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U.S. AGRICULTURAL POLICY AND GASOHOL:
SIMULATION OF SOME POLICY ALTERNATIVES

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Summary

The utilization of agricultural production to meet the nation's energy needs has emerged as a significant issue in public policy and legislative debate. One of the major types of programs being discussed are those encouraging gasohol production.

The research evaluates the implications of alternative gasohol programs for a large segment of the food and agricultural sector—corn and soybean producers, consumers, and taxpayers. The impacts on corn and soybean prices, production, acreage planted, carryover stocks, exports, and commodity program expenditures are presented.

The research findings indicate that alcohol production levels below 2.0 billion gallons do not result in serious dislocations in the agricultural sector. As the level of alcohol production increases and more grain is required, corn prices rise significantly, stocks fall to extremely low levels, exports decline, and government expenditures increase greatly.

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Federal policy towards oil prior to 1973 was a patchwork of restrictive measures justified on the grounds that national security required a strong oil industry. The energy policies of the United States during this period have been characterized as "surplus policies" (Mitchell). An import quota restricted the amount of foreign oil that could enter U.S. markets. Under the protection of the quota, major producing states restricted domestic production in order to support the price of domestic crude. These policies were operable because there was a worldwide surplus of oil. Since the Arab oil embargo of 1973, the thrust of the U.S. energy policy has been to "manage the shortage" and stimulate supply with an intricate system of price controls for crude oil and refined products together with programs for allocations and entitlement payments.

Agricultural policy has undergone a similar transition. The underlying supply and demand conditions have not, however, dictated a stringent shortage management policy approach. Reliance on price support and supply control programs to reduce chronic over-production have given way to increased reliance on managed grain reserve programs and measures to modify the impacts of competitive and unstable markets. With the impending shortage of liquid fuels a new set of economic factors are invoked that may warrant further change in agricultural policy.

The utilization of grain for the production of gasohol--a blend of ten percent alcohol produced from grain and gasoline--has gained substantial interest among those concerned with agricultural and energy policy. Gasohol production is perceived as a means of utilizing agricultural land periodically withdrawn from production to increase domestic energy supplies.

Previous research on this issue concludes that gasohol production is not currently economically viable given current relative factor and product prices, and alcohol production technology (Tyner and Okos). With alcohol distilled from grain costing at least twice the current wholesale price of gasoline, a subsidy would be required to make alcohol competitive on a cost basis with gasoline. Yet within the current context of rapidly rising energy prices, grain surpluses, and acreage set asides, the economic implications of policy alternatives that could potentially improve resource use in both the agricultural and energy production sectors need to be evaluated.

As might be expected for an issue with important implications for both agricultural and energy policy, several gasohol program alternatives have emerged in the legislative process.^{1/} The proposed gasohol programs generally provide (a) a subsidy for gasohol production, (b) the means to enhance the level of grain production, and (c) measures assuring a minimum supply of grain to distillers. Without reference to specific legislation, this paper examines possible alternative agricultural programs under the assumption that demand exists for grains used in gasohol production.

Two alternative gasohol programs and, for purposes of comparison, an extension of current commodity programs are evaluated. The first gasohol program alternative postulates a significant departure from the current set of commodity programs. The income support and acreage set aside programs are eliminated. Loan rates are increased to levels that would provide producers with about an equivalent production incentive and level of income protection as that provided by current commodity programs. Increased loan rates are also utilized as a means to increase inventories of the Commodity Credit Corporation, which assumes the additional role of providing minimum amount of grain to alcohol distillers.

The second gasohol program alternative incorporates the exogenous demand for grain to be used for alcohol production within the context of the current set of commodity programs. The deficiency payment, non-recourse loan, and domestic grain reserve programs would continue to operate much as they do currently. However, the CCC would assume the marketing role specified in the first program alternative.

The two gasohol program alternatives differ primarily in the manner in which producers are encouraged to increase production above export, domestic demand, and reserve needs to meet gasohol supply commitments. The first gasohol alternative provides the production incentive through loan rates that are raised to nearly the level of target prices assumed if current programs are extended. The second gasohol alternative postulates that the incentive to increase production is obtained by higher expected market prices resulting from the increased utilization of grain for alcohol production.

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of corn, respectively. These amounts can be compared to the 460 million bushels of corn that a previous study estimates could have been produced on corn acreage withdrawn from production in 1978 (School of Agriculture, Purdue University).^{2/}

The alternative levels of supply commitment are purchased and sold by the CCC. This modification is incorporated in the stocks component of the model by specifying that the CCC make available that amount of grain from either inventories accumulated through nonrecourse loan defaults or purchases from the market, which equal the difference between the levels of supply commitment and quantity defaulted. The CCC is charged the loan rate for grain withdrawn from inventories and the market price for grain purchased from the market.

The per bushel corn price used to calculate CCC revenues is that required to make gasohol competitive with gasoline—\$.75 in 1979. This amount is increased ten percent annually in following years to reflect rising gasoline prices. The subsidy for gasohol production is equal to the difference between the average price the CCC is charged for the grain supply commitment and price for grain that makes gasohol production competitive.

The process of grain to alcohol conversion also results in the production of distillers dried grain—a protein source that substitutes for soybean meal at a rate of 2 to 1.^{3/} Each bushel of grain used in gasohol production reduces domestic soybean demand by .19 bushels.^{4/} Current utilization levels indicate that the substitution possibility of distiller dried grain for soybean meal would cease to exist for

alcohol production levels greater than 3.0 billion gallons because that amount of distillers grain would substitute for all currently fed soybean meal.

PROGRAM ALTERNATIVES

The analysis compares two gasohol program alternatives and an extension of current commodity programs for the period 1979/80 through 1984/85. Assumptions are made with respect to the level of commodity program parameters for each alternative for individual years in that period.^{5/}

The current program alternative (CURRENT) incorporates announced target prices, loan rates, set aside levels, and reserve program parameters for 1978/79 - 79/80. Target prices in the remainder of the period are adjusted on the basis of the formula contained in the Food and Agriculture Act of 1977 and projected input costs. Loan rates, and corresponding farmer-held reserve parameters, are escalated on the basis of the trend in corn prices received by producers from 1960-76. Set aside levels are calculated internally by the model. The specific values for the CURRENT program parameters are shown in Table 1.

Announced program parameters for 1978/79 - 79/80 are also specified for the first gasohol alternative, GAS I, with the exception of the 1979/80 loan rate being raised to \$2.10. The loan rate for 1980/81 is set at \$2.20 and adjusted in subsequent periods by the target price adjustment formula specified in the 1977 Act and projected input costs. Farmer-held reserve (FHR) program parameters reflect these adjusted loan

Table 1. Program Parameters for CURRENT, GAS I, and GAS II Alternatives.

	1978/79	1979/80	1980/81	1981/82	1982/83	1983/84	1984/85
CURRENT and GAS II							
Target Price	2.10	2.20	2.26	2.41	2.47	2.53	2.59
Loan Rate	2.00	2.00	2.07	2.14	2.22	2.29	2.37
FHR Release Price	2.50	2.50	2.59	2.67	2.77	2.86	2.96
FHR Call Price	2.80	2.80	2.90	3.00	3.11	3.21	3.32
CCC Release Price	3.00	3.00	3.10	3.21	3.33	3.43	3.55
GAS I							
Target Price	2.10	2.20	0.0	0.0	0.0	0.0	0.0
Loan Rate	2.00	2.10	2.20	2.35	2.41	2.47	2.53
FHR Release Price	2.50	2.62	2.75	2.94	3.01	3.09	3.16
FHR Call Price	2.80	2.94	3.08	3.29	3.37	3.46	3.54
CCC Release Price	3.00	<u>1/</u>					

1/ Under the GAS I program, the CCC only releases stocks to meet gasohol supply commitments, thus altering currently employed provisions of releasing stocks at 150 percent of the loan rate.

rates. Both target prices and acreage set-aside programs are eliminated for the 1980/81 - 84/85 period. One-half of the supply commitment levels specified above would be utilized in 1980/81 with full supply commitment levels being in effect in remaining years. Specific values for program parameters under GAS I are shown in Table 1.

As is also shown on Table 1, the second gasohol alternative, GAS II, incorporates the assumed program parameter levels for the CURRENT alternative. The increased exogenous demand for corn is incorporated in the model in a similar fashion as that for GAS I.

EMPIRICAL RESULTS

The following discussion emphasizes empirical results for supply commitment levels of 769 and 1538 million bushels for each GAS alternative (corresponding to 2 and 4 billion gallons of alcohol). These levels are representative of, and are referred to in the text as, low and high levels of alcohol production.

Acreage Planted and Production

Corn acreage planted for both GAS I and GAS II are substantially larger in the later years of the period considered, than those indicated under the CURRENT alternative. The difference of 7 to 10 million acres is largely due to the acreage response to higher corn prices relative to soybeans, and the reduction in acreage set asides under both GAS alternatives. With corn yields averaging about 3.5 bushels per acre less under the GAS I levels of production, and 2.2 bushels per acre less under the GAS II levels (1980/81 - 84/85), the differences in production

are less than that indicated by acreage differences. The average difference in production between GAS and CURRENT alternatives is 300 million bushels for low production levels and 330 and 480 for high levels of alcohol production under GAS I and GAS II, respectively.

Figure 1 indicates no substantial differences between corn acreage planted under GAS I and GAS II alternatives, or between alternative levels of supply commitment. Corn acreage planted increases substantially with introduction of the gasohol programs and holds steady between 86 and 89 million acres in later years. Corn acreage for CURRENT decreases due to lower levels of acreage set asides--averaging 80 million acres for 1980/81 - 84/85.

Figure 2 shows that the type of GAS program, and, in the case of GAS II, the alcohol production level has significant but different implications for soybean acres planted. Soybean acres show steady increases through most of the period of analysis under the CURRENT alternative. Low levels of alcohol production under GAS I and GAS II reduce soybean acreage by, at most, two million acres, while at high levels of alcohol production the reduction can be as large as 10 million acres (GAS II). The impacts on soybean acreage are largely explained by factors on both the supply and demand sides. Soybean demand is reduced due to the substitution of distillers dried grain for soybean meal. On the supply side, the relatively higher corn prices under the GAS I alternative induce planting of more corn acreage and less soybean acreage.

LEGEND: — • — CURRENT Program; GASOHOL I (Corn 769) Program;
 — — — — — GASOHOL I (Corn 1538) Program; - - - - - GASOHOL II (Corn
 769) Program; — — — — — GASOHOL II (Corn 1538) Program.

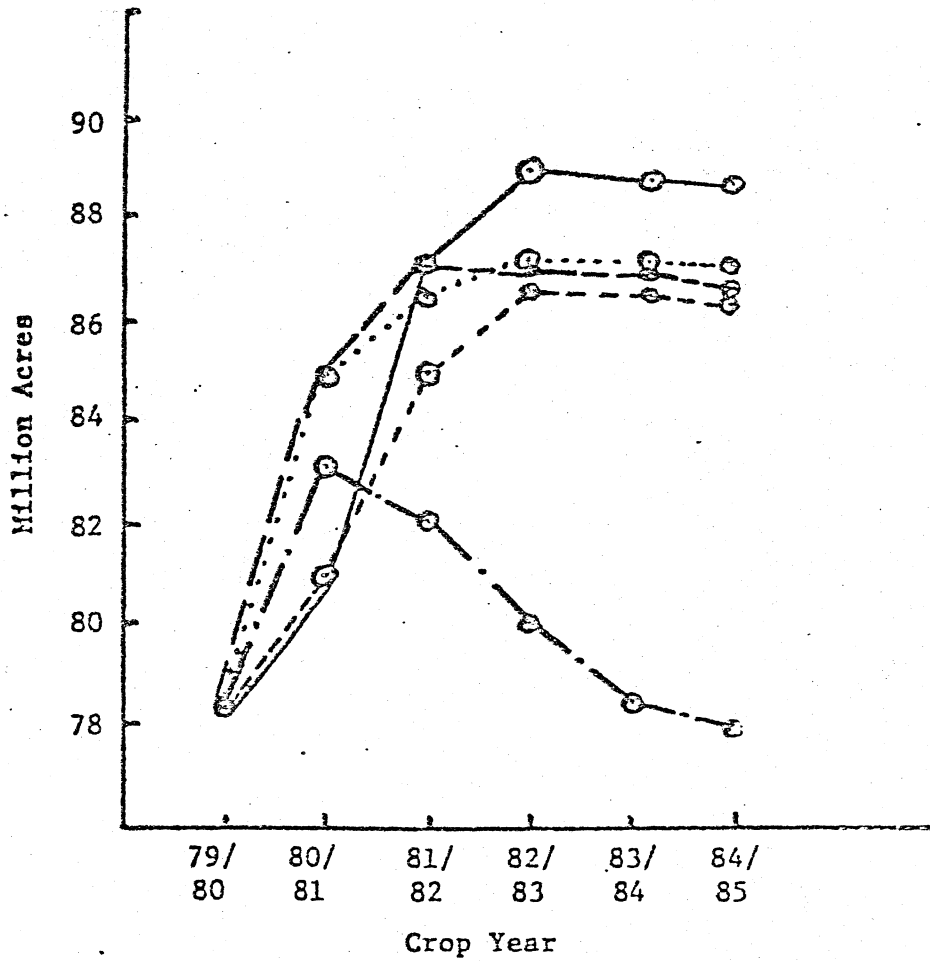


Figure 1. Acres planted of corn.

LEGEND: — • — CURRENT Program; GASOHOL I (Corn 769) Program;
 — — — GASOHOL I (Corn 1538) Program; - - - - GASOHOL II
 (Corn 769) Program; ——— GASOHOL II (Corn 1538) Program.

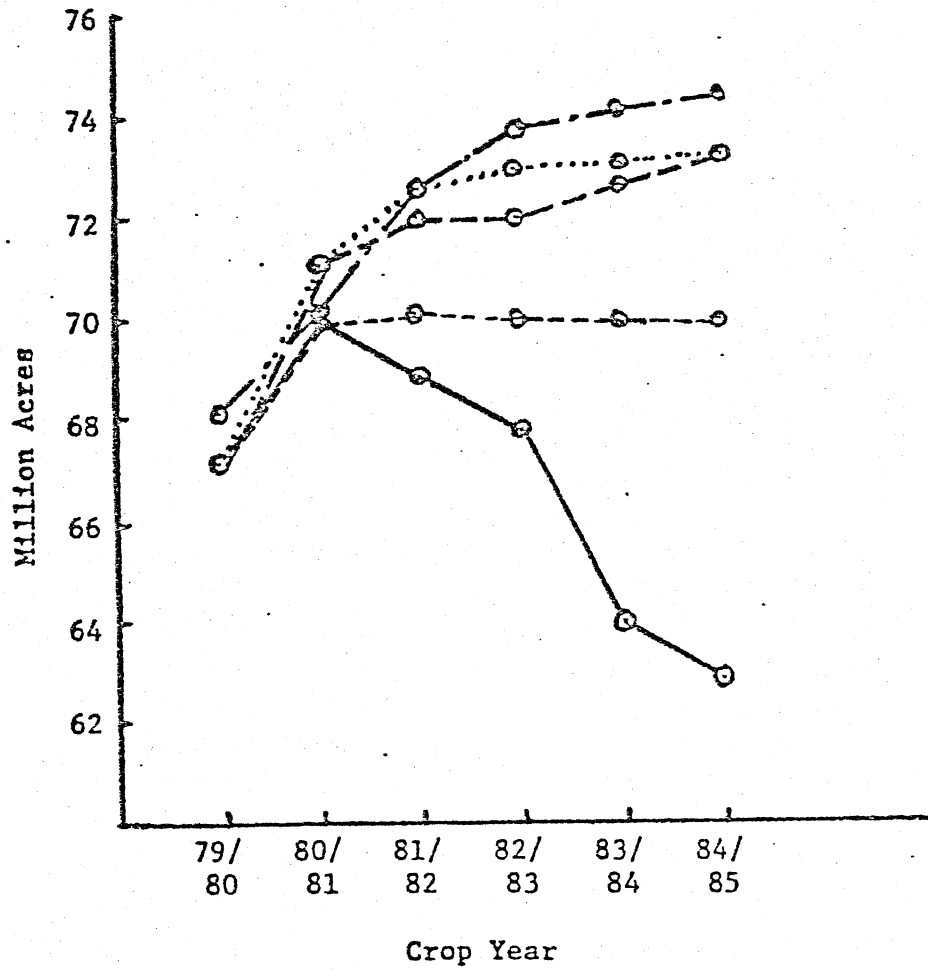


Figure 2. Acres planted of soybeans.