AN EVALUATION OF THE 1981 FARM PROGRAM FOR CROPS: IMPLICATIONS FOR THE 1985 FARM BILL

Abner W. Womack, Stanley R. Johnson, William H. Meyers, and Robert Young, II

The cornerstone of the 1977 and 1981 Farm Bills for crops is a buffer stock-supply management program involving the farmer-owned reserve and acreage adjustment instruments. Among the several reasons normally cited for adopting this type program is price and income stability. However, recent swings in commodity prices, net farm income and government program costs have stimulated widespread interest in farm program redesign and modification in 1985. Before joining this chorus, it may be worthwhile to reexamine the operation of this supply management program to discern the feasibility of this type of design in the current economic-political environment. In order to accomplish this objective, an econometric model of the U.S. crops - livestock sector was utilized. Four program designs were simulated over the crop years 1970 through 1979, which included periods of scarcity and surplus. These options employ the supply management program with four alternative management strategies, some relying more heavily on acreage reduction and others on the reserve program. Conclusions drawn from these program simulations serve as a focal point for evaluating the 1982-83 Reduced Acreage Program and the Payment-In-Kind Program in 1983-84.

In general these results indicate that the supply management program can be balanced or imbalanced depending upon the set of management rules that are followed. By implication, consistent adherence to the management rules over time is desirable unless there is evidence of imbalance. A conclusion of this paper is that the significant players in the political process of management and operation (Administration, Congress, and Budget) did not reach compromises on program design in 1982-83 and 1983-84 that conform to a balanced set of rules. As a result, the industry has been subjected to impacts that should not occur under the efficient operation of a supply management strategy.

GRAIN MANAGEMENT PROGRAMS

As indicated by Burnstein in reviewing the 1977 Farm Bill, major reasons for implementing the reserve program were to (1) moderate market instability, (2) maintain reasonable price levels for producers and consumers, and (3) provide reliable supplies for domestic and foreign markets. It was implicitly assumed that the managed buffer stocks would be more effective in producing these results than the free market, or that the free market would be less efficient in assuring reserve levels necessary to produce these results.

Implicit in these criteria is the notion of the value of price stabilization, since the buffer stock system addresses price stabilization as opposed to price support. It is often argued that price stability for agricultural producers leads to greater efficiency (Hallett, Houck). Also, reserves in lean years reduce the danger of food shortage. This, in turn, reduces sharp price changes for grain inputs to the livestock and food grain sectors, resulting in less erratic price changes at the retail market. Thus, stabilization has a dual focus, price protection for the producer and the consumer. Major questions for a managed reserve program are the price band to be used in its operation and the level of stocks required to assure that prices within the range can be maintained at minimum government cost.

The 1977 Farm Program for Wheat and Feedgrains

The 1977 Farm Bill adopted by the Congress combined a modified buffer stock program (farmer owned reserve) with an acreage adjustment program. While price corridors and

Abner W. Womack is an Associate Professor, Department of Agricultural Economics, University of Missouri; Stanley R. Johnson is a Professor of Economics and Agricultural Economics, University of Missouri; William H. Meyers is an Associate Professor of Economics, Iowa State University; and Robert Young, II is a Research Associate, Department of Agricultural Economics, University of Missouri.

Invited paper presented at the annual meeting of the Southern Agricultural Economics Association, Nashville, Tennessee, February 5-8, 1984. Invited papers are routinely published in the July *SJAE* without editorial council review but with review of the copy editor (as per Executive Committee action June 25, 1982).

Research support for this study was provided by the National Oceanic and Atmospheric Administration, Department of Commerce, Washington, D.C., the National Farm Bureau Federation, Chicago, IL., and the Agricultural Experiment Station at the University of Missouri.

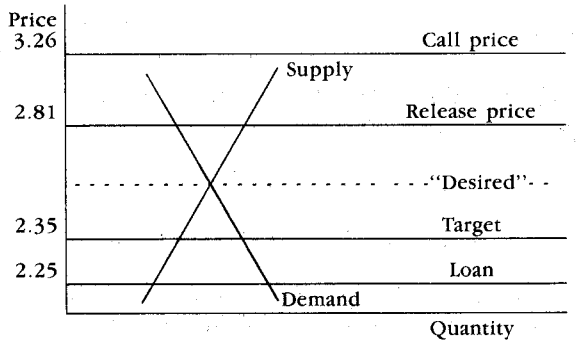

Figure 1. Corn: Program variables associated with the 1977 farm bill, 1980-81.

reserve objectives were set, significant modifications to the simple concept of a buffer stock system should be noted. Instead of a single price band, this program contained several trigger prices, as depicted in Figure 1. Specific program rules controlling these prices can be best understood by dividing into inter- and intra-year sets.

Intra-Year Rules (Reserve)

The program was designed to operate so that the expected price in a "good crop" year would remain between the loan and release price a high percentage of the time. In short crop years, the price would remain between the release and the call price a high percentage of the time. In years with large crops, the price would be maintained between the loan and the desired price. To maintain this price corridor, a set of within or intra-year incentives were utilized to manipulate the reserve level. If, for example, supply was strong relative to demand, implying an equilibrium price below the loan, reserve placements were induced to a level sufficient to at least support the loan price. The reserves scheme involved farmers holding grain rather than direct government purchases. Farmers who had participated in government programs (in set-aside years) or complied with normal crop acreage (in no-set-aside years) had an option to place either feedgrain or wheat into the reserve. There was no such option for soybeans, cotton, and rice.

To reduce price in periods of tight supply, strong demand or both, economic incentives for holding reserve grains are relaxed at two specific price levels. First, when the market price exceeded the release price, storage payments were discontinued and farmers could market the grain without penalty. If, however, the market price exceeded the call price, then stronger measures were taken to reduce reserves, loans had to be repaid within 90 days.

Inter-Year Rules (Acreage Adjustment)

A second facet of the program was the inter-year rules available to maintain the price corridor. In simplest terms, this is a land management program. Future supply and demand, including stock level objectives, are assessed relative to the desired price in the center of the corridor. Acreage forecast with expected yield generates an expected supply without a set-aside. If this exercise indicates strong supplies relative to demand—price for the next year at the bottom of the corridor—then a set-aside program is instituted. An assessment of this type resulted in a set-aside for feedgrains and wheat in 1978-79, 1979-80, 1982-83, 1983-84 and 1984-85 crop years.

Alternatively, if projected demand is strong relative to supply implying market prices in the next year above some predetermined price range with anticipated stock below program level objectives, a set-aside is not instituted. This set of circumstances led to a no-set-aside decision for feedgrain and wheat in the 1980-81 and 1981-82 crop years.

It should be noted that a very crucial facet of this program strategy is the necessity for forward supply and utilization estimates conditioned on a forward price objective.

The 1981 Farm Program for Feedgrains and Wheat

The 1981 farm program for feedgrains and wheat was a modification of the 1977 program. A significant feature of the 1981 Farm Bill as proposed by the administration was centered around reserve operation and elimination of target prices. The ensuing legislation resulted in a mandatory sequence of target prices with higher maximums for farmer-owned reserves, which was mandatory for feedgrains and wheat. Also, the bill gave discretionary authority to the Secretary for setting release prices. Specifically, the release-call price mechanism was replaced by a single release price with discretionary authority on setting the release. Farmers were not required to repay loans at the release, however the Secretary was given authority to raise interest rates and discontinue storage payments. Finally, new maximums were set on grain flowing into the reserve. Maximums, if set by the Secretary, could not be less than 700 million bushels of wheat and 1 billion bushels of feedgrain.

Formulas for loan rates were modified with new specified minimums and authority to increase and decrease below minimums under certain conditions. Discretionary authority was

not given for target prices. Rather, a prescribed sequence of target prices were mandated for the duration of the program. Rates of increase in these prices have exceeded the rate of increase in production cost, resulting in an imbalanced situation relative to government exposure in financing the program.

The set-aside and paid diversion program options were maintained in the 1981 Farm Bill. A new voluntary acreage control program was added—"Acreage Reduction." Under this strategy, acreage limitation was based on a portion of base acreage, which provides a tighter requirement in acreage reduction for program compliance compared with the set-aside provision. This strategy has been used in the 1982-83 and 1983-84 crop years with no requirement for cross-compliance. That is, each commodity is viewed independently of any other commodity in regard to eligibility and provisions for program participation.

INTERACTIVE MODEL FOR EVALUATING THE OPERATION AND MANAGEMENT OF THE BUFFER STOCK PROGRAM

The quantitative model used for evaluating alternative management strategies for the buffer stock program has several components (Baumes and Meyers, Yanagida and Conway). First, the markets have been modeled to permit interaction across commodities, with linkage to export markets and the livestock industry, and supply response-acreage equations that react to market prices, farm program variables, and input costs. Also, these components have been specified to reflect government program variables and corresponding operating rules. The behavioral characteristics of the model are represented by the structural price elasticities in Table 1.

The procedure for developing the interactive model in a policy mode involved the following steps.

(1) Derive the reduced-form price equations from the cross-commodity structural model to simplify the analytical model while maintaining the cross-commodity linkages. The other components of the model are the acreage response, inventory functions and the policy decision rules.

(2) A dynamic simulation of the model was validated over the historical period, taking actual set-aside and reserve policies as given.

(3) Two sets of policy decision rules were introduced in conjunction with price corridor objectives. The first set was for within year decisions. If, for example, market price fell below the corridor, then reserve stocks were accumulated to the level where market price equaled the lower limit price. Alternatively, if market price exceeded the upper limit price, then reserve stocks are placed back on the market until the market price equaled the upper limit price or until reserve stocks were exhausted. This rule was designed to maintain prices within the corridor whenever possible, i.e., if sufficient stocks were on hand to protect the upper limit price. These rules were used rather than using the set of instruments actually employed in the farmer-owned reserve. Thus the results apply either to a government owned reserve where purchases and sales occur or to the current program where government can set provisions to achieve reserve objectives.

The second set of policy rules involved inter-year rules based on estimated future expected price. If this estimated price was below a specified acreage trigger level, then a set-aside was adopted for the following year sufficient to raise expected price to the acreage trigger. Otherwise a no-set-aside policy was adopted. Again, the results using these simplified rules apply to mandatory controls or voluntary programs where government can

TABLE 1. ANNUAL ECONOMETRIC MODEL PRICE ELASTICITIES OF DEMAND FOR CROPS BY COMPONENT, AGGREGATE DEMAND ELASTICITY WITH 1978 WEIGHTS, AND ACREAGE RESPONSE ELASTICITY[a]

	Demand components (pct. of total demand)								Total	Demand	Acreage
Commodity	Feed	(%)	Food	(%)	Export	(%)	Stocks	(%)	elasticity	(level)	response elasticity
Corn	−.32	(51)	−.10	(7)	−.19	(27)	− 1.50	(15)	−.45	(8,187)[b]	.11
Sorghum	−.61	(58)	—[c]	(0)	− 2.10	(22)	−.62	(20)	−.94	(939)[b]	.25
Barley	−.67	(33)	−.03	(27)	—[b]	(4)	−.54	(36)	−.42	(629)[b]	.37
Oats	−.75	(58)	−.13	(9)	—[b]	(1)	−.67	(32)	−.66	(913)[b]	.26
Wheat	−2.60	(6)	−.03	(23)	−.35	(40)	−.66	(31)	−.51	(2,977)[b]	.42
Soymeal	−.21	(72)	—[c]	(0)	−.60	(27)	—[b]	(1)	−.31	(24,468)[d]	—[c]
Soybeans	—[c]	(3)	− 1.26[e]	(51)	− 1.99	(38)	− 2.29	(8)	− 1.58	(2,004)[b]	.62

[a] Elasticities from annual econometric crops model, computed at means (Baumes and Meyers).

[b] Bushels

[c] No equation in model.

[d] 1000 short tons.

[e] Crush.

set provisions to achieve acreage objectives.

(4) To compare alternative policies under differing market conditions, each reserve policy alternative was simulated over two historical periods, 1971-72 - 1977-78 and 1974-75 - 1980-81. The first period began and ended with relatively low prices and weak markets but had a strong market period in between. The second period began and ended with relatively high prices and strong markets but had a weak market period in between. Each simulation generated a scenario for: (1) acreage diversion, (2) reserve activity, (3) production, (4) stocks, (5) price, (6) government costs, and (7) farmer-owned reserves.

Model Simulation and Summary Statistics

The policy-price simulation model was conditioned by a set of policy rules designed to replicate the management strategy for the supply management programs. Market prices at specific levels imply specific model responses. The simulation was initiated at a prescribed beginning reserve level plus an upper bound constraint on reserves. This upper bound was used only in the forward price test to determine if acreage diversion was necessary. That is, if reserves exceeded the bound in a period, the excess was added to expected supply in determining the need for reduced acreage in the next period.

An additional characteristic of the model, designed to represent the actual decision making process 1 year ahead for acreage diversion, was the trend yield and export assumption. As the model moved forward in time, a "look ahead" price considered trend yields and exports in making an acreage diversion decision. However, when the model moved to the next year, actual levels of yields and estimated exports were used. In some cases acreage diversions were put in place when in fact a drought year such as 1974 actually occurred. Also, in some cases reserve levels were permitted to exceed the upper bound levels for the same reason.

Program Strategies

Two general management regimes for the buffer stocks program were investigated.

1. A minimum government intervention strategy was examined where the government enters stock accumulation to provide a floor price at the loan rate but disposes of accumulated stocks as soon as price recovers to 115 percent of the loan rate. A paid diversion was used if forecasted price 1 year ahead was below loan rate. This is essentially the strategy in place before the 1977 Act.
2. A farmer-owned reserve strategy was examined where the government provided incentives for farmers to lock-up reserve grain when prices were low (below release level) and redeem and sell the grain when prices were high (above release price). The effective floor price (reserve floor trigger) was set midway between the loan and release levels and the price was an approximation of the ceiling price (ceiling trigger). Alternative acreage trigger levels were selected to reflect the 1977 program and modifications suggested by the 1981 program which reduce reliance on acreage reductions.

TABLE 2. POLICY PROGRAM STRATEGIES FOR THE INTERACTIVE SIMULATION MODEL

	1977 Bill		1981 Bill		1981 Reserve-I		Minimum	
Item	Ia	Ib	IIa	IIb	IIIa	IIIb	IVa	IVb
Beginning reserve:								
Corn	0	1,000	0	1,000	0	1,000	0	1,000
Wheat	0	400	0	400	0	400	0	400
Soybeans	0	0	0	0	0	0	0	0
Acreage trigger prices:								
Corn	1.125 loan		loan		0		loan	
Wheat	1.125 loan		loan		0		loan	
Soybeans	0		0		0		0	
Reserve floor trigger:								
Corn	1.125 loan		1.125 loan		1.125 loan		loan	
Wheat	1.20 loan		1.20 loan		1.20 loan		loan	
Soybeans	loan		loan		loan		loan	
Reserve ceiling trigger:								
Corn	1.45 loan		1.45 loan		1.45 loan		1.15 loan	
Wheat	1.75 loan		1.75 loan		1.75 loan		1.15 loan	
Soybeans	1.15 loan		1.15 loan		1.15 loan		1.15 loan	

The four alternatives considered are given in Table 2. Each alternative has been evaluated for two different levels of beginning reserves. In general, five constraints can be preselected for policy simulations based on this model. These include: (1) beginning reserve levels, (2) acreage trigger price, (3) reserve floor trigger price, (4) reserve ceiling trigger price, and (5) upper reserve bounds. Of the four program strategies examined, three were variations of the current supply management program. The fourth involved minimum intervention by government.

The acreage trigger price for each of the programs examined are the forward price objective. Estimated future price below this level implied acreage control for the next crop. Government program variables were selected to stimulate the necessary program participation and corresponding acreage to satisfy the forward price objective or acreage trigger price. Actual target price levels were used in every scenario.

Comparisons of Simulated Results

Results of these simulations point out the significance and importance of the "silent rules

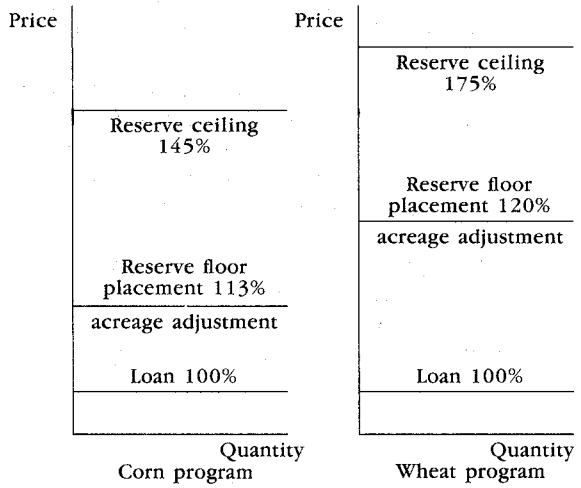

Figure 2. Policy I. 1977 Farm Bill—Corn and Wheat Farmer Owned Reserve Program—Strategy I.

of the game" in controlling supply management programs. Most of the differences between the simulated program costs and returns were associated with the overall price objective the administration had in making the acreage diversion decision. The 1977 program, Policy I, utilized a mid-range price between the release and loan rates as a management decision parameter and attempted to adjust reserves and acreage to produce an equilibrium at about 113 percent of the loan, Figure 2. The 1981 program, Policy II, leaned more heavily on reserve manipulation as a management strategy, Figure 3. For this reason, the acreage adjustment price was set at the loan rate. The 1981-I, Policy III option goes to an extreme in the direction of reliance on the reserve and only removed land from production when the expected future price was zero, Figure 4. The last program, Policy IV, conformed to the pre-1977 management regime, Figure 5. CCC stocks were obtained to support the loan and released back on the market at 115 percent of the loan rate. Acreage diversion programs were used to support the loan rates; hence, acreage adjustment occurs in the scenario if the projected future price is below the loan rate.

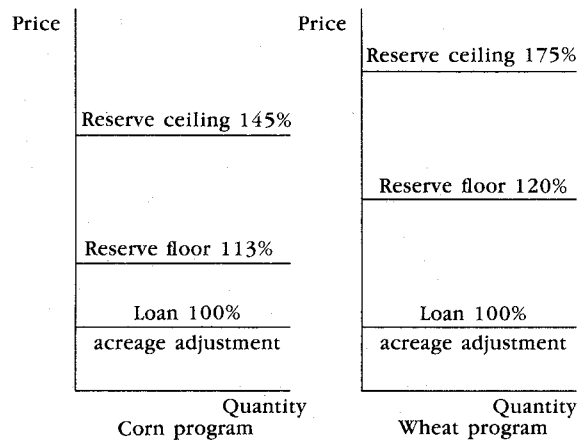

Figure 3. Policy II. 1981 Farm Bill—Corn and Wheat Farmer Owned Reserve Program—Strategy II.

Results obtained for each simulation are summarized in tables 3 and 4. Several important points are indicated by comparing these results: supply management strategies I, II, and III.

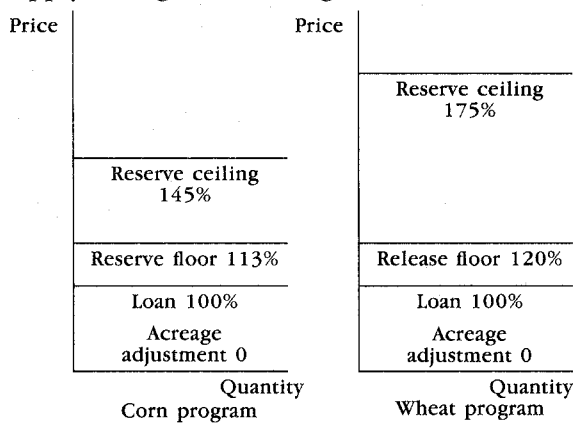

Figure 4. Policy III. 1981 Farm Bill—Corn and Wheat Farmer Owner Reserve Program—Strategy III.

TABLE 3. SUMMARY OF GOVERNMENT PROGRAM OPTIONS FOR CORN OVER THE PERIOD (1970-76) AND (1973-79)

Policy	Market price	Reserve level	Govt. cost	Gross revenues
	$/Bu.	Mil. bu.	Mil. dol.	Mil. dol.
Zero Beginning Reserves (1970-76) Average (1970-76)				
I. 1977	1.79	139	425	10,194
II. 1981	1.68	250	434	9,682
III. 1981-I	1.47[a]	1,060[a]	863[a]	9,096[a]
IV. Minimum	1.68	98	698	9,825
1 Billion Bu. Beginning Reserves (1970-76) Average (1970-76)				
I. 1977	1.61	737	663	9,218
II. 1981	1.53	810	671	8,818[a]
III. 1981-I	1.47[a]	1,608[a]	731	9,964
IV. Minimum	1.66	280	752[a]	9,964
Zero Beginning Reserves (1973-79) Average (1973-79)				
I. 1977	2.93	—	111[a]	18,713
II. 1981	2.80	—	91	17,907
III. 1981-I	2.44[a]	173[a]	35	15,651[a]
IV. Minimum	2.80	—	91	17,907
1 Billion Bu. Beginning Reserves (1973-79) Average (1973-79)				
I. 1977	2.61	54	438	16,937
II. 1981	2.48	54	411	16,178
III. 1981-I	2.24[a]	950[a]	394	13,353[a]
IV. Minimum	2.39	22	747[a]	15,587

[a] Lowest price, highest average reserve level, highest government cost, lowest gross revenues.

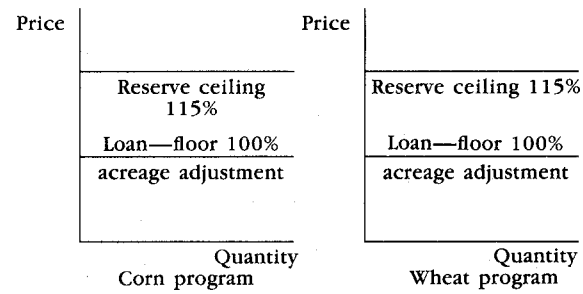

Figure 5. Policy IV. Minimum Government—Corn, Soybeans, and Wheat with no Farmer Owned Reserves—Minimum Government Program Strategy.

TABLE 4. SUMMARY OF GOVERNMENT PROGRAM OPTIONS FOR WHEAT OVER THE PERIOD (1970-76) AND (1973-79)

Policy	Market price	Reserve level	Government cost	Gross revenues
	$/bu.	mil. bu.	mil. dol.	mil. dol.
Zero Beginning Reserves (1970-76) Average (1970-76)				
I. 1977	2.74	7	752	5,719
II. 1981	2.70	7	755	5,623
III. 1981-I	2.58[a]	—	764	5,365[a]
IV. Minimum	2.70	—	766[a]	5,625
400 Mil. Bu. Beginning Reserves (1970-76) Average (1970-76)				
I. 1977	2.60	270	1,034	5,715
II. 1981	2.57	271	1,037	5,633
III. 1981-I	2.50[a]	283[a]	1,087[a]	5,535[a]
IV. Minimum	2.80	126	961	6,024
Zero Beginning Reserves (1973-79) Average (1973-79)				
I. 1977	3.72	—	135	7,647
II. 1981	3.58	—	82	7,331
III. 1981-I	3.30[a]	160[a]	249[a]	6,844[a]
IV. Minimum	3.58	—	82	7,331
400 Mil. Bu. Beginning Reserves (1973-79) Average (1973-79)				
I. 1977	3.27	10	461	6,967
II. 1981	3.14	10	408	6,668
III. 1981-I	2.76[a]	10	730[a]	6,097[a]
IV. Minimum	3.05	—	474	6,502

[a] Lowest price, highest average reserve level, highest government cost, lowest gross revenues.

Land diversion is a crucial part of a balanced supply management program. Tables 3 and 4 provide insight for the expected impact of alternative forward price objectives and diversion strategies. A balance between utilization of the reserve and acreage control is necessary for efficient program operation.

Program strategy 1981-I is an example of management by reserves as opposed to acreage control. In most of the scenarios for corn and all scenarios for wheat, this strategy gave the lowest farm prices, the highest reserves, the highest government cost, and the lowest gross farm revenues.

A forward price objective or acreage trigger price in a mid-range (Policy I) was generally the least expensive from a government standpoint, required less reserves and had higher farm prices and higher farm gross revenue. As the acreage trigger price was lowered, the solution moved toward less land diversion, increased reserve levels, and lower farm prices. Government costs increased as reserves increased, farm prices were lower, and deficiency payments were higher.

Levels of beginning reserves had a significant impact on the average level of reserves and the market price. The solution for 1 billion bushels of corn and 400 million bushels of wheat beginning reserves for the period 1970-76 most nearly reproduced the average stock objectives of the 1977 program. According to Table 3, the average reserve level was 737 million bushels of corn. From Table 4, the average reserve level for wheat was 270 million bushels. The average commercial stock levels were 775 million bushels of corn and 476 million bushels of wheat. Thus, the total stock averages for the period were about 1.5 billion bushels of corn and 750 million bushels of wheat.

Minimum Government Strategy (IV)

The minimum government strategy implied, in most cases, that prices would have been lower in low-price years and substantially higher in high-price years than those that occurred under the farmer-owned reserve strategies. Reserves were disposed of rapidly, and acreage control was utilized to support the loan rate. Therefore, when shortages did occur, there was less topside protection to price pressure. For this reason, the average gross farm income and farm prices compared favorably to those with reserves strategies.

The target price gives additional flexibility in achieving income support. However, this flexibility erodes if the target price begins to move above the forward price objective (acreage trigger). Specifically, if the target price rides up towards the ceiling price, this prevents the use of the farmer-owned reserve as a means of reducing deficiency payments.

In summary, these results tend to support the notion that efficient operation of a supply management program is dependent on a very balanced set of operation rules. These rules are critically dependent on four factors.

1. The price band for free market operation, between the floor and ceiling prices, should contain the long-run average cost of production and take account of cross commodity substitution. Since these bands are established in the political environment, this responsibility falls to policymakers.
2. The forward price objective (acreage trigger) should tend toward the center of the price band. Acreage control becomes the most viable option when desired stock levels are exceeded.
3. The capability to make accurate forward supply and demand estimates at least 2 years in the future is essential.Continual optimism or pessimism on either the demand or supply side can severely distort efficient program management.
4. Balanced operation is critically dependent on program design for acreage control and reserve operations that can be readily converted into program participation with a high degree of confidence.

ECONOMIC IMPLICATIONS OF THE 1982/83 REDUCED ACREAGE PROGRAM FOR CORN, WHEAT AND SOYBEANS

The 1982-83 reduced acreage program for crops, announced in January of 1982, required a 10 percent acreage reduction for feedgrains and 15 percent for wheat for loan and target price protection. Producers were given the reduced acreage option with no cross compliance constraint. This program did not offer a diversion payment. However, the incentive for participants to place grain in the farmer-owned reserve was significantly increased over the 1981-82 program. Participants were given an option of utilizing the Commodity Credit Corporation (CCC) loan of $2.55 for corn and $3.55 for wheat. Placing grain in the 3-year farmer-owned reserve provided an entry loan price of $2.90 per bushel for corn and $4.00 for wheat plus a 26.5 cents annual storage payment.

This program was a major departure from previous designs in that the reserve option contained the major economic incentive to attract program participation. As a result, this strategy modified the rules for regulating the buffer stock program. This weaker acreage program implies a lower forward price objective but the strong reserve incentive implies a large stock objective with a high floor price.

The negotiation process leading to this program design was conducted in an environment of tight near term budget constraints and expectations of continued strength in the export market. Strong acreage control programs are more expensive in the near term than strategies that rely on price support via manipulation of the farmer-owned reserve. This combination of events is more likely to yield the modifications in the program rules that were implemented in the 1982-83 program (Lesher). Most of the consequences of these modifications have already been experienced. *First,* utilization of this design departed rather significantly from previous programs, leaving very little or no observation data for sufficient evaluation of program participation. *Second,* after the feed grain harvest in the fall of 1982 and in the winter of 1983, participating farmers utilized the reserve at an unprecedented rate thus shorting the market of free stocks. Farm price of corn moved from a low of $2.00/bu. in October of 1982 to almost $3.00 by April of 1983. Part of this price strength may have been attributable to the announced payment-in-kind (PIK) program; however, most estimates at that time indicated that, with or without PIK, prices would have to reach release level to provide sufficient grain late in the crop year. Given concern over maintaining our competitive advantage in the export market and providing feed grains to the livestock industry at stable prices, this strategy produced the opposite effect. Grain was rationed to the market at prices normally experienced during drought years. *Third,* an extremely good crop year further complicated the outcome of the program. This simply compounded the excess supply problem in a year where program participation was very low. However, this outcome does tend to reaffirm the importance of aligning the program around a mid-level price objective - normal crop years yield prices in the center of the band, poor years at the top and good years at the bottom. Program designs that do not assure sufficient participation simply increase the risk of prices near the bottom side of the price band in normal years, compounding the down-side price risk with the corresponding potential for stock accumulation. *Fourth,* final impacts have not likely occurred. The drought of 1983 in conjunction with the PIK program resulted in a significant decline in supplies. Currently, farmer-held reserves available to the market are in the hands of a small percentage of 1982 program participants. Therefore, strong potential exists for these producers to delay sales with a significant upside price correction in the latter part of the 1983/84 marketing year. *Fifth,* for the first time in the history of the program, total government expenditures are very near net farm income for the same period. This is an unfortunate outcome in a political climate where total budget expenditures will be more seriously scrutinized in the future.

THE 1983/84 PAYMENT-IN-KIND PROGRAM

The 1983-84 program is characterized by a reduced acreage-paid diversion strategy supplemented with a payment-in-kind (PIK) program. Farmers are given grain in payment for idling PIK acres. Reports by the USDA indicate that total acreage idled was about 82 million.

This substantial reduction in acreage is almost three times the level projected by an analysis at the University of Missouri in the Spring of 1983 (Womack). The models did not include and were not designed to estimate effects of a PIK situation. The USDA most likely was in a similar position and clearly was surprised by the final level of participation. Although this strategy was aimed at realignment, program design eminating from the political process was such a drastic departure from previous designs that substantial errors were made in estimating participation.

What combination of events lead to the adoption of a PIK program? Several reasons have been given and perhaps were best summarized

TABLE 5. PROGRAM IMPACT SUMMARY *1983/1984*; CORN, SOYBEANS, WHEAT, COTTON AND RICE

Item	RAP/PD/ PIK[a]	RAP/PD/ PD[b]	Difference[c]
Planted acres (mil. acres)	212.7	230.2	(17.5)
Gross revenues (mil. dol.)	53,461	53,610	(410)
Total variable Input cost (mil. dol.)	24,521	27,602	(3,801)
Net returns (mil. dol.)	28,474	27,365	1,109
Government cost (mil. dol.)	14,741	7,124	7,617

[a]Reduced acreage, Paid Diversion, Payment In Kind Program announced in January 1983 for 1983 crop year.
[b]Reduced acreage, Paid Diversion, 10 percent additional voluntary paid diversion.
[c]RAP/PD/PIK − RAP/PD/PD.

by Lesher when he indicated that the political process was in no mood to further aggravate a record federal deficit, hence precluding traditional methods to reduce production. Although the agricultural sector has entered a period of potential excess supply, the near term budget constraint looms high on the horizon as a major obstacle in obtaining sufficient up front monies to effectively control the supply side.

Unfortunately, a tight budget environment was further complicated by the desire for a "quick fix." This type of climate did not allow sufficient time to analyze the total ramifications of this program relative to alternative designs.

Analyses conducted by the modeling unit at the University of Missouri after the March 1983 intentions report by the USDA indicated that a stronger paid diversion strategy would have reduced program cost by approximately one-half for corn, soybeans, wheat, cotton and rice, under a normal weather scenario, Table 5. Reserve levels, however, would have remained significantly higher, requiring a sequence of step-down years to reach more reasonable stock levels. Table 6 reflects the normal weather scenario for corn conducted in May of 1983. The stronger paid diversion strategy (RAP/PD/PD) is estimated to cost about $3.5 billion in contrast to about $7.8 billion for the PIK option (RAP/PD/PIK). Net revenues are estimated to be 1.1 billion higher under the PIK options and total reserves are estimated to be about 1.0 billion bushels lower.

Perhaps a more significant point to be made by this particular program comparison is the differential program cost. It would be most ironic for the agricultural sector to be saddled with additional budget restraints in the future because of the cost of the PIK program. This analysis suggests that the rather tight fisted budget constraint by Congress and the Office of Management and Budget contribute to this outcome. Stated another way, the PIK program most likely exceeded the mark necessary for program realignment. Part of this overkill can be attributed to the inability of predicting with reasonable accuracy farmer participation in this program design.

A similar case can be made for wheat, Table 7. Estimated government cost is about $2.6 billion higher under the PIK option; however, farmer net revenues are only $220 million lower. Table 8 reflects the cross impact on the soybean industry under the different program options.

The design of the PIK program supports the notion of a supply management strategy in that a strong acreage control program was necessary for realignment around forward price and stock objectives. The most serious departure from the more balanced set of rules is the formulation of program design that could not easily be evaluated before the fact. Our *ex post* analysis suggests options that would have been less expensive to the government and yielded similar net returns to farmers. The trade-off under a stronger paid diversion option would have

TABLE 6. SUMMARY OF PROGRAM OPTIONS FOR CORN, 1983/1984

Program	Acres Planted	Acres Harvested	Price	Reserves Free	Reserves CCC	Reserves FOR	Gross revenue	Total variable production cost[a]	Net revenues	Participation
	(mil.)	(mil.)	($/bu.)	(mil. bu.)	(mil. bu.)	(mil. bu.)	(mil. $)	(mil. $)	(mil. $)	%
RAP/PD[b]	79.0	69.0	2.57	452	475	2,200	20,491	12,409	8,082	50
RAP/PD/PIK[c]	58.8	51.0	2.71	493	304	1,250	22,421	9,806	12,615	81
RAP/PD/PD[d]	74.0	64.0	2.88	469	479	2,000	23,198	11,740	11,457	60

	Government costs Deficiency	Diversion	PIK	Other[e]	Total
	mil. dol.				
RAP/PD	578	516	—	1,525	2,618
RAP/PD/PIK	714	1,030	4,443	1,643	7,830
RAP/PD/PD	308	1,759	—	1,469	3,536

[a] Variable non-land costs of production were $150 per planted acre and $20 per conservation acre.
[b] Reduced acreage—paid diversion program announced in 1982 for 1983 program is 15-05 for wheat and 10-10 for corn.
[c] Reduced acreage—paid diversion program with PIK option.
[d] Reduced acreage—paid diversion program with an additional 10 percent voluntary paid diversion; i.e., 15-05-10 for wheat and 10-10-10 for corn.
[e] Included deferred interest and storage costs.

TABLE 7. SUMMARY OF PROGRAM OPTIONS FOR WHEAT, 1983/1984

Program	Acres Planted	Acres Harvested	Price	Reserves Free	Reserves CCC	Reserves FOR	Gross revenue	Total variable production cost	Net revenues	Participation
	(mil.)	(mil.)	($/bu.)	(mil. bu.)	(mil. bu.)	(mil. bu.)	(mil. $)	(mil. $)[a]	(mil. $)	%
RAP/PD[b]	83.5	74.0	3.71	315	187	1,000	10,933	7,279	3,653	50
RAP/PD/PIK[c]	77.4	63.0	3.68	325	480	592	11,843	6,165	5,678	85
RAP/PD/PD[d]	76.0	67.0	3.90	366	187	800	11,330	6,780	5,898	70

	Government costs Deficiency	Diversion	PIK	Other[e]	Total
			mil. dol.		
RAP/PD	780	202	—	782	1,994
RAP/PD/PIK	956	344	1,793	1,805	5,007
RAP/PD/PD	696	829	—	715	2,484

[a] Variable non-land costs of production were $85 per planted acre, $20 per conservation acre, and $50 per PIK acre on winter wheat.
[b] Reduced acreage—paid diversion program announced in 1982 for 1983 program is 15-05 for wheat and 10-10 for corn.
[c] Reduced acreage—paid diversion program with PIK option.
[d] Reduced acreage—paid diversion program with an additional 10 percent voluntary paid diversion; i.e., 15-05-10 for wheat and 10-10-10 for corn.
[e] Included deferred interest and storage costs.

been more stocks in hand, a somewhat more desirable situation given the drought conditions of 1983. Although tables 5 though 8 have not been updated for drought conditions, it is fairly obvious that government expenses under the stronger paid diversion option would be reduced because of reserve paybacks and reduced deficiency payments.

It should be noted that some analysts argue that the PIK option would cost less in the long run, since the grain would otherwise be defaulted at the end of the 3-year contract. Present value analysis tends to support this notion. However, this scenario is realized only if the grain is defaulted at the end of the reserve contract period.

THE 1984-85 REDUCED ACREAGE PROGRAM

Policy issues behind the formulation of the 1984-85 crop program centered around comparative advantage in world trade and the level of escalating target prices. As a result, loan rates were lowered for some commodities. However, the target price issue has not been resolved. These levels of target price support precluded the option of a zero reduced acreage program for coarse grains and has resulted in a program

TABLE 8. SUMMARY OF PROGRAM OPTIONS FOR SOYBEANS 1983/1984

	Acres Planted	Acres Harvested	Price	Reserves Free	Reserves CCC	Reserves FOR	Gross revenue	Total variable production[a] cost	Net revenues	Participation
	(mil.)	(mil.)	($/bu.)	(mil. bu.)	(mil. bu.)		(mil. $)	(mil. $)	(mil. $)	%
RAP/PD[b]	70.0	69.0	5.72	192	75	—	12,275	5,600	6,675	—
RAP/PD/PIK[c]	65.8	64.8	6.40	203	50	—	13,274	5,264	7,808	—
RAP/PD/PD[d]	68.0	67.0	6.36	185	50	—	13,254	5,440	7,814	—

	Government costs CCC sales	Diversion	PIK	Other[e]	Total
			mil. dol.		
RAP/PD	(132.50)	—	—	56	76.50
RAP/PD/PIK	(265.00)	—	—	57	208.00
RAP/PD/PD	(265.00)	—	—	40	255.80

[a] Variable non-land cost of production is $80 per planted acre.
[b] Reduced acreage—paid diversion program announced in 1982 for 1983 program is 15-05 for wheat and 10-10 for corn.
[c] Reduced acreage—paid diversion program with PIK option.
[d] Reduced acreage—paid diversion program with an additional 10 percent voluntary paid diversion; i.e., 15-05-10 for wheat and 10-10-10 for corn.
[e] Included deferred interest and storage costs.

for wheat that does not seem to be attractive to producers.

Target prices have reached a level that substantially constrain the Secretary in managing the farm program. A zero reduced acreage option for feed grains would have exposed the administration for a crop program cost of around $4 million under a normal weather scenario. This rather significant government cost exposure is a major constraint in program design. 1984 in conjunction with extremely low feedgrains stocks implied no constraints on feedgrain production, that option is precluded because of budget exposure.

Exactly the opposite situation has occurred for wheat. High target price exposure resulted in a 30 percent reduced acreage and 20 percent PIK program participation. This program strategy is still likely to result in an excess supply imbalance for 1984-85 with wheat prices moving at or near the loan rate. In this event government controlled stocks are very likely to increase with corresponding longer term government cost exposure.

Thus, a more salient factor that removes the 1984-85 program design away from the more balanced supply management objectives is the mandated target price moving near the top of the price band. Exposure of government costs preclude options that may be more feasible in the current environment. An additional factor somewhat related to this situation is program base acreage. Currently about 92 million acres are in the wheat program; however, only about 78 to 80 million are necessary for a supply-demand balance. This excess capacity, if maintained in the base, subjects program cost for the wheat program alone to an added $1.5 to $2.0 billion per year.

ISSUES FOR THE 1985 FARM BILL

In order that we monitor the agricultural sector on a continuous basis, the agricultural modeling unit at the University of Missouri in conjunction with Wharton Econometrics Forecasting Associates conducts a longer term outlook semiannually (Wharton). This exercise, completed in the later part of 1983 suggests the potential for excess supplies in the face of sluggish export demand with rather significant budget exposure. This forecast is conditioned on a moderate upturn in domestic and foreign economies, and slight declines in interest rates and the value of the dollar. These general economy forecasts were obtained from Wharton Econometrics in December of 1983. Also implicit is normal weather in the domestic and foreign markets.

Given that the chance of good to normal weather is greater than poor, this set of projections may reflect the more likely intermediate to longer term path. The question to be answered is whether the supply management program design is adequate to meet this economic-political environment. The answer lies in two areas. First, the operation of the program by all the players in the political environment must be clearly understood with regard to a balanced set of rules governing operation. Second, nearer term budget constraints must be examined relative to longer run government budget expo- Even if the risk of an additional short crop in sure. If this does not occur, experience suggests that a different program strategy is warranted.

The current environment of excess supplies, budget constraints and high target prices for several commodities has reduced the necessary flexibility for efficient management of the programs. This conclusion is fairly evident from the design and consequences of the 1982-83 and 1983-84 programs. Both options were strongly conditioned on meeting guideline budget constraints, apparently precluding more traditional options, thus subjecting program administration to more risky options. Unless the Secretary is given more flexibility in managing his budget and programs, the supply management strategy is doomed to failure. Supplies cannot be effectively controlled. Hence, the most likely price over time is the loan rate, with the potential for significant stock accumulation. In the longer term this could mean another major modification similar to PIK. If this buffer stock program design is maintained in the current budget environment, it may be necessary to legislate mandatory diversion programs after reserves reach undesirable levels. Otherwise, a more minimal government intervention program containing fewer options will be necessary.

On the positive side, this analysis does indicate that the focus for 1985 will be on more economical methods of acreage control and programs that will enhance export expansion. Supply controls will run the gamut from mandatory to no government programs. Based on previous program popularity with farmers, some type of voluntary program is likely. If so, considerable flexibility must be built in to accommodate the rather wide swings that have occurred in supply and demand since the early 1970's. Target prices and loan rates should reflect longer run average costs of regions with the comparative advantage. Target prices must be maintained at or below the center of the desired price band. Base acreage should reflect expected domestic and foreign demand. Excess base area represents potential government treasury exposure and encourages producers to maintain marginal land in production.

Ideally, excess base area offers the opportunity for conservation strategies. Also, experience with the bid option under the PIK program

suggests that this strategy should be considered in obtaining desired acreage in a set aside year. This strategy precludes a blanket diversion payment on all lands and places the administration in a position of stronger control over the uncertainty of program participation and cost. Counties with erodible lands could be treated accordingly.

Export program options are also being debated, ranging from free-market to marketing boards and cartel strategies. Combined with these options is the potential for significant trade subsidies or a trade war. If the more free market strategy is maintained, considerable attention will be given to the bottom side support price that maintains comparative advantage in world trade.

It will be necessary to ascertain whether loan rates are stifling exports and stimulating foreign supplies. Cartel and marketing boards will be considered. Given the previous unpopularity of mandatory programs in the major crop grain area, it is unlikely that this option will be adopted in the near term.

Finally, this research is another indication of the necessity for consideration of longer run implications of farm program design. Alternative strategies must be evaluated around the uncertainties of future supply and demand. This may necessitate the evaluation of several "what if" scenarios before a stamp of approval can be given. The lessen of the last 4 years simply reaffirms the condition of flexibility in farm program options. If the buffer stock strategy is maintained, these flexibilities must allow for cross-commodity interaction relative to the underlying rules for efficient program operation.

REFERENCES

Baumes, Harry and W. H. Meyers. "The Crops Model: Structural Equations, Definitions and Selected Impact Multipliers," NED Staff Report, ERS, USDA, March 1980.

Burnstein, Harlan. "The Farmer-Owned Reserve Program--A Regional Perspective." Selected paper presented at the annual meeting of the Southern Agricultural Economics Association, February 1-4, 1981, Atlanta, Georgia.

Hallett, G. *The Economics of Agricultural Policy,* New York: Augustus Kelly, 1968.

Houck, James P. "Some Economic Aspects of Agricultural Regulation and Stabilization." *Amer. J. Agr. Econ.,* Vol. 56, No. 5, December 1974.

Lesher, William G. "The Need to Look Beyond PIK: Hard Realities and Tough Choices." Proceedings for the National Agricultural Policy Symposium, sponsored by the Department of Agricultural Economics, University of Missouri-Columbia, March 27-29, 1983.

United States Congress. *Food and Agricultural Act of 1977,* Public Law 95-113, 95th Congress, September 29, 1977.

United States Congress. *Agriculture and Food Act of 1981,* Public Law 97-98, 97th Congress, December 22, 1981.

Wharton Econometrics and University of Missouri-Columbia, *Long Term Forecast,* Service Center, Philadelphia, Pennsylvania, February 1984.

Womack, Abner W., Stanley R. Johnson and William H. Meyers. "The Buffer Stock Program for Grains—How Well Is It Working?" Proceedings for the National Agricultural Policy Symposium, sponsored by the Department of Agricultural Economics, University of Missouri-Columbia, March 27-29, 1983.

Womack, Abner W. "Comments on the Operation of the Current Crop Program." Hearings before a subcommittee of the Committee on Government Operation-House of Representatives, Ninety-Eighth Congress, U.S. Government Printing Office, Washington, D.C., 24-6970, July 11, 1983.

Yanagida, John and Roger Conway. "The Annual Livestock Model: Beef, Pork, Poultry and Eggs, and Dairy Secters," NED Staff Report, ERS, USDA, November 1979.