

Economics of the Wheat Enterprise in Kentucky

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Winter wheat is an important part of many Kentucky farmers' crop rotations. As discussed earlier, wheat yields have increased greatly over the past half century (see Figure 1-1 in Section 1—Introduction). Likewise, as with other crops, wheat has experienced annual variability in yields. Yields have declined in some years, but this was due to some type of environmental problem (1983, 1986, and 1990) or conditions that favored extensive insect or disease development (1985 and 1991). This variability in yield can be a problem for the wheat enterprise in Kentucky. Yield variability, both over time and across geographical areas, is shown in Table 9-1. The statewide differences over time are attributable to general growing conditions throughout the growing season. However, the yield differences among geographical areas can be attributed to the general wheat production potential of the different soil types across the commonwealth. A comparison of yields in the Ohio Valley area¹, the Pennyroyal area², and the West Pennyroyal Soil Association area³ indicates that soils in the West Pennyroyal Soil Association area are more favorable to wheat production than soils in the other areas. Most of the wheat grown in the West Pennyroyal Soil Association area is on well-drained, limestone-derived soils. Wheat yields in this area have been consistently greater than state average yields.

Table 9-1 also provides a comparison of yields obtained by cooperators in the University of Kentucky Farm Analysis Program during the same ten-year period. As indicated

by the results for all participating cooperators in the Pennyroyal Farm Analysis group, average yields were comparable to, but somewhat higher than, the average of all producers in the Pennyroyal area.

Table 9-1 also indicates the average wheat yields in the Pennyroyal Farm Analysis group that ranked in the high one-third and low one-third of yields during the years of 1987-1996. There was a consistently large difference between the high- and low-yield groups. Over the most recent five years, the difference in average yields between the two groups was 25 bushels per acre. Since these producers were located in the same geographic area and should have experienced the same general growing conditions during this five-year period, the main factor contributing to this yield difference appears to be the management of the enterprise. This result should point up how important enterprise management and the adoption of good production practices are to achieving consistently high wheat yields. As documented in the remainder of this section, a wheat producer in Kentucky must obtain average yields that are several bushels above the state average for the wheat enterprise to be profitable.

¹ Includes Daviess, Hancock, Henderson, Hopkins, McLean, Ohio, Union, and Webster counties.

² Includes Allen, Barren, Butler, Caldwell, Christian, Crittenden, Edmonson, Livingston, Logan, Lyon, Metcalfe, Monroe, Muhlenberg, Simpson, Todd, Trigg, and Warren counties.

³ Includes Christian, Logan, Simpson, Todd, Trigg, and Warren counties.

Table 9-1. Comparative wheat yields by geographical area and production ranking, 1987-1996.

Area	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	5-Yr. Avg. 92-96
Kentucky*	49	54	50	40	27	55	49	60	53	53	54
Ohio Valley Area*	49	60	56	39	28	58	55	63	57	53	57
Pennyroyal Area*	50	56	52	44	34	60	53	65	58	60	59
West Pennyroyal Soil Assoc.*	51	58	53	45	35	61	55	68	60	62	61
Pennyroyal Farm Analysis (PFA) all cooperators**	58	64	59	48	38	66	60	76	63	63	66
PFA high one-third yield cooperators**	61	74	65	52	46	73	67	82	68	69	72
PFA low one-third yield cooperators**	48	54	49	38	25	51	41	53	46	48	47

* Source: Kentucky Agricultural Statistics, various years.

** Source: David Heisterberg, Area Farm Management Specialist, Pennyroyal Area, personal communication.

Table 9-2. Net income by enterprise, Ohio Valley Farm Analysis Area, 1992-1996.

	1992	1993	1994	1995	1996	5-year average*
Yellow Corn	\$92.45	\$77.92	\$35.69	\$89.92	\$59.82	\$71.16
White Corn	NA	184.89	85.68	131.35	84.86	121.70
Soybeans	63.19	61.60	40.38	73.34	85.70	64.84
Wheat	39.27	- 10.12	51.24	34.10	- 20.22	18.86

* Four-year average computed for white corn.

Source: Craig D. Gibson, Enterprise Analysis, Data for 1992-1996, University of Kentucky, Department of Agricultural Economics.

Table 9-2 is a comparison of enterprise economic performance by cooperators in the Ohio Valley Farm Analysis Area from 1992 to 1996. Of the net income generated by the four enterprises investigated, wheat has the lowest average net income for the five years. The lower net income for wheat in the Ohio Valley Farm Analysis Area can be attributed, in part, to soils that are not well adapted to wheat production. From 1992 to 1996, average wheat yields for cooperators in the Ohio Valley Farm Analysis Group (54 bushels per acre) were 12 bushels per acre lower than average wheat yields for cooperators in the Pennyroyal Farm Analysis Group (66 bushels per acre). The relatively low return for wheat shown in Table 9-2 seems to demonstrate the need for improved management of the intensive wheat enterprise. Wheat production practices to help improve the overall management of the wheat enterprise are covered in other sections of this manual. This will become more important since changed government programs that “decouple” payments from production decisions make it imperative for successful Kentucky wheat producers to consistently attain above-average wheat yields while controlling production costs.

Wheat Enterprise Economics

To examine the economics of the Kentucky wheat enterprise, an intensively managed wheat enterprise budget for 1997 was developed (Table 9-3). It reflects the wheat production situation in Kentucky using the most appropriate agronomic recommendations.

The enterprise budget assumes the use of intensive management in the wheat enterprise, meaning all inputs are used on an as-needed basis in a timely manner and reflecting the need for Kentucky wheat producers to achieve above-average yields to remain competitive. This assumption results in an expected wheat yield that is considerably greater than the state’s historical average yield. The expected yield of 70 bushels per harvested acre is approximately the average yield achieved by the high one-third yield cooperators in the Pennyroyal Farm Analysis Group over the five-year period of 1992 to 1996 (see Table 9-1). The budget also assumes that the wheat enterprise is part of a double-cropping system with a soybean enterprise. This results in a sharing of common inputs such as

fertilizer, lime, and land, which should lower these costs for both enterprises.

The “YOUR FARM” column can be used to develop the intensively managed wheat enterprise budget for any producer’s farm. Use this column to adjust for specific or unique production conditions. These may include differences in land production capabilities across the state as reflected in Table 9-1. The wide range of average yields of counties across the state exemplifies these differences in land production capabilities. Also, include cost adjustments for any expected production problems, such as fertility, weeds, or disease.

In an attempt to better manage the wheat enterprises in the riskier environment created by the new “Freedom to Farm” policy, this budget includes provisions for the use of crop insurance and Integrated Pest Management (IPM) crop scouting. While the use of these risk management tools is the decision of the farm business manager, they are included here as a reminder that the risk environment in agriculture has changed and producers need to reconsider the use of these tools in the future. Again, their use can be reflected in the specific production situation shown in the “YOUR FARM” column.

The economic results for the intensively managed wheat enterprise budget shown in Table 9-3 indicate that total specified variable costs of \$124.72 per acre can be covered, leaving a return above variable costs (RAVC) of \$109.78 per acre as a contribution to all fixed costs. Subtracting \$36.00 to cover depreciation, housing, and other such costs, and \$19.25 to cover operator labor costs, leaves a return to land, capital, and management of \$54.53 per acre.

In this budget, then, all specified costs of production have been covered while \$54.53 per acre remains to cover the unspecified costs. This \$54.53 could be considered a return to land, capital, and management. As such, this figure may seem low, but remember that the intensively managed wheat enterprise is assumed to be part of a double-cropped system with soybeans. Therefore, when this \$54.53 per acre is combined with the returns from the soybean enterprise, the combination should prove profitable for Kentucky producers.

The costs displayed in Table 9-3 may be too high. If this is your case, use the “YOUR FARM” column to adjust the budget to reflect your production situation. Alter-

Table 9-3. Intensively managed wheat enterprise, reduced tillage, estimated enterprise costs and returns for 1997.

	AMOUNT	UNIT	PRICE	TOTAL	YOUR FARM
Gross Returns Per Acre					
Wheat	70	bu	3.35	234.50	
<i>Total Gross Returns Per Acre</i>				234.50	
Variable Costs Per Acre					
Seed	110	lb	0.14	15.03	
Fertilizer	1	acre	43.10	43.10	
Lime	0.4	ton	10.82	4.33	
Herbicides	1	acre	6.10	6.10	
Insecticides	1	acre	5.50	5.50	
Fungicides	1	acre	10.64	10.64	
Fuel and Oil	1.45	hrs	5.18	7.51	
Repairs	1	acre	18.76	18.76	
IPM Scouting	1	acre	3.00	3.00	
Equipment Rental	1	acre	0.00	0.00	
Drying	70	bu	0.00	0.00	
Crop Insurance	1	acre	4.80	4.80	
Cash Land Rent	1	acre	0.00	0.00	
Hired Labor	1	acre	0.00	0.00	
Interest (½ year)	118.78	dollars	0.05	5.94	
<i>Total Variable Cost</i>				124.72	
Return Above Variable Cost				109.78	
Budgeted Fixed Costs/Acre					
Depreciation				27.00	
Insurance and Housing				9.00	
<i>Total Budgeted Fixed Cost</i>				36.00	
Return to Operator Labor, Land, Capital, and Management				73.78	
Less Operator Labor	2.75	hrs	7.00	19.25	
Return to Land, Capital, and Management				54.53	
Government Payments	1	acre	20.74	20.74	

natively, the wheat yield and expected prices may be too low. Table 9-4 provides some insights as to what would happen with various wheat prices and yields while the costs of production are held constant. It depicts the per-acre RAVC for various combinations of wheat yields and prices resulting from the budget shown in Table 9-3. This table is useful for examining “what if” situations concerning various levels of prices and yields.

A particular concern that can be addressed by Table 9-4, for example, is the need for a greater return to land to help justify the production of wheat on your farm. Assuming you are looking at the base budget situation described in Table 9-3, which shows a return to land of

\$54.53, if you can improve your yield to 80 bushels per acre, the return to land jumps to \$87.53. Moving up the yield chart each 10 bushels, at the price of \$3.35 per bushel, adds \$33.50 to your return to land, assuming your variable costs of production do not increase.

Table 9-4 can also be used to examine the risk inherent in most agricultural enterprises. This is reflected in yields and prices that are less than those expected in Table 9-3. For instance, should your yield prove to be only 40 bushels per acre rather than the 70 forecast in Table 9-3, the enterprise would cover variable costs and there would be \$9.00 available to cover any fixed costs or provide a return to land. If the wheat price was \$3.10 per bushel rather

than the \$3.35 projected in the base budget and the yield was only 40 bushels per acre, then the returns fall to -\$1.00 per acre and fails to cover all variable costs. Again, these possible outcomes reflect the need for improving management in the wheat enterprise of the future.

As indicated by Table 9-4, many outcomes are possible with a wheat enterprise. The possibilities cover a wide range and are highly dependent on land production capabilities, weather and general growing conditions, and the level of management devoted to the enterprise. As shown in Table 9-4, the expected return above variable costs might range from -\$31.00 per acre to \$310.00. The more favorable outcomes shown in Table 9-4 certainly could be used to justify the production of wheat in Kentucky. The main emphasis must be placed on intensive management of the enterprise to achieve higher than average yields while maintaining close control of production costs.

Growing Wheat on Rental Land

One question of interest to wheat producers is: "Can wheat be profitably produced on rented land?" Based on the results presented earlier, it seems that it should be possible to justify growing wheat on rented land. This is particularly true when the intensively managed wheat enterprise is combined with a soybean enterprise and the land rental cost is shared between the two enterprises. However, as stressed earlier, this depends on yields, prices, costs of production, rental arrangements, the level of management devoted to the enterprise, and many other factors.

To investigate the economics of using rented land, the Center for Farm Financial Management at the University of Minnesota developed the FAIRRENT computer program, which produced the results presented in Tables 9-5 through 9-7. These results are based on the budget shown in Table 9-3.

The major difference when land is rented involves the governmental transition payment. Since this payment is not tied to wheat production, it is of no importance to the owner/operator in the decision to produce wheat. But, in the case of land-rental agreements, it is generally understood that the transition payment is shared in the same proportion that risk is shared in the enterprise. In the case of cash rent, the payment is allocated to the operator. In share-rental agreements, it is shared in the same proportion as are the costs and returns. Therefore, the transition payment could be an important consideration in the deci-

Table 9-4. Per-acre returns above variable costs at various prices and yields, intensively managed wheat enterprise, 1997.

\$/bu	Yield Per Acre						
	40	50	60	70	80	90	100
2.35	-31	-7	16	40	63	87	110
2.60	-21	5	31	57	83	109	135
2.85	-11	18	46	75	103	132	160
3.10	-1	30	61	92	123	154	185
3.35	9	43	76	110	143	177	210
3.60	19	55	91	127	163	199	235
3.85	29	68	106	145	183	222	260
4.10	39	80	121	162	203	244	285
4.35	49	93	136	180	223	267	310

sion concerning production of wheat on rented land. The results for the \$50-per-acre cash-rent (with \$25.00 allocated to the intensively managed wheat enterprise) situation investigated in Table 9-5 indicate that at the projected price of \$3.35 per bushel, the yield would have to be at least 56 bushels per acre to be a feasible option for Kentucky producers with the production costs shown in Table 9-3. If the situation depicted in Table 9-3 is correct, the wheat price would have to be at least \$2.68 for the \$50.00-per-acre cash-rent (with \$25.00 allocated to the wheat enterprise) option to be feasible.

Table 9-6 reflects a cash rent of \$100.00 per acre (with \$50.00 allocated to the intensively managed wheat enterprise), and Table 9-7 reflects a three-quarter/one-quarter crop-sharing agreement. The tables indicate that it is feasible to rent land for wheat production in both situations, but only with the higher yields and prices. For the situation described in Table 9-3, the cash-rental agreement

Table 9-5. Per-acre returns above all budgeted costs, various prices and yields, intensively managed wheat enterprise, \$25 per acre cash rent allocated to wheat enterprise, 1997.

\$/bu	Yield Per Acre				
	56	63	70	77	84
2.68	-\$ 37	-\$ 18	\$ 1	\$ 20	\$ 38
3.01	- 18	3	24	45	67
3.35	1	24	48	71	95
3.69	20	45	71	97	123
4.02	38	67	95	123	151

Table 9-6. Per-acre returns above all budgeted costs, various prices and yields, intensively managed wheat enterprise, \$50 per-acre cash rent allocated to wheat enterprise, 1997.

\$/bu	Yield Per Acre				
	56	63	70	77	84
2.68	-\$64	-\$ 45	-\$ 27	-\$ 8	\$ 11
3.01	- 45	- 24	- 3	18	39
3.35	- 27	- 3	20	44	67
3.69	- 8	18	44	70	95
4.02	11	39	67	95	123

Table 9-7. Operator's per-acre returns above all budgeted costs, various prices and yields, intensively managed wheat enterprise, three-quarter / one-quarter crop-share rental agreement, 1997.

\$/bu	Yield Per Acre				
	56	63	70	77	84
2.68	- \$ 52	- \$ 38	- \$ 24	- \$ 10	\$ 4
3.01	- 38	- 22	- 6	10	26
3.35	- 24	- 6	11	29	47
3.69	- 10	10	29	48	68
4.02	4	26	47	68	89

seems to be preferable to the crop-sharing arrangement. The crop-sharing agreement would be preferred if prices and yields prove to be lower than expected, as shown in the upper left portion of Table 9-7, when compared to Table

9-6. At higher yields and prices, however, the cash-rental agreement seems to be the more desirable arrangement from the operator's viewpoint. This reflects the risk-sharing nature of the crop-sharing agreement.

Summary and Conclusion

Winter wheat has been an important part of the crop rotation for Kentucky farmers and will continue to be part of the crop mix. As indicated by the intensively managed wheat enterprise budget and an investigation of various yield and price scenarios based on it, there are opportunities to make profitable levels of return with a wheat enterprise in Kentucky. However, most producers will have to improve management of their enterprises in terms of both production and marketing to be able to earn these returns.