United States General Accounting Office

GAO

Briefing Report to the Honorable Byron L. Dorgan, U.S. Senate

September 1993

WHEAT COMMODITY PROGRAM

Impact on Producers' Income

RESTRICTED--Not to be released outside the General Accounting Office unless specifically approved by the Office of Congressional Relations.

557983 RELEASED

GAO/RCED-93-175BR

GAO

United States
General Accounting Office
Washington, D.C. 20548

Resources, Community, and
Economic Development Division

B-250057

September 8, 1993

The Honorable Byron L. Dorgan
United States Senate

Dear Senator Dorgan:

You requested that we provide information on how the provisions of the U.S. Department of Agriculture's (USDA) wheat commodity program affect wheat producers' incomes. USDA primarily supports wheat farm income through direct payments--technically called deficiency payments because they make up the difference between a target price established by USDA and the amount producers receive for their wheat. In response to your request, we briefed your staff on July 21, 1993. This briefing report outlines our findings and serves to formalize the information we presented during that briefing.

Specifically, we examined (1) the program's overall costs, including producers' gains or losses from the program; (2) the distribution of wheat deficiency payments to program participants by counties; (3) the distribution of wheat deficiency payments to program participants by farms; and (4) the distribution of government payments, including wheat deficiency payments,[1] to farms whose wheat production accounted for 50 percent or more of the value of the farms' crop and livestock production (known as specialized wheat farms). Our examination focused on 1990 government payment data--the most recent available at the time of our county analysis--for our second through fourth objectives. In addressing the first objective, we used

[1]Government payments include deficiency payments for wheat and other crops, disaster payments, and payments to retire highly erodible cropland from production. Separate data on wheat deficiency payments to specialized wheat farms were not available for 1990.

1990-92 economic data. An earlier report of ours examined the effects of changes to the wheat commodity program in 1985 and 1990.[2]

RESULTS IN BRIEF

The wheat commodity program cost the U.S. government an average of $2.2 billion annually for crop years (June through May) 1990 to 1992--primarily for payments to producers. For the same years, we estimated that U.S. wheat producers received an annual average of about $1.4 billion in net economic benefits from the program.[3] In addition, by restricting the supply of wheat, the program cost wheat buyers an average of $32 million annually. Our analysis indicated that wheat producers did not receive all the benefits of the government expenditures primarily because the program required the idling of productive land. The idling of this land created an economic cost to the producers from lost opportunities because these acres were not planted. As a result, producers' economic benefits averaged only about 63 percent of total government costs. For more information on these results, see section 1.

Our analysis of the distribution of wheat deficiency payments found that, in calendar year 1990, USDA paid over $2.4 billion in wheat deficiency payments. Of this total, about $2.3 billion went to producers in 2,227 wheat-producing counties[4] in 41 states. About 85 percent of the deficiency payments went to 22 percent of the counties, which were mostly located in the Plains and Northwestern states. However, only 3.2 percent of the wheat-producing counties received 10 percent or more of the gross farm

---

[2]Wheat Commodity Program: Despite Reforms, Government's Involvement Remains Substantial (GAO/RCED-93-30, Mar. 18, 1993).

[3]Appendix I describes the wheat commodity program's major provisions.

[4]For the purposes of our review, a wheat-producing county is any county where producers planted 50 or more acres of wheat in crop year 1990 and received wheat deficiency payments.

receipts from these payments.[5] For detailed information on the distribution of wheat deficiency payments to counties, see section 2.

In crop year 1990, USDA's Agricultural Stabilization and Conservation Service (ASCS) paid over $2.4 billion in wheat deficiency payments to producers operating over 472,600 farms. Most of the payments were relatively small; about 72 percent of the total farms received less than $5,000. For these farms, wheat was often supplementary to other agriculture enterprises--on average, these farms received 1.6 times more from deficiency payments for other crops than they did for wheat. For additional information on this topic, see section 3.

Focusing on specialized wheat farms, we found that for calendar year 1990, the estimated 49,502 specialized wheat farms received an estimated $782 million in government payments, including wheat deficiency payments. The share of gross farm receipts provided by government payments to specialized wheat farms varied widely. Usually, larger farms received a larger percentage of gross farm receipts from government payments. See section 4 for additional information on government payments to specialized wheat farms.

AGENCY COMMENTS

We discussed a draft of this report with the Agency Staff Coordinator for Staff Analysis, Office of the Administrator, and several other agricultural economists in USDA's Economic Research Service (ERS). We also discussed our use of wheat deficiency payment data with the Director of ASCS' Kansas City Management Office and our use of data from the Department of Commerce's Bureau of Economic Analysis (BEA) with a regional economist from BEA's Regional Economic Measurement Division. These officials agreed with our overall findings and use of their data. However, they suggested minor technical revisions to our draft. Where appropriate, we incorporated these revisions into the body of this report.

- - - - -

[5]According to the U.S. Department of Commerce's Bureau of Economic Analysis, gross farm receipts include all income generated from the growing of crops and raising of livestock, including government payments.

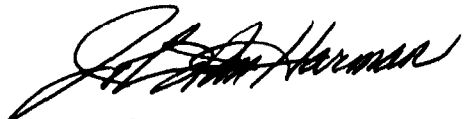
In conducting our review, we interviewed USDA officials, wheat farmers, academicians, and other wheat experts to identify issues and data sources. We reviewed pertinent agricultural literature relating to economics and reports on the wheat commodity program, wheat farms, and producers; analyzed existing data bases on wheat deficiency payments; and reviewed USDA's farm survey results on government payments to specialized wheat farms. We also used data obtained from ERS, ASCS, and BEA. Most of the data we collected were current as of 1990, the latest year for which we could obtain both county- and farm-level data. We did not independently verify any of these data sources.

To ensure the overall quality of our wheat review, we consulted with two prominent agricultural economists: Dr. William I. Tierney, Jr., from Kansas State University, and Dr. Bruce Gardner from the University of Maryland. Our review was performed between March 1992 and July 1993 in accordance with generally accepted government auditing standards. A detailed discussion of our overall scope and methodology is contained in section 5. Details of our economic methodology are contained in appendix II.

As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this briefing report until 7 days after the date of this letter. At that time, we will send copies of this report to the Chairman, House Committee on Agriculture; the Chairman, Senate Committee on Agriculture, Nutrition, and Forestry; the Chairmen, House and Senate Committees on Appropriations; the Secretary of Agriculture; and the Director, Office of Management and Budget. We will make copies available to others upon request.

Please contact me at (202) 512-5138 if you or your staff have any questions. Major contributors to this briefing report are listed in appendix III.

Sincerely yours,



John W. Harman
Director, Food and
Agriculture Issues

CONTENTS

ABBREVIATIONS

ARP	Acreage Reduction Program
ASCS	Agricultural Stabilization and Conservation Service
BEA	Bureau of Economic Analysis
CCC	Commodity Credit Corporation
CRP	Conservation Reserve Program
EEP	Export Enhancement Program
ERS	Economic Research Service
FCRS	Farm Costs and Returns Survey
GAO	General Accounting Office
USDA	U.S. Department of Agriculture

SECTION 1

ECONOMIC ANALYSIS OF PROGRAM'S GAINS AND LOSSES

Our economic analysis of the wheat commodity program for crop years 1990 to 1992 showed that most program costs are borne by the federal government and that most program benefits go to producers participating in the program. Table 1.1 (see p. 8) shows that:

-- Producers participating in the wheat commodity program received an average of $1.364 billion in net economic benefits annually.

-- Nonparticipating producers benefitted from higher wheat prices by an average of $0.012 billion annually.

-- By restricting supply, the program cost wheat buyers (millers and processors) an average of $0.032 billion annually in higher wheat prices.

-- The wheat commodity program cost the government an average of about $2.178 billion annually.

-- Costs to the government and wheat buyers exceeded benefits to producers primarily because of program requirements that producers idle productive land under the Department of Agriculture's (USDA) Acreage Reduction Program (ARP).[1] This cost, called a social welfare loss, averaged $0.834 billion annually for 1990 to 1992.

---

[1]Under ARP, USDA requires farmers who participate in the wheat commodity program to hold a percentage of acreage out of production in order to be eligible for program benefits.

Table 1.1: Gains and Losses From the Wheat Commodity Program

Dollars in billions

	Crop year			
	1990	1991	1992	Average
Participant wheat producers' gains	$ 2.212	$ 1.406	$ 0.474	$ 1.364
Nonparticipant wheat producers' gains or losses	0.026	-0.018	0.028	0.012
Domestic buyers' gains or losses	-0.082	0.055	-0.070	-0.032
Government costs	-2.727	-2.364	-1.442	-2.178
Social welfare loss	-$0.571	-$0.921	-$1.010	-$0.834

Note: Data are in 1992 constant dollars. The total average social welfare loss does not equal the sum of the averages because of rounding. See appendix II for a detailed discussion of this analysis.

In reviewing this analysis, Economic Research Service (ERS) officials noted certain other nonquantifiable costs and benefits that can be incurred by program participants. For example, this analysis did not include the costs to participants associated with maintaining idled program acres nor the environmental benefits that might accrue from the idling of these acres.

SECTION 2

DISTRIBUTION OF WHEAT PRODUCTION AND DEFICIENCY PAYMENTS BY COUNTIES

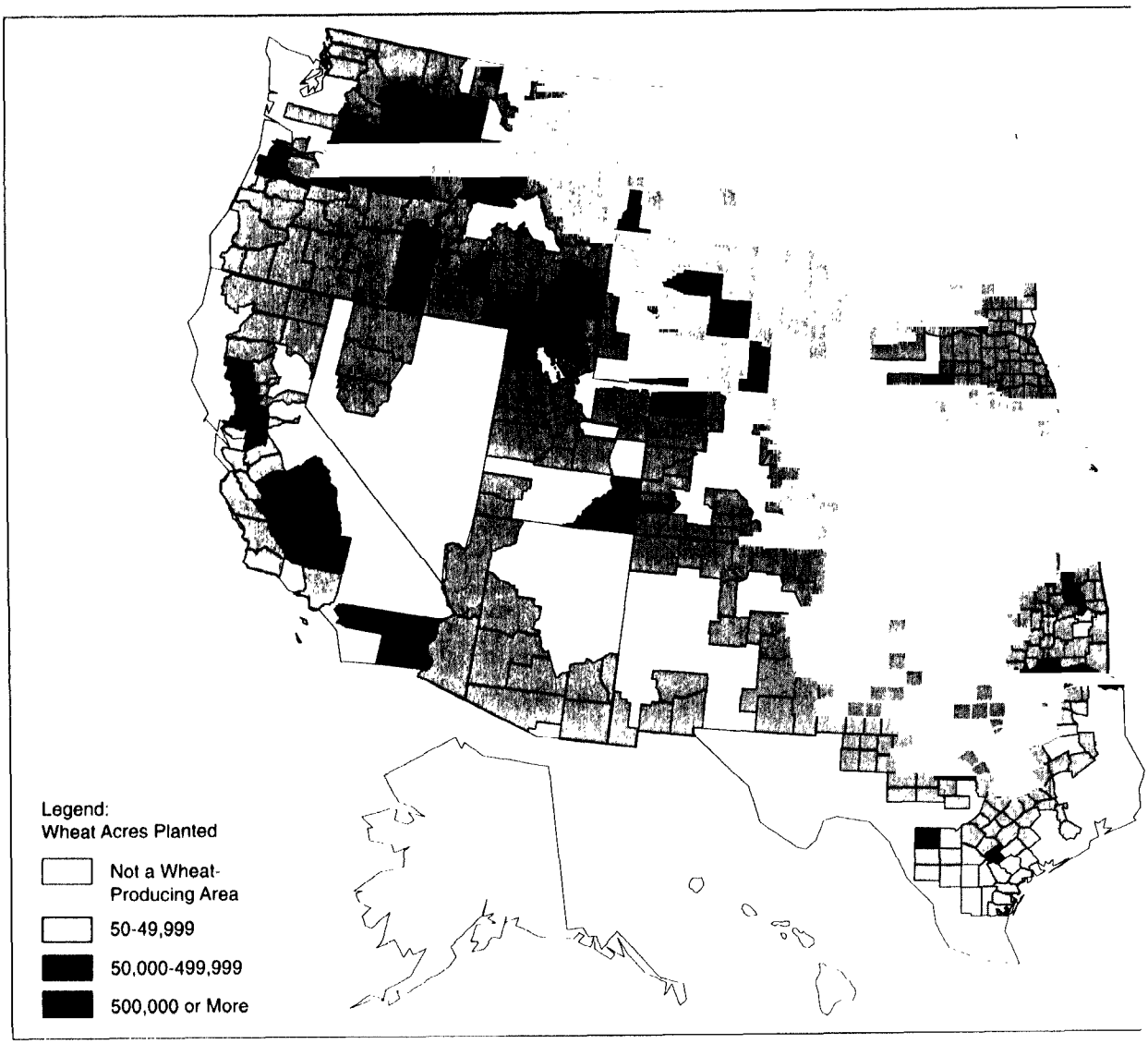
In calendar year 1990, USDA made wheat deficiency payments to wheat farms in 2,227 wheat-producing counties in 41 states across the United States. Although the program distributed payments throughout the country, most of these payments went to counties in the heavy wheat-producing regions of the Plains and Northwestern states.[1] Similarly, a few counties received a large share of gross farm receipts from wheat deficiency payments.

LOCATION OF WHEAT PRODUCTION

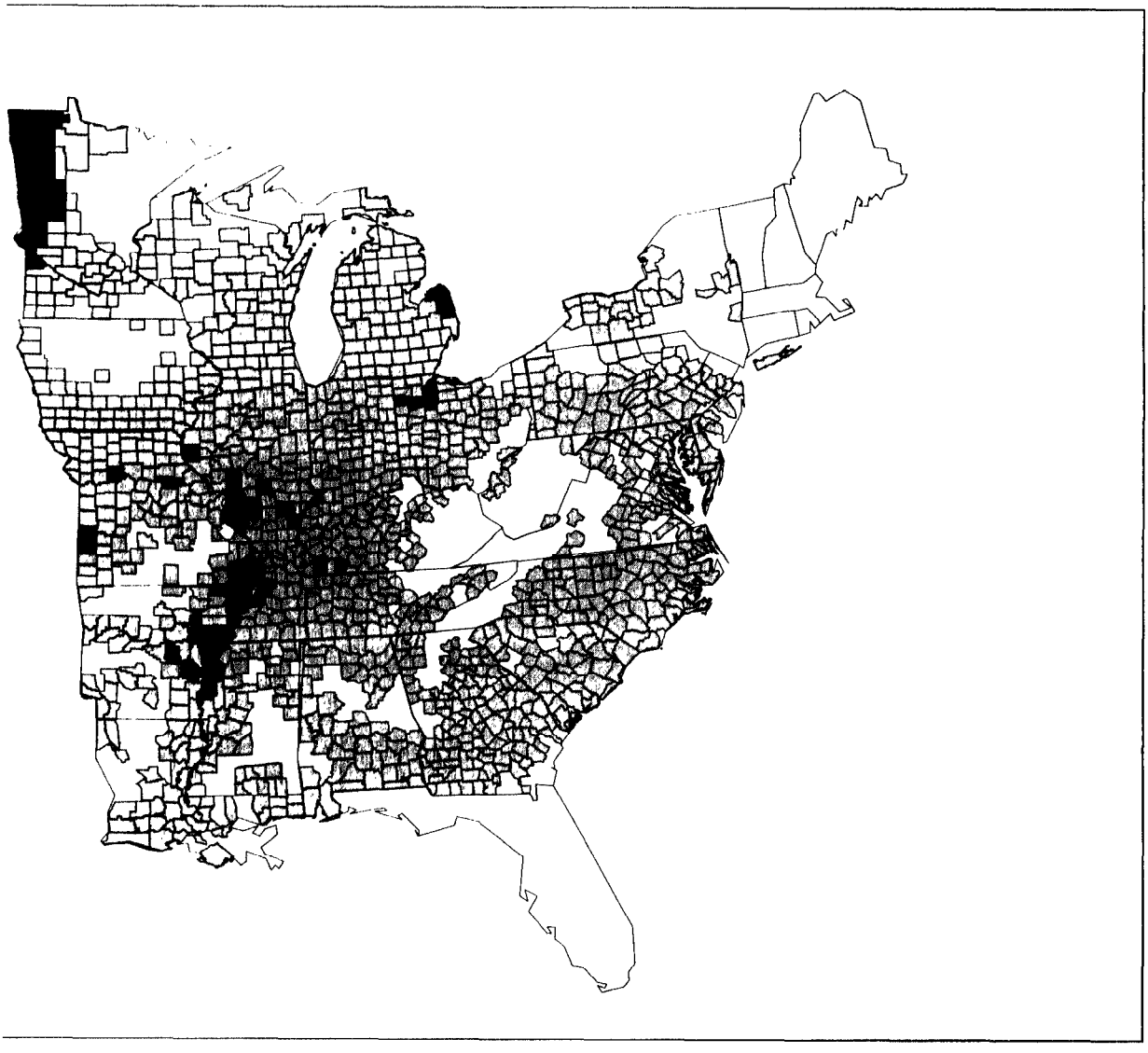
As shown in figure 2.1, the heavy wheat-producing counties are concentrated in the Plains and Northwestern states regions (see pp. 10 and 11).

[1]For purposes of our review, the Plains states are Colorado, Kansas, Minnesota, Montana, Nebraska, North Dakota, Oklahoma, South Dakota, and Texas. The Northwestern states are Idaho, Oregon, and Washington.

Figure 2.1: Distribution of Wheat-Producing Counties



Source: GAO's analysis of 1990 County Crop Estimates by USDA's National Agricultural Statistical Service.

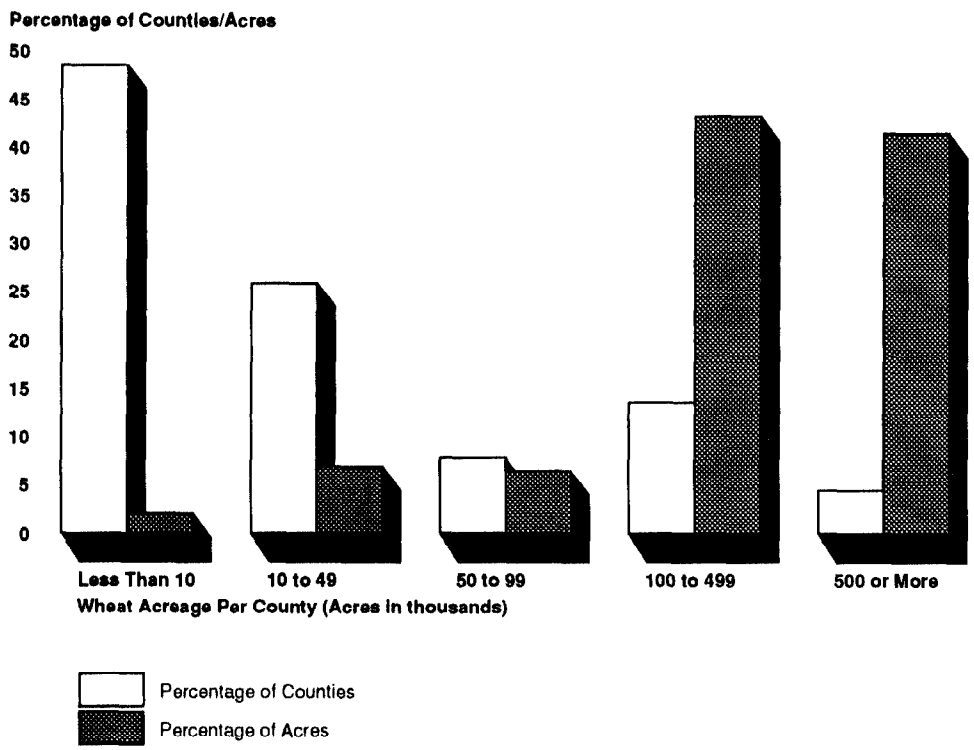


The following is shown in figure 2.2:

-- While accounting for only 18 percent (400 counties) of the wheat-producing counties, counties with 100,000 or more acres of planted wheat accounted for nearly 85 percent (161.9 million acres) of all wheat planted in 1990.

-- Conversely, while accounting for 49 percent (1,080 counties) of the wheat-producing counties in 1990, counties with fewer than 10,000 acres of planted wheat accounted for only 2 percent (3.8 million acres) of the wheat acres planted in all counties.

Figure 2.2: Share of Wheat-Producing Counties and Acres by County Acreage Class



Source: GAO's analysis of 1990 County Crop Estimates by the National Agricultural Statistical Service.

DISTRIBUTION OF WHEAT DEFICIENCY PAYMENTS BY COUNTY

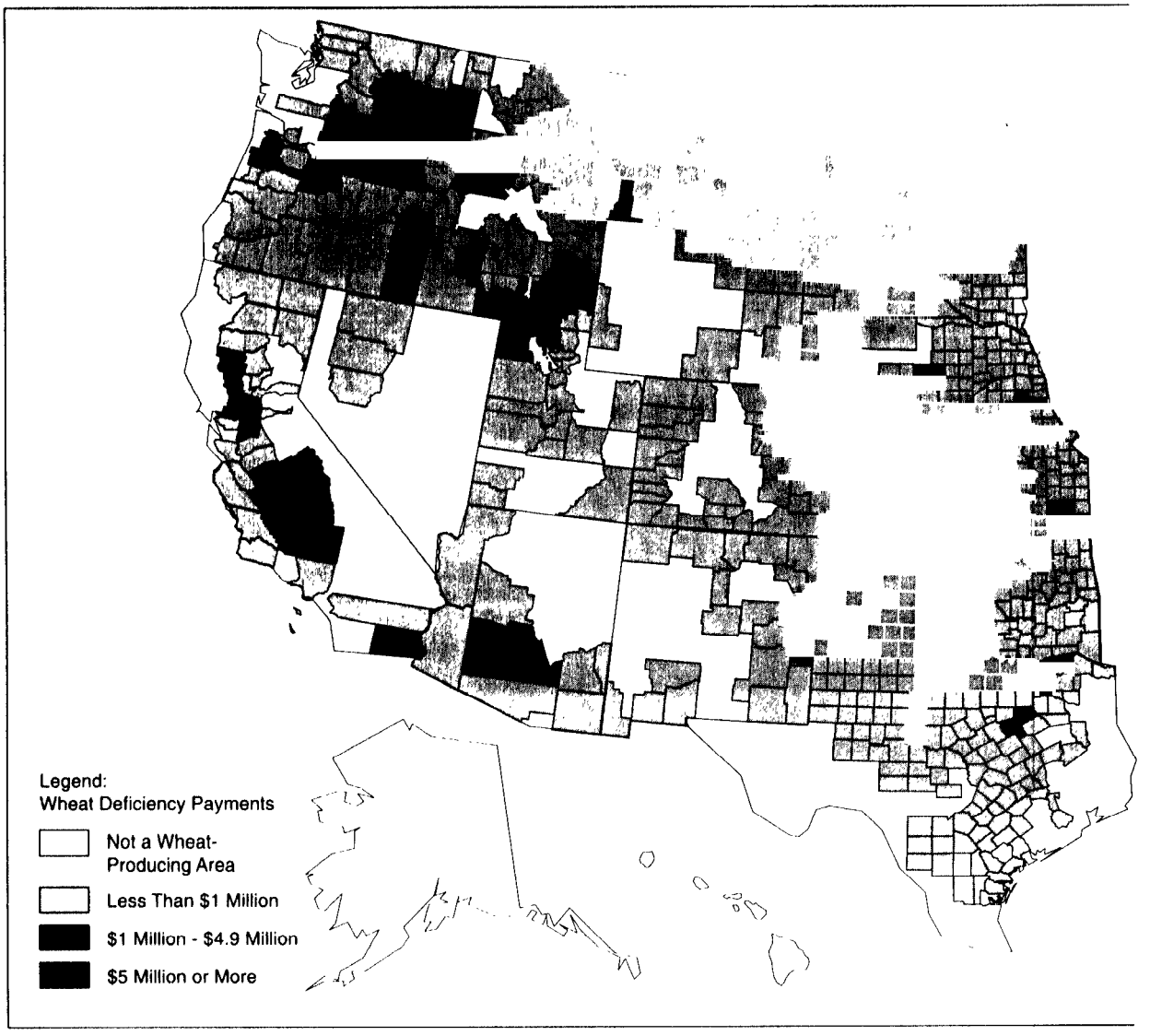
Figure 2.3 shows the distribution by county of the $2.2 billion in wheat deficiency payments paid in 1990 (see pp. 14 and 15).

-- The 498 counties (22 percent) in which program participants received more than $1 million in wheat deficiency payments accounted for nearly 86 percent of the payments, or $1.95 billion.

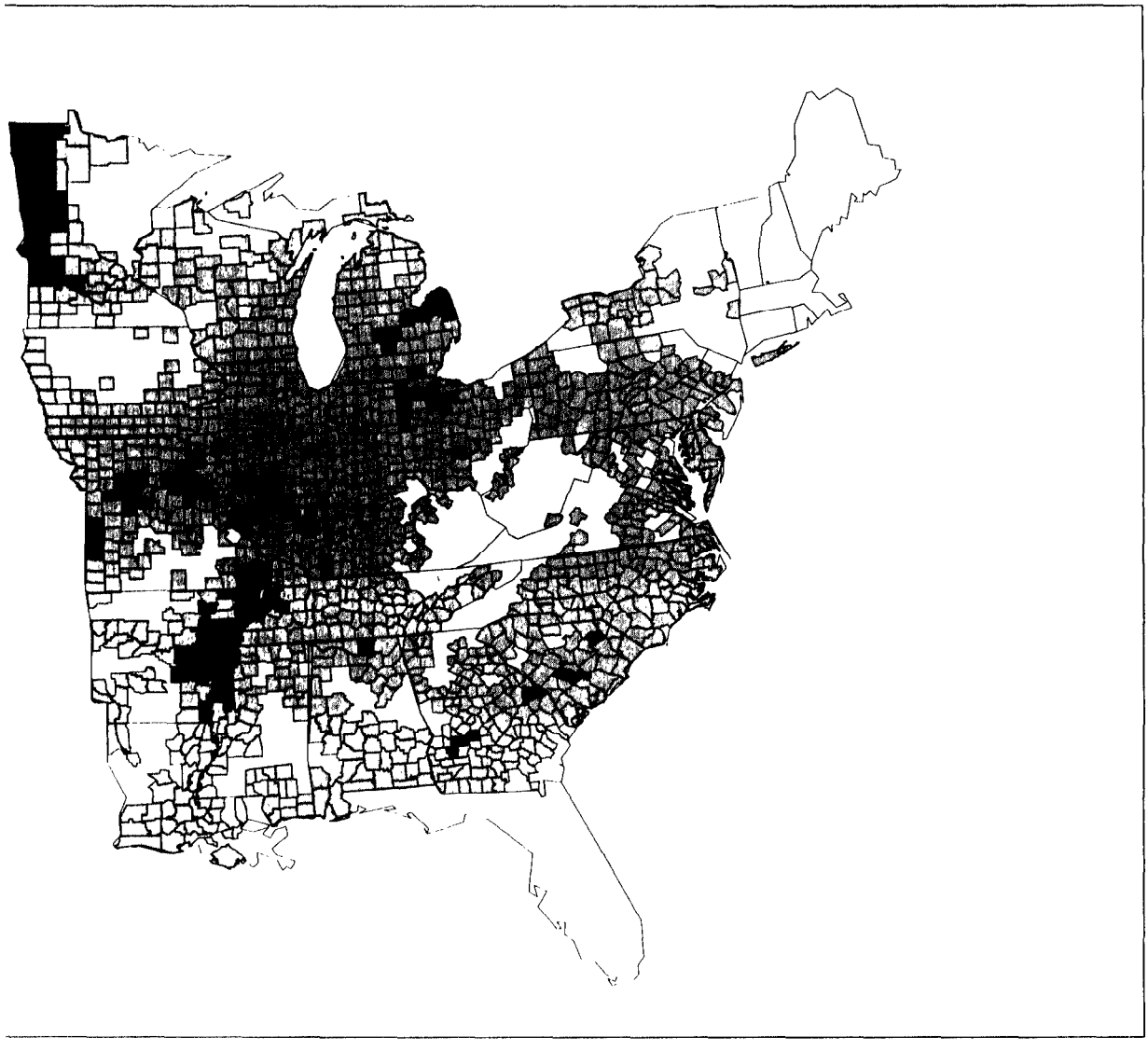
-- Most of these high-payment counties were located in the Plains and Northwestern states.

-- The 1,729 counties (78 percent) in which program participants received less than $1 million in wheat deficiency payments accounted for only 14 percent of the payments, or $334.2 million.

Figure 2.3: Distribution of Wheat Deficiency Payments by County



Source: GAO's analysis of 1990 program payment data from USDA's Agricultural Stabilization and Conservation Service.



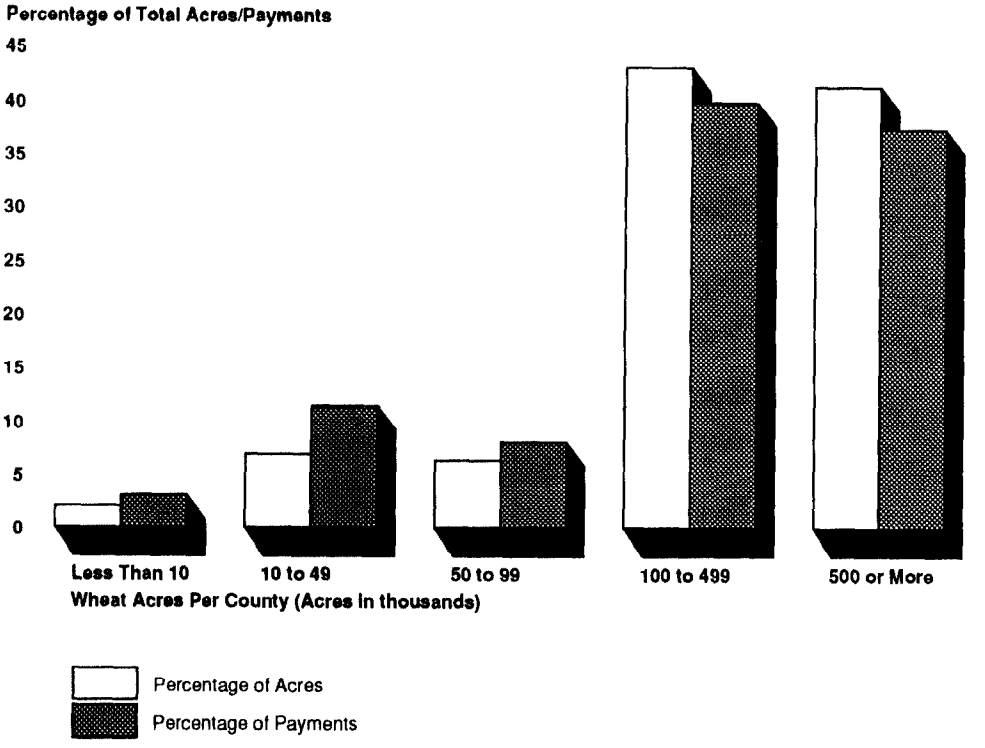
DISTRIBUTION OF PAYMENTS BY A COUNTY'S WHEAT ACREAGE CLASS

As shown in figure 2.4, in general, a county's share of wheat deficiency payments followed its share of wheat acres (see p. 17). However, the share of payments going to counties with 100,000 acres or more was slightly smaller. The Leader, Food Grains Analysis Section, ERS, told us that the wheat commodity program payment limitation and other regional production factors may account for the reason why a county's share of wheat deficiency payments does not exactly follow its share of wheat acres.

-- Wheat-producing counties that planted over 100,000 acres in wheat in 1990 accounted for nearly 85 percent (161.9 million acres) of all wheat acres planted and 77.5 percent ($1.77 billion) of the wheat deficiency payments.

-- Similarly, wheat-producing counties that planted fewer than 10,000 acres in wheat accounted for only 2 percent (3.8 million acres) of the wheat acres planted in 1990 and 3 percent ($68.5 million) of the wheat deficiency payments dispersed to these counties in 1990.

Figure 2.4: Share of Counties' Total Wheat Acres and Deficiency Payments by Number of Wheat Acres Planted



Source: GAO's analysis of 1990 program payment data by the Agricultural Stabilization and Conservation Service and 1990 County Crop Estimates by the National Agricultural Statistical Service.

DISTRIBUTION OF WHEAT DEFICIENCY PAYMENTS AMONG COUNTIES BY SHARE OF GROSS FARM RECEIPTS FROM WHEAT DEFICIENCY PAYMENTS

Although many counties received wheat deficiency payments in 1990, few counties received a large share of gross farm receipts from these payments.

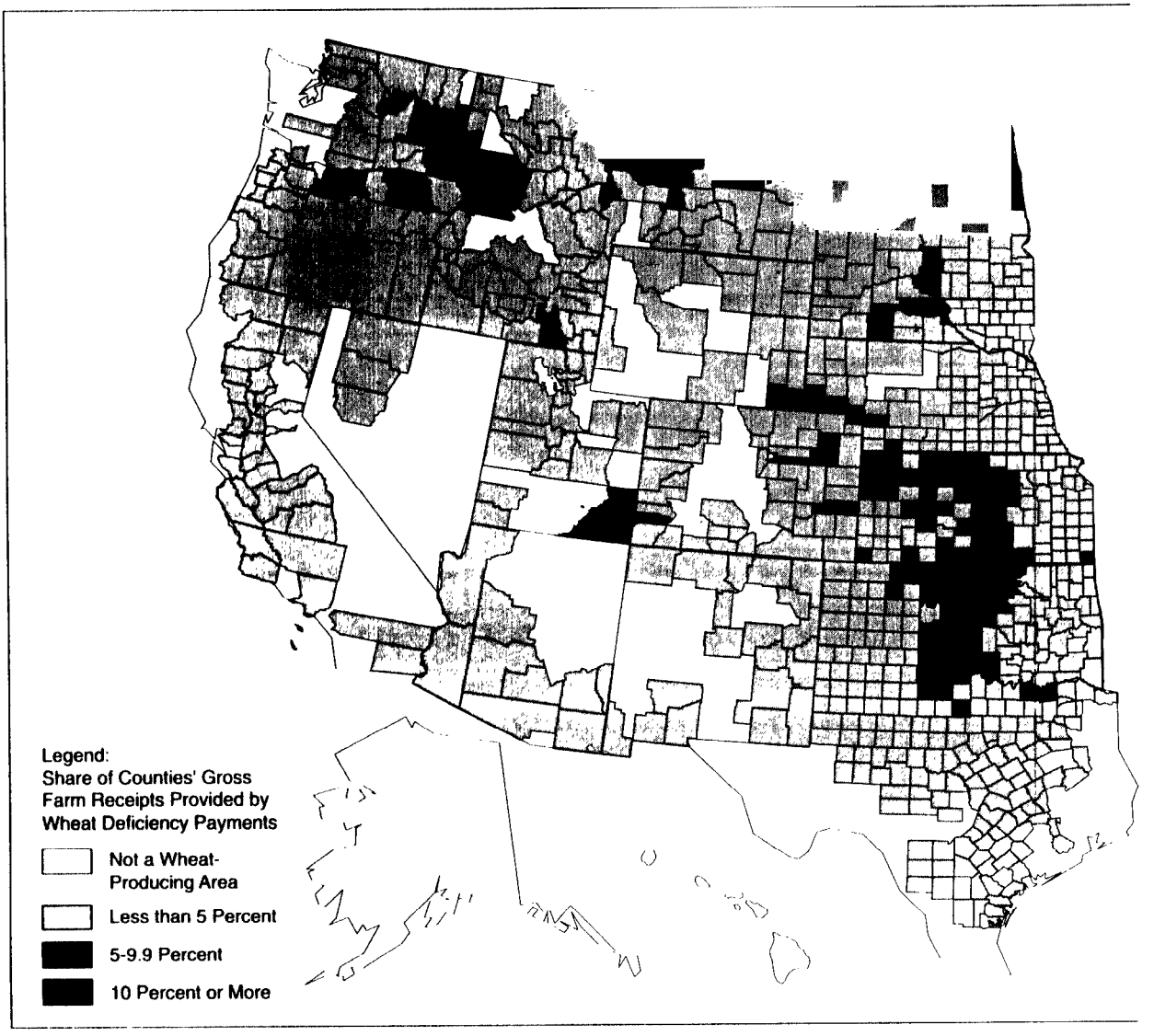
The following is shown in figure 2.5 (see pp. 18 and 19):

-- Almost 91 percent (2,021 counties) of the wheat-producing counties received less than 5 percent of gross farm receipts from wheat deficiency payments.

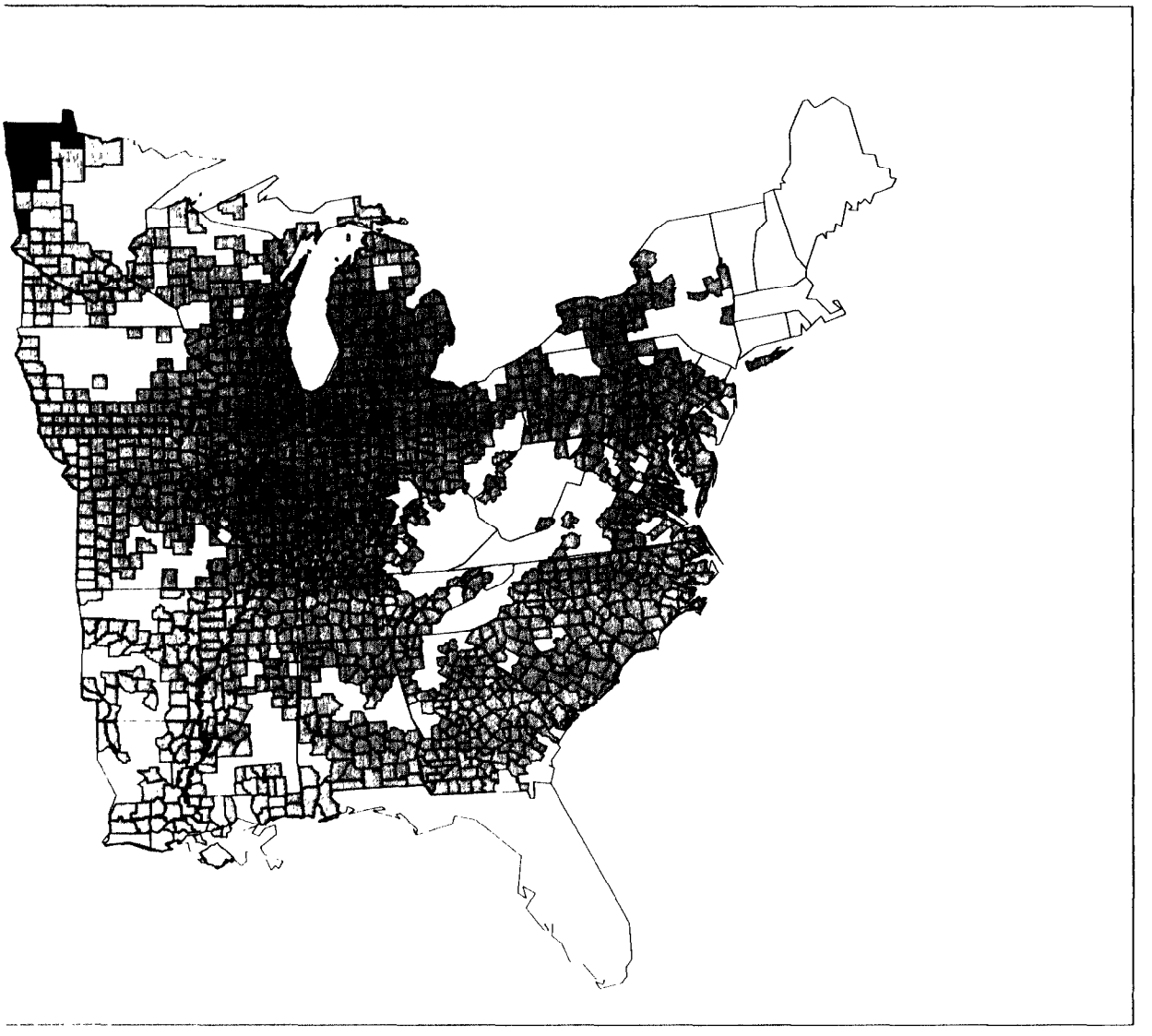
-- By contrast, less than 3 percent (72 counties) of the wheat-producing counties received more than 10 percent of their gross farm receipts from deficiency payments.

Additionally, of this group, 17 counties (less than 1 percent of all wheat-producing counties) received 15 percent or more of their gross farm receipts from deficiency payments. Of these 17 counties, 13 were located in Montana and North Dakota. The remaining four were in Kansas, Oklahoma, Oregon, and Washington State.

Figure 2.5: Share of Counties' Gross Farm Receipts Provided by Wheat Deficiency Payments



Source: GAO's analysis of USDA's data and the 1990 Farm Income and Expense (county) estimates from the Department of Commerce's Bureau of Economic Analysis.



SECTION 3

DISTRIBUTION OF WHEAT DEFICIENCY PAYMENTS TO PROGRAM PARTICIPANTS BY FARMS

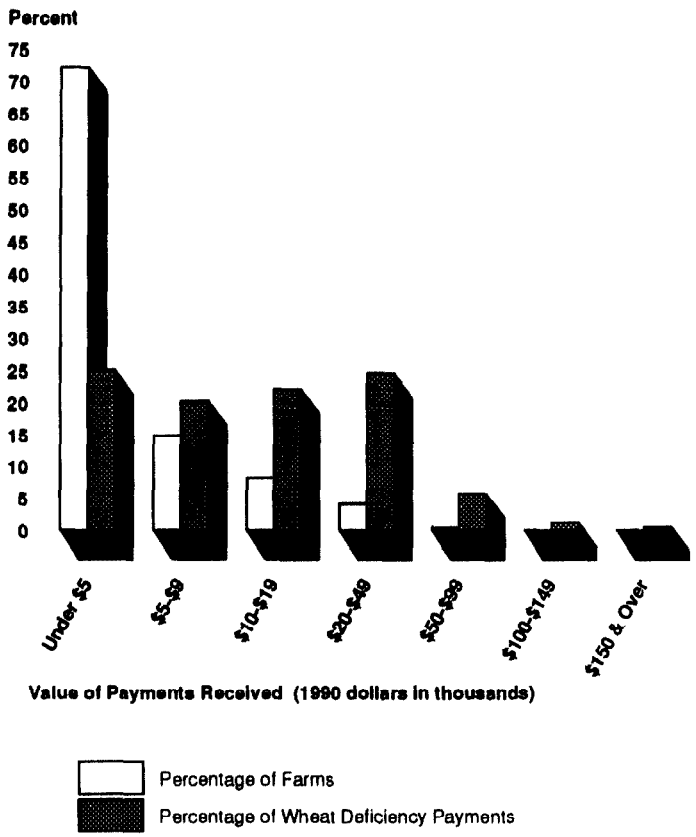
More than 95 percent of the 470,800 farms included in the Agricultural Stabilization and Conservation Service (ASCS) data base received less than $20,000 in wheat deficiency payments in 1990--amounting to 68 percent of total wheat deficiency payments. As figure 3.1 shows (see p. 21), of all wheat deficiency payments made, 25 percent ($609 million) went to farms receiving less than $5,000 in payments. These farms represent 72 percent (341,023) of all farms receiving wheat deficiency payments. In contrast, less than 1 percent (2,470 farms) received more than $50,000 in payments.[1]

The largest amount of wheat payments to a single farm was $666,475; although the land owner did not receive any payments, 19 nonowners received the total amount. The second highest amount was $619,868, paid to 17 owners and 1 other recipient. This amount reflects that, while the wheat program limits deficiency payments to $50,000 per person per year, the limit applied to persons--landowners and others actively engaged in farming--and not farms. More than one program participant can receive payments for wheat grown on a single farm. These participants can include both landowners and tenants who rent land.

---

[1]These concentration figures may be different if payments were analyzed over the lesser number of farms (282,700) in ERS' data base.

Figure 3.1: Distribution of Farms and Wheat Deficiency Payments by Value of Payments Received



Note: Totals may not add to 100 percent because of rounding.

Source: 1990 wheat commodity program payment data from ASCS.

However, typically, payments were much smaller. Table 3.1 classifies farms by the value of wheat deficiency payments received and shows average payments to owners and other recipients, as well as the average amount of deficiency payments received for other crops (see p. 22). The table shows the following:

-- For farms receiving less than $5,000 in wheat deficiency payments, the average wheat deficiency payment to owners was $927, and the average payment per farm was $1,786.

-- Farms receiving $150,000 or more in wheat deficiency payments averaged $127,038 in wheat deficiency payments to owners and $218,027 in average total payments per farm.

-- On average, all farm groups receiving wheat deficiency payments received additional deficiency payments for crops other than wheat. Farms receiving less than $5,000 in wheat deficiency payments received an average of $2,875 in payments for other crops, while farms receiving $150,000 or more in wheat deficiency payments received an average of $98,545 in other payments.

Table 3.1: Distribution of Wheat Deficiency Payments per Farm to Owners and Other Recipients by Value of Payments, Crop Year 1990

Value of wheat deficiency payments	Average wheat deficiency payment per farm to owners	Average wheat deficiency payment per farm to others	Total average wheat deficiency payment per farm	Total average nonwheat deficiency payments per farm	Total average of all deficiency payments per farm
Under $5,000	$927	$859	$1,786	$2,875	$4,661
5,000 to 9,999	3,914	3,092	7,006	4,197	11,202
10,000 to 19,999	8,817	5,007	13,824	5,724	19,548
20,000 to 49,999	21,949	8,232	30,181	7,827	38,008
50,000 to 99,999	46,304	18,982	65,286	16,072	81,358
100,000 to 149,999	86,344	33,635	119,979	23,249	143,228
150,000 and over	127,038	90,989	218,027	98,545	316,572

Note: Totals may not add because of rounding.

Source: 1990 wheat commodity program payment data from ASCS.

SECTION 4

DISTRIBUTION OF GOVERNMENT PAYMENTS TO SPECIALIZED WHEAT FARMS

In the previous section, we discussed deficiency payments to all farms participating in the wheat commodity program, regardless of the share of their total production coming from wheat. This section focuses on the 49,502 specialized wheat farms (about 18 percent of the estimated 282,700 farms that grow wheat) that received $782 million in government payments in 1990.[1,2] Of these government payments, 79.1 percent went to specialized wheat farms of 1,000 acres or more. Generally, larger farms received a larger percentage of gross farm receipts from government payments.[3] Many specialized wheat farms with a high share of gross farm receipts from government payments are located in the Plains region. Specialized wheat farms whose percentage of gross farm receipts from government payments was 10 percent or greater were less likely to have financial problems and more likely to have an operator whose principal occupation was farming.

DISTRIBUTION OF GOVERNMENT PAYMENTS TO SPECIALIZED WHEAT FARMS BY FARM SIZE

Most government payments went to large specialized wheat farms of 1,000 acres or more.

Figure 4.1 shows the following (see p. 24):

---

[1]A specialized wheat farm is a commercial farm whose value of wheat production not used as feed on the farm where it is produced accounts for 50 percent or more of the farm's value of total crop production plus livestock sales. Government payments to these specialized wheat farms include wheat deficiency payments, as well as deficiency payments for other crops, disaster relief payments, and payments from other federal agricultural programs.

[2]This number of farms is substantially lower than the 472,600 farms in ASCS' data base mentioned in section 3. The Agricultural Stabilization and Conservation Service counts farm tracts used in the program's administration; ERS measures operational units. Under ERS' definition, several farm tracts that ASCS would report separately could be combined if they are operated by the same producer.

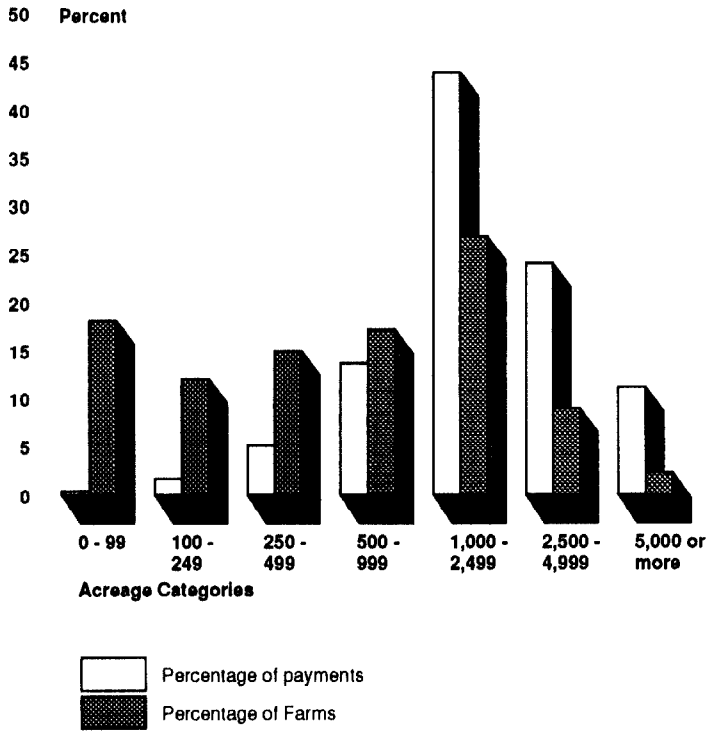
[3]Instead of "gross farm receipts," ERS uses the term gross cash income. Because the definitions are similar, we use "gross farm receipts" throughout this report.

-- Specialized wheat farms in 1990 with fewer than 100 acres made up about 18 percent (8,952 farms) of the farms and received less than one-half of 1 percent ($2.8 million) of government payments.

-- Specialized wheat farms with 1,000 or more acres made up about 38 percent (18,727 farms) of all specialized wheat farms in 1990 while receiving 79 percent ($618.3 million) of all government payments distributed to farms in 1990.

-- Those farms having more than 5,000 acres received about 11 percent ($87.1 million) of government payments, while accounting for only 2 percent (1,067 farms) of all specialized wheat farms in 1990.

Figure 4.1: Distribution of Government Payments by Farm Acreage Class, 1990



Note: Percentages may not equal 100 because of rounding.

Source: GAO's analysis of USDA's 1990 Farm Costs and Returns Survey.

DISTRIBUTION OF PAYMENTS AMONG SPECIALIZED WHEAT FARMS BY SHARE OF GROSS FARM RECEIPTS FROM GOVERNMENT PAYMENTS

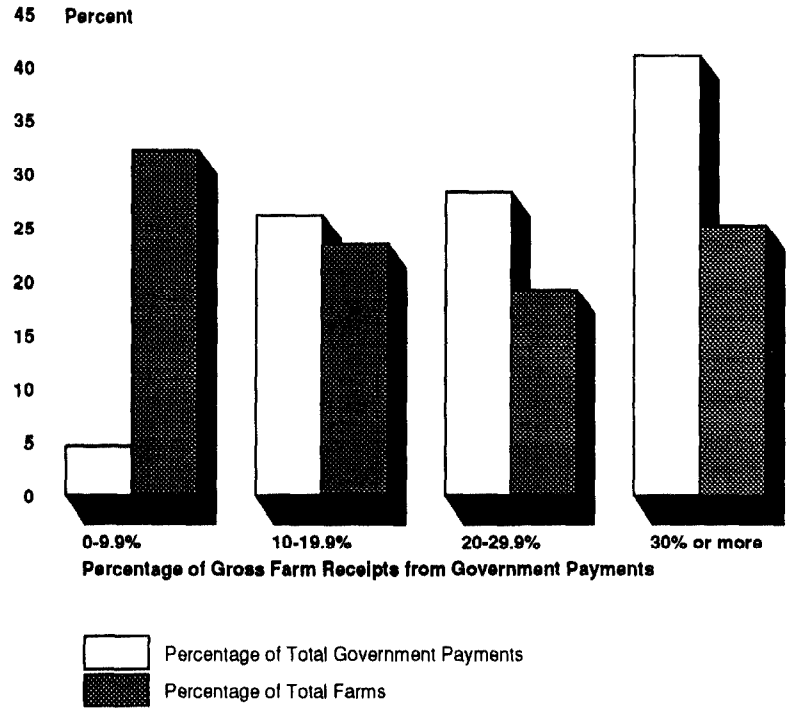
The share of gross farm receipts provided by government payments varies widely for specialized wheat farms. Usually, larger specialized wheat farms receive a larger share of gross farm receipts from government payments.

Figure 4.2 shows the following:

-- About 32 percent (15,915 farms) of specialized wheat farms received less than 10 percent of their gross farm receipts from government payments. These farms accounted for about 5 percent ($35.8 million) of total government payments.

-- About 25 percent (12,472 farms) received 30 percent or more of gross farm receipts from government payments. These farms accounted for 41 percent ($321.2 million) of total government payments.

Figure 4.2: Share of Total Government Payments and Total Specialized Wheat Farms by Share of Gross Farm Receipts From Government Payments, 1990



Note: Percentages may not equal 100 because of rounding.

Source: GAO's analysis of USDA's 1990 Farm Costs and Returns Survey.

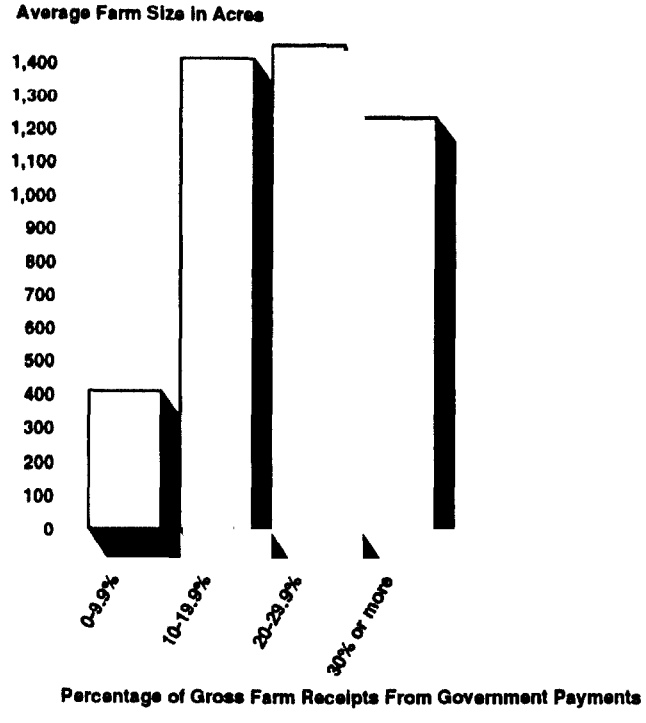
FARM SIZE CHARACTERISTICS OF SPECIALIZED WHEAT FARMS BY SHARE OF GROSS FARM RECEIPTS FROM GOVERNMENT PAYMENTS

Figure 4.3 shows the following:

-- Specialized wheat farms with less than 10 percent of gross farm receipts from government payments averaged 413 acres--fewer acres than those farms with a higher percentage of gross farm receipts from government payments.

-- The specialized wheat farms receiving more than 10 percent of gross farm receipts from government payments were roughly three times as large as farms receiving the smallest share and averaged 1,365 acres.

Figure 4.3: Average Specialized Wheat Farm Size by Share of Gross Farm Receipts Provided by Government Payments, 1990



Source: GAO's analysis of USDA's 1990 Farm Costs and Returns Survey.

LOCATION OF SPECIALIZED WHEAT FARMS BY SHARE OF GROSS FARM RECEIPTS PROVIDED BY GOVERNMENT PAYMENTS

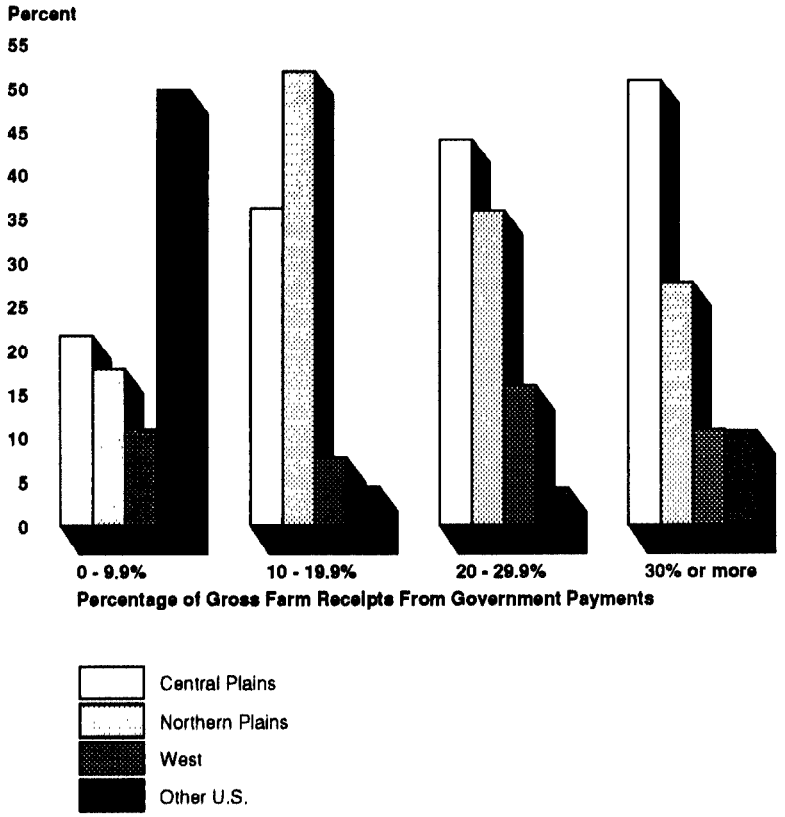
Figure 4.4 shows the following (see p. 28):

-- Of those specialized wheat farms that received more than 30 percent of their gross farm receipts from government payments, about 51 percent (6,343 farms) were located in the Central Plains states.[4]

-- Of those specialized wheat farms that received less than 10 percent of their gross farm receipts from government payments, about 50 percent (7,903 farms) were located outside of the Central Plains, Northern Plains, and West regions.

[4]The regions used in figure 4.4 are the Central Plains (Nebraska, Kansas, Oklahoma, and Texas), Northern Plains (Montana, Wyoming, North Dakota, South Dakota, Minnesota, and Colorado), and West (Washington, Oregon, California, Idaho, Utah, Nevada, Arizona, and New Mexico).

Figure 4.4: Regional Distribution of Specialized Wheat Farms by Share of Gross Farm Receipts Provided by Government Payments, 1990



Note: Percentages may not equal 100 because of rounding.

Source: GAO's analysis of USDA's 1990 Farm Costs and Returns Survey.

FINANCIAL INDICATORS BY SHARE OF GROSS FARM INCOME PROVIDED BY GOVERNMENT PAYMENTS

ERS classified specialized wheat farms into four financial condition groups---favorable, marginal income, marginal solvency, and vulnerable--on the basis of net farm income and debt-to-asset ratios.[5] Using these classifications, about 58 percent (28,841

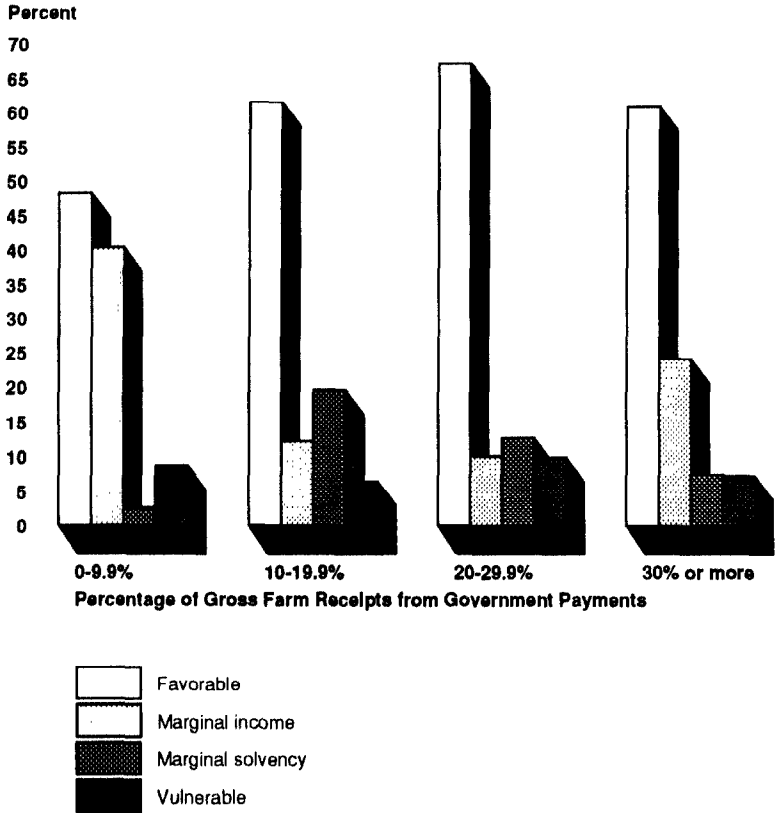
[5]According to ERS, farms in the favorable group have a positive net income and debt-to-asset ratios of less than 0.4, farms in the marginal income group have negative incomes and debt-to-asset ratios of 0.4 or less, farms in the marginal solvency group have positive net incomes and debt-to-asset ratios above 0.4, and farms in the vulnerable category have negative incomes and debt-to-asset ratios above 0.4.

farms) of all specialized wheat farms were in favorable economic condition. Figure 4.5 shows the financial condition of specialized wheat farms according to the share of gross farm receipts provided by government payments (see p. 30).

-- Of the group receiving less than 10 percent of its gross farm receipts from government payments, about 48 percent (7,692 farms) were in the favorable group. However, 40 percent (6,432 farms) were in the marginal income group, and an additional 11 percent (1,791 farms) were in the marginal solvency or vulnerable group.

-- Of the group receiving 30 percent or more of its gross farm receipts from government payments, 61 percent (7,608 farms) were in the favorable group, while 24 percent (3,017 farms) were in the marginal income group, and an additional 15 percent (1,486 farms) were in the marginal solvency or vulnerable group.

Figure 4.5: Specialized Wheat Farm Financial Position by Share of Gross Farm Receipts Provided by Government Payments



Note: Percentages may not equal 100 because of rounding.

Source: GAO's analysis of USDA's 1990 Farm Costs and Returns Survey.

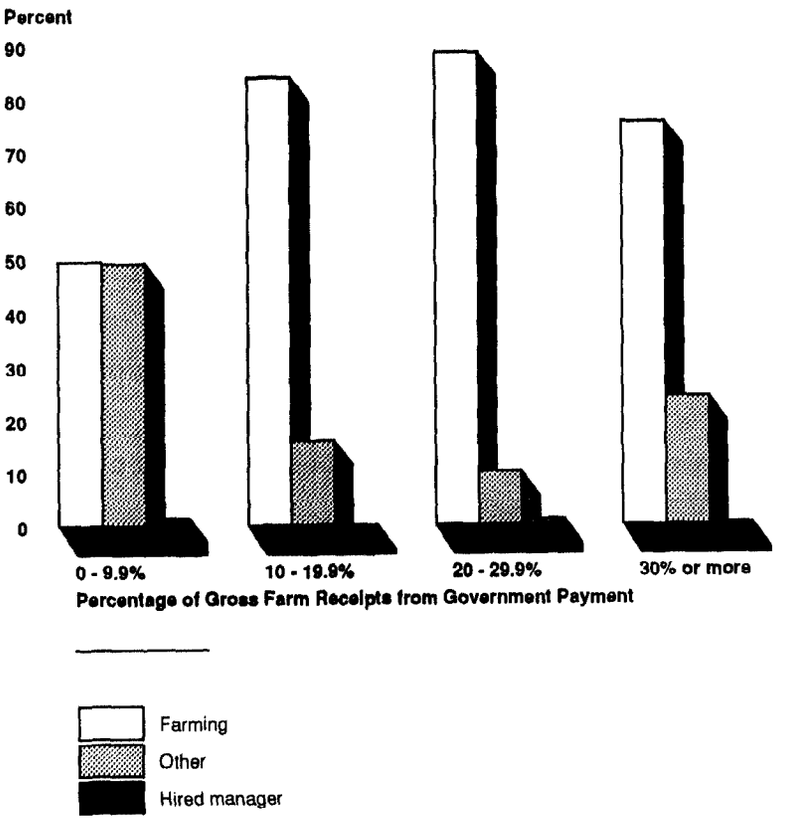
PRINCIPAL OCCUPATIONS OF PAYMENT RECIPIENTS

Figure 4.6 shows the percentage of operators with farming and nonfarming as their primary occupations by the percentage of gross farm receipts provided by government payments (see p. 31).

-- About 50 percent (7,883 farms) of the specialized wheat farms receiving less than 10 percent of their gross farm receipts from government payments had operators whose primary occupation was farming.

-- About 76 percent (9,441 farms) of the specialized wheat farms receiving 30 percent or more of their gross farm receipts from government payments had operators whose primary occupation was farming.

Figure 4.6: Principal Occupations of Farm Operator by Share of Gross Farm Receipts Provided by Government Payments



Note: Percentages may not equal 100 because of rounding.

Source: GAO's analysis of USDA's Farm Costs and Returns Survey.

SECTION 5

OBJECTIVES, SCOPE, AND METHODOLOGY

OBJECTIVES

Our objectives were to determine how the price and income support provisions of the USDA wheat commodity program affected domestic wheat farm incomes in 1990. Our specific objectives were to examine

-- the wheat commodity program's overall costs and the extent to which producers and domestic wheat buyers gain or lose from it,

-- the distribution of wheat deficiency payments to program participants by counties,

-- the distribution of wheat deficiency payments to program participants by farms, and

-- the distribution of government payments, including wheat deficiency payments, to farms whose wheat production accounts for 50 percent or more of the value of the farm's crop and livestock production (known as specialized wheat farms).

SCOPE AND METHODOLOGY

We used an economic analysis to estimate the costs and benefits of the wheat commodity program to program participants, nonparticipating wheat producers, domestic wheat buyers, and the government (sec. 1). We obtained data used in this analysis from USDA and prepared estimates for crop years 1990, 1991, and 1992. For more details on this analysis, see appendix II.

For the remainder of the report, we limited our analysis to 1990. We selected 1990 because it was the most recent year for which both county- and farm-level data were available.

To examine the distribution of wheat deficiency payments by counties (sec. 2), we collected data on all counties where farmers planted more than 50 acres of wheat and that received wheat deficiency payments. We used

-- ASCS' wheat commodity program data that identify the recipients of deficiency payments, and the amount and date of each payment consolidated at the county level;

-- the Bureau of Economic Analysis's farm income estimates for counties;[1] and

-- the wheat production estimates for counties from USDA's National Agricultural Statistical Service.

To analyze the distribution of wheat deficiency payments to individual wheat-producing farms (sec. 3), we used ASCS' records of deficiency payments and farm ownership. Using ASCS' 1990 crop year records of wheat deficiency payments, we traced each payment to farmland owners and other payment recipients--principally tenants--to farms. ASCS' data on deficiency payments included all farms in the United States that received wheat deficiency payments during crop year 1990.

In examining the distribution of government payments to specialized wheat farms (sec. 4), we used ERS' Farm Costs and Returns Survey (FCRS). FCRS collects data on government payments to wheat farmers. These government payments may include payments in addition to wheat deficiency payments--for example, payments to retire erodible cropland from production and deficiency payments for other commodity program crops. We compared government payments to farms with the characteristics of those farms, including size, financial condition and principal occupation. We also summarized FCRS' data of specialized wheat farms by region, groups, and other characteristics on the basis of the percentage of gross farm receipts from government payments.

[1]These farm income estimates are based on statistical adjustments of USDA's and the Department of Commerce's census data.

WHEAT COMMODITY PROGRAM'S PROVISIONS

The wheat commodity program consists of a number of program provisions that are laid out in farm legislation and are further specified by the Department of Agriculture's (USDA) regulations. Although most of these provisions apply to other commodities as well as wheat, the details of some provisions vary by commodity. This appendix includes the major program provisions affecting wheat production.

-- Nonrecourse loans. Nonrecourse loans establish the loan rate--a governmentally set support price--for wheat. Farmers can take 9-month nonrecourse loans when they harvest their wheat and place it into approved storage facilities. They may repay the loan at any time or, when the loan comes due, they may default on the loan and forfeit their wheat to the Commodity Credit Corporation (CCC)--part of the Department of Agriculture. The loans are "nonrecourse," in that, CCC must accept delivery of the wheat as repayment of the loan's principal and interest.

   To determine the actual loan rate for nonrecourse loans under the 1990 farm bill, USDA first calculates the "basic loan rate" (the price per bushel), on the basis of the previous 5 years' market prices per bushel of wheat. Under certain conditions, the basic loan rate is then adjusted downward. For example, if year-end stock levels of wheat are high relative to domestic use and exports, indicating the excess availability of wheat, and/or the Secretary of Agriculture determines that lower market prices are necessary for U.S. producers to remain competitive on the international market, USDA will adjust the basic loan rate downward to determine the "announced" loan rate. However, there are limits to how much the actual, or "announced," loan rate can fall in a given year.

   If the loan rate per bushel of wheat exceeds the market price, farmers are likely to default on their loans and forfeit wheat to CCC rather than deliver their wheat to the market. In such a case, reduced supplies to the market will put upward pressure on the market price until it rises to the level of the loan rate. The loan rate thus acts as a floor below which the market price is unlikely to fall for any extended period.[1]

---

[1]Beginning in crop year 1993, USDA instituted a marketing loan for wheat. Under a marketing loan, if the posted county price for wheat falls below the announced loan rate, farmers can (cont.)

By providing financing to farmers during storage of their wheat, the loan program gives farmers greater flexibility in timing their market deliveries of wheat. This helps to stabilize the domestic wheat market by smoothing out deliveries of wheat over time, and thus reduces price variability. Also, the program helps to stabilize wheat prices over time by providing a mechanism through which USDA takes stocks of wheat off the market during years of high production and low prices that CCC can supply to the market during years of lower production and higher prices.

-- Deficiency payments. Under this component of the wheat commodity program, farmers are paid the difference between a per-bushel "target" price, set by USDA, and the market price or the loan rate, whichever is higher. In cases where the market price is below the basic loan rate, additional deficiency payments (known as Findley payments) are made. Under the 1990 farm bill, the target price is frozen at $4 per bushel for crop years 1991 through 1995. Regular deficiency payments (not related to Findley payments) are limited to $50,000 per person per year.

Farmers establish a crop acreage base as a 5-year moving average of previous years' program acres. Base acres are difficult to increase because a farmer must leave the program to expand production for the purpose of redefining base acreage, and only one-fifth of the marginal acres planted during a nonparticipating year will be considered as an increase in the base under the 5-year moving average. Moreover, a farmer cannot increase base acreage in a given year and be eligible for payments for any program crop in that year.

Under the 1985 and 1990 farm bills, farmers' wheat program yields (bushels per acre) have generally been frozen at levels based on 1981-85 yield levels, so that they do not receive higher deficiency payments in response to higher levels of current production. That is, even if actual production per acre has increased since the mid-1980s, deficiency payments are only paid on yield levels that a farmer achieved during

---

repay their nonrecourse loan at the county market price. Thus, the loan rate should not act as a price floor, and U.S. prices should be able to fall below that level if world wheat prices fall below it. This is expected to enable U.S. farmers to remain competitive on the world market. As of 1992, however, market prices were generally above the loan rate, so it does not appear that the marketing loan will be activated in the 1993 crop year.

the 1981-85 period. In 1992, for example, actual average yields were 39.4 bushels per acre while average program yields were only 34.4 bushels per acre.

The purpose of deficiency payments is to support farmers' incomes. Because target prices have generally been above market prices and loan rates, farmers are likely to respond to the availability of deficiency payments by increasing their wheat production levels and their participation in the program. However, the freezing of wheat program yields under the 1985 and 1990 farm bills lessens producers' incentives to farm their eligible acres more intensely unless the expected market price of wheat or the loan rate implies that such extra production is profitable.

-- Acreage Reduction Program (ARP). Under ARP requirements, USDA requires farmers who participate in the wheat commodity program to hold some acreage out of production. Under the 1990 farm bill, the level of acreage reduction is tied to the ratio between available stocks of wheat and the level of domestic and export use. A high stocks-to-use ratio requires that a greater percentage of land be set aside. Because the 1992 stocks-to-use ratio was below 40 percent, farm legislation required USDA to set an ARP level of between zero and 15 percent for 1993. As a result, on the basis of a forecasted 1992 stocks-to-use ratio below 40 percent, USDA set an ARP level of zero for 1993. ARP levels could, however, increase if the stocks-to-use ratio rises in future years.

The purpose of ARP is to counteract the over-production incentives created by the income and price support features of the wheat commodity program, including the deficiency payments. Some farmers may choose not to participate in the wheat commodity program if they view the cost of foregone earnings from output that could be grown on ARP acres to be too high. However, this may be a less significant cost for farmers who have less productive land. In any case, the ARP level has been set to zero for the 1993 crop year.

-- Flexible acreage. In addition to ARP nonpayment acreage, the Omnibus Budget Reconciliation Act of 1990 disallowed deficiency payments on 15 percent of the wheat base acreage but allowed, with some exceptions, farmers to continue planting wheat or other crops on that acreage. Farmers also have the option of allocating up to an additional 10 percent of their acreage to flexible planting under the "optional flex acres" provision of the program. Deficiency payments would also be forfeited on any optional flex acres. All flex acres

are viewed as "considered planted" acres and preserve the farmer's crop base acreage.

Flex acreage encourages farmers to be more responsive to market signals than was true in the past because deficiency payments are not received on these acres, and thus, farmers will want to plant the most profitable--in terms of market returns--crops on these acres. For an alternative crop to be more profitable than wheat on wheat base acres, however, net revenues must be higher than the net revenues earned for the wheat that would have been harvested. The flexible acre program also helps to reduce federal outlays for deficiency payments, since acreage qualified for these payments is limited to a maximum of 85 percent of base acres.

-- Conservation Reserve Program (CRP). Under CRP, farmers are paid to retire croplands, including wheat land, classified as highly erodible from production for at least 10 years. Farmers are paid a per-acre rental fee and half of the costs of establishing land cover on the CRP acres (e.g., grass or trees). The goal of this program is to reduce soil erosion as well as to achieve several other environmental and economic benefits. In 1992, 30 percent (10.8 million acres) of the acres enrolled in CRP were wheat base acres. Under the 1990 farm bill, the characteristics of cropland necessary to qualify for CRP enrollment were modified.

Payment for acreage in CRP encourages some farmers to take croplands out of production. In crop year 1991, for example, approximately 11 percent of the national wheat base acreage was enrolled in CRP. The potential reduction in wheat output associated with CRP can raise market prices.

-- 0/92 program. Under the 0/92 program, if a farmer plants wheat on between zero and 92 percent of his/her permitted base acreage and allocates the rest of that acreage for conserving uses (or approved nonprogram crops), he/she can receive wheat deficiency payments for 92 percent of his/her permitted acreage. Because wheat itself qualifies as a conserving use, and each year's sign up date for the 0/92 program on winter wheat is well into planting season (and yields can be better determined), the 0/92 program can operate as a form of crop insurance for wheat producers.

Whether the 0/92 program is beneficial to a farmer usually depends on his/her particular circumstances. In general, farmers will find this program more attractive in years

when expected cash returns from wheat are low. In addition, farmers who have some marginally productive wheat base acres are more likely to enroll in the 0/92 program, since their "opportunity cost" for these acres is not as high as for more productive land. Similarly, if a farmer has experienced unfavorable weather conditions, he/she may decide not to harvest planted wheat and to enroll in the 0/92 program.

APPENDIX II

GAO'S WELFARE ANALYSIS OF THE WHEAT PROGRAM

This appendix discusses how we measured the economic gains and losses (called a welfare analysis) from the U.S. wheat program that were reported in the body of this report. The U.S. wheat program supports the income of wheat producers through direct deficiency payments from the government as well as through higher prices paid by wheat buyers in certain years. Other components of the program that affect the level of wheat producers' earnings include the acreage reduction program, the 0/92 program, and the flex acre program.[1] We also measured the efficiency of the transfer of payments from the government and wheat buyers to producers, in addition to the total gains and losses.

According to our estimates,[2] between 1990 and 1992, the program resulted in average annual gains to participating wheat producers of approximately $1.36 billion and to nonparticipating producers of $12 million. During this same period, wheat buyers contributed an average of $32 million per year and the government about $2.2 billion yearly toward paying for these producers' gains. These transfers resulted in a loss to society (deadweight loss) or efficiency loss which averaged approximately $834 million per year. For the most part, these deadweight losses are attributed to the opportunity cost associated with idled land.

We arrived at these estimates by comparing actual prices and quantities both produced and consumed with estimated prices and quantities derived, assuming that no wheat program was in place. In the first section of this appendix, we explain the methodological framework we used to find the "no-program" equilibrium price and quantity. Second, we explain the methodology we used to measure welfare gains and losses. Third, we discuss data sources, and fourth, we present the range of welfare gains and losses that were the result of our analysis.

---

[1]See appendix I for a discussion of these program components.

[2]These estimates of economic gains and losses are in 1992 dollars.

METHODOLOGY FOR NO-PROGRAM EQUILIBRIUM PRICE AND QUANTITY

We used a methodology developed by Gardner (1989)[3] to estimate the gains and losses from the wheat program for the years 1990, 1991, and 1992.[4] We chose these years, as they were essentially before and after the 1990 Farm Bill became law, and could be compared with Gardner's estimates from 1984-87, which displayed the welfare effects of the 1985 Farm Bill. In order to calculate welfare effects, we estimated price and quantity using a scenario in which no wheat price supports were in place--e.g., without deficiency payments, the loan rate, or acreage reduction programs. This was done by using current data to identify a probable single point on each of the no-program supply and the no-program demand curves. Using the assumption of constant elasticity in the relevant range of the function, we extended the identified points so that the entire supply and demand functions for the no-program scenario could be approximated. We then calculated equilibrium values and compared the resulting no-program prices and quantities with the prices and quantities that actually occurred (with the program in place) to obtain welfare estimates.

This methodology employs a static, partial equilibrium framework and considers a movement to a no-program situation. The no-program scenario assumes no deficiency payments, no loan program, no ARPs, and no flex acreage. The model does not consider a movement to worldwide free trade nor does it consider a complete absence of governmental intervention in agriculture (such as an absence of disaster payments, research and development, etc.). As it is a partial equilibrium model, it also does not include cross-commodity effects and the effects of other crop programs. Consistent with the treatment in Gardner's model, our analysis incorporated the assumption that, in a no-program situation, carry-in and carry-out stocks will cancel each other out under normal market conditions, so that stocks do not accumulate. We assumed that the Conservation Reserve Program would continue in the absence of the wheat program for environmental reasons and that these acres would not come back

---

[3]Gardner, Bruce L. "Gains and Losses From the Wheat Program," Department of Agricultural and Resource Economics, Working Paper 88-11, University of Maryland, 1989.

[4]These years--1990, 1991, and 1992--correspond to crop years 1990/91, 1991/92, and 1992/93 throughout the analysis.

into production.[5] In the case of the Export Enhancement Program (EEP), the amount of EEP payments and the effects of EEP were also not considered in this analysis.[6] For simplicity, only the essential features of the wheat program were considered.

Although we employed the same basic methodology over the 3 years of the analysis, it was necessary to modify our analysis to reflect significant yearly changes in the program. For example, in the 1990/91 crop year, we adjusted the calculations to reflect the fact that producers were offered a "modified" wheat program, which gave them the option of harvesting up to 105 percent of their base. Also, in the 1991/92 crop year, winter wheat producers were given a choice of either (1) retaining the right to collect wheat deficiency payments on flex acres using the 1994-95 method[7] or (2) not receiving payment on those acres. On the basis of conversations with a USDA official, we assumed that winter wheat producers chose the former option and received deficiency payments. For both the 1991/92 and 1992/93 crop years, we assumed that producers expected to receive the previous year's 12-month season average price on their flex acres planted for wheat. However, we did not include an analysis of "optional flex acres" in the model, since data on how they were apportioned between idled, wheat, and flexed acres were not available.

---

[5]Although the point can be made that without CRP, ARPs would be much higher, this argument can be made for a variety of programs, the export credit programs being one example. Therefore, we decided to maintain only the essential supply and demand features of the wheat program itself.

[6]Economists have noted a connection between EEP and domestic market price, and therefore a linkage between EEP and deficiency payments. However, we have no assessment of how EEP would affect market price in the absence of the wheat program.

[7]For 1991-93, the deficiency payment per bushel for wheat producers is the difference between the target price and the higher of either the national weighted average market price for the first 5 months of the marketing year or the basic loan rate. For 1994-95, the payment rate calculations will be based on the difference between the target price and the lower of either a 12-month weighted average marketing price or the 5-month marketing year price plus 10 cents per bushel, whenever these are higher than the loan rate.

Derivation of the No-Program Supply Function

To locate the no-program supply curve, it was necessary to locate one price/quantity combination representing a point on this curve. To obtain a price appropriate for locating such a point, we estimated a no-program market price (with no acreage restrictions) that would leave producers equally well off in comparison to their current situation with the program in place (with acreage restrictions). Gardner's concept of the price that would have been necessary to induce production without acreage constraints is referred to as the "participation incentive price." This price can be thought of as an expected price faced by an appropriately weighted "composite" producer--a composite of both program participant and nonparticipant producers. Instead of responding solely to the target price or to the market price, this composite producer would respond to some blend of the two prices. Producers have the option of not participating in the program, and the participation incentive price reflects this reality.

We then located the appropriate no-program quantity that corresponds to the participation incentive price. Starting from observed production data under the program, we calculated the quantity of wheat that would have been produced in the absence of the program by using information on yearly ARP levels, 0/92 acres, flex acres idled, and estimates of slippage.[8] These acres would come back into production because, adjusting for slippage, producers would have an economic incentive to plant on them at the market price equivalent of the average return that producers earn when the program is in effect. Given the producer's original commitment of land under the program's provisions, at the participation incentive price, producers would be likely to produce on these additional acres because, by doing so, they would earn the same return that they were earning with the program. This quantity, in combination with the participation incentive price, identifies a point on the no-program supply curve ("B" in fig. II.1).[9] We then used

---

[8]Slippage occurs when the level of commodity production decreases proportionately less than the number of idled acres under a program such as the acreage reduction program. The range of slippage estimates (0.30-0.44) that we used were production slippage estimates that include both acreage and yield slippage.

[9]Figure II.1 displays a theoretical construct of a no-program situation and not a specific year's situation. In reality, the simultaneous existence of both participants and nonparticipants (the former responding to the target price and the latter [cont.]

estimates of elasticities of supply to identify the remainder of the curve and find its intersection with the demand curve.[10]

Calculation of the Participation Incentive Price

The participation incentive price is the weighted average of two prices: 1) a price representing the expected returns from participation in the program and 2) a price representing the expectations of nonparticipants. This price elicits the quantity that is produced by a representative, or "average," producer, accounting for both participants and nonparticipants. It is lower than the target price because it incorporates the cost to participants of idled land as well as the market price weighted by nonparticipants. However, it must exceed the anticipated market price in order to induce a level of output that would exceed the output that corresponds to a no-program equilibrium. The expression for the participation incentive price is:

$$1)\ P_B = (PR * RETP) + ((1 - PR) * EXMP)$$

The variables are defined as follows:

P_B	= Participation incentive price
PR	= Participation rate
RETP	= Returns from participation
EXMP	= Expected market price

Calculation of Returns From Participation

To calculate the participation incentive price, we first estimated the returns from participating in the program. Returns from participating in the program are the difference between the expected benefits from participation and the costs of participation.[11] The decision to participate hinges on the difference between the expected returns from the market minus related fixed and variable costs compared with the expected

---

responding to the market price) makes graphical depiction somewhat difficult.

[10]The range of elasticities used was discussed on pages 40 and 41.

[11]The benefits or gains from the capitalization of agricultural support payments into higher land prices are not clear and are beyond the scope of this analysis.

program returns on only program-permitted acres minus related fixed and variable costs. Expected returns from the program on permitted acres must be greater than the expected market returns on all acres to induce farmers to participate in the program and take land out of production. A producer will participate in the program if:[12]

$$2)\ (P_T * A_T * (1-ARP) - TFC - VC_p) > (EXMP * A_T - TFC - VC_p - VC_A)$$

The variables are defined as follows:

EXMP = Expected market price
TFC = Total fixed costs
VC_p = Variable costs on program acres
VC_A = Variable costs on ARP acres
P_T = Target price
A_T = Total base acreage
ARP = Acreage reduction program percentage

rearranging terms,

$$3)\ (P_T * A_T * (1-ARP) - TFC + TFC - VC_p + VC_p + VC_A) > (EXMP * A_T)$$

or

$$4)\ (P_T * (A_T * (1-ARP)) + VC_A) > (EXMP * A_T)$$

Therefore, from the left-hand side of expression 4, we calculated the returns from participation as the expected revenue on the "permitted acres,"[13] plus the saved variable costs on the idled acreage. On a per-bushel basis, this calculation involves the following steps. First, we represented returns from participation on a per-bushel basis in two parts, revenue plus saved variable costs:

---

[12]This form represents the 1990 situation. For 1991 and 1992, the formula would include an adjustment to the payment acreage for normal flex acres.

[13]Permitted acreage is the maximum acreage of a crop which may be planted for harvest by a program participant. For each farmer, this amount is the farm's base acreage minus the ARP acreage.

5) $RETP=PBREV+SVCB$

Per-bushel revenue was calculated as:

6) $PBREV=(TP*(PY/AY)*(1-ARP))+(EXMP*((AY-PY)/AY)*(1-ARP)))$

And saved variable costs were calculated as:

7) $SVCB=(TVC*ARP)/AY$

The variables are defined as follows:

RETP	=	Returns to participants ($/bushel)
PBREV	=	Revenue ($/bushel)
SVCB	=	Saved variable costs ($/bushel)
TP	=	Target price ($/bushel)
EXMP	=	Expected market price (Season average price, lagged 1 year - $/bushel)
PY	=	Program yield (bushel/acre)
AY	=	Actual yield (bushel/acre)
ARP	=	Acreage reduction program (acres)
TVC	=	Total variable costs ($/acre)

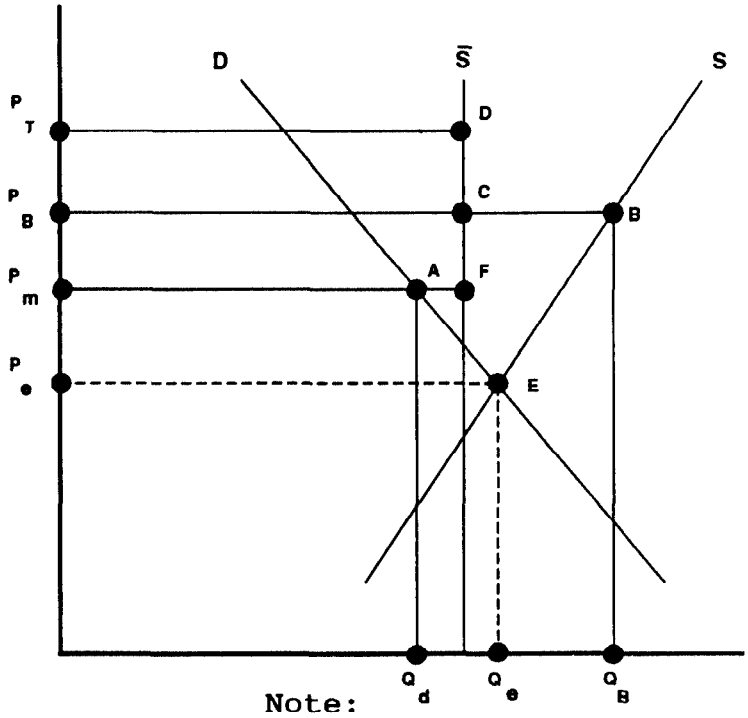
Therefore, substituting equation 5--the returns from participating in the program (RETP)--into equation 1, along with the participation rate and the expected market price gives the participation incentive price (P_B). This price would produce the equivalent market returns, without acreage constraints and other program provisions, that producers obtain under the program with acreage restraints.

Production Without Acreage Restraints

Without the program, under a scenario using the same producer's returns (only from the market), the quantity supplied would likely increase as acreage idled under ARP, 0/92, and flex acres were brought back into production. As discussed above, we used an observed quantity--actual wheat production--as a starting point to locate the estimated amount that would come back into production. This amount of production would identify the quantity coordinate of point B (Q_B) on the no-program supply curve which is elicited by the participation incentive price, P_B. To calculate this quantity, we used data on ARP percentages and

idled flex acres to augment observed yearly production data. However, because not all acres would come back into production and because the idled acres are likely to be lower-yielding acres, the production increases were mitigated by estimates of program slippage. Therefore, the quantity coordinate of "B" was located on the no-program supply curve by calculating the amount of production that would ensue (adjusting for slippage) without set-asides, flex acres, or the 0/92 program. We found the remainder of the no-program supply curve by using estimates of supply elasticities from other studies and the assumption of constant elasticity in the relevant range of the supply function.

Figure II.1: The Program/No-Program Wheat Supply and Demand Curves



Note:

$\bar{S}$ = Supply curve with program acreage controls
S = No-program supply curve
D = Wheat demand curve
P_T = Target price
P_B = Participation incentive price
P_m = Season's average market price
P_e = Equilibrium no-program price
Q_D = Total market demand (domestic and export)
Q_e = Equilibrium no-program quantity
Q_B = Quantity without acreage constraints at "B"

APPENDIX II

Derivation of the No-Program Demand Curve

The wheat program does not shift the demand curve as it does the supply curve (owing to the acreage set-asides). Just as they would be able to do in the absence of the program, consumers are free to buy what they demand at the going market price. The point on the demand curve most readily observed is the one at today's current price/quantity combination, point A. (See fig. II.1.) This price was located by identifying the farm-level price that corresponds to total wheat purchases. We assumed that this farm-level price was the 12-month-season average price. Using a constant elasticity demand function, we used elasticities of demand to extend the demand curve.

Equilibrium No-Program Price and Quantity

After finding the two points on the no-program supply and demand curves, points A and B, we used the constant elasticity functional forms to extend these points:

8) $Q_d = K_d P^{\eta}$

9) $Q_s = K_s P^{\epsilon}$

The variables are defined as follows:

Q_d = Quantity demanded
Q_s = Quantity supplied
K_d = Shift parameter or intercept term for demand equation
K_s = Shift parameter or intercept term for supply equation
P = Price
η = Price elasticity of demand
ϵ = Price elasticity of supply

The shift parameter K_d (equation 8) was found, given the actual values of market price and quantity demanded, by the equation:

10) $K_d = Q_A P_A^{-\eta}$

Similarly, the shift parameter K_s (equation 9) was found by incorporating knowledge of the quantity supplied at point B (Q_B), the producer's incentive price (P_B here), and estimates of the elasticity of supply:

11) $K_s = Q_B P_B^{-\epsilon}$

Finally, we solve for the equilibrium "no-program" price and quantity, P_e and Q_e. For equilibrium price, P_e, we equate supply and demand (equations 8 and 9) and solve, substituting in the shift parameters, K_d and K_s:

12) $P_e = (K_s/K_d)^{1/(\eta-\epsilon)}$

To obtain equilibrium quantity, we substitute either K_s or K_d as well as the equilibrium price, P_e, found in equation 12, into either the supply or the demand function.

13) $Q_e = K_s P_e^{\epsilon}$

or equivalently,

14) $Q_e = K_d P_e^{\eta}$

METHODOLOGY FOR MEASURING GAINS AND LOSSES

We can measure the gains and losses to different interests--participants, nonparticipants, buyers, and the government--by comparing the no-program price and output quantities estimated above with the program quantities. We define these gains and losses as the changes in real income that are brought about by the program. The magnitude and direction of these changes in any given period depend upon where the no-program price is positioned in relation to other prices such as the average market price or the calculated per-bushel returns to producers.

Producers' Gains and Losses

Under the wheat program, participating producers earn the calculated per-bushel returns from participation discussed earlier. This calculation consists of the expected total revenue (from the market and from deficiency payments) on the permitted acres plus the saved variable costs from not planting on the idled acres. In the absence of the program, all producers would earn the equilibrium no-program price. In figure II.1, average producer gain--for both participants and nonparticipants--consists of the area between the participation incentive price (P_B) and the no-program price (P_e) and to the left of the no-program supply curve--area $P_B BEP_e$. Mathematically, gains to participants and nonparticipants can be estimated by the following expressions:

APPENDIX II

15) $PPG=((RETP-P_e)*PR)*(0.5*(Q_e+Q_B))$

16) $NGL=((SAP-P_e)*(1-PR))*(0.5*(Q_e+Q_B))$

The variables are defined as follows:

PPG = Producer participant gain
RETP = Returns from participation
PR = Participation rate
P_e = No-program equilibrium price
Q_e = No-program equilibrium quantity
Q_B = Observed quantity without program set-asides
NGL = Nonparticipant gain or loss
SAP = 12-month season average price

Participants' gains depend on the difference between the returns from participation, RETP, and the equilibrium no-program price, P_e. The gain or loss of nonparticipants depends on the position of the no-program equilibrium price compared with the price that they receive from the market. Nonparticipants gain if the market price received with the program is higher than the no-program equilibrium and lose if the market price is lower.

Wheat Buyers' Gains or Losses

The gain or loss of wheat buyers with the program depends, again, upon the position of the no-program price. Buyers of wheat gain if they pay lower prices under the program compared with a no-program situation and lose if they must pay a higher price. To calculate this gain or loss, we measure the area P_mAEP_e in figure II.1, which is the difference between the average market price and the no-program price and is to the left of the demand curve. To obtain the amount gained or lost by domestic wheat buyers only, we multiplied this area times the percentage of yearly domestic wheat demand to total demand. The expression we used was:

17) $DWB=((SAP-P_e)*(0.5*(Q_d+Q_e)))*DD$

Variables not previously defined are,

DWB = Domestic wheat buyer gain or loss
Q_d = Total demand
DD = Percent of domestic demand

Government Costs

We calculated budgetary costs as the sum of deficiency payments, storage, transportation, and handling of CCC stocks, and losses on the sale of CCC stocks. Again, we did not consider the effects of EEP because of its uncertain effects upon domestic prices and thus deficiency payments in the absence of the program.

Deadweight Loss

The deadweight, or efficiency, loss is the amount of revenue that the government or wheat buyers give up, but producers do not gain. This revenue is lost to society and actually measures the inefficiency of the transfer from taxpayers and consumers to producers. In the case of wheat, most of the deadweight loss is due to the lost returns from idled land, which can be approximated by the area P_TDCP_B in figure II.1.[14] For every dollar paid by consumers and the government, producers are receiving less than a dollar because of lost returns as a result of acreage restrictions. Under previous programs, part of deadweight loss came from the more intensive use of variable inputs (such as fertilizer, herbicides, etc.) to increase yields on the remaining acres that were not required to be set aside. We assume here that a more intensive use of variable inputs does not occur because program yields, on which deficiency payments are based, have been frozen at their 1985 level. In reality, however, producers may still try to increase their yields to obtain the market price on the additional amount of bushels/acre over the program yield or in an attempt to build up greater future program yields. Therefore, in view of the possible bias imposed by this assumption concerning yield, we consider our estimates of deadweight loss to be somewhat conservative. We used the following equation to arrive at our estimates of deadweight loss:[15]

---

[14]Another component of deadweight loss is excessive CCC stocks, which must be sold at a loss or stored. However, this component is much smaller than in it was in the mid-1980s, when stockholdings were much larger.

[15]Since this equation contains the gains or losses from domestic wheat buyers only, the deadweight loss is domestic deadweight loss only. (See equation 17.)

18) $DWL = (GOVT+DWB) - (PG+NGL)$

The variables are defined as follows:

DWL = Deadweight loss
GOVT = Government budgetary cost
DWB = Domestic wheat buyer gain or loss
PG = Participants' gain
NGL = Nonparticipants' gain or loss

DATA AND DATA SOURCES FOR WHEAT WELFARE ESTIMATES

For the wheat welfare analysis, we examined a range of domestic supply and demand elasticities, export demand elasticities, and estimates of rates of slippage, as well as U.S. wheat price and quantity data, and budgetary data on government payments. We obtained all price data, such as target prices, loan rates, and 12-month season average prices through the ASCS office. We obtained the ARP and participation percentages and production, yield, and flex acre data from there as well. We took crop disappearance data and variable expense data, however, from USDA's Wheat Situation and Outlook reports. All quantity data are in crop years. We adjusted welfare estimates by the Gross Domestic Product Implicit Price Deflator and stated them in 1992 dollars. We used a range of elasticities that seemed appropriate from the economic literature as well as from expert opinion. Slippage estimates are from agricultural economic literature as well as USDA.[16]

RESULTS OF WHEAT WELFARE ANALYSIS

Incorporating the data items discussed above, we estimated participants' gain, nonparticipants' gain/loss, domestic buyers' gain/loss, and the government's loss due to the wheat commodity program. As explained above, we measured the efficiency loss of the program as the difference between government outlays plus consumers' expenditures and producers' gains. The difference describes the efficiency of the transfer from taxpayers and consumers to producers as a whole. This analysis describes the

[16]Roningen, Vernon O. and Praveen M. Dixit. "Economic Implications of Agricultural Policy Reforms in Industrial Market Economies," Agriculture and Trade Analysis Division, USDA-ERS, December 1989; and Love, H. Alan and William E. Foster. "Commodity Program Slippage Rates for Corn and Wheat." Western Journal of Agricultural Economics. 15(2) (1990): 272-281.

welfare effects of the wheat program in broad aggregates; however, it does not describe the welfare of particular classes of wheat producers or particular parts of the nation. Also, in their review of our analysis, ERS officials noted certain other nonquantifiable costs and benefits that can be incurred by program participants that are not included in this analysis such as (1) the costs to participants of maintaining idled land and (2) the environmental benefits of keeping land idle.

Range of Elasticities and Slippage

On the basis of our reading of variabilities in the literature, we explored the following range of elasticities: the elasticity of domestic demand between -0.2 and -0.5, the elasticity of supply between 0.3 and 0.5, and the export demand elasticity between -1.0 and -2.0. The average demand elasticity used was -0.3, while the average export demand elasticity was -1.5, and the average elasticity of supply used was 0.4.[17] We examined these ranges of demand, supply, and export demand elasticities using two estimates of slippage rates--0.3 and 0.44--that were gathered from the agricultural economics literature.

The results for the average estimates for participants', nonparticipants', and buyers' gains or losses are taken from an average level of elasticity over the chosen range as well as the average slippage level. For example, three supply and demand elasticity combinations (a high, low, and average) and two slippage rates (high and low) would produce a total of six different estimates of producers' gains. Of these six, the average estimate for producers' gains for each year was calculated using an average elasticity estimate and an average slippage factor. The "range" of gains and losses are the high and low figures among the range of elasticities chosen for the two slippage rates that were used. In general, the lower the supply and demand elasticities, the larger the estimates of producers' gain. Therefore, the more inelastic the estimates of

[17]We discussed these elasticities with an economist from the Food and Agricultural Policy Research Institute who indicated that, on the basis of the Institute's work, our elasticities were reasonable. The Institute's baseline aggregate demand elasticity for 1990 to 1992 was calculated to be -0.3 and its supply elasticity was about 0.37. He also indicated that our export demand elasticities were in a reasonable range for a long-run analysis.

supply and demand are and the larger the producer gains, the lower the estimates of deadweight loss.

Estimates of Wheat Gains and Losses

Over the past 3 years, estimates of producers' gains, consumers' costs, and the government's costs varied considerably because of changes brought about by the 1990 Farm Bill, yearly changes in the program, and other factors such as weather. Estimates of producers' gains, for both participants and nonparticipants reached an average of about $1.4 billion for the 3 years of this analysis. However, producers' gains ranged from a high of $2.2 billion in 1990 to a low of $474 million in 1992. As explained earlier, producers in 1990 were allowed to plant on 105 percent of their acreage base. Therefore, more total acreage was brought back into production. Also, in 1990, the flex acre program was not in existence yet, and farmers received deficiency payments on 15 percent more of their base than they did in 1991 and 1992. After the installation of the flex-acre provision, producers' gains decreased, on average, to $1.406 billion in 1991 and $474 million in 1992. Gardner's estimates (in 1992 dollars)[18] of producers' gain for the years 1984 through 1987 range from $2.42 billion to $5.38 billion, with a 4-year average of approximately $3.94 billion. Our average estimate of nearly $1.4 billion in producers' gains reflects a lower target price of $4 per bushel since 1990 (from $4.38 between 1984 to 1987), as well as lower deficiency payments with the flex-acre program.

At the same time, government budgetary costs ranged from a high of $2.7 billion in 1990 to over $1.4 billion in 1992. Total government costs in the Gardner analysis averaged $4.29 billion from 1984 to 1987. We estimated that these costs decreased in the 1990-1992 period to about $2.2 billion. This decline was due to the decrease in deficiency payments under the flex-acre program starting in 1991 as well as the lower target prices.

Average domestic buyer losses for the period 1990, 1991, and 1992 were approximately $32 million. However, if the year 1991 were to be removed from this average, consumers' losses would be around $76 million per year. Although market prices were higher because of the poor crop year in 1991, the no-program price turned out to be even higher. Therefore, there was a $55 million buyer gain because of the program in that unusual year. Gardner's estimates reveal a higher average yearly consumer cost of approximately $487 million for the crop years 1984 to 1987.

[18]Adjusted by GAO using the Gross Domestic Product Implicit Price Deflator.

Table II.1 shows that deadweight, or efficiency, losses also varied considerably, ranging from a low of $0.571 billion in 1990 to a high of $1.01 billion in 1992 (see p. 55). For the most part, these figures represent the loss of returns from idled acres. Deadweight losses in 1990 were low because of a low 5-percent actual ARP and because of the option that producers had to harvest 105 percent of their wheat base. In 1991, ARP jumped to 15 percent, and even more land was idled as part of the flex-acre program. Because of this, as well as weather problems all over the country, market price rose to $3 per bushel. However, because the no-program price was estimated to be even higher--$3.05/bushel--nonparticipants lost and total producer gains were lower when compared with the returns from participation. If deficiency payments had not been paid on flex winter wheat acres in that year, estimated participants' gains would have been even smaller and efficiency losses greater. Interestingly, when comparing our analysis with Gardner's, efficiency losses were estimated to be in the same approximate range between the two periods of analysis. Gardner estimated these average losses at $838 million, while we estimated the average to be $834 million for the later period. This result could stem from the fact that while ARP levels have declined since the Gardner study was issued (from 27.5 to 5 percent), our analysis reflects the inefficiencies of both ARP and the flex acreage left idle.

Table II.1: Gains and Losses From the Wheat Program

Dollars in billions

Crop year					
Group Gains/ losses (-)		1990	1991	1992	3-year average
Wheat producer participants	Range	$2.079 to 2.444	$1.319 to 1.560	$0.431 to 0.551	
	Average	2.212	1.406	0.474	$1.364
Wheat producer nonparticipants	Range	0.002 to 0.070	-0.029 to 0.006	0.018 to 0.044	
	Average	0.026	-0.018	0.028	0.012
Domestic buyer	Range	-0.007 to -0.219	-0.017 to 0.090	-0.046 to -0.112	
	Average	-0.082	0.055	-0.070	-0.032
Government		-2.727	-2.364	-1.442	-2.178
Deadweight	Average	-0.571	-0.921	-1.010	-0.834
No-program price	$/bushel	2.56	3.05	3.24	2.95
No-program quantity	Billion bushel	2.49	2.38	2.54	2.47

Note: Data are in 1992 constant dollars.

MAJOR CONTRIBUTORS TO THIS BRIEFING REPORT

RESOURCES, COMMUNITY, AND ECONOMIC DEVELOPMENT DIVISION, WASHINGTON, D.C.

Jeffrey E. Heil, Assistant Director
Patrick J. Kalk, Assignment Manager
Barbara J. El-Osta, Economist
Amy D. Abramowitz, Economist

CHICAGO REGIONAL OFFICE

Daniel M. Johnson, Regional Management Representative
Alexander G. Lawrence, Jr., Evaluator-in-Charge
Elizabeth E. Hughes, Staff Evaluator
Alan M. Runde, Staff Evaluator
John Matusik, Writer/Editor

KANSAS CITY REGIONAL OFFICE

F. John Schaefer, Jr., Senior Evaluator
Jerry Hall, Computer Analyst

(150035)

Ordering Information

The first copy of each GAO report and testimony is free. Additional copies are $2 each. Orders should be sent to the following address, accompanied by a check or money order made out to the Superintendent of Documents, when necessary. Orders for 100 or more copies to be mailed to a single address are discounted 25 percent.

Orders by mail:

U.S. General Accounting Office
P.O. Box 6015
Gaithersburg, MD 20884-6015

or visit:

Room 1000
700 4th St. NW (corner of 4th and G Sts. NW)
U.S. General Accounting Office
Washington, DC

Orders may also be placed by calling (202) 512-6000 or by using fax number (301) 258-4066.

United States
General Accounting Office
Washington, D.C. 20548

Official Business
Penalty for Private Use $300

First-Class Mail
Postage & Fees Paid
GAO
Permit No. G100