BARNYARDS & BACKYARDS

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Online tools available for determining fertilizer needs

By James Sedman and John Hewlett

The 2008 production season changed the way many approach risk management in crop and livestock production across Wyoming.

While prices for most commodities were at or near all-time highs, prices for inputs such as seed, fertilizer, and fuel also reached record levels. This caused many crop and livestock producers to reevaluate their input needs and pricing structure – especially when it came to fertilizer.

The Western Risk Management Library, online at agecon.uwyo.edu/RiskMgt, has two spreadsheet tools to help producers determine the most economical and risk effective way to apply fertilizer.

Once the main page is loaded, click on "Software" from the menu bar on the left side of the screen. From there will be two links – the fertilizer cost application worksheet and the fertilizer formulation worksheet.

Using the Fertilizer Formulation Work Sheet

The formulation worksheet assists producers in determining the exact cost and amount per acre of each nutrient applied. There are a number of fertilizer formulations – choosing the right one for each field operation should start with determining the nutrient content in pounds per acre applied.

This worksheet can help a producer determine what formulation is the most cost-effective. Up to 10 different fertilizer formulations per acre can be analyzed. Simply input the total pounds per acre applied, its nutrient percentage, and its total cost per ton. The calculated results are generated in three tables showing the pounds of available crop nutrient applied, cost per pound of crop-available nutrient applied, and the total cost of crop-available nutrients applied – all in per-acre terms.

For example, 120 pounds of 46-0-0-0 (Nitrogen - Phosphorus - Potash - Sulfur or N-P-K-S) fertilizer purchased for $1,000 per ton would yield 55.2 pounds of nitrogen per acre at a total cost of $60 per acre and $1.09 per-pound of nutrient applied.

Using the Fertilizer Cost-Application Work Sheet

Once the desired formulation and cost of the fertilizer in your operation is determined, the next question becomes at what rate or rates is it economical to apply? With nitrogen selling for more than $1,000 per ton and phosphorous approaching $900 per ton last year, the question for many producers became not at what rate do I apply, but do I fertilize at all? This question can be answered using the cost application work sheet. A total of 15 common Wyoming crops are listed for nitrogen and phosphorous fertilization cost calculation. To begin, select a crop to analyze and input the fertilizer cost per pound of nutrient applied.

For example, consider the $1.09 per pound of nitrogen from the example above in the corn for silage worksheet. The work sheet has yield increases corresponding with the increasing amount of fertilizer automatically applied – if your yield data is different, you can input your own or even run the calculations for an unlisted crop.

Fertilizer per Acre	Yield Ton/Acre	Added Yield Ton/Acre	---Added Costs---		Added Return [$38.00/Ton]	Added Return Less Added Costs
			Fertilizer [$1.09/Pound]	Harvest [$8.50/Ton]		
0	16.8	---	---	---	---	---
40	20.1	3.3	$43.60	$28.05	$125.40	$53.75
80	22.7	2.6	$43.60	$22.10	$98.80	$33.10
120	24.6	1.9	$43.60	$16.15	$72.20	$12.45
160	25.8	1.2	$43.60	$10.20	$45.60	($8.20)
200	26.3	0.5	$43.60	$4.25	$19.00	($28.85)

* Deficit noted in red

The harvest cost for silage corn in this example is $8.50 per ton, and the crop sale price is $38 per ton. The work sheet results (shown above) show that 120 pounds of fertilizer is the most cost effective level; beyond that the value of the yield increase is less than the value of the additional fertilizer (marginal cost is greater than marginal return).

While fertilizer prices may not be as high currently as they were last season, it is still imperative for producers to manage fertilizer applications in the most cost-effective way available. One of the most important methods for keeping fertilizer costs down is to complete a soil test (see companion article *Getting the Straight Dirt – How to test the health of your soil*) for more information.

Using these fertilizer calculation worksheets as part of an overall risk management plan can help lower risk and increase profitability.

For more information on this and other risk management topics on the Web, visit the Western Risk Management library online at agecon.uwyo.edu/RiskMgt.

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Getting the Straight Dirt – How to test the health of your soil

By Kelli Belden

Soil tests can help assess the quality of a specific site for growing a crop, whether it is grass, alfalfa, small grains, vegetables, or flowers.

If production has been acceptable and there are no obvious problem areas in fields, a standard fertility test (nitrate, phosphate, organic matter, pH, salt estimate, qualitative lime, and texture) may be sufficient. Potassium, iron, or zinc may be tested if deficiencies for these nutrients are suspected.

Your local University of Wyoming Cooperative Extension Service (UW CES) county educator or the UW Soil Testing Laboratory in Laramie (contact information is below) can help determine needed tests.

Timing Important

Soil sampling a few weeks before fertilizer application is usually best, but equipment and time constraints can prevent this. The important thing is to be consistent with the timing so results can be compared year-to-year. Establish a sampling time that suits your management practices.

Where to Sample

Next, identify the areas to sample. There are three basic approaches to choosing these areas – whole field, grid sampling, and management-unit sampling.

If using the whole-field method, take 15 to 20 cores from random areas in the field. The cores are mixed together in a clean bucket, and a representative sample is sent to a laboratory for analysis. Unusual areas in the field, such as salt deposits, animal watering or feeding areas, and old building sites, should be avoided. The whole-field method treats the entire field in the same manner and can result in over fertilizing some areas and under fertilizing others.

With grid sampling, the field is divided into uniform cells, usually one to two acres in size. Ten to 15 cores from random areas within each cell are taken. Avoid unusual areas. Grid sampling usually results in more accurate estimates of nutrient availability. If variable rate fertilizer application equipment is not available, growers will not be able to take advantage of that accuracy. It requires many samples for one field and can be expensive.

A compromise between whole-field and grid sampling is the management-unit approach. Divide a large field into several smaller sampling areas based on known characteristics. These may be soil type, historical management differences, yield data, or aerial photographs that show distinct differences in plant growth. Fifteen to 20 random cores are taken from each management-unit area.

Taking the Sample

A good soil test requires collecting good soil samples. First, decide if surface (0-6 inches or 0-8 inches) samples will be taken or if surface and deep samples (for nitrate at 2 to 3 feet) will be taken. A fertility recommendation can be made from the surface sample only, but nitrogen recommendations are more accurate if deep samples are also taken.

Start with clean tools. A plastic bucket and a shovel are all that are needed; however, a soil probe, which removes a soil core, makes taking consistent samples easier. To sample, remove debris from the top of the soil and use a soil probe to remove a 6- or 8-inch-long core. If using a shovel, dig a hole and then shave a 1- to 2-inch slice off the side of the hole to a depth of 6 or 8 inches. Make sure the slice is as thick at the bottom as at the top.

Go to other random sampling areas, and repeat the process. Mix the cores or slices well, and discard any large stones. The soil should be spread on a clean surface and allowed to dry in the shade. Mix the soil again, and put about a quart of soil in a clean plastic bag. DO NOT dry it in the oven or microwave to speed the process; this will ruin the sample.

Submit the Sample

You are now ready to send your sample for testing. The more information provided to the laboratory, the better the quality of the recommendation. Complete the soil sample questionnaire, providing information from the last two to three years, if known.

Soil testing information sheets can be obtained at any UW CES office or online at http://ces.uwyo.edu/PUBS/MP6.2.pdf.

UW CES county office information is available online at http://ces.uwyo.edu/Counties.asp.

The soil lab can be reached by calling (307) 745-4825, by e-mail at soiltest@uwyo.edu, or by writing to: UW Soil Testing, Laramie R&E Center Research Greenhouse, 962 N. 30th St., Room #17, Laramie, WY 82072.

The laboratory charges $20 for the standard test, which includes pH, salts, organic matter, phosphate-phosphorus, nitrate-nitrogen, lime, and texture.

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