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WHEAT PRODUCTION AND PROFIT OPTIMIZATION WITH ALTERNATIVE WATER MANAGEMENT STRATEGIES IN THE TEXAS PANHANDLE

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A quadratic water response function for irrigated wheat is estimated using field data collected from commercial wheat producers in the Texas Panhandle. The response function is used to estimate irrigation requirements and net returns for three irrigation strategies: 1) yield maximization, 2) satisfying 100% of crop evapotranspiration (ET) requirements, and 3) the profit maximization irrigation level for combination of wheat prices between \$2.5 and \$5.5 per bushel and natural gas prices between \$4 and \$12.

Irrigation requirements and net returns from the three irrigation strategies are compared for wheat price of \$3 per bushel and natural gas price of \$6 per mcf. The yield maximization strategy has an expected yield of 4,981 lbs of wheat with a net loss of \$36.22 per acre with 18.94 acre-inches of water. Irrigating to meet 100% of crop ET requires 11.72 acre-inches of water, produces an expected yield of 4,628 lbs of wheat with saving of seven acre-inches of water. The profit maximizing irrigation level at these prices is 8.79 acre-inch of water with an expected yield of 4,281 lbs. of wheat.

Ranking the three strategies, the profit maximization strategy provides the highest net returns and uses the least water. Irrigating to meet 100% of crop ET requirements is a close second, and maximizing yield per acre produces the lowest net returns using the most water. The profit maximization strategy improves the profit margin for the producer, enhances the regional economy, reduces the water requirement, and prolongs the economic life of the Ogallala Aquifer.

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