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A FARM BUILDING EVALUATION TECHNIQUE FOR TAX ASSESSMENT

by

Joshua F. Robinson

A thesis submitted
in partial fulfillment of the requirements for the
degree Master of Science at South Dakota
State College of Agriculture
and Mechanic Arts

June 1956

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A FARM BUILDING EVALUATION TECHNIQUE FOR TAX ASSESSMENT

By

Joshua F. Robinson

This thesis is approved as a creditable, independent investigation by a candidate for the degree, Master of Science, and acceptable as meeting the thesis requirements for this degree; but without implying that the conclusions reached by the candidate are necessarily the conclusions of the major department.

Thesis Advisor

Head of the Major Department

714 (Replacement)

ACKNOWLEDGMENT

The author wishes to express his sincere appreciation to Dr. Richard R. Newberg, and Professor John E. Thompson, Agricultural Economics Department, who have been especially helpful in developing and analyzing the data throughout the course of this study. The author is also grateful to Dr. Fredrick C. Westin, Agronomy Department, for his cooperation in supplying soil survey information.

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CHAPTER 1

INTRODUCTION

Equity in appraisal of farm buildings for tax assessment purposes has been a major concern of tax assessors for many years. Farm appraisers have long sought appraisal methods which are more reliable and valid than present techniques.

The value of farm buildings contributes to the total market value of real estate. The Bureau of Agricultural Economics estimated the ratios of the value of farm buildings to the value of land and buildings for South Dakota. The ratios ranged from .098 to .271 during the years 1910-1955. 1/

If equity in tax assessment is to be achieved, the assessment of farm buildings should reflect their productive value. The productive value of farm buildings is based on their contribution to farm income. The assessment techniques used should be such that the assessed tax valuation changes in direct proportion to the changes in productive value.

In establishing a measure for tax assessments, the South Dakota Code defines true and full value as ". . . the usual cash selling price at the place where the property to which the term is applied shall be at the time of the assessment." 2/ There are three major problems

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1/ Census Data. 1910-1940, March 1, 1941-1955.

2/ South Dakota Code 1939, Volume 3, Title 57, Section 57.0301.

inherent in the real estate tax assessment system in South Dakota at the present time.

First, there is a tendency for tax assessments to lag behind the change in market value of real estate. This is largely true because the tax assessor does not have the necessary tools to measure accurately current changes in the market price of real estate. As a result, he frequently copies previous assessment records. In Brown County, for example, the assessed valuation of farm real estate did not change appreciably from 1933 to 1953, although the market price fluctuated over a wide range. 3/

Second, the assessed valuation of farm real estate tends to concentrate around an average figure rather than reflect the market price or the productive potential of the farm. Farms of a given size are assessed at the same rate irrespective of market price or earning capacity. Heavy claypan soils are assessed at the same rate as the more productive silt loams.

A third problem in the present assessment technique is the tendency for assessed valuations to decline somewhat relative to true value over a period of time. When the market price of farm land declined during the early thirties, assessors were forced to reduce the assessed valuation in response to complaints of farmers. Since that time, assessors have decreased the assessed valuation of farm real estate slightly. It is easier for assessors to adjust the valuation downward or stabilize the tax valuation of real estate to avoid com-

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3/ John E. Thompson and Max Myers, Taxation in South Dakota. South Dakota Agricultural Experiment Station. Agricultural Economics Pamphlet 58. 1954.

plaints of the taxpayer. The lack of an accurate measure of the earning capacity of real estate has contributed to the inequalities in the present assessment system.

Purpose

The purpose of this study is to develop a technique which may be used to improve farm buildings assessment procedures in South Dakota. Since farm buildings contribute in varying amounts to farm productivity, they should be assessed in direct proportion to their contribution. Such a procedure should aid tax assessors to determine accurately the true valuation.

The specific objectives of the study were (1) to determine the relationship between market price and soil productivity for use in assessment of farm real estate; (2) to establish a ratio of the market value of buildings to land; and (3) to develop a technique for assessment of farm buildings based on relative soil productivity and differences in market price of improved and unimproved farm real estate. The study is designed to facilitate in equalizing tax assessments between farms within a county. As the procedure is adopted in other counties, it will help to equalize assessments between counties.

Review of Literature

Very little research has been done on the valuation of buildings for tax assessment purposes.

Ottoson, Aandahl, and Kristjanson recently made a study of farm

land valuation in Saunders County, Nebraska. 4/ The tax assessment procedure developed for valuation of farm land was based primarily upon the ability of a tract of land to produce net income. Principal factors that affect ability to produce net income are soil type and improvements. Other factors that affect market price are location, type of roads, and proximity to market centers, schools, and entertainment facilities. The study was designed to estimate the net income of the farm and from this to attempt to approximate the sale value of the farm.

The economic rating for a given soil was determined by selecting a typical rotation with the major crops grown and budgeting the soils income producing capacity on the basis of a 100 acre unit. Selected price levels were used in the budgets to determine the crop price-cost relationships in establishing the net income. The soil with the highest net income per acre was given an economic rating of 100. The net income producing capacity for other soils were budgeted and given an economic rating relative to the highest economic rating of 100.

In order to approximate the net income producing capacity of a farm unit, soil survey information was used to estimate the number of acres of each soil type in the farm. The average number of acres of each crop grown on a given soil type was determined and multiplied by the economic rating for that soil type to obtain the composite rating. The economic rating divided by the number of acres in the farm represented the average rating per acre.

4/ H. W. Ottoson, A. R. Aandahl, and L. B. Kristjanson, Valuation of Farm Land for Tax Assessment. Nebraska Agricultural Experiment Station Bulletin 427. 1954.

A balance point ratio system was developed to compare the productivity of lower income producing soils. Soils of lower crop productivity than the balance point were given a pasture rating. The balance point rating for a given unit was the point where the budgeted crop cost was equal to the budgeted pasture rating. The decision as to the most feasible land use for rating purposes was based on the highest economic rating.

The farm buildings were rated according to condition and adequacy. The house was rated according to condition, type, and size, with a maximum possible rating of 50. Farm buildings, other than the house, were rated as a group on the basis of condition and adequacy, with a maximum possible rating of 50. The two ratings were added together to give an overall farm building rating.

Location rating was considered of lesser importance by the authors. Location value was determined by assigning importance ratings to nearness to elevator, shopping center, and schools. The rating was determined by multiplying the distance by the location rating. The location rating was divided by the sum of the rating factors to determine an average weighted rating.

The final approximation for the assessed valuation for land with buildings was converted to a dollar valuation. Based on the economic productivity rating per acre, a dollar value was determined for each productivity rating. The dollar value was multiplied by the productivity rating and acres to determine the approximate assessed valuation. The same procedure was used for determining the discount value for location rating. The discount value for location rating was subtracted

from the economic productivity value to determine the final approximation of the valuation of a given farm.

Procedure

Spink County South Dakota was selected for this study because of availability of recent data on climate, physiography, geology, native vegetation, land use, productivity, and management of the soil order which are important in making a comparative analysis of land values.

The north half of Spink County was used for this study because it represents varied agricultural conditions. It includes wheat farming in the central area and a combination of crop and livestock farming in the outlying areas. In selecting the sample, the legal descriptions and market prices of all the farm real estate sold were obtained from the register of deeds office at the county court house. From this list, a stratified sample of farms was selected with the help of county assessors and realtors using criteria of stratification which facilitated comparative analysis.

Index numbers of average value per acre were developed from the market price data; the index was based on 1948 values. The price data were adjusted to the 1953 sale price for the analysis.

An assessment technique for the determination of the market price of farm buildings was developed from formulas which reflect the ratio of market value of improved to unimproved land. Market price of improved and unimproved real estate and soil productivity were used to estimate the market value of buildings within and between soil produc-

tivity rating groups. Soil productivity in terms of income producing capacity was used to rate the soils according to their relative value. The farm units were grouped and classified according to a rating scale based on soil management group, size of unit, and condition and adequacy of buildings, assuming normal agricultural conditions. The analysis of variance technique was used to evaluate the data.

CHAPTER II

TAX ASSESSMENT PROCEDURE

Relatively little change has been made in the assessment procedure in South Dakota since 1930. Lack of adequate tools for assessment of farm real estate has been largely responsible for failure of the assessed valuation to vary with changes in market price. One of the weaknesses in the present assessment system is the tendency of assessors to copy previous records from year to year. Since the early 1930's the assessed valuation of farm real estate has remained relatively constant while the market price of land has varied over a wide range.

Market price and productivity of a farm unit are indicators of the potential income producing capacity. Using market prices of improved and unimproved real estate and soil productivity, the ratio of the market value of buildings to land may be calculated. This ratio may be used in determination of the value of buildings for assessment purposes. A sample of improved and unimproved farms was selected to test the assessment technique. The sample was composed of 244 improved and unimproved 160 and 320 acre units selected from 500 farm real estate sales made during the years 1948-1953. The units were located between townships 117-120 north and Ranges 60-65 west, and in the north half of Spink County, South Dakota. Data on market price were taken from farm real estate transfer worksheets previously compiled

by the Agricultural Economics Department at South Dakota State College (See Appendix, Worksheet No. 1). Information relating to each unit such as assessed valuation for land and buildings, type of transfer, date of sale and the name of the grantor and grantee was taken from the farm transfer worksheets.

The data were rechecked with court records at the Spink County court house for farms in which information was found to be incomplete. With the help of realtors, bankers and farm loan representatives, 244 representative bona fide farm transfer sales were selected. Farm sales which did not appear to be bona fide and representative were eliminated from the sample.

Soil Survey Information

A productivity classification was established for each of the 16 soil management groups. The Spink County soils survey bulletin was used in classifying the 104 soils as to climatic conditions, physiography, geology, native vegetation, land use, productivity, management, agricultural practices, erosion control, green manure, and fertilizer use. 5/

The measure of the quality of the soil in terms of gross income was calculated by the use of budgets.

The north half of Spink County is divided into three types of farming areas (See Appendix, Figure 1). Areas B and E are a combination of crop and livestock type of farming while area A, is

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5/ F. C. Westin and others, Soil Survey of Spink County, South Dakota. South Dakota Agricultural Experiment Station Bulletin 439. 1954.

largely a small grain area. Because of the difference in type of farming, it was necessary to budget the income capacity of the soil management groups for the type of farming areas separately.

The major crops used in measuring the income capacity of the soil in Areas B and E were corn, wheat, oats, barley, and alfalfa. Using acreage harvested of the five major crops as a basis, the percentages of each were calculated for the six-year period 1948-1953. Wheat accounted for 57 percent of the harvested acres. The other crops in order of importance were corn 17, oats 15, barley 7, and alfalfa 4 percent. The percentages of the crops were calculated from Crop and Livestock Reporting Service data (Table 1).

Table 1 Acres Harvested for Selected Crops in Spink County 1948-1953. *

Year	Corn	Spring Wheat	Oats	Barley	Alfalfa
			Acres		
1948	77,900	318,700	83,900	61,100	6,000
1949	86,900	327,100	73,600	39,600	10,300
1950	102,000	267,000	91,900	46,400	13,300
1951	97,800	302,200	78,000	25,100	21,100
1952	84,300	313,100	77,200	20,900	28,800
1953	99,200	301,100	85,000	18,700	32,600
Average	91,400	304,900	81,600	35,300	18,700
Percentage of total	17	57	15	7	4

* South Dakota Agriculture, 1948-1953. Crop and Livestock Reporting Service.

The 32 budgets calculated for the 16 soil management groups for Areas B and E and Area A are shown in Appendix, Tables 17 to 48, and

the results summarized in Table 7. The overall productivity rating group for each of the 16 soil types was determined by averaging together the corresponding soil management groups. The 16 soil types were given classification letters which indicated their relative income producing capacity. The 16 soil management groups were divided into four classifications with four soil management groups in each classification. The productivity rating groups were given the letters A, B, C, and D in order of the relative income producing capacity of the soil. Soil productivity rating group A was classified as the most productive soil while soil productivity rating group D was the least productive soil in terms of income (Table 7).

Soil survey evaluation worksheets were used to classify the soils of each farm according to the appropriate soil management group rating (See Appendix, Worksheet No. 2).

Detailed soils survey aerial maps, containing the location and distribution of the various types of soils for each of the sample farms, were paired with the soil evaluation worksheets by means of map code numbers. The aerial maps scaled four inches to the mile were used to facilitate and determine the number of acres representative of each soil type. Plastic grid plates, scaled to two inches square and representing 160 acres, were used to grid the number of acres representative of each soil type for a given farm unit. The number of acres of each soil type for each 40 acres sub-division in the grid were calculated and recorded on the soil management group worksheet. The total number of acres representative of each soil type was calculated for each soil management group represented on the unit. From the above calculations, a weighted average of the soil management groups was obtained

which represents the overall soil management group rating for the farm unit. The overall soil management group rating was compared with the productivity rating sheet and given a rating in terms of relative income producing capacity of the soil and the soil rating was entered on the corresponding soils survey evaluation sheet and the duplicate identification cards. In area A only two crops were used to classify the relative quality of the soils in terms of income producing capacity. Ninety percent of the rotated acres were allocated to wheat and 10 percent to barley for classification purposes.

Budgets for determining the relative quality of the soil in terms of income were based on 160 and 320 acre units. The percentage breakdown of the various crops used to measure the quality of the land in terms of gross income was based on the percentage of each crop harvested as explained previously (Table 1). Two systems of soil management, C and D, and yield expectations classified as favorable based on soil survey information for Spink County were used as a basis in establishing the productivity of the soil management group (See Appendix, Tables 1-16). 6/

System of soil management C to be used in areas B and E was composed of small grain, alfalfa two to six years (second cutting of alfalfa plowed down), followed by small grain, corn and small grain. The rotation for the fourth system of soil management D was composed of a two year rotation consisting of small grain plus sweet clover carried over winter and plowed down when 6 to 8 inches high, followed by a small grain. Yield expectations under favorable growing conditions

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6/ Westin, op. cit.

were used in the budgets. Prices used in calculating the gross income for each soil type are based on the six-year average prices received by farmers in South Dakota for the period 1948-1953 (Table 2).

Table 2 Prices Received by South Dakota Farmers for Selected Crops 1948-1953. *

Year	Crop				
	Corn	Spring Wheat	Oats	Barley	Alfalfa
1948	$1.24	$1.97	$.62	$1.05	$18.80
1949	1.18	1.94	.58	1.01	16.80
1950	1.37	2.03	.71	1.17	16.90
1951	1.23	2.11	.73	1.06	16.50
1952	1.40	2.14	.71	1.16	18.10
1953	1.29	2.04	.66	1.02	15.62
Average	1.28	2.04	.67	1.08	17.12

* Data obtained from South Dakota Agriculture, South Dakota Crop and Livestock Reporting Service. 1948-1953.

Identification of Farms

A coding system was developed to identify and classify each farm according to the number of acres in the unit, soil management group, location in the county, productivity rating group, and whether the unit was improved or unimproved. The code was inserted in the upper left hand corner of each soil survey evaluation worksheet. For a detailed description, refer to Appendix.

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Adjustment of Real Estate Prices for Analysis

It was necessary to adjust the market price of the land to a base year to compensate for the variation in the real estate market before the data representing farm sales for the six-year period 1948- 1953 could be analyzed. An index for the market value of land and buildings for the period 1948- 1953 was developed for the north half of Spink County (Table 3). The based period for the index was selected as 1948. The market price of each unit was corrected to the index of the market price for 1953 prior to making a comparative analysis of the market price data. The corrected sales price was entered on the soil evaluation worksheets and on the duplicate identification cards before an analysis was made of the market data.

Table 3 Index Numbers and Average Market Value Per Acre for Land and Buildings, North Half of Spink County South Dakota, 1948- 1953. *

Year	Index Numbers of Average Market Value Per Acre for Land and Buildings **	Average Market Value Per Acre for Land and Buildings
1948	1 00	$36
1949	114	41
1950	104	37
1951	119	43
1 952	118	42
1953	131	47

* Data was obtained from Farm Real Estate Transfer Worksheets compiled by the Agricultural Economics Department, South Dakota State College.

** Index based on 1948 = 100.

Determining Market Price of Farm Buildings

A normal market value of farm buildings in the north half of Spink County for 160 and 320 acre farm for each soil productivity rating group was determined by the following method. The farms were grouped according to the appropriate productivity rating group, size of farm, and whether they were improved or unimproved. The market value of the buildings for each productivity rating group was determined by subtracting the average market price of a comparable sized unimproved unit from the average price of a comparable improved unit (Table 4 and 5).

Table 4 Average Market Value of Improved and Unimproved 160 Acre Units Classified According to Productivity Ratings, North Half of Spink County, South Dakota.

Productivity Rating Group	Average Market Value of Improved Units	Average Market Value of Unimproved Units	Average Market Value of Buildings	Ratio of Unimproved to Improved Units	Market Value of Buildings as a Percentage of Land and Buildings
A	$10,327	$6,919	$3,408	1:1.493	33.0
B	9,011	6,868	2,143	1:1.312	23.8
C	10,792	5,703	5,089	1:1.892	47.2
D	8,540	7,126	1,414	1:1.198	16.6
A to D	9,340	6,805	2,535	1:1.373	27.1

The market value of buildings, as a percentage of land and buildings, was determined by dividing the average market price of buildings, found by the method shown above by the average market price of comparable unimproved units (Tables 4 and 5). The ratio of the market price of improved to unimproved units was calculated by dividing the market value of improved units by unimproved units.

Table 5 Average Market Value of Improved and Unimproved 320 Acre Units Classified According to Productivity Rating, North Half of Spink County, South Dakota.

Productivity Rating Group	Average Market Value of Improved Units	Average Market Value of Unimproved Units	Average Market Value of Buildings	Ratio of Unimproved to Improved Units	Market Value of Buildings as a Percentage of Land and Buildings
A	$16,834	$14,193	$2,641	1:1.861	15.7
B	14,703	14,672	31	1:1.002	.2
C	14,613	11,376	3,237	1:1.284	22.2
D	16,496	16,398	98	1:1.006	.6
A to D	15,442	14,805	639	1:1.043	4.1

Building Rating Scale

An economic rating was developed for farm buildings which more closely established the market value of the buildings on a given farm. The economic rating for farm buildings was based on an index rating of from 0 to 200 with an optimum adequacy index of 100. Farm buildings with an index rating greater than 100 add to the normal market price of an improved farm. Buildings with a composite index rating of less than 100 subtract from the normal market price of an improved farm.

The economic classification for farm buildings was composed of two parts (Table 6). The first part was designed to classify the farm dwelling. The second part of the table was used to classify the out buildings which were associated with the crop and/or livestock program. The economic rating for the buildings was subclassified into factors descriptive of the condition and adequacy of the buildings.

Condition was based on the general condition and the remaining useful life of the buildings with a rating factor range of 1 to 10, the optimum level of which is 7. 2/

Table 6 Economic Rating Scale for Farm Buildings.

Index Factor	=	Dwelling Condition	X	Dwelling Adequacy	+	Building Condition	X	Building Enterprise Adequacy
200.0		10.0		10.0		10.0		10.0
162.0		9.0		9.0		9.0		9.0
128.0		8.0		8.0		8.0		8.0
98.0		7.0		7.0		7.0		7.0
72.0		6.0		6.0		6.0		6.0
50.0		5.0		5.0		5.0		5.0
32.0		4.0		4.0		4.0		4.0
18.0		3.0		3.0		3.0		3.0
8.0		2.0		2.0		2.0		2.0
2.0		1.0		1.0		1.0		1.0

Adequacy was determined according to livability and modern facilities in the case of the house and the adequacy of the out buildings for the crop and the livestock program. Adequacy was given a rating factor range of 1 to 10 with an optimum level of 7. By use of Table 6, the economic rating for a given set of buildings was

2/ Optimum as used here represents the minimum of buildings necessary to provide adequate shelter for the farm family and efficient operation of the farm unit. Thus, it is a compromise between costly overbuilding of the farmstead and underbuilding to the extent that it may prevent efficient farm operation.

determined in the following manner: Starting with the dwelling the first factors reflecting the condition of the dwelling which are descriptive of the state of repair and useful life of the building were selected. Second, the factors descriptive of the adequacy of the building which provide an indication of the suitability of the dwelling for a family in terms of the size and modern facilities were selected. Next, the out buildings were rated according to condition, by selecting the factors which would describe the state of repair and the remaining years of useful life of the out buildings. Then, the factors that appropriately described the enterprise adequacy of the out buildings were selected. The composite rating for buildings was determined by multiplying the condition factor by the adequacy factor for the dwelling plus the condition factor multiplied by the adequacy factor for the out buildings. The result represents the adjusted index of value of buildings as mentioned previously.

Suggested Method of Valuing Farm Buildings

Using the basic soil productivity classification data explained previously, the assessed valuation for farm buildings for 160 and 320 acre units was determined by the following method (Tables 4 and 5): For each set of farm buildings to be assessed, the soil management group rating for the unit was calculated on the soil survey evaluation worksheet as explained previously (See Appendix, Worksheet No. 2). The soil management group calculated for the unit on worksheet No. 2 was classified according to the appropriate productivity rating group designated as A, B, C, and D in Table 7, column 1 opposite the appropriate

soil management group in column 3 or 5 depending on the type of farming area in which the farm is located.

Table 7 Productivity Ratings Based on Budgeted Gross Income for Selected Crops for 16 Soil Management Groups Classified by Area, North Half of Spink County, South Dakota (320 Acre Units)

Productivity Rating Group	Soil Class	Areas B-E		Area A	
		Soil Management Group	Soil Management System C	Soil Management Group	Soil Management System D
	1	17	$11,970.14	17	$10,782.72
	2	3	11,369.56	3	10,782.72
A	3	2	11,109.02	4	9,573.12
	4	4	10,962.31	2	9,469.44
	5	13	10,390.24	13	9,469.44
	6	1	10,099.04	8	9,434.88
B	7	8	9,948.96	14	8,916.48
	8	14	9,804.64	6	8,881.92
	9	12	9,777.13	12	8,847.36
	10	6	9,360.91	10	8,778.24
C	11	10	8,960.07	1	7,672.32
	12	9	8,769.97	9	7,603.20
	13	5	8,323.88	11	6,877.44
	14	15	6,843.70	7	6,877.44
D	15	11	6,795.28	5	6,393.60
	16	7	6,482.89	15	5,736.96

The productivity rating group found in column 1 of Table 7 was located in column 1 of Table 4 and 5 for the appropriate units. Opposite the productivity rating group in column 4 of Table 4 and 5 the average market value of the buildings was obtained. A visual economic rating of the farm buildings was determined as explained previously (Table 6). The market value of the buildings was determined by multiplying the normal market value of the buildings, corresponding to the productivity rating group for the unit, by the visual economic building index factor shown in column 1 of Table 6. The result

represented the true market value or the assessed valuation for the unit. The true market value or the assessed valuation for any size of farm unit classified according to any of the productivity rating groups may be calculated using this technique.

By using the technique of budgeting potential income, it is possible to accomplish two things. For a given area it is possible to attach specific values to real estate and buildings based on their income producing capacity. Second, based on estimated income potential, it is possible to arrive at an ordering for farm real estate and to tell with a fair degree of accuracy where a farm unit ranks with respect to other farm units. This provides a measure of the variability in income potential among farms units within the area. From these, it is possible to set up a distribution of farm valuations which may be given either in the form of dollars per unit for different quality categories as in Table 7, or it may be given in terms of percentage of average farm value for the area.

Market price may provide a basis for valuing farms in terms of quality of soil. Productivity ratings have been obtained for different soils types. From the ratings for soil management group, four major soil productivity rating groups have been established. In a similar manner buildings have been rated as to their contribution to farm income capacity.

In the following chapters, farm real estate price data will be analyzed to determine: (1) whether the market differentiates accurately enough between farms within different productivity rating groups so that average prices for various productivity rating groups may be used

in the assessment technique, (2) whether the market differentiates between improvements in various soil rating groups with sufficient reliability so these may be used in the assessment technique.

CHAPTER III

SUMMARY AND ANALYSIS OF FARM REAL ESTATE PRICE DATA

From the 500 farms, 92 improved and 152 unimproved representative and bona fide farm real estate sales were obtained. The sample of improved and unimproved farms was stratified according to soil productivity rating groups (A, B, C, and D) and by size of farm. There were 47 improved and 124 unimproved 160 acre farm units within the stratified soil productivity rating groups A to D (Table 8).

Table 8 Number of Improved and Unimproved 160 Acre Units Classified According to Productivity Rating, North Half of Spink County, South Dakota.

Productivity Rating Group	Number of Improved Units	Number of Unimproved Units
A	9	10
B	17	47
C	6	18
D	15	49
A to D	47	124

The sample of 73 improved and unimproved 320 acre units included 45 improved and 28 unimproved farm units stratified according to productivity rating groups A to D (Table 9).

Sale Prices

The range in the market price of the improved 160 acre units for productivity rating groups A to D was from $5,745 to $16,768 (Chart 1).

CHART 1

Market Price of Improved 160 Acre Units
Classified According to Productivity Rating Groups,
North Half of Spink County, South Dakota, 1948-1953.

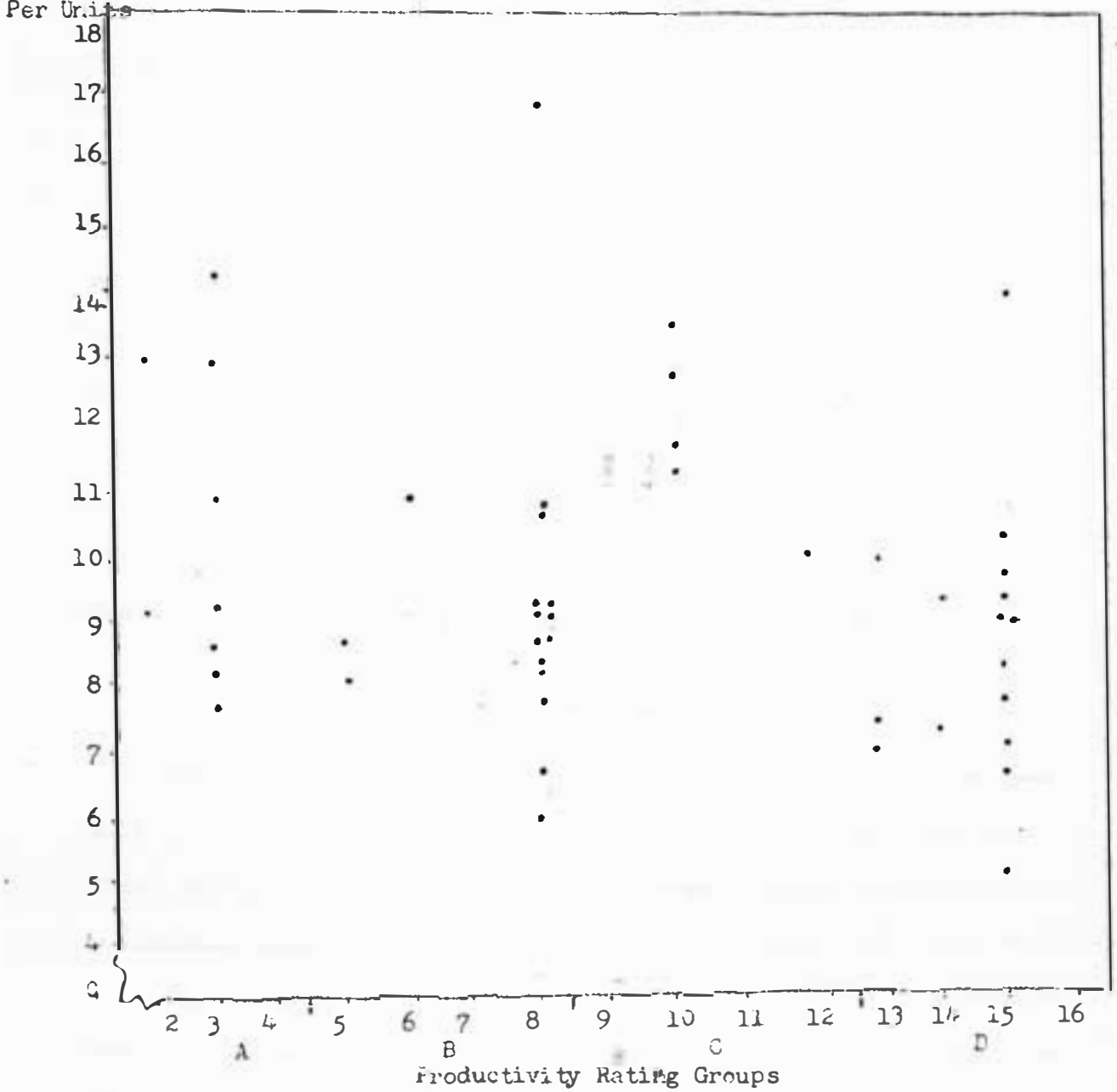


Table 9 Number of Improved and Unimproved 320 Acre Units Classified According to Productivity Rating, North Half of Spink County, South Dakota.

Productivity Rating Group	Number of Improved Units	Number of Unimproved Units
A	4	4
B	13	12
C	13	3
D	15	9
A to D	45	28

For the unimproved 160 acre farm units stratified according to productivity rating groups A to D, the range in market price for the real estate sales was from $1,260 to $15,818 (Chart 2).

For the 320 acre improved units, the market price ranged from $6,259 and $25,000 for productivity rating groups A to D (Chart 3). The unimproved 320 acre farm real estate sales ranged from $7,250 to $24,430 for productivity rating groups A to D (Chart 4).

160 Acre Units

Differences in average market price of improved farms of various soil productivity rating groups were tested statistically. Similar tests were conducted on the unimproved farms. In neither case were differences found to be significant at the 5 percent level (Table 4).

The standard error of estimate of the average value of improvements for farms of various soil productivity rating groups ranged from $718 to $1,195. Using standard errors of estimates and average differences between improved and unimproved units, 95 percent confidence

CHART 2

Market Price of Unimproved 160 Acre Units
Classified According to Productivity Rating Groups,
North Half of Spink County, South Dakota, 1948-1953.

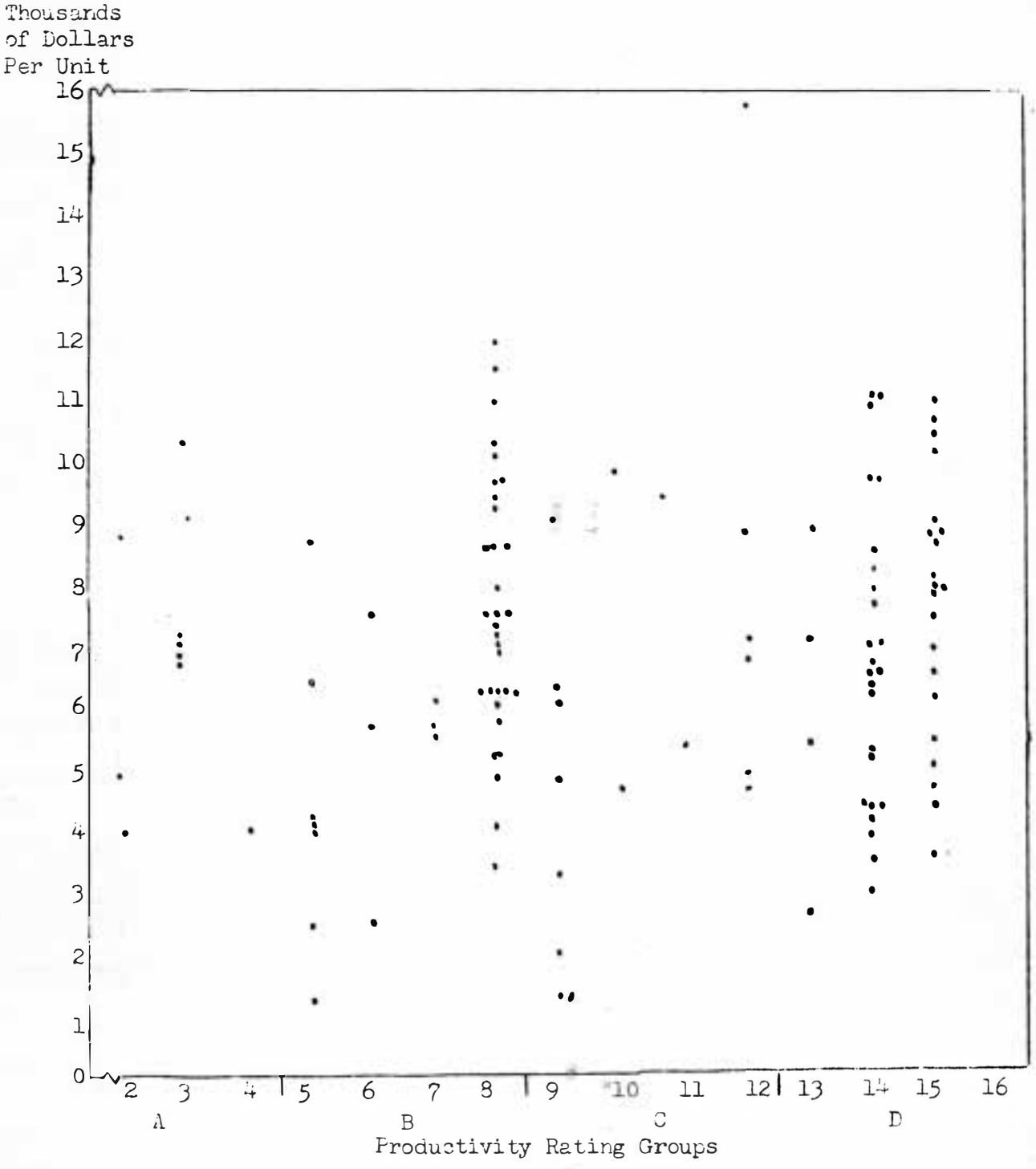


CHART 3

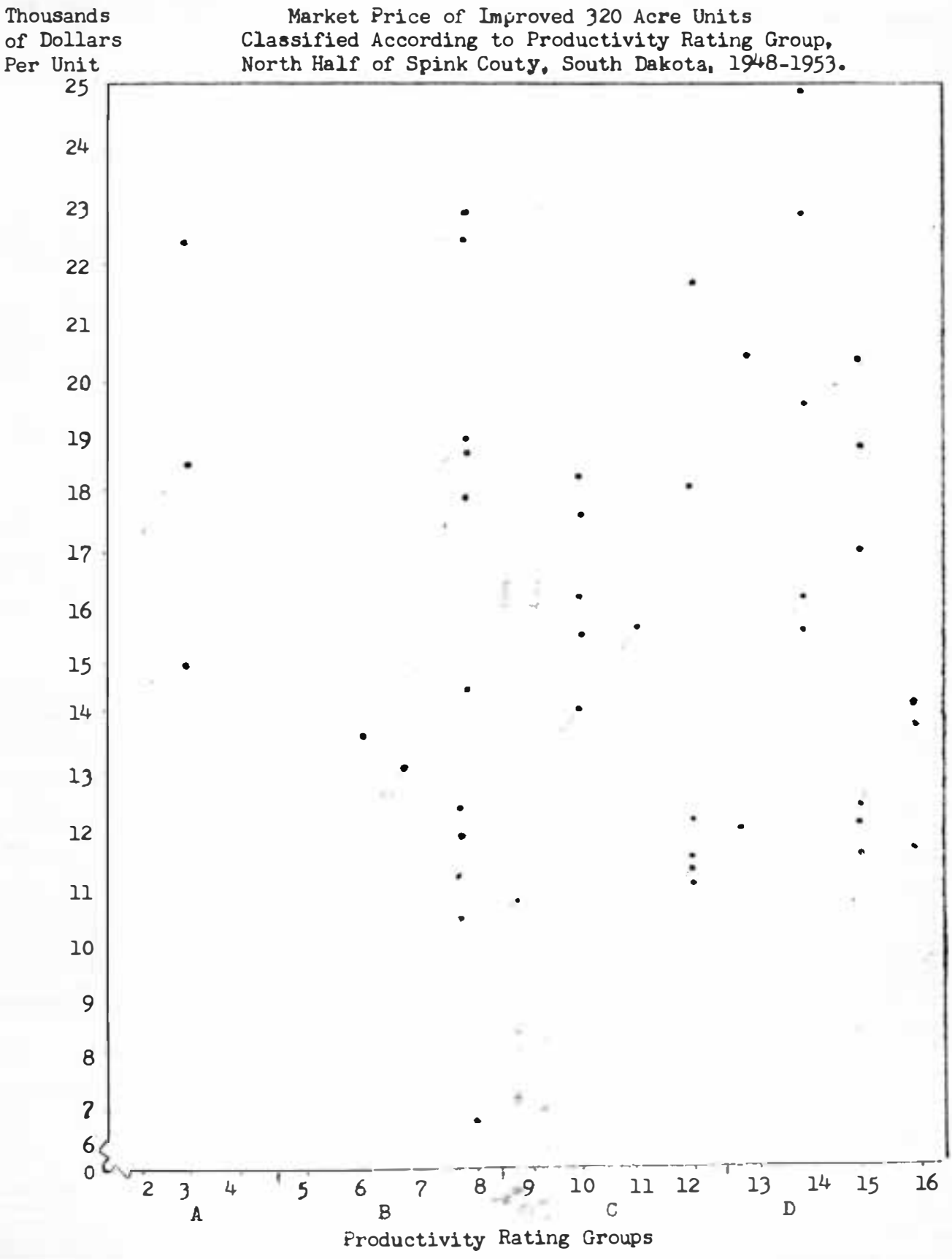
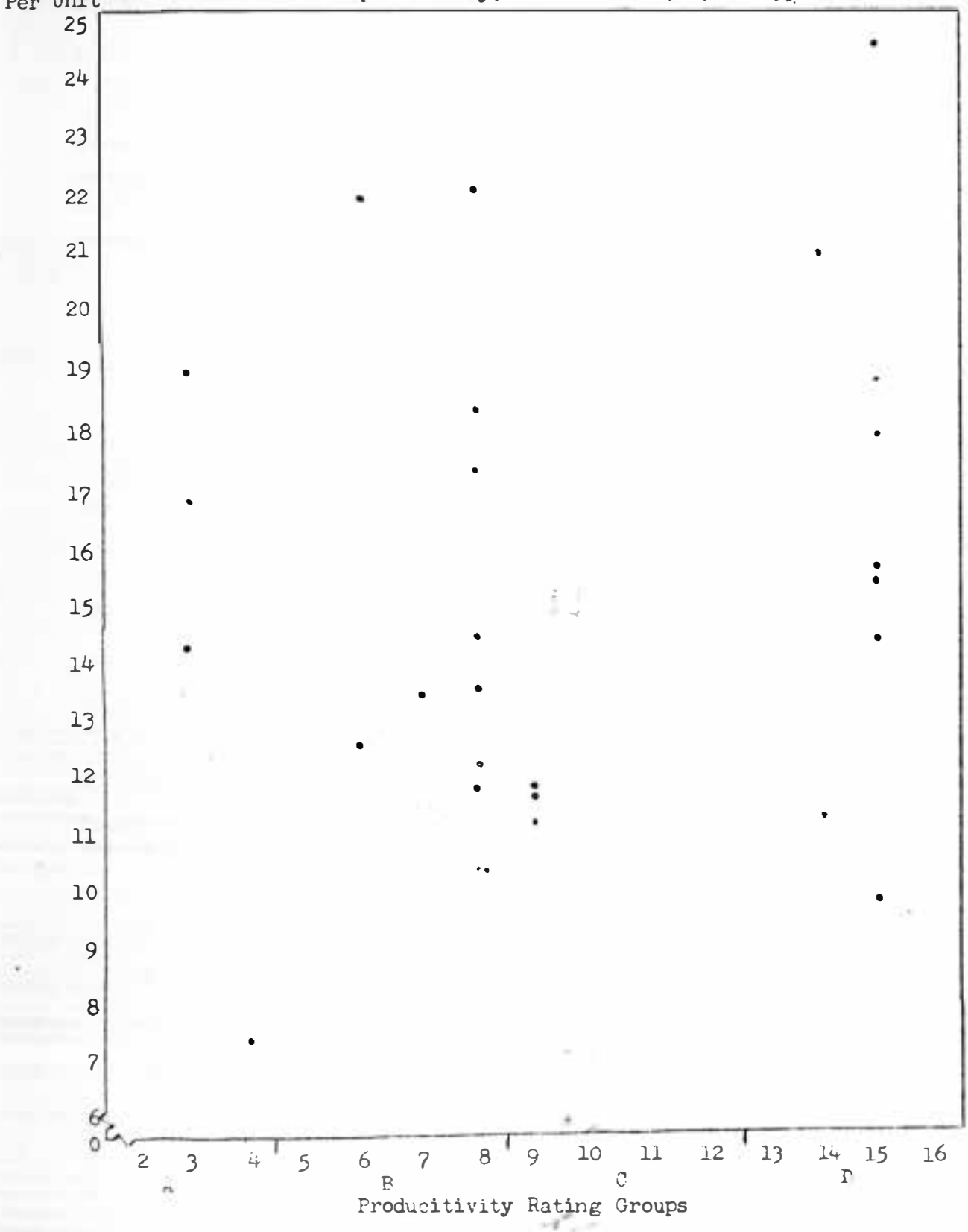

Thousands of Dollars Per Unit
Market Price of Improved 320 Acre Units Classified According to Productivity Rating Group, North Half of Spink Couty, South Dakota, 1948-1953.
25
24
23
22
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
0
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
A
B
C
D
Productivity Rating Groups

CHART 4

Market Price of Unimproved 320 Acre Units
Classified According to Productivity Rating Groups,
North Half of Spink County, South Dakota, 1948-1953.



limits were set up for the estimates of average buildings values in different soil productivity groups (Table 10).

Table 10 Confidence Limits and Best Estimate for Market Value of Improvements for 160 Acre Units Classified According to Productivity Rating, North Half of Spink County, South Dakota.

Productivity Rating Group	Estimated Market Value of Improvements		
	Best Estimate	95 Percent Confidence Limits	
A	$3,408	$ 950	$5,866
B	2,143	707	3,579
C	5,089	2,615	7,563
D	1,414	- 58	2,886
A to D	2,535	1,676	3,394

In a similar manner 50 percent confidence limits were set up for the estimates of value of buildings on the various soil productivity rating groups (Table 11).

Table 11 Confidence Limits and Best Estimate for Market Value of Improvements for 160 Acre Units Classified According to Productivity Rating, North Half of Spink County, South Dakota.

Productivity Rating Group	Estimated Average Market Value of Improvements		
	Best Estimate	50 Percent Confidence Limits	
A	$3,408	$2,606	$4,210
B	2,143	1,656	2,630
C	5,089	4,269	5,909
D	1,414	915	1,913
A to D	2,535	2,242	2,828

320 Acre Units

Differences in the average prices of neither improved nor unimproved 320 acre units of various soil productivity rating groups were statistically significant at the 5 percent level (Table 5). In a manner similar to that used for the 160 acre units, 95 percent and 50 percent confidence limits were set up for the estimates of average value of buildings in 320 acre units for the different soil productivity rating groups. These are shown in Tables 12 and 13.

Table 12 Confidence Limits and Best Estimates for Market Value of Improvements for 320 Acre Units Classified According to Productivity Rating, North Half of Spink County, South Dakota.

Productivity Rating Group	Estimated Average Market Value of Improvements		
	Best Estimate	95 Percent Confidence Limits	
A	$2,641	-$4,872	$10,156
B	31	- 3,561	3,623
C	3,237	- 2,705	9,179
D	98	- 3,674	3,870
A to D	639	- 1,446	2,720

Table 13 Confidence Limits and Best Estimates for Market Value of Improvements for 320 Acre Units Classified According to Productivity Rating, North Half of Spink County, South Dakota.

Productivity Rating Group	Estimated Average Market Value of Improvements		
	Best Estimate	50 Percent Confidence Limits	
A	$2,642	$ 440	$4,844
B	31	-1,158	1,220
C	3,237	1,315	5,159
D	98	-1,152	1,348
A to D	637	- 69	1,343

CHAPTER IV

RESULTS OF STATISTICAL TESTS

Statistical tests between sale price and soil productivity within the four major classes--160 acre improved, 160 acre unimproved, 320 acre improved, and 320 acre unimproved--were not significant at the 5 percent level.

Estimates of average market values for buildings were based on differences between prices of otherwise similar improved and unimproved farms. In most cases the estimated market values differed significantly from zero, but generally the values the market put on buildings and other improvements were a great deal below replacement cost less depreciation and well below appraised values based on the potential contribution of the buildings to farm income.

It is generally recognized that the market for farm real estate is at best a very imperfect market. These results sharply point up the inadequacy of the market, particularly its failure to differentiate in selling price between farms of widely differing quality as measured in terms of income producing capacity. Little differentiation is made in price between farms with highly productive soil and those with very inferior soil. Purchasers give only limited consideration to the value of improvements as they contribute to the farm unit.

Use of Budgets in Valuing Land

The market price of a farm unit should reflect the potential long-term revenue-producing capacity of the unit with the proper allowances made for cost adjustments. Thus, it appears desirable to use budgets in estimating the expected annual income.

Budgets, or estimated production potentialities of a unit, are based on the productive capacity of the farm. The purchaser should have in mind the approximate yield that can be obtained under his management and some idea of the market for the product. Consideration should be given to the type of livestock program that may be carried on and the building needs necessary to complement the crop and livestock program.

Adjustments should be made in the budget for a return for labor and management, and discount for taxes, interest, insurance, operating expenses, repairs, replacement costs, and allowances for hazards common in the area.

Other factors of lesser importance are adjustments made for intangible values such as location, distance to the market center, proximity to churches, schools, and social ties. Failure to make a careful evaluation of the long term expected income potentialities may result in capital and income losses.

Relationship Between Farm Real Estate Prices and Income Producing Capacity

There was no significant difference among prices paid for different qualities of soil, for either the 160 or 320 acre farms (Tables

4 and 5). In productivity rating group A for the 160 acre units the average market price was $10,327, while in group C the average price was $10,792. These figures show that the price paid for the farms in group C were somewhat greater than group A. The unimproved farms in group A also averaged lower in price than those in group D. Average prices paid for land in group A were $6,919 compared to $7,126 in group D. It is interesting to note that the price of the unimproved farms in group D averaged $207 more than those in group A, although in terms of income producing capacity they are classified the lowest.

Chart 1 provides a good indication of the wide range in the market price of real estate. For the 160 acre improved farms it may be noted that the market price ranged from $5,700 to $16,750, and the range in price for any given soil productivity group was large. It also may be noted that the individual farms within the productivity groups (A, B, C, and D) were distributed over approximately the same range without regard to quality of soil. The farms in group D were distributed over about the same range as group A.

Market prices of the 160 acre unimproved units were more widely distributed than prices of the improved farms (Chart 2). The range in the market price was from $1,150 to $15,750. The market prices of unimproved farms were distributed over approximately the same range without regard to soil quality (A, B, C, and D). In fact, the average market price of the unimproved farms in the poorer soil groups was higher than the average for farms in group A.

The analysis showed no significant difference between prices of 320 acre farms of different soil productivity for either the improved

or unimproved units. The average price paid for improved land in productivity group A was $16,834, while in group D the average price was $16,496. This is only $348 less for much inferior land. In the case of unimproved 320 acre farms, the average selling price for group A was $2,205 less than group D. The average price received for the unimproved farms in group A was $14,193, while the farms in group D averaged $16,398.

The range in prices of improved 320 acre farms was from $6,350 to $25,000. The unimproved farms ranged from $7,150 to $24,450. In general the farms with poorer soils varied slightly more in price than did those with the better soils.

Imperfections in the Farm Real Estate Market

Lack of knowledge of the potential income producing capacity of land is largely responsible for the otherwise unexplainable price structure. This imperfection results partly from the inability of buyers to appraise the income potential of known soils and partly from the lack of knowledge of soil on the farm being sold. If buyers do not possess this important information it is impossible for them to differentiate between farms of different productivity capacity. In many cases, bidding by absentee investors who are completely unfamiliar with both the soil and the income potential of various soils, drives up the prices of poorer soils.

The general rise in the level of land prices, which appears inconsistent with the general decline in farm prices, may be explained in part by the prosperity in the other sectors of the economy. This

prosperity has resulted in more investment funds than are required for immediate business needs. Outside investors have continued to bid for land even after it reached prices not justified by the potential income producing capacity.

Easier credit policies during the last 10 to 15 years have contributed to the rise in land prices. This also may have had a part in pushing the price of poorer quality land upward in relation to more productive land. According to realtors interviewed, farmers who have a smaller sized unit and limited capital and credit tend to bid up poorer quality land because they cannot compete for better quality land with investors with unlimited capital.

Market Valuation of Buildings

The statistical analysis showed that there was a significant difference between market price of improved and unimproved farms in most soil productivity groups. Ninety-five percent confidence limits for the 160 acre farms showed a relatively wide range in the estimated value of buildings. For example, confidence limits for value of buildings in soil productivity rating group A were $950 and $5,866, while in group D the confidence limits were -$58 and $2,886. The best estimates of the value of buildings, ranged from $1,414 to $5,089 for the different soil productivity groups (Table 10).

The best estimates for the market value of buildings for the productivity groups, A and D,in the 320 acre improved units ranged from a low of $31 in group B to a high of $3,237 in group C. The 95 percent confidence limits for the estimated values of buildings for each soil

are shown in Table 12. There was no perceptible relationship between estimated market value of buildings and soil productivity for either the 160 or the 320 acre units.

The low price which the market puts on farm buildings as indicated by the best estimates of value of buildings may be due in part to a change in size of units. Farmers with large capital investments in modern machinery must utilize their machinery to the fullest extent, if they are to maximize their income. The alternative to under-utilization of machinery for such farmers is to purchase more land. When more land is purchased, often the land is equipped with a set of farm buildings which are considered by the purchaser as a liability rather than an asset. It means that either the farmer must use the buildings and keep them in repair or they will deteriorate rapidly. In the meantime, a farmstead covering 5 to 20 acres or more is contributing nothing to the farm income.

Another cause of the decreasing value placed on buildings is buying by investors. Generally investors place little value on the utility of the buildings. It is less risky for an absentee landlord to rent out the bare land and get a share of the crop or a cash payment for a one year lease of the land than to be bothered with buildings. The investor in unimproved land has no expenses other than initial cost and annual taxes. He probably does not want to assume the responsibility of keeping buildings in repair.

Conclusions

In establishing a technique for tax assessment, the South Dakota code specifies that property shall be assessed at true and full value

which is defined as ". . . the usual cash selling price at the place where the property to which the term is applied shall be at the time of assessment". 8/

The results of the study indicate that difference in productivity of land, and utility of buildings are only poorly reflected by market prices. Thus, it appears that factors other than market price should be used in arriving at the valuation of a farm for assessment purposes. If the real estate is to be assessed, the assessment technique should not place great reliance on the land market which, with its imperfections, is at best only a rough indicator of value.

Assessors should assess farm real estate at true and full value, according to the law, but care must be exercised in determining "true and full value". The system must be designed to assess land and buildings according to their productive capacity, but it also must be sufficiently flexible to permit changes when farm prices change.

Although the system should reflect income capacity and be flexible, it should not be cumbersome. The success of the system is dependent on whether the assessors can use it easily and efficiently.

8/ South Dakota Code 1939. loc. cit.

CHAPTER V

SUMMARY

This study was designed to develop a technique which might be used to improve farm building assessment procedures in South Dakota. A tax assessment system for farm units was presented and analyzed.

Objectives of the study were (1) to determine the relationship between market price and soil productivity for use in assessment of farm real estate; (2) to establish a ratio of the market value of land to buildings; and (3) to develop a technique for assessment of farm buildings based on relative soil productivity and differences in market price of improved and unimproved farm real estate.

To test the tax assessment system, a sample of 244 improved and unimproved 160 and 320 acre farm units was selected in the north half of Spink County, South Dakota. Only farms which changed hands through bona fide sales during the six year period, 1948-1953 were included.

Data were obtained on the market price, soil productivity, and type and condition of buildings for each unit. Soil survey information was used to classify the soils on the farms sampled. Budgets were developed to classify the productivity rating groups in accordance with income producing capacity. Improved and unimproved farms were used to determine the estimated market price of buildings in each productivity rating group.

The proposed tax assessment technique involves rating the soil on the farm through use of a soil survey evaluation sheet. The soil

management group, representative of the farm is compared with the table value of the corresponding productivity rating group to classify the farm in the appropriate soil class. From this, the estimated average market price for buildings, corresponding to the soil productivity rating group, is obtained. A building rating index is developed to rate the buildings. The rating obtained from the index times the estimated market price, corresponding to the soil productivity rating group, gives the true market value of the buildings, or the assessed valuation if assessed directly.

Market price does not appear to be a reliable criterion for assessment of land and buildings in the north half of Spink County. The assessor should place only limited weight on the price paid. Statistical test showed that the relationship between the market price and quality of soil for the farm soil productivity rating groups was not significant. Differences between average market prices of improved and unimproved farms within the same size and soil productivity groups were used to estimate the market value of buildings. Ratios of market values of improvements to value of land were calculated for each productivity group. Ninety-five percent confidence limits were set up for these estimates. However, in some cases statistical tests revealed no significant difference between market value of improvements estimated in this manner and zero.

The general inability of market price to reflect income potential of a farm casts grave doubt on the equity involved in use of this criterion of valuation for tax purposes. If the assessed valuation of farm real estate was to fluctuate with the market, the assessment

technique would not fulfull the requirements of an equitable tax assessment procedure. A variable valuation procedure based on an imperfect market would fail to tax farmers in accordance with their ability to pay.

Conclusions

Imperfections in the farm real estate market make the market at best only a very rough indicator of "true and full" value of the property. Buyers, particularly those from a distance, do not have information which would enable them to appraise accurately the income potential of a farm. Surface appearance is often used as the sole criterion for valuing farm real estate. Methods of operation of a farm during the past year or two strongly affect the surface appearance of the farm. Proper handling of a poor farm during the season prior to selling may make it much more attractive to the uninformed buyer than a good farm which has had a year of poor management. Thus, where surface appearance is almost the sole criterion buyers use, it is to be expected that there will be little relationship between price and inherent quality. What little relationship is found, is likely a result of the relationship between good management methods of a farmer and the type of farm he operates. Of course, when neighbors buy land it is likely that they are much better appraised of the value than outsiders, but if their only competition is from the outsiders this may not have a strong effect on the price received.

An appraisal technique can not be completely divorced from the market. Market price provides an index price which may be used to set the average for appraised value of land in various areas.

An index of value of buildings and other improvements may be obtained from comparison of selling prices of improved and unimproved farms.

The average true value of land and buildings should be approximately the same respectively as the average market value of land and the average market value of buildings. In general, in the past, assessed valuations of land and buildings have varied a great deal less than have either market price or appraised value based on long term income expectations. The variation in the distribution of assessed valuations should be approximately the same as the variation found in the distribution of potential net incomes for farm land and buildings and should be centered about the average for market values.

A method has been developed for estimating the value of land and buildings based on budgeted long term gross income potential. This method may be used to obtain a measure of the variation which assessed valuations should exhibit. It also may be used as a device for ordering or placing specific units of real estate within this distribution. It was found that the real estate market did not differentiate accurately enough between farms within different productivity rating groups so that average prices for various productivity rating groups could be used in the assessment technique. It also was found that the market did not differentiate between improvements on different soil rating groups with sufficient reliability for use in the assessment technique. However, the data provide basic information for an alternative assessment technique.

In utilizing real estate market price data and budgets, a more reliable technique may be developed to overcome differences encountered as a result of imperfections in the real estate market. The alternative proposal would involve the establishment of an average market value of real estate based on sales price for productivity rating groups A to D combined (Table 5). Using budgeted gross income for a given size of farm, the soils may be ranked in order of income producing capacity (Table 7).

Ratios could be established between the average market price and farm value based on long term income producing potential for farms in the area. These could be obtained by dividing the average market prices by the average values based on income capacity. In order to obtain a value for tax purposes of an individual farm, it is necessary to multiply the value based on long term income producing capacity by this ratio.

In a similar manner a ratio between estimated market value and value based on income producing capacity could be calculated for buildings. To obtain a value of buildings for an individual farm, the value based on income producing capacity must be multiplied by the ratio. One of the problems with this technique is that in an area where absentee investors are very active in the farm real estate market their bidding tends to drive the price of bare land up to the point where there is little difference in average price between improved and unimproved farm units. Where farm land is purchased with buildings but the buildings are not used, their value to the farm unit is at the most zero. On the other hand, a farm with good buildings may be purchased at near

the bare land price, and the buildings may be immediately put to profitable use. The buildings yield a good return in the use to which they have been put, but the market places virtually no value on them. Of course, there is no change in the potential income producing capacity of the set of buildings. The question of whether or not there should be a difference in the tax assessment on the same buildings, depending on whether or not they are being used, appears to be primarily a question of ethics, and is beyond the scope of this study. However, it does suggest an area for more study in the future.

More study also is needed in determining the differences in the relationship between average price and value based on long term income producing capacity for various areas of the state. This basic information will be helpful in establishing equity in real estate appraisal within and between counties for tax assessment.

APPENDIX

U.S.D.A, - B.A.E.
L.E.D. Form 1
Rev. 5-1-45

FARM REAL ESTATE TRANSFER WORKSHEET NO. 1

Quarter_____
Year _____
County _____

A. Sel. _____ St. _____ Co._____ Book_____ Remarks:_____

B. Buy. _____ St. _____ Co. _____ Page_____

C. Date Trans._____ D. Date Filed_____ E. Fed. Rev. St. $_____

F.

Description	Sec.	Twp.	Range	Acres
Total Acres:	xxxx	xxxx	xxxx	

G. Consideration:
1. Total $_____
2. Cash $_____
3. 1st Mortg. $_____
4. 2nd Mortg. $_____
5. Pur. Cont. $_____
6. Full Con. _____
7. Par. Infor. _____

H. Mortgages Bk._____ Pg._____
1. Seller_____
2. New _____
3. Assumed_____
4. Other _____
Int. Rate: _____% Years: _____

I. Assessed Value:
1. Total $_____
2. Improve. $_____
3. Land $_____

J. Kind of Transfer:

Voluntary Transfer
1. _____Voluntary sale

Distress Transfer
1. _____Foreclosure
2. _____Assignment
3. _____County acquires
4. _____Bankruptcy sale

K. Kind of Instrument:
1. _____Warranty
2. _____Deed
3. _____Quit claim
4. _____Tax deed
5. _____Sheriff
6. _____Cont. for deed
7. _____Adm. Exec. Trustee

M. Type of Seller:

Individual
1. _____Owner-Operator
2. _____Non-operator
3. _____Unclassified

Estate
1. _____Sale by Estate

N. Type of Buyer (Status before purchase):

Farmer
1. _____Owner-Oper. reg.
2. _____Owner-oper. C. F.
3. _____Tenant
4. _____Labor, son, etc.

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Soil Survey Evaluation
Worksheet No. 2

Code _ _ _ _ _ Size of Farm _____

Code _ _ _ _ _ Map Number _____ Date of Sale _____

Desc. _____ Sec. _____ Twp. _____ R. _____ Acre _____

_____ _____ _____ _____ _____

Soil Mgt. G. _ _ _ _ _ _ _ _ _ _

_ _ _ _ _ _ _ _ _ _

Desc.		Total Acres
NW 1/4	_ _ _ _ _ _ _ _	_____
SW 1/4	_ _ _ _ _ _ _ _	_____
SE 1/4	_ _ _ _ _ _ _ _	_____
NE 1/4	_ _ _ _ _ _ _ _	_____
_____		
NE 1/4	_ _ _ _ _ _ _ _	_____
SW 1/4	_ _ _ _ _ _ _ _	_____
SE 1/4	_ _ _ _ _ _ _ _	_____
NE 1/4	_ _ _ _ _ _ _ _	_____
Total Acres	_ _ _ _ _ _ _ _	_____
Percent in S.M.G.	_ _ _ _ _ _ _ _	_____
WTD. Ave.	_ _ _ _ _ _ _ _	_____

Remarks _____

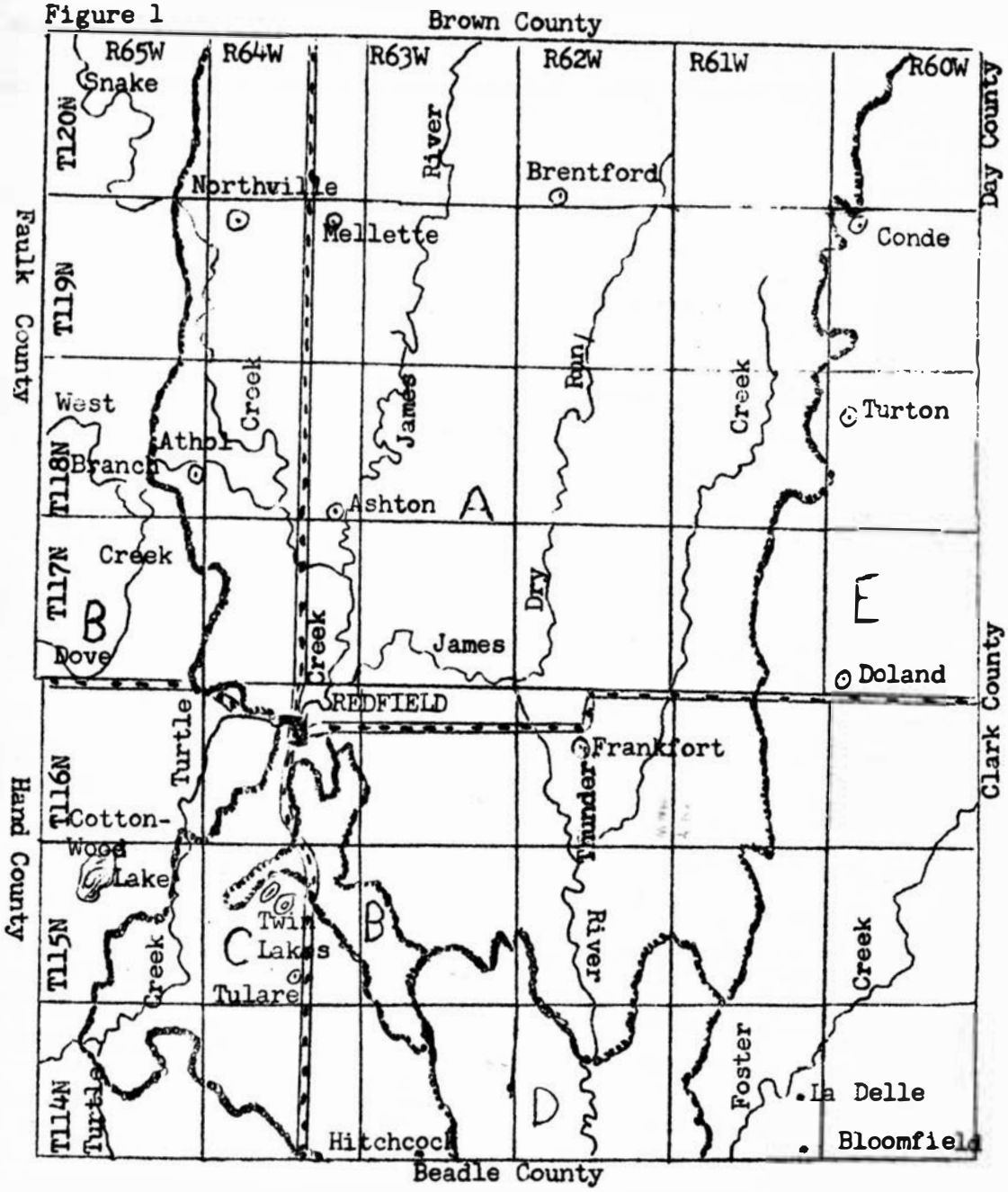
Mkt. Price _____ Adj. Mkt. Price for Acres & Years _____

Assd. Value Total _____ Adj. Assd. Value Total _____

Assd. Value Bldg. _____ Adj. Assd. Value Bldg. _____

Assd. Value Land _____ Adj. Assd. Value Land _____

Figure 1



General Soil Areas of Spink County

A. Nearly level, medium to fine-textured soils of the Lake Bed. (Chiefly Aberdeen, Beotia, and Harmony).

B. Undulating to rolling, medium textured soils of the upland.

C. Nearly level to hummocky sandy soils. (Chiefly Hecla and Wessington).

D. Nearly level, moderately fine-textured soils of the upland. (Chiefly Beadle soils with nonsaline parent materials).

E. Undulating to rolling, moderately fine-textured soils of the upland. (Chiefly Houdek, Beadle, and Cavour).

Table 1 Estimated Yields Per Acre of Crops Under Three Growing Conditions and Four Systems of Management for Soils of Management Group 1. The soils included are: 61, 62, 63, 64, 95, 96, 97.*

	Systems of Soil Management			
	A	B	C	D**
Crop	Corn Small Grain	Corn Small Grain, 20 lb. Nitrogen on Both	Small Grain, Alfalfa (2-6 Yrs.) Small Grain, Corn, Small Grain	Small Grain Plus Sweet Clover, Corn, Small Grain
		Unfavorable Growing Conditions		
Corn, Bu.	8	8	8	5
Wheat, Bu.	3	6	6	5
Oats, Bu.	7	10	10	9
Barley, Bu.	5	8	8	7
Alfalfa, T.	--	--	0.65	--
Wild Hay, T.	--	0.43	--	--
		Favorable Growing Conditions		
Corn, Bu.	24	31	33	29
Wheat, Bu.	9	14	16	12
Oats, Bu.	20	27	30	25
Barley, Bu.	14	20	22	18
Alfalfa T.	--	--	1.60	--
Wild Hay, T.	--	0.82	--	--
		Very Favorable Growing Conditions		
Corn, Bu.	33	41	45	38
Wheat, Bu.	14	22	25	19
Oats, Bu.	34	48	50	40
Barley, Bu.	23	33	36	28
Alfalfa, T.	--	--	1.95	--
Wild Hay, T.	--	1.12	--	--

* F. C. Westin and others, Soil Survey of Spink County, South Dakota. South Dakota Agricultural Experiment Station Bulletin 439. 1954.

** An adjustment was made in the rotation D in consultation with F. C. Westin, Agronomy Department, South Dakota State College. The corn was omitted in rotation D as used in this study making the rotation read, small grain plus sweet clover, small grain.

Table 2 Estimated Yields Per Acre of Crops Under Three Growing Conditions and Four Systems of Management for Soils of Management Group 2. The soils included are: 26, 27, 28, 43, 59, 60.*

	Systems of Soil Management			
	A	B	C	D
Crop	Corn Small Grain	Corn Small Grain, 20 Lb. Nitrogen on Both	Small Grain, Alfalfa (2-6 Yrs.) Small Grain, Corn, Small Grain	Small Grain Plus Sweet Clover, Corn, Small Grain
		Unfavorable Growing Conditions		
Corn, Bu.	7	8	8	6
Wheat, Bu.	3	6	6	5
Oats, Bu.	9	12	12	11
Barley, Bu.	6	8	8	7
Alfalfa, T.	--	--	0.85	--
Wild Hay, T.	--	0.55	--	--
		Favorable Growing Conditions		
Corn, Bu.	25	32	34	30
Wheat, Bu.	11	16	18	15
Oats, Bu.	25	32	35	31
Barley, Bu.	15	21	23	19
Alfalfa, T.	--	--	1.65	--
Wild Hay, T.	--	0.75	--	--
		Very Favorable Growing Conditions		
Corn, Bu.	34	42	46	39
Wheat, Bu.	14	22	25	18
Oats, Bu.	37	50	53	43
Barley, Bu.	24	33	36	29
Alfalfa, T.	--	--	2.10	--
Wild Hay, T.	--	0.95	--	--

* F. C. Westin and others, Soil Survey of Spink County, South Dakota. South Dakota Agricultural Experiment Station Bulletin 439. 1954.

** An adjustment was made in the rotation D in consultation with F. C. Westin, Agronomy Department, South Dakota State College. The corn was omitted in rotation D as used in this study making the rotation read, small grain plus sweet clover, small grain.

Table 3 Estimated Yields Per Acre of Crops Under Three Growing Conditions and Four Systems of Management for Soils of Management Group 3. The soils included are: 15, 16, 17, 18, 19, 20, 22, 23, 24, 25, 34, 35, 36, 37, 38, 39, 42, 47, 48, 50, 54, 86, 87.*

	Systems of Soil Management			
	A	B	C	D**
Crop	Corn Small Grain	Corn Small Grain, 20 Lb. Nitrogen on Both	Small Grain, Alfalfa (2-6 Yrs.) Small Grain, Corn, Small Grain	Small Grain Plus Sweet Clover, Corn, Small Grain
		Unfavorable Growing Conditions		
Corn, Bu.	5	6	5	4
Wheat, Bu.	4	8	8	6
Oats, Bu.	10	16	16	12
Barley, Bu.	7	12	12	9
Alfalfa, T.	--	--	1.10	--
Wild Hay, T.	--	0.35	--	--
		Favorable Growing Conditions		
Corn, Bu.	18	22	24	20
Wheat, Bu.	13	19	20	17
Oats, Bu.	28	36	38	32
Barley, Bu.	17	24	26	23
Alfalfa, T.	--	--	1.85	--
Wild Hay, T.	--	0.90	--	--
		Very Favorable Growing Conditions		
Corn, Bu.	27	35	42	32
Wheat, Bu.	19	28	30	23
Oats, Bu.	45	56	60	52
Barley, Bu.	29	37	42	35
Alfalfa, T.	--	--	2.16	--
Wild Hay, T.	--	1.24	--	--

* F. C. Westin and others, Soil Survey of Spink County, South Dakota. South Dakota Agricultural Experiment Station Bulletin 439. 1954.

** An adjustment was made in the rotation D in consultation with F. C. Westin, Agronomy Department, South Dakota State College. The corn was omitted in rotation D as used in this study making the rotation read, small grain plus sweet clover, small grain.

Table 4 Estimated Yields Per Acre of Crops Under Three Growing Conditions and Four Systems of Management for Soils of Management Group 4. The soils included are: 6, 7, 8, 9, 13, 14, 33, 55, 56, 57, 58, 88, 90, 91.*

	Systems of Soil Management			
	A	B	C	D**
Crop	Corn Small Grain	Corn Small Grain, 20 Lb. Nitrogen on Both	Small Grain, Alfalfa (2-6 Yrs.) Small Grain, Corn, Small Grain	Small Grain Plus Sweet Clover, Corn, Small Grain
		Unfavorable Growing Conditions		
Corn, Bu.	5	6	5	4
Wheat, Bu.	4	8	8	6
Oats, Bu.	10	16	16	12
Barley, Bu.	7	13	12	9
Alfalfa, T.	--	--	0.95	--
Wild Hay, T.	--	0.30	--	--
		Favorable Growing Conditions		
Corn, Bu.	16	22	24	21
Wheat, Bu.	12	18	19	15
Oats, Bu.	28	36	38	32
Barley, Bu.	16	23	25	22
Alfalfa, T.	--	--	1.80	--
Wild Hay, T.	--	0.85	--	--
		Very Favorable Growing Conditions		
Corn, Bu.	25	33	40	31
Wheat, Bu.	20	28	30	24
Oats, Bu.	44	56	60	52
Barley, Bu.	29	37	44	35
Alfalfa, T.	--	--	2.10	--
Wild Hay, T.	--	1.20	--	--

* F. C. Westin and others, Soil Survey of Spink County, South Dakota. South Dakota Agricultural Experiment Station Bulletin 439. 1954.

** An adjustment was made in the rotation D in consultation with F. C. Westin, Agronomy Department, South Dakota State College. The corn was omitted in rotation D as used in this study making the rotation read, small grain plus sweet clover, small grain.

Table 5 Estimated Yields Per Acre of Crops Under Three Growing Conditions and Four Systems of Management for Soils of Management Group 5. The Soils included are: 65, 66.*

	Systems of Soil Management			
	A	B	C	D**
Crop	Corn Small Grain	Corn Small Grain, 20 Lb. Nitrogen on Both	Small Grain, Alfalfa (2-6 Yrs.) Small Grain, Corn, Small Grain	Small Grain Plus Sweet Clover, Corn, Small Grain
		Unfavorable Growing Conditions		
Corn, Bu.	5	5	5	5
Wheat, Bu.	3	6	6	5
Oats, Bu.	7	10	12	10
Barley, Bu.	4	6	7	6
Alfalfa, T.	--	--	0.5	--
Wild Hay, T.	--	0.3	--	--
		Favorable Growing Conditions		
Corn, Bu.	11	18	21	19
Wheat, Bu.	7	11	14	10
Oats, Bu.	19	26	30	25
Barley, Bu.	10	16	18	15
Alfalfa, T.	--	--	1.15	--
Wild Hay, T.	--	0.5	--	--
		Very Favorable Growing Conditions		
Corn, Bu.	21	29	36	30
Wheat, Bu.	12	18	21	16
Oats, Bu.	30	40	43	36
Barley, Bu.	22	29	32	27
Alfalfa, T.	--	--	1.45	--
Wild Hay, T.	--	0.7	--	--

* F. C. Westin and others, Soil Survey of Spink County, South Dakota. South Dakota Agricultural Experiment Station Bulletin 439. 1954.

** An adjustment was made in the rotation D in consultation with F. C. Westin, Agronomy Department, South Dakota State College. The corn was omitted in rotation D as used in this study making the rotation read, small grain plus sweet clover, small grain.

Table 6 Estimated Yields Per Acre of Crops Under Three Growing Conditions and Four Systems of Management for Soils of Management Group 6. The soils included are: 1, 2, 3, 4, 5, 12, 29, 30.*

	Systems of Soil Management			
	A	B	C	D**
Crop	Corn Small Grain	Corn Small Grain, 20 Lb. Nitrogen on Both	Small Grain, Alfalfa (2-6 Yrs.) Small Grain, Corn, Small Grain	Small Grain Plus Sweet Clover, Corn, Small Grain
		Unfavorable Growing Conditions		
Corn, Bu.	3	4	5	4
Wheat, Bu.	3	6	7	5
Oats, Bu.	8	11	12	10
Barley, Bu.	5	8	9	7
Alfalfa, T.	--	--	0.5	--
Wild Hay, T.	--	0.4	--	--
		Favorable Growing Conditions		
Corn, Bu.	11	16	18	15
Wheat, Bu.	10	15	17	14
Oats, Bu.	22	28	30	27
Barley, Bu.	15	20	22	19
Alfalfa, T.	--	--	1.3	--
Wild Hay, T.	--	0.6	--	--
		Very Favorable Growing Conditions		
Corn, Bu.	19	25	30	23
Wheat, Bu.	17	24	27	21
Oats, Bu.	37	47	51	43
Barley, Bu.	25	32	36	30
Alfalfa, T.	--	--	1.5	--
Wild Hay, T.	--	0.7	--	--

*. F. C. Westin and others, Soil Survey of Spink County, South Dakota. South Dakota Agricultural Experiment Station Bulletin 439. 1954

** An adjustment was made in the rotation D in consultation with F. C. Westin, Agronomy Department, South Dakota State College. The corn was omitted in rotation D as used in this study making the rotation read, small grain plus sweet clover, small grain.

Table 7 Estimated Yields Per Acre of Crops Under Three Growing Conditions and Four Systems of Management for Soils of Management Group 7. The soils included are: 31, 44, 45.*

	Systems of Soil Management			
	A	B	C	D**
Crop	Corn Small Grain	Corn Small Grain, 20 Lb. Nitrogen on Both	Small Grain, Alfalfa (2-6 Yrs) Small Grain, Corn, Small Grain	Small Grain Plus Sweet Clover, Corn, Small Grain
		Unfavorable Growing Conditions		
Corn, Bu.	3	3	3	3
Wheat, Bu.	3	5	5	5
Oats, Bu.	7	10	10	10
Barley, Bu.	5	6	6	6
Alfalfa, T.	--	--	0.4	--
Wild Hay, T.	--	0.25	--	--
		Favorable Growing Conditions		
Corn, Bu.	8	11	13	12
Wheat, Bu.	5	9	12	11
Oats, Bu.	12	16	18	17
Barley, Bu.	8	11	13	12
Alfalfa, T.	--	--	1.0	--
Wild Hay, T.	--	0.50	--	--
		Very Favorable Growing Conditions		
Corn, Bu.	12	16	18	17
Wheat, Bu.	10	14	17	15
Oats, Bu.	19	23	26	24
Barley, Bu.	15	19	22	20
Alfalfa, T.	--	--	1.2	--
Wild Hay, T.	--	0.75	--	--

* F. C. Westin and others, Soil Survey of Spink County, South Dakota. South Dakota Agricultural Experiment Station Bulletin 439. 1954.

** An adjustment was made in the rotation D in consultation with F. C. Westin, Agronomy Department, South Dakota State College. The corn was omitted in rotation D as used in this study making the rotation read, small grain plus sweet clover, small grain.

Table 8 Estimated Yields Per Acre of Crops Under Three Growing Conditions and Four Systems of Management for Soils of Management Group 8. The soils included are: 52, 53.*

	Systems of Soil Management			
	A	B	C	D**
Crop	Corn Small Grain	Corn Small Grain, 20 Lb. Nitrogen on Both	Small Grain, Alfalfa (2-6 Yrs.) Small Grain, Corn, Small Grain	Small Grain Plus Sweet Clover, Corn, Small Grain
		Unfavorable Growing Conditions		
Corn, Bu.	4	6	5	4
Wheat, Bu.	3	7	7	6
Oats, Bu.	6	12	12	10
Barley, Bu.	4	8	8	7
Alfalfa, T.	--	--	0.95	--
Wild Hay, T.	--	0.30	--	--
		Favorable Growing Conditions		
Corn, Bu.	11	17	20	16
Wheat, Bu.	8	16	18	15
Oats, Bu.	18	28	30	27
Barley, Bu.	12	19	22	18
Alfalfa, T.	--	--	1.65	--
Wild Hay, T.	--	0.80	--	--
		Very Favorable Growing Conditions		
Corn, Bu.	21	29	33	28
Wheat, Bu.	13	21	24	21
Oats, Bu.	31	41	45	40
Barley, Bu.	21	31	35	30
Alfalfa, T.	--	--	1.9	--
Wild Hay, T.	--	1.10	--	--

* F. C. Westin and others, Soil Survey of Spink County, South Dakota. South Dakota Agricultural Experiment Station Bulletin 439. 1954.

** An adjustment was made in the rotation D in consultation with F. C. Westin, Agronomy Department, South Dakota State College. The corn was omitted in rotation D as used in this study making the rotation read, small grain, plus sweet clover, small grain.

Table 9 Estimated Yields Per Acre of Crops Under Three Growing Conditions and Four Systems of Management for Soils of Management Group 9. The soils included are: 101, 105, 106, 107, 108, 109.*

	Systems of Soil Management			
	A	B	C	D**
Crop	Corn Small Grain	Corn Small Grain, 20 Lb. Nitrogen on Both	Small Grain, Alfalfa (2-6 Yrs.) Small Grain, Corn, Small Grain	Small Grain Plus Sweet Clover, Corn, Small Grain
		Unfavorable Growing Conditions		
Corn, Bu.	5	6	6	5
Wheat, Bu.	3	6	6	5
Oats, Bu.	6	8	8	6
Barley, Bu.	4	6	6	5
Alfalfa, T.	--	--	0.7	--
Wild Hay, T.	--	0.25	--	--
		Favorable Growing Conditions		
Corn, Bu.	13	19	21	18
Wheat, Bu.	8	13	15	12
Oats, Bu.	18	26	28	24
Barley, Bu.	12	19	21	16
Alfalfa, T.	--	--	1.45	--
Wild Hay, T.	--	0.70	--	--
		Very Favorable Growing Conditions		
Corn, Bu.	31	38	40	36
Wheat, Bu.	12	20	23	18
Oats, Bu.	30	40	42	38
Barley, Bu.	20	28	30	26
Alfalfa, T.	--	--	1.85	--
Wild Hay, T.	--	1.00	--	--

* F. C. Westin and others, Soil Survey of Spink County, South Dakota. South Dakota Agricultural Experiment Station Bulletin 439. 1954.

** An adjustment was made in the rotation D in consultation with F. C. Westin, Agronomy Department, South Dakota State College. The corn was omitted in rotation D as used in this study making the rotation read, small grain plus sweet clover, small grain.

Table 10 Estimated Yields Per Acre of Crops Under Three Growing Conditions and Four Systems of Management for Soils of Management Group 10. The soils included are: 21, 40, 41, 46, 49, 51.*

	Systems of Soil Management			
	A	B	C	D**
Crop	Corn Small Grain	Corn Small Grain, 20 Lb. Nitrogen on Both	Small Grain, Alfalfa (2-6 Yrs.) Small Grain, Corn, Small Grain	Small Grain Plus Sweet Clover, Corn, Small Grain
		Unfavorable Growing Conditions		
Corn, Bu.	4	6	5	4
Wheat, Bu.	3	5	5	5
Oats, Bu.	7	10	12	11
Barley, Bu.	5	7	8	7
Alfalfa, T.	--	--	0.9	--
Wild Hay, T.	--	0.25	--	--
		Favorable Growing Conditions		
Corn, Bu.	11	15	18	15
Wheat, Bu.	9	14	16	14
Oats, Bu.	20	23	30	26
Barley, Bu.	11	16	19	16
Alfalfa, T.	--	--	1.5	--
Wild Hay, T.	--	0.75	--	--
		Very Favorable Growing Conditions		
Corn, Bu.	23	31	34	31
Wheat, Bu.	15	21	23	21
Oats, Bu.	33	42	45	42
Barley, Bu.	21	30	33	30
Alfalfa, T.	--	--	1.85	--
Wild Hay, T.	--	1.10	--	--

* F. C. Westin and others, Soil Survey of Spink County, South Dakota. South Dakota Agricultural Experiment Station Bulletin 439. 1954.

** An adjustment was made in the rotation D in consultation with F. C. Westin, Agronomy Department, South Dakota State College. The corn was omitted in rotation D as used in this study making the rotation read, small grain plus sweet clover, small grain.

Table 11 Estimated Yields Per Acre of Crops Under Three Growing Conditions and Four Systems of Management for Soils of Management Group 11. The soils included are: 110, 111.*

	Systems of Soil Management			
	A	B	C	D**
Crop	Corn Small Grain	Corn Small Grain, 20 Lb. Nitrogen on Both	Small Grain, Alfalfa (2-6 Yrs) Small Grain, Corn, Small Grain	Small Grain Plus Sweet Clover, Corn, Small Grain
		Unfavorable Growing Conditions		
Corn, Bu.	2	4	4	3
Wheat, Bu.	2	5	5	5
Oats, Bu.	4	6	6	6
Barley, Bu.	3	4	4	4
Alfalfa, T.	--	--	0.65	--
Wild Hay, T.	--	0.20	--	--
		Favorable Growing Conditions		
Corn, Bu.	8	12	14	12
Wheat, Bu.	5	10	12	11
Oats, Bu.	12	20	22	20
Barley, Bu.	8	13	15	12
Alfalfa, T.	--	--	1.30	--
Wild Hay, T.	--	0.52	--	--
		Very Favorable Growing Conditions		
Corn, Bu.	14	20	22	20
Wheat, Bu.	8	14	16	15
Oats, Bu.	20	27	32	28
Barley, Bu.	13	18	20	19
Alfalfa, T.	--	--	1.5	--
Wild Hay, T.	--	0.90	--	--

* F. C. Westin and others, Soil Survey of Spink County, South Dakota. South Dakota Agricultural Experiment Station Bulletin 439. 1954.

** An adjustment was made in the rotation D in consultation with F. C. Westin, Agronomy Department, South Dakota State College. The corn was omitted in rotation D as used in this study making the rotation read, small grain plus sweet clover, small grain.

Table 12 Estimated Yields Per Acre of Crops Under Three Growing Conditions and Four Systems of Management for Soils of Management Group 12. The soils included are: 74, 75, 76.*

	Systems of Soil Management			
	A	B	C	D**
Crop	Corn Small Grain	Corn Small Grain, 20 Lb. Nitrogen on Both	Small Grain, Alfalfa (2-6 Yrs.) Small Grain, Corn, Small Grain	Small Grain Plus Sweet Clover, Corn, Small Grain
		Unfavorable Growing Conditions		
Corn, Bu.	6	7	7	6
Wheat, Bu.	3	6	6	5
Oats, Bu.	7	10	10	9
Barley, Bu.	5	7	7	6
Alfalfa, T.	--	--	0.8	--
Wild Hay, T.	--	0.30	--	--
		Favorable Growing Conditions		
Corn, Bu.	14	21	24	20
Wheat, Bu.	9	15	17	14
Oats, Bu.	20	26	29	25
Barley, Bu.	14	19	21	18
Alfalfa, T.	--	--	1.55	--
Wild Hay, T.	--	0.75	--	--
		Very Favorable Growing Conditions		
Corn, Bu.	25	32	34	30
Wheat, Bu.	14	21	23	19
Oats, Bu.	34	43	46	42
Barley, Bu.	23	31	33	30
Alfalfa, T.	--	--	1.85	--
Wild Hay, T.	--	1.10	--	--

* F. C. Westin and others, Soil Survey of Spink County, South Dakota. South Dakota Agricultural Experiment Station Bulletin 439. 1954.

** An adjustment was made in the rotation D in consultation with F. C. Westin, Agronomy Department, South Dakota State College. The corn was omitted in rotation D as used in this study making the rotation read, small grain plus sweet clover, small grain.

Table 13 Estimated Yields Per Acre of Crops Under Three Growing Conditions and Four Systems of Management for Soils of Management Group 13. The soils included are: 67, 68, 69, 70, 71, 72, 73, 77.*

	Systems of Soil Management			
	A	B	C	D**
Crop	Corn Small Grain	Corn Small Grain, 20 Lb. Nitrogen on Both	Small Grain, Alfalfa (2-6 Yrs.) Small Grain, Corn, Small Grain	Small Grain Plus Sweet Clover, Corn, Small Grain
		Unfavorable Growing Conditions		
Corn, Bu.	4	7	7	4
Wheat, Bu.	3	6	6	5
Oats, Bu.	8	10	10	9
Barley, Bu.	5	7	7	6
Alfalfa, T.	--	--	0.88	--
Wild Hay, T.	--	0.35	--	--
		Favorable Growing Conditions		
Corn, Bu.	15	23	26	22
Wheat, Bu.	11	16	18	15
Oats, Bu.	22	28	31	27
Barley, Bu.	14	20	23	19
Alfalfa, T.	--	--	1.50	--
Wild Hay, T.	--	0.80	--	--
		Very Favorable Growing Conditions		
Corn, Bu.	26	33	35	32
Wheat, Bu.	15	21	23	19
Oats, Bu.	37	46	49	44
Barley, Bu.	25	32	34	31
Alfalfa, T.	--	--	1.90	--
Wild Hay, T.	--	1.15	--	--

* F. C. Westin and others, Soil Survey of Spink County, South Dakota. South Dakota Agricultural Experiment Station Bulletin 439. 1954.

** An adjustment was made in the rotation D in consultation with F. C. Westin, Agronomy Department, South Dakota State College. The corn was omitted in rotation D as used in this study making the rotation read, small grain plus sweet clover, small grain.

Table 14 Estimated Yields Per Acre of Crops Under Three Growing Conditions and Four Systems of Management for Soils of Management Group 14. The soils included are: 10, 11.*

	Systems of Soil Management			
	A	B	C	D
Crop	Corn Small Grain	Corn Small Grain, 20 Lb. Nitrogen on Both	Small Grain, Alfalfa (2-6 Yrs.) Small Grain, Corn, Small Grain	Small Grain Plus Sweet Clover, Corn, Small Grain
		Unfavorable Growing Conditions		
Corn, Bu.	4	5	4	4
Wheat, Bu.	3	7	7	6
Oats, Bu.	8	12	12	11
Barley, Bu.	5	11	11	10
Alfalfa, T.	--	--	0.80	--
Wild Hay, T.	--	0.30	--	--
		Favorable Growing Conditions		
Corn, Bu.	14	20	22	19
Wheat, Bu.	10	16	17	14
Oats, Bu.	22	30	32	28
Barley, Bu.	14	21	23	20
Alfalfa, T.	--	--	1.65	--
Wild Hay, T.	--	0.75	--	--
		Very Favorable Growing Conditions		
Corn, Bu.	23	31	35	29
Wheat, Bu.	16	24	26	22
Oats, Bu.	37	47	50	45
Barley, Bu.	25	31	36	30
Alfalfa, T.	--	--	1.95	--
Wild Hay, T.	--	1.10	--	--

* F. C. Westin and others, Soil Survey of Spink County, South Dakota. South Dakota Agricultural Experiment Station Bulletin 439. 1954.

** An adjustment was made in the rotation D in consultation with F. C. Westin, Agronomy Department, South Dakota State College. The corn was omitted in rotation D as used in this study making the rotation read, small grain plus sweet clover, small grain.

Table 15 Estimate Yields Per Acre of Crops Under Three Growing Conditions and Four Systems of Management for Soils of Management Group 15. The soils included are: 78, 79, 80, 81, 82, 83.*

	Systems of Soil Management			
	A	B	C	D**
Crop	Corn Small Grain	Corn Small Grain, 20 Lb. Nitrogen on Both	Small Grain, Alfalfa (2-6 Yrs.) Small Grain, Corn, Small Grain	Small Grain Plus Sweet Clover, Corn, Small Grain
		Unfavorable Growing Conditions		
Corn, Bu.	3	5	5	3
Wheat, Bu.	2	4	3	3
Oats, Bu.	4	6	5	5
Barley, Bu.	3	5	4	4
Alfalfa, T.	--	--	0.75	--
Wild Hay, T.	--	0.30	--	--
		Favorable Growing Conditions		
Corn, Bu.	8	13	15	12
Wheat, Bu.	5	10	12	9
Oats, Bu.	12	19	21	18
Barley, Bu.	8	14	15	13
Alfalfa, T.	--	--	1.35	--
Wild Hay, T.	--	0.70	--	--
		Very Favorable Growing Conditions		
Corn, Bu.	14	19	23	18
Wheat, Bu.	8	15	18	14
Oats, Bu.	20	28	32	27
Barley, Bu.	13	18	22	17
Alfalfa, T.	--	--	1.80	--
Wild Hay, T.	--	1.05	--	--

* F. C. Westin and others, Soil Survey of Spink County, South Dakota. South Dakota Agricultural Experiment Station Bulletin 439. 1954.

** An adjustment was made in the rotation D in consultation with F. C. Westin, Agronomy Department, South Dakota State College. The corn was omitted in rotation D as used in this study making the rotation read, small grain plus sweet clover, small grain.

Table 16 Estimated Yields Per Acre of Crops Under Three Growing Conditions and Four Systems of Management for Soils of Management Group 17. The soils included are: 89, 94, 103.*

	Systems of Soil Management			
	A	B	C	D**
Crop	Corn Small Grain	Corn Small Grain, 20 Lb. Nitrogen on Both	Small Grain, Alfalfa (2-6 Yrs.) Small Grain, Corn, Small Grain	Small Grain Plus Sweet Clover, Corn, Small Grain
		Unfavorable Growing Conditions		
Corn, Bu.	6	7	8	7
Wheat, Bu.	4	8	8	7
Oats, Bu.	11	16	16	12
Barley, Bu.	7	11	12	10
Alfalfa, T.	--	--	1.30	--
Wild Hay, T.	--	0.50	--	--
		Favorable Growing Conditions		
Corn, Bu.	18	23	26	22
Wheat, Bu.	14	19	21	17
Oats, Bu.	30	36	39	36
Barley, Bu.	19	24	27	23
Alfalfa, T.	--	--	2.0	--
Wild Hay, T.	--	1.00	--	--
		Very Favorable Growing Conditions		
Corn, Bu.	31	35	42	33
Wheat, Bu.	20	28	31	26
Oats, Bu.	45	56	60	53
Barley, Bu.	30	37	42	35
Alfalfa, T.	--	--	2.25	--
Wild Hay, T.	--	1.30	--	--

* F. C. Westin and others, Soil Survey of Spink County, South Dakota. South Dakota Agricultural Experiment Station Bulletin 439. 1954.

** An adjustment was made in the rotation D in consultation with F. C. Westin, Agronomy Department, South Dakota State College. The corn was omitted in rotation D as used in this study making the rotation read, small grain plus sweet clover, small grain.

Table 17 Budget Showing Gross Income for a 320 Acre Unit Under Favorable Growing Conditions With System of Soil Management C for Soil Management Group 1.

Crop	Percentage of Rotated Acres	Acres Harvested	Yield Per Acre (Bushels or Tons)	Total Yield (Bushels or Tons)	Price Per Bushel or Ton	Gross Income
Corn	17	54.4	33	1,795.2	$ 1.28	$ 2,297.86
Wheat	57	182.4	16	2,918.4	2.04	5,953.54
Oats	15	48.0	30	1,440.0	.67	964.80
Barley	7	22.4	22	492.8	1.08	532.22
Alfalfa	4	12.8	1.6	20.48	17.12	350.62
Total	100	320				$10,099.04

Table 18 Budget Showing Gross Income for a 320 Acre Unit Under Favorable Growing Conditions With System of Soil Management C for Soil Management Group 2.

Crop	Percentage of Rotated Acres	Acres Harvested	Yield Per Acre (Bushels or Tons)	Total Yield (Bushels or Tons)	Price Per Bushel or Ton	Gross Income
Corn	17	54.4	34	1,849.6	$ 1.28	$ 2,367.49
Wheat	57	182.4	18	3,223.2	2.04	6,697.73
Oats	15	48.0	35	1,680.0	.67	1,125.60
Barley	7	22.4	23	515.4	1.08	556.63
Alfalfa	4	12.8	1.65	21.12	17.12	361.57
Total	100	320	—	—	—	$11,109.02

Table 19 Budget Showing Gross Income for a 320 Acre Unit Under Favorable Growing Conditions With System of Soil Management C for Soil Management Group 3.

Crop	Percentage of Rotated Acres	Acres Harvested	Yield Per Acre (Bushels or Tons)	Total Yield (Bushels or Tons)	Price Per Bushel or Ton	Gross Income
Corn	17	54.4	24	1,305.6	$ 1.28	$ 1,671.17
Wheat	57	182.4	20	3,648.0	2.04	7,441.92
Oats	15	48.0	38	1,824.0	.67	1,222.08
Barley	7	22.4	26	582.4	1.08	628.99
Alfalfa	4	12.8	1.85	23.68	17.12	405.40
Total	100	320				$11,369.56

Table 20 Budget Showing Gross Income for a 320 Acre Unit Under Favorable Growing Conditions With System of Soil Management C for Soil Management Group 4.

Crop	Percentage of Rotated Acres	Acres Harvested	Yield Per Acre (Bushels or Tons)	Total Yield (Bushels or Tons)	Price Per Bushel or Ton	Gross Income
Corn	17	54.4	24	1,305.6	$ 1.28	$ 1,671.17
Wheat	57	182.4	19	3,465.6	2.04	7,069.82
Oats	15	48.0	38	1,824.0	.67	1,222.08
Barley	7	22.4	25	560.0	1.08	604.80
Alfalfa	4	12.8	1.8	23.04	17.12	394.44
Total	100	320				$10,962.31

Table 21 Budget Showing Gross Income for a 320 Acre Unit Under Favorable Growing Conditions With System of Soil Management C for Soil Management Group 5.

Crop	Percentage of Rotated Acres	Acres Harvested	Yield Per Acre (Bushels or Tons)	Total Yield (Bushels or Tons)	Price Per Bushel or Ton	Gross Income
Corn	17	54.4	21	1,142.4	$ 1.28	$ 1,462.27
Wheat	57	182.4	14	2,553.6	2.04	5,209.34
Oats	15	48.0	30	1,440.0	.67	964.80
Barley	7	22.4	18	403.2	1.08	435.46
Alfalfa	4	12.8	1.15	14.72	17.12	252.01
Total	100	320				$ 8,323.88

Table 22 Budget Showing Gross Income for a 320 Acre Unit Under Favorable Growing Conditions With System of Soil Management C for Soil Management Group 6.

Crop	Percentage of Rotated Acres	Acres Harvested	Yield Per Acre (Bushels or Tons)	Total Yield (Bushels or Tons)	Price Per Bushel or Ton	Gross Income
Corn	17	54.4	18	979.2	$ 1.28	$ 1,252.38
Wheat	57	182.4	17	3,100.8	2.04	6,325.63
Oats	15	48.0	30	1,440.0	.67	964.80
Barley	7	22.4	22	492.8	1.08	532.22
Alfalfa	4	12.8	1.3	16.64	17.12	284.88
Total	100	320				$ 9,360.91

Table 23 Budget Showing Gross Income for a 320 Acre Unit Under Favorable Growing Conditions With System of Soil Management C for Soil Management Group 7.

Crop	Percentage of Rotated Acres	Acres Harvested	Yield Per Acre (Bushels or Tons)	Total Yield (Bushels or Tons)	Price Per Bushel or Ton	Gross Income
Corn	17	54.4	13	707.2	$ 1.28	$ 905.22
Wheat	57	182.4	12	2,188.8	2.04	4,465.15
Oats	15	48.0	18	864.0	.67	578.88
Barley	7	22.4	13	291.2	1.08	314.50
Alfalfa	4	12.8	1	12.8	17.12	219.14
Total	100	320	—	—	—	$ 6,482.89

Table 24 Budget Showing Gross Income for a 320 Acre Unit Under Favorable Growing Conditions With System of Soil Management C for Soil Management Group 8.

Crop	Percentage of Rotated Acres	Acres Harvested	Yield Per Acre (Bushels or Tons)	Total Yield (Bushels or Tons)	Price Per Bushel or Ton	Gross Income
Corn	17	54.4	20	1,088.0	$ 1.28	$ 1,392.64
Wheat	57	182.4	18	3,283.2	2.04	6,697.73
Oats	15	48.0	30	1,440.0	.67	964.80
Barley	7	22.8	22	492.8	1.08	532.22
Alfalfa	4	12.8	1.65	21.12	17.12	361.57
Total	100	320				$9,948.96

Table 25 Budget Showing Gross Income for a 320 Acre Unit Under Favorable Growing Conditions With System of Soil Management C for Soil Management Group 9.

Crop	Percentage of Rotated Acres	Acres Harvested	Yield Per Acre (Bushels or Tons)	Total Yield (Bushels or Tons)	Price Per Bushel or Ton	Gross Income
Corn	17	54.4	21	1,142.4	$ 1.28	$1,462.27
Wheat	57	182.4	15	2,736.0	2.04	5,581.44
Oats	15	48.0	28	1,344.0	.67	900.48
Barley	7	22.4	21	470.4	1.08	508.03
Alfalfa	4	12.8	1.45	18.56	17.12	317.75
Total	100	320	—	—	—	$8,769.97

Table 26. Budget Showing Gross Income for a 320 Acre Unit Under Favorable Growing Conditions With Systems of Soil Management C for Soil Management Group 10.

Crop	Percentage of Rotated Acres	Acres Harvested	Yield Per Acre (Bushels or Tons)	Total Yield (Bushels or Tons)	Price Per Bushel or Ton	Gross Income
Corn	17	54.4	18	979.2	$ 1.28	$1,253.38
Wheat	57	182.4	16	2,918.4	2.04	5,953.54
Oats	15	48.0	30	1,440.0	.67	964.80
Barley	7	22.4	19	425.6	1.08	459.65
Alfalfa	4	12.8	1.5	19.2	17.12	328.70
Total	100	320				$8,960.07

Table 27 Budget Showing Gross Income for a 320 Acre Unit Under Favorable Growing Conditions With System of Soil Management C for Soil Management Group 11.

Crop	Percentage of Rotated Acres	Acres Harvested	Yield Per Acre (Bushels or Tons)	Total Yield (Bushels or Tons)	Price Per Bushel or Ton	Gross Income
Corn	17	54.4	14	761.6	$ 1.28	$ 974.85
Wheat	57	182.4	12	2,188.8	2.04	4,465.15
Oats	15	48.0	22	1,056.0	.67	707.52
Barley	7	22.4	15	336.0	1.08	362.88
Alfalfa	4	12.8	1.3	16.64	17.12	284.88
Total	100	320	—	—	—	$6,795.28

Table 28 Budget Showing Gross Income for a 320 Acre Unit Under Favorable Growing Conditions With System of Soil Management C for Soil Management Group 12.

Crop	Percentage of Rotated Acres	Acres Harvested	Yield Per Acre (Bushels or Tons)	Total Yield (Bushels or Tons)	Price Per Bushel or Ton	Gross Income
Corn	17	54.4	24	1,305.6	$ 1.28	$1,671.17
Wheat	57	182.4	17	3,100.8	2.04	6,325.63
Oats	15	48.0	29	1,392.0	.67	932.64
Barley	7	22.4	21	470.4	1.08	508.03
Alfalfa	4	12.8	1.55	19.84	17.12	339.66
Total	100	320	—	—	—	$9,777.13

Table 29 · Budget Showing Gross Income for a 320 Acre Unit Under Favorable Growing Conditions With System of Soil Management C for Soil Management Group 13.

Crop	Percentage of Rotated Acres	Acres Harvested	Yield Per Acre (Bushels or Tons)	Total Yield (Bushels or Tons)	Price Per Bushel or Ton	Gross Income
Corn	17	54.4	26	1,414.4	$ 1.28	$1,810.43
Wheat	57	182.4	18	3,283.2	2.04	6,697.73
Oats	15	48.0	31	1,488.0	.67	996.96
Barley	7	22.4	23	515.2	1.08	556.42
Alfalfa	4	12.8	1.5	19.2	17.12	328.70
Total	100	320				$10,390.24

Table 30 .Budget Showing Gross Income for a 320 Acre Unit Under Favorable Growing Conditions With System of Soil Management C for Soil Management Group 14.

Crop	Percentage of Rotated Acres	Acres Harvested	Yield Per Acre (Bushels or Tons)	Total Yield (Bushels or Tons)	Price Per Bushel or Ton	Gross Income
Corn	17	54.4	22	1,196.8	$ 1.28	$1.531.90
Wheat	57	182.4	17	3,100.8	2.04	6,325.63
Oats	15	48.0	32	1,536.0	.67	1,029.12
Barley	7	22.4	23	515.2	1.08	556.42
Alfalfa	4	12.8	1.65	21.12	17.12	361.57
Total	100	320	---	---	---	$9,804.64

Table 31 Budget Showing Gross Income for a 320 Acre Unit Under Favorable Growing Conditions With System of Soil Management C for Soil Management Group 15.

Crop	Percentage of Rotated Acres	Acres Harvested	Yield Per Acre (Bushels or Tons)	Total Yield (Bushels or Tons)	Price Per Bushel or Ton	Gross Income
Corn	17	54.4	15	816	1.28	$1,044.48
Wheat	57	182.4	12	2,188.8	2.04	4,465.15
Oats	15	48.0	21	1,008.0	.67	675.36
Barley	7	22.4	15	330.0	1.08	362.88
Alfalfa	4	12.8	1.35	17.28	17.12	295.83
Total	100	320	—	—	—	$6,843.70

Table 32 Budget Showing Gross Income for a 320 Acre Unit Under Favorable Growing Conditions With System of Soil Management C for Soil Management Group 17.

Crop	Percentage of Rotated Acres	Acres Harvested	Yield Per Acre (Bushels or Tons)	Total Yield (Bushels or Tons)	Price Per Bushel or Ton	Gross Income
Corn	17	54.4	26	1,414.4	$ 1.28	$1,810.43
Wheat	57	182.4	21	3,830.4	2.04	7,814.02
Oats	15	48.0	39	1,872.0	.67	1,254.24
Barley	7	22.4	27	604.8	1.08	653.18
Alfalfa	4	12.8	2	25.60	17.12	438.27
Total	100	320	—	—	—	$11,970.14

Table 33 Budget Showing Gross Income for a 320 Acre Unit Under Favorable Growing Conditions With System of Soil Management D for Soil Management Group 1.

Crop	Percentage of Rotated Acres	Acres Harvested	Yield Per Acre (Bushels or Tons)	Total Yield (Bushels or Tons)	Price Per Bushel or Ton	Gross Income
Wheat	90	288	12	3,456	$2.04	$7,050.24
Barley	10	32	18	576	1.08	622.08
Total	100	320	--	---	---	$7,672.32

Table 34 Budget Showing Gross Income for a 320 Acre Unit Under Favorable Growing Conditions With System of Soil Managements D for Soil Management Group 2.

Crop	Percentage of Rotated Acres	Acres Harvested	Yield Per Acre (Bushels or Tons)	Total Yield (Bushels or Tons)	Price Per Bushel or Ton	Gross Income
Wheat	90	288	15	4,320	$2.04	$8,812.80
Barley	10	32	19	608	1.08	656.64
Total	100	320	--	---	---	$9,469.44

Table 35 Budget Showing Gross Income for a 320 Acre Unit Under Favorable Growing Conditions With System of Soil Management D for Soil Management Group 3.

Crop	Percentage of Rotated Acres	Acres Harvested	Yield Per Acre (Bushels or Tons)	Total Yield (Bushels or Tons)	Price Per Bushel or Ton	Gross Income
Wheat	90	288	17	4,896	$2.04	$ 9,987.84
Barley	10	32	23	736	1.08	794.88
Total	100	320	--	----	----	$10,782.72

Table 36 Budget Showing Gross Income for a 320 Acre Unit Under Favorable Growing Conditions With System of Soil Management D for Soil Management Group 4.

Crop	Percentage of Rotated Acres	Acres Harvested	Yield Per Acre (Bushels or Tons)	Total Yield (Bushels or Tons)	Price Per Bushel or Ton	Gross Income
Wheat	90	288	15	4,320	$2.04	$8,812.80
Barley	10	32	22	704	1.08	760.32
Total	100	320	--	----	----	$9,573.12

Table 37 Budget Showing Gross Income for a 320 Acre Unit Under Favorable Growing Conditions With System of Soil Management D for Soil Management Group 5.

Crop	Percentage of Rotated Acres	Acres Harvested	Yield Per Acre (Bushels or Tons)	Total Yield (Bushels or Tons)	Price Per Bushel or Ton	Gross Income
Wheat	90	288	10	2,880	$2.04	$5,875.20
Barley	10	32	15	480	1.08	518.40
Total	100	320	--	----	---	$6,393.60

Table 38 Budget Showing Gross Income for a 320 Acre Unit Under Favorable Growing Conditions With System of Soil Management D for Soil Management Group 6.

Crop	Percentage of Rotated Acres	Acres Harvested	Yield Per Acre (Bushels or Tons)	Total Yield (Bushels or Tons)	Price Per Bushel or Ton	Gross Income
Wheat	90	288	14	4,032	$2.04	$8,225.28
Barley	10	32	19	608	1.08	656.64
Total	100	320	--	----	----	$8,881.92

Table 39 Budget Showing Gross Income for a 320 Acre Unit Under Favorable Growing Conditions With System of Soil Management D for Soil Management Group 7.

Crop	Percentage of Rotated Acres	Acres Harvested	Yield Per Acre (Bushels or Tons)	Total Yield (Bushels or Tons)	Price Per Bushel or Ton	Gross Income
Wheat	90	288	11	3,168	$2.04	$6,462.72
Barley	10	32	12	384	1.08	414.72
Total	100	320	--	---	---	$6,877.44

Table 40 Budget Showing Gross Income for a 320 Acre Unit Under Favorable Growing Conditions With System of Soil Management B for Soil Management Group 8.

Crop	Percentage of Rotated Acres	Acres Harvested	Yield Per Acre (Bushels or Tons)	Total Yield (Bushels or Tons)	Price Per Bushel or Ton	Gross Income
Wheat	90	288	15	4,320	$2.04	$8,812.80
Barley	10	32	18	576	1.08	622.08
Total	100	320	---	---	---	$9,434.88

Table 41 Budget Showing Gross Income for a 320 Acre Unit Under Favorable Growing Conditions With System of Soil Management D for Soil Management Group 9.

Crop	Percentage of Rotated Acres	Acres Harvested	Yield Per Acre (Bushels or Tons)	Total Yield (Bushels or Tons)	Price Per Bushel or Ton	Gross Income
Wheat	90	288	12	3,456	$2.04	$7,050.24
Barley	10	32	16	512	1.08	552.96
Total	100	320	--	---	---	$7,603.20

Table 42 Budget Showing Gross Income for a 320 Acre Unit Under Favorable Growing Conditions With System of Soil Management D for Soil Management Group 10.

Crop	Percentage of Rotated Acres	Acres Harvested	Yield Per Acre (Bushels or Tons)	Total Yield (Bushels or Tons)	Price Per Bushel or Ton	Gross Income
Wheat	90	288	14	4,032	$2.04	$8,225.28
Barley	10	32	16	512	1.08	552.96
Total	100	320	--	---	---	$8,778.24

Table 43. Budget Showing Gross Income for a 320 Acre Unit Under Favorable Growing Conditions With System of Soil Management D for Soil Management Group 11.

Crop	Percentage of Rotated Acres	Acres Harvested	Yield Per Acre (Bushels or Tons)	Total Yield (Bushels or Tons)	Price Per Bushel or Ton	Gross Income
Wheat	90	288	11	3,168	$2.04	$6,462.72
Barley	10	32	12	384	1.08	414.72
Total	100	320	--	----	----	$6,877.44

Table 44 Budget Showing Gross Income for a 320 Acre Unit Under Favorable Growing Conditions With System of Soil Management D for Soil Management Group 12.

Crop	Percentage of Rotated Acres	Acres Harvested	Yield Per Acre (Bushels or Tons)	Total Yield (Bushels or Tons)	Price Per Bushel or Ton	Gross Income
Wheat	90	288	14	4,032	$2.04	$8,225.28
Barley	10	32	18	576	1.08	622.08
Total	100	320	--	----	----	$8,847.36

Table 45 Budget Showing Gross Income for a 320 Acre Unit Under Favorable Growing Conditions With System of Soil Management D for Soil Management Group 13.

Crop	Percentage of Rotated Acres	Acres Harvested	Yield Per Acre (Bushels or Tons)	Total Yield (Bushels or Tons)	Price Per Bushel or Ton	Gross Income
Wheat	90	288	15	4,320	$2.04	$8,812.80
Barley	10	32	19	608	1.08	656.64
Total	100	320	--	----	----	$9,469.44

Table 46 Budget Showing Gross Income for a 320 Acre Unit Under Favorable Growing Conditions With System of Soil Management D for Soil Management Group 14.

Crop	Percentage of Rotated Acres	Acres Harvested	Yield Per Acre (Bushels or Tons)	Total Yield (Bushels or Tons)	Price Per Bushel or Ton	Gross Income
Wheat	90	288	14	4,032	$2.04	$8,225.28
Barley	10	32	20	640	1.08	691.20
Total	100	320	--	---	---	$8,916.48

Table 47 Budget Showing Gross Income for a 320 Acre Unit Under Favorable Growing Condition s With System of Soil Management D for Soil Management Group 15.

Crop	Percentage of Rotated Acres	Acres Harvested	Yield Per Acre (Bushels or Tons)	Total Yield (Bushels or Tons)	Price Per Bushel or Ton	Gross Income
Wheat	90	288	9	2,592	$2.04	$5,287.68
Barley	10	32	13	416	1.08	449.28
Total	100	320	--	----	----	$5,736.96

Table 48 Budget Showing Gross Income for a 320 Acre Unit Under Favorable Growing Conditions With System of Soil Management D for Soil Management Group 17.

Crop	Percentage of Rotated Acres	Acres Harvested	Yield Per Acre (Bushels or Tons)	Total Yield (Bushels or Tons)	Price Per Bushel or Ton	Gross Income
Wheat	90	288	17	4,896	$2.04	$9,987.84
Barley	10	32	23	736	1.08	794.88
Total	100	320	--	----	----	$10,782.72

Farm Identification Code

Example: 16 - 6 - N - I - A
3 - SE - B

In the order of the items listed in the code, identification of the farm unit may be made possible. The first number, "16", identifies the size of the farm as 160 acres. The second number in the code represents the soil management group. There are 16 soil management groups designated by the number 16. The third item in the code represents the area of the north half of the county in which the farm is located. Range 60-61 is designated by north east, 62-63 north, 64-65 north west area. The fourth item in the code indicates whether the farm unit is improved or unimproved. The letter I is used to represent an improved farm, while the letter U indicates an unimproved farm. The fifth item indicates the productivity rating group of the unit which was designated as A for this unit. The farm productivity rating groups are lettered A-D.

The second part of the code represents a more detailed location of the farm with respect to the nearest town. The first item represents the miles from the nearest town to the farm. The second item represents the direction in which the farm is located from the town as north east. The third item represents the abbreviation for the name of the town as B for Brentford. Market centers in the sampled area are listed in Table 50 with the corresponding abbreviation, and population for both of the 13 towns.

Table 50 Population and Abbreviations for 13 Major Towns in the Sampled Area, Spink County, South Dakota.

Town	Population	Abbreviation	Town	Population	Abbreviation
Ashton	222	As	Mellette	250	Me
Athol	87	At	Northville	220	N
Brentford	132	B	Raymond	174	Ra
Conde	409	C	Redfield	2,655	Re
Doland	535	D	Turton	201	T
Frankford	331	F	Zell	150	Z
Mansfield	150	Ma			

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