50(May): 392-402.
- Makarczyk, Wacaw  
1968 "Factors of Occupational Stability and Activeness Among Farmers on Private Farms." In *Sociological Abstracts* 16(February-July 1968): 289.
- Roy, Prodipto  
1961 "Factors Related to Leaving Farming." *Journal of Farm Economics* 43( August): 666-674.
- Sanders, Irwin T.  
1966 *The Community: An Introduction to a Social System*. New York: The Ronald Press Company.
- Smith, T. Lynn and Paul E. Zopf, Jr.  
1970 *Principles of Inductive Rural Sociology*. Philadelphia: F.A. Davis Company.
- South Dakota Crop and Livestock Reporting Service  
1975 *South Dakota Crop and Livestock Reporter*. January 10, 1975.
- Turner, Jonathan H.  
1974 *The Structure of Sociological Theory*. Homewood, Illinois: the Dorsey Press
- U.S. Department of Commerce, Bureau of the Census  
1969 *1969 Census of Agriculture, Volume I, Area Reports: South Dakota*.
- U.S. Department of Commerce, Bureau of the Census  
1970 *1970 Census of Population, Part C, General Social and Economic Characteristics, South Dakota*.
- Willsie, Roger H.  
N.D. "Why Farmers Sold Out in Central Nebraska in 1956-57." Nebraska Agricultural Experiment Station, Bulletin No. 445.