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Potential Corn Acreage Expansion for Ethanol Production: Western North Dakota

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Abstract

Several recent developments have stimulated farmers' interest in raising corn for ethanol production in northwestern North Dakota. The purpose of this study is to estimate the corn supply response of western North Dakota farmers for ethanol production. Two focus groups of western North Dakota farmers (Williston and Minot) were organized. The market premium over prevailing local corn prices that was required by western North Dakota farms to entice additional production of an ethanol specific hybrid was determined. Aggregation of these farm responses yielded a supply function of corn for the region. Results show that sufficient corn can be produced in the surrounding region to support a 12 million gallon ethanol facility if modest price premiums are provided. The availability of short-season hybrids adapted specifically to the region may constrain expansion**.**

Key Words: Ethanol, corn supply, response

Potential Corn Acreage Expansion for Ethanol Production:
Western North Dakota

Cole R. Gustafson*

Several recent developments have renewed farmers' interest in raising corn for ethanol production. The Renewable Fuels Standard (RFS) in Senate Energy Bill (S. 517) phases out use of MTBE, the most popular oxygenate in gasoline sold today, in a time-frame of four years and it will be unavailable. In place of MTBE, the RFS requires gradual and increasing percentage of renewable fuels including ethanol and biodiesel, growing to 5 billion gallons per year (BGY). Renewable fuel credit trading and banking will be permitted. In addition to increasing demand for ethanol, prevailing low commodity prices, rising concerns over national energy security, and the need to diversify North Dakota's rural economy have all contributed to greater interest in ethanol plant construction. The North Dakota Governor's office is developing a proposal to support ethanol production based on a sliding scale of ethanol and corn prices (Hoeven).

National ethanol production in 2001 was 2.01 BGY (Renewable Fuels Association). Current industry capacity is 2.4 BGY originating from 65 facilities in 20 states. Twelve additional plants are under construction in various stages of completion. These additional plants will raise industry capacity to 2.7 BGY.

The economic impact of a new ethanol plant is substantial. The Renewable Fuels Association estimates that initial plant construction results in a one-time boost to local economies of $142 million. On-going expansion of the local economic base totals $110.2 million per year of operation through direct spending of $56 million. Average employment created is 41 full-time jobs at the plant and secondary employment throughout the entire economy of 694 jobs. State and local tax receipts raise an average of $1.2 million. Average corn prices rise by an estimated 5-10 cents per bushel, adding significantly to local farm incomes.

There are two existing ethanol plants in North Dakota, located in the northeastern part of the state, near Grafton and Walhalla. In addition, a corn whet milling facility is located in the southeastern part of the state in Wahpeton.

In response to this recent interest in ethanol, 18 corn producers in eastern North Dakota have formed *North Dakota Renewable Fuel*s to explore construction of an ethanol facility near Valley City. Meetings to gauge investor interest were held during September across southeastern North Dakota.

Another private West Coast investment group is considering construction of an ethanol plant in northwestern North Dakota. Initial sites under consideration included Williston, Minot, and Bismarck. Recently, the group selected Williston as a final candidate. Rather than base site selection on concentrated regions of existing corn production, this group has the novel strategy of shipping ethanol to West Coast markets (instead of targeting eastern markets such as

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Minneapolis and Chicago) and basing the decision on readily available western energy and water resources.

A key unknown is the production supply response of western North Dakota farmers. Lt. Gov. Dalrymple recently remarked that "we don't know how much corn North Dakota farmers are willing to supply for ethanol." Only modest corn for grain is grown in the western region, most of it for silage. The region has an expanding irrigation base and is looking for additional crops to diversify existing rotations.

The production response of western farmers in this instance is complicated for several reasons. First, the response will likely vary based on each farmer's experience with raising corn and their existing resource base. Those with prior corn experience will likely be more willing to supply corn at a lower premium. Second, those with irrigation resources may face less risk producing a water-intensive crop in an arid region.

A third complication is farmers' willingness to enter into production contracts to raise corn. The investment group evaluating northwestern North Dakota as a potential ethanol plant desires contracts to ensure adequate corn supply for their plant. Some farmers are reluctant to enter into contracts because of highly variable changes in farm commodity prices. Yet, other farmers routinely enter into contracts and agreements for specialty crops produced in the western region that offer market premiums and profitability (edible beans, durum, malt barley, and sugar beets).

A final complication is that the investment group is considering an identity preservation (IP) requirement involving a genetically modified hybrid. Costs of IP at the farm level can be significant (Gustafson). In addition, public acceptance of genetically modified crops is mixed.

The purpose of this study is to estimate the corn supply response of western North Dakota farmers for ethanol production. The market premium over prevailing local corn prices that is required by western North Dakota farms to entice additional production of an ethanol specific hybrid will be determined. Aggregation of these farm responses yields a supply function of corn for the region. Additional incentives needed for contract production, restrictions on hybrid selection, and production of genetically modified hybrids will be determined.

Procedure

To elicit necessary information for this study, two focus groups of western North Dakota farmers in Williston and Minot were organized. Focus groups are a systematic method of using a structured group session, moderated by a group leader, held in an informal setting, with the purpose of collecting information on a designated topic (Carey).

Participants in each group were carefully selected to represent diverse production, geographic, and resource situations. Care was taken to balance existing dry land and irrigated production, familiarity with production of corn, and geographic diversity. Focus group size

ranged from 5-10 producers, with a total of 20 producers participating. Useable data was obtained from all but two participants. Each session was approximately one hour in length.

During the session, producers were asked to provide their name, total number of acres operated, number of existing crop acres under contract production, and premium received above prevailing local prices for crops produced under those existing contracts. Total acreage was elicited for purposes of scaling their individual responses for additional corn production to the region. Information on existing contracts was obtained to gauge familiarity with the process and premiums required to motivate behavior.

Participants were then presented with information on local corn market prices. They were instructed to specify the price they required to expand corn production and the number of acres they would likely produce if that premium were attainable. For those not familiar with corn production and unable to estimate costs of production, a representative enterprise budget for corn production in the region was provided. Additional premiums necessary for participation in a long-term contract (3-5 years), planting a specific hybrid, and planting of a genetically modified variety were also obtained.

After producers specified the above information, they were asked to compare their responses and report reasons for their premium election to the group. A general discussion followed during which regional and institutional opportunities/impediments were evaluated.

The individual responses of participants were collected and evaluated using conjoint analysis. Economists are increasingly using choice-based conjoint analysis to estimate the value of non-market goods. An agribusiness sponsored pre-session at the 2002 American Agricultural Economics Association annual meeting reviewed the rising interest in this method and offered several suggestions for improving results.

Results

All focus group participants were excited at the prospect of raising additional corn for ethanol production, if additional market price premiums could be obtained. They noted a critical need to diversify cropping rotations, produce crops with greater income potential, and expand local economic development by processing more crops locally.

Opportunities for Corn Acreage Expansion

The overwhelming factor influencing producers' decisions to expand acreage for corn production is the level of price premium available. They felt that if a premium were available enabling them to cover the additional costs of production of raising corn, most producers in the region would seriously consider raising it. The importance of this in their decision process was revealed when they aggressively questioned Extension personnel present as to specific cost of production estimates for the region. They were specifically interested in seed, chemical, and fertility costs–indicating that marginal changes in variable operating costs are important.

Changes in fixed costs of machinery and equipment operation were of lesser importance. Thus, additional acreage would likely be obtained if market premiums covered marginal changes in variable costs of corn production.

Irrigated sugar beet producers and existing dry land corn producers would most likely be the first farm types to expand corn production as market premiums they required were between $0.00 and $0.20/bu. over prevailing local prices. The addition of corn in sugar beet rotations allows producers to use new chemicals that target severe on-going weed problems in sugar beets. Moreover, few other cropping options offer the income potential of corn. Irrigated acreage in the Williston area totals 110,000 acres and farmers estimated that 20 percent of the off-year acreage would readily be available for corn production.

Existing producers who raise corn, harvest it mainly for silage to feed livestock. They noted that for only a small premium, they would readily raise the crop for grain. They already have the specialized planting and most of the harvesting equipment for corn. Thus, they are able to raise additional corn without significant new investment costs which would have to be recovered in the price premium.

During discussion, several producers noted that farmers without harvesting equipment may be able to custom hire or lease needed equipment. Custom corn harvesters seeking additional acreage may be interested in continuing north if more corn acreage were available.

Both focus groups remarked that the area has a shortage of feed grains. Livestock producers would readily welcome more feedstocks, either in the form of corn or distillers dried grains. Diversifying feedstock sources would provide them with a more stable supply of inputs. Grazing of corn stover would be a valuable additional resource for beef cows in the region.

Producers were also excited about the income diversification opportunities of producing corn for an ethanol market. Prices of corn used for ethanol production are derived from energy markets. Existing corn in the region is utilized for feed and prices are driven by livestock markets. Additional market opportunities may provide farmers with more price stability over time, thereby reducing total risk. Farmers did assume that production of corn under contract would require an “act of God” clause.

Producers felt that expansion of dry land corn production is equally competitive with irrigation. In Minot, producers felt dry land corn yields 80-100 bu. per acre, whereas irrigated corn yields 140-150 bu. per acre but entails considerable more expense.

In both areas, construction of an ethanol plant would likely encourage farmers within a 120-mile radius to expand corn production. Beyond that, transportation costs become prohibitive. Truck licensing requirements place an upper bound at 150 miles.

Contracts and Hybrid Restrictions

Most farmers in the area (85 percent) had experience with contract or long-term grain production agreements. Sugar beet agreements in the area are five-year duration. Malt barley production is expanding in the region and is often done under contract. In addition, many producers raise specialty crops under contract for niche markets.

The availability of long-term contracts for ethanol corn production had mixed results on farmers' specified price premiums. Some farmers would lower their price premium if long-term contracts were available because of the additional stability afforded. They could invest and plan longer term crop rotations, thereby easing management decision making and allowing more bulk purchases. They also noted that lenders would look favorably on longer term contracts and be more willing to supply operating capital. Other farmers required higher premiums to engage in contracts because of uncertainty in overall market conditions.

The requirement to plant a specific hybrid had negligible impact on corn premiums. Producers in the region routinely plant specific seeds under contract agreements.

Farmers also had no reservation about planting a genetically modified hybrid. They commented that other genetically modified crops (canola, soybeans) are raised in the region. Since the genetically modified corn variety would be dedicated for fuel and not food production, they felt the general public in the region would have no concern.

Constraints on Corn Acreage Expansion

The most important concern expressed by producers that could limit interest in corn expansion within the region was the availability of suitable hybrids. Given the short growing season, producers emphatically required corn varieties suitable for their region. Without their availability, farmers' interest in raising corn was negligible.

Other concerns about corn expansion were mentioned by some farmers, but most felt that they could be managed. In the western region where malt barley acreage is increasing, producers were concerned that corn may harbor scab which in turn would greatly affect the quality of barley produced. Not only were they concerned about scab on their farm, but they were also concerned about social pressure because scab readily travels to neighboring fields. Farmers with experience of raising both barley and corn in rotation felt that agronomic practices could mitigate such concerns.

Producers in both regions expressed concern about drying facilities. They felt that their present methods of bin aeration would be insufficient. A novel approach suggested was to form a grain drying and storage "condominium" nearby the ethanol plant. The facility would be available to producers without sufficient equipment and/or resources to dry and store the additional volume of production.

Finally, producers were concerned about the availability of crop insurance and financing. Crop insurance policies for corn in the region are limited. If available, they are most often based on silage values. Adequate risk management protection, including establishment of crop insurance yield bases (histories) would be required.

Corn Acreage Supply Response

A regression estimated the corn acreage supply response from the premium data provided by the producers. The acreage response of producers (Y) was regressed on the corn price premium they required (X) and the corn price premium squared (X^2).

Results of the regression are shown in Table 1. The model has excellent fit (R^2 =.95) and statistically strong variable coefficients ($p<.01$). Model results are graphed in Figure 1.

Table 1. Regression Output

	Value	Std. Error
Constant	-0.0422	
x	0.0092	.000889
x^2	-0.000102	.0000156
Std. Error of Y	.0125	
Number of Obs.	18	
R^2	.948	

The results can be interpreted as follows. An eleven cent ($0.11) increase in prevailing corn prices will motivate producers in the region to expand corn production by five percent (5%) of total harvested acreage of all crops

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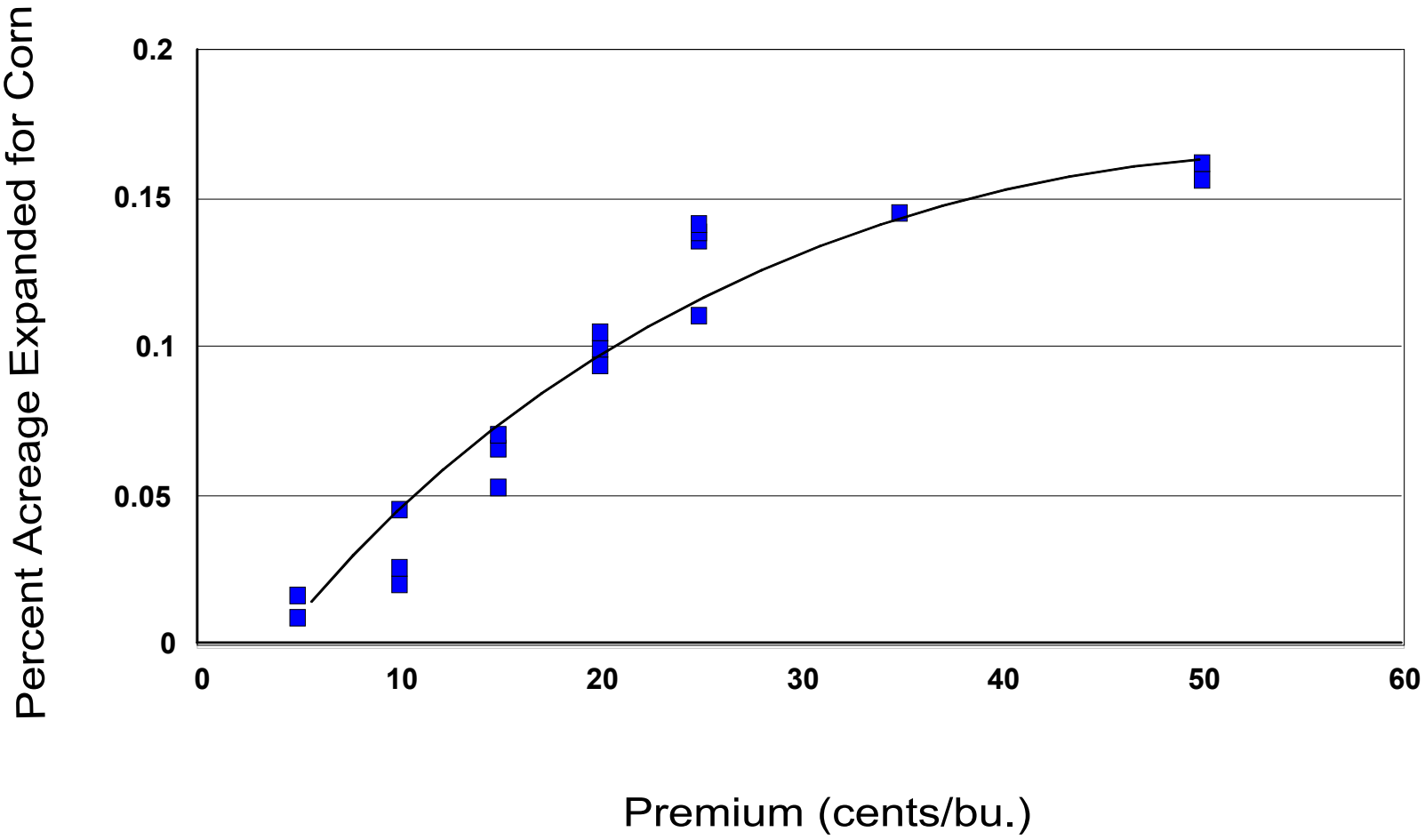
Using Williston as an example, Williams County and each of its neighboring counties have the following total harvested acreage (USDA):

North Dakota	Acres (,000)	Montana	Acres (,000)
Burke	310	Richland	175
Divide	361	Roosevelt	365
McKenzie	321	Sheridan	370
Mountrail	474		
Williams	494		

Figure 1. Corn Acreage Supply Response



Total cropland harvested in the Williston region is nearly 2.9 million acres. Five percent of this equals 140,000 acres which is the number of acres in the region that farmers would likely shift towards additional corn production.

Given the low corn price basis in the region, ethanol production should be quite competitive with traditional corn production regions. Even with an additional $0.11 premium, prevailing corn prices would still be lower than other regions due to transportation expenses.

Barley as a Feedstock

Both groups of producers expressed interest in the use of barley as a feedstock for ethanol production. Each year, certain areas of the region experience hardship, resulting in production of substandard barley. This barley is routinely sold at steep market discounts and would be very acceptable for ethanol production. Producers felt that the feasibility of a new ethanol plant would be higher, at least initially, if lower priced residual barley was used instead of corn. Over time as corn production in the region expands, the plant could be converted over to corn.

Conclusions

Farmers in the northwest region of North Dakota are readily able to expand corn acreage for ethanol production, providing adequate market incentives are available. They noted a critical need to diversify cropping rotations, produce crops with greater income potential, and expand local economic development by processing more crops locally. Conjoint analysis of focus group responses indicates that 173,000 acres of expanded corn production could be obtained with market premium of $0.11. The availability of short-season hybrids adapted specifically to the region may constrain expansion.

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