Distribution of Wheat Production Costs

Average costs of production represent a single point on the distribution of production costs and provide only limited information about the economic performance of U.S. wheat farms. Considerable variability in production costs exists among wheat growers. Analysis of the entire cost-of-production distribution enables the identification of sources of cost differences among producers, such as the effects of various farm characteristics and management practices.

To identify factors affecting production costs, wheat farms were grouped into low-, mid-, and high-cost groups. For this purpose, estimated variable cash costs were converted to a per-bushel basis (actual yield) and ranked from lowest to highest to form a weighted cumulative distribution of farms and production. The low-cost group was the 25 percent of farms with the lowest variable costs, and the high-cost group was the 25 percent of farms with the highest variable cash costs (fig. 10).

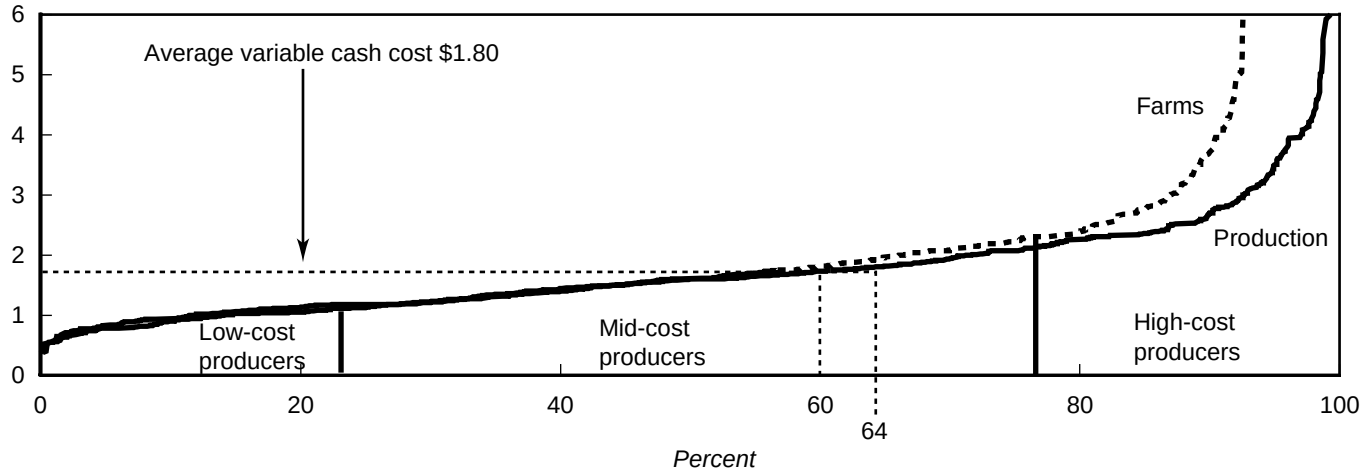
The low-cost group of farms had per-bushel variable costs of $1.12 or less and accounted for 20 percent of total production and 15 percent of wheat acreage planted in 1994. Most low-cost farms were in the North Central region (fig. 11). At the other end of the distribution, the high-cost group of farms had variable costs of $2.22 or more per bushel and accounted for 21 percent of wheat production and 33 percent of wheat acreage. Three-fourths of these high-cost growers were in the Plains regions. Note, however, that farms in the Plains regions had the largest deviation in actual yield from expected yield.

Differences between low- and high-cost farms in 1994 were attributable to yield differences, farm location, and enterprise size. Low-cost farms had average variable cash costs of $40 per planted acre, compared with $69 per acre for high-cost farms (table 8). Variable costs varied greatly among cost groups, ranging from an average $0.93 per bushel for low-cost producers to $3.21 per bushel for high-cost producers due to differences in expected and actual yields. On average, high-cost growers expected 37 bushels, but harvested 22 bushels of wheat per acre. Low-cost growers harvested an average 44 bushels per acre, 3 bushels more than they expected (table 9). Only 28 percent of the gross value of production was needed to cover variable cash costs on low-cost farms. By comparison, high-cost farms needed nearly all of their gross value of production to cover their variable cash and overhead expenses. There was not enough to cover the additional fixed cash expenses.

Figure 10

Cumulative distribution of wheat variable cash costs, 1994

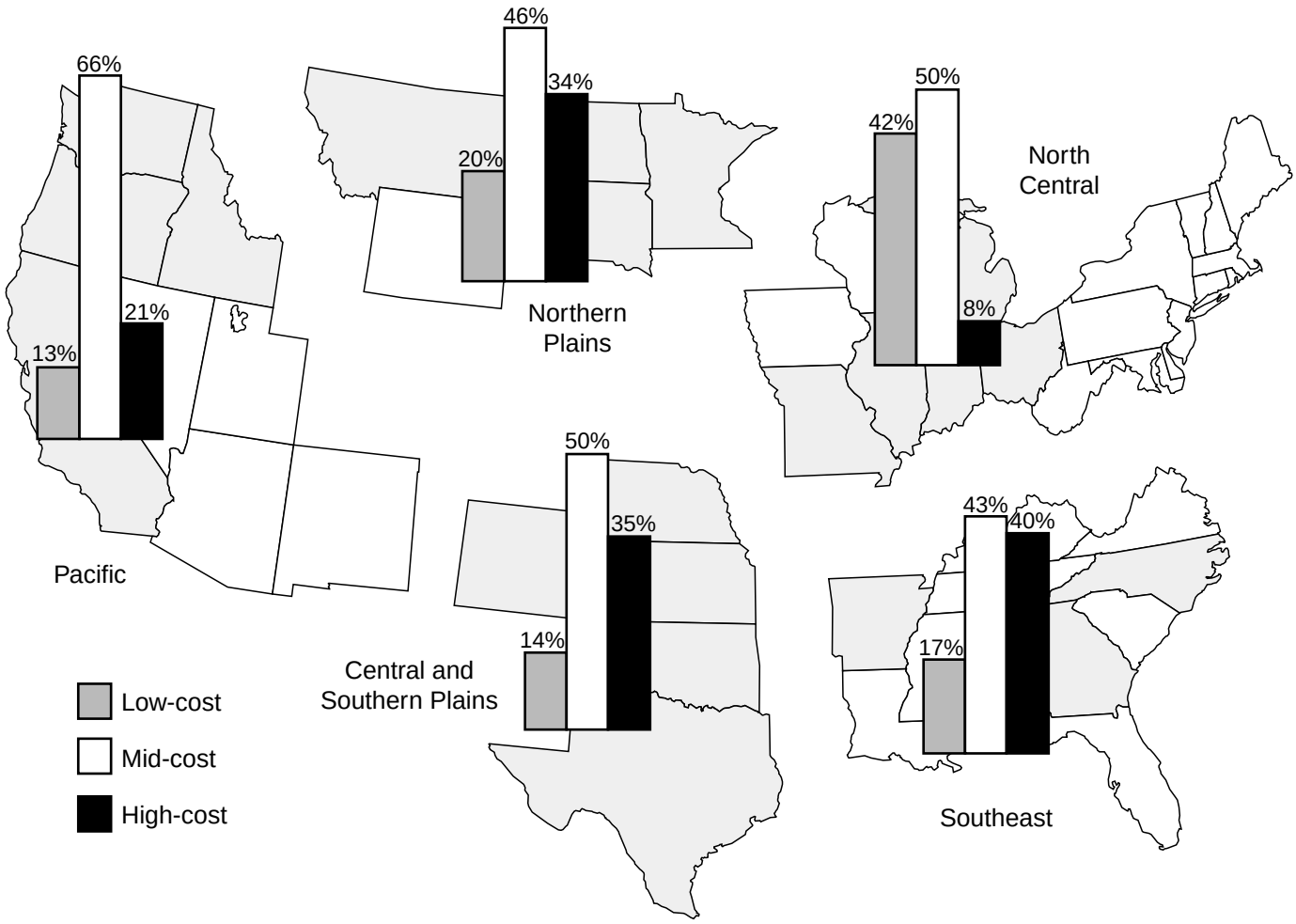
About 60 percent of Farm Costs and Returns Survey wheat farms, representing 64 percent of wheat production had variable cost at or below the average cost of $1.80 per bushel.



Source: U.S. Department of Agriculture's 1994 Farm Costs and Returns Survey.

Figure 11

Distribution of farms by variable cash costs group, by region, 1994



Unshaded States are not covered in the Farm Costs and Returns Survey.
Source: U.S. Department of Agriculture's 1994 Farm Costs and Returns Survey.

As before, per-bushel costs based on actual 1994 yields provide a realistic picture of conditions in 1994. For longrun implications, however, it is better to use expected yields. Expected yields show that the Pacific region has the highest total economic costs of production, followed by the Northern Plains, Central and Southern Plains, North Central, and Southeast. When the costs are ordered from lowest to highest, per-bushel costs based on actual yields are higher than those based on expected yields. At the 1994 average variable cost of $1.43 per bushel, had expected yields been realized, 56 percent of farms producing 56 percent of U.S. wheat would have had variable costs below the average. Using expected yields, the low-cost growers would have had an average total cost of production of $2.54 per bushel, the mid-cost growers, $3.70, and the high-cost growers, $5.25. There was little difference between per-bushel costs among the different size classes of wheat acreage.

Enterprise and farm size also differed between low- and high-cost wheat farms. The average low-cost farm had less acreage overall in wheat than the average high-cost farm (table 10). Because high-cost farms were more diversified than low-cost farms, wheat contributed less to their total farm income. Only 49 percent of high-cost farms considered themselves cash grain farms, compared with 62 percent of low-cost farms. Roughly 15 percent of high-cost farms considered themselves specialized in other crops, compared with less than 5 percent of low-cost farms. About one-third of farms in both groups considered

Table 8a—Wheat production cash costs and returns per planted acre, by variable cost group, 1994

Item	Low-cost farms	Mid-cost farms	High-cost farms	All FCRS farms
		Dollars per planted acre		
Gross value of production:				
Wheat grain	135.65	120.10	69.17	105.64
Wheat straw/grazing	9.04	3.31	4.49	4.55
Total, gross value of production	144.68	123.41	73.66	110.19
Cash expenses:				
Seed	6.64	7.41	7.90	7.46
Fertilizer	10.99	18.33	16.69	16.70
Chemicals	2.36	5.51	7.47	5.69
Custom operations	3.01	5.62	7.02	5.70
Fuel, lube, and electricity	5.84	7.11	12.05	8.55
Repairs	10.17	11.88	12.07	11.69
Hired labor	1.17	3.59	5.41	3.83
Purchased water and baling	0.26	0.46	0.26	0.36
Total, variable cash expenses	40.44	59.92	68.88	59.99
General farm overhead	6.63	5.86	4.00	5.36
Taxes and insurance	9.86	9.75	8.30	9.29
Interest	8.54	8.96	5.75	7.84
Total, fixed cash expenses	25.03	24.57	18.05	22.49
Total, cash expenses	65.48	84.49	86.93	82.48
Gross value of production less cash expenses	79.21	38.93	-13.27	27.71
		Dollars per bushel		
Harvest-period price	3.09	3.17	3.21	3.16
		Bushels per planted acre		
Yield	43.93	37.88	21.55	33.40

Table 8b—Wheat production economic costs and returns per planted acre, by variable cost group, 1994

Item	Low-cost farms	Mid-cost farms	High-cost farms	All FCRS farms
		Dollars per planted acre		
Gross value of production:				
Wheat grain	135.65	120.10	69.17	105.64
Wheat straw/grazing	9.04	3.31	4.49	4.55
Total, gross value of production	144.68	123.41	73.66	110.19
Economic (full-ownership) costs:				
Variable cash expenses	40.44	59.92	68.88	59.99
General farm overhead	6.63	5.86	4.00	5.36
Taxes and insurance	9.86	9.75	8.30	9.29
Capital replacement	20.80	21.82	22.44	21.87
Operating capital	0.94	1.40	1.60	1.40
Other nonland capital	11.91	11.58	11.26	11.52
Land	46.74	41.14	25.76	36.91
Unpaid labor	8.25	9.01	6.90	8.20
Total, economic costs	145.58	160.47	149.15	154.54
Residual returns to management and risk	-0.89	-37.06	-75.48	-44.35
		Dollars per bushel		
Harvest-period price	3.09	3.17	3.21	3.16
		Bushels per planted acre		
Yield	43.93	37.88	21.55	33.40

Source: U.S. Department of Agriculture's 1994 Farm Costs and Returns Survey.

Table 9—Input use of wheat production operations, by variable cash cost group, 1994

Item	Unit	Low-cost farms	Mid-cost farms	High-cost farms	All FCRS farms
Wheat yield:					
Actual yield	*Bushels/acre*	43.93	37.88	21.55	33.40
Expected yield	*Bushels/acre*	40.92	40.72	37.30	39.62
Seed:					
Rate-one time	*Bushels/acre*	1.31	1.40	1.49	1.42
Acres reseeded	*Percent of acres*	0.16	1.26	5.28	2.42
Home-grown seed	*Percent of seed*	36	47	47	45
Fertilizer use:					
Any fertilizer	*Percent of farms*	91	97	83	92
Nitrogen	*Percent of farms*	90	97	82	91
Phosphorus	*Percent of farms*	68	72	55	67
Potassium	*Percent of farms*	47	42	31	40
Manure	*Percent of farms*	*	*	7	5
Fertilizer application rates:					
Nitrogen	*Pounds/acre*	43.46	59.20	58.27	56.56
Phosphorus	*Pounds/acre*	27.40	22.49	18.04	21.75
Potassium	*Pounds/acre*	14.44	9.45	4.26	8.48
Manure	*Tons/acre*	0.04	0.05	0.06	0.05
Chemical use:					
Any chemicals	*Percent of farms*	31	50	54	46
Herbicides	*Percent of farms*	31	49	50	45
Insecticides/fungicides	*Percent of farms*	*	*	8	*
Herbicide	*Acre treatments*	0.66	0.77	0.83	0.77
Insecticides/fungicides	*Acre treatments*	0	0.04	0.08	0.05
Tillage system:					
Conventional with moldboard plow	*Percent of farms*	11	6	11	9
Conventional without moldboard plow	*Percent of farms*	58	69	62	64
Mulch tillage	*Percent of farms*	17	15	23	18
No-till	*Percent of farms*	15	10	*	10
Custom operations:					
Any custom operations	*Percent of farms*	41	69	66	61
Land preparation/cultivation	*Percent of farms*	6	13	17	13
Planting	*Percent of farms*	*	*	8	*
Fertilizer/chemical application	*Percent of farms*	33	58	47	49
Harvesting/hauling	*Percent of farms*	10	25	33	23
Fuel use:					
Diesel	*Gallons/acre*	3.98	4.82	5.36	4.87
Gasoline	*Gallons/acre*	2.25	2.58	2.62	2.55
LP gas	*Gallons/acre*	0.01	0.09	0.27	0.14
Natural gas	*1,000 cubic feet/acre*	0.06	0.04	0.64	0.24
Electricity	*Kilowatt hours/acre*	0.02	0.08	0.29	0.14
Labor use:					
Unpaid labor	*Hours/acre*	1.35	1.42	1.13	1.31
Paid labor	*Hours/acre*	0.27	0.38	0.44	0.39

* = 0.1 to less than 5 percent. Totals may not add to 100 percent due to omission of a category or rounding error.
Source: U.S. Department of Agriculture's 1994 Farm Costs and Returns Survey.

Table 10—Characteristics of wheat farms, by variable cost group, 1994

Item	Unit	Low-cost farms	Mid-cost farms	High-cost farms	All FCRS farms
FCRS wheat farms	*Number*	66,524	132,167	66,553	265,245
FCRS share--					
Wheat acreage	*Percent*	15	52	33	100
Wheat production	*Percent*	19	59	21	100
Size:					
Operated	*Acres*	998	959	1,329	1,062
Planted wheat	*Acres*	126	224	280	214
Harvested wheat	*Acres*	126	222	238	202
Sales class:					
$49,999 or less	*Percent of farms*	42	30	39	35
$50,000-$99,999	*Percent of farms*	13	21	22	19
$100,000-$499,999	*Percent of farms*	39	45	35	41
$500,000 or more	*Percent of farms*	6	5	*	5
Value of production:					
Wheat production value	*Dollars per farm*	18,148	28,498	19,623	23,675
Farm production value	*Dollars per farm*	199,545	174,140	151,818	174,910
Wheat tenure:					
Owned	*Percent of farms*	53	37	37	39
Cash-rented	*Percent of farms*	18	21	36	25
Share-rented	*Percent of farms*	29	42	27	35
Production practices:					
Winter wheat	*Percent of acres*	69	65	60	64
Spring wheat	*Percent of acres*	31	35	40	36
Irrigated	*Percent of acres*	*	*	8	
Double-cropped	*Percent of acres*	6	6	5	6
Fallow	*Percent of acres*	40	37	17	31
Straw	*Percent of acres*	10	7	*	6
Grazing	*Percent of acres*	*	6	15	9
Previous crop:					
Barley/oats	*Percent of farms*	0	*	*	*
Corn	*Percent of farms*	16	8	11	11
Soybeans	*Percent of farms*	44	34	12	31
Wheat	*Percent of farms*	6	15	32	17
Fallow	*Percent of farms*	17	21	15	19
Crop rotation:					
Continuous wheat	*Percent of farms*	5	13	24	14
Fallow-wheat	*Percent of farms*	9	13	12	12
Fallow-other	*Percent of farms*	*	7	*	5
Corn-soybeans	*Percent of farms*	*	6	*	4
Corn-other	*Percent of farms*	13	*	11	7
Soybeans-soybeans	*Percent of farms*	13	7	*	7
Soybeans-corn	*Percent of farms*	25	21	6	18
Production specialty:					
Cash grains	*Percent of farms*	62	67	49	61
Other crops	*Percent of farms*	*	7	13	8
Livestock	*Percent of farms*	35	24	37	30
Livestock:					
Hogs	*Percent of farms*	24	15	9	16
Beef cattle	*Percent of farms*	52	46	49	48
Dairy cattle	*Percent of farms*	18	7	9	10
Wheat for farm use	*Percent*	4	*	6	*
Participated in wheat program	*Percent of farms*	57	76	75	71
Operator characteristics:					
Individual farm organization	*Percent of farms*	79	87	88	85
Partnership	*Percent of farms*	16	8	8	10
Farming as major occupation	*Percent of farms*	89	84	84	85
Under 50 years of age	*Percent of farms*	43	47	42	44
Completed college	*Percent of farms*	40	46	40	43

* = 0.1 to less than 5 percent. Totals may not add to 100 percent due to omission of a category or rounding error.
Source: U.S. Department of Agriculture's 1994 Farm Costs and Returns Survey.

themselves livestock farms. However, a larger share of low-cost farms reported hogs than did high-cost farms (24 percent versus 9 percent). High-cost farms grazed 15 percent of wheat acreage, as opposed to less than 5 percent for low-cost farms.

Low-cost producers reported using less nitrogen (43 pounds per acre) than high-cost producers (58 pounds). Low-cost producers applied 27 pounds of phosphorus and 14 pounds of potassium per acre, about 10 pounds more of both nutrients per acre than the high-cost farms. Lower nitrogen use on low-cost farms was due to natural buildup of nitrogen on land previously fallowed. Forty percent of wheat acreage was previously fallowed on low-cost farms, compared with only 17 percent on high-cost farms. This resulted in a lower fertilizer expense ($11 versus $17 per acre).

Chemicals were used more on high-cost farms. Fifty-four percent of the high-cost farms used chemicals, compared with 31 percent of the low-cost group. As a result, chemical expenses on the high-cost farms were three times those of the low-cost group ($2.36 versus $7.47 per acre).

Differences in yield, location, enterprise, and input use were distinguishing characteristics of low- and high-cost farms. Low yields, combined with heavier input use, raised per-bushel costs on high-cost farms considerably (table 9).

Characteristics Significantly Different Between Low- and High-Cost Farms

Landownership: On low-cost farms, the average operator owned more wheat acreage and rented less acreage on a cash basis than did high-cost farms.

Irrigation: Low-cost farms irrigated less wheat acres than did high-cost farms.

Specialization: High-cost farms were less specialized in cash grains but more specialized in other crops.

Acreage abandoned: About 13 percent of acreage on high-cost farms was abandoned (after incurring some production expenses), thereby raising per-bushel variable costs; low-cost farms reported no abandoned acreages.

Crop rotation: Growing continuous wheat was dominant on the high-cost farms, in contrast to wheat-soybean-corn rotation on the low-cost farms.

Seed: Low-cost farms had lower seeding rates but used less home-grown seed.

Fuel expense: Fuel expenses per acre for high-cost farms were twice as high as on the low-cost farms ($12 versus $6 per acre).

Labor: High-cost farms had more hired help. Per-acre labor expenses were about five times higher than for the low-cost farms.

Custom operations: The use of custom operations, particularly for fertilizer and chemical application, harvesting, and land preparation, was more common on high-cost farms. Custom costs on the high-cost farms totaled $7 per acre, compared with $3 per acre on the low-cost farms.