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Relationships Between Land Sales Figures, Soils, and Crop Yields as a Guide for Agricultural Land Evaluation: Spink County, South Dakota

Cooperative Extension Service
South Dakota State University

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Many factors affect the prices paid for agricultural land.

One set of factors—including distance to market, kind of roads, size of farms, characteristics of land ownership, cultural patterns, and the skill and resources of the operator—do not lend themselves readily to analysis. Another set of factors—the kind of soil and the ability of soils to produce crops and grass—can be measured and related to land sale figures.

Data from recent land sales of unimproved agricultural land (Table 1) provide basic data to which data on soils and productivity can be related. The three kinds of soils and yield data available on a county basis to relate to land sale figures include: (1) the County Soil Map (Figure 1); (2) The County Land Inventory (Table 3); and (3) The Crop and Grass Yields (Table 5).

THE LAND SALE FIGURES

The sale figures for unimproved agricultural land in the county for the years 1967, 1968, and 1969 supplied the basic data, along with climate and agronomic data, for the Soil Map Area values given in Table 1. The procedure was to group the sales for each map area of Figure 1. The resulting values, which are shown in Table 1, then represent the average sale price of all farms or ranches in each of these map areas for the years 1967, 1968, and 1969.

The data are from bona fide transactions representing voluntary sales at market value. All sales covered by warranty deeds and contracts for warranty deeds meeting the “willing buyer, willing seller” concept were used except the following:

1. Sales between members of the immediate family and/or where the stated consideration includes the words “love and affection,” interpretation of the words “immediate family” shall be from grantor or grantee to father, mother, brother, sister, son, daughter, nephew, niece or grandchild.
2. Sales between affiliated companies or corporations and to or from an officer of said company or corporation.
3. Sales by sheriff or other court officials which includes forced sales, auction sales (10-6-33), foreclosures, bankruptcies and condemnations.
4. Sales of cemetery lots.
5. Sales where life estates are retained.
6. Sales of minerals or timber only, or right to mine or cut.
7. Sales which include release of damage or satisfaction of indebtedness as part of the recited consideration.
8. Sales involving a trade or exchange of property.
9. Sales including personal property unless value can be determined and subtracted from selling price.
10. Sales to or from the United States of America or any federal agency, except sales by Veterans Administration and Federal Housing Authority or Farmers Home Administration.
11. Sales to or from any state, county, city, town, school district, special improvement district or other municipal body, or any other political subdivision or agency of either.
12. Sales to or from any railroad, telephone, electric, gas, pipeline or other utility company.
13. Sales to or from any church, lodge, parochial school, benevolent, fraternal, educational institution or any other legal tax exempt organization.
14. Sales to or by administrator. Sales can be used in some instances with written authorization from Department of Revenue, Executors, guardians, receivers or trustees in bankruptcy, decrees and referrees.
15. Sales conveying an unspecified, undivided or fractional interest in property.
16. Transactions involving the consummation of contracts executed prior to the study period. Sales to be used will be from the three (3) years preceding the legal assessment date for each study.
17. Conveyances made to correct deeds previously executed unless the correcting deed makes a change in the legal description.

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Figure 1. General Soil Map

SPINK COUNTY
A. Deep, permeable, silty soils on nearly level topography.
B. Moderately deep claypan soils of silty clay loam texture on nearly level slopes.
C. Moderately deep and shallow claypan soils of silty clay texture on nearly level slopes.
D. Shallow and moderately deep claypans of silty clay texture on flats and shallow depressions.
E. Deep, moderately permeable clay loams on nearly level moderately stony uplands.
F. Deep moderately permeable clay loams on undulating uplands.
G. Deep moderately sandy soils on undulating topography.
H. Deep silty clay loam soils on bottomlands.
I. Moderately deep clay loams on undulating topography.
J. Deep loamy soils on undulating topography.
K. Deep loamy soils on gently sloping topography.
L. Deep loamy soils of bottomlands.
Figure 1. General Soil Map

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H. Deep silty clay loam soils on bottomlands.
I. Moderately deep clay loams on undulating topography.
J. Deep loamy soils on undulating topography.
K. Deep loamy soils on gently sloping topography.
L. Deep loamy soils of bottomlands.
new use (Example: agricultural to residential), when two
stances, namely: Lead, S.D.; tax deeds; mortgage releases; and
deeds showing exactly the same name for grantor and grantee.

20. When property changes its classification because of its
change in assessed value should not be used. Lots shall be
used for one (1) year if the improvement was made after the
sale.

THE SOIL MAP

A general soil map of the county is shown in Fig-
ure 1. Each map area is identified by a letter symbol
described in the accompanying legend. The map areas
are called soil associations which means that usually
several soils are grouped together to make up the map
unit. The soil associations divide the county into
major physiographic areas. The acreages of the Soil
Map Areas are given in Table 2.

THE LAND INVENTORY DATA

The second kind of data relating to Land Sale Fig-
ures available on a county basis is the Land Inventory.
In these data the individual soils have been grouped
into higher categories called Land Use Capability
Subclasses. The basis for grouping is the degree and
kind of limitation the soil has for agriculture (Refer-
ence: Land Capability Classification, USDA Hand-
book 10, 1962). The acres of land in the capability
subclasses are shown in Table 3.

The inventory data shown in Table 3 come from
the Conservation Needs Inventory (Basic Statistics of
the National Inventory of Soil and Water Conserva-
tion Needs 1962) or, if available, from the detailed
county soil survey. The inventory acreage usually is
less than the total county acreage, since water areas,
urban areas, and Federal land are not included.

THE CROP AND GRASS YIELDS

Crop and grass yield predictions (for average man-
gement) made for the soils of South Dakota by state
and federal agencies have been for many years part of
the basic data for published soil surveys. The use of
the computer has facilitated the grouping of these
data into yields by capability subclasses. The procedure
was to select the dominant crops for the area of the
state represented by the county. Yields for the four or
five principal crops for subclasses of the first four cap-
ability classes were summarized and a crop rating
determined based on the relative ability of the soils in
each subclass to produce crops. The land subclass
having the highest yields of the important locally
grown crops was given a rating of 100% and the other
subclasses rated down from this. This is how the crop
ratings of Table 5 were developed.

The next step was to develop pasture or range rat-
ings for the non-crop subclasses of classes 5, 6 and 7.
Because class 8 is non-agricultural land no productiv-
ity ratings for it were developed. Land in class 4 is
equally suited for crops or pasture so the crop rating
and the grass yield for the subclasses of class 4 were
used to derive a “balance point” ratio. For example, if
the comparative crop rating for the subclasses of class
4 was 50 and the grass yield on these same subclasses
was 5000 pounds, the ratio of 50 :5,000==.01. The grass
yields of the subclasses of classes 5, 6 and 7 then were
multiplied by this ratio to arrive at the ratings for
these subclasses. These pasture or range ratings,
shown in Table 5 are in balance with the crop ratings
of the subclasses of the first four land classes.

INTEGRATION OF LAND SALE FIGURES, SOIL MAP,
LAND INVENTORY AND YIELD DATA

The Land Sale figures (Table 1) multiplied by the
acreages of the map areas (Table 2) results in a county
value (Table 4). This value represents the conditions
prevailing in 1967, 1968 and 1969 qualified by the
statements discussed in the above paragraph on
“Land Sale Figures.”

The yield data on crops and grass were summarized
by land subclass and put on a comparative rating
basis for land subclasses (Table 5). Crop and grass
yields were brought into balance by use of a “balance
point factor.”

A dollar rating called a Conceptual Dollar Value
(CDV) can be calculated for the land subclasses,
Table 5. The CDVs are so-called because these are
dollar values for the land subclasses which are concep-
tual units of classification. The CDVs are a reflection
both of the Land Sales Figures and the Crop and
Grass yielding abilities of the land. They were deter-
dined for the county as follows: The land subclass
with a 100% crop or grass rating was called “x.” A
computer then solved for “x” so that the sum of the
products of the land subclasses and “x” or a percent-
age of “x” (depending upon the yield rating)
equalled the county value as determined by the Land
Sale Figures.

The CDVs actually apply best for the central part
of a county. The CDVs are based in part on land sale
figures which reflect climate and climate changes
gradually rather than abruptly at county lines. There-
fore, the CDVs of adjacent counties should be noted
at achieve smooth value transitions. The range of the
CDVs in Table 5 represents the range of township
CDVs in the county, which permits smooth transi-
tions with adjoining counties.

USING CDVs AS A GUIDE FOR
AGRICULTURAL LAND EVALUATION

Soil types making up a farm or ranch are placed
into the appropriate land subclass. The acreages of
each of the land subclasses then are multiplied by the
CDV of the subclass to arrive at a dollar value for each
subclass. These values are totaled for a first approxi-
ination value of the farm or ranch.

The accompanying state map shows the relation-
ship of agricultural regions and land sales figures.
Table 1. Map Area Values From Land Sale Figures

<table>
<thead>
<tr>
<th>Map Area</th>
<th>Dollars Per Acre</th>
<th>Map Area</th>
<th>Dollars Per Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>111</td>
<td>G</td>
<td>89</td>
</tr>
<tr>
<td>B</td>
<td>107</td>
<td>H</td>
<td>87</td>
</tr>
<tr>
<td>C</td>
<td>97</td>
<td>I</td>
<td>86</td>
</tr>
<tr>
<td>D</td>
<td>93</td>
<td>J</td>
<td>76</td>
</tr>
<tr>
<td>E</td>
<td>91</td>
<td>K</td>
<td>72</td>
</tr>
<tr>
<td>F</td>
<td>90</td>
<td>L</td>
<td>72</td>
</tr>
</tbody>
</table>

Table 2. Acreages of Map Areas

<table>
<thead>
<tr>
<th>Map Area</th>
<th>Acres</th>
<th>Map Area</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>147,840</td>
<td>G</td>
<td>66,440</td>
</tr>
<tr>
<td>B</td>
<td>84,360</td>
<td>H</td>
<td>90,120</td>
</tr>
<tr>
<td>C</td>
<td>99,720</td>
<td>I</td>
<td>116,360</td>
</tr>
<tr>
<td>D</td>
<td>57,480</td>
<td>J</td>
<td>54,280</td>
</tr>
<tr>
<td>E</td>
<td>47,880</td>
<td>K</td>
<td>96,520</td>
</tr>
<tr>
<td>F</td>
<td>65,160</td>
<td>L</td>
<td>22,681</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>87,145,032</td>
</tr>
</tbody>
</table>

Table 3. County Land Inventory

<table>
<thead>
<tr>
<th>Land Subclass</th>
<th>Acres</th>
<th>Land Subclass</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-</td>
<td>4e</td>
<td>23,780</td>
</tr>
<tr>
<td>2C</td>
<td>188,697</td>
<td>4W</td>
<td>6,577</td>
</tr>
<tr>
<td>2E</td>
<td>178,839</td>
<td>4s</td>
<td>40,311</td>
</tr>
<tr>
<td>2W</td>
<td>76,773</td>
<td>5W</td>
<td>9,714</td>
</tr>
<tr>
<td>2S</td>
<td>107,657</td>
<td>6E</td>
<td>7,051</td>
</tr>
<tr>
<td>3C</td>
<td>-</td>
<td>6S</td>
<td>25,947</td>
</tr>
<tr>
<td>3E</td>
<td>57,872</td>
<td>7E</td>
<td>-</td>
</tr>
<tr>
<td>3W</td>
<td>15,287</td>
<td>7S</td>
<td>9,188</td>
</tr>
<tr>
<td>3S</td>
<td>201,148</td>
<td>8*</td>
<td>-</td>
</tr>
</tbody>
</table>

*Class 8 land is included in land inventory but, since it is essentially non-agricultural land, no yields are shown for it in Table 5.

*Yield data were from soil series. Data were summarized for land subclass by computer.

+Although these wetlands are productive for grass, seasonal inaccessability of sites and stock trampling may reduce ratings.

**Range represents the range of township CDVs in the county calculated to permit smooth value transitions with adjoining counties.

Table 4. County Value from Land Sale Figures and Soil Map Acreages

<table>
<thead>
<tr>
<th>Map Area</th>
<th>Acreage</th>
<th>Sale Figure Value Dollars/Acre</th>
<th>County Value Dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>147,840</td>
<td>111</td>
<td>16,410,240</td>
</tr>
<tr>
<td>B</td>
<td>84,360</td>
<td>107</td>
<td>9,026,520</td>
</tr>
<tr>
<td>C</td>
<td>99,720</td>
<td>97</td>
<td>9,672,840</td>
</tr>
<tr>
<td>D</td>
<td>57,480</td>
<td>93</td>
<td>5,345,640</td>
</tr>
<tr>
<td>E</td>
<td>47,880</td>
<td>91</td>
<td>4,357,080</td>
</tr>
<tr>
<td>F</td>
<td>65,160</td>
<td>90</td>
<td>5,864,400</td>
</tr>
<tr>
<td>G</td>
<td>66,440</td>
<td>89</td>
<td>5,913,160</td>
</tr>
<tr>
<td>H</td>
<td>90,120</td>
<td>87</td>
<td>7,840,440</td>
</tr>
<tr>
<td>I</td>
<td>116,360</td>
<td>86</td>
<td>10,006,960</td>
</tr>
<tr>
<td>J</td>
<td>54,280</td>
<td>76</td>
<td>4,125,280</td>
</tr>
<tr>
<td>K</td>
<td>96,520</td>
<td>72</td>
<td>6,949,440</td>
</tr>
<tr>
<td>L</td>
<td>22,681</td>
<td>72</td>
<td>1,633,032</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>87,145,032</td>
</tr>
</tbody>
</table>

Table 5. Comparative Crop and Grass Ratings* and Conceptual Dollar Values (CDVs)

<table>
<thead>
<tr>
<th>Land Subclass</th>
<th>Crop Rating %</th>
<th>Grass Rating %</th>
<th>Conceptual Dollar Values and Range**</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2C</td>
<td>100</td>
<td>-</td>
<td>110 (100-130)</td>
</tr>
<tr>
<td>2E</td>
<td>91</td>
<td>-</td>
<td>100 (91-118)</td>
</tr>
<tr>
<td>2W</td>
<td>86</td>
<td>-</td>
<td>95 (86-112)</td>
</tr>
<tr>
<td>2S</td>
<td>95</td>
<td>-</td>
<td>103 (95-124)</td>
</tr>
<tr>
<td>3C</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3E</td>
<td>80</td>
<td>-</td>
<td>87 (80-104)</td>
</tr>
<tr>
<td>3W</td>
<td>78</td>
<td>-</td>
<td>86 (78-101)</td>
</tr>
<tr>
<td>3S</td>
<td>82</td>
<td>-</td>
<td>90 (82-107)</td>
</tr>
<tr>
<td>4E</td>
<td>59</td>
<td>59</td>
<td>65 (59-77)</td>
</tr>
<tr>
<td>4W+</td>
<td>60</td>
<td>60</td>
<td>65 (60-78)</td>
</tr>
<tr>
<td>4S</td>
<td>44</td>
<td>44</td>
<td>48 (44-57)</td>
</tr>
<tr>
<td>5W+</td>
<td>-</td>
<td>62</td>
<td>68 (62-81)</td>
</tr>
<tr>
<td>6E</td>
<td>-</td>
<td>26</td>
<td>28 (26-34)</td>
</tr>
<tr>
<td>6S</td>
<td>-</td>
<td>20</td>
<td>22 (20-26)</td>
</tr>
<tr>
<td>7E</td>
<td>-</td>
<td>22</td>
<td>24 (22-29)</td>
</tr>
<tr>
<td>7S</td>
<td>-</td>
<td>21</td>
<td>23 (21-27)</td>
</tr>
</tbody>
</table>

*Yield data were from soil series. Data were summarized for land subclass by computer.

+Although these wetlands are productive for grass, seasonal inaccessability of sites and stock trampling may reduce ratings.

**Range represents the range of township CDVs in the county calculated to permit smooth value transitions with adjoining counties.
Agricultural Areas and Land Sales Figures, Generalized.

(1967, 1968, and 1969 Data)

<table>
<thead>
<tr>
<th>Areas</th>
<th>Approximate land sale figure $/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>A—Western range</td>
<td>less than 20</td>
</tr>
<tr>
<td>B—Western range and wheatland</td>
<td>20-50</td>
</tr>
<tr>
<td>C—Wheatland, range or pasture</td>
<td>50-75</td>
</tr>
<tr>
<td>D—Mixed grains and general</td>
<td>75-100</td>
</tr>
<tr>
<td>E—General agriculture</td>
<td>100-150</td>
</tr>
<tr>
<td>F—Corn, oats and soybeans</td>
<td>150-200</td>
</tr>
<tr>
<td>G—Corn, soybeans</td>
<td>more than 200</td>
</tr>
<tr>
<td>H—Missouri River bottomland</td>
<td>200-500</td>
</tr>
</tbody>
</table>