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Agricultural Land Values in South Dakota: A Comparison of Methods and Findings From two Surveys: 1995-1999

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AGRICULTURAL LAND VALUES IN SOUTH DAKOTA:
A comparison of methods and findings From two surveys, 1995 – 1999*

By
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ABSTRACT:

This report provides comparative findings from two South Dakota farmland market value surveys (SDSU and SDASS) for the 1995 – 1999 period. The annual SDSU farmland market survey is a key informant mail survey of agricultural appraisers, lenders, and extension educators. The annual SDASS county-level farmland survey results are based on nearly 3300 telephone survey responses from a random sample of farmers and ranchers. This report also includes considerable documentation of methods used to generate land value estimates at the regional and statewide level from available data in both surveys. The results and discussion sections include comparisons of: (1) relative values of cropland, pasture, and all agricultural land across counties and regions of SD, and (2) per acre land values obtained from both surveys for crop, pasture, and all non-irrigated land values using alternative approaches to aggregate results to the region and statewide level.

Key Words: farmland market surveys, land value survey methods, agricultural land valuation, South Dakota farmland values

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AGRICULTURAL LAND VALUES IN SOUTH DAKOTA: a comparison of methods and findings from two surveys: 1995 – 1999

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I. INTRODUCTION

Farmland markets are "barometers" reflecting current and prospective economic and financial conditions in agriculture. Farmland values reflect underlying trends in farmland net returns and changes in net returns. South Dakota farm real estate values and cash rental rates increased rapidly during the export boom of the 1970's, decreased during the farm finance depression in the mid-1980's, and have increased at or above the rate of general price inflation from 1987 to present (1999).

These trends are important to agriculture because farm real estate (land and buildings) represents nearly two-thirds of the total value of farm business assets in South Dakota. Farm operators own two-thirds of South Dakota's agricultural land and also assume more than 90% of farm sector debt. Changes in farmland values have major impacts on the wealth and collateral base of farmland owners, credit policies established by agricultural lenders, and farm real estate tax assessments. Recent changes (1996) in Federal farm programs, which decoupled commodity prices and farm income support, have considerable impacts on farmland values and rental rates.

Monitoring farmland market trends is an important component of ongoing land economic research at South Dakota State University (SDSU). During the past nine years (1991 - 1999) SDSU economists, Janssen and Pflueger, have conducted an annual South Dakota farm real estate market survey. (see Appendix I for a copy of the 1999 survey instrument.) This survey was developed in response to numerous requests by landowners, farmers, agricultural professionals, and other citizens for information on and interpretation of agricultural land market trends in different regions of South Dakota. This mail survey is sent to and completed by rural appraisers, farm real estate loan officers, real estate tax assessors, and county extension educators in South Dakota. An average of 240 farmland market reporters have completed this annual farmland market survey.

From 1994 to present, the South Dakota Agricultural Statistics Service (SDASS), an agency of the U.S. Department of Agriculture has annually published survey-based information on county level land rents and values for cropland, pasture, and whole-farms. This SDASS telephone survey is completed by approximately 2200 to 3300 farm and ranch operators each year.

Purpose of Report

The major purpose of this report is to compare and interpret agricultural land value estimates obtained from the SDSU and SDASS farmland market surveys. The major topics discussed in this report are:

(1) comparisons of survey methods, procedures, and major uses of the SDSU and SDASS farmland market surveys.

(2) comparisons of relative values of cropland, pasture, all-agricultural land, and whole farms across counties and regions of South Dakota.

(3) methods used to generate land value estimates by regional categories and land use categories. This includes documentation of land use weighting factors used to generate the land value estimates.

(4) comparisons of land value estimates, statewide and regional, for all-agricultural land, cropland, and pasture / rangeland generated from the SDSU and SDASS surveys.

The five year time period of 1995 - 1999 is used to compare results from both surveys.[1] This report is intended for professional users of the SDSU and SDASS farmland market surveys. Hopefully, this report will help readers assess the contribution of each survey in providing agricultural land market information for South Dakota. This report may also provide useful ideas for future land market research in South Dakota.

After discussion of previous and related work, the report is organized into four major sections (II – V) which correspond with the four major topics listed above. Figures and tables are found at the end of each major section. A summary and conclusions section completes the report, followed by a reference list and three appendices.

[1] During the 1995 - 1999 period, the SDASS and SDSU surveys have obtained the values of non-irrigated agricultural land by land use. This makes it possible to compare results from both surveys.

Previous and Related Work

The U.S. Department of Agriculture (USDA), through its State Agricultural Statistics Service offices, has conducted annual farmland market surveys from 1912 to present. The USDA has historically published statistics on agricultural real estate values and cash rental rates for 48 states, including South Dakota. The annual farm real estate value series in each state extends from 1912 to present. Historical land values in this series are adjusted to farm real estate values reported in the U.S. Census of Agriculture (NCR-123 Committee, 1985).

As of 1996, Land Grant Universities in at least 12 states including South Dakota, Nebraska, Minnesota, and Iowa maintain annual data series on farmland prices and/or cash rental rates for their state and provide information at sub-state regional levels. Their efforts are based on annual opinion surveys of farmland market observers and/or data collection on actual tract sales. All of these reports provide descriptive analyses of land market trends by sub-state region, land quality, and buyer-seller characteristics (Reynolds and Atkinson, 1997; B. Johnson and B. Miller, 1996; Taff, 1996; Duffy, 1996, Janssen et.al. 1996).

From 1983 - 1989, South Dakota State University economists and graduate students conducted descriptive studies and econometric studies of farmland markets using actual sales tract information and land financing information provided by the Farm Credit Banks of Omaha (Swinson and Janssen, 1985; Janssen and Haque, 1987). Detailed information and interpretation of trends (1975 - 1987) in farmland sales by sub-state agricultural region, selected counties, and agricultural land uses was summarized by Janssen in SDSU Economics Research Reports 88-1 and 88-2.

Detailed "benchmark" studies of agricultural land rental practices in South Dakota were also conducted in the late 1980's (Peterson and Janssen, 1988; Cole, Janssen, and Beutler, 1992). Finally, agricultural land tenure, ownership, and rental market trends in South Dakota and Nebraska from 1951 to 1986 were compared to U.S. and North Central region agricultural land trends during the same time period (Hallam, ed., Janssen and Johnson, 1993; Janssen and Johnson, 1989; Lundeen et.al. 1988).

Farmland sales tract databases provide a lot of information for land economic analyses, but do not generally provide land rental data. Most user requests for land market information involve requests for values, rental rates, and rates of return by agricultural land use. The simultaneous need for land value and rental rate data led to development of the SDSU farm real estate market survey in 1991. Additional needs for farmland rental rate and value data at the county level by the Property Tax Division of the South Dakota Department of Revenue led to creation of the SDASS survey in 1994.

II. SURVEY METHODS AND RESPONDENT CHARACTERISTICS

SDSU Farm Real Estate Market Survey

The primary purpose of the annual South Dakota Farm Real Estate Market Survey is to obtain regional and statewide information on agricultural land market trends and conditions. Key information obtained in the two page questionnaire (Appendix I) are: (1) per acre agricultural land values by land use and land productivity, and (2) cash rental rates by agricultural land use and productivity, and (3) respondent assessment of changing land market conditions including buyer / seller motivations and positive / negative factors that impact the farmland market in their locality.

This land market information is summarized and interpreted in annual research reports from the SDSU Agricultural Experiment Station and presented in more condensed form in extension publications and farm magazines. This information is widely used in land market education programs and is also used by individual landowners, renters, land market professionals (lenders, realtors, appraisers), and others persons interested in agricultural land market conditions.

The SDSU survey is a **key informant survey** of South Dakota respondents employed in one of the following occupations: (1) agricultural lenders (senior agricultural loan officers of commercial banks, Farm Service Agency, or Farm Credit Banks), (2) Cooperative Extension Service Extension Educators and Farm Management Specialists, and (3) licensed appraisers. Some appraisers are primarily realtors, assessors, or professional farm managers. Each respondent is asked to report on agricultural land market conditions as of **February 1** in their locality. Copies of the survey are mailed to potential respondents in early February with a follow-up mailing in mid-March. The mailing list is updated each year.

Respondents are asked to estimate the per-acre value of private non-irrigated cropland, hayland, rangeland, tame pastureland, and irrigated land in their county and the percent change in value from one year earlier. Similar questions are asked about cash rental rates and rates of return by agricultural land use. In addition, respondents are asked to estimate per acre land value and cash rental rate of each land use for average, high, and low productivity land. Value estimates of farmland buildings and farm houses are NOT included in the survey.

Responses for non-irrigated land uses are grouped into eight agricultural regions (Figure 1). The six regions in eastern and central South Dakota correspond with USDA Agricultural Statistics Districts. In western South Dakota,

farmland values and cash rental rates are reported for northwest and southwest regions.[2]

The number of completed useable responses to the annual SDSU survey from has varied from 218 to 262 respondents. During the 1995 - 1999 period, 53% of respondents were agricultural lenders, 17% were extension educators, and 30% were licensed appraisers, assessors, and realtors. One half of the respondents were from the three eastern regions of South Dakota, 32% were from the three central regions of South Dakota, and 18% were from western South Dakota.

South Dakota Ag Statistics Survey: County Level Land Rents and Values

Since 1994, the USDA's South Dakota Agricultural Statistics Service has conducted an annual telephone survey of farmers and ranchers to obtain cash rental rates and value of land by county. The survey is designed to provide statistics for private non-irrigated agricultural land in three categories: (1) whole farm, with the value of buildings included, (2) cropland, and (3) pasture. Data published for each agricultural land category include average land value, cash rental rates (average, minimum, and maximum), ratio of gross cash rent to land value, and current number of responses.

The SDASS telephone survey is conducted in January and requests land values as of **January 1.** The **random sample** of farmers and ranchers is redrawn each year. The number of useable reports has varied from 2200 to 3300, with the latter being the current target number. A telephone response is considered useable if the respondent can provide cash rent and land value information for any one of the three land use categories: whole farm, crop land, or pasture.

A summary of 1999 responses by land use category and regional location are shown in Table 1. The total responses exceed 3300 while the number of responses by land use category are lower, especially for whole farm values which are more difficult to obtain. The percentage of respondents for pasture and whole farm questions were fairly similar across western, central, and eastern South Dakota. However, respondents to cropland questions were primarily located in the eastern and central regions of South Dakota (Table 1).

The SDASS publishes their survey data results in a special 4-page report entitled: South Dakota (year) County Level Land Values and Rents and in their

[2] The U.S. Department of Agriculture classifies western South Dakota into three Agricultural Statistics Districts: northwest, west central, and southwest. Few SDSU survey respondents are from the southwest Agricultural Statistics District where a majority of the land is held by federal agencies or in tribal trust. Consequently, the SDSU report reclassifies western South Dakota into two regions: Northwest (Butte, Corson, Dewey, Harding, Lawrence, Meade, Perkins, and Ziebach counties) and Southwest (Bennet, Custer, Fall River, Haakon, Jackson, Pennington, Shannon, and Stanley counties).

annual bulletin entitled: SOUTH DAKOTA AGRICULTURE. The survey report is designed to provide a lot of current and useful land market data (at the county level) to producers, landowners, lenders, assessors and other users. The survey report has no interpretative commentary or analysis of land market trends.

Summary Comparison of SDSU and SDASS Agricultural Land Market Surveys

(1) The SDSU mail survey is a **key informant** survey completed by 220 to 260 lenders, appraisers, and extension educators. The SDASS telephone survey is completed by a **random sample** of about 3300 farmers and ranchers.

(2) Both surveys provide information on private agricultural land values and rental rates by major land use categories. The SDSU survey provides this information at the regional and multi-county level, while the SDASS survey provides results at the county level.

(3) The SDSU survey instrument is designed to obtain information on and reasons for land market trends by various land uses. The SDASS survey is designed to obtain current numerical information on cropland, pastureland, and whole farm land values and rental rates by county.

(4) Both surveys provide current information on land values and rental rates. The SDSU survey report includes more detailed information on land market trends and commentary on major reasons for changing land market trends over time.

Figure 1. Agricultural regions of South Dakota.

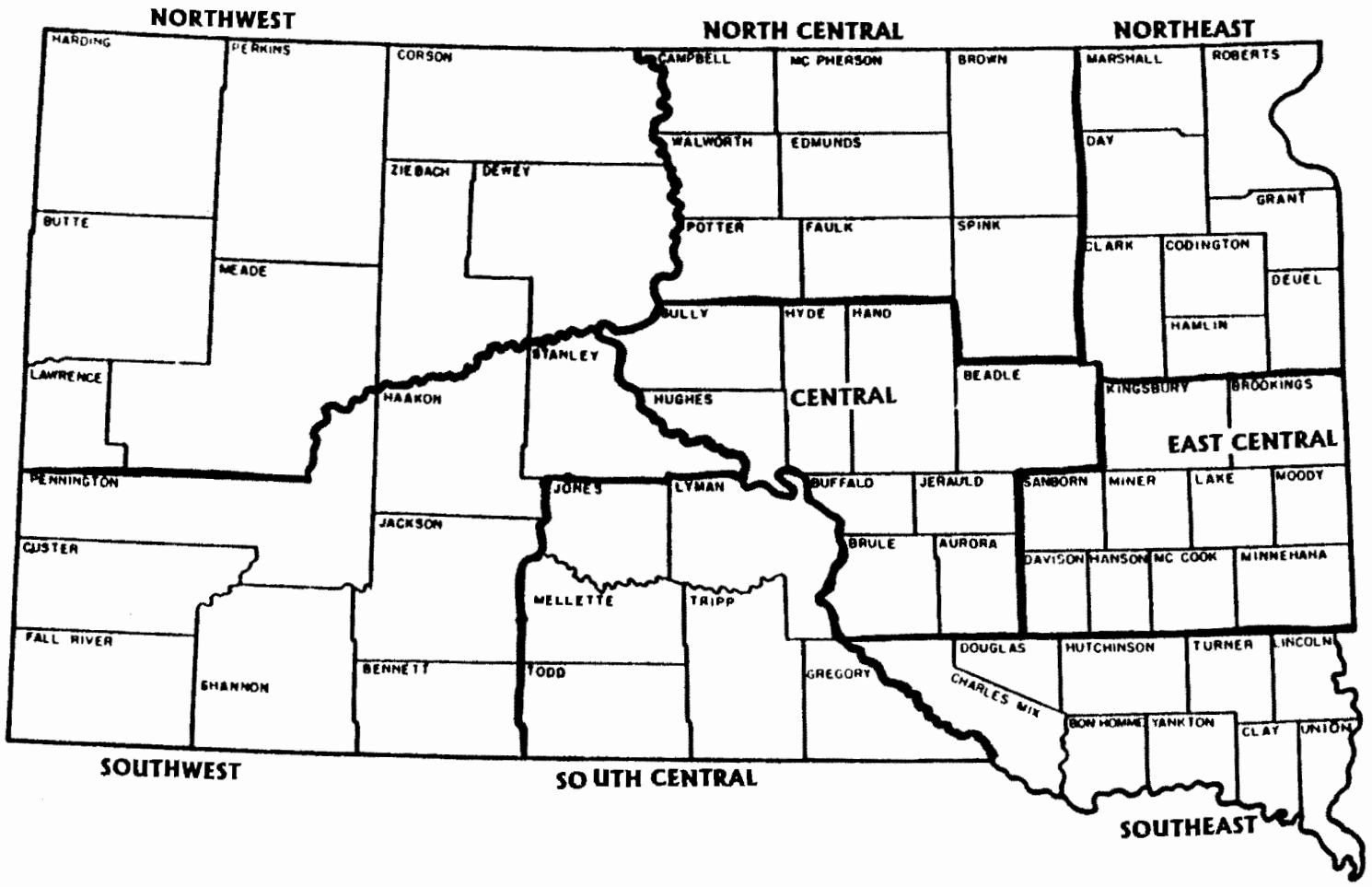

Table 1. Regional distribution of respondents to the 1999 South Dakota survey on county land rents and values by land use category.

Regional Location[a]	Land Use Category					
	Cropland		Pastureland		Whole Farm	
	number and percent of responses[b]					
Eastern	1079	41.2%	945	34.1%	351	34.7%
Central	908	34.6%	889	32.1%	368	36.3%
Western	635	26.2%	937	33.8%	294	29.0%
State	2622	100.0%	2771	100.0%	1013	100.0%

Source: Compiled from survey data reported in South Dakota 1999 County Level Land Rents and Values conducted and published by the South Dakota Agricultural Statistics Service (SDASS), Sioux Falls, SD, March 1999.

[a]Regional location grouped by South Dakota Ag Statistics Districts (ASD)
Eastern = southeast, east central, and northeast ASD
Central = south central, central, and north central ASD
Western = southwest, west central, and northwest ASD

[b]Total number of survey responses is over 3300 South Dakota farm and ranch operators

III. FARM REAL ESTATE VALUE RELATIONSHIPS

Previous farmland market research has shown systematic relationships of per acre prices of farmland across counties and regions of South Dakota (Janssen, 1988a). Information presented later in this section updates and expands past research by showing the relative (percentage) relationships of average per acre values of different types of farm real estate by county and region in South Dakota. The updated information is based on 1995 - 1999 data from the SDASS survey.

Previous research on South Dakota farmland price relationships, 1975 - 1987

Farmland price relationships between counties and regions during the 1975 - 1987 period indicated extensive and systematic variation across South Dakota. This principal finding was based on examination of per acre price of 13,465 farm real estate sales transactions of 40 acres or more in South Dakota which occurred from January 1975 through June 1987. The database of farm real estate sales transactions was provided by the Federal Land Bank of Omaha (Janssen, 1988a).

Farmland price relationships from 1975 –1987 between counties and regions were estimated using a linear regression model.[3] Results are displayed in Figure 2.[4]

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[3] The linear regression equation used to estimate farmland prices relationships was:

(1) $X_i = bX_L + e$

where:

X_i = annual average per acre sale price of farm real estate in i^{th} county / region,

X_L = annual average per acre sale price of farm real estate in Lincoln county,

b = beta coefficient of linear price relationship, and

e = error term

All equations were statistically significant (p=0.01) and the coefficient of determination, R^2, was above 0.95. Equations were estimated using nominal, instead of deflated, land sales price data because Xi and XL have the same proportional relationship (beta coefficient) regardless of sales price data (nominal or deflated) used.

[4] Figure 2 is a reprint of Figure 3.1: South Dakota Farm Real Estate Price Relationships, 1975 – 1987 originally published in Janssen, South Dakota Farmland Values and Sale Prices, Economics Dept. Research Report 88 –1, South Dakota State University, Brookings, SD, pp. 21.

During the 13-year period, 1975 - 1987,

> "farm real estate sale prices were highest in Lincoln and Union counties. Farmland sales prices in Moody, Turner, Minnehaha, and Clay counties are 79% to 91% of per acre average sale price in Lincoln county. Average sale prices rapidly decline in the remaining counties of east central and southeast South Dakota and vary from 32% to 60% of Lincoln county average per acre farmland sale price. All counties in other regions of South Dakota showed average per acres farmland sale prices of less than 50% of those in Lincoln county. County farmland sale price relationships (relative to Lincoln county) in other regions are:
>
> | | |
> |---|---|
> | Northeast region | = 34 to 47% |
> | North Central region | = 24 to 42% |
> | Central region | = 25 to 34% |
> | South Central region | = 18 to 27% |
>
> County sale price relationships were not estimated in western South Dakota. Percentage coefficients for the northwest and southwest region were 14% and 17%, respectively, while the Black Hills region coefficient was 32%.
>
> The dramatic differences in per acre prices of farm real estate across South Dakota were primarily related to differences in land quality and land use. An econometric study of South Dakota farmland market prices from 1976 - 1984 indicated that land tract variables reflecting land use and quality explained about 64% of the statewide variation in per acre sale price of 7202 credit financed farmland tract sold in this period (Janssen and Haque, 1987)." [quoted from Janssen, 1988a, pp. 23 - 24].

South Dakota Farmland Value Relationships, 1995 - 1999

In this section, the relative (percentage) relationships of per acre average value of different types of farm real estate across counties and regions of South Dakota are presented for the 1995 - 1999 period. The data source is county-level land value data for cropland, pasture, and whole farms obtained from the annual SDASS survey of South Dakota farm / ranch operators. County land value data for cropland, pasture, and whole farms from 1995 – 1999 is shown in Appendix II.

For each county, the five-year (1995 - 1999) average per acre value of cropland, pasture, and whole farms are estimated directly as the simple average of annual per acre value of each item reported in the SDASS survey.[5] The per acre value of all non-irrigated agricultural land in each county is obtained by weighting the per acre cropland values and per acre pasture values by the estimated proportion of cropland and pasture in the county. Regional and statewide per acre average values are obtained by weighting the appropriate county land value by its relative share of the region's or State's farmland acreage in each specific use.

A percentage index is used to compare average farmland values across counties and regions. The index is set at 100 in Lincoln county which usually has the highest average county land values. Relative (percentage index) land values are obtained by indexing the 5-year average per acre land value in each county and region to the 5-year per acre average land value in Lincoln county.

Relative (percentage) relationships of per acre average value of cropland, pasture, all non-irrigated agricultural land, and whole farms across South Dakota counties and regions for 1995 - 1999 are shown in figures 3, 4, 5 and 6. Information reported in these four figures for land value relationships from 1995 - 1999 updates and extends the findings from the 1975 - 1987 period (figure 2). The main differences in reporting are:

(1) Relative land values reported from 1995 - 1999 are obtained from annual surveys of farm operators. Relative land prices from 1975 - 1987 are based on farmland sales transaction data.

(2) Cropland, pasture, all-agricultural land, and whole farm value data are reported for the 1995 - 1999 period, compared to farm real estate sales price data from 1975 - 1987. Farm real estate sales transactions, which may include sale of land and buildings, is closely related to whole farms or to all-agricultural land. Whole farm data includes the value of land and farm buildings on a per acre basis, while all agricultural land values do not include the value of farm buildings.

(3) Relative land values from 1995 - 1999 are reported for all counties and regions. From 1975 to 1987, relative land values are reported for all counties east of the Missouri River and for three regions (northwest, southwest, and Black Hills) west of the Missouri River.

[5] The simple average county land values are constructed from nominal, instead of deflated, land value data as the proportional relationships of land values between counties are the same regardless of using nominal or deflated data.

Key findings are highlighted.

1. A systematic pattern of farmland values occurs across regions, regardless of land use.

Average per acre values of cropland, all non-irrigated agricultural land, and whole farms are highest in the southeast region, followed in descending order by land values in the east central, northeast, north central, central, south central, southwest, and northwest region. The same pattern occurs for pasture and rangeland values except average per acre values are somewhat higher in the central region than in the north central region.

2. Tremendous variation in non-irrigated agricultural land values exists across South Dakota.

The percentage index of non-irrigated agricultural land value varies from 8.7% in Harding county to 93.5% in Union county and 100% in Lincoln county. Agricultural land values in Moody, Clay, and Minnehaha county vary from 82.7% to 86.2% of per acre average farmland values in Lincoln county. In the remaining counties of the southeast and east central regions, per acre values rapidly decline and vary from 57.1% of Lincoln county land values in Lake county to only 31.2% in Sanborn county. Only 10 counties in the east central and southeast region have per acre average land values exceeding 50% of average farmland values in Lincoln county (figure 5).

Average agricultural land values in all other counties east of the Missouri River vary from 18.5% to 48.5% of agricultural land values in Lincoln county (figure 5). County farmland value relationships (relative to Lincoln county) in these regions are:

Northeast region	= 30.7% in Day county	to	48.5% in Hamlin county
North Central region	= 26.0% in Edmunds county	to	43.6% in Brown county
Central region	= 18.5% in Buffalo county	to	33.9% in Sully county

Average agricultural land values in counties located west of the Missouri River vary from 8.7% to 29% of agricultural land values in Lincoln county. Only three of these counties (Tripp, Lyman, and Gregory counties located in the south central region) have percentage index values exceeding 25% (figure 5). County agricultural land value relationships (relative to Lincoln county) in these regions are:

South Central region	= 13.7% in Mellette county	to	29.0% in Gregory county
Southwest region	= 10.6% in Fall River county	to	17.4% in Custer county
Northwest region	= 8.75% in Harding county	to	20.5% in Lawrence county

The dramatic differences in non-irrigated agricultural land values across the state are primarily related to differences in land quality, land productivity, and land use. Rangeland is the dominant land use in most counties west of the Missouri River, while cropland (including hay) is the dominant land use in eastern South Dakota.

3. The distribution of relative per acre values of non-irrigated agricultural land and whole farms across South Dakota is very similar.

For each county, per acre value of whole farms is the simple average of survey responses and represents the value of land and buildings. The county average per acre value of non-irrigated land is **derived** from per acre average cropland and pasture values obtained from farmer respondents, weighted by the proportion of cropland and pasture/rangeland in that county.

The correlation coefficient of average per acre whole farm values and non-irrigated agricultural land values across counties is 0.99. In all counties of eastern South Dakota, the percentage index of whole farm values is above the percentage index of non-agricultural land values. In the central and western regions of South Dakota, the percentage indices of whole farm and non-irrigated land values are very close (-2% to +2%) in most counties (figures 5 and 6).

4. The variation in relative per acre values across South Dakota is the least for pasture/ rangeland, intermediate for cropland, and greatest for all non-irrigated agricultural land.

The northwest (southeast) region has the lowest (highest) percentage index value for each land use. The regional variation in percentage index values by land use are: pasture / rangeland = 20.3% to 68%, cropland = 16.4% to 67%, and non-irrigated agricultural land = 11.3% to 60.9% of Lincoln county land values.

At the county level, the percentage index value of pasture / rangeland is higher than the percentage index value of cropland in all except three counties (Moody, Minnehaha, and Clay counties) that are in close proximity to Lincoln county. This implies the value and productivity of pasture/rangeland is more evenly distributed across South Dakota than the value and productivity of cropland. This finding is consistent with annual land value and cash rental rate results obtained from the SDSU survey and is also consistent with the shifting pattern of land use across the state.

Relative to Lincoln county land values, the percentage index value of all non-irrigated agricultural land is **lower in all other counties** than the

corresponding percentage index values for cropland or pasture / rangeland. These results are due to the compounding effects of two factors: (1) average per acre value of pasture / rangeland is lower than the average per acre value of cropland in all counties, and (2) the proportion of agricultural land in range/pasture uses increases as one moves west and north across the State.

5. Compared to Lincoln county, the statewide percentage index of land value is highest for cropland (39.7%), intermediate for pasture/ rangeland (32.2%), and lowest for whole farms (27.9%) or all agricultural land (27.3%).

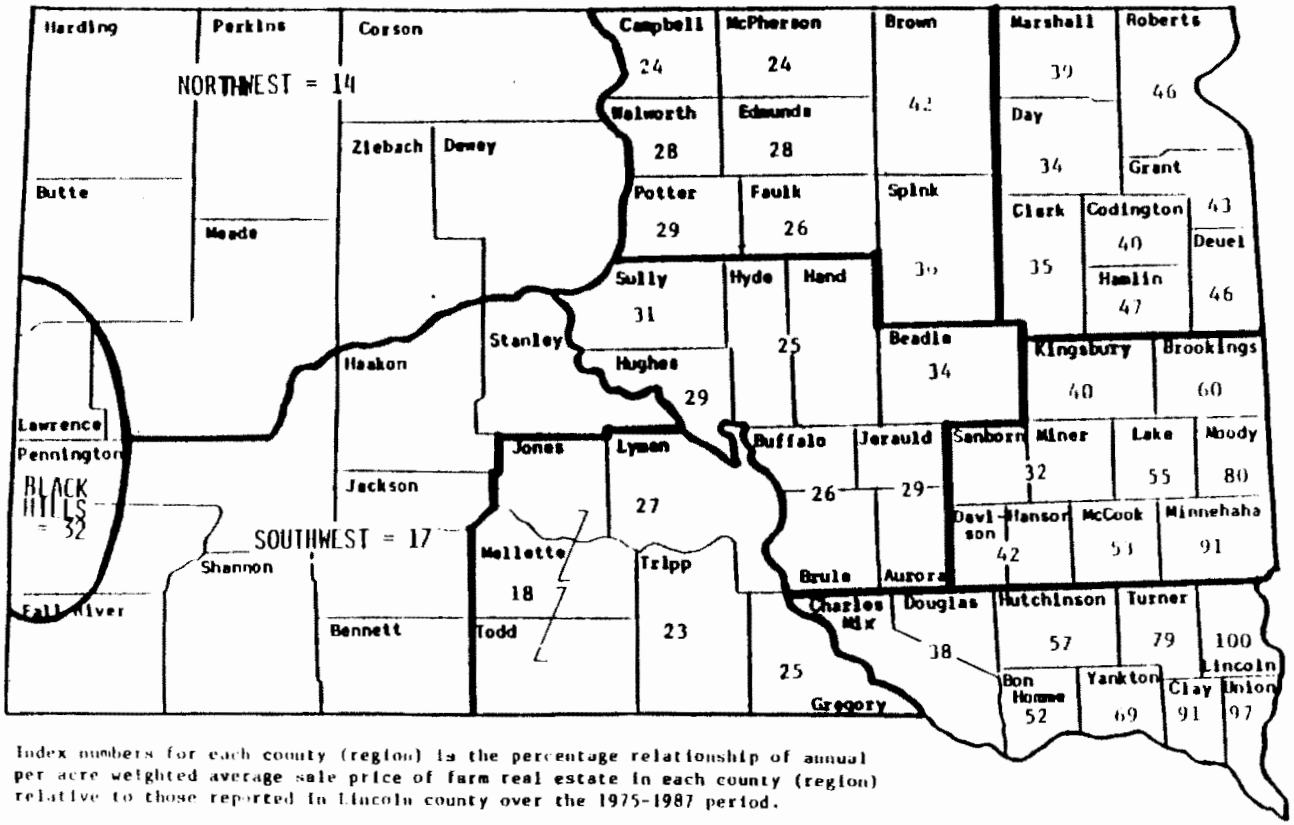
The statewide (and regional) average land values and percentage indices are weighted average values based on the distribution of various land uses across the State. Since a majority of cropland is located in the eastern regions where land productivity and land values are higher, the statewide percentage index value for cropland is higher than the corresponding statewide values for rangeland or all non-irrigated agricultural land. A majority of South Dakota's acreage of rangeland and all agricultural land is located in counties west of the Missouri River, where average per acre land values are lower for all agricultural land uses.

6. The distribution of percentage indices of agricultural land values per acre across South Dakota from 1995 - 1999 is similar to the distribution of percentage indices of farm real estate sale prices per acre from 1975 - 1987.

This finding is consistent with the concept that the distribution of agricultural land values per acre primarily reflect **relative differences** in land productivity and land use - attributes that usually change slowly over time after the land settlement era has ended. Of course, more intensive economic development activity near metropolitan cities (Sioux Falls, Rapid City, and Sioux City), regional trade centers, and recreational areas (Black Hills) lead to considerable increases in residential and commercial site values and positive, but indirect, impacts on agricultural land values.

Major changes in the **relative distribution** of farmland values within or between geographic regions usually occur for one or more of the following reasons: (1) a major change in agricultural technology with differential regional impacts, such as irrigation development in the western United States, (2) urbanization that leads to development of large metropolitan areas and associated changes in agricultural land uses, or (3) other reasons that lead to major changes in the spatial distribution of population and associated economic development patterns. Historical examples include land settlement policies and changing transportation development policies in the 19th and 20th centuries. Contemporary examples include recreational and amenity development in some rural regions, such as the Black Hills.

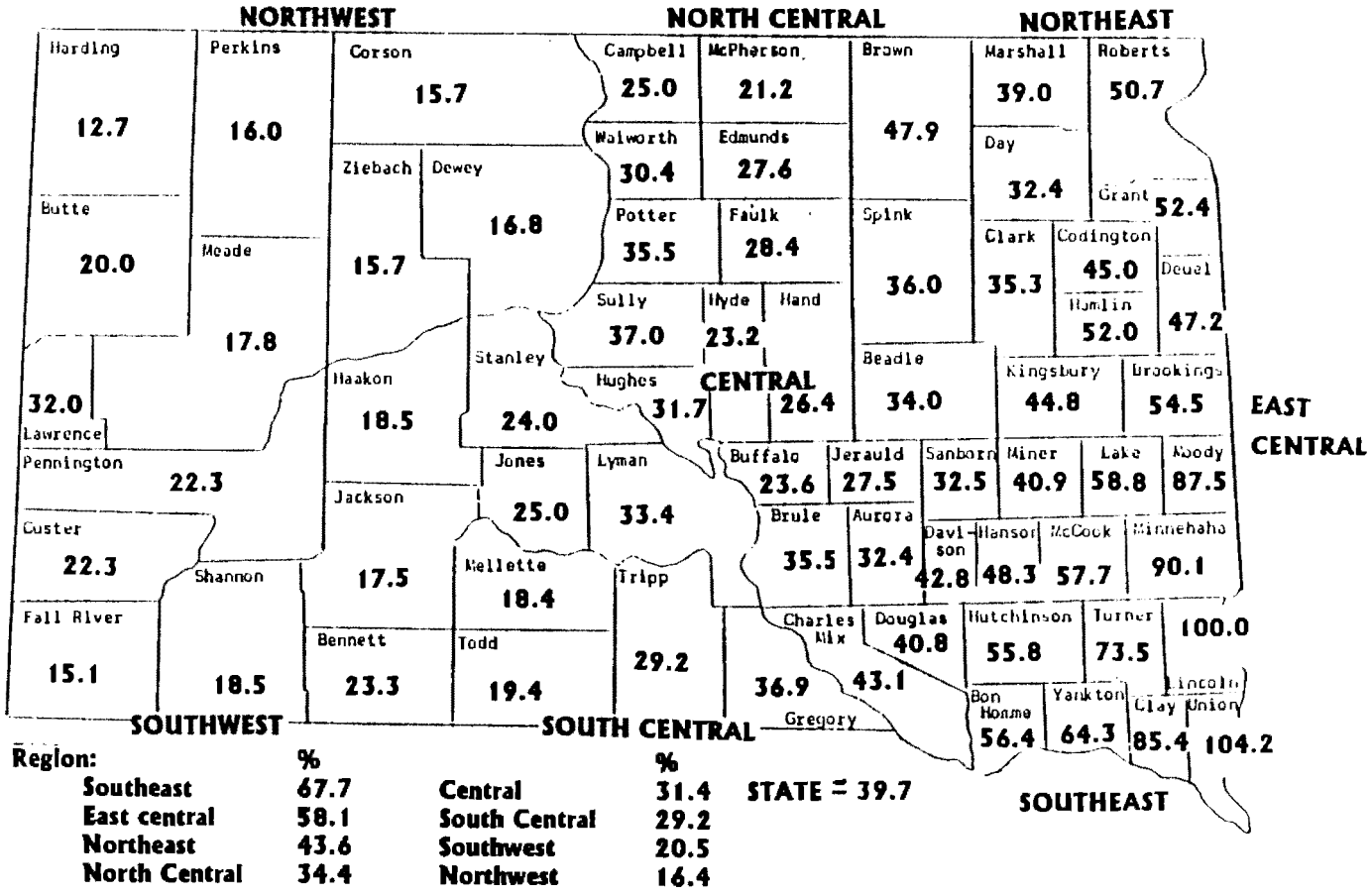
Figure 2. South Dakota farm real estate price relationships, 1975 – 1987.



Index numbers for each county (region) is the percentage relationship of annual per acre weighted average sale price of farm real estate in each county (region) relative to those reported in Lincoln county over the 1975-1987 period.

Source: Derived from regression analysis of datasets provided by the Farm Credit Banks of Omaha.

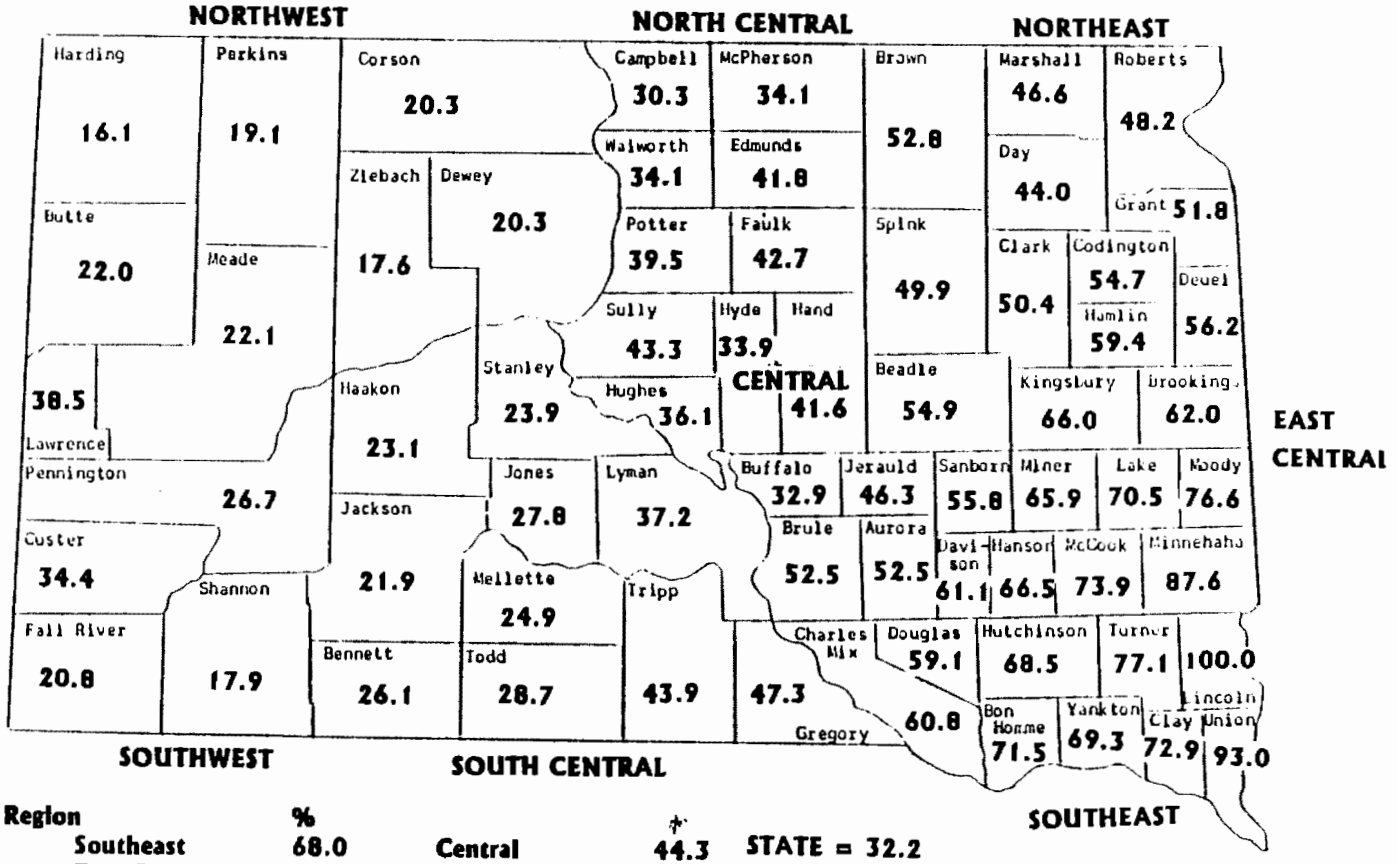
Fig. 3. Average per acre value of cropland by South Dakota county and region as a percent of average cropland value in Lincoln county, 1995-1999.



Region:	%		%	
Southeast	67.7	Central	31.4	STATE = 39.7
East central	58.1	South Central	29.2	
Northeast	43.6	Southwest	20.5	
North Central	34.4	Northwest	16.4	

Source: Compiled from annual data published in South Dakota County Land Values and Rental Rates survey conducted by the USDA's South Dakota Agricultural Statistics Service (SDASS survey).

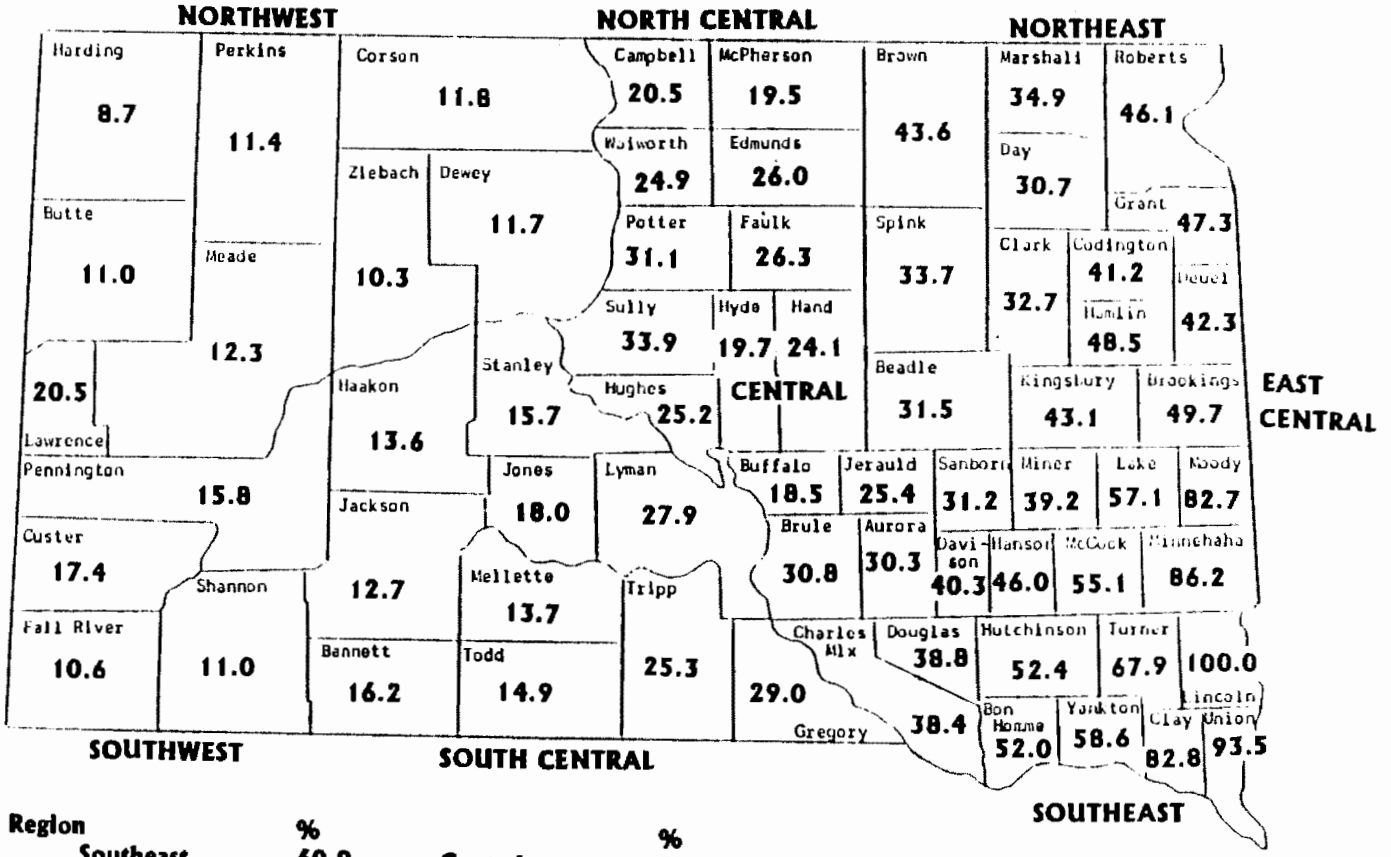
Fig. 4. Average per acre value of pasture and rangeland, by South Dakota county and region as a percent of average pasture and rangeland value in Lincoln county, 1995- 1999.



Region	%			
Southeast	68.0	Central	44.3	STATE = 32.2
East Central	66.7	South Central	34.7	
Northeast	50.3	Southwest	24.1	
North Central	40.9	Northwest	20.3	

Source: Compiled from annual data published in South Dakota County Land Values and Rental Rates survey conducted by the USDA's South Dakota Agricultural Statistics Service (SDASS survey).

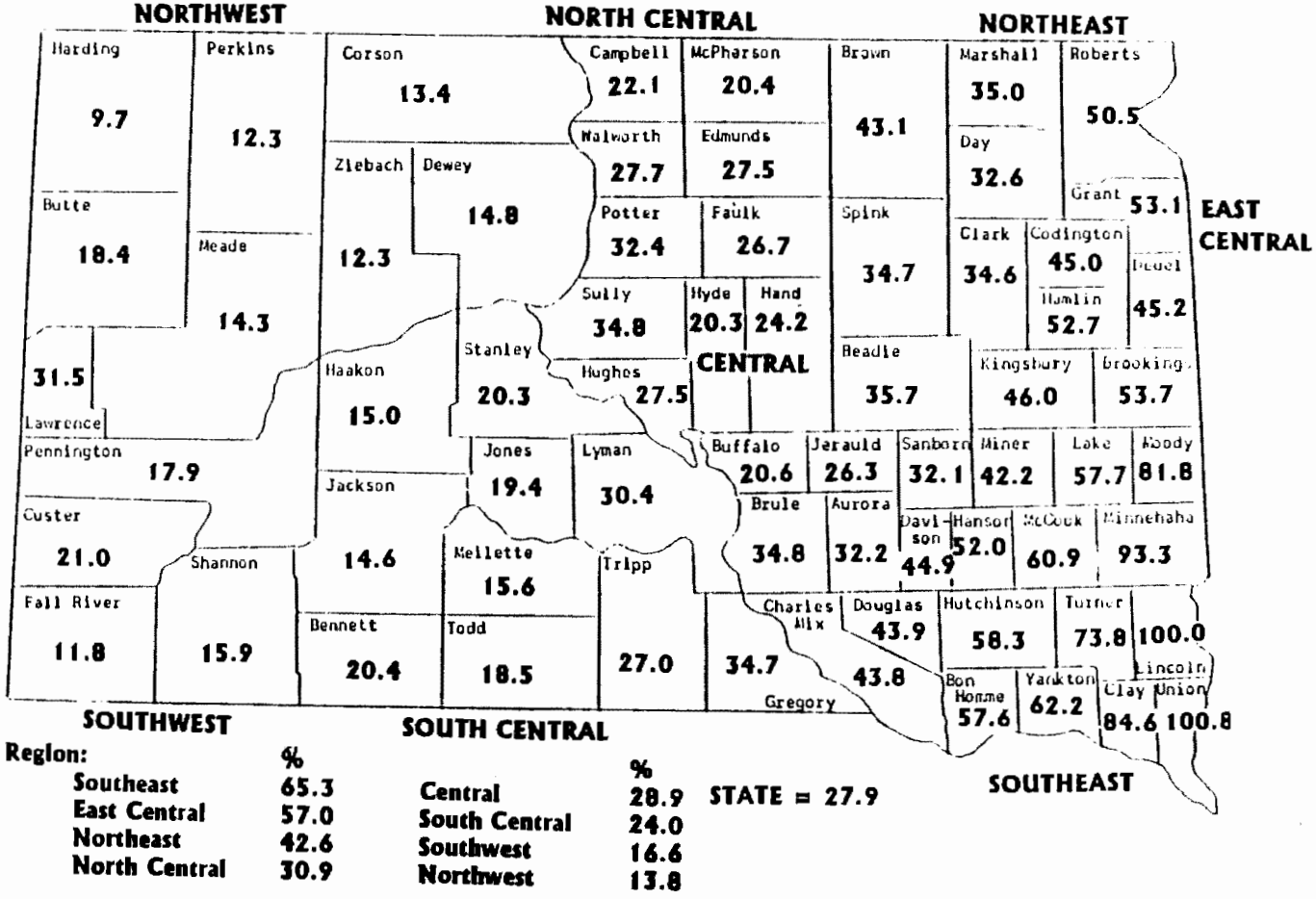
Fig. 5. Average per acre value of nonirrigated agricultural land, by South Dakota county and region as a percent of average value in Lincoln county, 1995- 1999



Region	%		%	
Southeast	60.9	Central	27.3	STATE = 27.3
East Central	53.5	South Central	21.8	
Northeast	39.6	Southwest	14.1	
North Central	30.1	Northwest	11.3	

Source: Compiled from annual data published in South Dakota County Land Values and Rental Rates survey conducted by the USDA's South Dakota Agricultural Statistics Service (SDASS survey).

Fig. 6. Average per acre value of whole farms, by South Dakota county and region as a percent of average whole farm value in Lincoln county, 1995-1999.



Region:	%		%	
Southeast	65.3	Central	28.9	STATE = 27.9
East Central	57.0	South Central	24.0	
Northeast	42.6	Southwest	16.6	
North Central	30.9	Northwest	13.8	

Source: Compiled from annual data published in South Dakota County Land Values and Rental Rates survey conducted by the USDA's South Dakota Agricultural Statistics Service (SDASS survey).

IV. ESTIMATION OF REGIONAL AND STATEWIDE LAND VALUES: DEVELOPMENT OF LAND USE WEIGHTING FACTORS

Weighted average approach to land value estimates

The three most common methods of reporting central tendency of farm real estate sale prices per acre in a geographic region are: (1) median sale price, (2) simple average sale price, or (3) weighted average sale price. The median sale price is found by ranking sale tracts from highest to lowest sale price and selecting the sale price of the middle (50^{th} percentile) tract. The simple average sale price is the arithmetic average of the per acre sale price of tracts sold. The weighted average sale price is obtained by weighting each sale tract by the number of acres sold. In some real estate markets, the per acre sale price is similar regardless of which measure is used, but this is not the case in South Dakota.

Statewide and in most regions, the per acre median and simple average sale price have been considerably higher than the weighted average sale price. This relationship occurs because: (1) cropland prices exceed pasture / rangeland prices per acre in all counties and regions of South Dakota, (2) larger size sale tracts in all regions of South Dakota tend to have a lower proportion of cropland and a higher proportion of rangeland than smaller size tracts, and (3) average tract size sold greatly increases and farmland sale price per acre declines as one moves north and west from southeast South Dakota (Janssen, 1988b).

Agricultural land market survey estimates of per acre average land values at the local level are usually a simple average (mean) of responses. However, regional or statewide land value estimates are usually weighted by the number or proportion of eligible acres from each locality. Statewide and in most regions, the weighted average price per acre is lower than a simple average price per acre reported from survey responses. The major reason is that the distribution of respondents by county is often similar to the distribution of cropland by county, but is considerably different than the distribution of rangeland or all agricultural land by county.

For example, in the 1998 SDSU Farm Real Estate Survey, the three eastern regions with the highest average land values had nearly 49% of respondents, 45% of cropland acres, 9% of rangeland acres, and 26% of all non-irrigated agricultural acres. The statewide implications of using weighted average, instead of simple average, for the per acre value of cropland, rangeland, and all non-irrigated agricultural land are shown as follows:

SDSU Farm Real Estate Survey, 1998:

Statewide land use	Weighted average value per acre	Simple average value per acre
cropland:	$536 / acre	$551 / acre
rangeland:	$167 / acre	$263 / acre
all non-irrigated agricultural land	$319 / acre	$378 / acre

This author believes the weighted average approach to statewide and regional land values is preferable to a simple average (mean) of all responses. The weighted average approach increases the relative importance of western South Dakota land values in the final computations and results in lower statewide average land value estimates.

Furthermore, the weighted average approach to estimating land use is conceptually consistent with the cost (inventory) approach used to estimate farm values in rural real estate appraisals. In this report, farmland survey data is directly used to estimate (assign) the per acre value of each land use in each locality (region or county), but the aggregated regional or statewide land value is determined by the relative amount of agricultural land in each use in each locality.

Land use factors

The total number of eligible acres may be defined as **all agricultural land** or a major subset such as **privately owned agricultural land.** The decision of which eligible acres definition to use has considerable impact on agricultural land value estimates in many states, including South Dakota, with varied land ownership and leasing patterns. Both farmland market surveys request respondents to report land values and rental rates for privately owned agricultural land. In this study, we examine the consequences of this assumption on regional and statewide agricultural land value estimates.

Data for **all land in farms** as reported in the U.S. Census of Agriculture are used by the U.S. Department of Agriculture to develop their estimates of statewide and national agricultural real estate values. The USDA farm real estate value series includes the estimated value of farm buildings and all land operated by farmers and ranchers. It does not break down estimated values by land use.

In this comparison study of the SDSU and SDASS surveys, the interest is in: (1) comparing per acre **non-irrigated land values** by major land uses such

as crop land or pasture, and in (2) estimating the per acre value of all non-irrigated land at the regional or statewide level. This requires developing land use weights at the county or regional level for non-irrigated land uses.

In the SDSU survey, per acre land values are estimated for the four major non-irrigated agricultural land uses: range, pasture, hay, and crop. Regional average land values by land use are simple average (mean) values of useable responses. Statewide average land values per land use category are estimated by weighting the per acre regional values by its relative share of acres in the same land use category. All non-irrigated land use values, statewide and regional, are estimated by weighting the per acre value of land in each use by its relative share of acres in the same agricultural land use category.

In the SDASS survey, county land values per acre are simple average (mean) values of useable responses for two non-irrigated land uses, cropland and pasture, and for whole farms. Regional and statewide values are not reported in the SDASS survey.

In this study, the following assumptions and procedures are used to permit comparison of SDASS and SDSU land values at the regional and statewide level:

(1) SDASS cropland is non-irrigated agricultural land used for hay or crop production, while SDASS pasture is non-irrigated agricultural land used for range or pasture production. Of course, the total amount of non-irrigated land is the sum of these major land uses and is the same acreage amount in both surveys.

(2) In the SDASS survey, regional and statewide land values per acre are estimated by weighting the per acre land value in each county by its relative share of regional (statewide) agricultural land. This weighted average approach is used for each land use category (crop, pasture) and for all non-irrigated agricultural land.[6]

(3) Both definitions of total non-irrigated acres are used to develop land use weighting factors: **all** and **privately owned** non-irrigated agricultural land. Irrigated land, farm building sites and a few other land uses (ponds, roads, wasteland) are excluded from both definitions. Privately owned farmland also excludes land (mostly rangeland) leased from tribal, state, or federal agencies and a few other farmland uses, such as research farms.

[6] Regional and statewide average per acre value of whole farms are also estimated by weighting the per acre value of whole farms at the county level by its proportion of all non-irrigated agricultural land. Per acre value of whole farms, which includes the value of land and buildings, is not directly comparable to other agricultural land values in the two surveys, but serves as a useful cross-check to our estimates of all non-irrigated land values.

(4) The land use weighting factors were developed from county level agricultural land use data available in the 1992 South Dakota Census of Agriculture and other sources.

Data in Table 2 show the estimated acreage of agricultural land by region and land use for all land in farms, for non-irrigated agricultural land, and for privately owned non-irrigated agricultural land. Data in Tables 3 and 4 show the percentage distribution of major land uses across regions and within each region. Data sources and specific procedures used to derive land use weighting factors are further discussed in Appendix III.

Empirical Comparisons

Key findings from examination of land use data in Tables 2, 3, and 4 are:

1. **Most federal, state, and tribal trust agricultural land is located west of the Missouri River in the south central, southwest, and northwest regions.**

Furthermore, most of the estimated 5.75 million acres of federal, state, and tribal trust agricultural lands are in range land which usually has lower per acre value than other agricultural land use values. The implications of using **all agricultural land** (which includes these 5.75 million acres), compared to **privately owned agricultural land** (which excludes these 5.75 million acres) as the weighting factor is to reduce the statewide agricultural land value estimate and to reduce land value estimates in several regions.

2. **The relative importance of various regions on statewide agricultural land values varies greatly by land use.**

For example, the three eastern regions have nearly 45% of the state's cropland acres, 26% of privately owned agricultural land acres, and only 9% of rangeland acres. By contrast, the two western regions have nearly 61% of the state's privately owned rangeland acres, 39% of private agricultural land acres, and only 16% of the state's crop land acres. Thus, statewide estimates of rangeland values are heavily weighted by reported rangeland values from western and central South Dakota regions, while statewide estimates of cropland values are heavily weighted by reported values in eastern South Dakota.

3. **Regional estimates of all non-irrigated agricultural land values are considerably influenced by land use patterns.**

Land uses in eastern South Dakota regions are primarily crop/hay, while pasture / range land is the predominant land use in western South Dakota. For example, more than 70% of agricultural land acres in the three eastern regions are in crop/hay uses, while 80% (85%) of private (all) agricultural land acres in

the northwest region are in range land or pasture. Hay land and tame pasture land are nearly 20% of agricultural land acres in the eastern and central regions, and less than 10% of agricultural land acres in western regions of South Dakota.

Table 2. Distribution of South Dakota agricultural land by region and land use, thousands of acres.

Region/State	All land in Farms	All nonirrigated ag land*	Public, Tribal & other ag land	Private nonirrigated agricultural land				
				All ag land	Range	Pasture	Hay	Crop
Southeast	3223	3025	7	3018	418	314	295	1991
East Central	3390	3211	7	3204	493	368	290	2053
Northeast	3571	3359	27	3332	658	318	340	2016
North Central	5154	4970	133	4837	1398	428	531	2480
Central	4627	4462	181	4281	1692	381	469	1739
South Central	4819	4720	624	4096	2428	235	467	966
Southwest	8178	7950	2014	5936	4357	186	374	1019
Northwest	11866	11643	2754	8889	6938	239	638	1074
SOUTH DAKOTA	44828	43340	5747	37593	18382	2469	3404	13338

Source: Derived from county data in 1992 Census of Agriculture and other sources.

*All land in farms minus irrigated land minus farmsite and nonag land uses on farms.

Table 3. Percentage distribution of South Dakota nonirrigated agricultural land acreage across regions by land use.

Region/State	All ag land	Private ag land	All rangeland	Private rangeland	Pasture	Hay	Crop
	percent of acres per land use by region						
Southeast	7.0	8.0	1.4	2.3	12.7	8.7	14.9
East Central	7.4	8.5	2.1	2.7	14.9	8.5	15.4
Northeast	7.7	8.9	2.8	3.6	12.9	10.0	15.1
North Central	11.5	12.9	6.3	7.6	17.4	15.6	18.6
Central	10.3	11.4	7.8	9.2	15.4	13.8	13.0
South Central	10.9	10.9	12.7	13.2	9.5	13.7	7.3
Southwest	18.3	15.8	26.4	23.7	7.5	11.0	7.6
Northwest	26.9	23.6	40.2	37.7	9.7	18.8	8.1
SOUTH DAKOTA	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Thousand of Acres	43340	37593	24129	18382	2469	3404	13338

Source: Derived from data presented in Table 2.

Table 4. Percentage distribution of South Dakota nonirrigated agricultural land uses, statewide and by region, all nonirrigated land and privately owned non irrigated land.

A: Region/State	All nonirrigated ag land		Land Use Category			
	Thousand acres	Pct	Range	Pasture	Hay	Crop
			percent of all ag land			
Southeast	3025	100.0	14.0	10.4	9.8	65.8
East Central	3211	100.0	15.6	11.5	9.0	63.9
Northeast	3359	100.0	20.4	9.5	10.1	60.0
North Central	4970	100.0	30.8	8.6	10.7	49.9
Central	4462	100.0	42.0	8.5	10.5	39.0
South Central	4720	100.0	64.6	5.0	9.1	20.5
Southwest	7950	100.0	80.1	2.4	4.7	12.8
Northwest	11643	100.0	83.2	2.1	5.5	9.2
SOUTH DAKOTA	43340	100.0	55.7	5.7	7.8	30.8

B: Region/State	Private nonirrigated ag land		Land Use Category			
	Thousand acres	Pct	Range	Pasture	Hay	Crop
			percent of private ag land			
Southeast	3018	100.0	13.8	10.4	9.8	66.0
East Central	3204	100.0	15.4	11.5	9.0	64.1
Northeast	3332	100.0	19.8	9.5	10.2	60.5
North Central	4837	100.0	28.9	8.9	10.9	51.3
Central	4281	100.0	39.5	8.9	11.0	40.6
South Central	4096	100.0	59.3	5.7	11.4	23.6
Southwest	5936	100.0	73.4	3.1	6.3	17.2
Northwest	8889	100.0	78.0	2.7	7.2	12.1
SOUTH DAKOTA	37593	100.0	48.9	6.6	9.0	35.5

Source: Derived from data presented in Table 2.

V. LAND VALUE COMPARISONS, STATEWIDE & REGIONAL

Statewide estimates of per acre land values generated from both surveys (SDASS and SDSU) for 1995 - 1999 are reported in Tables 5 and 6. Non-irrigated land values are reported for both alternative land use weighting factors - private agricultural land and all agricultural land - and are based on methods / assumptions discussed in the previous section (IV) of this report. Regional estimates of per acre values of different types of farmland generated from both surveys for 1995 – 1999 are reported in tables 7 – 10. Key findings are highlighted.

1. **Whole farm values per acre are considerably higher than non-irrigated land values and have increased more rapidly from 1995 - 1999.**

Statewide whole farm values in 1999 are about 27% higher than non-irrigated land values, compared to only 13 - 15% higher in the 1995 - 1997 period (table 5). A similar relationship between per acre whole-farm values and non-irrigated land values generated from the SDASS survey occurs in each region. The percentage difference between per acre whole farm and non-irrigated land values are least in the north central region and greatest in western South Dakota (tables 7 and 8).

Whole farm values, which include respondent's estimated per acre value of land and buildings, are expected to be higher than non-irrigated land values. The latter value is the weighted average of crop/hay land values and pasture/range values and exclude farm buildings. However, the more rapid increase in whole farm values, statewide, and in all regions, was not expected.

Per acre value of whole farms are greater than per acre cropland values in eastern South Dakota where most farms are predominantly cropland. Per acre value of whole farms in western and south central South Dakota are lower than per acre cropland values because the dominant land use is rangeland (tables 7 and 9).

2. **Statewide land value estimates (whole farm or non-irrigated land) are $19 to $25 per acre higher for privately owned land than for all-agricultural land. The statewide per acre value of whole farms is increased by 6 - 7%, while per acre value of non-irrigated agricultural land is increased by 8 - 9%. Changing the land use weighting factor from privately owned to all-ag land has a greater impact on statewide land value estimates than on regional land value estimates.**

In South Dakota the choice of land use weighting factors (privately owned vs. all ag land) has a substantial impact on statewide land value estimates. The statewide differences in land value estimates stem from the impact of excluding or including 5.75 million acres of public and tribal trust agricultural land (mostly rangeland located west of the Missouri River) in constructing the land use weighting factors. Currently, respondents to the SDASS and SDSU land market surveys are asked to estimate the value of privately owned land in different land uses. Consequently, the appropriate land value estimate to report at the statewide or regional level is the higher per acre value estimated for privately owned land.

Regional land value estimates in eastern South Dakota are barely affected ($1 to $3 per acre and <1%) by choice of land use weighting factor, because 99%+ of agricultural land is in private ownership and most farmland is used for crop / hay production. Estimated average values of agricultural land are affected by $3 to $5 per acre (1% to 1.5%) in the north central and central regions where 96 - 97% of agricultural land is in private ownership and a majority of agricultural land in most counties is used for crop/hay production.

As expected, average land value estimates in the south central, northwest, and southwest region are more affected by choice of land use weighting factor. Based on SDASS survey data, the estimated value of agricultural land is affected by nearly 4% in the south central region ($9 to $10 per acre impact) and in the northwest region ($4 to $6 per acre impact). In the southwest region, the estimated value of agricultural land is affected by 7 - 8% or $9 to $12 per acre.

The southwest is the only region in South Dakota where choice of land use weighting factors results in similar percentage impact on regional average land values as on statewide average land values. The southwest region has the lowest proportion (about 75%) of privately owned agricultural land in South Dakota, but agricultural land use is dominated by rangeland. Statewide land use is very heterogeneous with tremendous regional diversity in patterns of agricultural land use and land ownership. However, the choice of land use weighting factor on statewide land values is primarily affected by the impact of excluding (including) 5.75 million acres with the lowest average land values in South Dakota.

3. Statewide rangeland value estimates are $7 to $12 per acre (5% to 7%) higher for privately owned land than for all-agricultural land.

In both surveys, regional estimates of per acre rangeland values are nearly the same, regardless of land use weighting factor (private or all ag land). The statewide impact on rangeland values is entirely due to the location of most federal and state leased rangelands and tribal trust rangelands in western and

south central South Dakota, where rangeland values are lowest.

4. Data from both surveys generate consistent and similar per acre values of agricultural land in South Dakota, statewide and in each region. However,estimated changes in land values for 1995 to 1999 are greater in the SDSU survey than in the SDASS survey.

The statewide per acre average value of non-irrigated agricultural land increased each year in both surveys and are relatively close to each other. However, the average value reported in the SDSU survey increased 24% from 1995 to 1999, compared to a 16% increase in the SDASS survey. Average values in the SDSU survey were greater in 1998 and 1999 and lower in 1995, 1996, and 1997 (table 5).

Regional comparisons indicate both surveys generate similar per acre values and percentage increases throughout the 1995 to 1999 period in the southeast, northeast, central, and northwest region. Compared to the SDASS survey, average per acre values generated from the SDSU survey are slightly higher in the southeast and northeast region and lower in the northwest region.

Further regional comparisons indicate the average per acre values generated from the SDSU survey increased much more rapidly than those reported in the SDASS survey in the east central, north central, and south central regions. In each of these regions, the average per acre value generated from SDSU survey data was lower in 1995, 1996, and 1997 and higher in 1998 and 1999. Differences in results between the two surveys in these regions generates most of the statewide differences (tables 5 and 8).

5. A consistent pattern of per acre land value by land use occurs in both the SDSU and SDASS survey, statewide and across regions. In both surveys, pasture / rangeland values increased more rapidly than cropland values from 1995 to 1999.

Statewide and in most regions of South Dakota, per acre values are highest for cropland followed by hayland, tame pasture, and rangeland. Per acre values of hayland and tame pasture are similar in the north central and central regions (SDSU survey data reported in table 10). Of course, per acre cropland values generated from SDASS survey data are higher than per acre rangeland values in all regions.

Statewide and in most regions, the per acre average value of cropland generated from SDSU survey data is slightly higher than the per acre average value of cropland obtained from SDASS survey data. In all regions, the per acre value of "pasture" generated from the SDASS survey is similar to the per acre

value of rangeland reported in the SDSU survey and is considerably lower than the per acre value of tame pasture.

Table 5. Statewide estimates of whole farm and nonirrigated agricultural land values by land use weighting factor, South Dakota, 1995-1999.

Whole Farm (land and building)

Survey Data Source[a]	Land Use Weighting Factor[b]	Estimated Land Value ($/acre) 1995	1996	1997	1998	1999
SDASS	Private	310	318	334	376	402
SDASS	All	291	298	313	353	377

Nonirrigated Agricultural Land

Survey Data Source	Land Use Weighting Factor	Estimated Land Value ($/acre) 1995	1996	1997	1998	1999
SDASS	Private	272	277	294	306	315
SDASS	All	250	255	270	282	290
SDSU	Private	262	273	290	319	325
SDSU	All	241	252	268	295	300

[a] SDASS = South Dakota Agricultural Statistics Service annual survey county level land values and rents
SDSU = South Dakota State University annual Farm Real Estate Market survey

b Private = average land values, $/acre, for private agricultural land
All = average land values, $/acre, for all nonirrigated agricultural land

Table 6. Statewide comparisons of nonirrigated agricultural land value estimates, SDASS and SDSU survey data, by land use, private vs. all agricultural land, South Dakota, 1995-1999 .

A. SDASS Survey Data:

Land Use	Land Use Weighting Factor	Estimated Land Values ($/acre) 1995	1996	1997	1998	1999
Crop/Hay	Private/All	422	430	455	472	483
Pasture/range	Private	155	160	170	178	185
Pasture/range	All	145	149	158	166	173

B. SDSU Survey Data:

Land Use	Land Use Weighting Factor	Estimated Land Values ($/acre) 1995	1996	1997	1998	1999
Crop	Private/All	439	456	488	536	543
Hay	Private/All	254	267	280	303	310
Pasture	Private/All	237	256	271	299	301
Range	Private	136	143	151	167	173
Range	All	129	136	143	159	165

Table 7. Average value and annual percentage change in value of South Dakota whole farms by regions, 1995-1999. SDASS survey data.

Type of Land	South-east	East Central	North-east	North Central	Central	South Central	South-west	North-west	STATE
Whole farm - private agricultural land									
Average value, 1999	912	781	557	400	410	318	231	186	402
Average value, 1998	812	719	557	381	371	305	210	180	376
Average value, 1997	741	625	474	355	330	270	178	161	334
Average value, 1996	670	607	456	342	303	272	183	149	318
Average value, 1995	679	597	442	331	289	265	182	137	310
Average annual % change 99/95	7.7%	6.9%	6.0%	4.8%	9.1%	4.7%	6.1%	7.9%	6.7%

Table 8. Average value and annual percentage change in value of South Dakota nonirrigated agricultural land by region, 1995-1999. SDASS and SDSU survey data comparisons.

Private Nonirrigated agricultural land	South-east	East Central	North-east	North Central	Central	South Central	South-west	North-west	STATE
	dollars per acre								
SDASS survey data									
Average value, 1999	716	614	444	343	324	247	165	130	315
Average value, 1998	683	604	444	334	313	241	155	129	306
Average value, 1997	657	579	432	323	294	229	150	123	294
Average value, 1996	605	543	402	310	273	228	146	116	277
Average value, 1995	603	530	403	303	263	224	141	109	272
Average annual % change 99/95	4.4%	3.7%	2.5%	3.1%	5.7%	2.5%	4.0%	4.5%	3.7%
SDSU survey data									
Average value, 1999	735	645	459	374	335	273	164	120	325
Average value, 1998	766	612	457	350	337	280	153	115	319
Average value, 1997	660	591	437	320	293	241	137	108	290
Average value, 1996	636	522	419	291	288	217	124	112	273
Average value, 1995	627	475	424	277	257	222	129	100	262
Average annual % change 99/95	4.0%	7.9%	2.0%	7.8%	6.8%	5.3%	6.2%	4.7%	5.5%

Table 9. Average value and annual percentage change in value of South Dakota nonirrigated agricultural land by land use, by region, 1995-1999. SDASS survey data comparisons.

Land Use	South-east	East Central	North-east	North Central	Central	South Central	South-west	North-west	STATE	
	dollars per acre									
Cropland (crop/hay)										
Average value, 1999	849	707	519	415	393	343	243	191	483	
Average value, 1998	805	696	520	407	382	339	233	190	472	
Average value, 1997	776	671	503	390	360	331	228	188	455	
Average value, 1996	714	626	470	378	328	332	233	186	430	
Average value, 1995	713	609	470	367	326	319	231	178	422	
Average annual % change 99/95	4.5%	3.8%	2.5%	3.1%	4.8%	1.8%	1.3%	1.8%	3.4%	
									STATE	
Pasture & Rangeland									Private	All
Average value, 1999	385	381	276	232	260	198	143	117	185	173
Average value, 1998	381	369	273	221	248	191	132	115	178	166
Average value, 1997	363	344	274	220	233	177	127	109	170	158
Average value, 1996	335	334	249	204	213	175	121	100	160	149
Average value, 1995	330	331	253	202	213	175	114	93	155	145
Average annual % change 99/95	3.9%	3.6%	2.2%	3.5%	5.1%	3.1%	5.8%	5.9%	4.5%	4.5%

Table 10. Average reported value and annual percentage change in value of South Dakota agricultural land, by type of land, by region, 1995-1999. SDSU survey data.

Type of Land	South-east	East-Central	North-east	North-Central	Central	South-Central	South-west	North-west	STATE
					dollars per acre				
Nonirrigated Cropland									
Average value, 1999	866	756	565	488	435	402	246	202	543
Average value, 1998	903	728	564	452	434	399	241	200	536
Average value, 1997	777	699	535	412	386	348	217	188	488
Average value, 1996	751	613	514	372	371	317	214	191	456
Average value, 1995	732	555	522	353	332	326	237	185	439
Av annual % change 99/95	4.3%	8.0%	2.0%	8.4%	7.0%	5.4%	0.9%	2.2%	5.5%
Rangeland (native)									
Average value, 1999	405	386	276	241	255	220	143	102	173
Average value, 1998	408	346	274	226	256	231	130	98	167
Average value, 1997	364	354	268	204	214	197	116	92	151
Average value, 1996	336	311	250	194	214	177	100	97	143
Average value, 1995	354	303	247	184	197	180	101	83	136
Av annual % change 99/95	3.4%	6.2%	2.8%	7.0%	6.7%	5.1%	9.1%	5.3%	6.2%

Source: 1999 and earlier South Dakota Farm Real Estate Market Surveys

Table 10. (continued)

Type of Land	South-east	East Central	North-east	North Central	Central	South-Central	South-west	North-west	STATE
					dollars per acre				
Pasture (tame, improved)									
Average value, 1999	453	437	314	266	290	240	161	125	301
Average value, 1998	461	406	297	264	302	272	161	120	299
Average value, 1997	416	373	299	236	265	222	138	114	271
Average value, 1996	379	358	279	231	258	188	127	115	256
Average value, 1995	385	346	262	218	214	214	117	102	237
Av annual % change 99/95	4.2%	6.0%	4.6%	5.1%	7.9%	2.9%	8.3%	5.2%	6.2%
Hayland									
Average value, 1999	619	562	317	278	293	294	194	163	310
Average value, 1998	668	504	330	265	295	291	178	149	303
Average value, 1997	553	507	316	262	253	258	169	150	280
Average value, 1996	568	451	314	219	273	232	156	146	267
Average value, 1995	562	365	336	213	229	230	164	145	254
Av annual % change 99/95	2.4%	11.4%	-1.4%	6.9%	6.4%	6.3%	4.3%	3.0%	5.1%

VI. SUMMARY, CONCLUSIONS, and IMPLICATIONS

The major purpose of this report is to compare and interpret South Dakota agricultural land value estimates obtained from the SDSU and SDASS farmland market surveys. The SDSU mail survey is a **key informant** survey completed annually since 1991 by 220 to 260 lenders, appraisers, and extension educators. Since 1994, the SDASS telephone survey has been completed annually by a **random sample** of 2200 to 3300 farmers and ranchers. Both surveys provide information on land values and rental rates by major land use categories. The SDSU survey provides this information at the regional and multi-county level, while the SDASS survey provides results at the county level. In this report, regional and statewide land value estimates generated from both surveys are compared for the 1995 – 1999 period.

Land Value Comparisons

Average land values per acre from 1995 – 1999 were compared across counties and regions by developing a percentage index of relative land values in each county or region compared to those in Lincoln county where the highest per acre average land values have historically occurred. Relative land values were estimated for cropland, pasture/rangeland, whole farms, and all non-irrigated agricultural land using data from the SDASS survey. Key findings are highlighted.

(1) A systematic pattern of farmland values occurs across regions, regardless of land use. Average per acre land values are highest in the southeast region, followed in descending order by land values in the east central, northeast, north central, central, south central, southwest, and northwest region.

(2) Tremendous variation in non-irrigated farmland values exists across South Dakota. Only 10 counties in the east central and southeast region have per acre average land values exceeding 50% of average farmland values in Lincoln county. Average ag land values in all other counties east of the Missouri River vary from 18.5% to 48.5% of Lincoln county land values, while average land values in counties located west of the Missouri River vary from 8.7% to 29% of agricultural land values in Lincoln county.

(3) The variation in relative per acre values across South Dakota is the least for pasture / rangeland, intermediate for cropland, and greatest for all non-irrigated agricultural land. This implies the value and productivity of rangeland is more evenly distributed across South Dakota than the value and productivity of cropland or all land.

(4) The distribution of percentage indices of farmland values per acre across South Dakota from 1995 to 1999 is similar to the distribution of percentage

indices of farm real estate sale prices per acre from 1975 to 1987. This finding is consistent with the concept that the distribution of farmland values primarily reflect **relative differences** in land quality, land productivity, and land use – attributes that usually change slowly over time.

The three most common methods of reporting central tendency of farmland values or sale prices per acre in a geographic region are: (1) median, (2) simple average, or (3) weighted average. In South Dakota, the weighted average approach results in lower average per acre value or sale price of agricultural land, statewide and in most regions. This approach increases the relative importance of western South Dakota land values in the final computations and results in lower statewide average land value estimates. Alternative land use weighting factors used to estimate per acre land values, regional and statewide, were **all** vs. **privately owned** agricultural land. All agricultural land includes private, federal, state, and tribal trust lands operated by farmers and ranchers,

Regional and statewide estimates of non-irrigated land values are strongly influenced by different land use patterns in different regions of South Dakota. For example, more than 70% of ag land acres in eastern South Dakota regions are in crop / hay uses, while more than 80% of ag land acres in northwestern South Dakota are in range / pasture uses.

Key land value comparisons include:

(1) Whole farm values per acre are considerably higher than non-irrigated land values and have increased more rapidly from 1995 – 1999.

(2) Statewide land value estimates (whole farm or non-irrigated land) are $19 to $25 per acre higher (+6% to +9%) for privately owned land than for all-agricultural land. Changing the land use weighting factor from privately owned ag land to all-ag land has a greater impact on statewide land values than on regional land value estimates.

(3) Statewide rangeland value estimates are $7 to $12 per acre (5% to 7%) higher for privately owned land than for all-agricultural land. The statewide impact on rangeland values is entirely due to the location of most federal, state, and tribal trust rangelands in western and south central South Dakota, where rangeland values are lowest.

(4) Data from both surveys generate consistent and similar per acre values of agricultural land in South Dakota, statewide and in each region. However, estimated changes in land values from 1995 to 1999 are greater in the SDSU survey than in the SDASS survey.

(5) A consistent pattern of per acre land values by land use occurs in both surveys, statewide and across regions. In both surveys, pasture / range land values increased more rapidly than cropland values from 1995 to 1999.

Concluding Remarks

The SDSU and SDASS farmland market surveys were both developed in the 1990's to provide various users with information on agricultural land values and cash rental rates in South Dakota. The annual SDSU farm real estate survey report has emphasized regional and multi-county land value and cash rental rate data by land use and information / commentary on changing land market conditions over time. The annual SDASS survey reports county-level land values and cash rental rates for pasture / rangeland, cropland, and whole farms. Five years (1995 – 1999) of land value data from both surveys generate similar cropland and rangeland value estimates in each region, despite major differences in survey approach (mail vs. telephone), survey questions, and respondents queried.

The weighted average approach used to estimate regional and statewide land values from data in both surveys is conceptually consistent with the cost (inventory) approach used to estimate farm values in rural real estate appraisal. In this report, farmland survey data is directly used to estimate (assign) the per acre value of each land use in each locality (region or county), but the aggregate regional or statewide land value is determined by the relative amount of agricultural land in each use in each locality.

Based on survey data and farmland sales data results, it is very important to estimate land values in South Dakota regions for two major uses: cropland and pasture / rangeland. Most users want information on these two items because the per acre value of cropland and pasture are very different from each other in almost all localities. Furthermore, regional and statewide agricultural land value estimates are very sensitive to the relative amount of pasture / rangeland or cropland in each locality. Further refinements in land values for hay, tame pasture, or irrigated land are important information for many users, but are not as important in the estimation of regional or statewide all-ag land values.

Finally, land market education programs in South Dakota should make use of information generated from both surveys. It may be possible to design a land market survey that can take advantage of the different, but complementary, strengths of both farmland market surveys.

LIST OF REFERENCES

Cole, J.; L. Janssen and M. Beutler. 1992. Rangeland leasing markets in South Dakota. S.D.Ag Expt. Sta. (SDAES) Bul.716. Brookings, SD: South Dakota State University.

Duffy, M. and J. Lillywhite. 1997. "1996 Iowa land survey." Ext. FM – 1825. Ames, IA: Iowa State University.

Janssen, L.; B. Pflueger and L. Longwood. 1999. South Dakota farmland market trends, 1991 – 1999. SDAES C - 263. Brookings,SD: South Dakota State University.

Janssen, L.and B. Pflueger. 1998. South Dakota agricultural land market trends, 1991 – 1998. SDAES C - 262. Brookings, SD: South Dakota State University.

Janssen, L. and B. Pflueger. 1997. South Dakota farmland market trends: 1991 - 1997. SDAES C - 260. Brookings, SD: South Dakota State University.

Janssen, L.; B. Pflueger and R. Woodland. 1996. South Dakota agricultural land market trends: 1991-1996. SDAES C – 259. Brookings, SD: South Dakota State University.

Janssen, L.; L. Venhuizen and B. Pflueger. 1995. South Dakota agricultural land values and cash rental rates: 1995. SDAES C – 258. Brookings, SD: South Dakota State University.

Janssen, L. and B. Johnson. 1993. Empirical analysis of tenure patterns and farm structure. Chpt. 18 in The Changing Size and Structure of American Farms. A. Hallam, ed. Westview Press, Boulder, CO.

Janssen, L. and B. Johnson. 1989. Farmland leasing and land tenure in South Dakota and Nebraska - Empirical findings emphasizing current situation and changes between 1951-1986. Determinants of Farm Size and Structure in Am. Ag.. NC-181 Proc. of 1989 Conf. in Tucson, AZ. pp. 179-190, Dec.

Janssen, L. and S. Peterson. 1988. Farmland leasing in South Dakota. SDAES Bul. 704). Brookings, SD: South Dakota State University.

Janssen, L. 1988a. South Dakota farmland values and sale values--long-term and recent trends--statewide, regional, and selected counties. Econ Res. Rpt. 88-1. Brookings, SD: South Dakota State University.

Janssen, L. 1988b. South Dakota cropland and rangeland sales, statewide and regional, 1971-1987. Econ. Res. Rpt. 88-2). Brookings, SD: South Dakota State University.

Janssen, L. and M. Haque. 1987. Determining factors in South Dakota farmland market prices, 1976-1984. SDAES Tech. Bul. 691. Brookings, SD: South Dakota State University.

Johnson, B. and B. Miller. 1996. Nebraska farm real estate developments, 1995 – 96. EC 96 – 809. Lincoln, NE: Univ. of Neb.

Lundeen, M.; L. Janssen, and B. Johnson. 1988. Characteristics of and participants in farmland rental markets. J. of Amer. Soc. of Farm Mgrs. and Rur. App. 52(2): 13-20, Oct.

NCR – 113. 1985. Ongoing farmland market research: a handbook. North Central Regional Research Pub. No. 306. Univ. of Nebraska Ag. Expt. Sta.

Reynolds, J.E. and J.H. Atkinson. 1997. Farmland market research: the collection and reporting of agricultural land values. Unpublished manuscript

South Dakota Ag Statistics Service. 1999. South Dakota 1999 county level land rents and values. Sioux Falls (also annual reports from 1994 – 1998)

Swinson, C. and L. Janssen. 1985. Trends in South Dakota farmland market long term and recent. SDAES Bul. 694. Brookings, SD: South Dakota State University.

Taff, S. 1996. "1996 farm real estate sales prices up sharply across Minnesota." Minnesota Ag Economist No. 686. St. Paul, MN: University of Minnesota. Fourth Qtr. 1996.

U.S. Dept. of Commerce. 1992 Census of Agriculture, South Dakota, vol. 1 (41).

APPENDIX I

1999 SOUTH DAKOTA FARM REAL ESTATE MARKET SURVEY

South Dakota State University, Economics Department
(All replies are handled on a strictly confidential basis)

Please return completed survey in the business reply envelope to Dr. Larry Janssen, Dept. of Economics, SOUTH DAKOTA STATE UNIVERSITY, Brookings, SD.

PART I: CURRENT FARM REAL ESTATE MARKET SITUATION

A. For the following types of farm or ranch land that are typical in your surrounding area, please report your estimate of average values per acre as of Feb. 1st. Please list the county(s) included in this report:

COUNTY(s)_____

	February 1, 1999 (average current value)	Percentage Change in Value Past Year (Estimated)	Next Year (Projected)
Cropland (nonirrigated).....	$_____/acre	_____%	_____%
Hayland (nonirrigated).....	$_____/acre	_____%	_____%
Irrigated crop/hay land.....	$_____/acre	_____%	_____%
Grassland:			
Native Pasture.....	$_____/acre	_____%	_____%
Tame (Improved) Pasture.....	$_____/acre	_____%	_____%

B. For the hayland value and rental data reported in this survey, please check (X) the predominant type of hayland that you are reporting:

1. Alfalfa hayland _____ 2.Other tame hayland _____
3. Native hayland _____ 4. All types of hayland _____
5. I am not reporting hayland values or rental rates _____

C. Please report the per acre values of the following types of ag land found in your locality. For example, **higher value** ag land usually has above average yields, while **lower value** ag land would usually have below-average yields.

	Estimated Current Value, February 1, 1999 Lower Value Land	Higher Value Land
Dryland Cropland.....	$_____/acre	$_____/acre
Hayland (nonirrigated).....	$_____/acre	$_____/acre
Irrigated crop/hay land.....	$_____/acre	$_____/acre
Grassland:		
Native.....	$_____/acre	$_____/acre
Tame (improved).....	$_____/acre	$_____/acre

D. Given the land values reported in (A) and (C) above, what is your estimate of the current net rate of return (%) that a landowner could expect (after payment of property taxes and other expenses).
(Appraisers refer to this as the market capitalization rate)

Dryland Cropland _____% Irrigated crop/hay land _____%

Hayland (nonirrigated) _____% Rangeland _____%

PART II: CURRENT FARM REAL ESTATE CASH RENTAL MARKET SITUATION

A. Please report your estimates of 1999 **cash rental rates** and the associated market values for the following types of rented land in your area.

	Cash Rental Rates for 1999			Estimated Average Market Value of Rented Land
	Low	High	Average	
Dryland cropland	$_____/acre	$_____/acre	$_____/acre	$_____/acre
Hayland	$_____/acre	$_____/acre	$_____/acre	$_____/acre
Irrigated crop/hayland	$_____/acre	$_____/acre	$_____/acre	$_____/acre
Pasture/Rangeland	$_____/acre or $_____/AUM	$_____/acre or $_____/AUM	$_____/acre or $_____/AUM	$_____/acre

where $____/AUM refers to grazing lease rates per Animal Unit Month (AUM). An AUM refers to sufficient forage to maintain a cow with calf at side (or equivalent) for one month during the normal grazing season.

B. Relative to a year ago, cash rental rates in your area for:

Cropland increased by _____% or decreased by _____% or remained the same _____(check)

Hayland increased by _____% or decreased by _____% or remained the same _____(check)

Irrigated land increased by _____% or decreased by _____% or remained the same _____(check)

Rangeland increased by _____% or decreased by _____% or remained the same _____(check)

Part III: FARM REAL ESTATE MARKET ACTIVITY

A. The number of farm (ranch) tracts sold in your area during the past year:

increased by _____% or **decreased** by _____% or **remained the same** _____ (check)

B. During this past year, what have been the most important reasons:

a. among BUYERS for purchasing farmland (ranchland) in your area?

1. _____ 2. _____

b. among SELLERS for offering farmland (ranchland) for sale in your area?

1. _____ 2. _____

C. Relative to 1998, you expect the number of farms/ranches and farmland (ranchland) tracts offered for sale in 1999 to **increase** by _____% or **decrease** by _____% or **remain the same** ____ (check)

D. Please list what you believe are key **POSITIVE FACTORS** currently impacting the farm real estate market?

_____

_____

E. Please list what you believe are key **NEGATIVE FACTORS** currently impacting the farm real estate market?

_____

_____

PART IV. RESPONDENT INFORMATION

A. Please check (x) your main occupation(s):

1. Extension Agent _____ 2. Broker/Realtor _____ 3. Appraiser _____

4. Banker/Loan Officer _____ 5. Auctioneer _____ 6. Assessor _____

7. If other, please specify _____

B. Other comments or suggestions you would like to offer.

_____

_____

Thank you very much for your time and effort in completing this survey. We plan to send each respondent a copy of the results. If your name/address label needs to be corrected in any way, please write the correct information.

Name _____

Address _____

_____

APPENDIX II

County average per acre values of cropland, pasture and whole-farms, 1995-1999, SDASS survey.

	VALCROP 1995	VALCROP 1996	VALCROP 1997	VALCROP 1998	VALCROP 1999
AURORA	331	330	356	392	437
BEADLE	352	353	388	431	411
BENNETT	257	261	275	265	271
BON HOMME	602	609	635	664	703
BROOKINGS	592	596	620	656	638
BROWN	515	531	540	578	565
BRULE	363	343	412	423	478
BUFFALO	226	223	296	264	337
BUTTE	213	244	246	216	210
CAMPBELL	277	272	278	294	301
CHARLES MIX	468	461	505	519	500
CLARK	369	383	415	433	411
CLAY	883	938	1007	1039	996
CODINGTON	484	507	501	561	508
CORSON	183	180	171	181	178
CUSTER	271	271	232	259	238
DAVISON	448	422	478	557	533
DAY	358	359	368	386	373
DEUEL	512	540	520	540	575
DEWEY	193	175	207	193	187
DOUGLAS	405	432	486	481	517
EDMUNDS	289	291	316	328	349
FALL RIVER	154	160	185	175	184
FAULK	284	316	331	343	343
GRANT	552	524	600	647	660
GREGORY	371	390	426	430	485
HAAKON	195	211	196	221	232
HAMLIN	545	562	615	604	634
HAND	272	278	309	321	324
HANSON	485	475	545	627	616
HARDING	137	139	139	156	150
HUGHES	331	340	356	393	384
HUTCHINSON	575	563	686	659	696
HYDE	256	237	259	268	302
JACKSON	204	189	194	194	213
JERAULD	266	299	321	321	357
JONES	302	291	267	289	277
KINGSBURY	477	481	492	554	549
LAKE	583	650	673	699	745
LAWRENCE	408	380	371	363	298
LINCOLN	1023	1018	1103	1239	1312
LYMAN	385	380	372	386	377
MC COOK	608	617	658	677	724
MC PHERSON	229	230	240	252	257
MARSHALL	414	393	457	500	459
MEADE	169	208	212	210	216
MELLETTE	192	218	201	219	219
MINER	406	433	433	511	546
MINNEHAHA	941	997	1113	1004	1075
MOODY	945	957	1034	1056	992
PENNINGTON	234	271	261	236	268
PERKINS	177	178	175	185	194
POTTER	392	392	395	429	415
ROBERTS	567	552	599	563	605
SANBORN	340	347	362	403	400
SHANNON	215	192	203	222	219
SPINK	381	401	412	410	444
STANLEY	304	273	250	272	265
SULLY	392	403	422	450	438
TODD	207	221	223	236	215
TRIPP	307	340	344	335	339
TURNER	780	761	842	861	940
UNION	1133	1142	1159	1214	1288
WALWORTH	332	330	342	349	378
YANKTON	692	683	690	719	876
ZIEBACH	166	185	177	180	183

	VALPAST 1995	VALPAST 1996	VALPAST 1997	VALPAST 1998	VALPAST 1999
AURORA	257	253	264	295	316
BEADLE	257	264	294	329	304
BENNETT	129	127	139	152	140
BON HOMME	336	348	370	415	416
BROOKINGS	322	313	312	336	352
BROWN	262	253	292	279	306
BRULE	253	254	272	305	301
BUFFALO	144	147	174	165	238
BUTTE	81	110	126	143	119
CAMPBELL	153	152	155	158	181
CHARLES MIX	296	315	322	334	336
CLARK	258	263	268	268	273
CLAY	358	358	382	412	412
CODINGTON	294	265	288	300	295
CORSON	109	103	111	105	108
CUSTER	136	206	189	175	201
DAVISON	318	305	295	347	347
DAY	215	223	246	247	230
DEUEL	267	284	317	305	310
DEWEY	97	91	116	109	121
DOUGLAS	293	274	320	330	341
EDMUNDS	211	207	212	230	243
FALL RIVER	91	96	107	114	141
FAULK	197	225	234	234	235
GRANT	257	255	289	278	288
GREGORY	239	237	233	258	279
HAAKON	111	114	118	131	136
HAMLIN	297	293	312	324	339
HAND	205	201	220	231	241
HANSON	309	337	347	381	379
HARDING	75	84	84	89	93
HUGHES	183	172	194	188	216
HUTCHINSON	342	318	359	397	391
HYDE	169	162	176	182	205
JACKSON	107	99	111	124	136
JERAULD	212	243	246	252	269
JONES	151	140	138	149	154
KINGSBURY	338	326	336	359	380
LAKE	319	364	359	403	415
LAWRENCE	196	164	270	225	159
LINCOLN	467	520	549	546	555
LYMAN	201	186	189	192	214
MC COOK	343	394	410	406	395
MC PHERSON	169	171	185	181	192
MARSHALL	221	217	260	261	270
MEADE	95	109	108	128	143
MELLETTE	121	124	128	141	143
MINER	331	328	330	373	375
MINNEHAHA	409	446	462	477	516
MOODY	415	347	412	415	430
PENNINGTON	121	136	147	142	157
PERKINS	98	94	100	104	108
POTTER	204	207	204	219	207
ROBERTS	261	236	259	251	263
SANBORN	279	273	289	305	324
SHANNON	104	94	92	92	90
SPINK	241	243	281	274	276
STANLEY	123	117	122	127	140
SULLY	206	195	231	250	260
TODD	138	147	144	164	163
TRIPP	218	223	232	241	244
TURNER	401	380	399	431	423
UNION	415	419	522	525	569
WALWORTH	170	165	178	184	201
YANKTON	319	338	405	369	396
ZIEBACH	82	95	88	97	103

	VALWHOLE 1995	VALWHOLE 1996	VALWHOLE 1997	VALWHOLE 1998	VALWHOLE 1999
AURORA	294	336	332	391	526
BEADLE	330	366	398	452	538
BENNETT	220	242	231	253	242
BON HOMME	578	614	609	721	838
BROOKINGS	573	587	581	658	736
BROWN	465	503	515	465	566
BRULE	355	320	392	452	513
BUFFALO	184	213	230	255	321
BUTTE	163	201	242	245	220
CAMPBELL	244	235	242	296	273
CHARLES MIX	451	439	505	553	608
CLARK	372	377	391	443	436
CLAY	888	928	979	1052	1092
CODINGTON	469	513	492	565	590
CORSON	147	150	159	165	163
CUSTER	245	245	238	250	247
DAVISON	452	419	448	653	648
DAY	338	359	373	383	451
DEUEL	489	500	490	584	573
DEWEY	180	126	176	192	192
DOUGLAS	423	425	536	539	639
EDMUNDS	272	279	306	362	385
FALL RIVER	103	99	128	156	202
FAULK	264	293	304	349	351
GRANT	562	521	558	728	732
GREGORY	374	369	386	436	461
HAAKON	155	157	150	206	206
HAMLIN	554	562	569	646	743
HAND	241	261	281	306	321
HANSON	533	502	554	675	772
HARDING	97	102	105	119	144
HUGHES	271	301	317	373	344
HUTCHINSON	596	565	712	680	850
HYDE	223	204	230	261	266
JACKSON	161	157	155	189	205
JERAULD	249	273	303	338	370
JONES	234	226	216	227	231
KINGSBURY	498	499	477	602	612
LAKE	543	617	658	715	836
LAWRENCE	368	372	361	339	398
LINCOLN	1043	1017	1128	1297	1353
LYMAN	354	320	332	384	385
MC COOK	622	678	645	766	842
MC PHERSON	221	219	231	249	272
MARSHALL	312	355	415	550	413
MEADE	120	159	155	190	212
MELLETTE	150	170	166	197	225
MINER	401	419	422	539	680
MINNEHAHA	1046	1012	1116	1065	1207
MOODY	876	919	923	1050	1010
PENNINGTON	178	205	192	183	284
PERKINS	122	136	137	164	158
POTTER	359	358	359	443	372
ROBERTS	531	545	571	649	653
SANBORN	330	326	343	442	432
SHANNON	167	185	165	212	198
SPINK	371	389	394	435	437
STANLEY	257	208	201	253	267
SULLY	372	381	406	434	436
TODD	185	186	205	251	255
TRIPP	284	331	301	322	337
TURNER	751	785	812	961	1000
UNION	1120	1072	1057	1195	1442
WALWORTH	316	285	317	349	349
YANKTON	672	606	702	767	882
ZIEBACH	110	128	138	170	173

APPENDIX III

Data Sources and Equations used to construct Land Use Weighting Factors

South Dakota agricultural land use data in the 1992 Census of Agriculture was the principal information source used to develop the land use weighting factors used in this study. Additional sources were used to obtain estimates of leased rangeland from state, federal, and tribal trust agencies and to cross-check Census land use estimates at the county level.

Land use factors

The following land use accounting relationships were used to estimate non-irrigated agricultural land use. Statewide acreage in thousands of acres is shown for each land use / ownership category.

	Land use factor	Statewide (1000 ac.)	Definition
(1)	LAND in FARMS	= 44828	All agricultural land owned or leased by SD farmers and ranchers
Minus:			
(2)	IRR igated LAND	= 371	Irrigated agricultural land
(3)	FARMSITE	= 1117	Land in farms used for house, lots, ponds, roads, waste land, and woodland not pastured
Equals:			
(4)	ALL AGLAND - non-irrigated	= 43340	Estimated acreage of non-irrigated agricultural land used for crop, hay, range, and pasture.
Minus:			
(5)	PUBLIC AG LAND State, federal, tribal trust, and other rangeland	= 5747	Estimated acreage of rangeland leased to SD farmers and ranchers from state, federal, tribal trust plus institutional farms.[1]

1

The 1992 South Dakota Census of Agriculture classifies 5.09 million acres of land in farms as "abnormal farms" which comprise institutional farms (including university research farms), tribal trust, and federal lands. Most (4.94 million acres or 97%) of this acreage is range land leased to farmers and ranchers. Most of the remaining acreage in this category are grazing lands leased from the state of South Dakota to farmers. The net effect of this procedure is to slightly underestimate the amount of public agricultural land.

Equals:

(6)	PRIVATE AG LAND = 37593 non-irrigated	Estimated acreage of private non-irrigated agricultural land used for crop, hay, range, and pasture

The Census of Agriculture uses inclusive definitions for "total cropland" and for "pastureland, all types". Total cropland includes harvested cropland, cropland used only for pasture and grazing, and all other cropland. Pastureland, all types, includes cropland used only for pasture and grazing, woodland pastured, and rangeland.

In this study, "cropland used only for grazing" was defined as improved (tame) pasture land. Cropland was considered to be harvested cropland and all other cropland, excluding "cropland used only for pasture and grazing". Data from the 1992 Census of Agriculture indicates that almost all cropland (99.7% of total cropland acreage) in South Dakota is privately owned, while 97% of public (state, federal, or tribal trust) agricultural land is rangeland. However, the specific breakdown is not readily available at the county level. Therefore, we assume, for simplifying purposes, that all cropland is privately owned, while all "public" agricultural land is rangeland.

The following land use factors were used to weight per acre value estimates obtained in the SDASS farmland market surveys for non-irrigated agricultural land.

	Land use factor	Statewide (1000 ac.)	Definition
(7a)	RANGE/PASTURE	= 26598	All rangeland and tame pasture defined as "pastureland, all types."
(7b)	PRANGE/PASTURE	= 20851	Private rangeland and tame pasture defined as "pastureland, all types" minus PUBLIC AG LAND.
(8)	CROP/HAY	= 16742	All cropland, excluding "cropland only used for pasture or grazing."

Total non-irrigated agricultural land is defined as:

(9a)	ALL AG LAND non-irrigated	= RANGE/ PASTURE + CROP/ HAY
(9b)	PRIVATE AG LAND non-irrigated	= PRANGE/ PASTURE + CROP/HAY

In the SDSU farmland market survey, land use weights were separately developed for PASTURE, RANGE, PRANGE, HAY, and CROP uses.

	Land use factor	Statewide (1000 ac.)	Definition
(10)	PASTURE	= 2469	Cropland used only for pasture or grazing (tame pasture)
(11a)	RANGE	=24129	All private and public rangeland defined as "pastureland, all types" minus "cropland used only for pasture or grazing."
(11b)	PRANGE	=18382	Private rangeland acre estimated as RANGE minus PUBLIC AG LAND
(12)	HAY	= 3403	Cropland used for hay production
(13)	CROP	= 13338	Total cropland minus irrigated land minus cropland used only for hay. pasture, or grazing.

Total non-irrigated agricultural land is defined as:

(14a) ALL AG LAND non-irrigated = RANGE + PASTURE + CROP + HAY

(14b) PRIVATE AG LAND non-irrigated = PRANGE + PASTURE + CROP +HAY

Consistency in land use factors between the SDASS and SDSU survey is obtained by the following relationships.

(15) CROP/HAY = CROP + HAY

(16a) RANGE/ PASTURE = RANGE + PASTURE, and

(16b) PRANGE/ PASTURE= PRANGE + PASTURE.

Overall, the land use estimates are the most accurate and consistent at all levels (county, region, or state) for all non-irrigated agricultural land, crop/hay, pasture, and all rangeland. The assumptions and data sources used to obtain estimates of private and public agricultural land may result in less accurate and consistent estimates in some counties and regions.

Weighted average land value equations

The general procedures used to estimate the weighted average per acre value of agricultural land at the regional or statewide level are to: (1) estimate the per acre land value in a locality as the simple average of useable survey responses, and (2) weight the local per acre value by the proportion of the region (or statewide) land acres from the locality. The general form of the equations are to define:

L = land acres,	V = land value per acre	i = land use category
r = region, and	c = county	T = total land use

then:

(1) $l_i = L_i / L_T$

where l_i = proportion of agricultural land acres in the i-th land use

and (2) $V_T = \sum l_i \overline{V_i}$

where $\overline{V_i}$ = simple average per acre land value for the i-th land use (crop, pasture, etc) estimated directly from survey responses.

and V_T = weighted average per acre land value across all land uses.

In the SDSU survey, per acre land values are directly estimated from survey data for four land uses (crop, hay, pasture, or range) in each of eight regions. Statewide land values by land use and regional average ag land values are weighted by the proportion of acres in each land use and region. We define:

(3a) $\overline{V_{ir}}$ = simple average per acre value of agricultural land in the i-th land use in the r-th region estimated directly from survey responses,

and (4a) $l_{ir} = L_{ir} / L_{Tr}$

where l_{ir} = proportion of land acres in the i-th land use in the r-th region

Thus:

(5a) $V_r = \sum_i l_{ir} \overline{V_{ir}}$ is the regional average per acre ag land value weighted by proportion of regional acres in each i-th land use.

and (6a) $V_i = \sum_r l_{ir} \overline{V_{ir}}$ is the statewide average per acre land value for the i-th land use weighted by the proportion of acres in the i-th land use across all regions,

and (7a) $V_T = \sum_i \sum_r l_{ir}\overline{V_{ir}}$ is the statewide average per acre value of ag land

weighted by the proportion of acres in each land use and region.

Of course, the per acre weighted average land values of $V, V_r,$ and V_i may differ depending on the selection of weighting factor (private vs. all) for rangeland.

In the SDASS survey, per acre land values are directly estimated from survey data for two land uses (crop/hay, and range/pasture) in each of 66 counties. Statewide and regional land values are weighted by the proportion of acres in each land use and county. We redefine:

(3b) $\overline{V_{ic}}$ = simple average per acre value of agricultural land in the i-th land use in the c-th county estimated directly from survey responses,

and (4b) $l_{ic} = L_{ic} / L_{Tc}$

where l_{ic} = proportion of land acres in the i-th land use in the c-th county

Thus:

(5b) $V_{ir} = \sum_c l_{icr}\overline{V_{icr}}$ is the regional average per acre value of agricultural land

in the i-th land use weighted by the proportion of acres in the i-th land use across all counties in the r-th region,

and (6b) $V_r = \sum_i \sum_c l_{icr}\overline{V_{icr}}$ is the regional average per acre value of agricultural

land weighted by the proportion of acres in the i-th land use and c-th county of the r-th region,

and (7b) $V_i = \sum_r l_{ic}\overline{V_{ic}}$ is the statewide average per acre land value for the i-th

land use weighted by the proportion of acres in the i-th land use and c-th county across all regions,

and (8b) $V_T = \sum_i \sum_c l_{ic}\overline{V_{ic}}$ is the statewide average per acre value of ag land

weighted by the proportion of acres in each land use and counties across all regions.

Of course, the per acre weighted average land values of V, V_i, V_r and V_{ir} may differ depending on the selection of weighting factor (private vs. all) for rangeland.