AAE 05003 **August 2005**

RESULTS OF THE NORTH DAKOTA LAND VALUATION MODEL FOR THE 2005 AGRICULTURAL REAL ESTATE ASSESSMENT

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

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Dwight G. Aakre and Harvey G. Vreugdenhil[1]

ABSTRACT

This report summarizes the 2005 results of the North Dakota Land Valuation Model. The 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 2005 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 increased by 7.8 percent based on the value of production. Cropland value increased by 8.24 percent and non-cropland value increased by 5.1 percent. The formula capitalization rate was below the minimum set by the State Legislature, therefore the minimum rate of 8.9 percent was used.

Changes in market value are included for comparison. Market value data are 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 Agribusiness and Applied Economics, at North Dakota State University annually compute an estimate of 1) the average value per acre of agricultural lands on a statewide and countywide basis, and 2) the average value per acre for cropland and non-cropland (N.D.C.C. §57-02-27.2). These estimates are provided to the State Tax Department.

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

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

current rental rates. The Legislature has specified that the landowner share of gross returns is 30 percent of gross returns for all crops except sugar beets 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 2005 Legislature amended the capitalization rate formula again, specifying a rate no lower than 8.9 percent to be used for the 2005 analysis. For subsequent years the capitalization rate may not be lower than 8.3 percent. The capitalization rate calculated according to the formula was 7.733 percent. As a result, the minimum value of 8.9 percent was used for the 2005 assessment. The change in the capitalization rate was the most significant factor affecting any change in land values relative to the previous year.

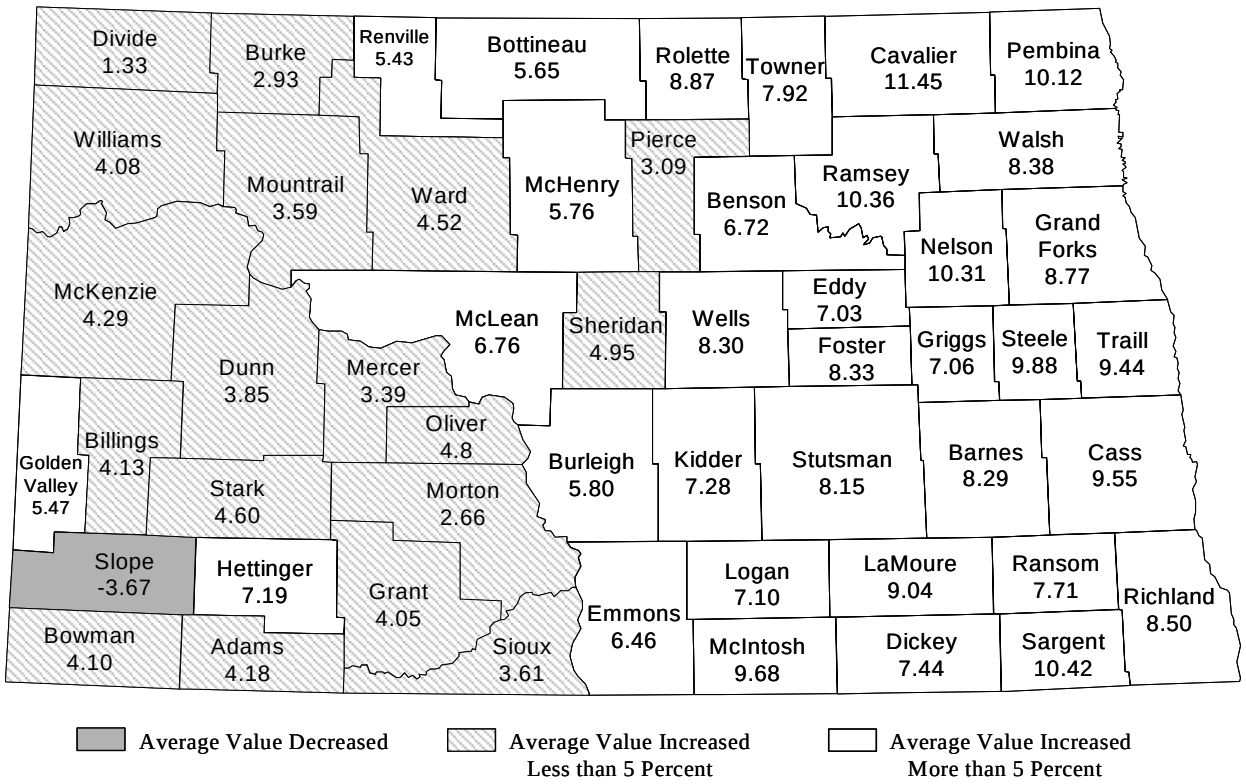
Cost of Production Index

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 values of the latest ten years 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 2005 analysis was 113.848, which results in a reduction in the landowner share of gross returns of 12.16 percent. The landowner share of gross returns is the amount that is capitalized to determine the land values. Therefore, land values are 12.16 percent lower than they otherwise would have been if the cost of production index was not included in the model. The index used for 2005 increased from 112.0 in 2004, for a one-year change of 1.848 points.

RESULTS: ALL AGRICULTURAL LAND VALUE

Valuation of all agricultural land in North Dakota, for the 2005 assessment, increased by 7.8 percent or $19.37 per acre over the previous year. The largest increase occurred in Cavalier County at 11.45 percent, followed by Sargent County at 10.42 percent, Ramsey County at 10.36 percent, Nelson County at 10.31 percent and Pembina County at 10.12 percent. Results are shown in Figure 1.

Figure 1. Percent Change in Average Value of All Agricultural Land, 2004-2005



Slope was the only county to have the average value of all agricultural land decline. The average land value was down 3.67 percent. This reduction in value was not due to lower productivity. A total 15.2 percent of acres previously classified as cropland were switched to non-cropland which by itself, lowers the all agricultural land value due to the difference in value between cropland and non-cropland. The smallest increases in average all agricultural land values included Divide County at 1.33 percent, Morton County at 2.66 percent and Burke County at 2.93 percent.

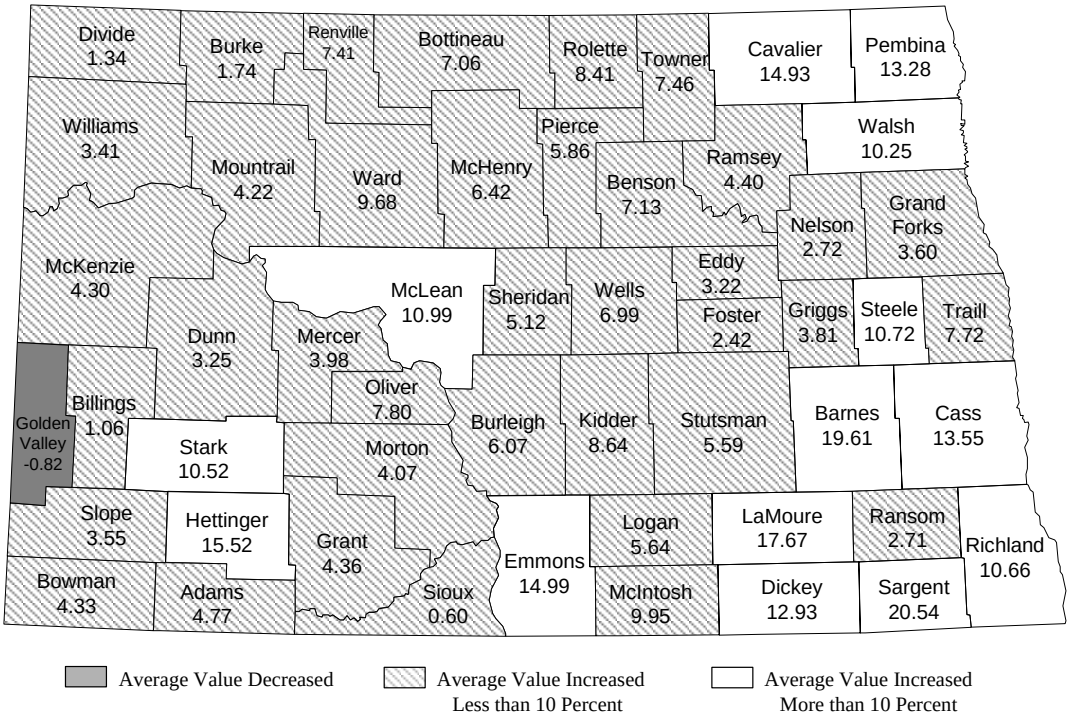
The value for all agricultural land is a weighted average of cropland and non-cropland in each county. Calculated values for cropland generally are three to five times the value of non-cropland in each county. Therefore, a shift in acres between these two categories will alter the all land value even 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. Slope County reported a decrease of 53,533 acres of cropland and an increase of 53,580 acres of non-cropland. Sargent County reported an increase of 23,558 acres of cropland.

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.

Five-Year Trend: All Agricultural Land Value

Estimated values for 2005 were compared with values estimated for 2000 to see how they have changed over time. The percent change in value by county is shown in Figure 2. Values had increased by 10 percent or more in fourteen counties. The largest increase was in Sargent County at 20.54 percent, followed by Barnes County at 19.61 percent, LaMoure County at 17.67 percent, and Hettinger County at15.52 percent. Golden Valley was the only county to decrease in value over this period. All remaining counties showed values increasing by less than 10 percent.

Figure 2. Percent Change in Average Value of All Agricultural Land, 2000-2005



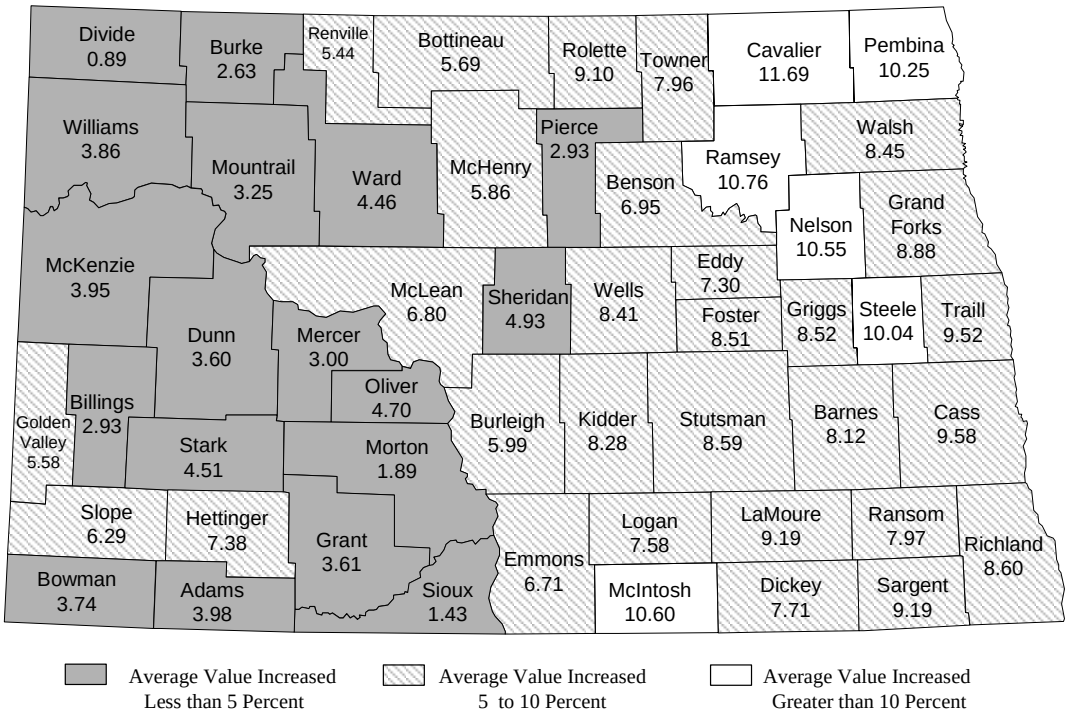
RESULTS: CROPLAND VALUE

The average value of cropland in North Dakota increased by $26.87 per acre or 8.24 percent. Cropland values increased in all counties. See Figure 3. The largest increase in average cropland value was 11.69 percent in Cavalier County. Ramsey County increased 10.76 percent, McHenry County 10.6 percent, Nelson County 10.55 percent, Pembina County 10.25 percent and Steele County 10.04 percent.

Counties with the lowest increase in cropland values were Divide County (0.89 percent), Sioux County (1.43 percent), Morton County (1.89 percent), Burke County (2.63 percent), Billings County (2.93 percent) and Pierce County (2.93 percent).

Changes in the capitalization rate and cost of production index impact all counties equally. The capitalization rate was down from 2004.The lower capitalization rate increased values by 6.74 percent. Twenty-seven counties had increases in cropland values of 6.74 percent or more, thus the average value of production increased in these counties as well. The increase in the cost of production index resulted in a downward shift in land values of 1.62 percent from 2004.

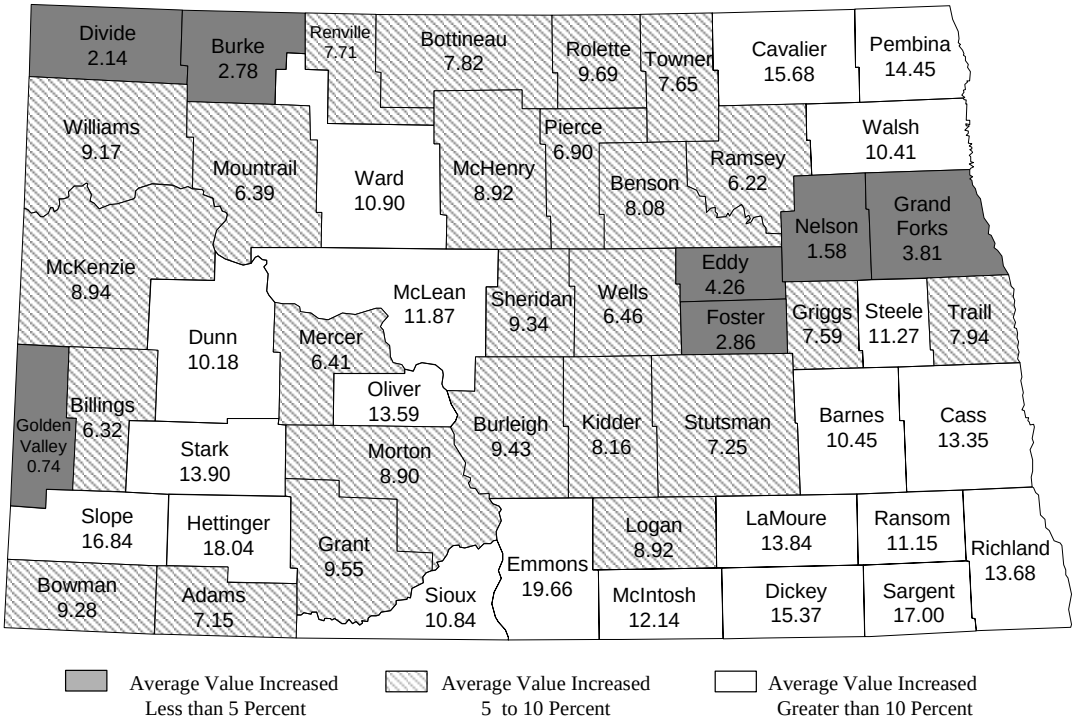
Figure 3. Percent Change in Average Value of Cropland, 2004-2005



Five-Year Trend: Cropland Value

Cropland values have increased in all counties over the 2000-2005 period. The rate of increase has been highly variable around the state as can be seen in Figure 4. Seven counties, Eddy, Foster, Nelson and Grand Forks in the east and Divide, Burke and Golden Valley in the west increased by less than 5 percent. Twenty-five counties had increases between 5 and 10 percent. The majority of these counties are in the central part of the state. Twenty-one counties had increases greater than 10 percent. The largest increases were Emmons County at 19.66 percent, Hettinger County at 18.04 percent and Sargent County at 17 percent.

Figure 4. Percent Change in Average Value of Cropland, 2000-2005



RESULTS: NON-CROPLAND VALUE

The value of non-cropland (grazing land) increased by 5.1 percent for the 2005 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 increase in non-cropland values over 2004.

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 $66.51 for the 2003 marketing year, the most recent year added to the data set. This was up from $57.09 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 1993, the year rolled out of the data set for this analysis, was $66.29. As a result, the value of production changed very little. The increase in value for non-cropland is almost entirely attributable to the decrease in the capitalization value used.

Two tables are provided comparing county values for 2004 and 2005. North Dakota Capitalized Average Annual Values Per Acre by County for 2004 are shown in Table 1. North Dakota Capitalized Average Annual Values Per Acre by County for 2005 are shown in Table 2.

Table 1. 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

Table 2. North Dakota Capitalized Average Annual Values Per Acre by County for 2005 Assessment

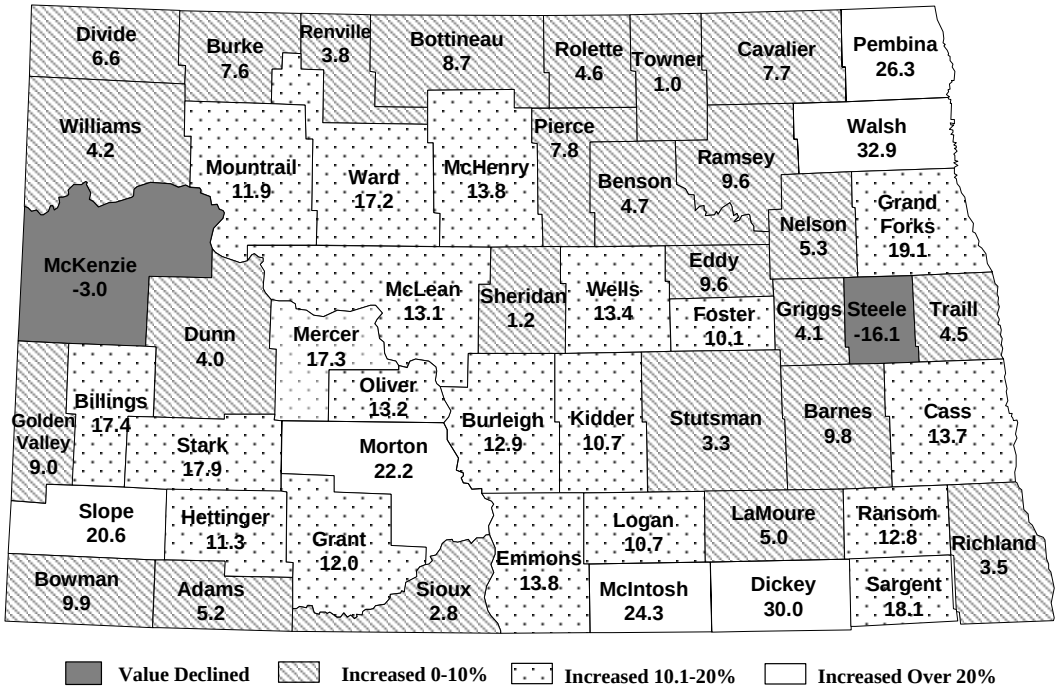
County	Cropland	Noncropland	All Agricultural Land
Adams	211.81	74.21	159.72
Barnes	438.62	103.09	378.68
Benson	317.38	91.27	268.64
Billings	188.26	69.46	106.42
Bottineau	321.46	88.33	282.13
Bowman	214.11	61.30	136.63
Burke	253.76	81.22	201.59
Burleigh	248.41	81.47	173.04
Cass	566.32	104.82	553.47
Cavalier	409.02	89.58	363.73
Dickey	433.21	102.84	328.23
Divide	239.69	80.76	197.74
Dunn	218.16	74.02	128.31
Eddy	291.07	91.66	231.42
Emmons	289.97	80.69	200.83
Foster	359.16	88.23	309.63
Golden Valley	222.99	60.81	139.27
Grand Forks	513.15	102.89	478.04
Grant	216.04	74.40	136.82
Griggs	376.68	89.91	308.65
Hettinger	279.16	73.83	228.11
Kidder	253.16	82.28	176.50
LaMoure	429.55	106.35	387.01
Logan	269.33	81.19	178.64
McHenry	265.65	87.74	211.43
McIntosh	263.35	80.73	192.09
McKenzie	260.75	74.32	149.15
McLean	312.43	80.95	272.54
Mercer	238.15	73.98	167.06
Morton	244.11	74.16	144.76
Mountrail	273.01	80.65	192.71
Nelson	333.30	89.42	291.76
Oliver	285.00	74.37	160.79
Pembina	657.43	107.12	586.60
Pierce	282.68	87.76	241.22
Ramsey	335.95	91.94	291.09
Ransom	474.92	101.29	362.82
Renville	332.03	88.02	313.23
Richland	628.26	104.07	552.35
Rolette	305.02	89.27	268.12
Sargent	516.70	103.87	450.40
Sheridan	266.25	80.72	194.01
Sioux	200.16	74.22	98.76
Slope	246.85	67.63	154.73
Stark	245.33	74.54	181.91
Steele	487.69	91.35	433.00
Stutsman	342.25	101.59	266.22
Towner	323.62	91.69	313.28
Traill	597.91	103.87	559.96
Walsh	588.74	95.86	536.52
Ward	333.41	80.64	274.31
Wells	348.21	88.56	301.98
Williams	227.11	80.87	170.52
State	352.95	79.49	267.66

MARKET VALUE OF NORTH DAKOTA FARM LAND

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 farm land 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 2005 survey were compared with the 2004 survey for cropland and pasture. Changes in market values by county for cropland varied widely across the state. This survey showed values declined in 2005 in two counties with the largest decline in Steele County at a negative 16.1 percent. McKenzie County cropland value declined by 3 percent. Values increased less than 10.0 percent in 25 counties, from 10.0 to 20.0 percent in 20 counties and over 20.0 percent in 6 counties. The largest increase in market value of cropland occurred in Walsh County at 32.9 percent. Percentage changes in market value for cropland by county are shown in Figure 5.

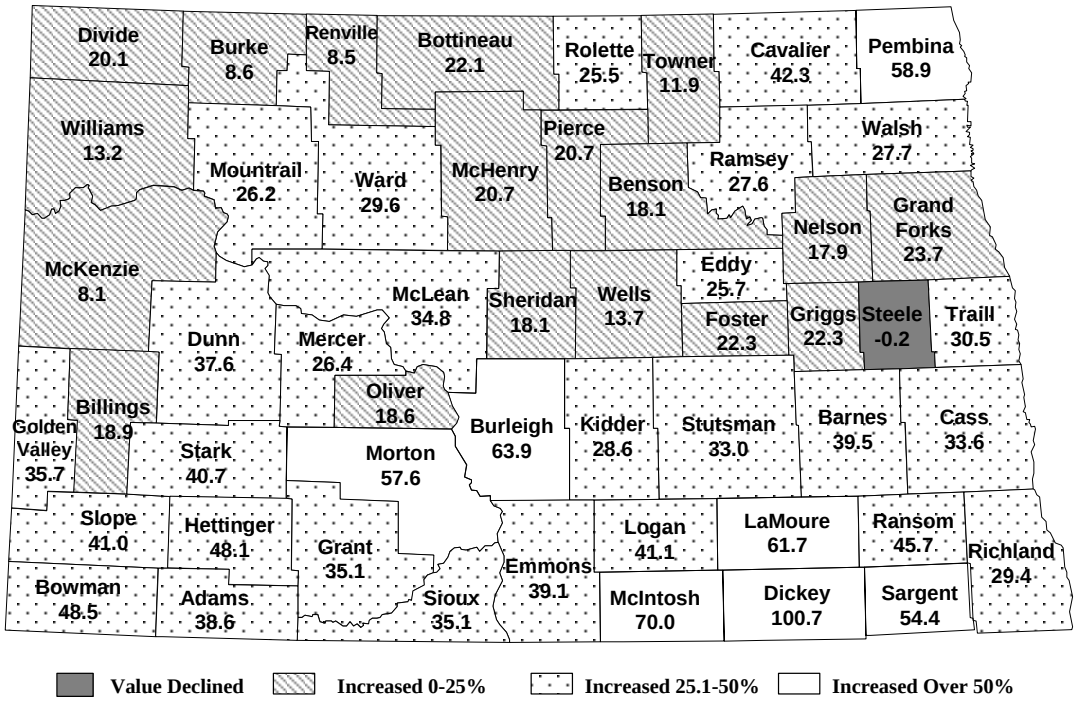
Figure 5. Percentage Change in Estimated Market Value of Cropland, 2004-2005



Five-Year Trend: Market Value of Cropland

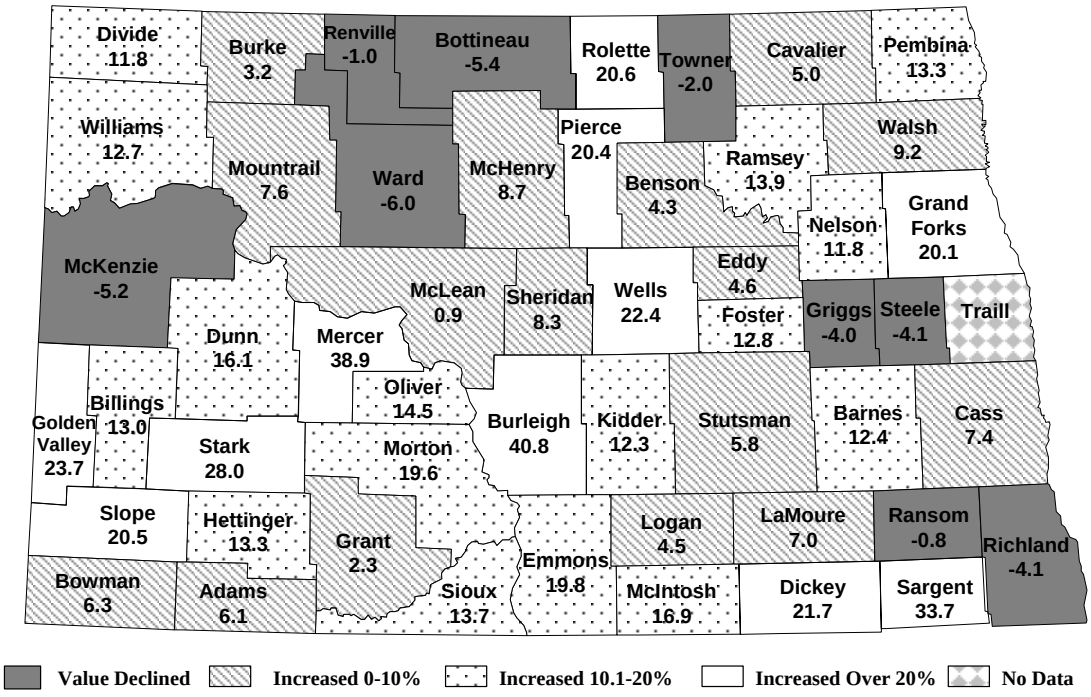
The estimated market value of cropland reported by NASS has generally increased significantly more than the increase in productivity value over the 2000-2005 time period. Two exceptions, McKenzie and Steele counties experienced smaller percentage increases in market value than the increase in productivity value. Dickey County values increased 100.7 percent. Nearby counties, LaMoure, McIntosh, and Sargent as well as Morton, Burleigh and Pembina all increased greater than 50 percent as shown in Figure 6. The majority of the counties showed increases of 25 to 50 percent.

Figure 6. Percentage Change in Estimated Market Value of Cropland, 2000-2005



The change in market value of pasture was highly variable across the state as well. The survey indicated market values declined in 9 counties with the largest decline being a negative 5.4 percent in Bottineau County. Sixteen counties had increases in value of less than 10 percent, Sixteen counties showed increases between 10.0 and 20.0 percent and 11 counties increased greater than 20 percent. Traill County had insufficient data to publish the results. Percentage changes in the market value of pasture are shown in Figure 7.

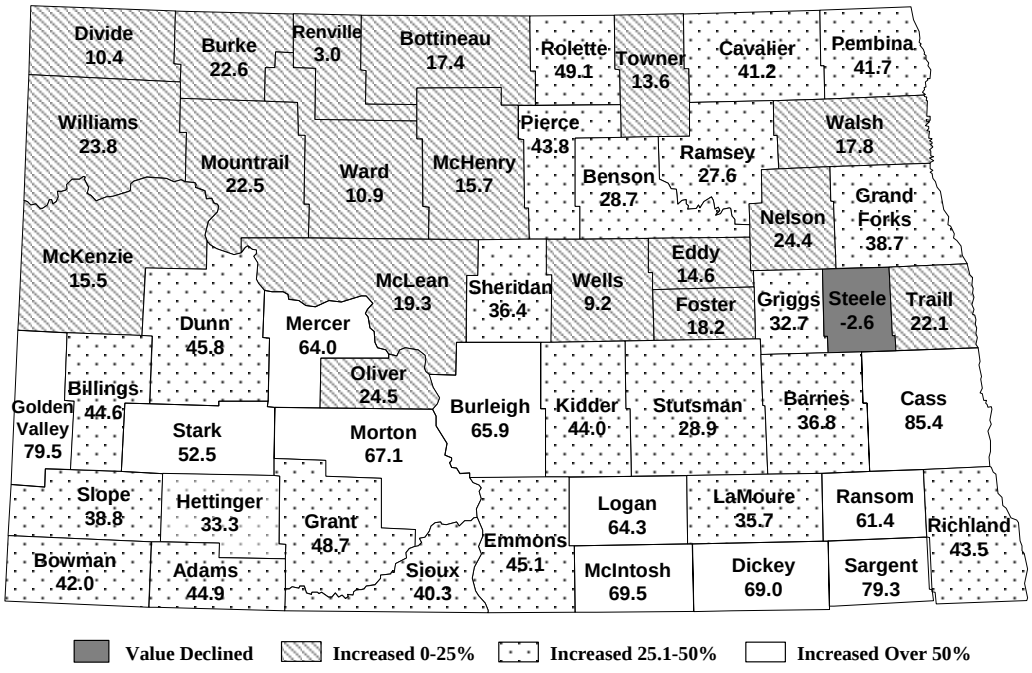
Figure 7. Percentage Change in Estimated Market Value of Pasture, 2004-2005



Five-Year Trend: Market Value of Pasture

Since 2000, market value estimates of pasture have shown considerable strength across most of the state. See Figure 8. The only county showing a decrease was Steele county. A block of counties in the northwest corner increased by less than 25 percent. Ten counties, all in the southern half of the state had increases greater than 50 percent while about half of the state showed values increasing by 25 to 50 percent.

Figure 8. Percentage Change in Estimated Market Value of Pasture, 2000-2005



CONCLUSIONS

Valuation of all agricultural land in North Dakota increased by 7.8 percent or $19.37 per acre for the 2005 assessment as compared to the previous year. The average value of all agricultural land increased in all but one county. Slope County reclassified over 15 percent of cropland acres to non-cropland and this was the primary reason for the decline in all agricultural land value in that county. Five counties showed increases greater than 10 percent.

The average value of cropland in North Dakota increased by $26.87 or 8.24 percent. Six counties showed increases greater than 10 percent with the largest increase being 11.69 percent in Cavalier County. Non-cropland values for all counties increased by 5.1 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 percentage change in non-cropland value is the same for all counties.

The capitalization rate used for the 2005 analysis was the minimum value of 8.9 percent. The 2005 Legislature changed the minimum rate to 8.9 percent for the 2005 assessment. The calculated rate based on the formula was 7.733 percent..

The cost of production index increased by 1.848 points over the previous year to 113.848. This index reduced the landowner share of gross returns by 12.16 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.

Comparing changes over 2000 to 2005 period shows the agricultural productivity value has increased at a moderate over time. Overall state average increase in all agricultural land value has been 8.8 percent and for cropland 10.5 percent while non-cropland declined by 5.4 percent. On the other hand, market values have increased substantially over this time period.

REFERENCES

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

North Dakota Agricultural Statistics Service, USDA, “North Dakota 2005 County Rents & Values,” April 2005.

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@ndsuext.nodak.edu . This publication is also available electronically at: http://agecon.lib.umn.edu/.

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