Solutions to problems of oversupply in crop agriculture

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Introduction

First of all, we thank the Australian Society of Agronomy for the invitation to discuss "Solutions to problems of oversupply in crop agriculture". To set the stage for our discussion it is necessary to review some of the assumptions we have made concerning present agricultural policies and the conditions of agriculture. Then we will discuss one example of a form of demand enhancement to demonstrate the impact that an alternative agricultural policy might have for United States agriculture and rural areas.

Current United States agricultural policy relies on market/trade driven supply control concepts that are presumably based on a commitment to a worldwide free market for agricultural commodities and goods. United States policies have become increasingly focused on attempts to control supplies of agricultural commodities through acreage reduction and the enhanced export programme (EEP) (see Table 1). Through EEP we have subsidized exports of commodities (dumped) on world markets to reduce the domestic surplus and gain market share. This practice hurts other economies with significant agricultural exports. Not only is the reality of our agricultural policy contrary to our free-market philosophy, it has also been largely ineffective in meeting the long-term goals for United States agriculture or rural America.

In addition, agricultural policies have become increasingly expensive, detrimental to the economic well-being of agricultural-related industries and subject to an increasing array of economic and environmental criticisms. Presently our farm programmes are costing roughly $25 billion per year (about 50% was used to reduce acreage of all crops that were in surplus) and have resulted in the removal from production of approximately 25% of our production capacity (see Table 1 for corn). This, in turn, negatively impacts input supply industries and rural areas where many of these industries are located.

Admittedly reliance on conventional market trade supply policies are very appealing from an idealogical perspective. However, the policies have not worked historically because of: (1) the tendency of many nations to intervene, (2) the tendency of farmers to idle marginal lands first and to crop their better lands more intensively and (3) the bioligical nature of crop production and yearly climatological variations, which makes agriculture inherently more unstable than other sectors of our economy.

Agriculture is also among the most technology-intensive industries in the world. Supplies have increased substantially because of the use of technologies whose introduction is largely unregulated by government policy and, in fact, is subsidized by the government (e.g. support of agricultural research and extension). Most agricultural scientists would not criticize the use of such technology, recognizing that it generally provides a competitive advantage to early adopters, but projecting the impacts of the introduction and use of technology on supplies is difficult. Thus, technology further increases the difficulties entailed in estimating world supplies of commodities, which is a central part of our present agricultural policies.

We conclude that United States agricultural policies of controlling supplies have been ineffective and produced effects that are contrary to intentions. Many factors have led to this conclusion, but among the most important may be:

- agricultural production is affected by variable and unpredictable patterns of weather that make control and prediction of supplies impossible;
- many other nation's agricultural policies are not market oriented and thus respond to forces in addition to the market; and
- agriculture is among the most technology-intensive industries and the diffusion of that technology has become increasingly international in scope and continues to increase production.

If we further conclude that most nations of the world will not quickly adopt our proposed free-trade policy, that weather will remain unpredictable, that technological impacts are likely to become more frequent (and may, in fact, increase substantially with the use of biotechnological products), and that existing farm policy is likely to come under an increasing number of economic and environmental criticisms, it appears that a search for alternatives to the present United States policy is timely.

United States agriculture now

Present United States agricultural policy enables us to produce crops for internal use, for export and for storage. An undetermined amount of crop commodities in storage is desired to even out production between poor and good weather years. To further reduce production, we have taken acreage out of production. At the present time, approximately 25% of United States crop production acreage is idled because it is not needed internally and there is not sufficient demand for additional exports.

United States agriculture is hobbling along at the present time because we have excess capacity (or too few want to buy what we have to sell), and because we have not decided how to develop a long-term policy that is economical and will satisfy the numerous, and often conflicting demands of producer, commodity, consumer, environmental and other groups involved in formulating agricultural policy in the United States. We are joined in this dilemma by most nations exporting agricultural commodities. Conditions of excess crop production capacity are expected to continue here and elsewhere for the foreseeable future. Consequently, we need to examine if producers of agricultural commodities, where production is subject to the vagaries of the weather as well as the United States economy, would benefit under some alternative policy.

It is obvious that the United States lacks a clear policy on what we expect our agriculture to do for us. The lack of a clear policy, to help focus where we want United States agriculture to be five or 10 years hence, could lead to increasingly more expensive and more chaotic conditions for individual operators than is necessary or desired, particularly when the operating units are dispersed, small or highly leveraged and production is dependent on the weather. It could also lead to higher than necessary costs for the United States Treasury as well as lost opportunities for many people. Present United States agricultural policy assumes that crop commodity producers can compete on the export market with producers living in countries with policies having different objectives than those in the United States.

As the 21st century approaches, we recognize that the fundamentals on which economic and science policy for agriculture, natural resources and rural development rest are changing. Biotechnology and computers have increased world-wide scientific and economic integration; we have a heightened awareness of food safety and we are all concerned about the environment. Congress is increasingly concerned about the viability of rural communities and all of these concerns impact on the kind of agriculture and the kind of agricultural policy we must have to attain our goals.

Agricultural policy and our future

Obviously, today's agricultural problems are tomorrow's challenge so let us discuss our future. The diffuse producing units of United States agriculture would seem to benefit from a long-term (10 or more years) United States agricultural policy that individual owners and operators could rely on in making decisions for their farming unit. Would policies that expand internal demand to help use excess agricultural production

lead to a more stable long-term policy? This and other policy alternatives need to be compared to the supply control and export policies that are the backbone of our present policy. Any alternative policy needs to position United States agriculture to be internationally competitive in the years ahead but agricultural policy must also support an agriculture that is enabled by science and in harmony with environmental and human values.

If we examine present agricultural policies of countries around the world, some similarities can be identified. Every country wants enough agricultural production to properly feed and clothe their people. They also want to produce as much of their own crop and livestock as they can, even if it costs more than importing the same commodities. Such a policy is desired because it reduces foreign currency needs, provides employment and allows individual countries to be more self-reliant.

Agricultural policy in virtually all countries is conditioned by weather uncertainty. Since crop production is dependent on the weather, we must necessarily have enough production in storage from good weather years to see us through in poor weather years if we are to feed and clothe people adequately. We must also recognize that if we design our agricultural policies so supplies are ample in average or below average weather years (we would rather have too much than not enough), we will have excess production in good or in normal weather years. Excess production occurs and leads to a need to expand exports and/or impose acreage controls to support price. This plus increased yields per acre have led to over-production and our pre-occupation with free trade and competition to gain export market share.

Under present policies we have opted to heavily subsidize exports by paying the difference between target and market price for crop commodities in order to reduce stocks in storage rather than to expand demand. For corn, for example, the target price is $2.93 and the market price was about $1.69 for a difference of $1.24 per bushel which is the subsidy we paid to export corn in 1987. We are also curtailing production by various acreage set-a-side programmes (see Table 1 for corn and Table la for wheat. Only corn (maize) will be discussed in the remainder of this paper).

If we are objective, we must admit that there is not enough traditional demand for what we and other crop commodity exporters can produce. Also our export subsidy drives down the world price for the commodity being exported. These policies lead other nations to accuse the rich United States of forcing (dumping) grain into the export market at the expense of poorer nations that desperately need to sell their excess grain to obtain precious foreign exchange. Some would say this is a curious way for the United States to spend its money, particularly when through USAID programmes we have been most generous in helping less-developed countries to become self-sufficient. Also, we agriculturalists need to assume that export dumping can not be forever justified to Congress. Can we devise a better alternative?

Present United States agricultural policy uses crop production to supply normal channels of commerce in the United States and to supply exports.

We have also developed elaborate facilities to store excess production for use in poor weather years. For example, ending stocks of corn for 1986/87 were 4.88 billion bushels. From 1983/84 to 1987/88 ending stocks of corn varied from 1.01 to 4.88 billion bushels (Table 1). Since we have considerably more crop commodities in storage than needed, acreage control policies have been developed to help curtail excess crop production. At the present time many policy makers would say that we need to curtail production even more through increased acreage set-a-sides. If the present drought continues that idea will perish too.

Set-a-side acreages are often made politically palatable by inferring that we are saving our precious topsoil for future generations. Some of us do not believe that this is necessarily so, but we strongly advocate that agricultural production must be sustainable and in harmony with environmental and human values. All things being equal it seems logical to us that it would be better to pay farmers to produce a renewable resource by growing a crop that has some use, even if uneconomic, than to pay the same amount and more to idle land and produce nothing of value.

What about the future? One potential alternative policy for future consideration if the deveopment of a "sink" for excess crop production as a substitute for subsidized exports as the way to dispose of excess grain. The sink would convert excess agricultural production to products useful to the United States. Under such a scenario, the United States would produce food and fibre for normal United States channels of commerce, for unsubsidized exports and for "reasonable" storage. Production beyond these needs would be used by the proposed sink.

To be seriously considered the cost of operating such a sink must be no more expensive, and hopefully less than present costs of our export subsidy ($1.24 per bushe1 of corn exported). The only sink large enough to absorb excess United States crop production capacity is the ethanol and/or chemical feed stocks industry. It seems inherently reasonable to us that the sink concept for crop commodities is superior (less costly and less disruptive) to our present policy of highly subsidized exports. It would also start us on a path of supplying part of our energy needs from renewable instead of fossil sources as well as helping us diminish the impact of the next energy crisis.

Any excess crop production capacity as well as the variation in crop production caused by yearly weather fluctuations would be absorbed by the sink. It is reasonable to assume that yearly ethanol production could be stabilized somewhat by grain flow in or out of storage. Such use of our elaborate storage system should permit stable and more nearly optimum use of capital intensive ethanol production facilities. Also it is less expensive to adjust production capacity of ethanol plants that it is to adjust capacity of capital intensive crop production units such as we are doing with acreage set-a-side programmes. We fee1 we can argue successfully that the United States should develop an agricultural policy that relies on renewable resources to the extent that it is economically, environmentally, and agronomically feasible to do so.

A possible scenario

Obviously any proposed agricultural policy must be economically competitive with present policy to be seriously considered. It needs to be fully studied and debated whether or not excess supply use and demand enhancement policies, such as using crop commodities for chemical feedstocks, is a viable alternative. The adoption of such a policy would more than likely lead to more economic conversion processes of crop commodities or to higher value end-product uses over time. Further comprehensive studies are needed and must include all aspects of the economy that are impacted by agricultural policy including rural development.

Let us examine if excess supply use and demand enhancement using corn is cost competitive with present policies. For example, if the 1.7 billion bushes of corn (Table 1) that we presently export with a subsidy of $1.24 per bushe1 ($2.93 target price less $1.69 market price; does not include Public Law 480 export costs) were converted to ethanol it would produce 4.25 billion gallons of ethanol at the conversion rate of 2.5 to 2.6 gallons of ethanol per bushe1 of corn. The present United States subsidy on ethanol if $0.60 per gallon, so the cost of converting 1.7 billion bushels of corn to ethanol is $2.55 billion to produce 4.25 billion gallons of ethanol. The ethanol produced has a gasoline value of $1.7 billion for a net cost of $0.85 billion. If used as an octane enhancer, the ethanol would have additional value. With these figures the ethanol demand enhancement programme costs $1.26 billion less than what we are spending for enhanced exports (1.7 billion bushels x $1.24 per bushe1 subsidy = $2.11 billion total export subsidy). Choosing this policy will not stop exports but it is better than dumping our excess crop production on world markets at the expense of poorer Third World Countries (see Figures 1 and 2 for relationships).

There is debate among us whether or not the cost of converting corn to ethanol is only $0.60 per gallon. Various States subsidize ethanol production and much of the ethanol produced may be sold in those States. Consequently ethanol conversion costs could be higher. At least one documented study suggests that ethanol production is profitable with $3 per bushe1 corn when the subsidy for ethanol is $0.85 per gallon. If such costs are more correct, (we believe an $0.85 per gallon subsidy is high), the $2.55 billion cost for converting 1.7 billion bushels of corn to 4.25 billion gallons of ethanol in our example would be $3.6 billion. With an ethanol gasoline credit of $1.7 billion, the net subsidy cost is $1.9 billion - still $0.2 billion less than the $2.1 billion being paid under the present policy to subsidize the export of corn.

Future Considerations

Annual United States gasoline consumption is approximately 100 billion gallons so there is the potential to use up to 10 billion gallons of ethanol if blended to make gasohol that is 90% gasoline and 10% ethanol. We could not supply this amount of corn to the chemical feedstocks industry, as well as supply domestic needs and unsubsidized exports under current technology in a sustainable and environmentally acceptable way with current production practices, even if acreage controls are lifted. However, some conservation reserve or other set-aside acres could be used to increase corn production. Also, corn production could be increased by shifting production from other crops to corn. Shifts between corn and other crops would depend on relative prices between commodities and the net profit expected from producing the crop. Also, present ethanol production capacity is approximately 800 million gallons per year (see Figure 1) and would need time to install additional production capacity.

In Figure 3, we have developed a demand enhancement example by increasing corn production by one billion bushels and decreasing set-aside by 10 million acres. We have not developed cost comparisons but the relationships are given by extrapolation from those discussed under a possible scenario section and represented in Figure 2. In Figure 2, exports are reduced to 0.7 billion bushels and ethanol use is increased by 1.0 billion bushels over that in Figure 1. It is not the purpose of this paper to discuss shifts in acreage between crops, to fine tune any particular example, or to discuss all sector impacts such policy changes would create. It is clear to us that we do have alternative agricultural policy possibilities that should be evaluated.

Obviously the cost of operating an ethanol programme will vary depending on the price of corn. Policy can determine price at least to a degree. *We* concentrated only on converting corn that is exported to ethanol because we could identify the $1.24 per bushe1 subsidy and make relatively concise comparisons. Obviously, some exports will take place irrespective of the price of corn, hence our Figure 2 example. It is our contention that an ethanol sink for using excess crop production does not need to increase food costs per se, to substantially interfere with internal use and exports of corn, or to replace present market and target price policies.

Figure 1 Present relationships

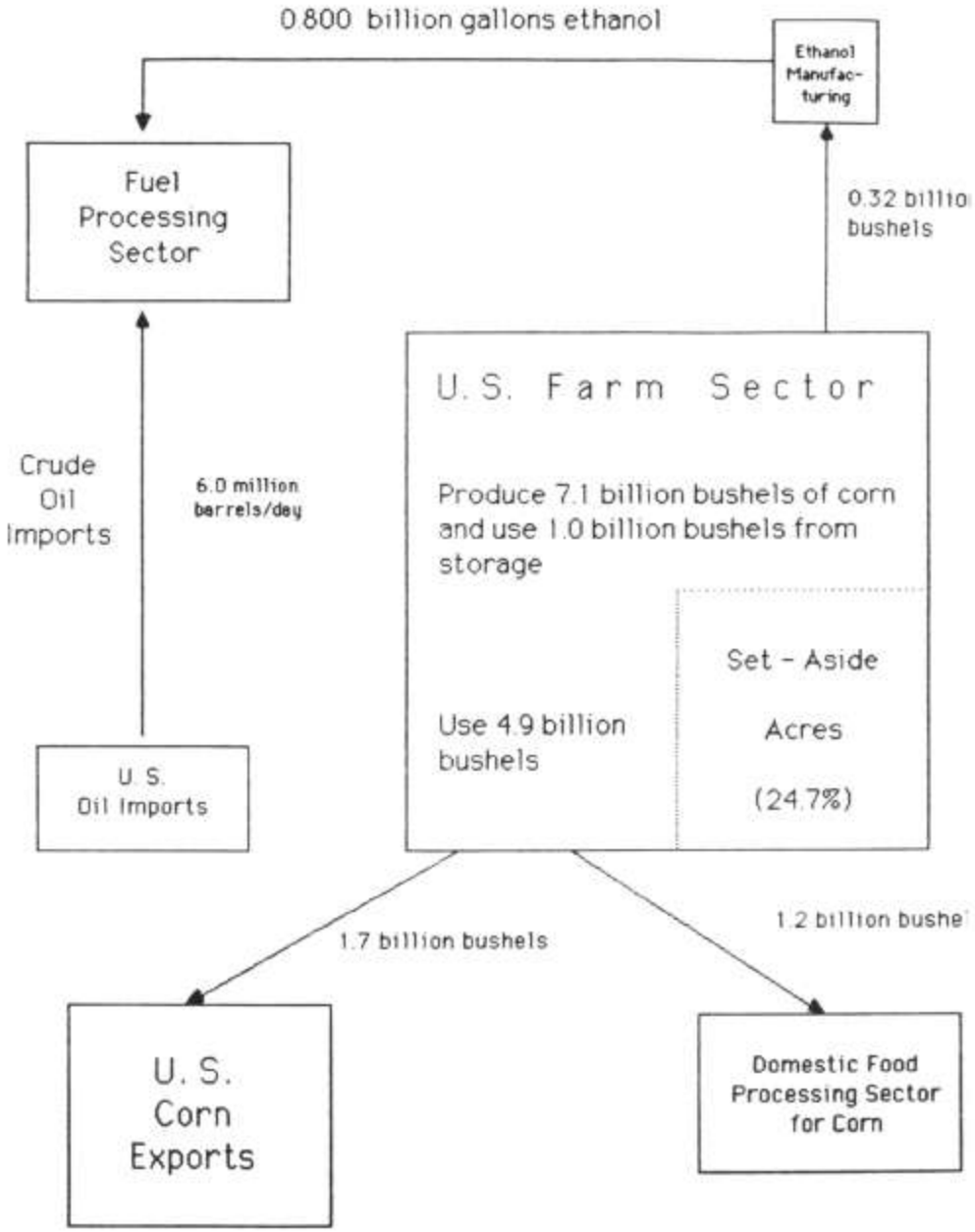


Figure 2 Possible relationships using a "sink" rather than exports to dispose of excess supply (example only)

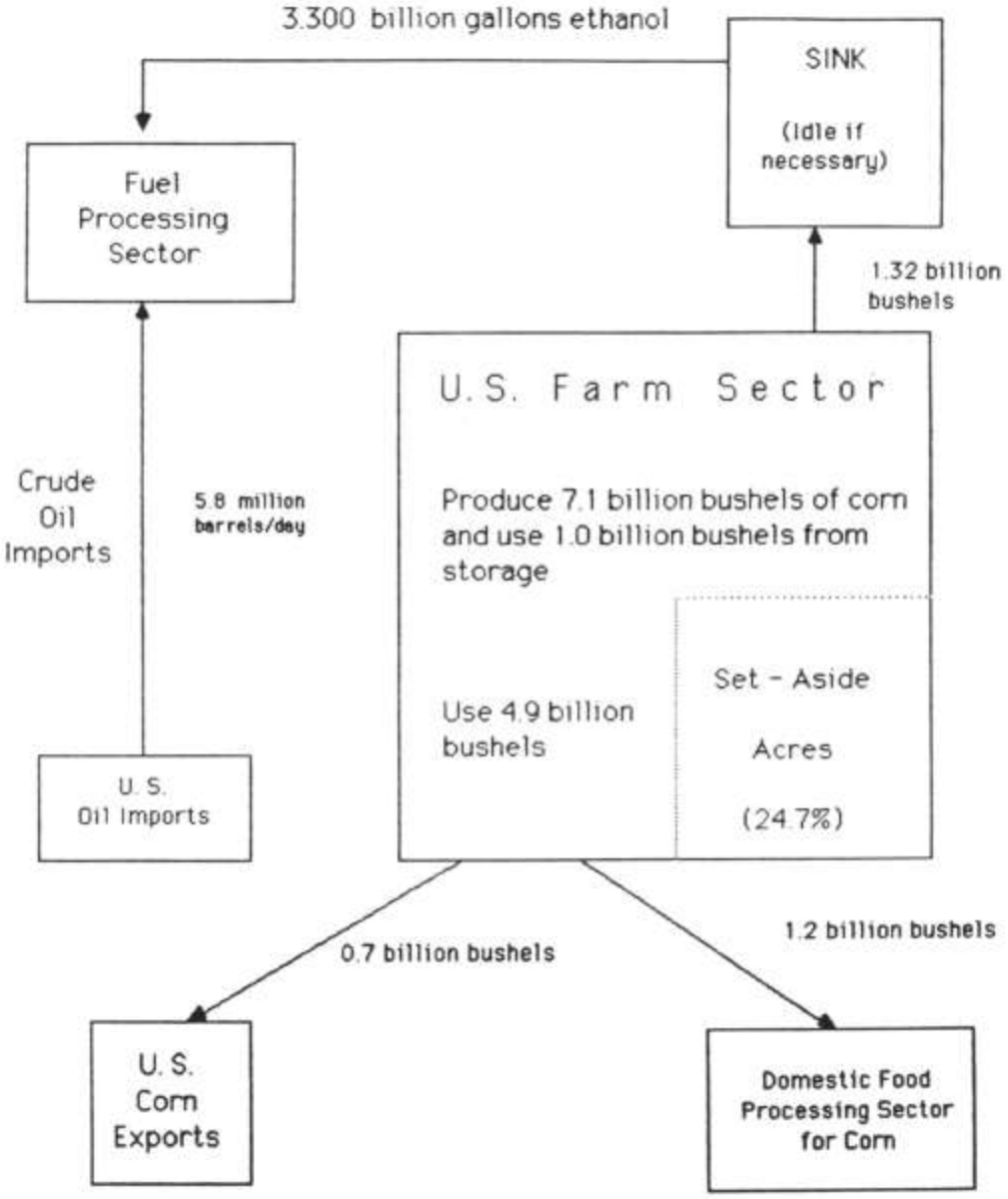
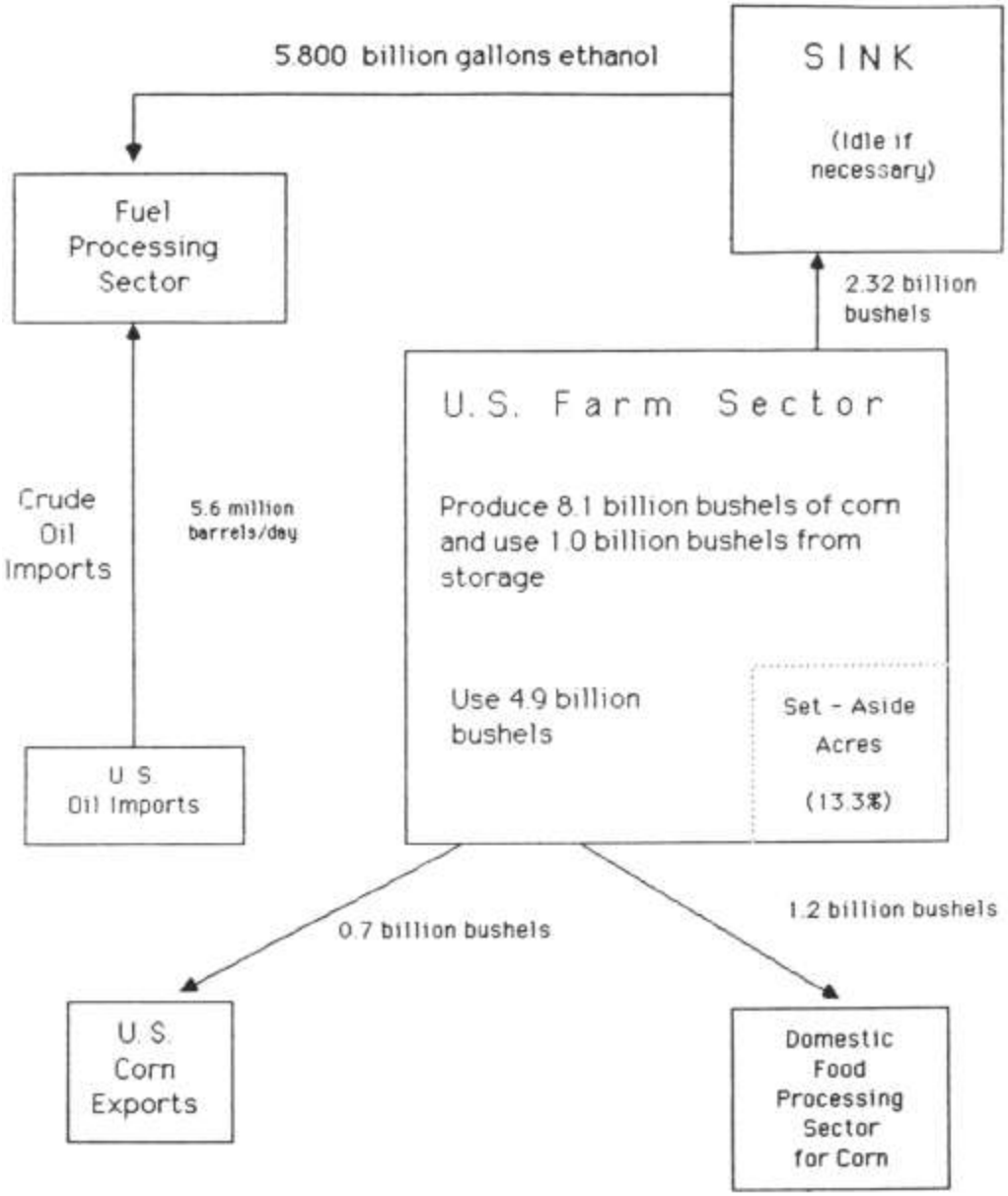


Figure 3. Future relationships with a demand enhancement instead of a set-aside policy and then using a "sink' to dispose of excess supply (example only).



Such an ethanol sink does present an alternative that needs thorough evaluation. The possibility exists that costs to the United States government could decrease substantially depending upon how the costs are partitioned between the government, farmers and consumers. Regional adjustments may vary but policies could reduce or minimize negative sector impacts. Successive, or should we say progressive, changes over a period of years could seemingly enable United States agriculture to operate with reduced acreage restrictions and with substantial economic benefit.

Another positive aspect of such a policy is that 4.25 billion gallons of ethanol would save between 245,000 and 255,000 barrels of oil imports per day, thereby helping our balance of payments. Ethanol produced from corn would impact positively on the problem of the build-up of carbon dioxide. It would also help control air pollution in some of our major cities. For example, Denver mandates the sale of gasahol within the city during parts of the year to improve air quality. Clearly, the potential to use considerably more ethanol is available if cost, policy and other factors impacting on production are positive.

If we really got serious about adopting demand enhancement as a major part of United States agricultural policy it should impact positively on rural development which is a major concern of the present Congress. It is likely to have positive impact on other countries world-wide and we would not be accused of dumping. Other major commodity exporters could be encouraged to develop sinks for their portion of excess crop production as well. Cost, commodity displacement, and sector impacts, etc. need careful study. Ethanol production may not be the most economical use of corn if reliable supplies were available for use in the chemical feedstocks industry. More economic industrial uses of corn products than ethanol will only come with stable supplies and a research development programme.

The development of a demand enhancement policy is also likely to have secondary and tertiary impacts that are predominantly positive. Although the development of ethanol would likely lead to some displacement of workers from the crude oil refining and export sectors, and may require subsidization of the ethanol industry, we anticipate that analyses of impacts of this policy will show positive impacts on the economic, demographic, public service, fiscal and social dimensions of agriculturally dependent rural areas in the United States.

Whereas present policies have resulted in the loss of more than 4.0 million farms and more than 25 million persons from the rural farm population since 1930, we believe that the proposed policy (or similar policies) would reduce the rate of farm and population decline. The economic activity and employment associated with increased agricultural production would stabilize agricultural input industries and other businesses in rural areas and likely positively impact income stability in producer households. Such conditions would, in turn, likely lead to the retention of more producers' and secondary workers' households in rural communities.

These increased service populations, together with increased economic activity and associated income, would also likely positively affect rural services and the tax bases of rural areas, that are presently feeling the impact of reductions in the value of farm lands and other natural resources. Although the exact nature of such secondary and tertiary impacts require much more extensive analysis, we believe that assessments of agricultural policy must include evaluations of their impacts on socio-economic conditions in rural areas and that demand enhancement policies are likely to have positive impacts on such conditions.

The adoption of agronomic and biotechnologic crop production technology will be slowed under present supply control policies compared with what they would be under demand enhancement policies. For example, college students enrolled in agronomic as well as in many other agricultural disciplines have decreased as a result of the slump in United States agriculture and the commensurate decrease in suitable employment opportunities. The rate of technology development and adoption will be negatively impacted by the reduced talent base employed in agricultural positions. United States and world agricultural policy makers need to be aware that technology development and adoption in the future will be negatively impacted by these trends.

Summary and conclusion

In this paper, an agricultural policy that develops a sink for excess crop production and that may offer an attractive alternative to present policy has been described. Such a demand enhancement policy would attract more talent to agricultural occupations and should speed technology development and adoption.

A well thought-out United States agricultural policy should also take into account rural development. Other countries, particularly in Europe, use agricultural policy as an instrument for rural development. Stability in United States agricultural policy would be very positive for agriculture world-wide and would enhance the adoption of technology. In addition, it would help develop a United States agricultural industry that is enabled by science and in harmony with environmental and human values.

The policy alternative proposed clearly requires additional analysis. As proposed, however, we believe it may provide a number of advantages for the nation. It would allow our crop production capacity to be usefully employed. It would provide a sink that is sufficiently flexible to respond to variations in weather,

technology and other factors affecting supplies. It would help reduce our dependence on foreign energy imports and assist in addressing the deficit. It would retain people in agriculturally dependent rural areas and thus assist in retaining a better quality of life in rural America. Although, no one policy alteration is sufficient to address all of the nation's policy needs related to agricultural production, the need to seriously consider alternatives is evident. We believe the alternative proposed here and others should be considered as we seek to establish an agricultural policy that is good for American agriculture, good for rural America, and good for the environmental and fiscal stability of the United States.

Table 1. Supply and use of corn (from agricultural outlook)

Table la. Supply and utilization and target price of wheat (from agricultural outlook)*

* Source: Agricultural outlook, ERS USDA, May 1989, p. 49 and 52.

	set aside	Acres planted	harvested	Yield	Production	Total supply	Feed and residual	Other domestic use	Exports	Total use	Ending stocks	Farm price
		Mil. acreas		Bu/acre				Mil. bu				$/bu
Corn												
1982/83	2.1	81.9	72.7	113.2	8,235	10,772	4,521	894	1,834	7,249	3,523	2.55
1983/84	32.2	60.2	51.5	81.1	4,175	7,700	3,818	975	1,901	6,694	1,006	3.21
1984/85	3.9	80.5	71.9	106.7	7,674	8,684	4,079	1,091	1,865	7,036	1,648	2.63
1985/86	5.4	83.4	75.2	118.0	8,877	10,536	4,095	1,160	1,241	6,496	4,040	2.23
1986/87	13.6	76.7	69.2	119.3	8,253	12,294	3,717	1,191	1,504	7,412	4,882	1.50
1987/88	21.6	65.7	59.2	119.4	7,064	11,948	4,900	1,225	1,700	7,825	4,123	1.65-1.85

	set aside	Acres planted	harvested	Yield	Production	Total supply	Feed and residual	Other domestic use	Exports	Total use	Ending stocks	Farm price	Target price
		Mil. acreas		Bu/acre				Mil. bu				$/bu	
Wheat													
1982/83	5.0	86.2	77.9	35.5	2,765	3,932	195	713	1,509	2,417	1,515	3.45	4.05
1983/84	30.0	76.4	61.4	39.4	2,420	3,939	369	742	1,429	2,540	1,399	3.51	4.30
1984/85	18.3	79.2	66.9	38.8	2,595	4,003	405	749	1,424	2,578	1,425	3.39	4.38
1985/86	18.8	75.6	64.7	37.5	2,425	3,866	279	767	915	1,961	1,905	3.08	4.38
1986/87	20.2	72.1	60.7	34.4	2,092	4,018	413	780	1,004	2,197	1,821	2.42	4.38
1987/88	27.9	65.8	56.0	37.7	2,107	3,945	288	804	1,592	2,684	1,261	2.57	4.38
1988/89	30.1	65.5	53.2	34.1	1,811	3,094	210	835	1,500	2,545	549	3.72	4.23