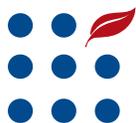




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# Consequences of Higher Input Costs and Wheat Prices for U.S. Wheat Producers

Mir Ali and Gary Vocke

## Abstract

The recent historic rise in farm input costs and wheat prices has had economic effects on the U.S. wheat sector. A cumulative distribution of forecasted production costs for wheat farms shows that current high (but falling) wheat prices will allow a greater share of producers to cover their production costs in 2008 (90 percent) than in 2004 (82 percent), despite higher input costs in 2008. However, if farm-gate prices for wheat continue to fall into 2009, and if prices for inputs do not drop off similarly, many more wheat producers may find themselves unable to cover production costs and the U.S. wheat sector may see further attrition of planted area.

**Keywords:** wheat, price, inputs, costs of production, profitability, Agricultural Resource Management Survey.

## Acknowledgments

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## Wheat and Input Prices Are Up

Like the prices of many other agricultural commodities, the price of wheat rose to record highs during 2008 (fig. 1). Low stocks and adverse weather conditions around the world tightened global supplies of wheat in 2007. This, in turn, boosted foreign demand for U.S. wheat. Supplies were high in 2007/08 relative to levels in previous years. The resulting increase in U.S. wheat exports (the highest in 15 years) depleted the surplus U.S. supply, contributing to the lowest ending stocks since the late 1940s. These and other factors helped account for the sharp increase in U.S. wheat prices in 2008. The farm-gate season average price rose to \$6.48 per bushel in 2007/08, besting the previous high of \$4.55 per bushel in 1995/96.

Though U.S. wheat prices have fallen since spring 2008, they remain high by historical standards. The season-average price range forecast by USDA for the 2008/09 marketing year is \$6.70 to \$6.90 per bushel.<sup>1</sup> In part, prices received by U.S. wheat producers have remained high because of the large quantity of wheat that was forward priced during spring 2008, when prices were very high. Also, part of the wheat crop was marketed early in the market year before prices started to drop.

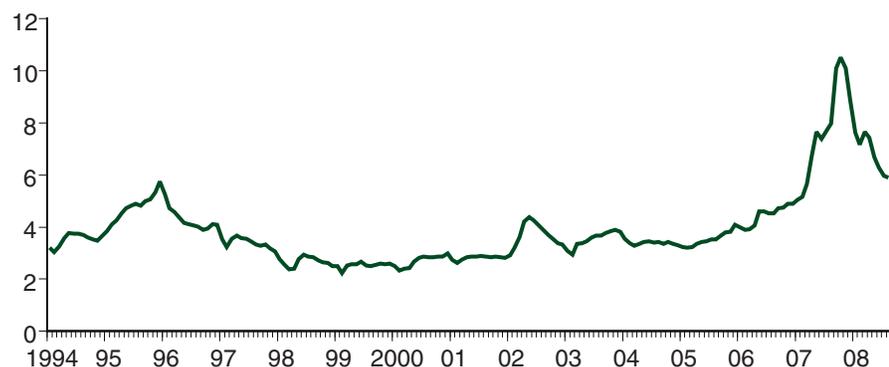
Rapidly rising input costs offset this unprecedented runup in wheat prices for producers. USDA's National Agricultural Statistics Service reports that prices paid for production inputs have been rising since 2004, particularly for fuel and fertilizer (fig. 2). The pace of the increase for these two inputs accelerated in 2008. U.S. energy prices rose to historical highs in 2008, a reflection of rising international energy prices and the low value of the U.S. dollar. Both fuel and fertilizer prices have come down in recent months but remain high.

Rising energy prices have contributed to higher fertilizer prices, directly through high prices for the natural gas used to produce ammonia and indirectly through higher transportation costs. Fertilizer prices also have been affected by the rapidly rising demand for fertilizers, especially in China,

Figure 1

### Average monthly wheat prices received by U.S. farmers, June 1994-January 2009

Dollars/bushel



Source: USDA, Economic Research Service using data from USDA, National Agricultural Statistics Service, *Agricultural Prices*.

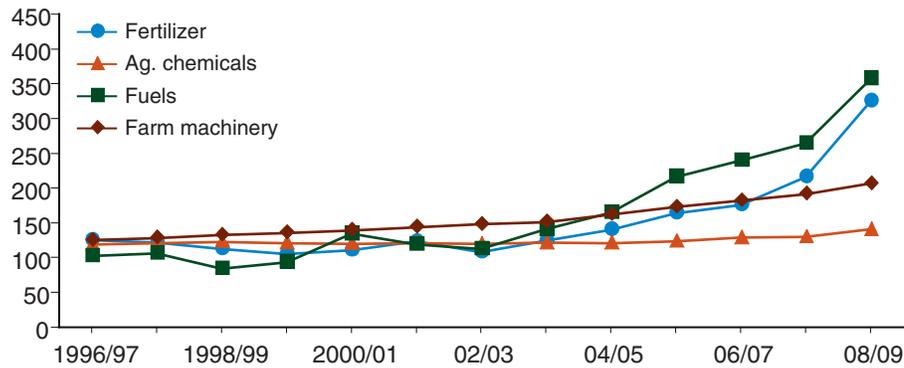
<sup>1</sup>USDA, World Agricultural Outlook Board, *World Agricultural Supply and Demand Estimate*, February 10, 2009.

India, and Brazil. Finally, the fall in the value of the U.S. dollar in recent years has raised the price of imported energy and fertilizer for U.S. farmers. The United States imports over half of its nitrogen and over 90 percent of its potash used each year.

Figure 2

**Prices paid index for selected farm inputs**

Index 1990-92 = 100



2008/09 forecast.

Source: USDA, Economic Research Service using data from USDA, National Agricultural Statistics Service, *Agricultural Prices*.

## Long-term Competitiveness of the U.S. Wheat Sector

The U.S. wheat sector faces challenges to its long-term competitiveness. Domestically, wheat planted area has declined for the last few decades for various reasons. Internationally, Ukraine and Russia have emerged as new competitors with the United States in foreign markets in years when their production is high. Traditional global competitors include Canada, Argentina, Australia, and the European Union. The overall result is a slightly smaller expected share of expanding world wheat trade for U.S. wheat.

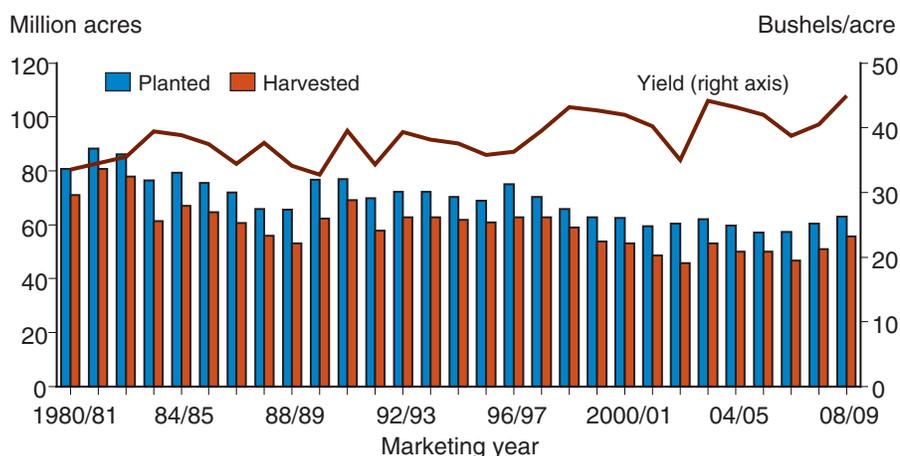
**U.S. wheat planted area has trended down for many years.** U.S. wheat planted area has varied widely during the past half century and peaked in the early 1980s (fig. 3). Wheat area dropped off sharply in the late 1980s, primarily due to farmers retiring large portions of cropland under USDA's Acreage Reduction Program (ARP), which was designed to reduce government-owned stocks of particular commodities, including wheat. By 1987-88, nearly 30 percent of the national wheat base acreage had been idled by farmers participating in this voluntary program, enabling them to become eligible for such commodity program benefits as nonrecourse loans and deficiency payments. U.S. wheat area partially recovered in the mid-1990s as stocks declined and prices rose, thus lessening the need for ARPs. The program was eliminated under the 1996 Farm Act.

Planting flexibility provisions introduced in the 1996 Farm Act removed most planting constraints on producers, increased competition among field crops for area, and continued to apply downward pressure on U.S. wheat acreage. Planted wheat area in the United States has dropped by about 30 percent from an annual average of 85 million acres in the early 1980s to an annual average of 59.6 million acres over the 5-year period 2004/05 to 2008/09.

**Wheat land switched to other uses.** Wheat area has dropped off in the United States as farmers have taken their land out of production or switched to alterna-

Figure 3

### U.S. wheat area and yield



Source: USDA, Economic Research Service using data from USDA, National Agricultural Statistics Service, *Quick Stats*.

tive crops offering higher returns. Farmland enrolled in USDA's Conservation Reserve Program (CRP) is concentrated in those U.S. regions where wheat production predominates. About 60 percent of the land enrolled in the CRP is located in the Plains States, stretching from Texas to North Dakota and Montana. USDA estimates that about 8 million acres of CRP land have been planted to wheat or wheat rotations, including fallow, prior to enrollment.

In the traditional wheat-growing areas of the Plains, there is a more-than-20-year trend in some States to reduce area fallowed by planting alternative crops and lengthening crop rotations. For example, in western Kansas, the historical wheat/fallow rotation has been most commonly replaced by a rotation of wheat/grain sorghum/fallow in which wheat is planted once every 3 years rather than once every 2 years. Though cropping intensity increases under this type of system, wheat is not favored.

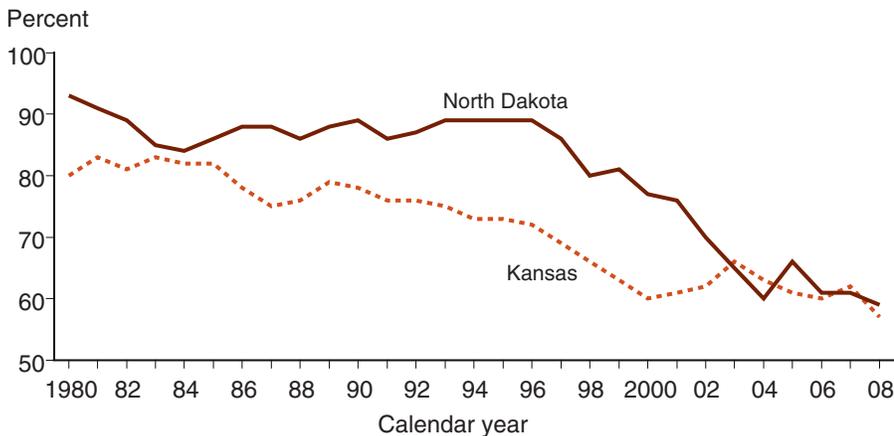
In some of the largest wheat-growing States, producers are increasingly planting more profitable crops, such as corn and soybeans, on acreage traditionally planted to wheat. For example, in the early 1980s, wheat accounted for 80-90 percent of the total wheat, corn, and soybean acres planted in Kansas and North Dakota. In recent years, wheat's share in these States has dropped to 57-62 percent of the total (fig. 4).

**Genetic gains for competing crops on the Plains.** Loss of wheat acreage to row crops, such as corn and soybeans, on the Plains partly reflects strong genetic improvements in those crops (fig. 5). New varieties of corn and soybeans can be planted farther west and north in U.S. areas with drier conditions or shorter growing seasons. Plus, herbicide-resistant varieties make it easier for farmers to control weeds (see [www.ers.usda.gov/briefing/biotechnology/](http://www.ers.usda.gov/briefing/biotechnology/) for more information).

The pace of genetic improvement has been slower for wheat than for some other field crops, resulting in little growth in wheat yields. This makes wheat a less attractive option for farmers. Genetic improvement for wheat has been slower because of genetic complexity and because of lower potential returns

Figure 4

**Wheat planted area as a share of planted area of wheat, corn, and soybeans in Kansas and North Dakota**

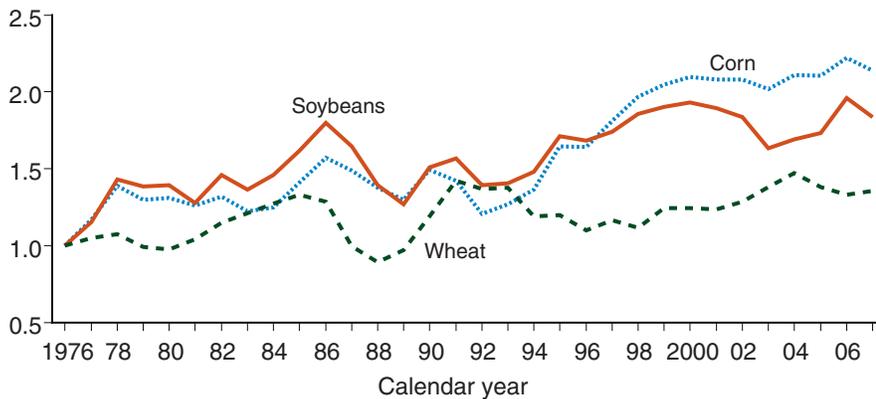


Source: USDA, Economic Research Service using data from USDA, National Agricultural Statistics Service, *Quick Stats*.

Figure 5

**Indices of North Dakota crop yields (3-year averages)**

Index 1976 = 1



Source: USDA, Economic Research Service using data from USDA, National Agricultural Statistics Service, *Quick Stats*.

to commercial seed companies, which discourages investment in research. For example, farmers are accustomed to buying seed corn each year because seed saved from a hybrid cannot be used for a subsequent crop. This creates a large annual market for seed companies. In contrast, many wheat farmers, particularly in the Plains States, use saved seed from the previous year's crop rather than buy new seed from dealers every year. This practice sharply reduces the potential market for branded commercial seed wheat.

**Wheat disease also a factor.** Concerns about wheat disease outbreaks in the Northern Plains, particularly scab (head blight) in North Dakota and Minnesota (caused by the fungus *Fusarium graminearum*), influenced planting decisions in the 1990s and will likely do so in the future. The increased incidence of scab may stem in part from larger corn plantings and minimum tillage practices in the region's traditional wheat-growing areas. Both activities can introduce hosts for disease-causing organisms.

**Ethanol expansion in the United States.** The large expansion in ethanol production in the United States is affecting virtually every aspect of the field crops sector, ranging from domestic crop use and exports to prices and the allocation of acreage among crops. Many aspects of the livestock sector are affected, too. For example, ethanol byproducts are substituting for corn and other feeds in livestock rations. Cellulosic sources of feedstocks for ethanol production hold some promise for the future, but the primary feedstock in the United States is currently corn. Market adjustments to this increased demand extend well beyond the corn industry to supply and demand for other crops, such as wheat. Adjustments in the agricultural sector are already underway and will continue for many years as interest grows in alternative sources of energy.

## Covering Production Costs Essential to the Long-Term Sustainability of U.S. Wheat Sector

In any year, adverse weather, disease, or insects may lead to a crop loss and revenue returns that do not cover production expenses. This type of revenue loss occurs from time to time in agriculture. However, if revenues do not cover production costs repeatedly, farmers may be forced to switch to alternative crops with higher returns in order to stay in business.

This study's cost and returns analysis of the U.S. wheat sector provides a snapshot of the range of production expenses across the United States and compares this range with the national season average price that farmers received for wheat. This comparison allows for a sectoral overview of the proportion of U.S. wheat producers covering their production costs. If a significant share of U.S. wheat producers are not covering production costs, U.S. planted area will likely continue its long-term decline.

USDA's 2004 Agricultural Resource Management Survey (ARMS) provides the most recent data on U.S. wheat production costs (see box, "USDA's Agricultural Resource Management Survey").<sup>2</sup> The wide variation of wheat production costs across the country captured by the survey reflects the differences in cropping practices, yields, and costs of land, labor, and capital assets. Production costs used in this analysis are the sum of operating costs of inputs and ownership costs related to capital assets that are used during the production process. Ownership costs include the annualized costs of maintaining the capital investment in farm machines (depreciation and interest). Operating and ownership costs do not include the opportunity costs for other resources, such as the farmer's labor and land (see box, "Enterprise Costs of Production"). Opportunity costs for these resources are not likely to influence planting decisions in the short term but may ultimately affect farmers' decisions to switch to other crops or pursue off-farm income.

The yields used in this analysis are normal yields per planted area. The normal yield is the ARMS-reported yield that farmers expected at the time of planting. Most farmers budget for the crop season based on the expected yield for each crop they grow. This analysis uses normal yields rather than actual yields to neutralize the effects of unexpected high yields due to favorable weather conditions or yield loss or even crop abandonment due to adverse weather conditions for a particular producer in the year of the survey. Normal yields are also used later in this report in ERS's comparison of actual 2004 costs and 2008 forecasted costs.

<sup>2</sup>Seventeen wheat-producing States were included in the survey. Respondents to the 2004 ARMS wheat survey used in this analysis represented 168,392 farms, or 44.8 million acres of the 59.6 million acres planted to wheat in 2004.

## USDA's Agricultural Resource Management Survey

The farm-level data used in this study were derived from USDA's 2004 Agricultural Resource Management Survey (ARMS) of wheat farms. ARMS is the only national survey that provides information on a broad range of issues about agricultural resource use, production practices, farm costs and financial conditions, and the economic well-being of U.S. farm households—all collected in a representative sample.

ARMS is an annual survey designed and conducted jointly by USDA's Economic Research Service and USDA's National Agricultural Statistics Service. Annual production cost estimates are based on data collected in ARMS every 4-8 years for each commodity. More information about ARMS can be found at [www.ers.usda.gov/briefing/arms/](http://www.ers.usda.gov/briefing/arms/)

## Enterprise Costs of Production

The costs of all inputs in the production process reported by all wheat operators, partners, landlords, and contractors are included in either operating or asset ownership costs.

**Operating costs** include the costs for inputs that are consumed in one production period, such as seed fertilizer, chemicals, custom operations, fuel, electricity, repairs, purchased irrigation water, baling straw, and hired labor.

**Operating and ownership costs** include the sum of operating costs and asset ownership costs. Ownership costs are the annualized cost of maintaining the capital investment (depreciation and interest) in farm machinery, equipment, and facilities and cost for property taxes and insurance.

**Total costs** include operating and ownership costs plus opportunity costs of other resources, such as charges for unpaid labor, including the time spent by a farmer in the production of a commodity, the opportunity cost of land, and the enterprise share of general farm overhead.

## Analysis of the Variation Around the Average Cost of Production

ERS derived forecasts of U.S. wheat production costs for 2008 by separately indexing input production costs from 2004 as reported in ARMS. Among all operating cost items, fertilizer accounted for the largest share (45 percent) of total operating costs forecast for 2008 (table 1). Fuel, lube, and electricity accounted for the next largest share (18 percent). Ownership costs are forecast to average \$68.08 per acre in 2008, while the addition of opportunity costs for land, unpaid labor, and general overhead raise the average total to \$287.33 per acre.

Table 1  
U.S. wheat production costs, 2008F, by cost group

Item	Low-cost producers <sup>1</sup>	Mid-cost producers <sup>2</sup>	High-cost producers <sup>3</sup>	Average, all producers
<i>Dollars per planted acre</i>				
<b>Operating costs</b>				
Seed	11.86	13.30	14.61	13.20
Fertilizer	38.43	63.83	85.62	61.81
Chemicals	7.36	11.21	13.53	10.72
Custom operations	9.91	7.60	10.37	8.69
Fuel, lube, and electricity	10.75	16.22	71.43	25.41
Repairs	8.17	11.72	22.33	12.88
Other variable costs	0.38	0.43	0.73	0.48
Interest on operating capital	1.82	2.61	4.59	2.80
Hired labor	1.10	2.07	6.16	2.61
Total operating costs	89.78	128.99	229.37	138.60
<b>Ownership costs</b>				
Capital recovery (machinery)	41.40	56.55	91.94	59.61
Taxes and insurance	6.09	8.54	11.28	8.47
Total ownership costs	47.49	65.09	103.22	68.08
Total operating and ownership costs	137.27	194.08	332.59	206.68
<b>Other costs</b>				
Opportunity cost of land	15.91	19.74	38.40	22.36
Opportunity costs of unpaid labor	50.17	47.89	53.34	49.49
General farm overhead	7.69	8.71	10.47	8.80
Total other costs	73.77	76.34	102.21	80.65
Total costs	211.04	270.42	434.80	287.33
<i>Bushels per acre</i>				
Expected yield	52.80	48.00	46.20	48.80
<i>Dollars per bushel</i>				
Total operating costs	1.70	2.69	4.96	2.84
Total operating and ownership costs	2.60	4.04	7.20	4.24
Total costs	4.00	5.63	9.41	5.89

F = Forecasts (obtained by indexing 2004 actual values).

<sup>1</sup>Low-cost = The 25 percent of producers with the lowest operating plus ownership costs per bushel.

<sup>2</sup>Mid-cost = The 50 percent of producers in the midrange of operating plus ownership costs per bushel.

<sup>3</sup>High-cost = The 25 percent of producers with the highest operating plus ownership costs per bushel.

Source: USDA, Economic Research Service using data from USDA's 2004 Agricultural Resource Management Survey for wheat.

Based on the 2004 normal yield of 48.8 bushels per planted acre, the forecasted 2008 operating cost per bushel is estimated to be \$2.84 per bushel. The addition of ownership costs and other costs increase the total forecasted 2008 costs to \$5.89 per bushel. This amount is well below the season average price range of \$6.70 to \$6.90 as forecast by USDA for the 2008/09 marketing year, indicating that, on average, wheat farmers should be able to cover their costs of production in 2008.

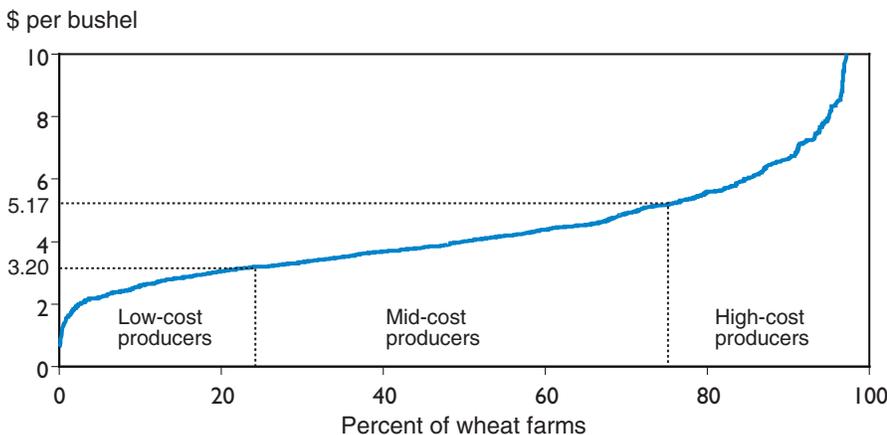
The variation of costs around the average can be shown by arranging wheat farms with the lowest to highest costs per bushel to form a cumulative distribution of farms (fig. 6). A cumulative distribution of forecasted operating and ownership costs for 2008 reveals that 25 percent of the producers had costs of \$3.20 per bushel or less, and 75 percent had costs of \$5.17 per bushel or less.

Analysis using the categories in figure 6 reveals a wide range around the average of \$4.24 per bushel for total operating and ownership costs (see table 1). The average operating and ownership costs per bushel for low-cost producers is forecast at \$2.60 per bushel in 2008, \$4.60 per bushel lower than the average forecast for the high-cost group. Lower operating costs per bushel account for most of the gap in total cost between low-cost and high-cost groups of producers in the survey.

High-cost producers had both higher operating and ownership costs per acre than low-cost producers in 2008. Much of these higher operating costs stems from higher expenditures for fuel, lube, and electricity and for fertilizer on irrigated acres. Ownership costs are also higher for the high-cost group due to higher capital recovery costs, again, due to irrigation. Less than 3 percent of the total wheat acreage cropped by low-cost producers is irrigated. By comparison, more than 13 percent of the total wheat acreage cropped by high-cost producers is irrigated. These irrigated wheat acres are concentrated in parts of the Pacific Northwest and in California and Arizona. Yield difference is another part of the cost-per-bushel calculation. The normal yield for the low-cost group is 6.6 bushels per planted acre higher than that for the high-cost group.

Figure 6

**Distribution of U.S. wheat operating plus ownership costs per bushel of expected yield, 2008**



Note: 2008 data are forecast.

Source: USDA, Economic Research Service using data from USDA's 2004 Agricultural Resource Management Survey for wheat.

## Wheat Production Expected To Be More Profitable in 2008 Than in 2004

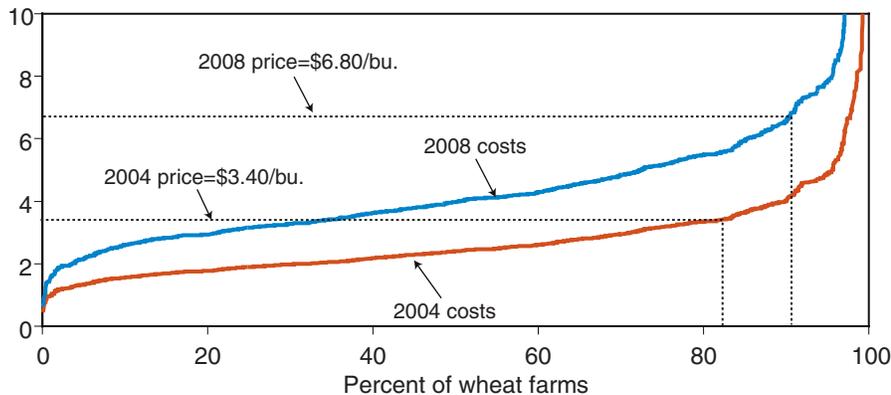
Analysis of the cumulative, per bushel cost of U.S. wheat production in 2004 compared with that forecasted for 2008 shows that the higher expected prices for the 2008/09 marketing year increase the percentage of farmers who will cover these costs. The 2004/05 season-average price for wheat was \$3.40 per bushel. This price level covered the per bushel production cost for 82 percent of the farms in the survey (fig. 7). A price of \$5.67 per bushel is needed to get an equivalent coverage using the forecasted 2008 cumulative distribution. The analysis for the forecasted 2008 cumulative distribution using the midpoint of the USDA February forecasted price range for 2008/09 shows that 90 percent of the farmers in the survey will be able to cover their per bushel costs of production.

If farm-gate prices continue to fall into 2009, and if prices for fuel and fertilizer do not drop off similarly, many more wheat producers will find themselves unable to cover all of their costs and the U.S. wheat sector may see continued attrition of planted area.

Figure 7

### Distribution of wheat operating plus ownership costs per bushel, 2004 and 2008

\$ per bushel



Note: Per bushel costs for 2008 are forecast.

Source: USDA, Economic Research Service using data from USDA's 2004 Agricultural Resource Management Survey for wheat.