SHORT AND LONG TERM EFFECTS OF THE FOOD SECURITY ACT OF 1985 VERSUS A COMMODITY SUPPLY MANAGEMENT PROGRAM ON THE U.S. LIVESTOCK SECTOR

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Although the Food Security Act of 1985 (FSA85) was signed into law little more than one year ago, proponents of alternative farm policies have advocated significant changes in the program provisions. One group includes supporters of legislation recently reintroduced by Senator Harkin and Representative Gephardt titled "Save the Farm Family Act". The Harkin-Gephardt proposal is a commodity supply management program (CSMP) which requires strict crop (and dairy) production controls in order to allow supply and demand to balance at prices that are 71 percent of parity in 1987 and increase to 80 percent of parity by 1996.

In the past, the livestock industry (not including dairy) have not played an active lobbying role in attempting to shape farm policy. However, the livestock sector is directly affected by policies which promote or depress crop production through lower or higher feed costs. Consequently, analyses which investigate the effects of alternative farm programs on the livestock sector should provide useful information for policy positions by the various livestock groups on proposed legislation. Because of the high feed cost ramifications associated with the parity-oriented proposal, ignoring the impacts on the livestock sector could generate an inaccurate picture of the program's benefits and costs. A recent study emphasized the effects of alternative farm policies on the crops sector but discussed only general implications on the livestock sector (Knutson, et al.; Young). This paper contrasts the near and long term impacts on the livestock industry of the FSA85 and CSMP. Macroeconomic assumptions and program parameters are described followed by a brief discussion of the econometric model and simulation procedures used in

the analysis precedes. The empirical results and their implications to producers of livestock and consumers of meat complete the paper.

ASSUMPTIONS OF THE PROGRAMS

The macroeconomic factors affecting U.S. agriculture were obtained from Wharton Econometric Forecasting Associates. Those assumptions for both scenarios include real U.S. economic growth averaging 3 percent in 1987 and 1988 with the possibility of a recession thereafter. Growth in the other countries of the world average 3 to 5 percent annually. The federal deficit declines over the period of analysis to less than $100 billion in 1995. For FSA85, commodity loan rates continue lower through 1991 before rising modestly. Paid diversions and the conservation reserve (45 million acres) are utilized. For CSMP, four important parameters shaped the analysis. (1) Prices for the major crop commodities and dairy are set at 71 percent of parity in 1987 and increased one percent per year to 80 percent. (2) A world export cartel, part of the proposed legislation, maintains trade shares at parity prices. (3) Imports restrictions are imposed on all crops and dairy products. (4) For a 3 year transition period, livestock producers may purchase feed grain from CCC stocks starting at CCC acquisition cost rising to parity prices for the 1990/91 crop year, up to a $50,000 limit. Livestock producers may not feed over-quota production.

DESCRIPTION OF THE ECONOMETRIC MODEL

An econometric model of the U.S. and international agricultural economies was used in the analysis to quantify the expected impacts. Domestic models included key behavioral equations for acreage, production, stocks, exports, feed and food use for crops (corn, wheat, soybeans, barley, rice, cotton, oats, and sorghum) and for breeding herd, production, inventories, prices

and consumption for livestock (beef, pork, chickens, eggs, turkey) and dairy. The commodity models were developed by the Food and Agricultural Policy Research Institute (FAPRI) to provide long term forecasts and examine the effects of alternative policy proposals. Detailed documentation of these models is provided in CARD Staff Reports 86-SR1, 86-SR2, 86-SR3, and CNFAP Reports 85-5, and 85-9.

While interest in this paper focuses on the livestock sector, the major differences in the two programs evolve from the crops side. An important objective of the FSA85 was to reduce government involvement in the pricing of domestic and international agricultural markets. Price supports are reduced. Conversely, the CSMP increases commodity prices sharply but controls production to balance estimated domestic and export demand. Because feed is a major cost of livestock production, changes in these costs can dramatically affect production response in the livestock sector. For FSA85, corn and soybean (and meal) models were solved in conjunction with the livestock models. This generated a stream of crop prices consistent with feed demand by the livestock sector. For CSMP, mandated parity prices for corn and soybeans (and from that, the processed meal) were imposed on the livestock sector. In 1987, the prices of feed components under CSMP were more than double those under FSA85 (even with the transition period feed purchase program) and continued sharply higher throughout the period of analysis.

EMPIRICAL RESULTS

The econometric models were run over the period 1986-1995 for FSA85 and for CSMP. The results suggest sharply differing production, consumption, and price paths under the alternative policy options (Table 1). Under FSA85, beef and pork production would follow cyclical patterns

TABLE 1 COMPARISON OF THE FOOD SECURITY ACT OF 1985 (FSA 85) AND THE AGRICULTURAL COMMODITY SUPPLY MANAGEMENT PROGRAM (PARITY)

Commodity and Variable	Source	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
BEEF												
Omaha Price	FSA 85	58.31	58.00	64.95	68.55	70.00	67.90	64.70	60.70	57.20	54.50	55.00
($/cwt)	Parity	---	---	---	57.32	60.94	69.56	71.46	74.06	80.57	77.20	78.00
Commercial Production	FSA 85	23,723	24,174	22,000	20,240	19,630	20,020	20,620	21,240	21,770	22,205	21,985
(million lbs)	Parity	---	---	---	22,429	21,656	19,855	19,038	18,106	17,032	17,292	16,918
Per Capita Consumption	FSA 85	79.10	79.80	73.20	67.40	64.80	65.10	66.10	67.30	68.20	68.90	67.80
(lbs retail weight)	Parity	---	---	---	73.80	70.50	64.30	61.50	58.40	55.30	55.50	54.30
Retail Price	FSA 85	2.37	2.38	2.66	2.90	2.98	2.89	2.79	2.66	2.56	2.48	2.57
($/lb)	Parity	---	---	---	2.48	2.64	3.00	3.08	3.19	3.35	3.30	3.39
CHICKEN												
Wholesale Price, 12 City	FSA 85	0.57	0.55	0.53	0.49	0.48	0.46	0.44	0.42	0.40	0.39	0.40
($/lb)	Parity	---	---	---	0.48	0.52	0.57	0.60	0.58	0.66	0.67	0.68
Production, Broiler	FSA 85	13,762	14,298	15,264	15,934	16,385	16,875	17,415	17,940	18,300	18,760	18,570
(million lbs)	Parity	---	---	---	15,452	16,144	17,265	17,689	18,770	18,791	19,501	19,579
Per Capita Consumption	FSA 85	54.90	56.80	60.20	61.90	62.90	63.70	64.70	66.00	66.40	66.90	65.30
(lbs retail weight)	Parity	---	---	---	60.00	61.90	65.20	65.80	69.20	68.40	69.80	69.20
Retail Price	FSA 85	0.78	0.79	0.74	0.72	0.71	0.69	0.68	0.66	0.66	0.65	0.67
($/lb)	Parity	---	---	---	0.72	0.77	0.81	0.85	0.84	0.90	0.91	0.92
PORK												
7 Market Price	FSA 85	44.84	51.40	51.90	45.00	37.00	30.00	35.00	40.00	46.50	44.00	41.00
($/cwt)	Parity	---	---	---	36.87	45.04	53.87	59.67	61.40	60.50	58.00	59.00
Commercial Production	FSA 85	14,803	14,097	13,850	15,060	16,260	17,310	15,925	14,810	13,920	14,616	15,350
(million lbs)	Parity	---	---	---	15,312	13,802	12,454	11,321	11,287	11,346	11,634	11,509
Per Capita Consumption	FSA 85	62.80	59.60	58.70	63.20	66.40	68.70	63.00	58.50	55.00	56.60	58.40
(lbs retail weight)	Parity	---	---	---	64.10	58.30	52.50	47.30	47.00	46.50	47.00	46.00
Retail Price ($/lb)	FSA 85	1.62	1.72	1.78	1.63	1.55	1.49	1.62	1.73	1.84	1.76	1.69
	Parity	---	---	---	1.43	1.69	1.98	2.20	2.33	2.40	2.45	2.50
Total Expenditures	FSA 85	331.82	337.27	343.64	342.94	340.22	334.76	330.39	323.84	319.56	314.01	316.37
($ per capita)	Parity	---	---	---	317.82	332.12	349.64	349.26	354.16	358.61	361.80	362.74
Total Per Capita Consumption	FSA 85	196.80	196.20	192.10	192.60	194.20	197.50	193.70	191.90	189.70	192.40	191.50
(lbs)	Parity	---	---	---	197.90	190.70	182.00	174.50	174.60	170.20	172.30	169.50
Aggregate Meat Price	FSA 85	1.69	1.72	1.79	1.78	1.75	1.69	1.71	1.69	1.68	1.63	1.65
($/lb)	Parity	---	---	---	1.61	1.74	1.92	2.00	2.03	2.11	2.10	2.14

consistent with the past two decades and reflecting a policy that differs marginally from the 1977 and 1981 farm bills. Relative to FSA85, the shift to a parity-oriented pricing scheme for feed grain and protein commodities will result in two major changes in the beef sector. First, high feed prices will cause a sharp and immediate liquidation of the cattle herd, increasing production in the short run but reducing the potential for production in the long run. By the end of the 10 year analysis period, the cattle herd would be at or below 70 million head under CSMP relative to 94 million under FSA85. Beef production would be less than 17 billion pounds (23 percent below FSA85). Second, a major shift in the type of meat produced would occur concurrently with the shift toward less production. As feed costs increase toward 80 percent of parity, producers would shift away from grain-fed animals and utilize available forage to a greater extent. Non-fed beef slaughter would rise sharply in the early years of the analysis period due to liquidation of cows and the shift away from fed beef.

The short run effects on the beef industry of the two policy options are almost diametrically opposed. Under FSA85, low and falling crop prices generate substantial profits to cow-calf and feed lot operators and encourages expansion of the breeding herd in the initial years of the analysis. Production then expands throughout the analysis. Under CSMP, the signals to the beef industry are to contract immediately based on short term losses due to increased feed costs. Because of the biological lag involved in beef production, once a substantial portion of the cattle herd is liquidated (as is the case in the CSMP scenario), the potential for future production at pre-1986 levels is virtually eliminated.

The adoption of a parity program would ultimately result in a restructuring of the type of beef animal used in grain feeding. Feeder cattle

would be purchased at higher weights (than under the current policy program) and weight gain from grain would be reduced because of prohibitively high feed costs. The long run adjustment costs to develop an animal that required lesser amounts of grain and protein yet grade in the choice category would be substantial, but are excluded from this analysis.

The sharp liquidation of cattle in 1988 and 1989 under CSMP would reduce prices and increase per capita consumption relative to FSA85 (Figure 1). However, farm prices would then rise sharply in 1990 and continue higher through 1995 to more than 40 percent above FSA85. The traditional relationship between finished (9-11 Omaha price) and feeder (6-7 Kansas City price) cattle prices would invert. Because of higher feed costs, feed lot operators would bid down the price of feeders (6-7 Kansas City) below that for their finished animals. These price reductions would provide additional incentive for cow-calf operators to reduce herd size. Beef consumption is higher in 1988 and 1989 under CSMP relative to FSA85 but then falls to 55 pounds per capita by 1995, almost 30 percent below FSA85 (Figure 1).

Although hogs are relatively more efficient converters of feed grains to meat than are beef, pork does not benefit from the ability to convert forage to weight gain as does the beef industry. The effects of rising feed costs under CSMP are sharp and immediate. The breeding herd size declines by 10 percent in 1988 and an additional 10 percent in 1989. This liquidation raises production slightly and lowers prices in 1988 relative to FSA85 (Figure 2). The reduced breeding herd results in lower production in the out years. In 1995 production is nearly 22 percent below 1985 production and 25 percent below projected FSA85 production for 1995. Farm and retail prices follow patterns similar to beef except the cycle is shortened.

FIGURE 1 PER CAPITA BEEF CONSUMPTION

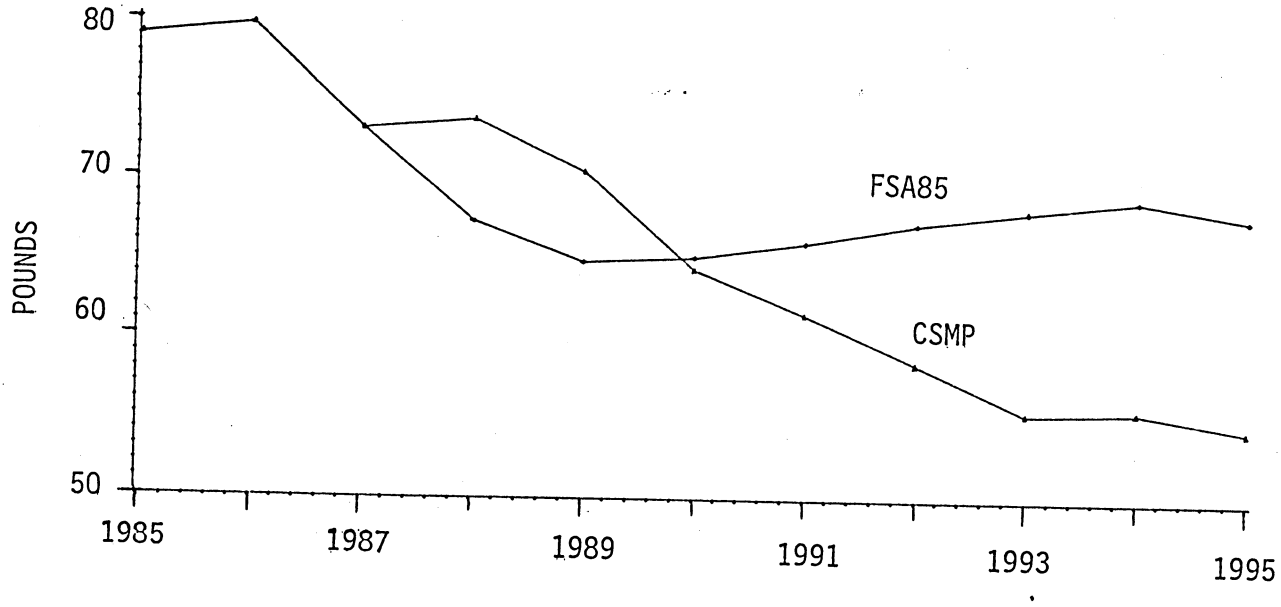
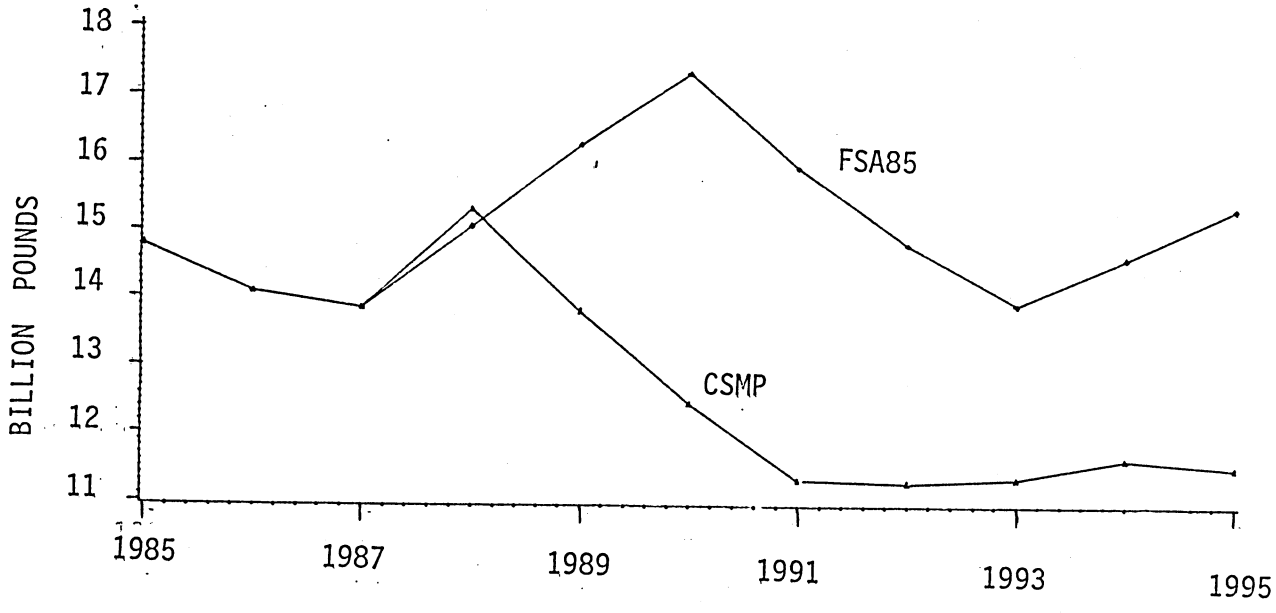


FIGURE 2 PORK PRODUCTION



Broiler production increases throughout the period under both FSA85 and CSMP. However, because of sharply reduced red meat supplies during the out years, broiler production increases more under CSMP. The productive efficiency of the broiler industry manifests itself during high feed cost periods. Broiler consumption rises from 55 pounds in 1985 to 66 pounds in 1995 under FSA85 and to 69 pounds under CSMP. Consumers continue to substitute relatively cheaper poultry meats for more expensive red meat. The retail price of broilers rises to $.92 per pound by 1995 under CSMP, but this 18 percent price increase over 1985 is modest relative to the 43 and 54 percent increases for beef and pork, respectively. Over the period of analysis for FSA85, beef, pork, and broiler consumption remains in the 190-196 pound range, with decreasing red meat and increasing broiler consumption. However under CSMP, the increase in per capita broiler consumption cannot offset the sharp decline in red meat purchases so that by 1995, total meat consumption is 169 pounds, a 14 percent decline from FSA85 (Figure 3).

Under both scenarios, consumers purchase less beef and pork over the period and more broiler meat. However, the substitution rate of white meat for red meat is increased under CSMP. Of the beef, pork, and broiler purchases in 1986, consumers averaged 41 percent beef, 30 percent pork, and 29 percent broilers. In 1995 under FSA85, these percentages were 35, 31, and 34, respectively, whereas under CSMP they were projected to be 32, 27, and 41, respectively,

Because of sharply higher prices, beef and pork retain significant expenditure shares under CSMP throughout the period. In 1985, consumers spent 56 percent of meat expenditure on beef, 31 percent on pork, and only 13 percent on broilers. By 1995, under CSMP these shares are 53, 32, and

FIGURE 3 PER CAPITA MEAT CONSUMPTION

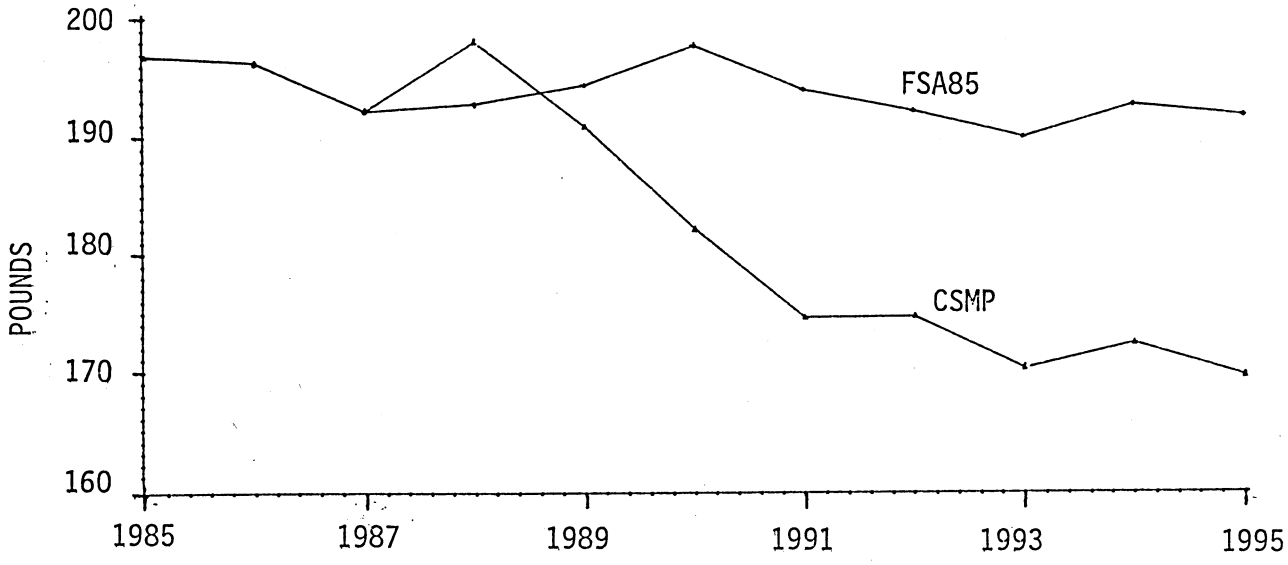
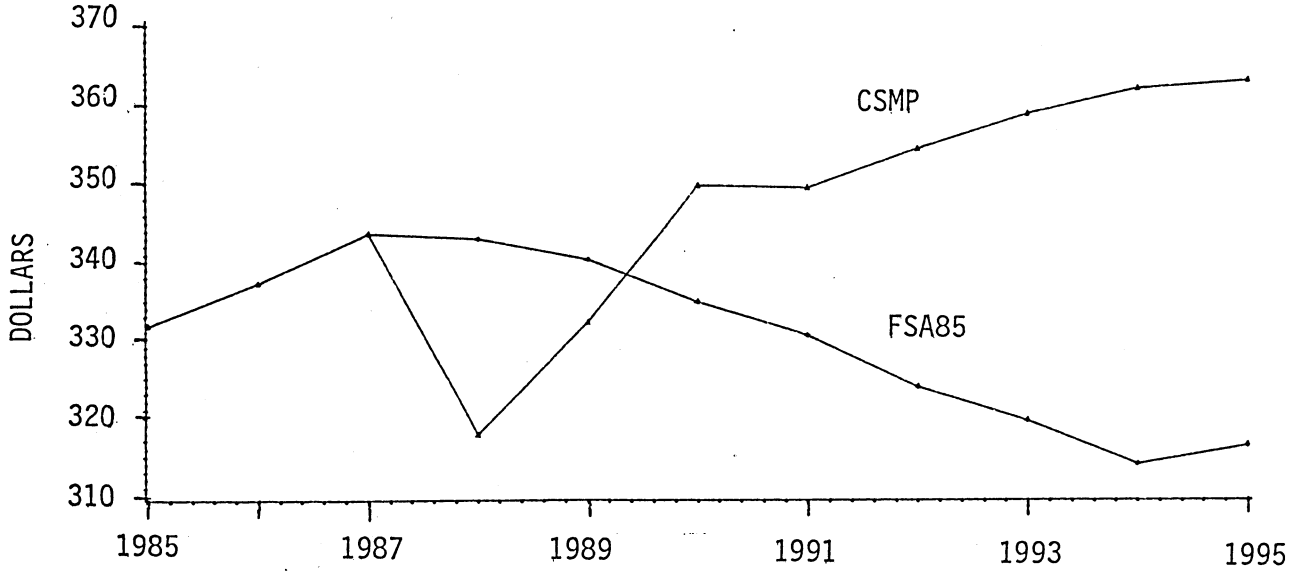


FIGURE 4 PER CAPITA MEAT EXPENDITURES



18 percent, respectively, whereas they are 55, 31, and 14 percent under FSA85. Under parity, expenditures on meat increase to $363 per person by 1995, a 15 percent or $45 per person increase over FSA85 (Figure 4). In addition, the substitution of chicken for beef and pork has reduced the aggregate meat bundle price from what it would have been had consumption shares remained constant. The 1995 aggregate meat bundle price increased to $2.14 per pound, only 24 percent over the price in 1985 ($1.69) and 30 percent over the level under FSA85 ($1.65) in 1995.

DISCUSSION

Simulation analysis of a future time period is difficult for several reasons. The exogenous values which drive the model (e.g., GNP, inflation, etc.) may be poorly forecast. Second, the historical data on which the econometric models are estimated tend to fall within a narrower range than do the data over the forecast period, particularly in the case of the parity program option. As a result, the CSMP option required additional assumptions to be imposed on the model. For example, retail meat prices of the magnitude projected here would result in a flooding of imported meats into the U.S. For this analysis, import and export of livestock and meats were held at the same levels under both programs. Third, provisions of the CSMP allow qualifying livestock producers to purchase up to $50,000 worth of grain at prices far below parity prices through 1990. Consequently, low volume livestock producers benefit relative to large producers.

FSA85 was designed to move government out of agricultural crop production through a "market-oriented" pricing scheme. (Estimated government costs for the first three years of the program hardly suggest a reduction in government exposure, however (FAPRI 2-86).) Artificially low feed prices in the short term lead to expanded livestock herds and greater

production. However, as crop stocks are reduced, prices respond upward and lead to higher livestock production costs at a time when required herd size corrections are significant. Over the 10 year period, consumption of poultry gradually replaces portions of the red meat market. Meat expenditures remain relatively low due to the lower priced broilers relative to more expensive beef and pork.

CSMP is designed to gradually bring crop prices to 80 percent of parity. While a more than doubling of prices generates considerable revenue for the crop sector, it causes immediate as well as far-reaching adjustment problems to the livestock industry. Sharply higher feed costs turn expected profits to losses for beef and pork producers and result in an immediate reduction in the breeding herds. With substantially lower supplies, prices for beef, pork, and poultry ultimately respond upward.

Traditionally, cash receipts have been about equally divided between crops and livestock. This balance remains during the first five years of the FSA85 scenario and then shifts moderately toward the crops sector as livestock production increases and cash receipts decline with prices during the latter five years. Under the parity option, crop receipts dominate throughout the period and the gap widens over time. Crops are protected by mandated prices, the livestock industry (with the exception of dairy) is not. Although livestock receipts rise gradually over the period, the share of three receipts shifts dramatically to dairy under CSMP. By 1995, 42 percent of livestock receipts under CSMP are attributed to dairy as opposed to only 18 percent under FSA85.

In the long run, the beef and pork breeding herds are sharply below the levels predicted under the FSA85 scenario. Beef producers attempt to compensate for high corn and soymeal costs by utilizing greater forage and

less feed. The pork industry has far less flexibility in this regard. Consumers increase the rate at which they substitute chicken for red meat relative to FSA85.

Of the numerous farm policy programs offered for consideration in 1987 as an alternative to FSA85, none is likely to alter the structure and conduct of the livestock industry more than one which mandates the rise of feed costs to 80 percent of parity. From a consumer perspective, any program which increases food expenditures (as does CSMP) will harm the disposable income status of poorer families relatively more than affluent families. Because low income families spend relatively more on food (than high income families), a program which increases retail prices and expenditure requirements is regressive in nature. A policy designed to shift income to producers from consumers/taxpayers is ill advised from a welfare perspective if lower income households pay a disproportionate share (though food expenditures) relative to higher income households.

REFERENCES

Bahrenian, Aniss, S. Devadoss, and William H. Meyers, "FAPRI Trade Model for Feed Grains: Specification, Estimation, and Validation." CARD 86-SR1, The Center for Agricultural and Rural Development. January 1986.

Brandt, Jon A., Robin Perso, Shamsul Alam, Robert E. Young II, and Abner Womack, "Documentation of the CNFAP Chicken, Eggs, and Turkey Models and Review of Previous Studies." CNFAP #5, Center for National Food and Agricultural Policy, University of Missouri-Columbia. August 1985.

Brandt, Jon A., Shamsul Alam, Robert E. Young II, and Abner W. Womack, "Documentation of the CNFAP Hog-Pork Model and Review of Previous Studies." CNFAP #9, Center for National Food and Agricultural Policy, University of Missouri-Columbia. November 1985.

Devadoss, S., Michael D. Helmar, and William H. Meyers, "FAPRI Trade Model for the Wheat Sector: Specification, Estimation, and Validation." CARD 86-SR3, The Center for Agricultural and Rural Development. January 1986.

Johnson, S.R., William H. Meyers, Abner W. Womack, Robert E. Young II, and Michael D. Helmar, "The Food Security Act of 1985: A Ten-Year Perspective." FAPRI 2-86, The Food and Policy Research Institute. June 1986.

Knutson, R.D., E.G. Smith, J.W. Richardson, J.B. Penson, D.W. Hughes, M.S. Paggi, R.D. Yonkers, and D.T. Chen. Policy Alternatives for Modifying the 1985 Farm Bill. Texas Agricultural Experiment Station Bulletin 1561, Texas A&M University. January 1987.

Long-Term International Agricultural Outlook. Food and Agricultural Policy Research Institute and Wharton Econometric Forecasting Associates. Spring 1986.

Meyers, William H., Michael D. Helmar, and S. Devadoss, "FAPRI Trade Model for Soybean Sector: Specification, Estimation, and Validation." CARD 86-SR2, The Center for Agricultural and Rural Development. January 1986.

The Food Security Act of 1985 One Year Later: Implications and Persistent Problems. Food and Agricultural Policy Research Institute, FAPRI #3-86, University of Missouri-Columbia and Iowa State University. December 1986.

Young, Robert E. II. "Secretarial Discretion under the Food Security Act of 1985." Ph.D. dissertation, University of Missouri-Columbia. December 1986.