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**RESULTS OF THE NORTH DAKOTA LAND VALUATION MODEL
FOR THE 2004 AGRICULTURAL REAL ESTATE ASSESSMENT****Dwight G. Aakre and Harvey G. Vreugdenhil¹**

ABSTRACT

This report summarizes the 2004 results of the North Dakota Land Valuation Model. This model is used annually to estimate average land values by county, based on the value of production from cropland and non-cropland. The county land values developed from this procedure form the basis for the 2004 valuation of agricultural land for real estate tax assessment. The average all land value from this analysis is multiplied by the total acres of agricultural land on the county abstract to determine each county's total agricultural land value for taxation purposes. The State Board of Equalization compares this value with the total value assessed to agricultural property in each county. Each county is required by state statute to assess a total value of agricultural property within 5 percent of this value.

The average value per acre of all agricultural land in North Dakota decreased by 0.66 percent based on the value of production analysis. Cropland value declined by 0.32 percent and non-cropland value dropped by 2.58 percent. The formula capitalization rate was below the minimum set by the State Legislature; therefore, the minimum rate of 9.5 percent was used.

Changes in market value are included for comparison. Market value data is from the annual County Rents and Values survey conducted by North Dakota Agricultural Statistics Service.

Key Words: Land valuation, real estate assessment, agricultural land

NORTH DAKOTA LAND VALUATION MODEL

State statute mandates that the Department of Agricultural Economics, now the Department of Agribusiness and Applied Economics, at North Dakota State University, annually compute an estimate of 1) the average value per acre of agricultural land on a statewide and countywide basis and 2) the average value per acre for cropland and non-cropland. These estimates are provided to the State Tax Department.

¹ Extension Farm Management Economist, Department of Agribusiness and Applied Economics and Research/Extension Associate, Agricultural Communications, North Dakota State University, Fargo.

The model determines agricultural land values as the landowner share of gross returns divided by the capitalization rate. *Landowner share of gross returns* is the portion of revenue generated from agricultural land that is assumed to be received by the landowner and is expected to reflect current rental rates. The Legislature has specified that the landowner share of gross returns is 30 percent of gross returns for all crops except for sugarbeets and potatoes (20 percent), non-cropland (25 percent), and irrigated land (50 percent of the dryland rate).

Capitalization Rate

The capitalization rate is an interest rate that reflects the general market rate of interest adjusted for the risk associated with a particular investment or asset (in this case, agricultural land in North Dakota). The Legislature specified the gross Federal Land Bank (AgriBank, FCB) mortgage interest rate for North Dakota be used as the basis for computing the capitalization rate. The capitalization rate used in the North Dakota Land Valuation model is a twelve-year rolling average with the high and low rates dropped. The 2003 Legislature amended the capitalization rate formula by introducing a minimum level of 9.5 percent with no upper limit.

The capitalization rate calculated according to the formula was 8.106 percent. As a result, the minimum value of 9.5 percent was used for the 2004 assessment. The capitalization rate was not a factor affecting any change in land values as the 2003 assessment used the minimum rate as well.

Cost of Production Index

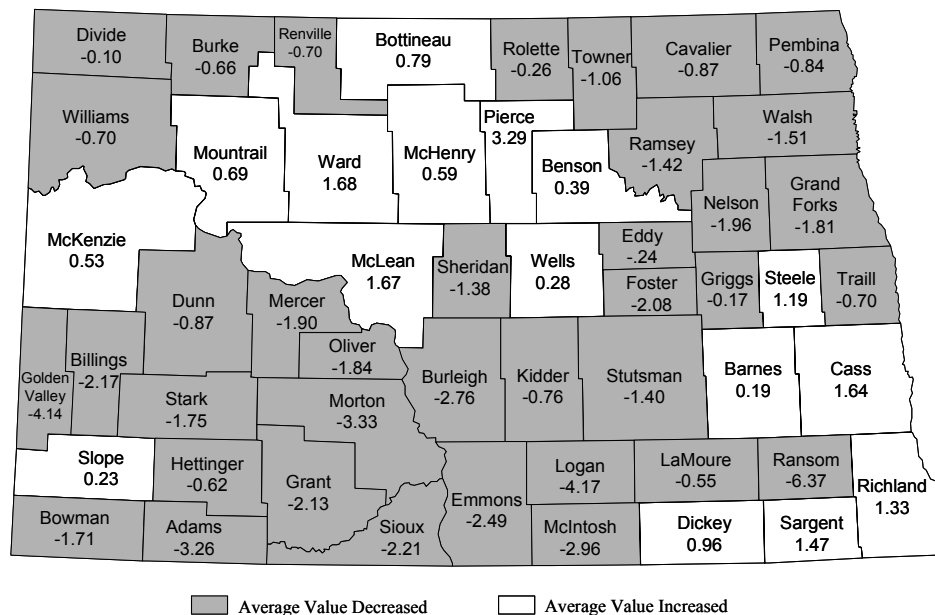
Beginning with the analysis for the 1999 assessment, a cost of production index was added to the land valuation model to account for the increasing proportion of the total cost of production represented by variable costs. The source of data for this index is the *Items Used For Production* from the *Prices Paid Index* published by National Agricultural Statistics Service. The index developed for this analysis was determined by averaging the latest ten years' values after dropping the high and low values and dividing this value by the base index. The base index was developed by averaging the index values from the years 1989 through 1995 after dropping the high and low values. The base index value is 102. The resulting index value used in the 2004 analysis is 112.0, which results in a reduction in the landowner share of gross returns of 10.72 percent. The landowner share of gross returns is the amount that is capitalized to determine the land values. Therefore, this means land values are 10.72 percent lower than they otherwise would have been if the cost of production index was not included in the model. The index used for 2004 increased from 109.8 in 2003, for a one-year change of 2.01 percent.

RESULTS: ALL AGRICULTURAL LAND VALUE

Valuation of all agricultural land in North Dakota, for the 2004 assessment, decreased by 0.66 percent or \$1.65 per acre over the previous year. Values declined in 37 counties and increased in the remaining 16 counties. The largest decrease occurred in Ransom County with a decline of 6.37 percent. The value of all agricultural land in Logan County declined by 4.17 percent and by 4.14 percent in Golden Valley County.

The largest increases occurred in Pierce County at 3.29 percent, Ward County at 1.68 percent, McLean County at 1.67 percent, and Cass County at 1.64 percent. Results are shown in Figure 1.

Figure 1. Percent Change in Average Value of All Agricultural Land, 2003-2004



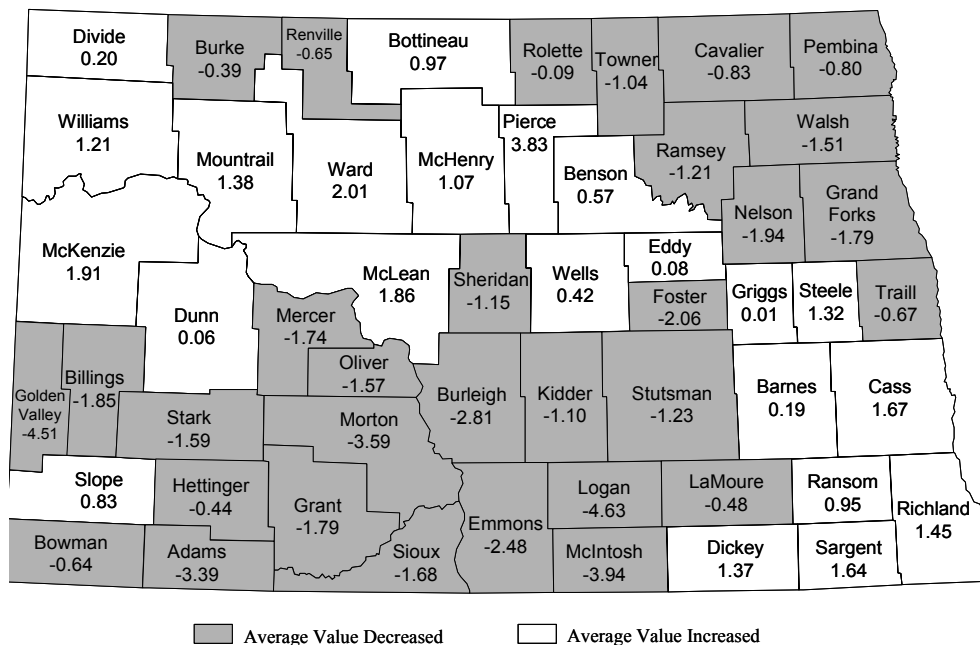
The value for all agricultural land is a weighted average of cropland and non-cropland in each county. Calculated values for cropland generally are three to five times the value of non-cropland in each county. Therefore, a shift in acres between these two categories will alter the all agricultural land value even if all other factors remain unchanged. County Directors of Tax Equalization are surveyed each year to determine total taxable acres of cropland and non-cropland as well as inundated land for each county. Changes in reported acres tend to be minimal. However, this year two counties reported substantial changes in acres. Ransom County reported a decrease of 31,056 acres of cropland and an increase of 38,977 acres on non-cropland. Likewise, Williams County reported a decrease in cropland of 17,813 acres and an increase in non-cropland of 17,616 acres.

Shifting acres from cropland to non-cropland results in a lower value for all agricultural land independent of what happens to gross revenue, the capitalization rate, and the cost of production index.

RESULTS: CROPLAND VALUE

The average value of cropland in North Dakota decreased by \$1.05 per acre or 0.32 percent. Cropland values decreased in 31 counties and increased in 22 counties (Figure 2). The average value of cropland in Logan County declined by 4.63 percent and by 4.51 percent in Golden Valley County. Average cropland values declined by 3.94 percent in McIntosh County, 3.59 percent in Morton County, and 3.39 percent in Adams County.

Figure 2. Percent Change in Average Value of Crop Land, 2003-2004



The largest increase in average cropland value was 3.83 percent in Pierce County. Ward County increased 2.01 percent, McKenzie County 1.91 percent, and McLean County 1.86 percent.

Nearly all of the counties with the largest decrease in cropland value are in southern and western North Dakota. The analysis for 2004 uses data from 1993 through 2002, so the severe drought that occurred over much of this area in 2002 is a factor in this analysis.

Changes in the capitalization rate and cost of production index impact all counties equally. The capitalization rate was unchanged from 2003; therefore, it was not a factor in changing values for 2004. The increase in the cost of production index resulted in a downward shift in land values of 1.96 percent from 2003.

RESULTS: NON-CROPLAND VALUE

The value of non-cropland (grazing land) decreased by 2.58 percent for the 2004 assessment. The value of non-cropland is derived by calculating the value of the beef produced from grazing. The carrying capacity and the production per cow are held constant in the model. As a result, all change in non-cropland value is due to changes in the price of calves and cull cows and changes in the capitalization rate and the cost of production index. All of these factors apply equally across all counties; therefore, all counties experienced the same percentage decrease in non-cropland values over 2003.

The prices of calves and cull cows are used to determine the value of an animal unit month (AUM) of grazing. AUM is used as the measure of productivity of grazing land. Based on the prices of calves and cull cows, an AUM had a value of \$57.09 for the 2002 marketing year, the most recent year added to the data set. This was down from \$60.58 the previous year. The value calculated for non-cropland, like cropland, is based on the average of the latest ten years after dropping the high and low years. Therefore, the average gross return is heavily influenced by the comparative values for the latest year added to the data set, relative to the year just removed from the data set. The average value per AUM for the year 1992, the year rolled out of the data set for this analysis, was \$61.05.

Two tables are provided comparing county values for 2003 and 2004. North Dakota Capitalized Average Annual Values Per Acre by County for 2003 are shown in Table 1. North Dakota Capitalized Average Annual Values Per Acre by County for 2004 are shown in Table 2.

Table 1. North Dakota Capitalized Average Annual Values Per Acre by County for 2003 Assessment

County	Cropland	Non-cropland	All Agricultural Land
Adams	210.85	72.47	158.47
Barnes	404.91	100.68	349.03
Benson	295.06	89.14	250.75
Billings	186.34	67.84	104.47
Bottineau	301.25	86.26	264.93
Bowman	207.73	59.86	133.54
Burke	248.23	79.32	197.16
Burleigh	241.15	79.56	168.19
Cass	508.35	102.36	497.05
Cavalier	369.28	87.48	329.21
Dickey	396.76	100.43	302.59
Divide	237.10	78.87	195.33
Dunn	210.44	72.28	124.64
Eddy	271.04	89.51	216.74
Emmons	278.63	78.80	193.47
Foster	337.94	86.16	291.88
Golden Valley	221.18	59.38	137.75
Grand Forks	479.90	100.48	447.58
Grant	212.33	72.65	134.35
Griggs	347.08	87.80	288.78
Hettinger	261.13	72.10	214.12
Kidder	236.41	80.35	165.78
LaMoure	395.27	103.86	356.90
Logan	262.52	79.29	174.05
McHenry	248.29	85.69	198.74
McIntosh	247.89	78.84	180.48
McKenzie	246.14	72.58	142.25
McLean	287.19	79.05	251.09
Mercer	235.32	72.25	164.71
Morton	248.50	72.42	145.86
Mountrail	260.82	78.76	184.77
Nelson	307.44	87.33	269.78
Oliver	276.55	72.63	156.30
Pembina	601.12	104.61	537.21
Pierce	264.49	85.70	226.52
Ramsey	307.05	89.79	267.55
Ransom	435.70	98.92	359.75
Renville	316.97	85.95	299.17
Richland	570.25	101.64	502.38
Rolette	279.82	87.18	246.91
Sargent	465.57	101.44	401.97
Sheridan	256.70	78.83	187.44
Sioux	200.72	72.48	97.47
Slope	230.32	66.04	160.26
Stark	238.54	72.80	177.01
Steele	437.45	89.21	389.40
Stutsman	319.13	99.22	249.66
Towner	302.90	89.54	293.39
Traill	549.63	101.44	515.26
Walsh	551.21	93.61	502.62
Ward	312.88	78.75	258.10
Wells	319.85	86.49	278.04
Williams	216.05	78.98	164.98
State	327.13	77.63	249.94

Table 2. North Dakota Capitalized Average Annual Values Per Acre by County for 2004 Assessment

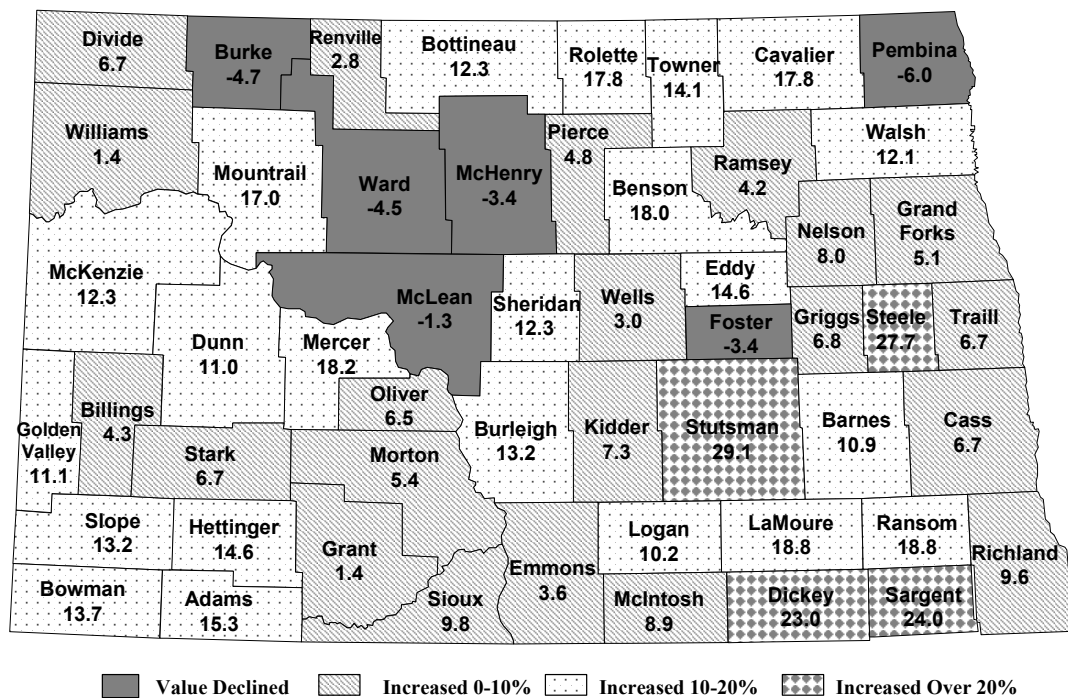
County	Cropland	Non-cropland	All Agricultural Land
Adams	203.70	70.61	153.31
Barnes	405.69	98.09	349.68
Benson	296.75	86.85	251.72
Billings	182.90	66.09	102.20
Bottineau	304.16	84.04	267.03
Bowman	206.40	58.33	131.25
Burke	247.25	77.28	195.86
Burleigh	234.38	77.52	163.55
Cass	516.82	99.73	505.21
Cavalier	366.20	85.23	326.36
Dickey	402.21	97.85	305.50
Divide	237.57	76.84	195.14
Dunn	210.57	70.42	123.55
Eddy	271.27	87.21	216.21
Emmons	271.73	76.77	188.65
Foster	330.99	83.95	285.82
Golden Valley	211.21	57.86	132.05
Grand Forks	471.29	97.90	439.49
Grant	208.52	70.79	131.49
Griggs	347.10	85.55	288.29
Hettinger	259.97	70.25	212.80
Kidder	233.81	78.29	164.52
LaMoure	393.38	101.19	354.92
Logan	250.36	77.25	166.80
McHenry	250.95	83.49	199.91
McIntosh	238.12	76.82	175.14
McKenzie	250.84	70.72	143.01
McLean	292.53	77.02	255.28
Mercer	231.22	70.39	161.58
Morton	239.58	70.56	141.01
Mountrail	264.42	76.73	186.04
Nelson	301.48	85.08	264.48
Oliver	272.21	70.77	153.42
Pembina	596.32	101.92	532.68
Pierce	274.62	83.50	233.98
Ramsey	303.32	87.48	263.76
Ransom	439.85	96.38	336.85
Renville	314.90	83.75	297.09
Richland	578.52	99.03	509.08
Rolette	279.57	84.94	246.27
Sargent	473.22	98.83	407.89
Sheridan	253.75	76.80	184.86
Sioux	197.34	70.62	95.32
Slope	232.24	64.35	160.63
Stark	234.74	70.93	173.91
Steele	443.21	86.92	394.05
Stutsman	315.19	96.67	246.16
Towner	299.75	87.24	290.28
Traill	545.94	98.83	511.66
Walsh	542.88	91.21	495.02
Ward	319.17	76.73	262.44
Wells	321.19	84.27	278.83
Williams	218.66	76.95	163.83
State	326.08	75.63	248.29

MARKET VALUE OF NORTH DAKOTA FARMLAND

The North Dakota Land Valuation Model was designed to estimate the value of agricultural land dependent solely on the revenue generated from the production of crops and beef cattle. The results of this model were not intended to reflect market value. Market value of farmland is influenced by numerous factors in addition to its productivity value. These include farm enlargement to gain economies of scale, land as an investment, recreational uses, development potential, and the effect of government fiscal, monetary, and tax policies. As a result, market value and productivity value often differ by a significant amount.

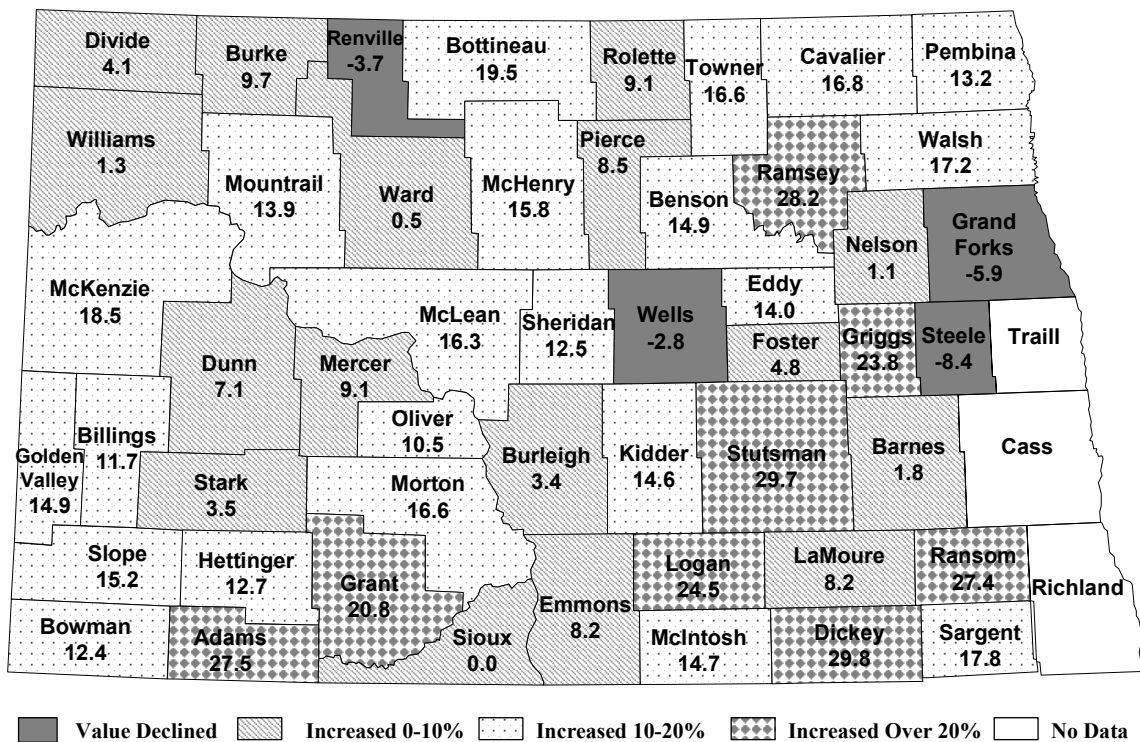
The North Dakota Agricultural Statistics Service conducts an annual survey of farmers and ranchers to obtain rental rates and the value of rented land. The data from the 2004 survey was compared with the 2003 survey for cropland and pasture. Changes in market values by county for cropland varied widely across the state. This survey showed values declined in 2004 in 6 counties with the greatest decline in Pembina county at a negative 6.0 percent. Values increased less than 10.0 percent in 21 counties, from 10.0 to 20.0 percent in 22 counties and over 20.0 percent in 4 counties. The largest increase in market value of cropland occurred in Stutsman County at 29.1 percent. Percentage changes in market value for cropland by county are shown in Figure 3.

Figure 3. Percentage Change in Estimated Market Value of Cropland, 2003-2004



The change in market value of pasture was highly variable across the state as well. The survey indicated market values declined in 4 counties with the largest decline being a negative 8.4 percent in Steele County. Sixteen counties had increases in value of less than 10 percent, 22 counties showed increases between 10.0 and 20.0 percent, and 8 counties increased greater than 20 percent. Three counties, Cass, Richland, and Traill, had insufficient data to publish the results. Percentage changes in the market value of pasture are shown in Figure 4.

Figure 4. Percentage Change in Estimated Market Value of Pasture, 2003-2004



CONCLUSIONS

Valuation of all agricultural land in North Dakota decreased by 0.66 percent for the 2004 assessment as compared to the previous year. The average value of all agricultural land decreased in 37 counties and increased in 16 counties. The range was from a negative 6.37 percent to a positive 3.29 percent.

The average value of cropland in North Dakota increased by 0.32 percent. County level changes were from a negative 4.63 percent to a positive 3.83 percent. Non-cropland values for all counties decreased by 2.57 percent from the previous year. Productivity of non-cropland does not change from year to year. The prices of cull cows and calves, cost of production index, and the capitalization rate are applied uniformly across all counties. Therefore, the change in non-cropland value is the same for all counties.

The capitalization rate used for the 2004 analysis was the minimum value of 9.5 percent. This was unchanged from the previous year. The calculated rate based on the formula was 8.106 percent.

The cost of production index increased by 2.2 points over the previous year to 112.0. This index reduced the landowner share of gross returns by 10.72 percent before this value is capitalized.

Changes in market value of cropland and pasture based on the survey of farmers and ranchers by North Dakota Agricultural Statistics Service is included for comparison. Changes in market values show much more variability than agricultural value based on the land valuation model. This is expected due to the additional factors that influence market values.

REFERENCES

North Dakota Agricultural Statistics Service, USDA, "North Dakota 2004 County Rents & Values," April 2004.

North Dakota Agricultural Statistics Service, USDA, "North Dakota 2003 County Rents & Values," April 2003.

CONTACT INFORMATION

We would be happy to provide a single copy of this publication free of charge. You can address your inquiry to: Carol Jensen, Department of Agribusiness and Applied Economics, North Dakota State University, P.O. Box 5636, Fargo, ND, 58105-5636, Ph. 701-231-7441, Fax 701-231-7400, e-mail cjensen@ndsuxext.nodak.edu . This publication is also available electronically at: <http://agecon.lib.umn.edu/>.

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**Department of Agribusiness and Applied Economics
Agricultural Experiment Station
North Dakota State University
Fargo, ND 58105-5636**