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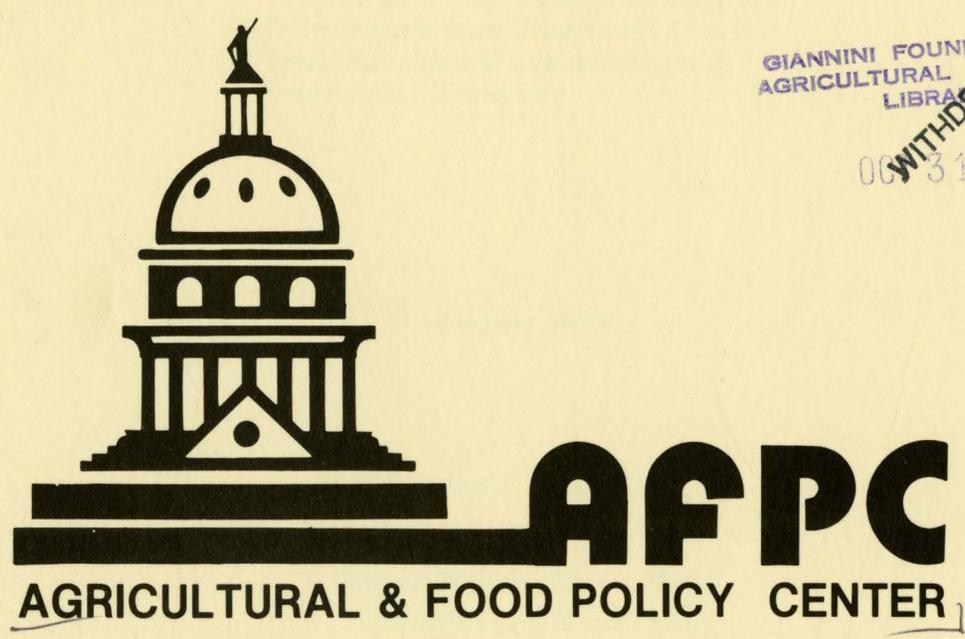
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# COTTON MARKET RESPONSES UNDER ALTERNATIVE ACREAGE REDUCTION (ARP) AND PAID LAND DIVERSION (PLD) OPTIONS

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Key Words: Cotton stocks, Policy model, Acreage reduction program,  
Paid land diversion, Market responses, Government costs.

## Abstract

Unlike the major grains and soybeans, cotton was not significantly affected by the 1988 drought. The large cotton production, declines in domestic mill use and export sales have combined to cause a sharp increase in the 1988/89 projected ending stocks to a burdensome level of 9.2 million bales, far beyond the 4 million target specified in the 1985 farm bill. A 25 percent ARP (Acreage Reduction Program) set-aside was announced for the 1989 crop in late 1988, but no PLD (Paid Land Diversion) provisions were included. Reflecting the industry's growing concern over the cotton outlook, there are calls for implementation of additional acreage reduction of PLD for the next crop season.

This study utilizes the AGGIES/Cotton (AGricultural Globally Integrated Econometric System) model to evaluate the effects of additional acreage reduction. Three alternative acreage assumptions are analyzed: a 12.5 percent PLD for 1989/90, a 12.5 percent PLD for the year earlier (1988/89), and an increase of the 1988/89 ARP percentage from the 12.5 percent to 25 percent. The simulation results indicate some increase in prices but cash receipts and gross income in the year the program is implemented would decline due to policy-induced production cutback. Mill use and exports would also decline. U.S. prices would be less competitive in the world market. However, some program benefits can be expected, including a reduction of excessive stocks and longer-term gains in producer's incomes and savings in government program costs.

## Introduction

Stimulated by unusually strong market conditions of rising mill consumption, increasing export sales, decreasing stocks and favorable prices in late 1987, the U.S. cotton program began to shift toward a relaxation of production restrictions for the 1988/89 crop. At 12.5 percent, the ARP set-aside cut in half the 25 percent rate of the previous season. Given the 12.5 percent ARP, our simulation study presented at the Beltwide Conference a year ago pointed to a baseline projection of cotton production and ending stocks at 15.2 and 5.5 million bales, respectively. In evaluating the

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specific performance variables associated with the baseline solution to those associated with the alternative ARP and PLD scenarios. The evaluation process focuses upon the dynamic impact measured as deviations from baseline and assessment of their policy implications for the cotton industry.

This study begins with a brief description of the model, especially its acreage reduction program instruments and policy transmission mechanisms. An overview of the baseline solution for a three year simulation period, from 1988/89 to 1990/91, will be discussed, followed by a comparative analysis of the simulation results of alternative ARP and PLD policy options. The last section of the paper provides a summary with some concluding observations regarding the advantages and disadvantages of acreage reduction programs.

#### **Policy Instruments and Transmission Mechanisms**

The AGGIES/Cotton model is designed to address a broad range of farm program policy issues. By capturing the linkages between U.S. farm programs and commodity market equilibrium, a theoretical framework of implicit revenue function is used in the construction of the model (Chen, 1987). The approach provides explicit evaluation of the effects of ARP and PLD program provisions on producers' net return per acre as well as direct and indirect returns from program participation (Chen, Penson and Teboh, 1988). The model is particularly useful in determining program participation rates, the idled acreage under various policy options of ARP, PLD, CRP (Conservation Reserve Program), 50/92 and marketing loan programs, and the planted acreages of program participants and non-participants.

The transmission of acreage reduction policy in the model initially affect producers' planting decisions which in turn influence CCC loan entries and redemptions, market price and income determination as well as government program costs for deficiency payment, diversion payment, loan deficiency payment, disaster payment, reserve storage payment, conservation reserve and marketing loan benefits, and others.

12.5 percent ARP or PLD in the previous crop season. It was also assumed that a diversion payment rate of 30 cents per pound in 1989 would attract enough eligible acreage for which payment would not be reduced by the \$50,000 payment limit. Due to higher market prices in 1987, a 35 cents per pound diversion payment rate was used for the 1988/89 crop. For the 1990/91 crop year, we assumed a 25 percent ARP and zero PLD for the baseline and all alternative scenarios.

### An Overview of Baseline Scenario

In developing the baseline, the key assumptions incorporated into the model include values of policy parameters relating to price support, income supplements, and acreage control provisions specified by FSA85 and recent program announcements. The target price was set at 73.4 and 72.9 cents for 1989 and 1990 crop seasons, while the loan rate was estimated at the minimum level of 50 cents for both years. Under the Plan B option, the producers can repay CCC loans at the lower of either the base loan level or the prevailing adjusted world market price announced weekly. The quantity eligible for loan deficiency payments is limited to the production otherwise eligible for loan, not to exceed the farm program acreage times the farm program payment yield. Up to 50 percent of the loan deficiency payment may be made in marketing certificates. This helps ensure free marketing of cotton in domestic and international markets (Glaser, 1986).

The most important policy parameters for acreage reduction simulation, other than the ARP and PLD percentage rates summarized in Table 1, are cotton base acreage and program participation rate. The baseline projection points to total base acres for upland cotton at 14.3 and 14.4 million acres for 1989 and 1990 seasons, year-to-year decreases about 265,000 and 165,000 acres respectively. The reductions in base acres are due mainly to cropland placed under conservation reserve programs, particularly in the Southwest (Table 2).

Program participation rate for ARP and PLD are behavioral equations in the model

response to weak market price expectation and reductions in target price and loan rate, the ARP participation rates in the baseline, at 93 and 92 percents for 1989 and 1990, are higher than the 88 percent of 1988.

Given the projected base acreage and program participation, total plantings in the next two seasons are 9,790 and 9,585 thousand acres. The baseline scenario indicates that plantings by participants will be 9 million acres for both years, while non-participant plantings will total 790,000 and 585,000 acres during 1989 and 1990.

The anticipated ARP reduced acreages were estimated at 3.2 million acres, with the 50/92 option acres totaling 800,000 and 700,000 acres for 1989 and 1990. Assuming a normal harvest-to-planting ratio of 93 percent, the baseline projections of total harvested acreages are 9.2 and 9.1 million acres, respectively. Following a trend growth pattern and reflecting productivity gains induced by acreage reduction, yields per acre were estimated at 655 and 675 pounds, up from 627 pounds of 1988 (Table 2).

Given the acreage and yield projections, the baseline production for 1989/90 and 1990/91 will be 12.6 and 12.7 million bales, about a 17 percent decline from the 1988 level. The USDA December release of world supply-demand estimate indicates the 1988/89 ending stock will be 9.2 million bales. Using this stock projection, total supply for 1989/90 should reach a substantially high level of 21.7 million, while the 1990/91 supply would be slightly reduced to 21.0 million.

Low cotton prices and continuous growth of the general economy expected for the next two years would help improve mill use, with baseline projections showing moderate gains of 0.3 and 0.2 million, to 7.2 and 7.4 million in the simulation period. With a 2 million bale expected decline of foreign stocks, U.S. exports should increase by 1.4 and 0.2 million bales in the coming two years. Total offtake projected in the baseline would increase 1.7 and 0.4 million to 13.6 and 14.0 million bales respectively. Much of the slowdown in 1988 cotton exports results from higher U.S. prices than the world market. Assuming U.S. prices become competitive, export sales are expected to recover

in 1988/89 to 9.8 million acres. Yield per acre should rise to reach 655 lbs. per acre, a 4.5 percent gain from the 1988 level. As a result, cotton production would total 10.8 million bales in 1989/90.

By implementing an additional 12.5 percent PLD in 1989/90, we assumed a program participation rate of 82 percent and the diversion payment rate of 30 cents per pound result in a reduction of 1.464 million acres in total plantings (Figure 2). The regional distribution of acreage reduction ranges from 147 thousand for the Southeast and the West, to 380 thousand in Mid-South and 790 thousand in the Southwest. With trend projection of productivity growth and the positive impact of reduced plantings, cotton yield would increase by 8 lbs. per acre in 1989/90.

Assuming a 12.5 percent PLD set-aside would have been implemented in 1988/89, a total of 1.384 million acres would be removed from production. This smaller acreage reduction reflects a lower participation rate of 76 percent assumed for 1988. The larger reduction would be 748 thousand acres in the Southwest, the smallest reduction of 138 thousand would be in the Southeast and the Mid-South regions, and the West decreases by 360 thousand. The policy-induced acreage cutback would result in a modest yield gain of 6 lb per acre for 1988/89.

In case that the ARP would have been increased from 12.5 percent to a total of 25 percent in 1988/89, planted acreage would drop 1.25 million. Since the increase in ARP set aside is considered to be less effective in production control due to the well-known problem of slippage, we expect lower ARP participation than PLD. In response to a smaller decline in total planted acreage, a modest 5 pound increase in yield is expected for this scenario (Table 3).

Among the three alternative scenarios, reduction in cotton production range from 1.7 million bales for PLD 89, 1.6 million for PLD 88 and 1.4 million for ARP 88. Acreage impact would be the strongest under the PLD 89 scenario and weakest for the option of ARP 88.

PLD or ARP options a year earlier, the production decrease in 1988 would be less than in 1989 due to higher prices and smaller program participations. The dynamic impact of these policy options would be extended into the following two years, resulting in a modest increase in price and some reduction in mill use and exports in 1989 and 1990.

Table 4. Supply and Use Indicators: Alternative Scenarios, Difference from Baseline (million bales)

	1987/88	1988/89	1989/90	1990/91
<b>12.5% PLD 1989/90</b>				
Production	14.8	15.2	10.8	12.7
Difference from Base		0.0	- 1.7	0.0
Mill Use	7.6	6.9	7.2	7.2
Difference from Base		0.0	0.0	- 0.1
Exports	6.6	5.0	6.4	6.2
Difference from Base		0.0	0.0	- 0.4
Ending Stocks	5.8	9.2	6.5	5.9
Difference from Base		0.0	- 1.7	- 1.2
Stocks/Use Ratio (%)	40.6	77.1	48.0	44.3
Difference from Base		0.0	-12.7	- 6.8
<b>12.5% PLD 1988/89</b>				
Production	14.8	13.6	12.5	12.8
Difference from Base		- 1.6	0.0	0.0
Mill Use	7.6	6.9	7.1	7.3
Difference from Base		0.0	- 0.1	- 0.1
Exports	6.6	5.0	6.0	6.4
Difference from Base		0.0	- 0.4	- 0.2
Ending Stocks	5.8	7.6	7.2	6.4
Difference from Base		- 1.6	- 1.1	- 0.8
Stocks/Use Ratio (%)	40.6	64.0	55.0	46.5
Difference from Base		-13.1	- 5.7	- 4.6
<b>25% ARP 1988/89</b>				
Production	14.8	13.7	12.6	12.7
Difference from Base		- 1.4	0.0	0.0
Mill Use	7.6	6.9	7.1	7.3
Difference from Base		0.0	- 0.1	- 0.1
Exports	6.6	5.0	6.1	6.4
Difference from Base		0.0	- 0.3	- 0.3
Ending Stocks	5.8	7.7	7.1	6.4
Difference from Base		- 1.4	- 1.1	- 0.1
Stocks/Use Ratio (%)	40.6	65.1	53.9	46.6
Difference from Base		-12.0	- 6.8	- 4.5

Source: USDA estimates and model projections.

The immediate impact is a 1.5 to 1.6 million drawdown in stocks at the end of 1988, reaching 7.6 and 7.7 million bales under PLD 88 and ARP 88 scenarios (Figure 3).

gains would be somewhat smaller than that of PLD 89 scenario, averaging by 6.0 and 4.3 cents for 1988 (Figure 4). Cash receipts decline \$136 and \$155 million, while government payments rise \$41 million under PLD 88 and drop \$210 million under ARP 88 scenario. Payment gain in 1988 for the PLD policy option reflects the net effect paid land diversion payments. Gross income declines by \$95 million under PLD and \$365 million under ARP option. However, the following two years reflect considerable improvement in gross income under both options as higher prices and cash receipts largely offset decreases in government payments.

**Government Program Costs**

Direct government program costs are estimated at \$1,168, \$987 and \$782 million over the three year baseline projection period. With an additional 12.5 percent PLD in 1989, diversion payments of \$259 million exceed deficiency payment savings of \$238 million for a net increase in total government costs of \$21 million. Because of higher prices, an additional savings in deficiency payments of \$169 million are projected for 1990/91.

Table 6. Government Program Costs: Baseline and Difference from Baseline, Alternative ARP, PLD Options.\*

	Baseline	12.5% PLD 89	12.5% PLD 88	25% ARP 88
<b>1988/89</b>	<i>-- Diff. from Base --</i>			
Deficiency and Loan				
Deficiency Payments	1,168	0	-245	-210
Diversion Payments	0	0	286	0
Total Program Costs	1,168	0	41	-210
<b>1989/90</b>				
Deficiency and Loan				
Deficiency Payments	987	-238	-158	-130
Diversion Payments	0	259	0	0
Total Program Costs	987	21	-158	-130
<b>1990/91</b>				
Deficiency and Loan				
Deficiency Payments	782	-169	-144	-122
Diversion Payments	0	0	0	0
Total Program Costs	782	-169	-144	-122

\* All figures in million dollars. Source: Model projections

reducing excessive stocks.

- Considerable government program cost savings are expected for CCC storage and interest charges.

There are important disadvantages of the set-aside and acreage reduction programs:

- Acreage control policy is generally not very effective at controlling production because of the well-known problem of slippage as program participation declines and yield increases.
- Increased U.S. prices limit mill use and reduce competitiveness of U.S. cotton in the world market.
- In the year the ARP and PLD set-aside program is implemented, reduction in deficiency payment is not enough to offset increase in diversion payment, even though there are significant long term benefits in reducing government costs.
- In the short run, farm cash receipts and gross income decline as increase in prices is less than the effect of reduced production.
- The ARP and PLD provisions tend to retire productive land from active use and distorts the mix of inputs in agriculture (Hertel, 1988).

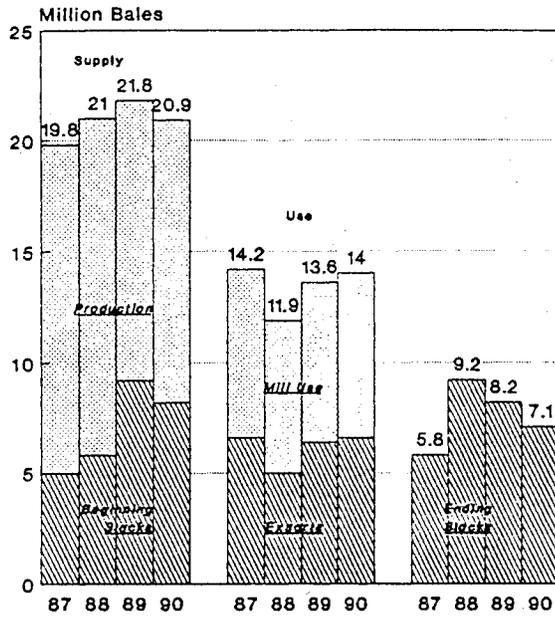


Figure 1. Cotton Model Baseline Projections of U.S. Supply, Use and Ending Stocks.

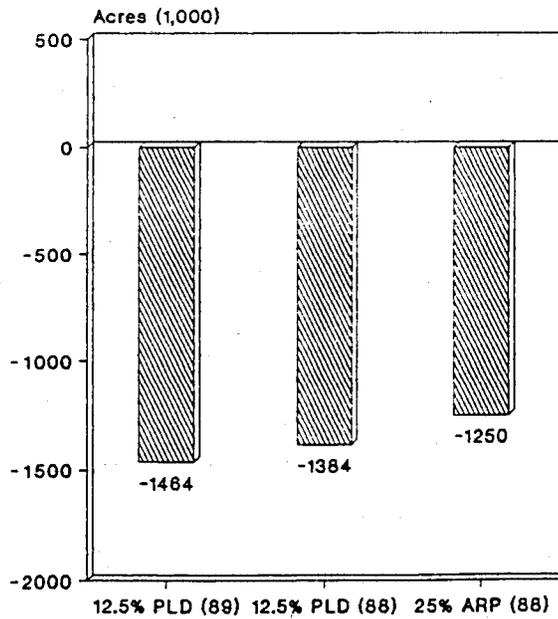


Figure 2. Acreage Reduction from Baseline Under Alternative ARP and PLD Options.

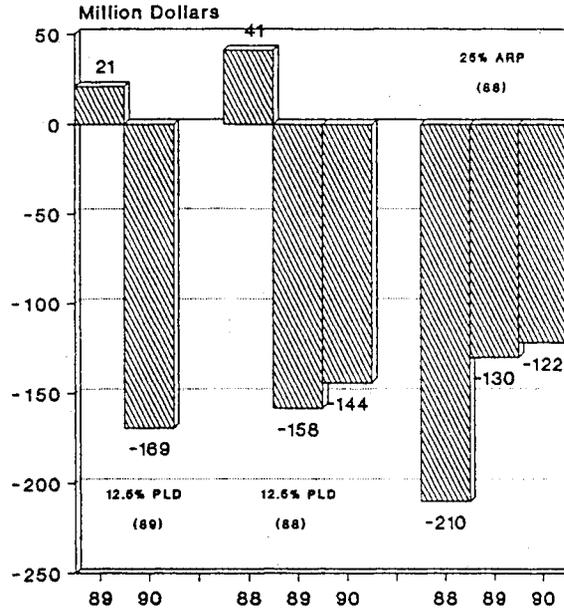


Figure 5. Government Program Costs Impact: Difference from Baseline of Alternative ARP and PLD Options.

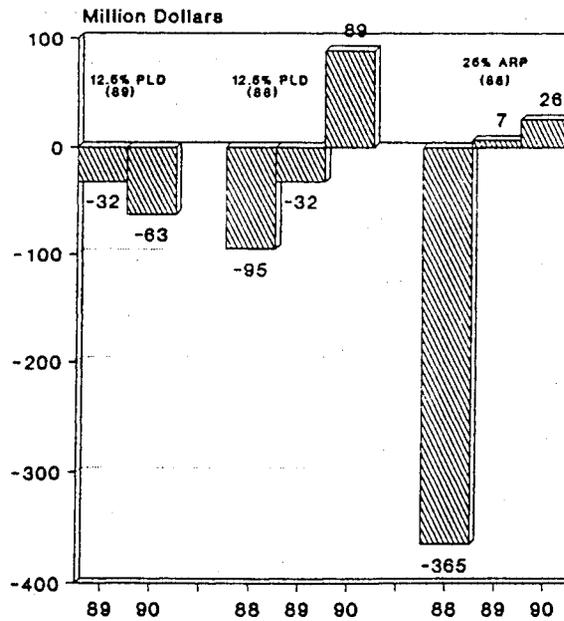


Figure 6. Gross Income Impact: Difference from Baseline of Alternative ARP and PLD Options.

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