

**A BRIEF ANALYSIS OF THE IMPACT OF EXPANDED ETHANOL
PRODUCTION ON U.S. AGRICULTURE**

By

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The Clean Air Act amendments of 1990 mandated oxygenated gasoline fuels in certain cities and reformulated gasoline in the nation's most air-polluted cities. What role ethanol will play in the Clean Air Act is still to be determined, but, if approved, this program could increase the amount of corn utilized for ethanol by 250 million bushels over the 1995-1997 period.

The impact of increased ethanol production on U.S. agriculture was analyzed with the implementation of "AGMOD," an econometric/simulation model of U.S. agriculture. This model generates year-to-year projections of major agricultural variables.

The analysis was encompassed in three "runs" of the model to the year 2000. The first "run" was performed under the assumption that ethanol would not be permitted as an oxygenate. The second run assumed that corn used for ethanol under this Act would expand to 250 million bushels over the 1995-97 period and remain at that level for the balance of the decade. Another assumption was that 90 percent of the increase in the by-product feed (corn gluten feed and meal) produced would be exported. This has been the case in the past. The third run of the model incorporated the same assumptions as in the second run except that only 25 percent of the increase in corn gluten feed (CGF) and meal (CGM) production would be exported. In that case, most of the increase in these middle protein (CGF) and high protein (CGM) feeds would be absorbed by the domestic livestock industry.

Under both the second and third runs, the increase in ethanol production was assumed to be through wet milling. Ethanol production could increase after 1997, but was held constant in order to

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evaluate how phasing in 250 million bushels of corn in 1995-97 would impact on agricultural variables in 1996-2000.

The results of the analysis are summarized in Table 1 in terms of changes from the baseline. As expected, net cash receipts from crops over variable costs increase under both scenarios, by over \$1 billion for the high by-product feed export assumption and just under \$1 billion for the low export assumption. Somewhat surprising is that net cash receipts from livestock (total cash receipts less feed and other variable costs) also increase under both scenarios even though feed costs are higher. This is because of the inelastic demand for livestock. Higher feed costs in the initial part of the 1995-2000 period generate a reduction in livestock production which increases livestock prices even more than output is reduced.

Because of higher corn prices, deficiency payments are lowered. Even so, net cash farm income increases as rising cash receipts from marketings more than offset reduced government payments. About a million acres of set-aside land would come back into production on corn and wheat.

Also, somewhat unexpected, is that a 250 million bushel increase in corn going into ethanol would generate only a 127-145 million bushel increase in corn production. That is because higher feed prices reduce domestic utilization and exports. Coarse grain producers abroad are also encouraged to expand production.

In spite of the increased availability of corn gluten feed and meal, and also corn oil, all of which would put downward pressure on soybean prices, the impact was minimal even if most of the by-product feed had to be absorbed in the domestic market. The reason is that higher corn prices would tend to undergird the soybean meal market enough to offset lower soybean oil prices. Price of corn gluten feed, however, would be somewhat lower than otherwise if most of the output had to be absorbed in the domestic livestock market.

Impact on U.S. Agriculture of the Utilization of an Additional 250 Million Bushels
of Corn for Ethanol Production Under the Renewable Oxygenate
Requirement for Reformulated Gasoline^{a/}

| Variable | Change from Baseline Projections in 1996-2000 | | | |
|--|--|---------|--|---------|
| | If 90% of the Increase in CGF and CGM is Exported | | If 25% of the Increase in CGF and CGM is Exported | |
| | Absolute | Percent | Absolute | Percent |
| Net cash receipts from: | | | | |
| Crops | +\$1.40 bil. | +2.2 | +\$.87 bil. | +1.4 |
| Livestock | +\$.24 bil. | +1.2 | +\$.26 bil. | +1.3 |
| Direct government payments | -\$.35 bil. | -11.9 | -\$.32 bil. | -10.9 |
| Net cash farm income | +\$1.42 bil. | +1.7 | +\$.92 bil. | +1.1 |
| ARP on corn and wheat | -.94 mil. A | -17.1 | -.91 mil. A | -16.5 |
| Corn production | +127 mil. bu. | +1.3 | +145 mil. bu. | +1.4 |
| Soybean production | -8 mil. bu. | -.3 | -15 mil. bu. | -.6 |
| Utilization of feed grain for feed | -.4 mil. MT | -.3 | -.4 mil. MT | -.3 |
| Non-feed utilization of feed grain | +5.7 mil. MT | +15.0 | +5.7 mil. MT | +15.0 |
| Utilization of soybean meal for feed | -.2 mil. MT | -.7 | -1.1 mil. MT | -4.1 |
| Farm price of corn | +\$.10/bu. | +3.8 | +\$.09/bu. | +3.4 |
| Farm price of soybeans | +\$.08/bu. | +1.1 | -\$.01/bu. | -.1 |
| Price of soybean meal | +\$4/T | +1.6 | +\$2/T | + .8 |
| Price of soybean oil | -\$.02/lb. | -1.1 | -\$.05/lb. | -2.9 |
| Price of corn gluten feed | +\$.70/T | +1.0 | -\$4.40/T | -6.1 |
| Real gross margin over variable cost | | | | |
| Corn in Feed Grain Program | +\$4/A | +3.9 | +\$4/A | +3.9 |
| Soybeans | \$2/A | +2.0 | NC | NC |
| Real gross margins over feed costs for milk production | -\$.05/cwt. | -.8 | -\$.04/cwt. | -.6 |
| Price of land in the Corn Belt | +\$5/A | + .4 | +\$7/A | + .6 |

^{a/}Assumed to be phased in during 1995-97.

Source: AGMOD.

Even though deficiency payments would decline on corn, the higher market prices would increase returns for farmers in the Feed Grain Program by about \$4 per acre over variable costs. This would amount to an increase of about 4 percent. Gross margins on soybeans would be slightly higher to unchanged.

While net returns to livestock producers would increase with the ethanol program as they respond to higher feed prices, the gross margins over feed costs for dairy farmers would decline slightly. This is because of the longer lag in production response in dairy relative to hogs, poultry and cattle feeding.

Higher returns to crop production would tend to be capitalized into higher land values on the order of \$5-7 per acre in the Corn Belt in 1996-2000.

In conclusion, the expanded ethanol production under the Clean Air Act should increase net farm incomes in general and should not be divisive (1) between corn and soybean producers, not only because corn and soybeans are commonly produced in rotation on the same farms in the Corn Belt, but also with regard to the more specialized soybean producers in the South; (2) between crop and livestock producers; and (3) between producers and agribusiness. Taxpayers would receive some positive effects from lower deficiency payments and consumers would not notice much effect on food prices.

Some concerns may remain in terms of our responsibilities under GATT as related to the European Community (EC) which imports most of our corn gluten feed. Also, the South American nations exporting soybeans and soybean meal may object to the increased competition from the corn gluten feed exports, but they would gain from higher corn prices.