

Encourage Growers to Do the Numbers before Reacting to Crop Prices

By Mike Stewart and Paul Fixen

Changes in crop prices often generate questions about the economics of fertilization. Prices for many crops, particularly corn, have fallen considerably from the highs of the past few years. This shift has some asking questions such as, “should I reduce fertilizer rates in response to lower prices?” A detailed answer for a specific situation will depend on several factors, but a review of some fundamental principles can give us a foundation for addressing such questions.

There are four primary factors affecting profitability...crop price, production costs, yield level, and crop quality (as it affects price). Now, which of these factors does the grower have significant control over? Typically, producers are price takers and thus have little control over prices. However, they do have control over variable costs, which directly impact yield and quality. Thus, in this sense yield level is a controllable factor determining profit. Once a decision has been made to plant a certain crop then it becomes a simple matter of making the most of the opportunity. This requires planning a program designed to optimize efficiency and produce maximum returns per acre... in other words, to produce yields that maximize profit while exercising responsible environmental stewardship.

Greater profits come from higher yields (to a point) since costs are spread over more production units (bushels, bales, pounds, etc.) resulting in lower cost per unit of production. Efficient and profitable production involves lowering unit cost to a point of maximum net return. This MEY (maximum economic yield) concept was popular decades ago, and is as valid and legitimate today as it was then.

Crop and fertilizer prices have relatively little effect on optimum levels of fertilization. This is because in determining profitability yield level has an overshadowing effect on crop and fertilizer price. Economists at Kansas State University (KSU) have published an online Excel tool (KSU-NPI_CropBudgets.xls, at <http://agmanager.info/crops/prodecon/decision/default.asp>) that helps demonstrate the impact of crop and fertilizer prices on estimated economic optimum rates of both N and P application. For irrigated corn with yield goal set at 250 bu/A, N and P₂O₅ prices set at \$0.50/lb, and all other settings left at default, when crop price was varied from \$7.00 to \$3.50/bu the estimated optimum N rate went from 340 lb N to 308 lb N/A—a decline of 32 lb N with a halving of corn price. For P the rate dropped from 34 to 27 lb P₂O₅/A—a decline of only 7 lb. This example is meant solely for illustrating that while shifts in crop prices do have an impact on optimal rates of application, that impact may not be nearly as great as one would first expect. Therefore, the tendency to react to crop price declines by deeply cutting inputs should be closely scrutinized.

Viewing corn as a form of currency is a useful exercise to illustrate the impact of market swings. **Table 1** compares fertilizer prices in November 2012 to August 2014 as \$ per ton of product and \$ per pound of nutrient. **Table 2** uses these fertilizer costs plus corn prices to determine the amount of fertilizer a bushel of corn would buy and also what the cost, in bushels, was for 100 pounds of each of the nutrients. The



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Table 1. Comparison of fertilizer prices in November 2012 to August 2014.

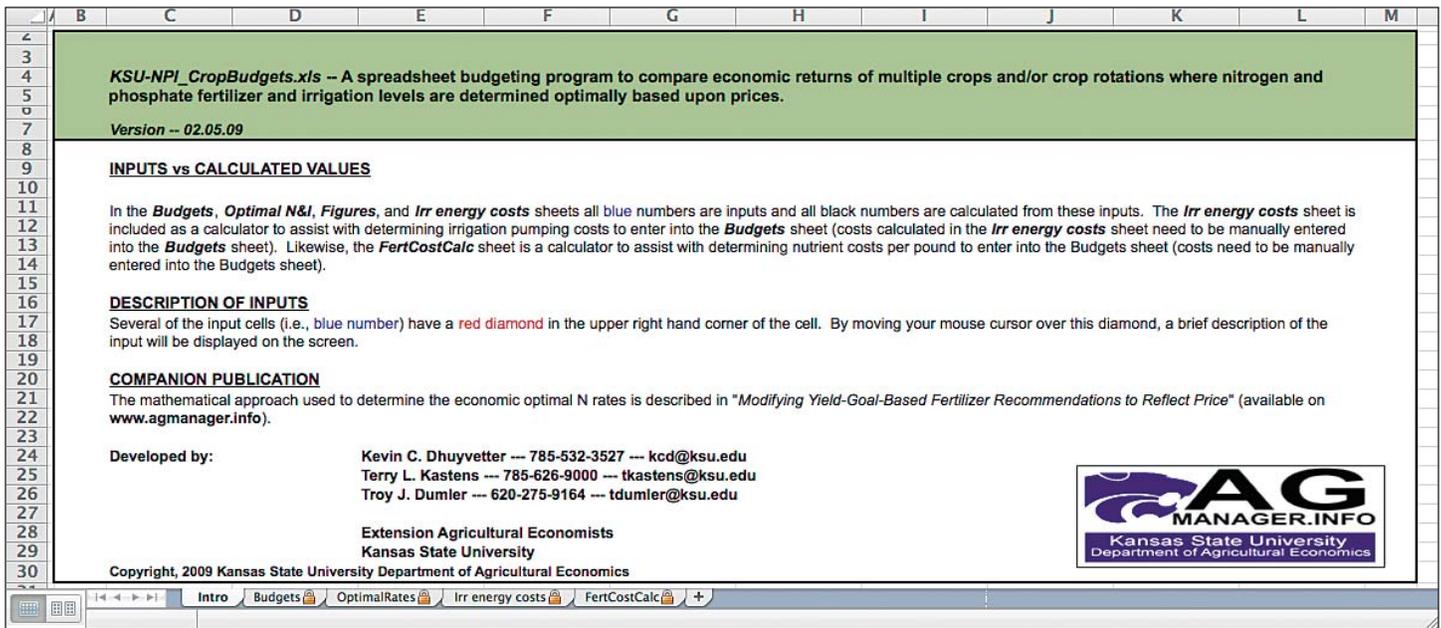
Source	Fertilizer cost (11/2012, 11/2013, 8/2014)					
	2012	2013	2014	2012	2013	2014
	----- \$/ton* -----			---- \$/lb nutrient** ----		
Urea, N	570	450	535	0.62	0.49	0.58
DAP, P ₂ O ₅	631	516	580	0.44	0.37	0.40
KCl, K ₂ O	605	476	474	0.50	0.40	0.40

*Midwest retail - The NPK Insider (12/3/2013, 8/15/2014).

**N in DAP valued as urea.

analysis shows that that cost of 100 pounds of nutrient was 6 to 8 bushels in 2012, 9 to 12 bushels in 2013, and 11 to 15 bushels currently. It now takes more bushels to buy fertilizer than in the previous years, but not much more relative to the full value of today’s high yielding crops. The analysis further shows that under current market conditions, N, P and K remain good investments when a yield response is expected.

Abbreviations and notes: N = nitrogen; P = phosphorus; K = potassium; DAP = diammonium phosphate; KCl = potassium chloride.



Spreadsheet budgeting tool developed by Kansas State University for comparing economic returns of multiple crops and crop rotations.

Table 2. Corn as a form of currency keeps prices in perspective.

Source	A bu buys:			Cost of 100 lbs		
	2012	2013	2014	2012	2013	2014
N	12	9	7	8	12	15
P ₂ O ₅	17	11	9	6	9	11
K ₂ O	15	11	9	7	9	11

Based on Midwest retail for urea, DAP and KCl; November 2012, 2013 and August 15, 2014 (The NPK Insider). Corn \$7.50/bu (2012); \$4.25/bu (2013); \$3.75/bu (2014).

So an important science-based reaction to potential financial pressures due to crop prices is the strengthening of yield response and nutrient need prediction through use of up-to-date soil testing and the latest N need prediction tools that are calibrated and proven for the cropping system in question. The goal is to maximize return on the last dollar spent on fertilizer inputs.

Adequate and balanced fertility may also produce non-yield profit affecting benefits. For example, in a KSU irrigated corn study (Dhuyvetter and Schlegel, 1994) P fertilizer hastened maturity, lowered grain moisture at harvest, and resulted in greater profit due to lower drying cost. This work showed that

P fertilizer reduced drying costs by an average of \$0.10/bu.

Farmers and their advisers are more than ever operating in a fluid global environment. Adaptation to abrupt and sometimes massive change is necessary for survival, but always remember that even in the face of change certain principles endure. One of these is the MEY principle discussed above, another is the principle of 4R Nutrient Stewardship. This article has discussed the effect of crop price on estimated optimum fertilizer rate. But none of the 4Rs (fertilizer rate, source, time, and place) stands alone; all are interconnected, each affecting the other. A MEY program requires not only the right rate, but also source, time and place factors that collectively assure efficient and effective nutrient use.

So encourage growers to take a breath, “do the numbers”, and apply sound agronomic and economic principles before reacting to recent market swings. **DC**

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