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RESULTS OF THE NORTH DAKOTA LAND VALUATION MODEL FOR THE 2010 AGRICULTURAL REAL ESTATE ASSESSMENT

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ABSTRACT

This report summarizes the 2010 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 2010 valuation of agricultural land for real estate tax assessment. The average all agricultural 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 10.6 percent from 2009 to 2010 based on the value of production. The value cropland increased by 11.5 percent and non-cropland value increased by 1.7 percent. The formula capitalization rate was below the minimum set by the State Legislature, therefore the minimum rate of 7.7 percent was used.

The majority of the increase in values for cropland and all agricultural land was due to the increased value of crop production. This increase in value of production was due primarily to market price increases that occurred in 2007 and 2008. The change in crop revenue impacted land values from a negative 1.6 percent to an increase of 21.8 percent by county. The capitalization rate change increased land valuations by 3.8 percent in all counties; while the cost of production index decreased land values in all counties by 5.3 percent.

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

RESULTS OF THE NORTH DAKOTA LAND VALUATION MODEL FOR THE 2010 AGRICULTURAL REAL ESTATE ASSESSMENT

Dwight G. Aakre and Ronald Haugen[1]

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 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 dry land 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 was not to be lower than 8.3 percent. The 2009 Legislature amended the capitalization rate formula to set a minimum of 8.0 percent for 2009, 7.7 percent for 2010 and 7.4 percent for 2011. The capitalization rate calculated according to the formula was 6.627 percent. As a result, the minimum value of 7.7 percent was used for the 2010 assessment. The decrease of 30 basis points in the capitalization rate raised the land values by 3.9 percent without any other changes.

Cost of Production Index

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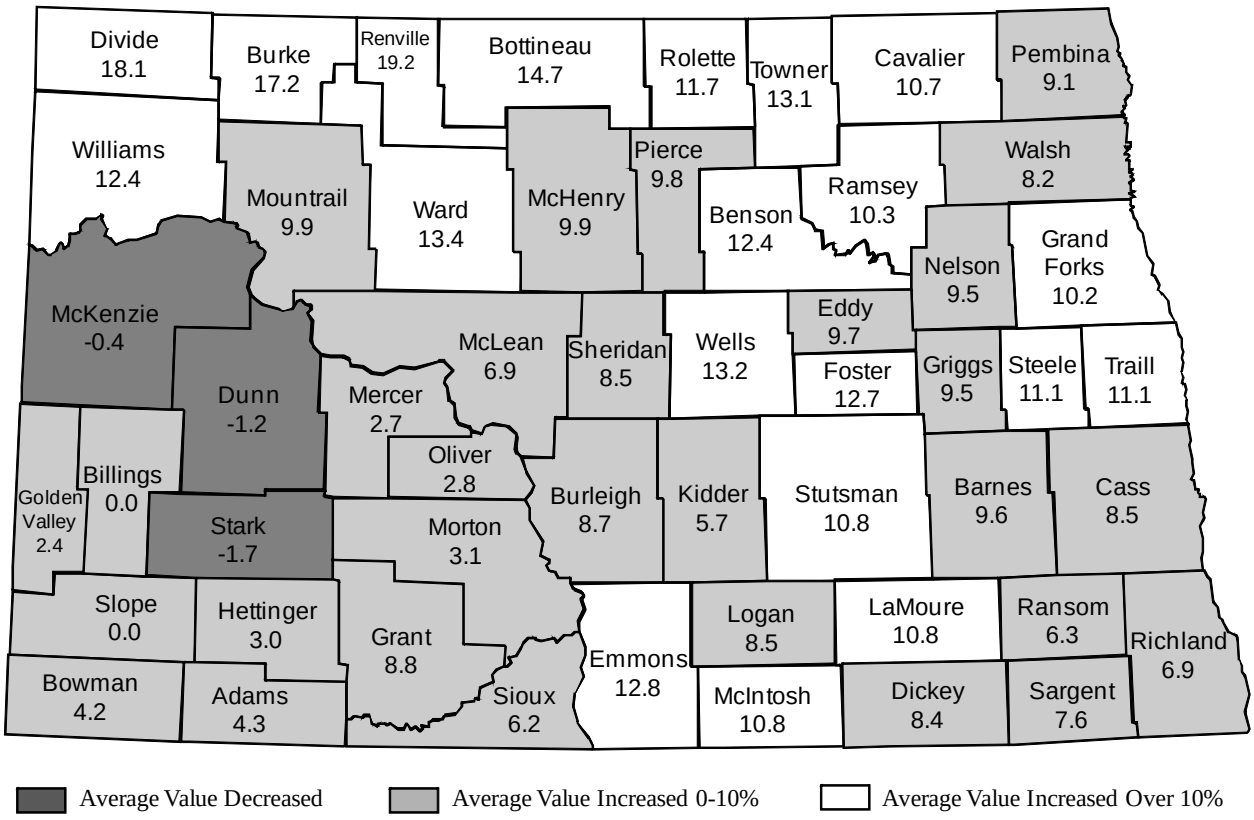
Beginning with the analysis for the 1999 assessment, a cost of production index was added to the land valuation model to account for the increasing proportion of the total cost of production represented by variable costs. The source of data for this index is the *Items Used For Production* from the *Prices 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 2010 analysis was 131.3725, which resulted in a reduction in the landowner share of gross returns of 23.88 percent. The landowner share of gross returns is the amount that is capitalized to determine the land values. Therefore, land values are 23.88 percent lower than they would have been if the cost of production index was not included in the model. The index used for 2010 increased from 125.735 in 2009, for a one-year change of 5.637 points, the largest increase since the cost of production index was added to the mode. This change in the cost of production index from 2009 has the effect of reducing calculated land values by 5.33 percent more than offsetting the increase caused by the reduced capitalization rate.

RESULTS: ALL AGRICULTURAL LAND VALUE

Valuation of all agricultural land in North Dakota, for the 2010 assessment, increased by 10.57 percent or $31.78 per acre over the previous year. The largest percentage increases occurred in Renville County at 19.2 percent, followed by Divide County at 18.1 percent, Burke County at 17.2 percent and Bottineau County by 14.7 percent. Sixteen additional counties showed increases greater than 10 percent while 29 counties increased less than 10 percent. The remaining four counties remained unchanged from 2009 or declined by less than 2 percent. Results are shown in Figure 1.

Figure 1. Percent Change in Average Value of All Agricultural Land, 2009-2010

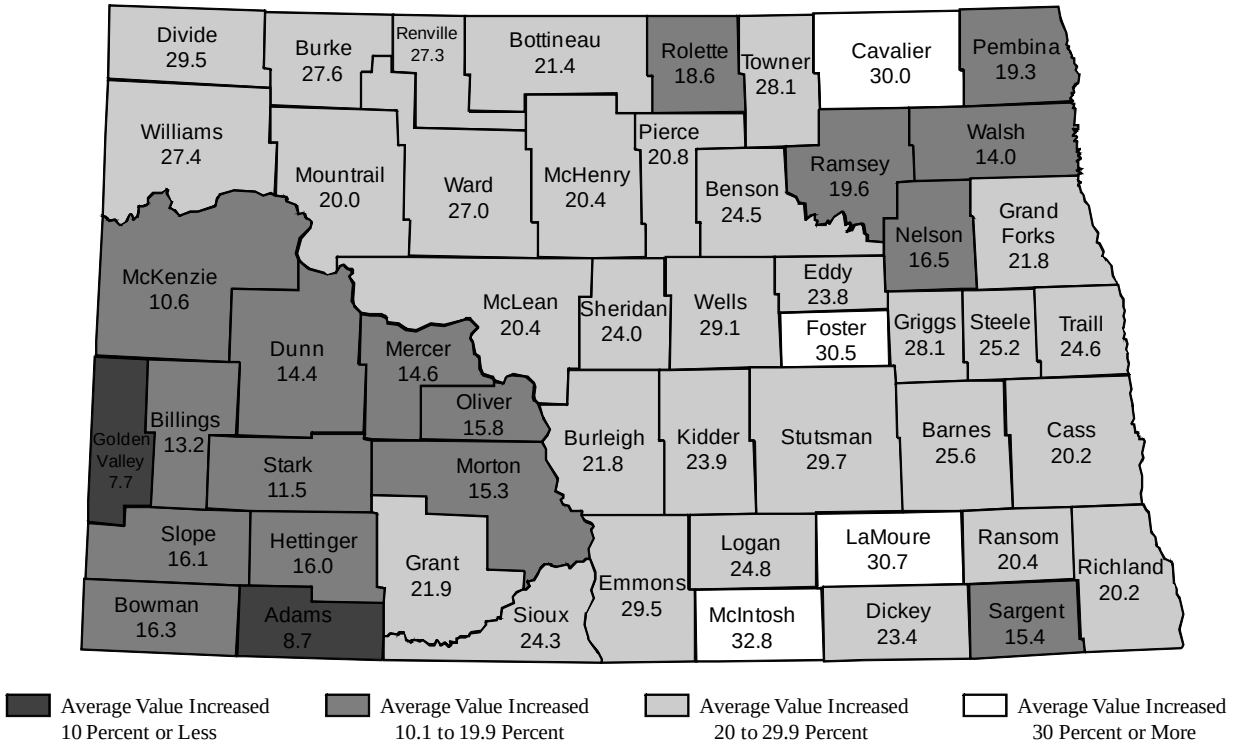


The value for all agricultural land is a weighted average of cropland and non-cropland in each county. Calculated values for cropland generally are three to five times the value of non-cropland in each county. Therefore, a shift in acres between these two categories will alter the all land value even 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 category. Changes in reported acres tend to be minimal. 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 2010 were compared with values estimated for 2005 to see how they have changed over time. The percent change in value by county is shown in Figure 2. The average value for all agricultural land in North Dakota increased 24.2 percent from 2005 to 2010. Values increased 30 percent or more in four counties, McIntosh, LaMoure, Foster and Cavalier. Thirty-one counties experienced increases from 20.0 to 29.9 percent. Land values in 16 counties increased between 10.0 and 19.9 percent. Two counties, Adams and Golden Valley, increased by less than 10.0 percent.

Figure 2. Percent Change in Average Value of All Agricultural Land, 2005-2010



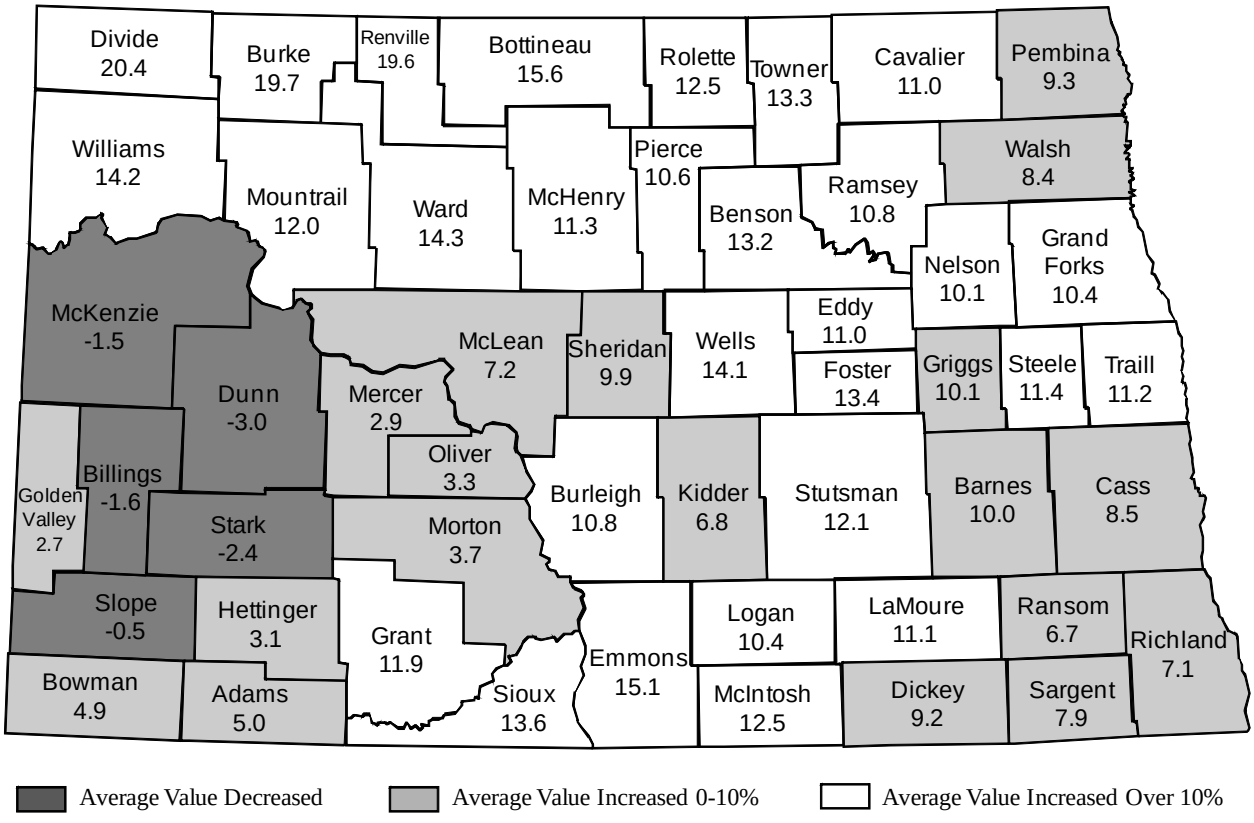
RESULTS: CROPLAND VALUE

The average value of cropland in North Dakota increased by $45.19 per acre, or 11.5 percent. Cropland values decreased in 5 counties. All decreases were 3 percent or less. See Figure 3.

The largest increase in average cropland value was 20.4 percent in Divide County. Other counties with average cropland value increases greater than 15 percent included Burke, Renville, Bottineau, and Emmons.

Changes in the capitalization rate and cost of production index impact all counties equally. The capitalization rate used for the 2010 analysis was the minimum value, 7.7 percent. The change in the capitalization rate increased values in all counties by 3.9 percent. The increase in the cost of production index resulted in a downward shift in land values in all counties of 5.33 percent from 2009. The net effect is that cropland values in all counties were down by 1.43 percent before any changes in productivity were include. Increased gross revenue due to increased yields and higher prices was the cause of increased cropland values calculated for 2010.

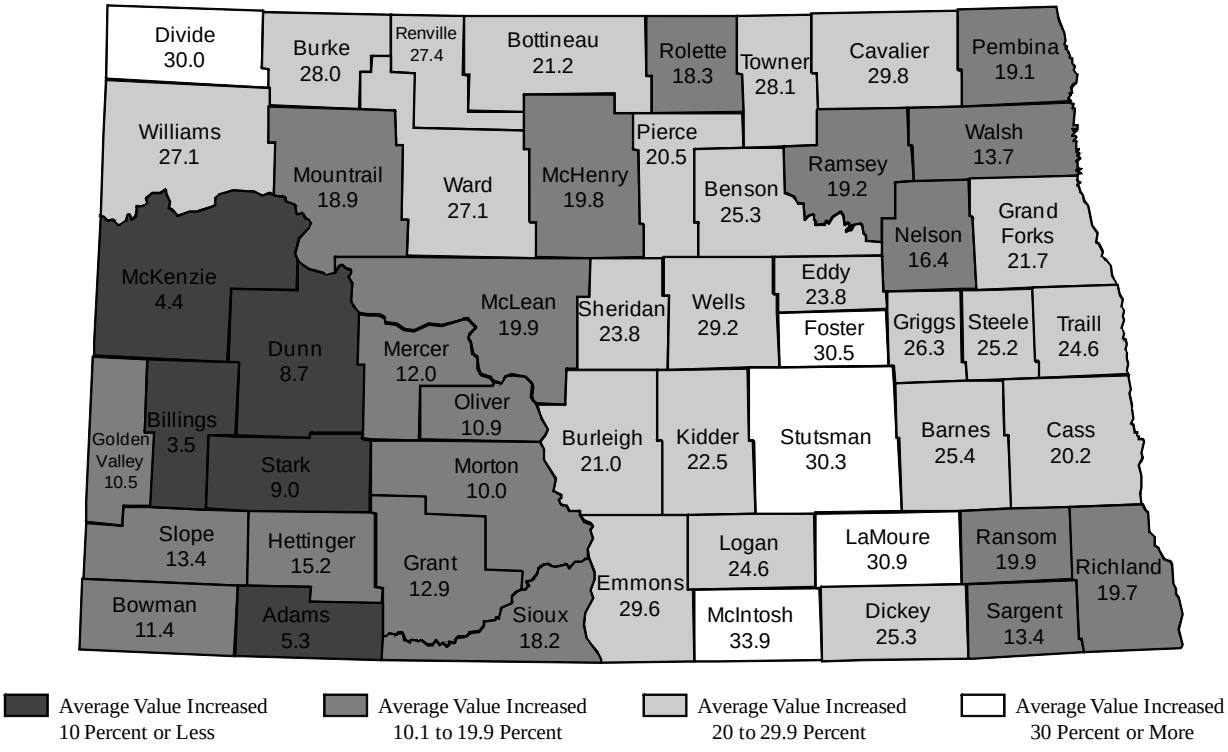
Figure 3. Percent Change in Average Value of Cropland, 2009-2010



Five-year Trend: Cropland Value

Cropland values have increased in all counties over the 2005-2010 year period. The average value of North Dakota cropland was 23.8 percent higher in 2010 than in 2005. The rate of increase has been highly variable around the state as can be seen in Figure 4. Five counties in the southwest, Adams, Billings, Dunn, McKenzie and Stark have 5-year increases of less than 10 percent. Cropland values increased by more than 10 percent in all other counties. The greatest increases were in McIntosh, LaMoure, Foster, Stutsman and Divide counties, all increasing by 30 percent or more.

Figure 4. Percent Change in Average Value of Cropland, 2005-2010



RESULTS: NON-CROPLAND VALUE

The value of non-cropland (grazing land) increased by 1.7 percent for the 2010 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 2009.

The price 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 price of calves and cull cows, an AUM had a value of $67.56 for the 2008 marketing year, the most recent year added to the data set. This was down from $72.82 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 for1998, the year rolled out of the data set for this analysis, was $49.95. As a result, the increase in value for non-cropland is a combination of an increase in the value of production, a decrease due to the increase in the cost of production index and the increase due to the lower capitalization rate.

Five-year Trend: Non-Cropland Value

Non-cropland values increased by25.2 percent across the state from 2005 to 2010. All counties experienced the same change.

Two tables are provided comparing county values for 2009 and 2010. North Dakota Capitalized Average Annual Values Per Acre by County for 2009 are shown in Table 1. North Dakota Capitalized Average Annual Values Per Acre by County for 2010 are shown in Table 2.

Table 1. North Dakota Capitalized Average Annual Values Per Acre by County for 2009 Assessments

County	Cropland	Noncropland	All Agricultural Land
Adams	212.24	91.34	166.48
Barnes	500.02	126.89	433.99
Benson	351.43	112.35	297.37
Billings	197.89	85.50	120.46
Bottineau	337.23	108.72	298.59
Bowman	227.22	75.45	152.53
Burke	271.36	99.97	219.54
Burleigh	271.19	100.28	193.86
Cass	627.30	129.02	613.36
Cavalier	478.15	110.26	427.33
Dickey	497.07	126.58	373.67
Divide	258.95	99.40	216.83
Dunn	244.53	91.10	148.49
Eddy	324.68	112.82	261.26
Emmons	326.64	99.32	230.49
Foster	413.45	108.60	358.42
Golden Valley	239.85	74.85	146.40
Grand Forks	566.07	126.64	528.39
Grant	217.96	91.57	153.32
Griggs	432.12	110.67	361.06
Hettinger	312.06	90.88	257.04
Kidder	290.37	101.28	206.88
LaMoure	505.93	130.91	456.56
Logan	304.02	99.94	205.44
McHenry	285.89	108.00	231.61
McIntosh	313.39	99.37	230.17
McKenzie	276.37	91.48	165.68
McLean	349.59	99.64	306.94
Mercer	259.26	91.06	186.42
Morton	258.82	91.28	161.92
Mountrail	289.86	99.27	210.30
Nelson	352.31	110.07	310.40
Oliver	306.06	91.55	181.06
Pembina	716.47	131.85	641.21
Pierce	308.06	108.02	265.33
Ramsey	361.47	113.17	315.54
Ransom	533.62	124.68	410.96
Renville	353.53	108.34	334.64
Richland	702.41	128.10	621.10
Rolette	320.99	109.89	284.70
Sargent	543.17	127.85	483.05
Sheridan	299.91	99.36	221.72
Sioux	208.16	91.35	115.59
Slope	281.53	83.24	179.61
Stark	273.99	91.76	206.26
Steele	547.80	112.45	487.73
Stutsman	397.84	125.05	311.67
Towner	365.96	112.86	354.68
Traill	669.82	127.85	628.19
Walsh	617.99	117.99	565.01
Ward	370.70	99.26	307.29
Wells	394.32	109.01	344.33
Williams	252.80	99.54	193.31
State	391.80	97.84	300.62

Table 2. North Dakota Capitalized Average Annual Values Per Acre by County for 2010 Assessments

County	Cropland	Noncropland	All Agricultural Land
Adams	222.95	92.93	173.63
Barnes	549.83	129.10	475.77
Benson	397.75	114.30	334.35
Billings	194.76	86.99	120.51
Bottineau	389.67	110.61	342.48
Bowman	238.42	76.77	158.87
Burke	324.93	101.71	257.32
Burleigh	300.46	102.03	210.82
Cass	680.89	131.27	665.52
Cavalier	530.79	112.18	472.96
Dickey	542.87	128.79	404.95
Divide	311.71	101.13	256.12
Dunn	237.19	92.69	146.74
Eddy	360.37	114.78	286.50
Emmons	375.89	101.04	260.09
Foster	468.69	110.49	404.09
Golden Valley	246.31	76.15	149.94
Grand Forks	624.72	128.85	582.21
Grant	243.89	93.17	166.80
Griggs	475.79	112.60	395.38
Hettinger	321.72	92.46	264.69
Kidder	310.14	103.04	218.74
LaMoure	562.19	133.19	505.73
Logan	335.61	101.67	222.96
McHenry	318.24	109.88	254.65
McIntosh	352.65	101.10	255.12
McKenzie	272.25	93.07	164.98
McLean	374.70	101.37	328.07
Mercer	266.83	92.64	191.40
Morton	268.47	92.86	166.91
Mountrail	324.53	100.99	231.22
Nelson	387.96	111.98	339.97
Oliver	316.11	93.14	186.19
Pembina	783.15	134.15	699.60
Pierce	340.67	109.90	291.31
Ramsey	400.58	115.14	348.17
Ransom	569.34	126.85	436.68
Renville	422.98	110.22	398.88
Richland	751.95	130.33	664.13
Rolette	360.98	111.80	318.11
Sargent	585.94	130.08	519.96
Sheridan	329.52	101.08	240.56
Sioux	236.57	92.94	122.75
Slope	279.99	84.69	179.61
Stark	267.49	93.35	202.75
Steele	610.43	114.41	541.99
Stutsman	445.93	127.23	345.25
Towner	414.69	114.82	401.32
Traill	744.87	130.08	697.65
Walsh	669.67	120.04	611.43
Ward	423.72	100.99	348.33
Wells	449.77	110.91	389.81
Williams	288.63	101.27	217.23
State	436.99	99.54	332.40

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 2010 survey were compared with the 2009 survey for cropland and pasture. Changes in market values by county for cropland varied widely across the state. This survey showed values declined in 2010 in sixteen counties with the largest decline in Stutsman County at a negative 14.0 percent. Values increased 10.0 percent or less in 19 counties, from 10.1 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 Foster County at 29.6 percent. Percentage changes in market value for cropland by county are shown in Figure
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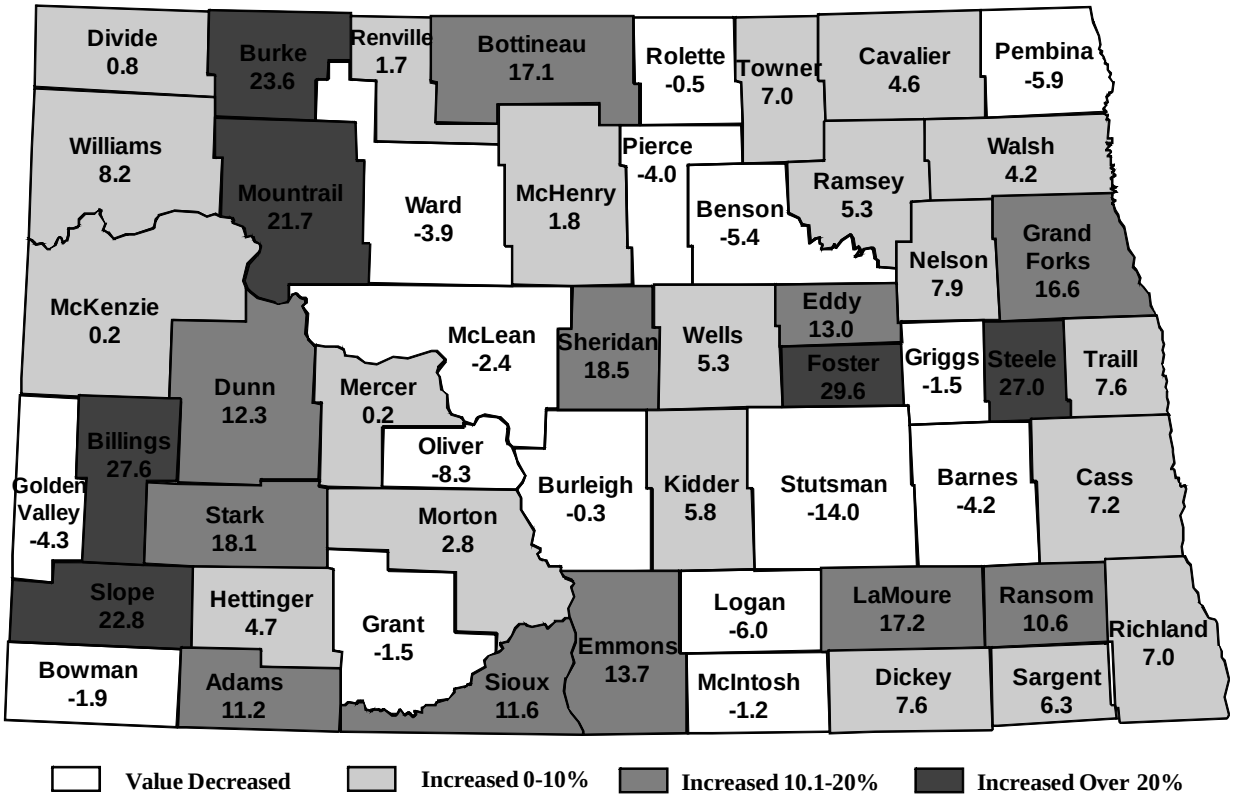
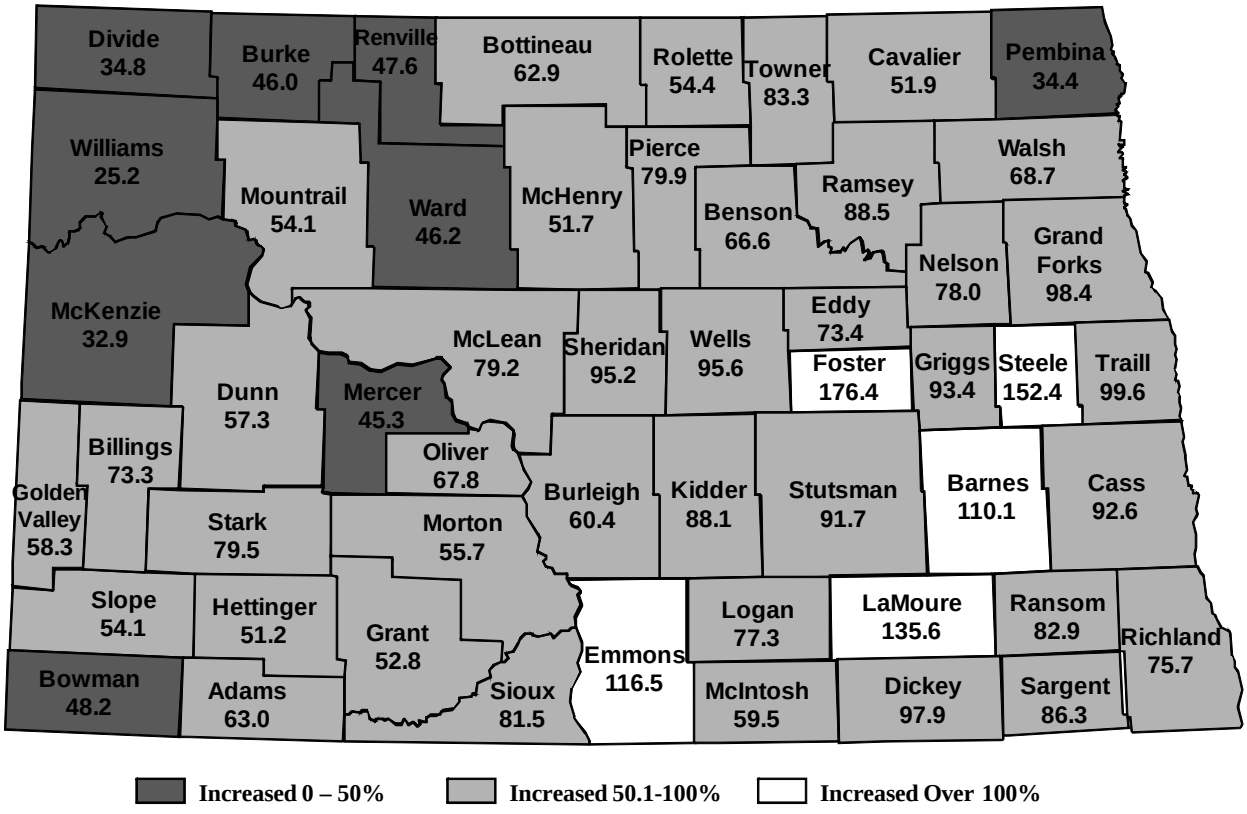
Figure 5. Percent Change in Estimated Market Value of Cropland, 2009-2010



Five-year Trend: Market Value of Cropland

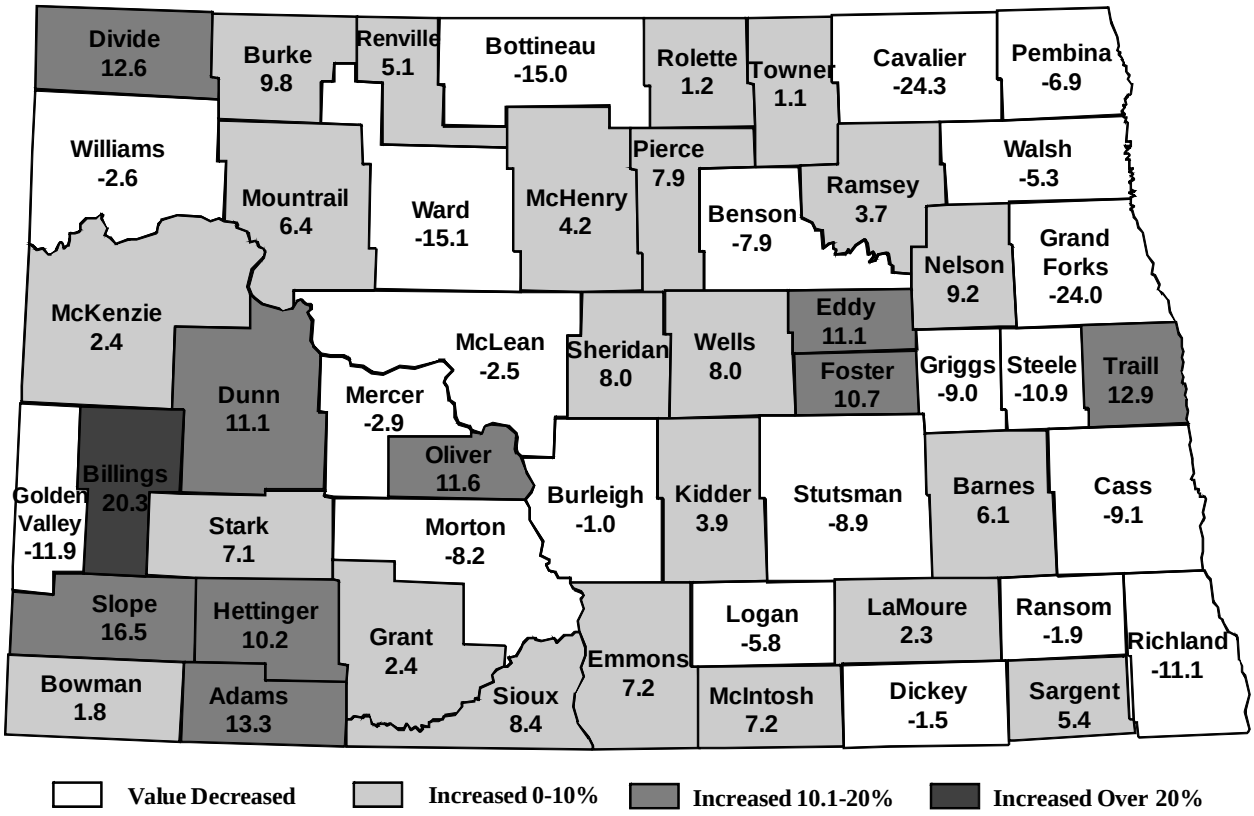
The estimated market value of cropland reported by NASS has increased significantly more than the increase in productivity value over the 2005-2010 period. Foster County market value increased 176.4 percent. Other counties with increases of over 100 percent in market value were Steele at 152.4 percent, LaMoure at 135.6 percent, Emmons at 116.5 percent, and Barnes at 110.1 percent. Percentage changes in cropland market values are shown in Figure 6.

Figure 6. Percentage Change in Estimated Market Value of Cropland, 2005-2010



The change in market value of pasture was highly variable across the state as well. The survey indicated market values declined in 21 counties with the largest decline being a negative 24.3 percent in Cavalier County followed by Grand Forks County at 24.0 percent lower. Twenty-two counties had increases in value of less than 10 percent, 9 counties showed increases between 10.1 and 20 percent and only Billings County increased by more than 20 percent. Percentage changes in the market value of pasture are shown in Figure 7.

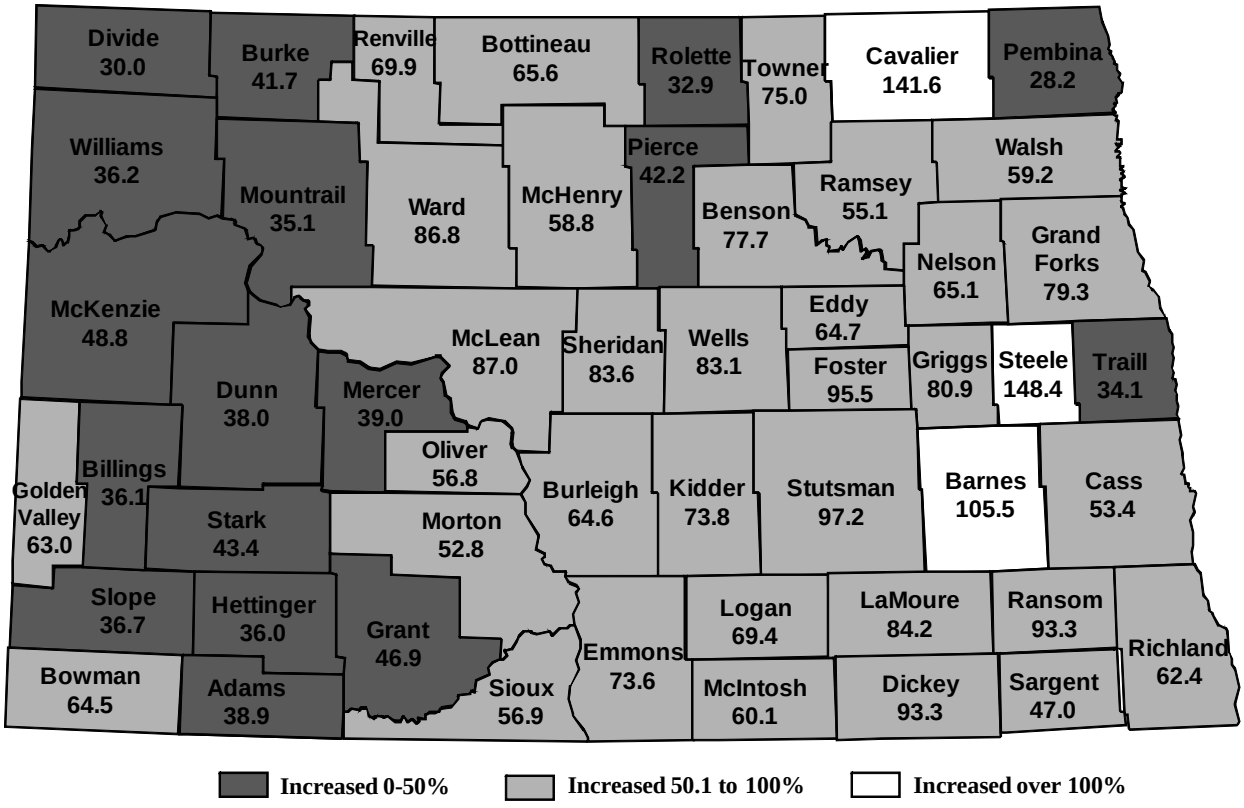
Figure 7. Percent Change in Estimated Market Value of Pasture, 2009-2010



Five-year Trend: Market Value of Pasture

Since 2005, market value estimates of pasture have shown considerable strength across most of the state. See Figure 8. The amount of increase was variable throughout the state. The greatest increase in market values occurred in Steele County at 148.4 percent, followed by Cavalier County at 141.6 percent and Barnes County at 105.5 percent. Values increased between 50 and 100 percent in 33 counties and less than 50 percent in 17 counties.

Figure 8. Percentage Change in Estimated Market Value of Pasture, 2005-2010



CONCLUSIONS

Valuation of all agricultural land in North Dakota, based on productivity, increased by 10.6 percent or $31.78 per acre for the 2010 assessment as compared to the previous year. The average value of all agricultural land increased in all but 4 counties. The increases were greater than 10 percent in 20 counties.

The average value of cropland in North Dakota increased by $45.19 per acre or11.5 percent. Non-cropland values for all counties increased by 1.7 percent from the previous year. The production of grazing units is held constant for non-cropland, only the values per unit change from year to year. The price 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 majority of the increase in values for cropland and all agricultural land was due to the increased value of crop production. This increase in value of production was due primarily to market price increases that occurred in 2007 and 2008. The change in crop revenue impacted land values from a negative 1.6 percent to an increase of 21.8 percent by county. The capitalization rate change increased land valuations by 3.8 percent in all counties; while the cost of production index decreased land values in all counties by 5.3 percent.

The capitalization rate used for the 2010 analysis was the minimum value of 7.7 percent. The 2009 Legislature changed the minimum rate to 7.7 percent for the 2010 and 7.4 percent for subsequent years. The calculated rate based on the formula was 6.627 percent.

The cost of production index increased by5.637 points over the previous year to 131.3725. The cost of production index reduced the landowner share of gross returns by 23.88 percent before this value was 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.

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