A Commodity Analysis of Two Farm Programs: Free Markets and Cropland Retirement

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Content

A Commodity Analysis of Two Farm Programs: Free Markets and Cropland Retirement

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Income and price support programs have been used by the federal government since the 1930's to redistribute gains and losses of the technological transformation of agriculture between consumers and commercial farmers. But the high cost of maintaining the programs, their failure to provide a permanent solution to the commercial farm program, the skewed distribution of direct payments favoring the relatively well-to-do farmers and lack of farmer control in program development have drawn considerable criticism.

Some propose that agriculture be turned back to a free market environment. Others encourage the adoption of a general long-term land retirement program that would provide a more permanent balance between output and demand. Still others prefer increased farmer control of production and prices through collective bargaining associations and other program possibilities are discussed.

A number of analytical policy models have been developed to investigate aggregate effects of these and other agricultural policies [2, 18, 23, 21]. But many of the econometric simulation models are not structured so as to estimate the impacts of alternative policies on individual commodity categories. Livestock producers, as an example, may underrate the indirect influence that policies for specific crops such as feed grains have on their seemingly unsupported enterprises.

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Objective of the Study

In this study a partially disaggregated policy simulation model is developed to estimate the impacts of a changed agricultural policy environment on the production, price and income levels of specific commodities. The investigation discussed in this report is limited to estimating the direct and indirect effects of: (1) eliminating acreage diversion and income and price support programs for feed grains, wheat and cotton, and (2) a shift from present programs to a 70 million acre general long-term land retirement program.

Model Development

The model used in this study is constructed from two major sets of information: (a) estimates of commodity supply and demand parameters obtained from previous studies and (b) benchmark estimates of production, price, utilization and income levels for major commodities and aggregate agriculture between 1972 and 1980 which are developed from projections made by the U. S. Department of Agriculture. Commodity groups included in the model are feed grains, wheat, soybeans, cotton, cattle and calves, hogs, sheep and lambs, chickens, turkey, eggs and milk.

The base projections of commodity supply and distribution levels reflect the influence of primarily two sets of variables; changes in supply and demand shifters and changes in relative prices. Changes in population, national income consumer preferences and technology are largely independent of happenings in the agricultural sector. Given the values of the shifters, it is the interaction of supply and demand responses to price that determine the economic well being of individual commodity sectors and national agriculture resulting from a change in agricultural policy. Hence, in the simulation model developed in this study, the non price-related supply and demand shifters (with the exception of government acreage divisions) are fixed while direct and cross price clasticities of supply and demand allow adjustments in supplies and demands following a change in the economic environment of farmers.

The procedure is to multiply the direct and cross price elasticities for a commodity series (say feed grain acreage) by the percentage change between calculated and base estimates for the relevant price variables (say previous year prices of feed grains, wheat, soybeans, and cotton). The results of these calculations are summed, added to one, and then multiplied times the base estimate for the series (feed grain acreage in time t). Since the long run response of supply and demand to a sustained price change often differs from the short run response, each relation allows for cumulative price response via an adjustment coefficient.

To illustrate the general procedure, the equation to estimate feed grain harvested acreage for the 1973 crop year is:

$$
\begin{aligned}
\text{Calculated Feed Grain Acreage}_{1973} = {} & \left(\text{Base Feed Grain Acreage}_{1973} \times \left\{\left[1.0 + \left(\text{Elasticity of Feed Grain Acreage wrt Feed Grain Price} \times \left[\frac{\text{Calculated Feed Grain Price}_{1972} - \text{Base Feed Grain Price}_{1972}}{\text{Base Feed Grain Price}_{1972}}\right]\right) + \left(\text{Elasticity of Feed Grain Acreage wrt Wheat Price} \times \left[\frac{\text{Calculated Wheat Price}_{1972} - \text{Base Wheat Price}_{1972}}{\text{Base Wheat Price}_{1972}}\right]\right)\right.\right. \right. \\
& + \left(\text{Elasticity of Feed Grain Acreage wrt Soybean Price} \times \left[\frac{\text{Calculated Soybean Price}_{1972} - \text{Base Soybean Price}_{1972}}{\text{Base Soybean Price}_{1972}}\right]\right) + \left(\text{Elasticity of Feed Grain Acreage wrt Cotton Price} \times \right. \\
& \left.\left.\left.\left[\frac{\text{Calculated Cotton Price}_{1972} - \text{Base Cotton Price}_{1972}}{\text{Base Cotton Price}_{1972}}\right] + \left(\text{Elasticity of Feed Grain Acreage wrt Prices Paid by Farmers} \times \left[\text{Percent change in Prices Paid by Farmers} \times .01\right]\right)\right\} + \left(\text{1.0 - Adjustment Coefficient}\right) \times \left(\text{Calculated Feed Grain Acreage}_{1972} - \text{Base Feed Grain Acreage}_{1972}\right)\right)
\end{aligned}
$$

In short, the percentage change in prices are confronted with the appropriate direct and cross elasticities to estimate the change in commodity supply and demand variables.

Figure 1 indicates the implicit functional relationships of the model. With the exception of identities and variable levels determined by physical relationships and indexing procedures, the causal relations are tied together with a priori elasticity estimates.

As is indicated in Figure 1, the model is recursive. Harvested acreages for feed grains, wheat, soybeans and cotton are related to previous year prices for the four crops and the index of prices paid by farmers. Deviations from base crop yield estimates depend on the percentage change in previous year price for the respective crop and the index of prices paid. The product of acreage and yield estimates production for each crop. Production expenses per acre for each crop are adjusted for changes in the previous year price of the crop and changes in the index of prices paid. Total production expenses for each crop are defined as the product of that crop's acreage and expenses per acre. The crop supply identities include production, imports and carryover. Crop prices are dependent on the percentage change in calculated crop supplies and the base supply estimates. The domestic demand categories and export demands are dependent on the percentage change between current and base estimates for current year prices of the crop and related commodities. Ending year stocks are calculated as residuals. Crop receipts are calculated as price times production adjusted for proportions sold.

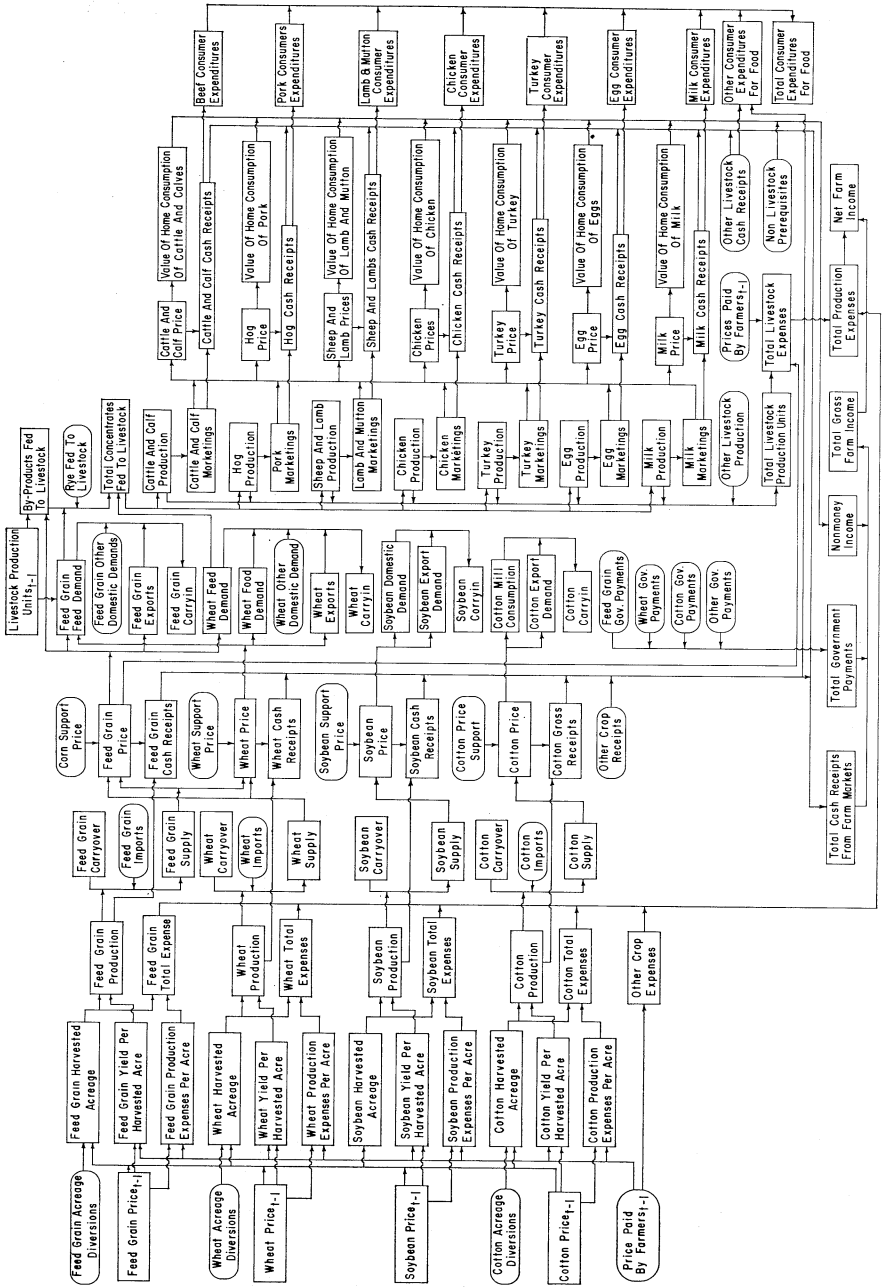

Figure 1. A schematic diagram of the simulation model.

The production levels of the seven classes of livestock are based on the estimate of all concentrates fed to livestock. Livestock prices are determined by the production levels of the livestock categories. Production and price levels determine gross receipts for each livestock category. The number of livestock production units, calculated from production estimates, influences livestock production expenses. The sum of cash receipts for the four crops, the seven livestock categories and other crops and livestock products equals total cash receipts. Adding government payments and the value of home consumption (adjusted for changes in the prices of the individual livestock categories) to total cash receipts yields total gross farm income. Total production expenses are calculated as the sum of individual crop expenses, other crop expenses and livestock production expenses. Net farm income is the difference between total gross farm income and total production expenses.

Summary of Base Projections

The base data used in the model are derived, for the most part, from 1980 projections made by United States Department of Agriculture and specifically by the Outlook and Projections Branch, Economic and Statistical Analysis Division of the Economic Research Service. Some of the projections are published in the July 1970 issue of Agricultural Economics Research [7], but a subsequently revised and updated statistical appendix to the article, available from the Outlook and Projections Branch, provided the bulk of the projections. 1980 projections were made by the USDA for commodity production, crop acreage and yields, price indexes by crop and livestock categories, commodity supplies and utilizations, and the components of the feed concentrate balance sheet.

Among the assumptions used by the USDA in making their projections are: a) a 1980 U. S. population of 231 million, b) a gross national product of $2.1 trillion, c) average per capita disposable income of $6,245, and d) the continuation of domestic farm programs and import restrictions on dairy and beef.

Per capita consumption of beef and veal is projected to reach 135 pounds (Table 1) by 1980, or about 20 pounds above the 1971 level. The increased per capita use of chicken and turkey is expected to continue with 1980 projections of 49 pounds per capita for chicken and 10 pounds for turkey. The per capita consumption of milk and lamb and mutton is projected to continue downward. Milk consumption per person declines from 558 pounds in 1971 to 500 pounds in 1980 while lamb and mutton per capita consumption is down .6 pound from the 1971 level of 3.1 pounds. The projected per capita consumption of pork for 1980 is near the 1970-71 average at 68 pounds.

Table 1. Population, income, per capita animal product consumption, and prices received by farmers, selected averages and years and base 1980 projections[1]

Item	Unit	ACTUAL				PROJECTED
		1957-59	1967-69	1970	1971	1980
Population	mil.	174.2	201.0	204.9	207.0	231.0
Disposable income per capita	current $	1846.	2942.3	3358.0	3581.0	6245.0
Per capita consumption levels						
Beef and veal	lbs. car wt.	89.2	112.6	116.6	115.8	135.0
Pork	lbs. car. wt.	63.0	65.1	66.4	72.9	68.0
Lamb and mutton	lbs. car. wt.	4.4	3.7	3.3	3.1	2.5
Chicken	lbs. rdy. cook	27.5	37.9	41.4	41.6	49.0
Turkey	lbs. rdy. cook	6.0	8.3	8.1	8.5	10.0
Eggs	lbs.	46.6	42.0	41.8	42.1	40.0
Dairy products	lbs. milk eq.	679.0	576.0	564.0	558.0	500.0
Prices received by farmers						
Feed grains	$ per ton	38.08	38.51	45.45	39.97	40.00
Wheat	$ per bu.	1.81	1.29	1.33	1.32	1.30
Soybeans	$ per bu.	2.01	2.42	2.85	2.96	3.00
Cotton lint	$ per lb.	.32	.23	.22	.25	.25
Cattle & calves	$ per lb.	20.73	24.21	27.68	29.47	31.50
Hogs	$ per lb.	17.16	19.85	22.70	17.48	23.50
Sheep	$ per lb.	17.35	22.40	23.53	23.42	27.45
Chickens	$ per lb.	11.80	13.64	13.17	13.14	14.00
Turkeys	$ per lb.	26.93	20.82	22.66	22.17	21.00
Eggs	$ per doz.	.35	.35	.39	.31	.33
Milk	$ per cwt.	4.12	5.30	5.78	5.94	7.50

[1]Actual and projected data adapted from the statistical supplement to Culver, David and J. C. Chai, "A View of Food and Agriculture in 1980," *Agr. Econ. Res.* 22:61-68, July 1970 [7].

The prices used in this study were developed from USDA projected price indexes for commodity groups so as to be consistent with supply and demand quantities. Crop prices are projected to be around levels of recent years. Assumed 1980 prices are $40 per ton (Table 2) for feed grains, $1.30 per bushel for wheat, $3 per bushel for soybeans and 25 cents per pound for cotton lint. Prices for livestock prices are expected to rise somewhat over the next decade from recent levels. The average price for all grades and ages of beef and veal is projected at $31.50 per hundredweight, up about two dollars from 1971. The 1980 price for all pork is $23.50 per hundredweight while the sheep and lamb price is projected at $27.45 per hundredweight. Chicken and turkey prices are assumed to be 14 cents and 21 cents per pound respectively. The price of milk is expected to increase to $7.50 per hundredweight, up about $1.50 from 1971.

Yields are expected to increase at about the same rate as the expected growth rate in demand so that crop acres harvested remain near recent levels. Projected 1980 yields per harvested acre are 2.3 tons for

feed grains, the 35 and 31 bushels for wheat and soybeans respectively, and 510 pounds for cotton (Table 2).

Crop output for 1980 is projected to rise around one-fourth from the 1967-69 average, due primarily to increased demand for feed crops, both here and abroad. Feed grain production is expected to increase 40 percent from 1967-69 at 240 million tons. Wheat production is projected near the 1967-69 average level at 1547 million bushels while continued strong domestic and export demand is expected to push 1980 soybean production to 1650 million bushels. Cotton production is projected to increase from recent levels and reach nearly 12 million bales by 1980.

The largest production increases for livestock products are for poultry (about 50 percent) and beef cattle (nearly one third). Pork production is expected to increase at about the same rate as population growth. A smaller increase is expected for eggs, while the output of milk declines.

Estimates of crop production expense per acre for the four crops,

Table 2. Harvested acreage, yields, and production for major crops and production of selected livestock classes, selected averages and years and base 1980 projections[1] to 1980

Item	Unit	ACTUAL				PROJECTED
		1957-59	1967-69	1970	1971	1980
Harvested acreage						
Feed Grains	mil. ac.	129.3	97.8	99.1	106.3	104.5
Wheat	mil. ac	49.5	53.9	44.2	48.5	43.0
Soybeans	mil. ac.	22.5	40.7	41.9	42.5	53.2
Cotton	mil. ac.	13.5	9.7	11.1	11.5	10.7
Other crops	mil. ac.	109.2	99.5	100.7	101.5	95.6
Total acreage harvested	mil. ac.	324.0	301.6	297.0	310.0	307.0
Yield per harvested acre						
Feed Grains	tons	1.1	1.73	1.6	1.9	2.3
Wheat	bu.	23.6	23.4	31.0	33.8	35.0
Soybeans	bu.	23.6	26.3	26.7	27.6	31.0
Cotton	lbs.	438	466	437	440.0	560.0
Production						
Feed Grains	mil. tons	108.7	173.2	158.6	205.3	240.3
Wheat	mil. bu.	1176.8	1519.5	1370.0	1640.0	1547.0
Soybeans	mil. bu.	532.2	1068.5	1123.7	1169.4	1650.0
Cotton	mil. bales	12.3	9.3	10.4	10.6	11.9
Cattle & calves	mil. live lbs.	27395	36480	39521	40625	51812
Pork	mil. live lbs.	19622	20742	21861	22928	25120
Sheep & mutton	mil. live lbs.	1635	1103	1093	1038	714
Chickens	mil. live lbs.	6684	10704	12006	12045	15981
Turkeys	mil. live lbs.	1382	2124	2184	2262	2896
Eggs	mil. doz.	4166	5788	5835	5970	6422
Milk	mil. lbs.	123279	117449	117149	118640	116099

[1]Actual and projected data adapted from the statistical supplement to Culver, David and J. C. Chai, "A View of Food and Agriculture in 1980," *Agr. Econ. Res.* 22:61-68, July 1970 [7].

total livestock production expenses and expenses for other crops for 1930-1967 were developed in an earlier study by Ray [22]. A trend analysis of these expense series along with published USDA expense estimates was used to project production expense series to 1980. The 1980 projections (with 1971 estimates in parenthesis) are $87.04 per harvested acre for feed grains ($68.93), $45.42 per acre for wheat ($37.62), $60.24 for soybeans ($49.92) and $155.03 for cotton ($125.02). Other crop and total livestock production expenses are each projected to increase at slightly faster rates than their respective production levels which brings total production expenses in 1980 to $60.2 billion. Direct payments to farmers under the various governmental farm programs are assumed to be $4.0 billion in 1980 compared to 1969-1971 average of $3.552 billion. Feed grain producers are assumed to receive $1800 million, wheat producers $925 million and cotton producers $875 million. Variable data for 1972 to 1979 were generally derived by interpolating between the last published estimate (usually 1971 but some preliminary 1972 estimates were used) and the 1980 projection. A complete listing of variable data is available from the author.

Price Response Parameters

Supply Elasticities

A change in relative crop prices influences a crop's production level through its effect on acreage and on yield. The acreage elasticity indicates the increase (decrease) in crop acreage resulting from a price rise (decline). The yield elasticity reflects change in the application of fertilizer, pesticides and other nonland inputs to each crop acre. As prices rise, farmers purchase and use larger amounts of yield-increasing inputs and, conversely, reduce input usage as prices fall.

Table 3 summarizes the short run and long run acreage and yield elasticities used in the model. The direct acreage elasticities were selected as being representative of empirical analyses conducted by other researchers. Nerlove [20] estimated the short run price elasticity for corn acreage at .09 and the long run elasticity at .18. Colyer and Irwin [5] derived a short run elasticity of feed grain production with respect to corn price of .11. In this study the short run elasticity of feed grain acreage with respect to feed grain price is assumed to be .1. Estimates of short-run acreage price elasticity for wheat varies from zero obtained by Bowlen [2] for nine western Kansas Counties to .93 derived by Nerlove [20]. Cochrane's [4] informal estimate of wheat supply price elasticity (including both the acreage and yield components) was between .1 and .2. The wheat acreage supply elasticity used in this study is .1.

Table 3. Direct and cross acreage and yield supply elasticities, long run elasticities in parentheses

Elasticity of	With Respect to: Feed Grain Price t—1	Wheat Price t—1	Soybean Price t—1	Cotton Price t—1
Feed Grain Acreage	.10 (.30)	—.05 (—.15)	—.03 (—.09)	—.01 (—.03)
Wheat Acreage	—.03 (—.06)	.10 (.20)	—.02 (—.04)	—.01 (—.02)
Soybean Acreage	—.20 (—1.00)	—.02 (—.10)	.30 (1.50)	—.03 (—.15)
Cotton Acreage	—.02 (—.04)	—.01 (—.02)	—.02 (—.04)	.20 (.40)
Feed Grain Yield	.15 (.30)	-- --	-- --	-- --
Wheat Yield	-- --	.10 (.20)	-- --	-- --
Soybean Yield	-- --	-- --	.15 (.30)	-- --
Cotton Yield	-- --	-- --	-- --	.15 (.30)

Vandenborre [23,] Houck and Subotnik [17] and Heady and Roa [12] obtained soybean supply price elasticity estimates of between .8 and .9. Houck and Mann [15] derived acreage price elasticity estimates of .16 for the first crop year following a sustained price increase and .29 for the second crop year. An elasticity of .3 was used for the short run acreage supply elasticity for soybeans. Estimates of the elasticity for cotton obtained by Blakley [1] range from .16 for selected years during 1934-1956 when allotments were in effect to .75 for nonallotment years. Walsh [29] derived a short run acreage price elasticity (based on production) of .361 while Cochrane's [4] judgment estimate was .2 to .3. The short run cotton acreage supply elasticity used here is .2.

The cross acreage elasticities and direct price elasticities for yield were adopted from a much larger simulation model developed by Ray [22]. The earlier econometric simulation model included submodels for feed grains, wheat, soybeans, cotton and tobacco. The cross supply elasticities were derived by changing a crop's price by 10 percent, noting the change in the acreage of competing crops and deriving the implied cross acreage elasticity for the crop. The direct price elasticities for yields were derived in a similar manner.

Demand Elasticities

The elasticity of feed grain demand was set at −.25 [3] in the short run and −.50 in the long run. Wheat flour price elasticity was estimated by Fox [8] at −.067, and a short run elasticity of −.10 (−.20 in the long run) is used in the model. Gomme [10] suggests that wheat feed demand is relatively price responsive and is influenced to a considerable extent by feed grain prices. The short run elasticities used are −.50 for the direct price elasticity and .45 for the cross elasticity with respect to feed grain prices. Houck and Mann's [15] estimate of the domestic demand elasticity for soybeans of −.35 is used (.70 in the long run). Cromarty [6] estimated price elasticity of cotton mill consumption at −.30 and Lowenstein's [19] estimate was −.23. The short run estimate used is −.25 with −.50 for the long run. Price elasticities for export demands are assumed to be −2.00 in the long run and −.4 in the short run except for soybeans which has a short run elasticity of −.5. The price flexibilities used to determine individual livestock prices (Table 4) are from Brandow [3, p. 65].

Livestock Supplies

A matrix of parameters that measure the production response by class of livestock to changes in livestock prices and to changes in the prices and/or production of livestock feeds would be highly desirable for use in a simulation model. Unfortunately, no internally consistent and integrated set of livestock supply parameters is available. However, Hassler [11], Shepherd et al [24] and Tweeten, Heady and Mayer [25] have developed procedures that incorporate feeding rates, phasing of commodity cycles, supply elasticities for individual livestock commodities and length of production periods to estimate the impact of changes in feed supplies and prices on production of the various livestock classes. Hassler used a set of equations to determine the equilibrium allocation of surplus feed production among livestock classes at a fixed price level for feed. Tweeten, Heady and Mayer implicitly allocated excess feed production resulting from an unrestricted production policy by determining the maximum rate of production expansion of various livestock categories consistent with livestock supply elasticities and expansion rates. Shepherd et al considered livestock supply elasticities feeding rates and length of feeding period in their allocation of estimated surplus feed grains resulting from a free market structure to the various classes of livestock.

A comparative analysis of these studies suggested that the difference between estimated and base concentrates fed to livestock would initially

Table 4. Demand equations for livestock and livestock products at the farm level, expressing prices as a function of quantity[1]

Log of Prices of	Logarithm of Quantities of						
	Cattle[2]	Hogs[2]	Sheep and Lambs[2]	Chickens[2]	Turkeys[2]	Eggs[3]	Milk[4]
Cattle[5]	—1.5862	—.2787	—.0363	—.1458	—.0248	—.0245	—.0283
Hogs[5]	—.4180	—2.3269	—.0478	—.1929	—.0331	—.0351	—.0407
Sheep and Lambs[5]	—.5026	—.4460	—.4832	—.1917	—.0317	—.0212	—.0243
Chickens[5]	—.4750	—.4205	—.0450	—1.4907	—.1375	—.0301	—.0347
Turkeys[5]	—.3112	—.2757	—.0295	—.5364	—1.1332	—.0265	—.0307
Eggs[6]	—.1018	—.0856	—.0068	—.0348	—.0087	—3.5000	—.0648
Milk[7]	—.0506	—.1189	—.0033	—.0172	—.0043	—.0230	—2.6390

[1]Source: Brandow, G. E., Interrelationships among demands for farm products and implications for control of market supply, Pennsylvania Agricultural Experiment Station Bulletin 680, 1961, [3].
[2]Million pounds slaughtered.
[3]Million dozen sold.
[4]Million hundred weight sold.
[5]Dollars per pound.
[6]Dollars per dozen.
[7]Dollars per hundredweight.

be allocated to livestock classes as follows: beef, 15 percent; pork, 55 percent; sheep and mutton, .5 percent; poultry meat, 19.5 percent; eggs, 5 percent; dairy, 5 percent; and other livestock, 0 percent. Hog, broiler and turkey production are assumed to exhibit the greatest initial response to changed feed supplies and prices. The production periods for hogs and poultry are short and grains make up a large proportion of their total rations. In the short run cattle expansion (contraction) is moderate, but adjustments in breeding stocks, feeding facilities, etc., allow marked changes in cattle production with the passage of time. In keeping with the implications of the Tweeten, Heady and Mayer analysis, the porportion of excess (deficit) concentrates allocated to cattle production is gradually adjusted so that after about seven years 40 percent of the surplus (deficit) feed is allocated to beef while 30 percent is allocated to pork.

Feed conversion rates for the various classes of livestock were adjusted slightly downward from their 1967-69 averages. Assumed levels of total concentrates fed per 100 pounds of liveweight production for the livestock classes are as follows: all beef, 245 pounds; pork, 480 pounds; sheep, 150 pounds; chickens, 300 pounds; turkeys, 475 pounds; milk, 944 pounds; and eggs, 600 pounds per 100 dozen. The base feeding rates were allowed to respond to changes in feed grain prices with an elasticity of $-.1$.

Production Expenses and Incomes

Each crop expense is calculated as the product of acreage and that crop's production expense per acre. Expenses per acre are adjusted for changes in own price with the same short run elasticities as are used for yield. In the long run these elasticities are tripled to reflect longer term adjustments including changes in the use of polyperiod inputs such as machinery.

Model Summary and Validity

The model developed in this study is a simple commodity-disaggregated policy model that incorporates the professions' best estimates of commodity supply and demand characteristics and a comprehensive set of projected supply and demand requirements for a future point in time. Unlike many highly aggregated models, the impacts of a policy change on production, price and income levels of major farm commodities are estimated by the model as well as the policy's effect on national farm income. No optimization assumptions are superimposed on the system. Commodity production, price and income levels are positivistically determined via the dynamic and interdependent supply and de-

mand structures. The validity of the model rests solely on the validity of the parameter estimates fed into the model and the accuracy of the base projections. Even though some of the parameter estimates used in the model are based on less than complete information, the synthetic development of the model allows the researcher to draw on the expertise of researchers who have spent months or years analyzing a supply or demand structure for a commodity or commodity group.

Simulation Results

Free Markets

A free market would exist in agriculture if the federal government terminated (a) acreage control programs and (b) ceased commodity purchase and storage activities designed to stabilize and support prices. Farmers' initial response to removal of government farm programs would be to increase crop acreage and production. The reasons for the increased production center on the economic incentives and price expectations of farmers. Each farmer views his production options independently. With voluntary production control programs for wheat, feed grains and cotton in effect, he receives compensation for idling cropland. Without such programs, and since in atomistic industry such as agriculture he cannot influence price, the agricultural producer tries to increase gross value of sales with the only instrument available to him; quantity produced. Hence, land formerly idled under government program provisions is brought into production. Also, there is a tendency for farmers to use prices received in the past as estimates of what prices will be in the future.

Such price expectations reinforce the farmer's belief that increasing quantity produced above levels possible under recent acreage diversion programs will enhance his income. As other farmers follow the same strategy, total output increases substantially and price expectations based on past prices do not materialize but rather prices decline sharply. With inelastic demand for farm commodities, the proportional drop in price would exceed the proportional increase in quantity sold and total returns would be reduced. The added output would require increased farmer outlay for production inputs resulting in even a larger decline in net returns. Estimates of the initial and longer term impacts of shifting from present programs to uncontrolled production are given below.

Short-Term Effects of a Free Market. As indicated earlier, the initial response to the elimination of crop acreage controls would be an increase in acreage planted to crops. The exact magnitude of increase is difficult to project. For example, acreage diverted under the feed grain program declined by 14.5 million acres between 1966 and 1967 but feed grain

harvested acreage increased by only 3 million acres from 1966 to 1967. Similarly, diverted feed grain acreage declined from 37.4 million in 1970 to 18.2 million in 1971 while harvested acreage increased by about 7 million acres. Assuming that nearly 40 million acres of feed grains would be diverted in 1973 with current programs in effect, the projected feed grain acreage without government controls is 120 million acres. This acreage level is about 20 million acres above the 1973 estimate with federal programs assumed to be in effect. Wheat acreage under free markets is projected to increase 12 million acres above the base 1973 acreage level of 47 million with government programs continued. Cotton acreage increases 3 million acres above recent levels of about 11 million acres.

Table 5 presents estimated free market production, price utilization and income levels for eleven major farm commodities for 1973 and 1974 assuming the termination of federal programs in 1973. Base variable estimates with the continuation of current programs are given for comparison.[1] National expense and income estimates are also presented.

The initial effect of a shift from present programs to free markets would be substantial increases in crop production levels and sharp reductions in crop price. With free markets, 1973 production levels would increase by 40 million tons for feed grains, 400 million bushels for wheat and 3.4 million bales for cotton. Crop prices drop considerably below recent levels. Wheat price declines to $.79 per bushel and feed grain price is $21.58 per ton. Cotton price declines to $.14 per pound. Soybean acreage and production decline slightly during the first year leaving soybean price near recent levels.

The substantial reductions in feed grain, wheat and cotton prices cause gross receipts from crops to decline by nearly $2.5 billion. Since livestock prices and incomes tend to lag crop prices by one or more production periods, livestock receipts are relatively uneffected the first year. The removal of government payments except under soil conservation, wool and sugar programs lowers total farm receipts by an additional $3.3 billion. While cash receipts would total much less than in recent years, cash outlay by farmers to produce the larger crop quantities would increase by $2.5 billion. The $5.8 billion reduction in market and federal receipts plus the $2.5 billion increase in production expenses results in a $8.3 billion reduction in net farm income during the first year of free markets.

During the second year of free markets, farmers respond to the new price environment by decreasing grain and cotton output and stepping up soybean production. In 1974, 7 million acres are shifted from grain and

[1] The base data for the study were developed from information available in the spring of 1972. The price and market developments after that time have not been incorporatd into the benchmark projections.

cotton production to the production of soybeans. Also with lower grain prices, agricultural producers reduce usage of fertilizer and other operating inputs which causes yields to decline from 2.01 to 1.93 per acre for feed grains and from 33 to 32 bushels per acre for wheat. These short-term adjustments reduce grain output but production still exceeds utilization demands at recent price levels. The price of feed grains is $28.72 per ton, while the price of wheat increases nine cents above its first year level at $.88 per bushel. The 200 million bushel increase in soybean production during the second period lowers the soybean price to $2.14 per bushel.

As the first year effects of free markets on crop production and price become evident, farmers expand their livestock operations to utilize the large quantities of cheap feed. These additional livestock supplies begin to reach the market during the second year of free markets or 1974. Estimated free market hog production in 1974 is 2 billion pounds or 8.7 percent above the base 1974 level. Poultry production increases by about 7 percent while cattle and calf production is up nearly 3 percent or about 1 billion pounds. The larger livestock marketings push livestock prices downward. Hog prices would average about $17 per hundredweight and cattle and calves about $26 per hundredweight. Chicken and turkey prices would be $11 and $18 per hundredweight respectively.

Hence, livestock producers are not immune from the downward pressure on prices and incomes resulting from a shift from current farm programs to free markets. Livestock gross returns are $2.3 billion below 1974 base livestock income estimates in which current farm programs are assumed to continue. Hog receipts exhibit the largest percentage decline at 14 percent. Gross income from the sale of cattle and calves is about $1 billion below the base 1974 level of $17 billion.

Livestock price and income reductions drive total gross and net farm income below their levels in the initial year of free markets. Net farm income in the second year of free markets is $7.5 billion which is well below any recently experienced levels.

Long-Term Effects of Free Markets. Expanded crop and livestock production the first years of a free market sharply depress farm prices and incomes. Agriculture would be under a severe financial strain. Many producers, unable to continue their farming operations, would liquidate their land and machinery holdings and seek off-farm employment. Land abandonment may result in the marginal cropland areas, but in most regions the more efficient and financially secure farmers would add the extremely depressed priced land to their operation. The decline in land prices relative to fertilizer and other yield increasing inputs would cause farmers to reverse somewhat the substitution of yield augmenting inputs for land.

Table 5. Production, prices, utilization and market receipts by commodity class and net farm income with free markets in 1973, base projections and estimates for 1973, 1974 and 1980

Item	Unit	1973 Base Projections	1973 Free Market Estimates	1974 Base Projections	1974 Free Market Estimates	1980 Base Projections	1980 Free Market Estimates
Production							
Feed Grains	Mil. tons	202.6	242.6	208.2	227.2	240.3	262.9
Wheat	Mil. bu.	1682.8	2077.2	1588.5	1853.2	1547.0	1863.6
Soybeans	do.	1307.5	1302.7	1356.5	1516.9	1650.0	1812.5
Cotton	Mil. R. bales	11.5	14.9	11.6	13.0	11.9	13.6
Cattle and Calves	Mil. live lbs.	43111.0	43111.0	44354.0	45372.0	51812.0	54449.8
Pork	do.	23415.2	23415.2	23658.8	25710.4	25120.0	26067.8
Sheep and Mutton	do.	966.0	966.0	930.0	990.8	714.0	775.6
Chickens	do.	12919.7	12919.7	13357.0	14202.2	15981.0	16725.4
Turkeys	do.	2403.0	2403.0	2473.5	2672.5	2896.0	3078.4
Eggs	Mil. doz.	6070.7	6070.7	6120.9	6311.4	6422.0	6614.7
Milk	Mil. lbs.	118075.5	118075.5	117793.2	117942.1	116100.0	116250.0
Prices							
Feed Grains	$/tons	40.00	21.58	40.00	28.72	40.00	31.21
Wheat	$/bu.	1.40	.79	1.35	.88	1.30	.95
Soybeans	$/bu.	3.00	3.03	3.00	2.14	3.00	2.70
Cotton	$/lb.	.23	.14	.24	.13	.25	.21
Cattle and Calves	$/cwt.	29.90	29.92	30.15	25.89	31.50	28.24
Hogs	do.	22.35	22.36	22.50	17.33	23.50	20.55
Sheep and Lambs	do.	24.30	24.32	24.70	22.36	27.45	24.82
Chickens	do.	13.30	13.30	13.40	11.32	14.00	12.28
Turkeys	do.	21.90	21.90	21.75	18.32	21.00	18.36
Eggs	$/doz.	.32	.32	.32	.28	.33	.29
Milk	$/cwt.	6.30	6.28	6.45	6.35	7.50	7.41
Total Concentrates Fed	Mil. tons	196.4	207.8	201.3	206.2	230.0	241.2
Feed Grains	do.	155.3	166.4	159.8	165.5	186.0	197.0
Wheat	do.	5.6	5.9	5.4	6.2	4.0	4.3
Other	do.	35.5	35.5	36.1	34.4	40.0	39.9

Table 5. (Cont'd.)

Item	Unit	1973 Base Projections	1973 Free Market Estimates	1974 Base Projections	1974 Free Market Estimates	1980 Base Projections	1980 Free Market Estimates
Other Domestic Utilization							
Feed Grains	Mil. tons	17.0	17.0	17.4	17.4	19.3	19.3
Wheat (including food)	Mil. bu.	605.0	620.8	614.9	648.9	674.7	701.5
Soybeans	Mil. bu.	831.0	828.4	855.0	939.9	1000.0	1059.7
Cotton	Mil. bales	8.2	8.9	8.2	9.6	8.5	9.6
Exports							
Feed Grains	Mil. tons	29.3	34.7	30.1	37.1	35.0	47.5
Wheat	Mil. bu.	900.0	1056.6	800.0	1098.0	740.0	1038.4
Soybeans	Mil. bu.	475.0	472.9	500.0	570.4	650.0	744.2
Cotton	Mil. bales	3.3	3.8	3.4	4.2	3.5	4.5
Total Crop Marketings	Mil. dol.	24105.5	21526.5	24696.1	21738.5	28958.2	27780.5
Feed Grains	do.	4618.6	2984.6	4747.0	4044.6	5478.8	4677.3
Wheat	do.	2190.9	1528.0	1994.4	1433.1	1870.3	1646.0
Soybeans	do.	3844.0	3864.0	3988.1	3175.0	4851.0	4788.0
Cotton	do.	1335.9	1036.0	1401.9	883.0	1500.9	1412.0
Total Livestock Marketings	Mil. dol.	33777.6	33780.0	34787.0	32439.0	41002.4	38716.4
Cattle and Calves	do.	16393.2	16394.2	17008.7	16094.0	20853.8	19646.9
Hogs	do.	5200.7	5201.7	5296.4	4428.9	5887.3	5343.7
Sheep and Lambs	do.	300.0	301.0	294.1	282.9	249.8	245.4
Chickens	do.	1924.3	1924.3	2004.1	1797.1	2502.8	2297.4
Turkeys	do.	523.9	523.9	536.1	487.1	605.3	562.4
Eggs	do.	1885.2	1885.2	1913.0	1731.6	2083.1	1896.1
Milk	do.	7220.8	7220.8	7409.3	7291.3	8520.3	8424.5
Total Government Payments	Mil. dol.	3735.5	400.0	3775.0	400.0	4000.0	400.0
Feed Grains	do.	1581.3	0.0	1612.5	0.0	1800.0	0.0
Wheat	do.	881.2	0.0	887.5	0.0	925.0	0.0
Cotton	do.	875.0	0.0	875.0	0.0	875.0	0.0
Other	do.	400.0	400.0	400.0	400.0	400.0	400.0
Total Farm Receipts	Mil. dol.	61620.6	55706.5	63258.1	54577.5	73960.6	66896.0
Farm Prerequisites	do.	5023.8	5016.8	4928.4	4884.6	4398.0	4364.0
Total Gross Farm Income	do.	66644.4	60723.3	68186.4	59462.1	78358.6	71260.9
Production Expenses	do.	48275.7	50710.8	50430.8	52000.2	60598.9	62520.9
Net Income	do.	18368.7	10012.5	17755.7	7461.9	17759.7	8740.1

Feed grain acreage in 1980, eight years after the initiation of free markets, is 15 million acres above the 1980 continuation of present programs estimate of 104 million acres. Yield per harvested feed grain acre is over 6 percent below the base 1980 yield projection. Wheat acreage stabilizes near 55 million acres while soybean acreage is near 60 million. Yields decline by 4 percent for wheat and 2 percent for soybeans from their base 1980 levels. Cotton yield declines 5 percent while cotton acreage is projected at 13 million acres.

Table 5 presents the 1980 production price and income estimates that result from the longer term land and resource-use adjustments. The 1980 estimates reflect agriculture's economic position after farmers have had eight years to adjust to an unrestricted production policy. Crop prices recover somewhat from their low levels of the first year of free markets but remain below recent levels. The price of wheat is estimated to stabilize near a long term level of $.95 per bushel with feed grain prices at $31 per ton. Prices for the various classes of livestock are about $3 per hundredweight below their base 1980 levels. Total livestock marketings are $2.3 billion below current program estimates for 1980. Over one-half of the decline in livestock receipts is attributable to the lower value of cattle and calf sales.

Even with lower feed prices, livestock production expense to produce the increased livestock supplies are up $.5 billion or 1.7 percent. Lower crop receipts and no acreage diversion or price support payments for major crops reduce total farm receipts even further below base 1980 estimates. Farm industry adjustments to the free market economy results in a slight improvement in net farm income over the 8 year period. But the $8.7 billion net income projection is far below any recently experienced levels.

General Cropland Retirement Programs

Land diversion provisions of recent farm programs have been used to restrict output, and to support farm prices and incomes. Farmers receive direct payment for annually agreeing to withdraw land from feed grain, wheat and cotton production. Some feel the time horizon of land withdrawal should be lengthened and should not be restricted to three crop categories. They argue that a long-term general cropland retirement program could provide a permanent resource adjustment in agriculture and do so at a lower cost than annual land retirement programs. It is assumed that under such a long-term program the nation's least productive cropland would be put to less intensive uses. Government costs per acre of land retired would be less than under current programs due to lower average profit margins on the less productive land the longer time

horizon. Given the opportunity to retire land for an extended time, some farmers may decide to liquidate their machinery inventory and discontinue their farming operation. Such a liquidation of fixed costs would reduce payment schedules required for land withdrawals.

Conceptually a long-term land retirement program seems superior to annual land withdrawal programs in that excess land resources are permanently removed from agricultural production. However, the mix of specific crop acreages removed from production is of as much importance as the level of acreage withdrawn. Under recent programs the withdrawal of feed grains, wheat or cotton acreage can be altered to meet sudden changes in supply or demand by adjusting payment rates. With a long-term general cropland retirement program, no short-term fine tuning of specific crop acreages is possible. Hence severe production imbalances could occur which, in the absence of price support feature of current programs, would result in large price fluctuations.

In addition to the year to year uncertainties of supply and demand, the economic health of agriculture during the first years of a general land retirement program depends largely on the criterion used to withdraw land from production. Zepp and Sharples [30] estimated the first year production levels of major crops under two retirement criterion; an acreage criterion and a production criterion. With the acreage criterion, the Government seeks to retire cropland at the lowest retirement payment per acre; this cropland has the lowest net return per acre above variable cash cost. The government would sign contracts with farmers offering their cropland for retirement at the lowest payment per acre before signing with farmers offering their cropland at higher rates.

With the production criterion, the Government seeks to retire cropland on which the greatest reduction in production per dollar of program payment can be obtained; this cropland has the highest variable cash cost per dollar of grass value of product. Selecting the land to be retired involves dividing the gross value of production per acre by net return per acre. The Government would sign contracts with farmers with the highest ratio of gross to net per acre receipts before signing with farmers with lower ratios.

Part-farm and whole-farm retirement programs are analyzed by Zepp and Sharples under the acreage and production criterion. Under the acreage criterion, cropland retirement is concentrated in small grain crops in the Great Plains, Southern Plains and Southwest. This retirement pattern results in a production mix that is long on feed grains. The production criterion yields a more balanced withdrawal of feed grain and wheat acreage and a production mix more nearly in line with expected use levels.

The USDA study and most other analyses of long-term land retirement programs assume recent crop price levels and focus on the first-year farmer response to a general cropland withdrawal program. The implications of production mix imbalances resulting from the initiation of the program are not usually investigated. Adjustments in the livestock sector are often ignored even in first-year analyses of retirement program. The model developed in this study is used to estimate the short-run and longer run price and income effects of a projected production imbalance resulting from a 70 million acre whole farm general land retirement.

Since the acreage criterion is most often discussed and since it results in a larger production imbalance than the production retirement criterion, the acreage criterion of land retirement is assumed. The first-year crop production estimates are based on the results of Zepp and Sharples' analysis of instituting a 70 million-acre whole-farm retirement program in 1970. With such a program, Zepp and Sharples estimated 1970 production levels of 192 million tons of feed grains, 1,104 million bushels of wheat, 927 million bushels of soybeans and 14.4 million bales of cotton. These estimated production levels were divided by their respective expected yields to obtain implied 1970 acreage levels for the four crops. The resulting acreages in millions (with actual 1970 acreages in parentheses) are: 104.9 (99.1) for feed grains, 35.6 (44.2) for wheat, 34.5 (41.9) for soybeans and 14.34 (11.2) for cotton.

Given the assumed crop price relationships projected for 1973 and the results of the Zepp and Sharples study, it is assumed in this study that in the first year of the 70 million acre general cropland retirement program feed grain and cotton acreage would increase 5.7 and 3.1 million acres respectively while wheat and soybean acreage would decline 8.6 and 6.0 million acres. Farmer participation in the cropland retirement program would be voluntary. Government contracts for the retirement of cropland would be offered on a bid basis with government payments per acre designed to equal net returns above production costs plus a $2 allowance for mowing and other weed control measures.

Short-Term Effects of a 70 Million Acre Land Retirement Program. With 70 million acres retired, 1973 production estimates for feed grains and cotton are above base levels while soybean and wheat production estimates are short of their 1973 base levels. Estimated total feed grain production in 1973 is 214 million tons, or about 7 percent above the expected 1973 level with present programs continued (Table 6). Cotton production is estimated at 14.6 million bales or about 28 percent above the base 1973 production level. Wheat and soybean production estimates are 1,398 and 1,094.1 million bushels respectively or about 16 percent below expected 1973 production levels with current programs in effect.

This imbalance in the production mix causes the prices of the major crops to deviate considerably from their expected 1973 levels.

A shift from present feed grain, wheat and cotton programs to a 70 million acre whole-farm land retirement program in 1973 would raise soybean and wheat prices $.81 and $.43 per bushel above 1973 "present program" levels of $3.00 and $1.40 per bushel, respectively. Cotton price declines to $.14 per pound and the price of feed grains declines $5.00 below the base 1973 price of $40 per ton.

Crop income levels are above free market levels but the total value of crop sales is below the estimated level with a continuation of current programs in 1973. Livestock prices and incomes the first year vary little due to the lag between crop and livestock production. Government payments total $1.6 billion with $1.2 billion being the cost of the long-term land retirement program. Net income during the first year of the 70 million acre land retirement program is estimated at $15.8 million.

In 1974, the second year of a 70 million acre land retirement program, the imbalance in the crop production mix is less severe but livestock producers are faced with lower prices as the larger livestock production precipitated by increased 1973 quantities of lower priced feed reach the market. In response to 1973 crop price relationships, farmers allocate fewer resources to feed grain and cotton production and more resources to higher priced crops such as soybeans. Soybean production increases by nearly 300 million bushels over 1973 which is only 18 million bushels short of its base 1974 level. Feed grain production is estimated at 211 million tons or about 3 million tons above the 1974 production level with present programs continued. Cotton production is down 2 million bales from the 1973 long-term land retirement level of 14.6 million bales. While wheat production is short of its base 1974 level, the difference between base and estimated output narrows by 100 million bushels between 1973 and 1974. Crop prices also move toward present program levels. Feed grain price is $37.75 per ton and estimated price of soybeans is $3.10 per bushel. The price of wheat is $.31 above its 1974 base level of $1.35 per bushel. However, the price of cotton in 1974 recovers very little from its 1973 level due in part to increased 1973 ending year stocks.

The expanded livestock production resulting from increased supplies of lower priced grains in 1973, increases livestock marketing in 1974. The increased supplies exert downward pressure on livestock prices. Livestock prices in 1974 are $1.50 to $2.00 per hundredweight below expected 1974 price levels with present programs continued except for the price of hogs which is $3.78 per hundredweight lower. Gross livestock receipts also decline due to the inelastic nature of demand. As was

Table 6. Production, prices, utilization and market receipts by commodity class and net farm income with a 70 million acre long-term land retirement program initiated in 1973, base projections and estimates for 1973, 1974 and 1980.

Item	Unit	1973 Base Projections	1973 Estimates Land Retirement Program	1974 Base Projections	1974 Estimates Land Retirement Program	1980 Base Projections	1980 Estimates Land Retirement Program
Production							
Feed Grains	Mil. tons	202.6	214.0	268.2	211.1	240.3	243.4
Wheat	Mil. bu.	1682.8	1398.6	1588.5	1384.5	1547.0	1390.2
Soybeans	do.	1307.5	1094.1	1356.5	1388.1	1650.0	1624.9
Cotton	Mil. R. bales	11.5	14.6	11.6	12.6	11.9	13.0
Cattle and Calves	Mil live lbs.	43111.0	43111.0	44354.0	44839.9	51812.0	54377.6
Pork	do.	23415.0	23415.2	23658.8	25098.0	25120.0	25924.1
Sheep and Mutton	do.	966.0	966.0	930.0	977.4	714.0	763.4
Chickens	do.	12919.7	12919.7	13357.0	14019.4	15981.0	16658.5
Turkeys	do.	2403.0	2403.0	2473.5	2625.2	2896.0	3051.0
Eggs	Mil. doz.	6070.7	6070.7	6120.9	6249.6	6422.0	6549.5
Milk	Mil. lbs.	118075.5	118075.5	117793.2	117893.8	116100.0	116199.3
Prices							
Feed Grains	$/tons	40.00	35.08	40.00	37.75	40.00	38.96
Wheat	$/bu.	1.40	1.83	1.35	1.66	1.30	1.53
Soybeans	$/bu.	3.00	3.81	3.00	3.10	3.00	3.11
Cotton	$/lb.	.23	.14	.24	.15	.25	.21
Cattle and Calves	$/cwt.	29.90	29.92	30.15	28.01	31.50	28.41
Hogs	do.	22.35	22.36	22.50	18.75	23.50	20.94
Sheep and Lambs	do.	24.30	24.32	24.70	22.85	27.45	25.18
Chickens	do.	13.30	13.30	13.40	11.77	14.00	12.44
Turkeys	do.	21.90	21.90	21.75	19.09	21.00	18.69
Eggs	$/doz.	.32	.32	.32	.29	.33	.30
Milk	$/cwt.	6.30	6.28	6.45	6.38	7.50	7.42

Table 6. (Cont'd.)

Item	Unit	1973 Base Projections	1973 Estimates Land Retirement Program	1974 Base Projections	1974 Estimates Land Retirement Program	1980 Base Projections	1980 Estimates Land Retirement Program
Total Concentrates Fed	Mil. tons	196.4	204.1	201.3	205.0	230.0	238.7
Feed Grains	do.	155.3	163.6	159.8	163.5	186.0	194.6
Wheat	do.	5.6	5.0	5.4	5.8	4.0	4.0
Other	do.	35.5	35.5	36.1	35.7	40.0	40.1
Other Domestic Utilization							
Feed Grains	Mil. tons	17.0	17.0	17.4	17.4	19.3	19.3
Wheat (including food)	Mil. bu.	605.0	581.0	614.9	588.8	674.7	655.3
Soybeans	Mil. bu.	831.0	752.5	855.0	805.8	1000.0	971.8
Cotton	Mil. bales	8.2	9.0	8.2	9.5	8.5	9.5
Exports							
Feed Grains	Mil tons	29.3	30.7	30.1	31.3	35.0	36.4
Wheat	Mil. bu.	900.0	790.2	800.0	653.3	740.0	581.4
Soybeans	Mil. bu.	475.0	410.0	500.0	443.6	650.0	596.1
Cotton	Mil. bales	3.3	3.9	3.4	4.3	3.5	4.5
Total Crop Marketings	Mil. dol.	24105.5	22427.5	24696.1	23020.4	28958.2	28182.6
Feed Grains	do.	4618.6	4279.9	4747.0	4542.3	5478.8	5405.8
Wheat	do.	2190.9	2376.6	1994.4	2137.1	1870.3	1974.3
Soybeans	do.	3844.0	4085.2	3988.1	4064.3	4851.0	4955.3
Cotton	do.	1335.9	1008.0	1401.9	979.3	1500.9	1443.2
Total Livestock Marketings	Mil. dol.	33777.6	33780.0	34787.0	32968.8	41002.4	38981.4
Cattle and Calves	do.	16393.2	16394.2	17008.7	16229.1	20853.8	19742.0
Hogs	do.	5200.7	5201.7	5296.4	4676.4	5887.3	5412.8
Sheep and Lambs	do.	300.0	301.0	294.1	285.2	249.8	245.0
Chickens	do.	1924.3	1924.3	2004.1	1843.2	2502.8	2318.8
Turkeys	do.	523.9	523.9	536.1	498.7	605.3	567.4
Eggs	do.	1885.2	1885.2	1913.0	1788.7	2083.1	1955.1
Milk	do.	7220.8	7220.8	7409.3	7322.0	8520.3	8440.5
Total Government Payments	Mil. dol.	3737.5	1619.0	3775.0	1619.0	4000.0	1619.0
Feed Grains	do.	1581.3	:	1612.5	:	1800.0	:
Wheat	do.	881.2	1219.0	887.5	1219.0	925.0	1219.0
Cotton	do.	875.0	:	875.0	:	875.0	:
Other	do.	400.0	400.0	400.0	400.0	400.0	400.0
Total Farm Receipts	Mil. dol.	61620.6	57826.4	63258.1	57608.2	73960.6	68783.0
Farm Prerequisites	do.	5023.8	5016.8	4928.4	4892.6	4398.0	4367.0
Total Gross Farm Income	do.	66644.4	62843.3	68186.4	62500.8	78358.6	73150.2
Production Expenses	do.	48275.7	46984.0	50430.8	49640.9	60598.9	60286.0
Net Income	do.	18368.7	15859.3	17755.7	12859.9	17759.7	12864.2

evident in the free market results presented earlier, farm policy changes that directly effect the crop sector of agriculture also have important implications for the economic health of the livestock industry.

Income levels in 1974 are again higher than free market levels but the 70 million acre land retirement program is estimated to provide about $5 billion less net income than with the continuation of present programs through 1974. Part of the decline in net income is attributable to $2.1 billion reduction in government payments. Increased livestock output and crop production imbalances also depress cash receipts as prices decline by more than production levels increase.

Long-Term Effects on 70 Million Acre Land Retirement Programs. Table 6 persents 1980 estimates of commodity production, price and income levels with a 70 million acre whole-farm general land retirement program initiated in 1973. The estimated price of feed grains is $38.96 per ton compared with $40 per ton with present programs continued to 1980. The cotton price estimate of $.21 per pound is also below the base 1980 estimate of $.25 per pound. Wheat and soybean prices in 1980 are $1.53 and $3.11 per bushel compared with present program estimates of $1.30 and $3.00 per bushel respectively.

Livestock supplies continue to be above base estimates in 1980 which exerts downward pressure livestock prices. The estimated price for cattle and calves is $28.41 per cwt. in 1980 and the price of hogs is $20.94 per cwt. These price estimates are above actual 1967-69 average levels of $24.21 per cwt. for cattle and calves and $19.85 per cwt. for hogs but are below estimates for 1980 under assumed supply and demand conditions with extension of present programs throughout the rest of the decade. The larger livestock supplies do not offset the price declines and gross receipts from livestock sales is about $2 billion below the base 1980 estimate. Net farm income is projected to stabilize at about $12.9 billion with a 70 million acre general cropland retirement program using the acreage criterion for withdrawing land.

Summary and Conclusions

This study explores the production, price and income implications of a) terminating present federal farm programs and reverting to free agricultural markets, and b) shifting from present programs to a 70 million acre general cropland retirement program. Benchmark estimates of commodity variable levels based on projections made by the United States Department of Agriculture, with present programs continued through 1980, were used in the development of the model. These base estimates were also used as a standard for analyzing the results of the free market and cropland retirement policies.

The free market results show substantial declines in prices and income for feed grains, wheat and cotton; crops that have been expressly shielded from price and income disasters with specific governmental programs. But the effects of eliminating these programs reaches far beyond individual crop sectors. A blanket of low prices and incomes is thrown on the industry with the termination of the crop programs.

Even though there is no direct governmental intervention in the cattle, hog and poultry markets, the termination of federal programs would nonetheless adversely effect livestock prices and incomes. Larger crop output following a shift from present programs to free markets not only reduces crop prices and incomes but also encourages expanded livestock production which in turn lowers price and income levels for livestock producers. While market and government receipts decline, farmer outlay to produce the larger output increases somewhat which drives net farm income far below recently experienced levels. Even eight years after the initiation of free markets crop and livestock prices and incomes would still be well below recent levels.

The impact of a general land retirement program on commodity price and income levels depends not only on the quantity of land retired but also on the production mix that results from the land remaining under cultivation. This study estimates the effects on a 70 million acre general land retirement program on the crop and livestock industries. Under the specific program investigated, the first-year production mix is long on feed grains and cotton and short on wheat and soybeans. Over the eight year period analyzed, the range between crop production and price levels under the general retirement program and projected present program levels narrows, but feed grain and cotton prices remain below and wheat and soybean prices remain above the benchmark estimates.

Livestock prices and incomes are pressured downward as livestock producers utilize the expanded quantities of lower priced grains. Net farm income under the general land retirement program stabilizes near $13 billion.

The results of the cropland retirement analysis implies that even a reasonable precise apriori estimate of needed cropland retirement which would balance *aggregate* farm output and demand may create large production and price fluctuations for individual commodities and, in the case of over production of grains, cause a scaling down of livestock prices as well as grain prices. A general cropland retirement program may be a cheap permanent solution to the farm problem. However, if it is to have the desired effect, land withdrawal criteria, payment schedules and other program details must be researched as carefully as the target retirement acreage.

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