Access software

EC192

Calculating the Value of Manure for Crop Production

Spreadsheet Instructions for Version 1.33

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Resources

Other University of Nebraska–Lincoln Extension publications are referenced throughout this publication. Many of these can be found online at *http://extension.unl.edu/publications.* To access related worksheets visit the UNL Comprehensive Nutrient Management Planning (CNMP) Web site at *http://cnmp.unl.edu.*

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I. Introduction Worksheet

Introduction

Manure has value for crop production when it provides nutrients or soil amendments needed for optimum crop yields. Manure does not supply nutrients at the same ratio as crop uptake, but has the advantage of slowly releasing nutrients which may reduce the risk of nitrate leaching. Manure nutrient content varies widely due to weather conditions, the livestock facility, manure storage systems, the age of manure and feed composition and application. Low nutrient concentration due to weathering and dilution with water or soil decreases the value of manure. The organic material in manure also can improve soil productivity by increasing the water infiltration rate and water holding capacity. On some soils, this gain in productivity may be worth more than its nutrient value.

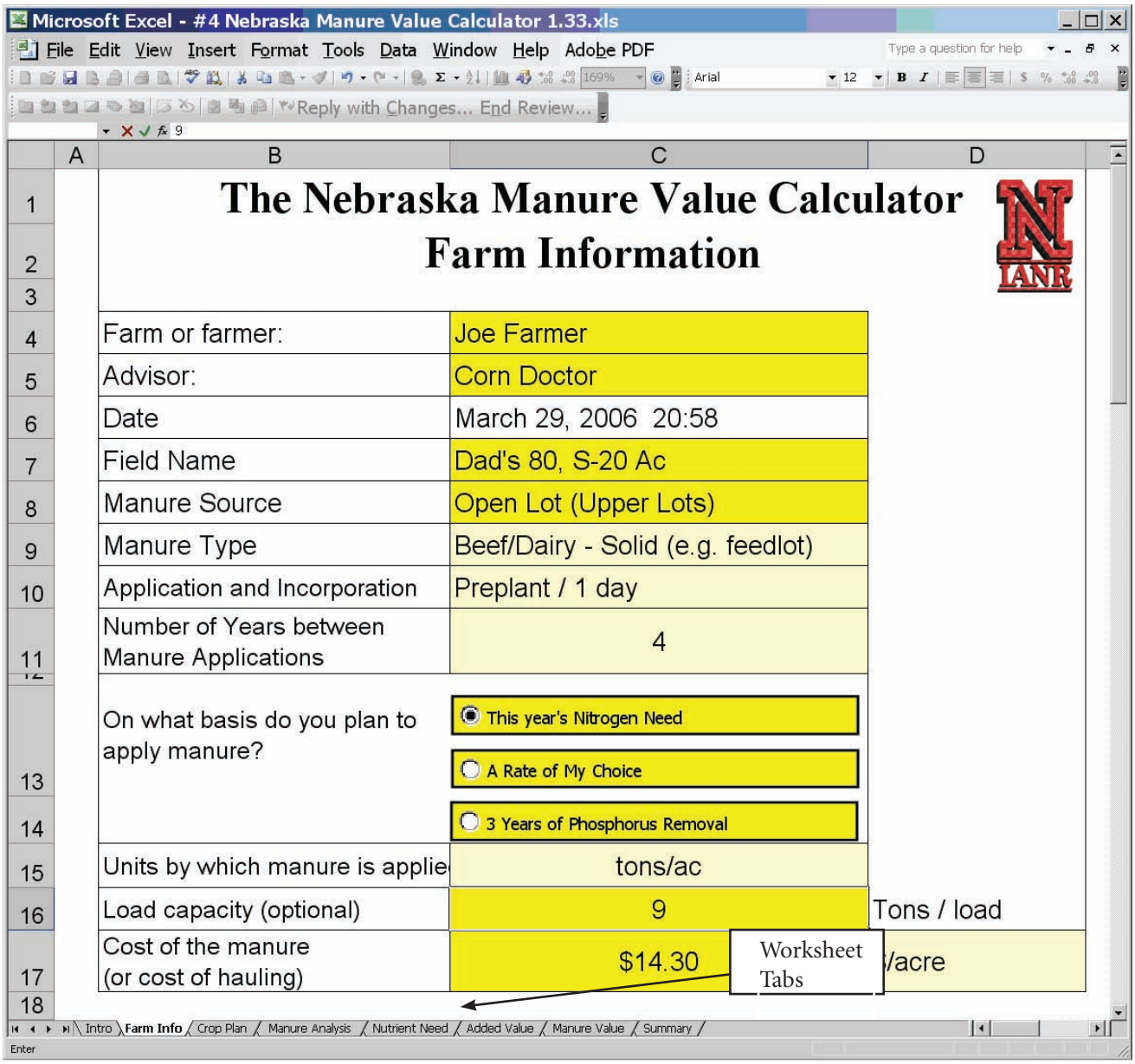

Figure 1. The spreadsheet has eight tabs, one for each worksheet.

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Purpose

This spreadsheet was developed to simplify the calculation of manure value outlined in UNL NebGuide G1519 *Calculating the Value of Manure for Crop Production*. It calculates the value of a manure source for a specific field. It includes the value of nutrients needed between manure applications, with the option of including manure nutrients used in the future. The value of other benefits of using manure, such as an expected yield increase, can be estimated.

Overview

The spreadsheet (*Nebraska Manure Value Calculator 1.33.xls*) for the Nebraska Manure Value Calculator was constructed in Microsoft Excel® with eight worksheets (*Figure 2*). The *Introduction* worksheet provides background information on the Nebraska Manure Value Calculator. Information entry begins on the *Farm Info Worksheet*, including identification information for the manure source and field selected for manure application, as well as a choice of manure application options.

The *Crop Plan* worksheet is for entering information on the crop rotation and crop harvest. Manure analysis information is entered in the *Manure Analysis* worksheet. Crop nutrient need and the prices of fertilizer nutrients are entered in the *Nutrient Need* worksheet. In the *Added Value* worksheet, information is entered on the value of nutrients applied in excess of crop needs and of other benefits. Information entered in the previous worksheets is carried forward to the *Manure Value* worksheet and the results of the calculations are given, including the net value of the manure to the crop producer. A summary report is given in the *Summary* worksheet which can be printed.

Typically, start with the *Farm Info* worksheet and after completing it, proceed to the next worksheet to the right, *Crop Plan*. Continue progressing to the right until viewing the right most worksheet, *Summary*. Some choices on an earlier (left) worksheet determine what choices you will have available on worksheets to the right. The results of calculations and basic information will be automatically entered in the *Manure Value* page and subsequently on the *Summary* page.

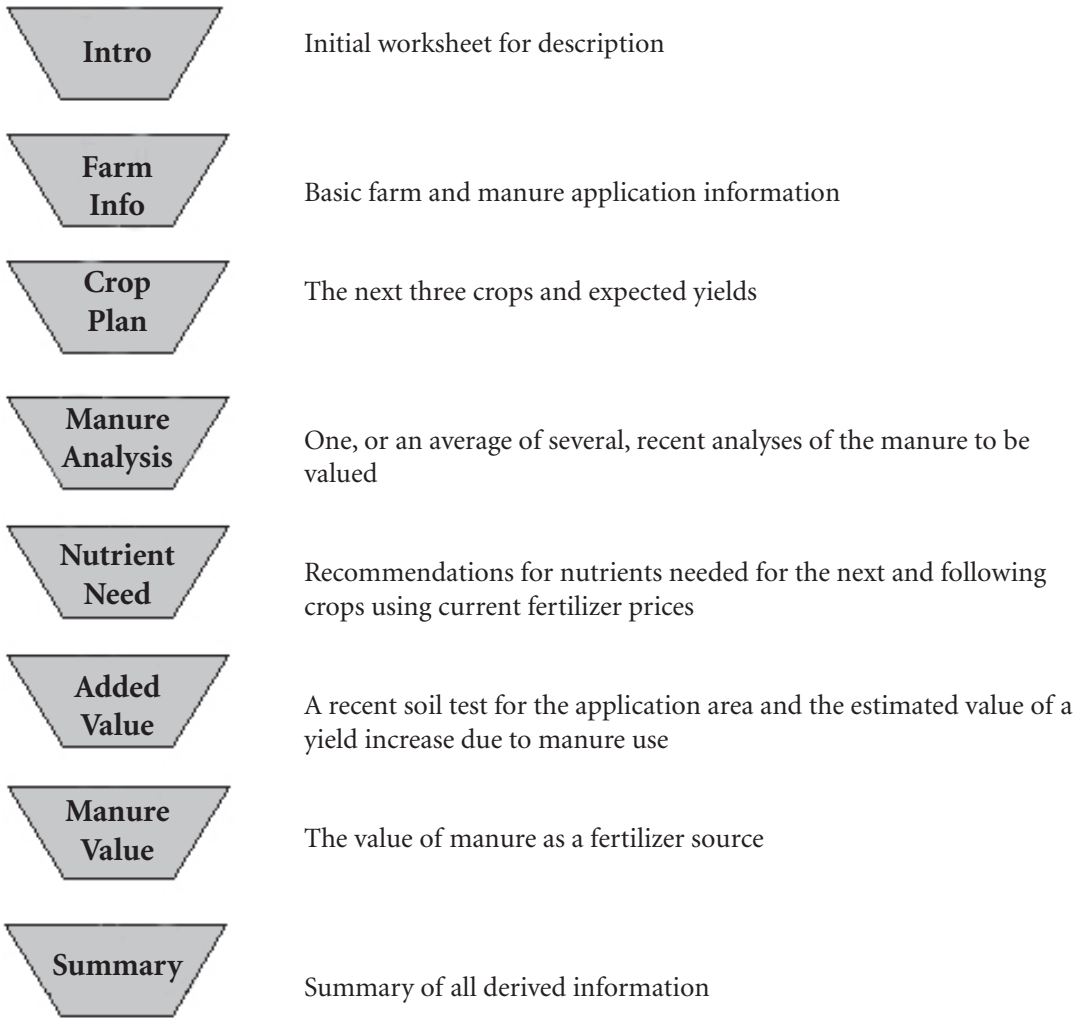

Figure 2. Description of each worksheet.

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Computing Requirements

The spreadsheet, *Nebraska Manure Value Calculator 1.33.xls*, was developed for Microsoft Excel 2000®. File size is about 250 k.

Instructions

1. **Open** *Nebraska Manure Value Calculator 1.33.xls* and save with a new file name (*Figure 3*). On the top left of the screen click on *file* and *save as*. In the file name box, replace *#4-Manure Value Calculator* with a new name (e.g. *#4-Manure Value Calculator for John Doe*). This will preserve the original unaltered form for future use. The new file should be saved periodically as each worksheet is completed to prevent loss from unexpected computer difficulties.

2. **Improve Screen View** (*Figure 3*): You can adjust the information that can be seen in a single screen by following these steps. It is best to adjust the information that fits into one screen to insure that you can see all yellow background (User Viewing Area) within the left to right limits of the screen. Try these steps to adjust your viewing area:

   a. Click on *View* and then *Zoom*. Adjust the *% Zoom* to your personal preference.

   b. To maximize the viewing area, select *View* from the menu bar and then *Full Screen*. The unnecessary tool bars should disappear.

   c. Adjust the screen resolution by clicking on *Start*, then *Settings*, then *Display*, and then *Settings* again. You can adjust screen size by going to a

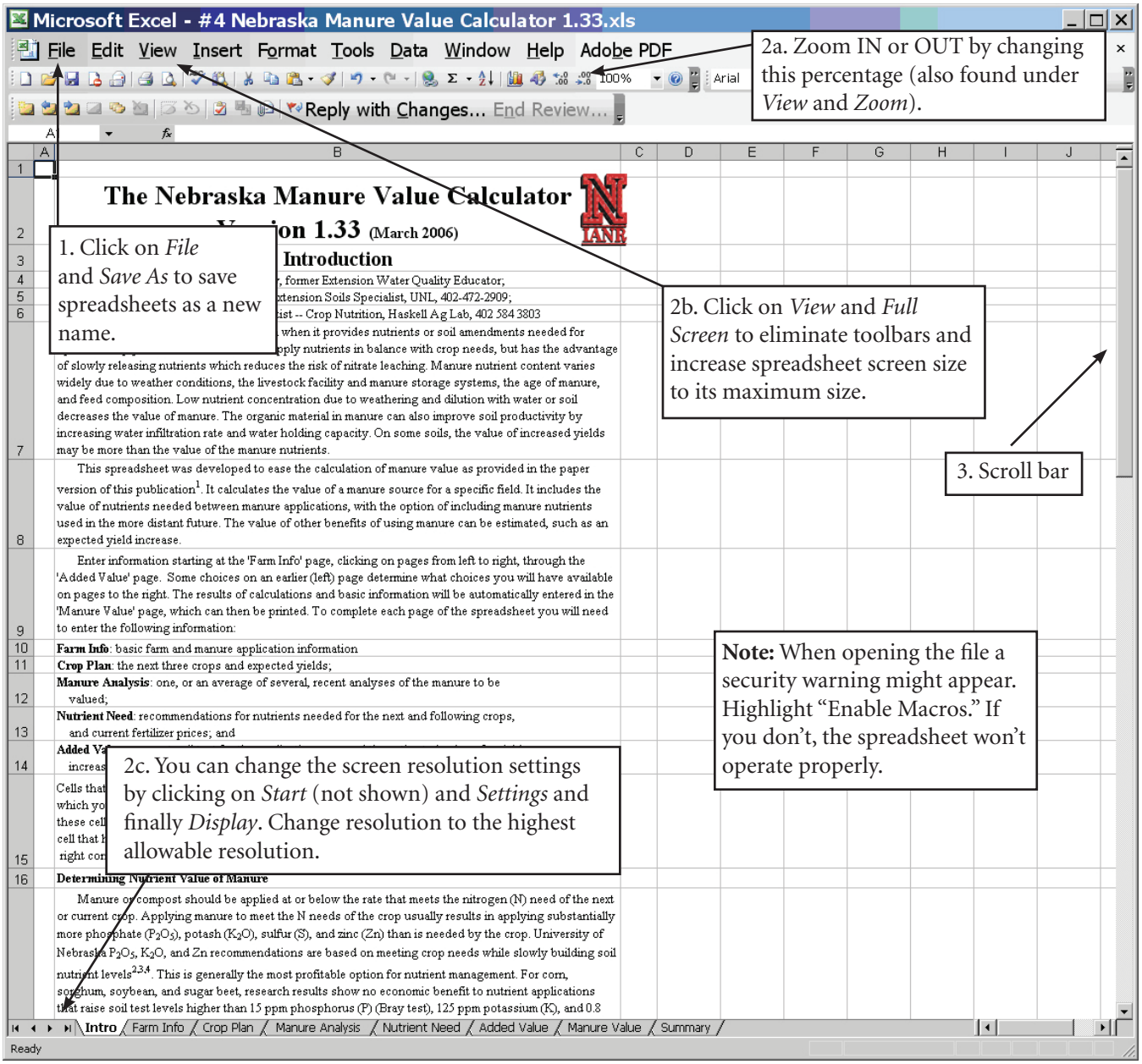

Figure 3. ***Save As*** **and** ***Viewing*** **instructions.**

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higher resolution such as *1280 x 1024* or *1400 x 1050*. Generally the higher resolution will produce better viewing. If the text is difficult to read, increase its size with Step *a* above.

3. For the *Introduction* worksheet, the entire contents will not appear on the screen. Additional screen information can be viewed by clicking on the "Up" and "Down" arrows on the scroll bar at the right side of the screen (*Figure 3*), or by using the scroll wheel on the mouse, if available. To move from cell to cell, use the arrow keys on your keyboard or hit "enter" or "tab" after typing in the current cell.

4. Color codes are used to assist the user with these worksheets.

Yellow Producer information is entered in cells colored yellow in the spreadsheet. These locations are not protected and can be changed or updated as necessary. These cells are for typing in names or numbers.

Beige Cells that are beige contain drop-down lists that help you make a selection by clicking on one of the names in the list. Do not type anything in these cells since the computer will look for an exact match in some of these (*Figure 4*).

Cells with small red triangles. By moving your cursor over a cell that has a small red triangle in the upper right corner, a comment will appear (*Figure 5*).

Radio buttons. Radio buttons can be "clicked" to get a drop-down list from which one option can be chosen.

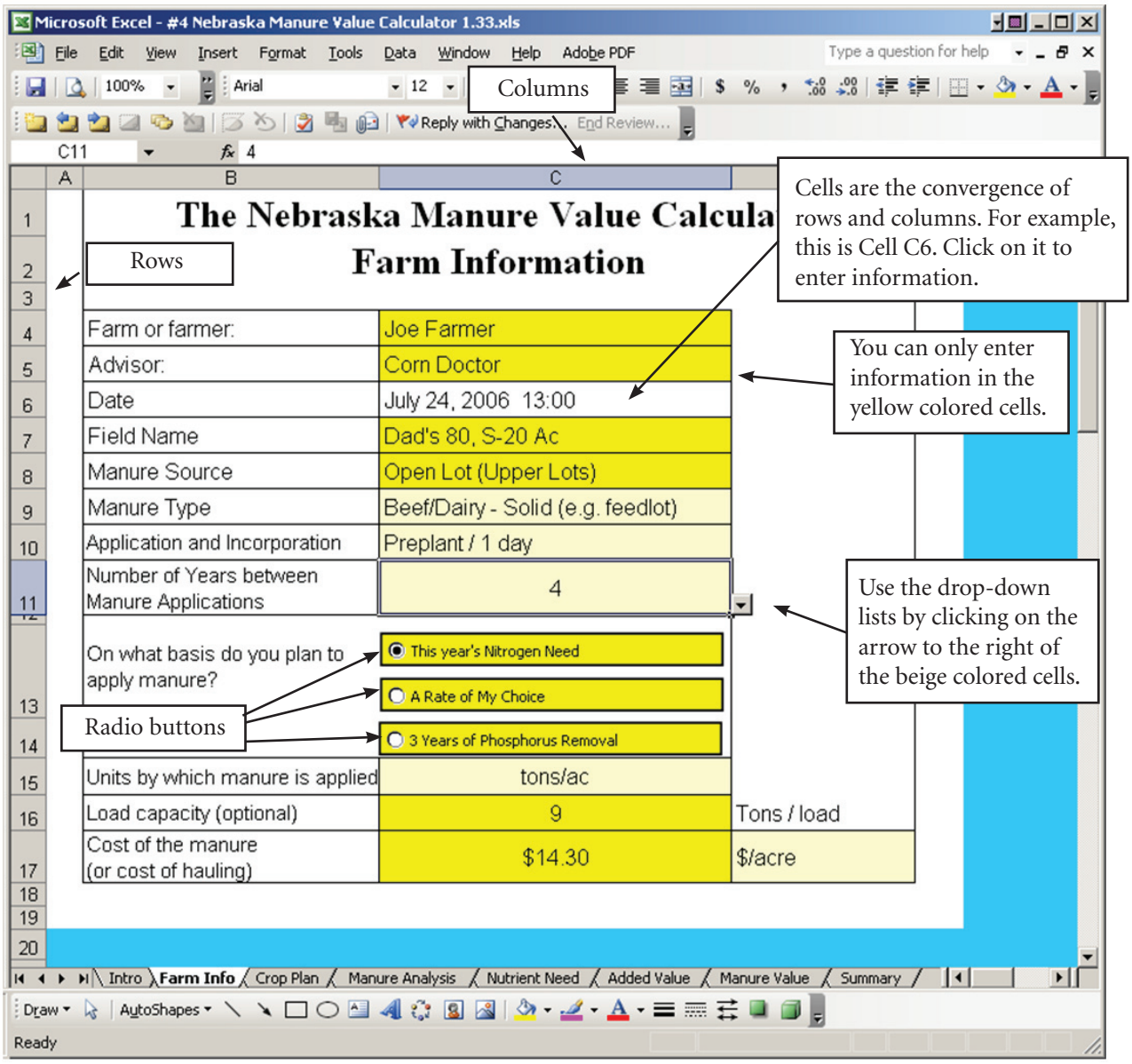

Figure 4. Cells, drop down lists, color coding used in worksheets.

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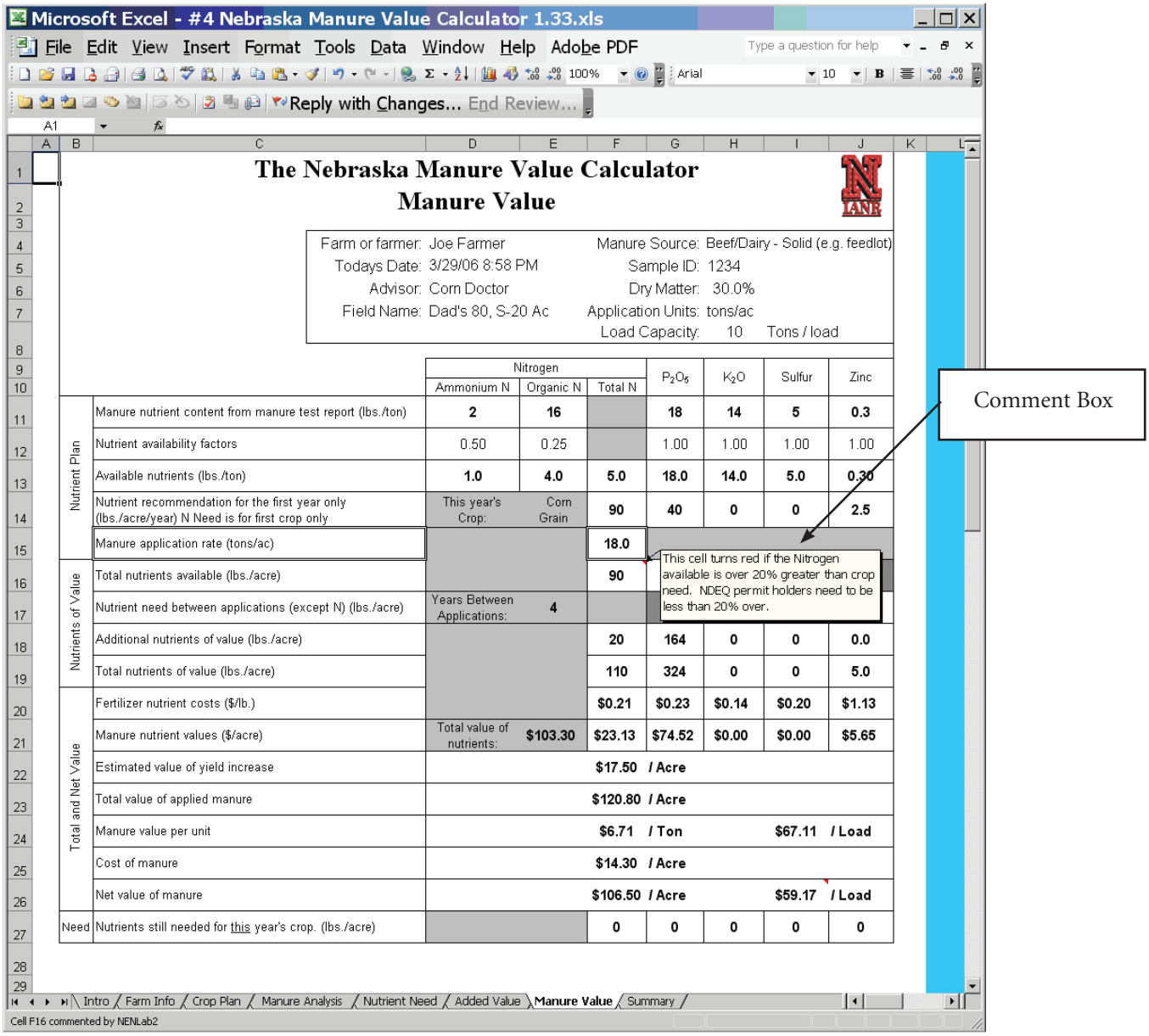

Figure 5. Example of a comment box.

5. When finished reviewing the information on the *Intro* worksheet, move to the *Farm Info* worksheet by clicking on the "Farm Info" tab on the bottom of the page.

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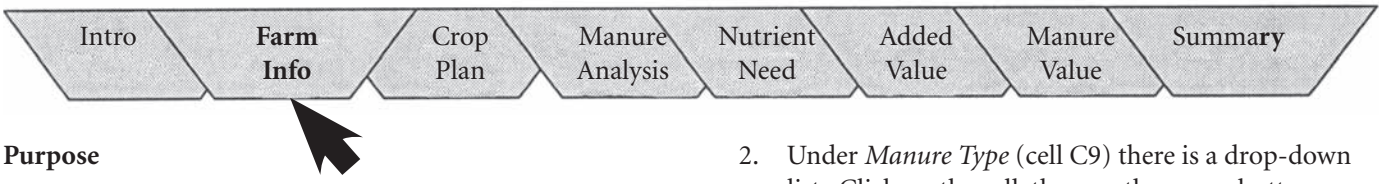
II. Farm Information Worksheet Instructions



Purpose

This worksheet provides a space to include basic information for the producer and/or advisor completing this analysis (*Figure 6*).

Example Problem

The scenario used in this instruction sheet corresponds with the example in the *Calculating the Value of Manure for Crop Production* NebGuide (G1519, revised April 2005)[1]. This example is:

> *Cattle manure from a dirt feedlot is applied on a sloping silt loam soil and is incorporated one day later. It is applied before corn, in rotation with soybeans, at a rate that meets the nitrogen requirements for corn with an expected yield of 130 bu/ac. The field has no history of manure application. Soil test results are: 3 ppm soil nitrate (0-36 inches), 2 percent organic matter (O.M.), Bray P-1 = 12 ppm (low); K = 205 ppm (very high); Zinc = 0.7 ppm (medium).*

Instructions

1. Enter producer name in cell C4. The name of the contact person who completes this worksheet, if different from the producer, also may be included (cell C5). The date (cell C6) automatically comes up when the spreadsheet is opened. Enter the field name (cell C7). Enter the source of the manure to be valued (cell C8).
2. Under *Manure Type* (cell C9) there is a drop-down list. Click on the cell, then on the arrow button on the right to view the list and make a selection. The next two cells below work the same way. *Application and Incorporation* (cell C10) gives several options and *Number of Years Between Manure Application* (cell 11) allows up to six years between applications.
3. Under *On what basis do you plan to apply manure* click the radio button that corresponds with the appropriate choice. If you click *A rate of my choice*, another box opens called, *Enter your application rate* where you can enter this numerical amount on a rate per acre basis.
4. Under *Units by which manure is applied* there is another drop-down list (cell C15) where you can choose the units per acre of application. The *Load Capacity* (cell C16) is optional but can include the loaded capacity of your spreader, e.g. 9 tons. Under *Cost of Manure (or cost of hauling)* (cell C17) you can enter a number which the spreadsheet converts to a dollar format. Cell D17 offers another drop-down list with dollars per selected unit.

   In this example the break-even price is calculated using this scenario: *Manure is hauled two miles from the feedlot to the field entrance and is based on two loads per acre, using a 70 hp tractor at a 10 mph road speed. Labor is $8.00 per hour and diesel fuel is at $1.00 per gallon. (University of Missouri, G9333:* Break-even Hauling Distance: Tractor Pulled Manure Spreaders*. Search for publication at http://muextension.missouri.edu/).*

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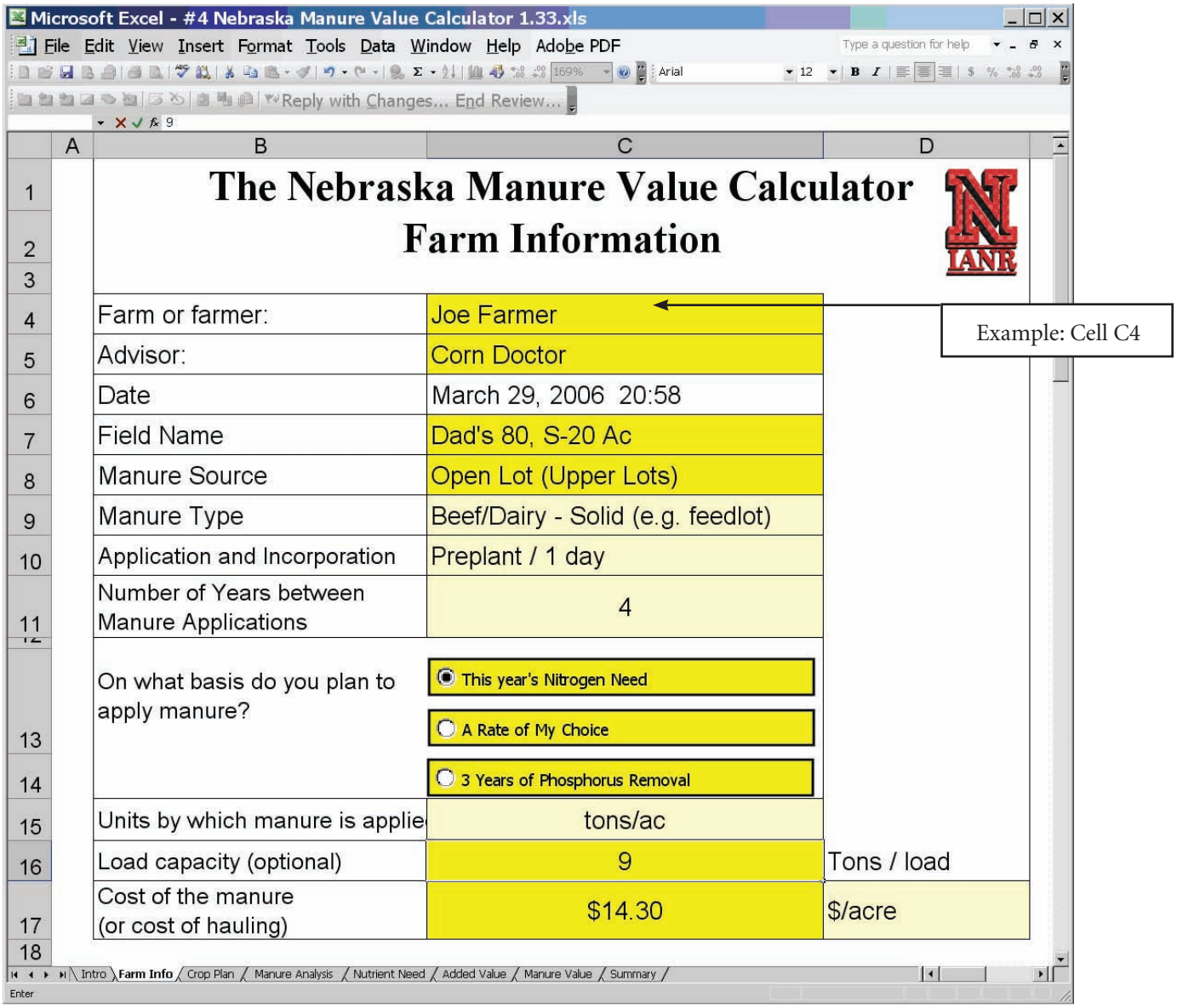

Figure 6. Entering farm information.

5. After checking the information entered, move to *Crop Plan* worksheet by clicking on the "Crop Plan" tab on the bottom of the page.

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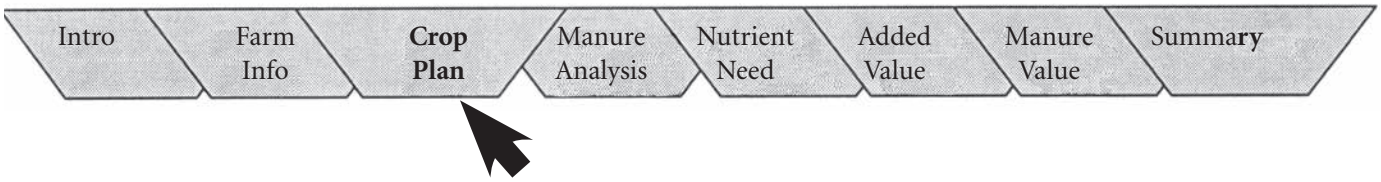
III. Crop Plan Worksheet Instructions



Purpose

This worksheet will aid the producer in identifying the next three crops for a given field and the expected yield (*Figure 7*).

Instructions

1. *Expected Yield* is needed if the basis of manure application is three years of phosphorus removal or if a legume is grown in year one:

   a. Select the crop to be grown for years one through three from the drop-down lists in cells C8 through C10 (*Figure 7*).

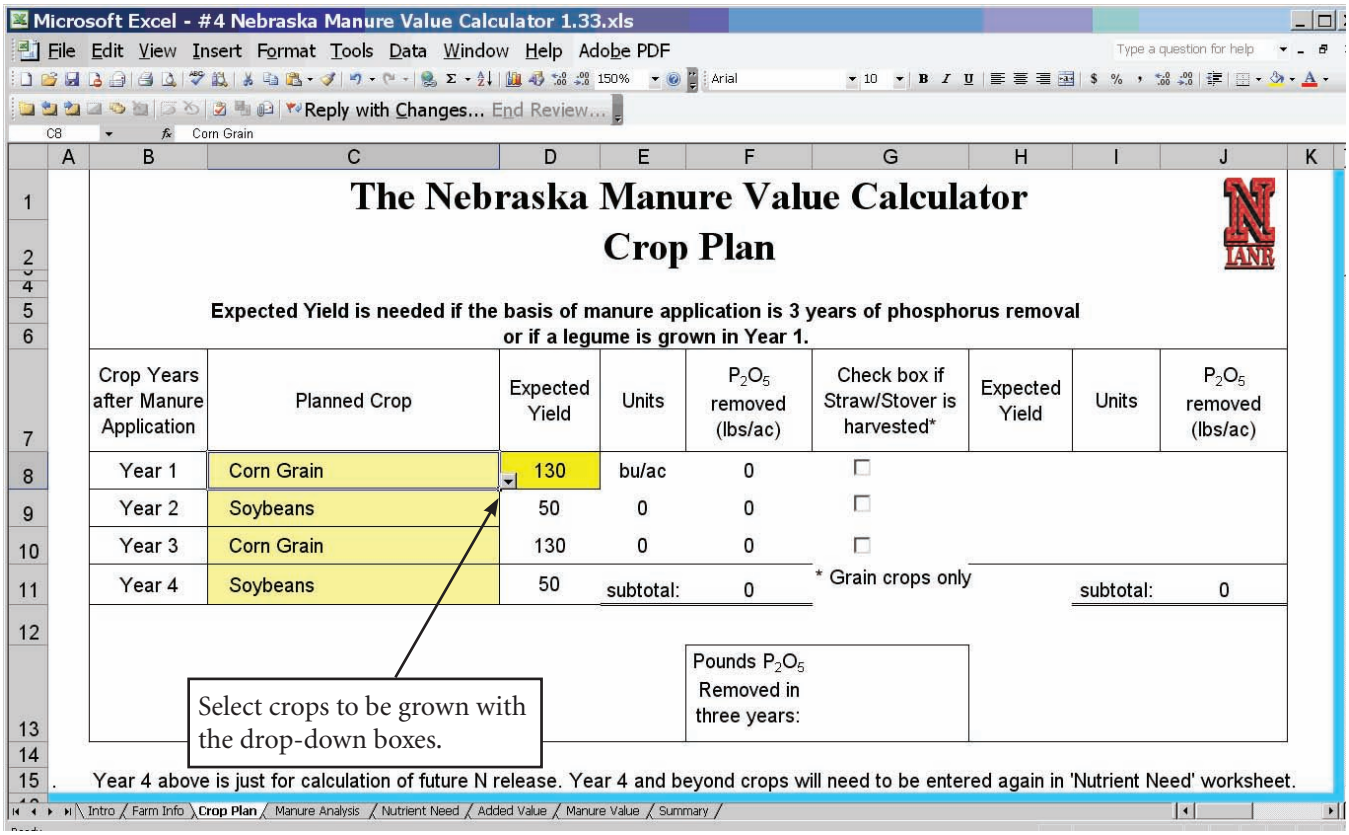


Figure 7. Entering a crop plan.

   b. If a legume such as soybeans or alfalfa is grown the first year, the expected yield must be entered. Note that the nutrient needs for other crops will be entered automatically in the *Nutrient Need* worksheet.

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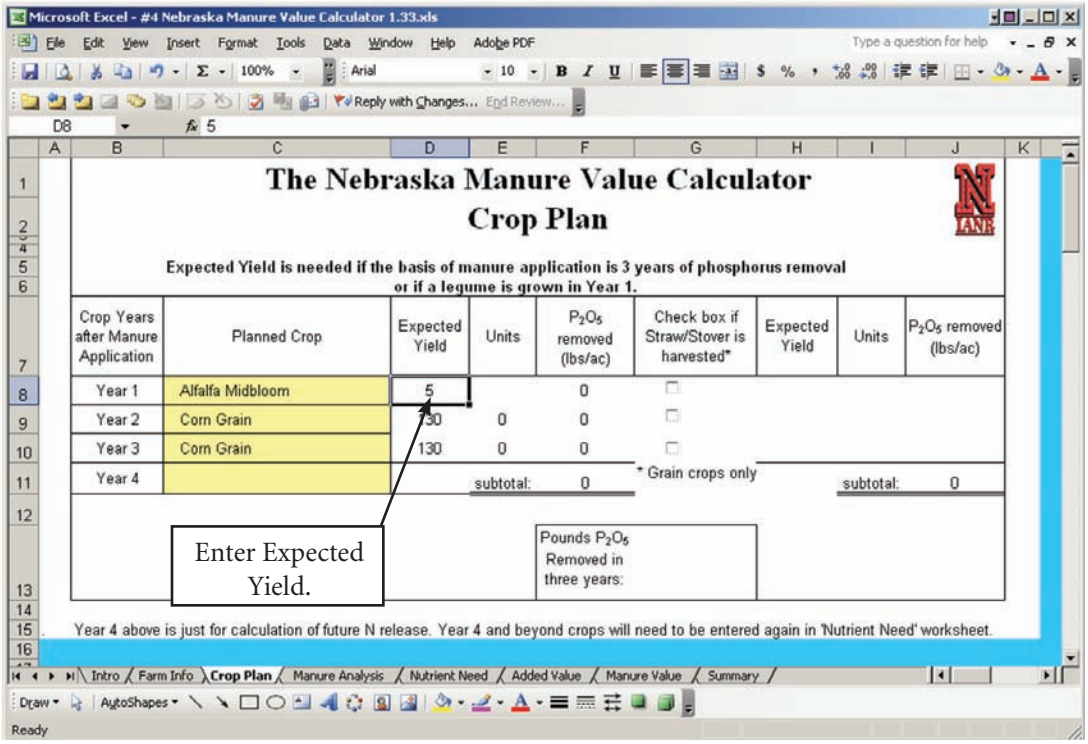

Figure 8. Enter expected yield.

c. If the *3 Years of Phosphorus Removal* radio button is checked in cell C14 on the *Farm Info* worksheet, an expected yield must be entered for all three years as well (*Figure 9*). Also, if the straw or stover is harvested from the field, click the check boxes in column G, rows 8, 9, and/or 10. If the *3 Years of Phosphorus Removal* option is selected, you will see the amount of phosphorus removed from the soil by the crops you have designated in cell G13.

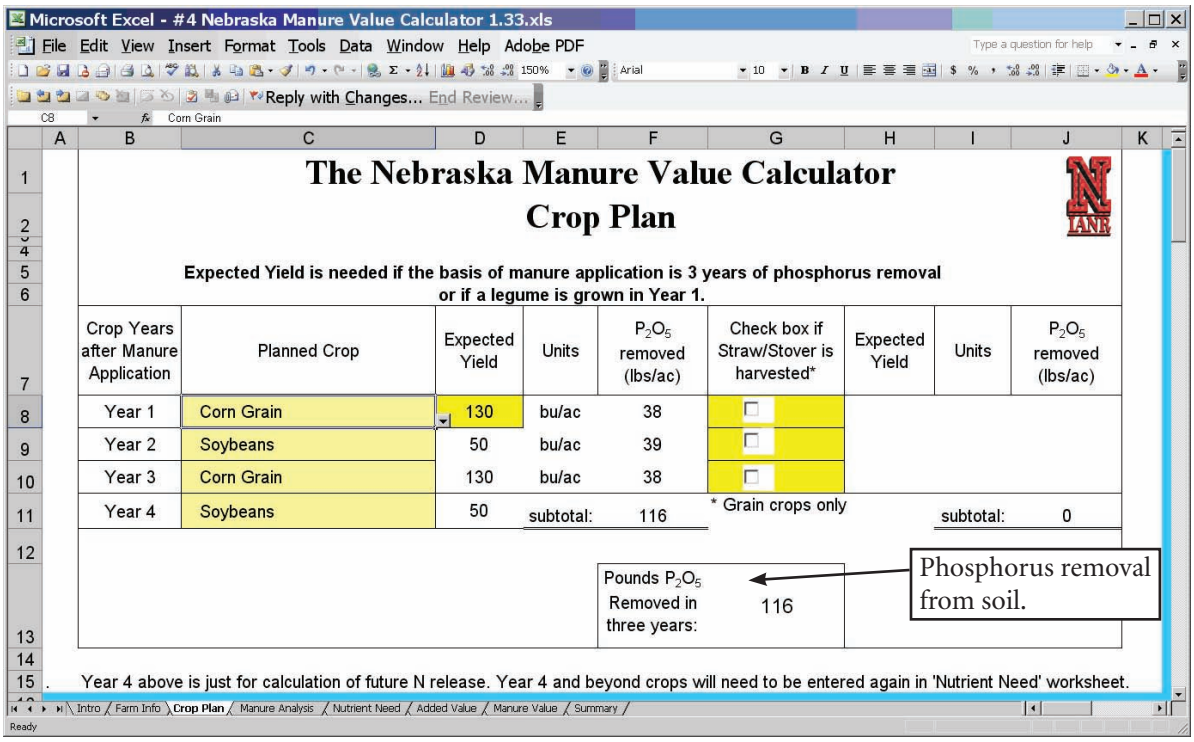

Figure 9. Phosphorus removal (shows when "3 years phosphorus removal" is checked under *Farm Info* worksheet).

2. After reviewing the input data for accuracy, move to the *Manure Analysis* worksheet by clicking on the *Manure Analysis* tab at the bottom of the page.

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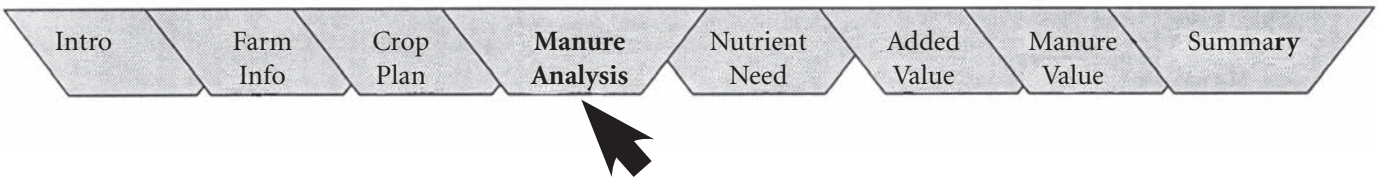
IV. Manure Analysis Records Worksheet Instructions



Purpose

This worksheet will:

1. Allow entry of the results of a manure analysis or an average of several analyses. Since manure is very variable, entering the average of several recent manure analyses is usually better than entering only one. Manure varies greatly in nutrient content, so recent samples of the manure or effluent to be applied should be analyzed by a laboratory to determine nutrient content.[2,3,4] Without a laboratory test, a book value of typical nutrients in manure could be used, but this should be avoided since the actual concentration of one or more nutrients in any manure is often several times more or less than the book value (*Figure 10*).
2. Consider not only nitrogen and phosphorus, but potassium, sulfur, and zinc to create a fertilizer value for the manure sample(s).

Instructions

1. Enter values in the yellow cells from the *Total* column of your lab analysis, not *Available*. These values are generally reported as "Lbs. per ton," "Lbs. per 1000 gal," "Lbs. per acre inch," or a similar column title. The results may also be reported as *As is* or *As received*.

   Note: It's extremely important that you track moisture content and consider it when interpreting manure analysis. The analysis used has to match the moisture content of the manure applied.
2. The *Manure Source* (cell C3) is derived from your entry of the manure source on the *Farm Info* worksheet. It can not be changed in this worksheet.
3. A sample ID number (cell C4) is optional, but can be used for further reference.
4. *Units of Measure used by Lab* (cell C6) uses a drop-down list. These units of measure must match the *Units by which manure is applied* from cell C15 on the *Farm Info* worksheet. Click on the appropriate units.
5. From the manure analysis you received from the lab, enter the *Nitrogen Concentration* amounts. Enter the *Organic-N* in cell D9 and the *Ammonium-N* in cell D10. Note that you should not enter "Available" N concentration from your lab analysis. Sometimes total nitrogen is given and ammonium-N is given. Organic-N is the total N minus the ammonium-N.
6. Again, from the manure analysis you received from the lab, determine the phosphorus form. If the phosphorus is given in Elemental P, click that radio button and enter the amount in cell D12. If the phosphorus is given as P_2O_5, click that radio button and enter that amount in cell D13.
7. Your lab analysis will provide either % Moisture or % Dry Matter. Click the radio button in either cell C15 or C16 that corresponds to the reported information. Then in either cell D15 or D16 enter the numerical amount.
8. Enter the values for: potassium (K_2O) in cell D18; sulfur (S) in cell D19; and zinc (DTPA) in cell D20.

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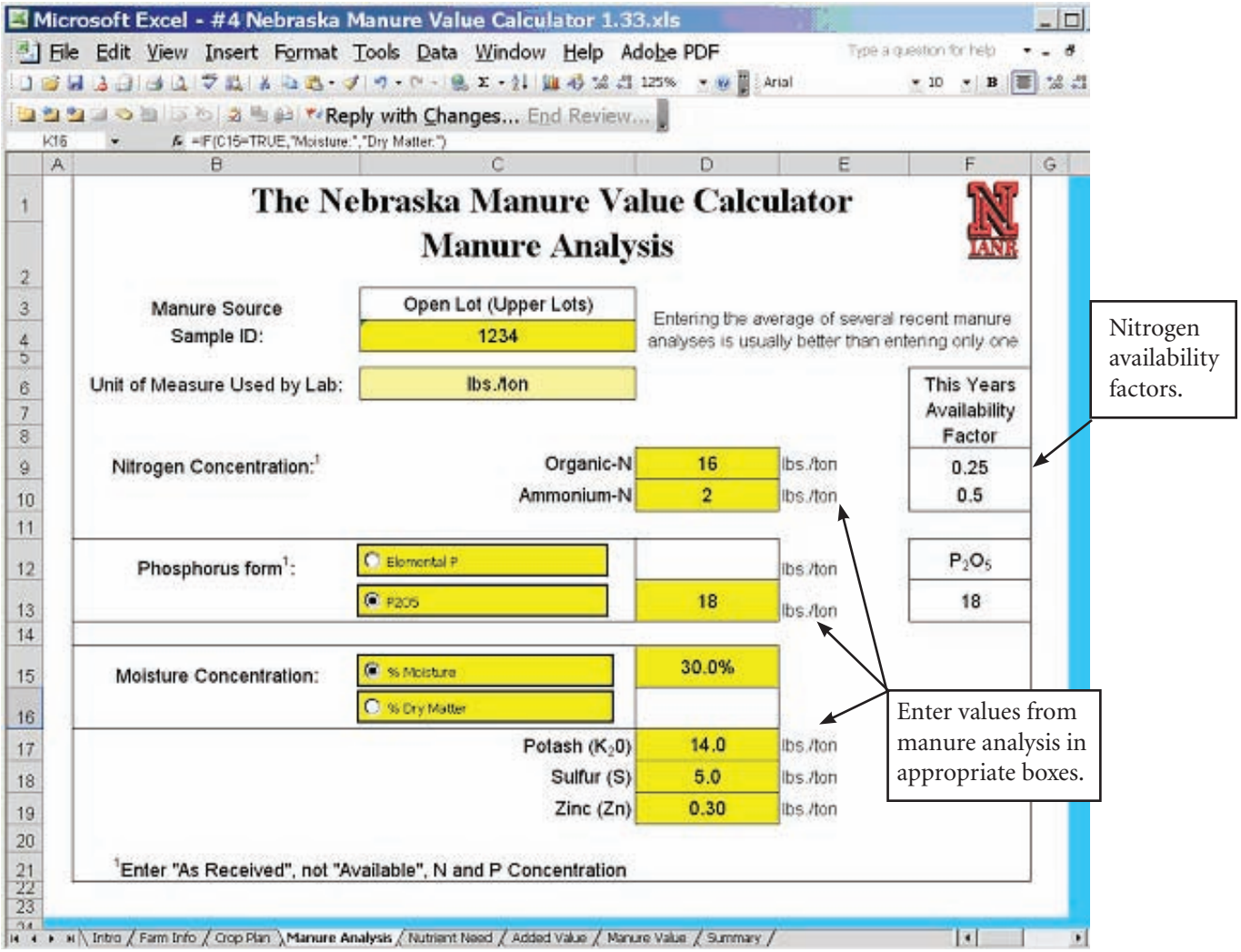

Figure 10. Entering manure analysis.

9. Note that to the right of cells, D-9 and D-10, there are figures for the availability of manure nitrogen for a crop to be grown (F-9, F-10). Manure N is primarily in two forms: ammonium-N and organic-N. All ammonium-N is available the first year if it is not lost. Ammonium-N is quickly lost from manure spread in a thin layer and left on the surface of either a feedlot or a field. Ammonium-N is retained once it is incorporated into the soil by injection, tillage, or by rainfall or irrigation of one-half inch or more. Organic-N is slowly released during the growing season by microbial action. From 25 to 50 percent of the organic-N in manure becomes available to crops in the first year. When manure is composted, it loses much of the first year's organic-N to the atmosphere. The remaining N may be resistant to quick release.

   About 0.15 (15%) of the original organic-N in manure or compost is released in year two, 0.07 in year three, and 0.04 in year four. For fall and early spring seeded small grains the organic-N factor is multiplied by 0.7. For the other nutrients, because most is available the first year and the rest is available the second year, a factor of 1.0 is used as an availability factor. Therefore, the P_2O_5 value in cell F13 is the same as in cell D13 (or 2.29 x Elemental P in cell D12).

10. Without a manure analysis report, a "book" value of typical nutrients in manure could be used, but this should be avoided since the actual concentration of one or more nutrients in any manure is often different than the "book" value. Book values are available from NebGuide G1335, *Determining Crop Available Nutrients from Manure*.

11. After reviewing the input data for accuracy, move to the *Nutrient Need* worksheet by clicking on the "Nutrient Need" tab at the bottom of the page.

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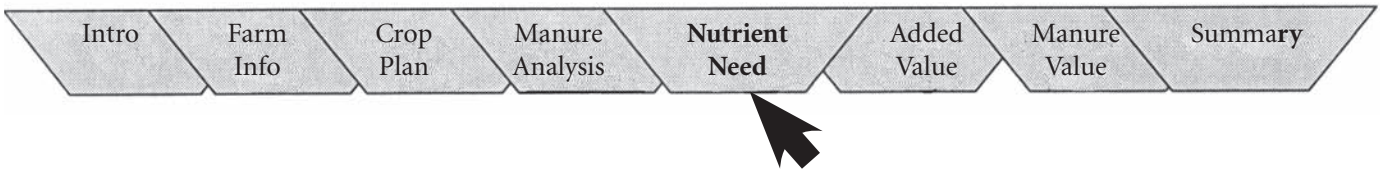
V. Nutrient Need Calculator Worksheet Instructions



Purpose

Use this worksheet to report nutrient need for the next and following crops listed in the crop plan sheet. Current fertilizer prices are entered to determine the value of nutrients contained in the manure (*Figure 11*).

Manure or compost should be applied at or below the rate that meets the nitrogen (N) need of this year's current crop. Applying manure to meet the N needs of the crop usually results in applying substantially more phosphate (P_2O_5), potash (K_2O), sulfur (S), and zinc (Zn) than is needed by the crop. University of Nebraska–Lincoln recommendations for P_2O_5, K_2O, and Zn are based on meeting crop needs while slowly building soil nutrient availability.[5,6,7] This is generally the most profitable option for nutrient management. For corn, sorghum, soybean, and sugar beet, research results show no economic benefit to nutrient applications that raise soil test levels higher than 15 ppm phosphorus (P) (Bray #1 P), 125 ppm potassium (K), and 0.8 ppm zinc-DTPA. Yields of alfalfa, small grains, sunflower, millet, and grasslands respond to higher soil P levels (25 ppm Bray #1).

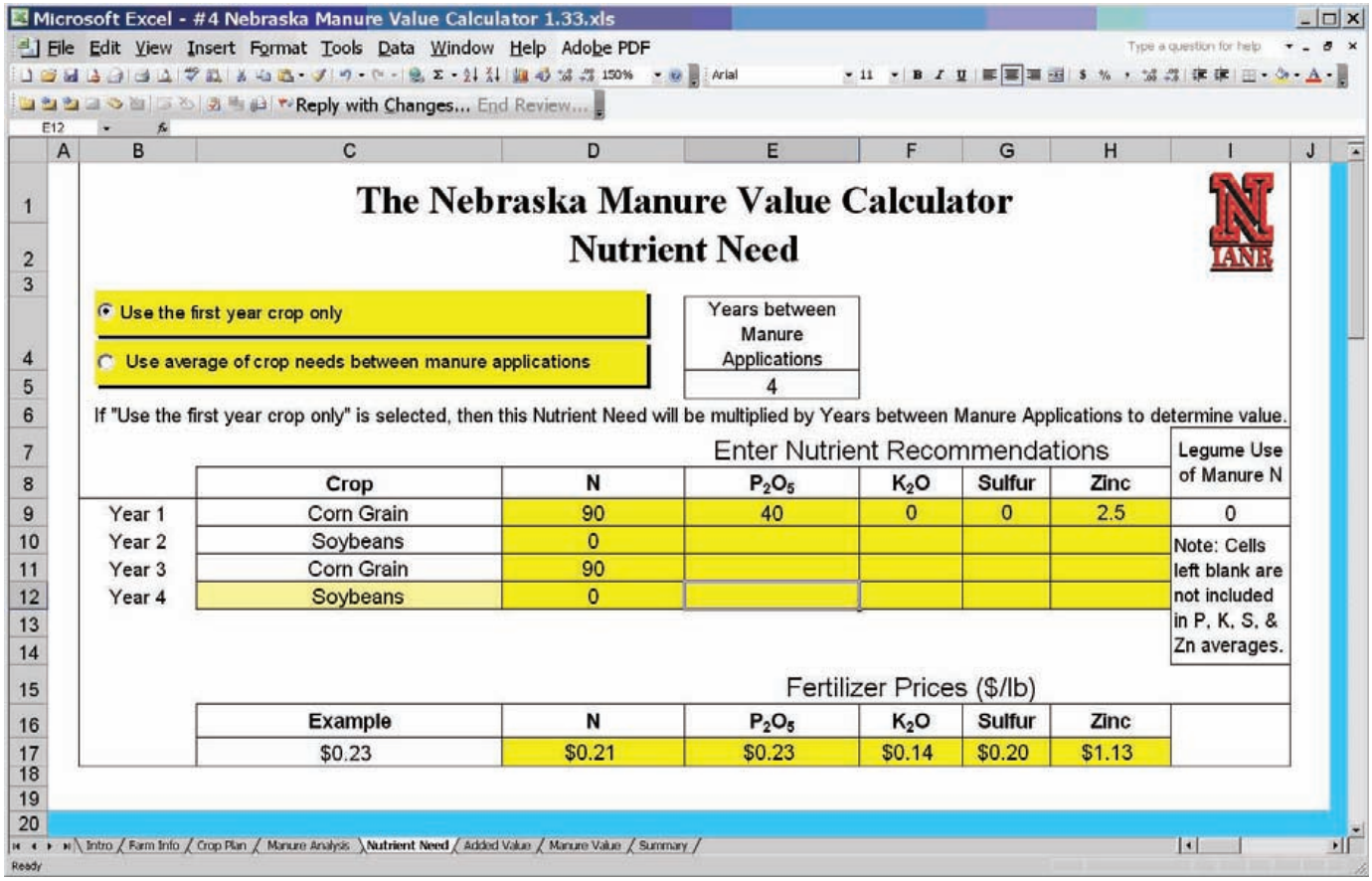


Figure 11. ***Nutrient Need*** **worksheet.**

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Instructions

1. Determine whether to calculate the value of the manure for the first crop year only or to use the average of crop needs between applications (*Figure 12*). Click on the button for your selection. If *Use the first year crop only* is selected, then this nutrient need will be multiplied by *Years between Manure Applications* (brought in from the *Farm Info Worksheet*) to determine value. Please note that not all the nutrients supplied by manure will be available the first year. For example, only about 25 percent of the organic nitrogen fraction will be available the first year, as mentioned previously. Additional organic N will be released (mineralized) into an inorganic, plant available form over the next four years or longer, depending on conditions.

   Which option to choose depends on the specific objectives of the producer. The maximum rate of manure a producer can put on in any one year is the amount of manure that supplies enough nitrogen for the crop grown in the first year. Where manure P application is restricted to the amount of P removed in crop harvests, a producer may want to apply once in three or four years at a rate equivalent to P removal during that period; this rate of application may or may not meet the first crop's N requirement.

2. As mentioned, the *Years between applications* box in cell E5 was brought in from *Farm Info* worksheet (cell C11). If you would like to change this information you must return to the *Farm Info* worksheet and change it there.

3. Entering nutrient recommendations:

   a. To calculate nutrient recommendations, you may need a yield goal, recent soil test results, and knowledge of the previous crop. **This spreadsheet does not calculate nutrient recommendations.**

   b. In row 9, in columns D through H enter nutrient recommendations for N (nitrogen), P_2O_5 (phosphorus), K_2O (potassium), sulfur, and zinc. Nitrogen and phosphorus recommendations for all crops grown in Nebraska can be found in the reference section of UNL Extension EC720 *Manure Application Workbook*.

   c. If application of a nutrient is not recommended, its cell can be left blank. Some operations are required to use the University of Nebraska–Lincoln recommendations. Others may prefer to use their fertilizer dealer's recommendation. Over-estimation of nutrient need will, however, result in an over-estimate of the value of the manure.

   d. If the planned crop in the first year is a legume, such as soybeans, the manure nitrogen used by the crop has been calculated according to expected yield entered in cell D8 on the *Crop Plan* worksheet and will appear in cell I9 (*Figure 13*).

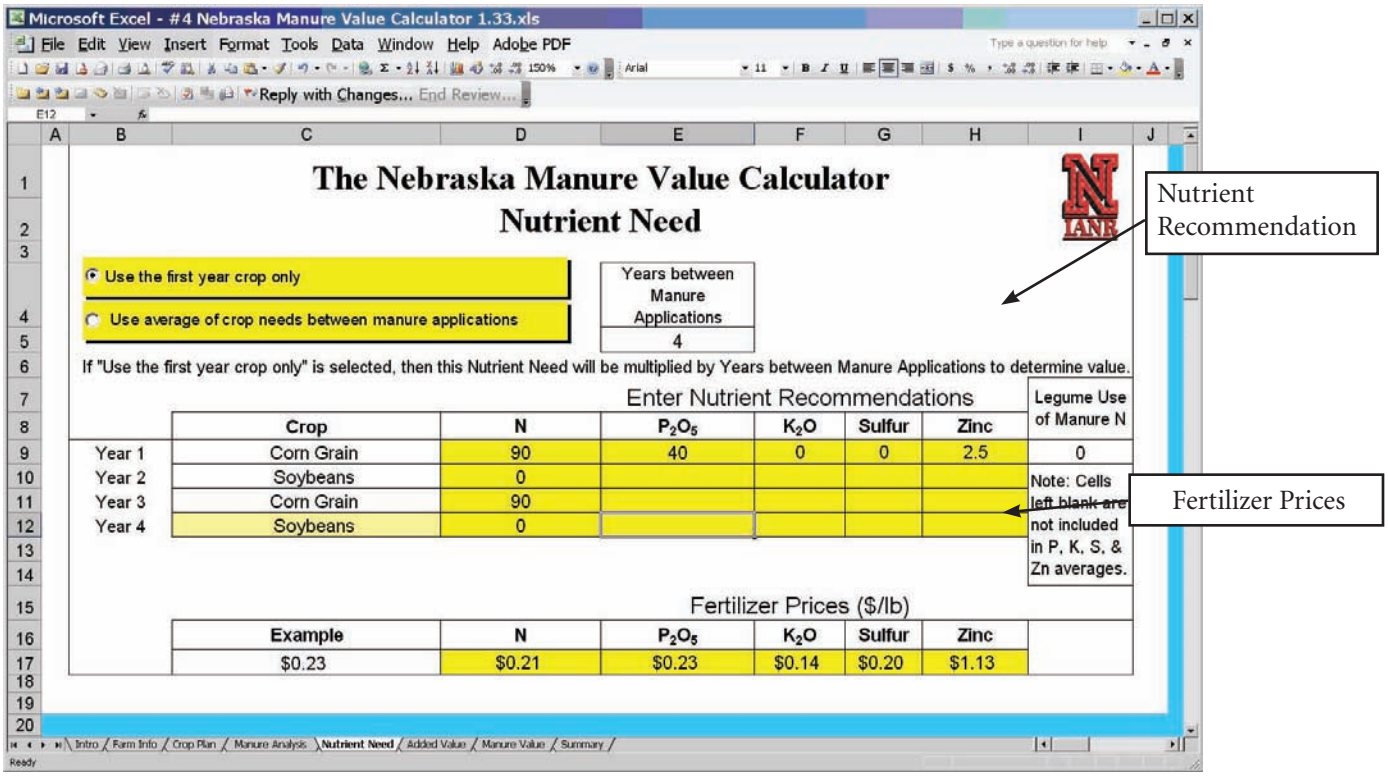

Figure 12. Nutrient need for crop years.

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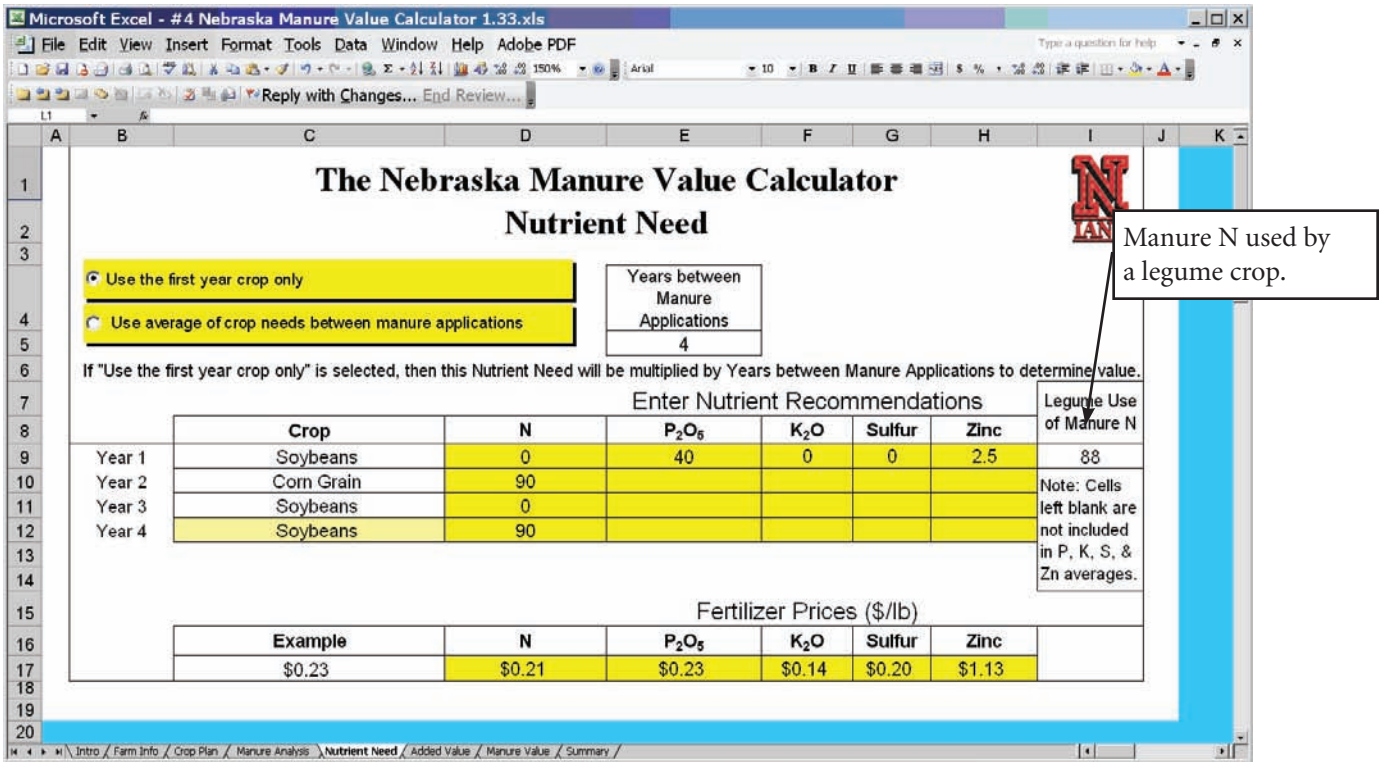

Figure 13. Nutrient value of manure N used by a legume crop.

4. Lastly, enter current fertilizer prices so the spreadsheet can calculate the value of the manure. Normally, these can be acquired from your local retailer. If you obtain prices for actual fertilizer products rather than nutrients, calculate the price of the nutrients.

   For example, if anhydrous ammonia (82-0-0) is $345.00 per ton, divide $345 by 2000 pounds in a ton to get $0.17 per pound of product. Then divide 0.17 by 0.82 (82% N in anhydrous ammonia) to get $0.21 or 21 cents per pound of actual nitrogen.

5. After reviewing the input data for accuracy, move to the *Added Value* worksheet by clicking on the "Added Value" tab at the bottom of the page.

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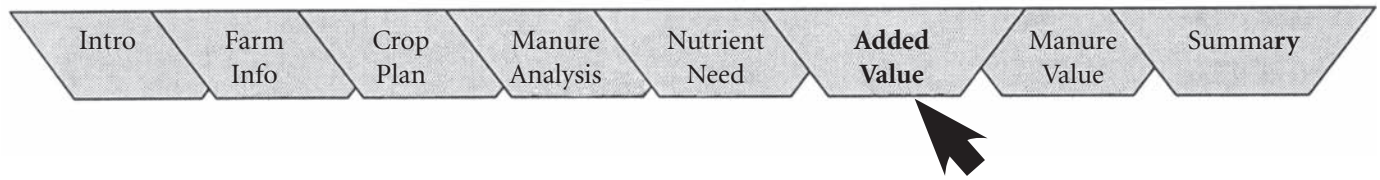
VI. Added Value of Manure Worksheet Instructions



Purpose

Manure application may improve soil productivity and crop yields, especially on sandy soils and soils with low organic matter. The increased yield may be due to one or more benefits of manure use. The rate of water infiltration may be increased due to improved soil aggregation which is expected to result in less runoff and erosion loss. Some manure has a liming effect which is beneficial on acid soils. Increased crop yield with manure application relative to the application of fertilizer alone has been verified in numerous on-farm trials and demonstrations. For example, manure demonstration plots in Nebraska from 1996 to 2001 produced an average of 7 bu/ac more corn (14 site years) and 2 bu/ac more soybeans (6 site years) where manure or manure plus fertilizer was applied compared to fertilizer alone. These increases will not occur in all years, under all conditions. The value of these yield increases is typically between $0 and $30 per acre. Expect less yield increase on fine textured soils, soils high in P, soils with organic matter greater than 2 percent, or if the land has a recent history of manure application. Expect a greater increase on sandy, eroded, or disturbed soil with no recent manure history (*Figure 14*).

This worksheet also calculates the value of the phosphorus needed to build the soil fertilizer level to 25 ppm Bray P1 or its equivalent Olsen P level. (See *Phosphorus Section*, page 21.)

Caution: A producer receives value from excess nutrient application only if subsequent crops remove the nutrients before additional fertilizer or manure is applied. Value is gained only from relatively immobile nutrients such as P, K and Zn. Application of excess nutrients is not the best strategy when fertilizer prices are high or when environmental effects of excess nutrients are considered.

Instructions

1. Enter soil test results into the *Added Value* worksheet (*Figure 14*) for phosphorus, potassium, sulfur, and zinc in parts per million (ppm) in the corresponding yellow cells in column C, rows 10 through 13.
2. In column B, rows 5 or 6 click the radio button that corresponds with the soil phosphorus test (Bray P1, Mehlich III or Olsen [sodium bicarbonate]) used to determine available phosphorus in your soil test report.
3. Move to the right and click the box if the soil is sandy or loamy sand AND organic matter is 1 percent or less. Organic matter also should be stated on a percentage basis on your soil test report. Sulfur is only needed on sandy soils with 1 percent organic matter or less, low soil test S, and where there is little S in the irrigation water. Sulfur in manure is given value only if these conditions exist.
4. When entries are made in column C, a value will appear in column D which is the *Recommended amount of manure nutrients* which may be credited for build-up, expressed in pounds per acre. You can enter different amounts if you prefer by clicking the appropriate check boxes in column E under *Check box below to use a different nutrient credit*. A yellow box will then appear in column F under *Nutrient credits instead of recommended amount* where you can enter your preferred values; however, this amount cannot exceed the amount shown in the right hand column. Applying large quantities of nutrients at one time, in excess of recommendations, may be profitable when interest rates are low and nutrients are inexpensive, as may be the case with manure nutrients. This approach is acceptable for relatively immobile soil nutrients like P, K and Zn. A producer receives value from these excess nutrients only if subsequent crops remove the nutrients before more of these nutrients are applied.
5. Next, the value of expected crop yield increase due to manure application is determined. In column C rows 17 and 18 enter the estimated yield increase for each of the next two crops. In column D, rows 17 and 18 enter the estimated value per unit of this yield increase for each crop, for example $2.00 per bushel for corn. The calculated increase in value per acre will appear in the corresponding cells in column E with the total increase for both crops given in Cell E19.

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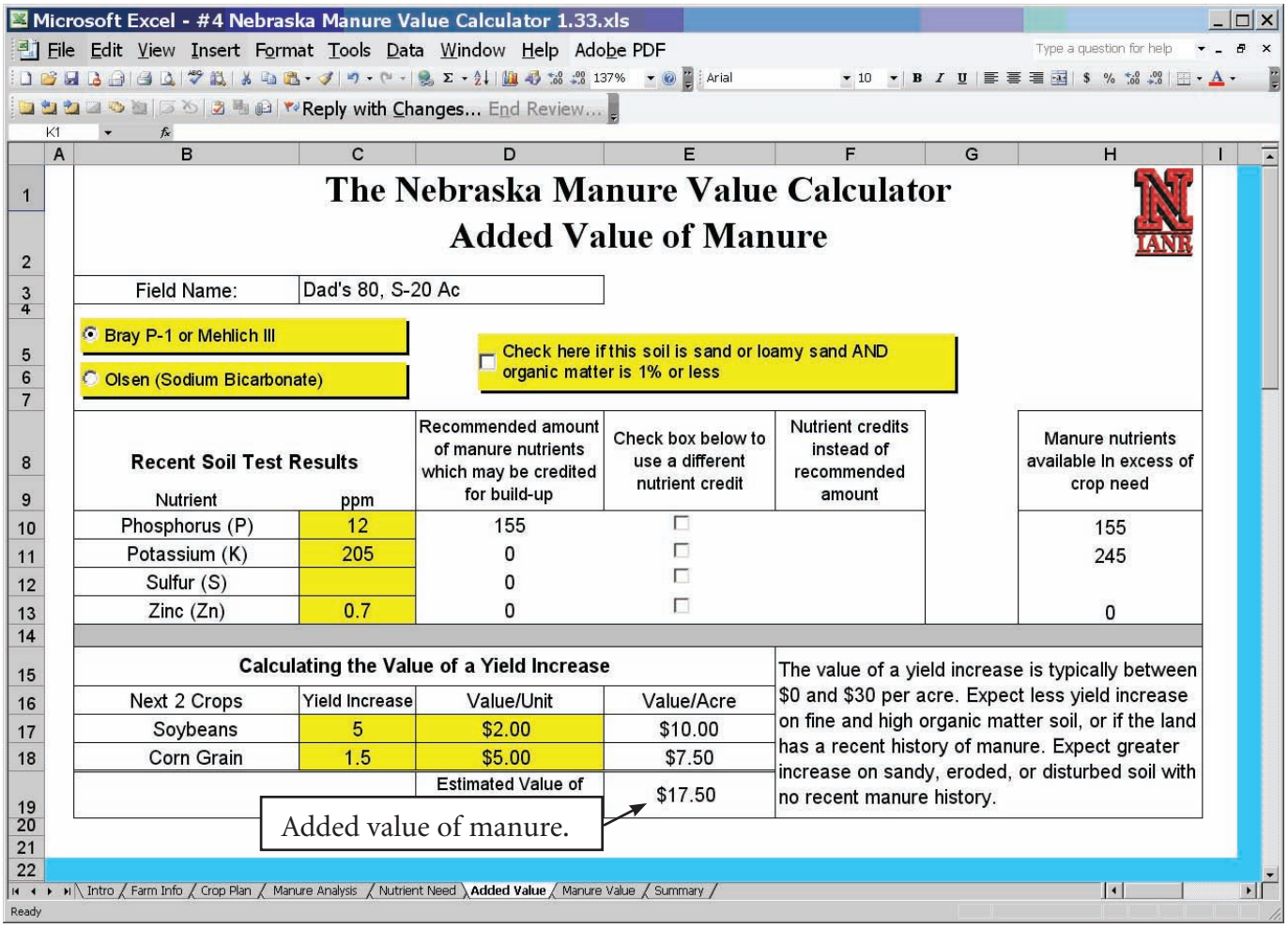

Microsoft Excel - #4 Nebraska Manure Value Calculator 1.33.xls

The Nebraska Manure Value Calculator
Added Value of Manure

Field Name: Dad's 80, S-20 Ac

Bray P-1 or Mehlich III

Olsen (Sodium Bicarbonate)

Check here if this soil is sand or loamy sand AND organic matter is 1% or less

Recent Soil Test Results		Recommended amount of manure nutrients which may be credited for build-up	Check box below to use a different nutrient credit	Nutrient credits instead of recommended amount	Manure nutrients available In excess of crop need
Nutrient	ppm				
Phosphorus (P)	12	155	☐		155
Potassium (K)	205	0	☐		245
Sulfur (S)		0	☐		
Zinc (Zn)	0.7	0	☐		0

Calculating the Value of a Yield Increase			
Next 2 Crops	Yield Increase	Value/Unit	Value/Acre
Soybeans	5	$2.00	$10.00
Corn Grain	1.5	$5.00	$7.50
		Estimated Value of	$17.50

The value of a yield increase is typically between $0 and $30 per acre. Expect less yield increase on fine and high organic matter soil, or if the land has a recent history of manure. Expect greater increase on sandy, eroded, or disturbed soil with no recent manure history.

Added value of manure.

Intro / Farm Info / Crop Plan / Manure Analysis / Nutrient Need / Added Value / Manure Value / Summary

Figure 14. Added Value of Manure worksheet.

6. After reviewing the input data for accuracy, move to the *Manure Value* worksheet by clicking on the "Manure Value" tab at the bottom of the page.

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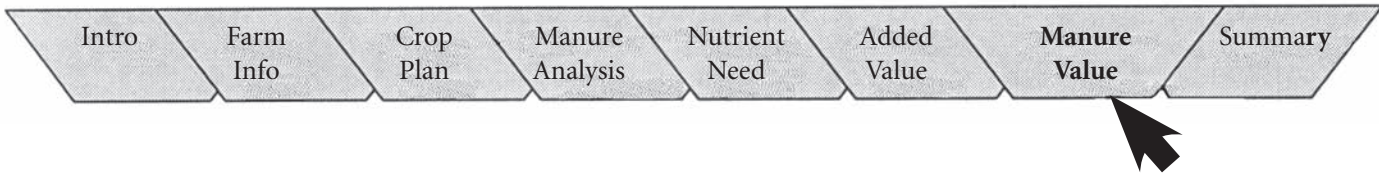
VII. Manure Value Worksheet Instructions

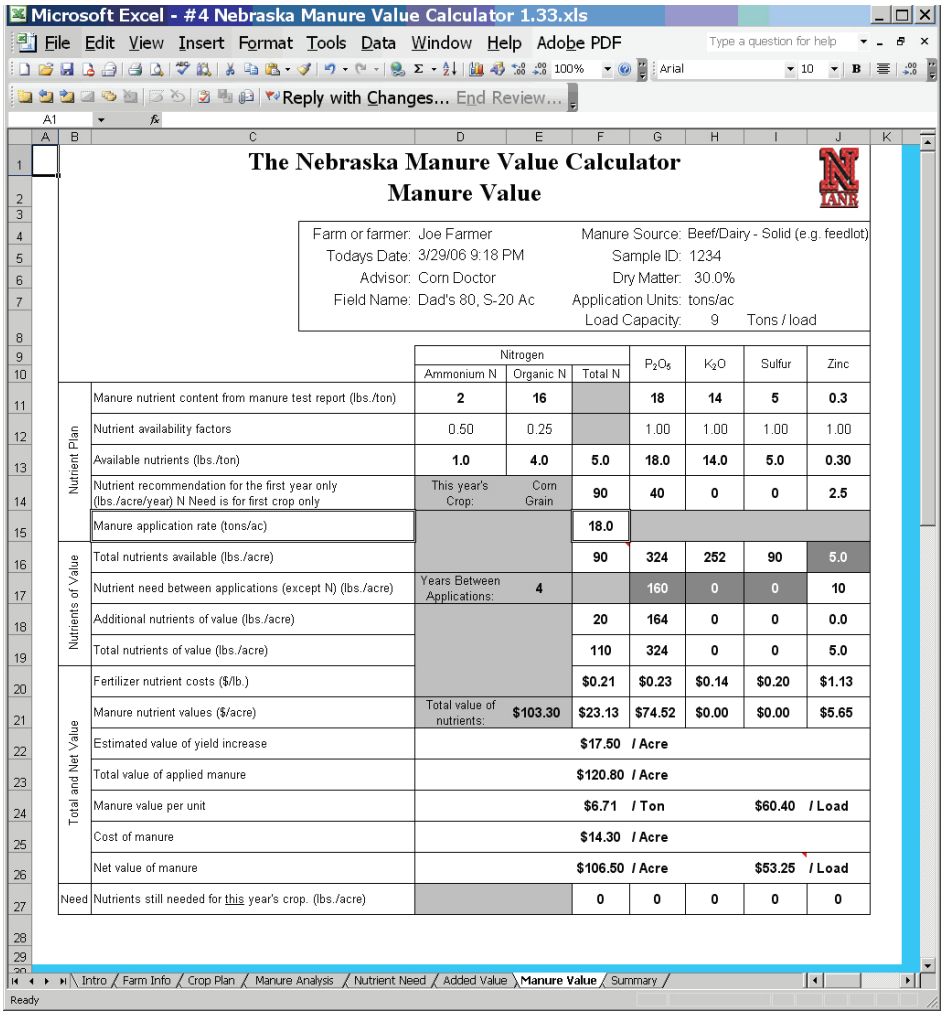


Purpose

This worksheet calculates the value of the manure for your field and crop plan using the information you entered in the other worksheets. There are four sections to this worksheet (*Figure 15*).

Nutrient Plan Section (Rows 11-15)

1. Row 11 contains the information from the *Manure Analysis*.
2. Row 12 contains the availability of the nutrients in the manure. For example, since the manure was incorporated into the soil a full day after application, 50 percent (0.50) of the ammonium N was lost to volatilization (cell D12). Also, approximately 25 percent (0.25) of the organic N will be available to the crop the first year (cell E12).
3. Row 13 gives amount of nutrients available to the first crop in a per unit basis, such as pounds of nutrients per ton of manure.
4. Row 14 contains the nutrient recommendations for the first year crop which you entered in the *Nutrient Need* worksheet.
5. Row 15 shows the actual application rate. Because the *This year's nitrogen need* option was chosen on the *Farm Info* worksheet, the spreadsheet has calculated an application rate to meet the needs of this year's crops. In this case, cell F15 shows that an application rate of 18 tons per acre is needed.



Microsoft Excel - #4 Nebraska Manure Value Calculator 1.33.xls

The Nebraska Manure Value Calculator
Manure Value

Farm or farmer:	Joe Farmer	Manure Source:	Beef/Dairy - Solid (e.g. feedlot)
Todays Date:	3/29/06 9:18 PM	Sample ID:	1234
Advisor:	Corn Doctor	Dry Matter:	30.0%
Field Name:	Dad's 80, S-20 Ac	Application Units:	tons/ac
		Load Capacity:	9 Tons / load

		Nitrogen			P_2O_5	K_2O	Sulfur	Zinc
		Ammonium N	Organic N	Total N				
Nutrient Plan	Manure nutrient content from manure test report (lbs./ton)	2	16		18	14	5	0.3
	Nutrient availability factors	0.50	0.25		1.00	1.00	1.00	1.00
	Available nutrients (lbs./ton)	1.0	4.0	5.0	18.0	14.0	5.0	0.30
	Nutrient recommendation for the first year only (lbs./acre/year) N Need is for first crop only	This year's Crop:	Corn Grain	90	40	0	0	2.5
	Manure application rate (tons/ac)			18.0				
Nutrients of Value	Total nutrients available (lbs./acre)			90	324	252	90	5.0
	Nutrient need between applications (except N) (lbs./acre)	Years Between Applications:	4		160	0	0	10
	Additional nutrients of value (lbs./acre)			20	164	0	0	0.0
	Total nutrients of value (lbs./acre)			110	324	0	0	5.0
Total and Net Value	Fertilizer nutrient costs ($/lb.)			$0.21	$0.23	$0.14	$0.20	$1.13
	Manure nutrient values ($/acre)	Total value of nutrients:	$103.30	$23.13	$74.52	$0.00	$0.00	$5.65
	Estimated value of yield increase			$17.50 / Acre				
	Total value of applied manure			$120.80 / Acre				
	Manure value per unit			$6.71 / Ton			$60.40 / Load	
	Cost of manure			$14.30 / Acre				
	Net value of manure			$106.50 / Acre			$53.25 / Load	
Need	Nutrients still needed for this year's crop. (lbs./acre)			0	0	0	0	0

Intro / Farm Info / Crop Plan / Manure Analysis / Nutrient Need / Added Value / Manure Value / Summary

Figure 15. Manure Value worksheet.

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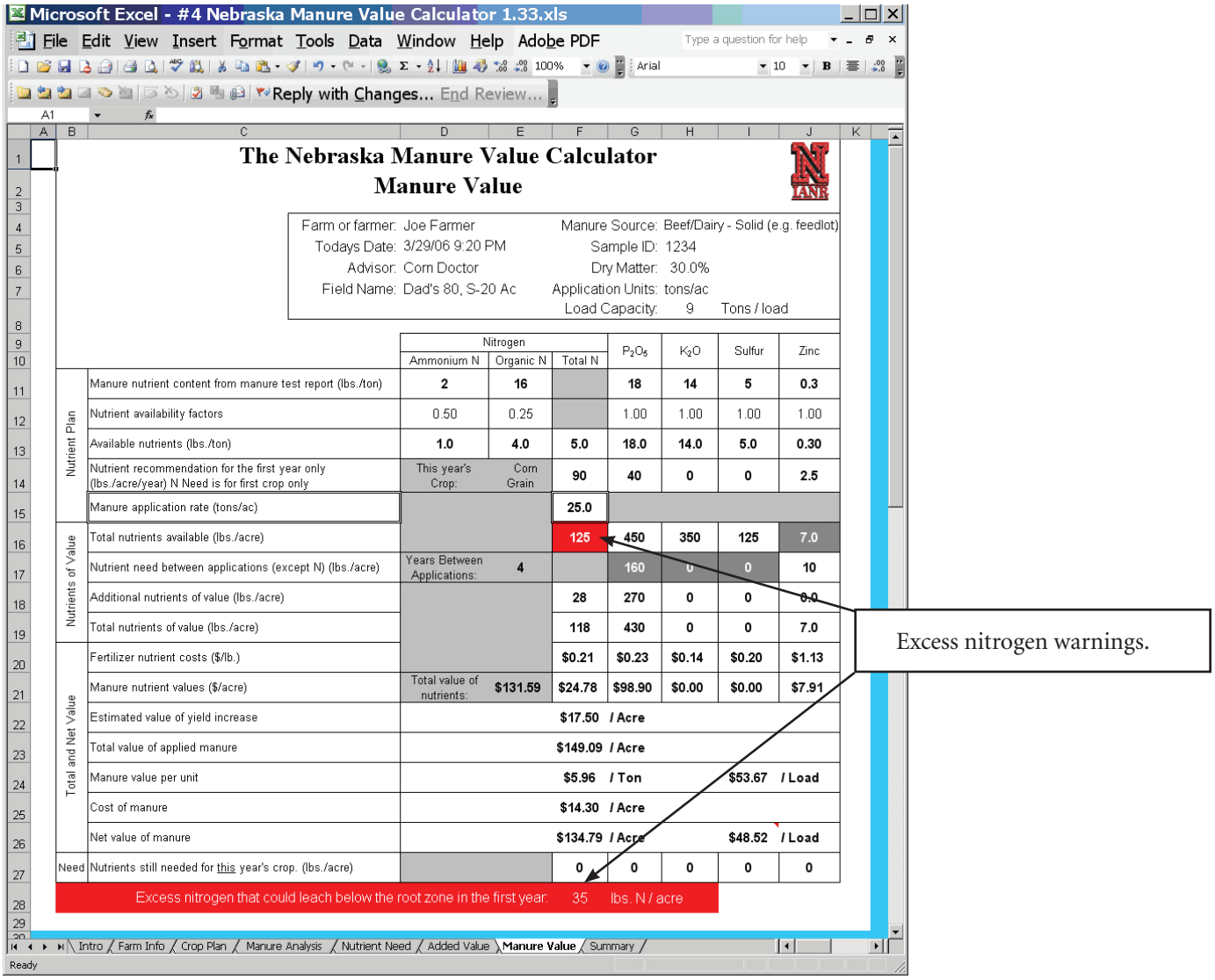

Figure 16: Excess Nitrogen applied warning.

Nutrients of Value Section (Rows 16-19)

6. Row 16 uses the application rate per acre information in cell F15, calculates the nitrogen available in the first year, and the total phosphorus, potassium, sulfur and zinc applied on a pounds per acre basis.

Note: Selecting the *A rate of my choice option* in the *Farm Info* worksheet and a manure rate where available N is more than 20 percent above the first year crop nitrogen need produces a red warning in cell F16 (Total N available), and in row 28 (*Figure 16*). Nebraska Department of Environmental Quality requires that nitrogen applications cannot be greater than the crop requirement for applied N. Agronomic manure application rates can be calculated by using the spreadsheet, *Manure Use Planner* available online at *http://cnmp.unl.edu*. (This information also appears in row 26 of the *Summary* worksheet).

7. Row 18 shows the quantity of manure nutrients in excess of recommended applications for the crop plan that are given value for building soil nutrient availability (*Figure 17*).

8. Row 19 shows the total amount of nutrients of value supplied by this manure application including those in excess of the crop needs for Year 1, but usable in future years.

The calculations in these rows are complicated and explained in the NebGuide G1519, *Calculating the Value of Manure for Crop Production*. They are different for each nutrient and depend on the values in rows 18 and 19 for each nutrient.

Nitrogen: The future release of organic nitrogen decreases each year after application. The program calculates the nitrogen release based on 0.15 the second year, 0.07 the third, and 0.04 the fourth. It also only considers the nitrogen valuable if it is

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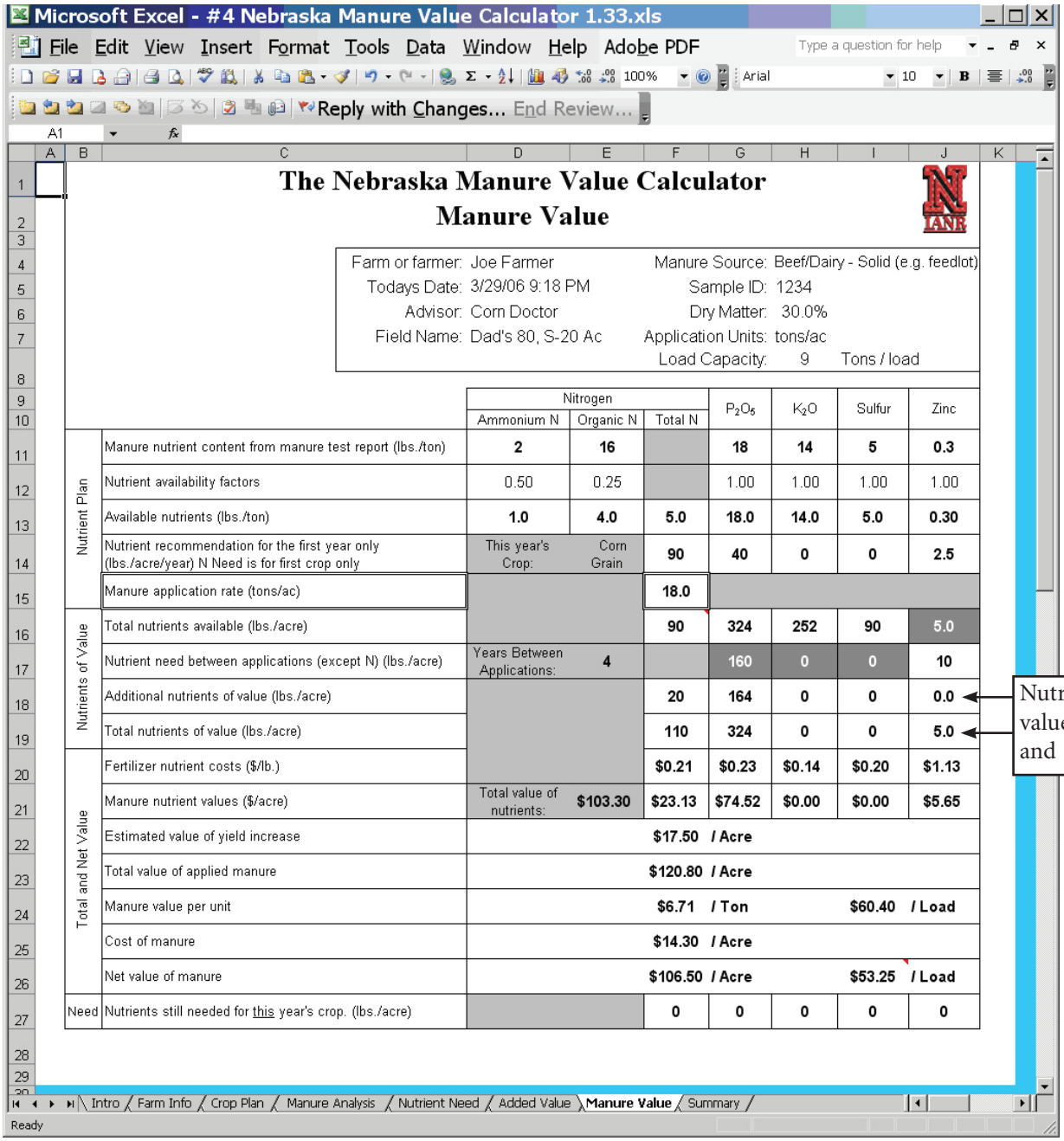
released in a year when a non-legume is grown, since it is valued as fertilizer replacement.

Phosphorus: If soil phosphorus is less than 15 ppm Bray P1 or 10 ppm Olsen, up to 250 lbs of phosphate can be of value to increase soil levels. If soil phosphorus is less than 25 ppm Bray P1 or 18 ppm Olsen, up to 150 lbs of phosphate can be of value to increase soil levels. The spreadsheet first allocates based on soil test and then builds the soil with the excess. If more phosphorus is applied than is needed for the crops and for building the soil, it is not valued.

Potassium: If soil potassium is less than 150 ppm, up to 200 lbs/ac additional potash is valued in a similar manner as phosphorus.

Sulfur: If the soil is sandy and sulfur is less than 10 ppm, up to 40 lbs/ac additional sulfur can be of value.

Zinc: If soil zinc is less than 1.0 ppm, up to 20 lbs/ac additional zinc can be of value.



The Nebraska Manure Value Calculator
Manure Value

Farm or farmer:	Joe Farmer
Todays Date:	3/29/06 9:18 PM
Advisor:	Corn Doctor
Field Name:	Dad's 80, S-20 Ac
Manure Source:	Beef/Dairy - Solid (e.g. feedlot)
Sample ID:	1234
Dry Matter:	30.0%
Application Units:	tons/ac
Load Capacity:	9 Tons / load

		Nitrogen			P_2O_5	K_2O	Sulfur	Zinc
		Ammonium N	Organic N	Total N				
Nutrient Plan	Manure nutrient content from manure test report (lbs./ton)	2	16		18	14	5	0.3
	Nutrient availability factors	0.50	0.25		1.00	1.00	1.00	1.00
	Available nutrients (lbs./ton)	1.0	4.0	5.0	18.0	14.0	5.0	0.30
	Nutrient recommendation for the first year only (lbs./acre/year) N Need is for first crop only	This year's Crop:	Corn Grain	90	40	0	0	2.5
	Manure application rate (tons/ac)			18.0				
Nutrients of Value	Total nutrients available (lbs./acre)			90	324	252	90	5.0
	Nutrient need between applications (except N) (lbs./acre)	Years Between Applications:	4		160	0	0	10
	Additional nutrients of value (lbs./acre)			20	164	0	0	0.0
	Total nutrients of value (lbs./acre)			110	324	0	0	5.0
Total and Net Value	Fertilizer nutrient costs ($/lb.)			$0.21	$0.23	$0.14	$0.20	$1.13
	Manure nutrient values ($/acre)	Total value of nutrients:	$103.30	$23.13	$74.52	$0.00	$0.00	$5.65
	Estimated value of yield increase			$17.50	/ Acre			
	Total value of applied manure			$120.80	/ Acre			
	Manure value per unit			$6.71	/ Ton		$60.40	/ Load
	Cost of manure			$14.30	/ Acre			
	Net value of manure			$106.50	/ Acre		$53.25	/ Load
Need	Nutrients still needed for this year's crop. (lbs./acre)			0	0	0	0	0

Nutrients of value Rows 18 and 19.

Figure 17. This worksheet provides the nutrients of value.

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Total and Net Value Section (Rows 20-26)

9. Row 20 contains the fertilizer prices entered on the *Nutrient Need* worksheet (*Figure 17*).
10. The calculated cash value of applied nutrients appears in row 21. In this case cell E21 shows that the total value of the nutrients applied with manure is $103.30.
11. The value in cell E21 is added to the *Estimated value of yield increase* in Row 22 to give the *Total value of applied manure* in cell F23, that is $120.80 per acre [$6.71 per ton (cell F24) or $60.40 per load (cell I24)].
12. The cost of manure (handling costs) (cell F25) was brought in from the entry on the *Farm Info* worksheet. This is subtracted from the total value of manure to give the net value of the manure (cell F26). The net value per load is also calculated (cell I26).

Need

13. If the amount of manure that was applied does not meet crop needs, the amounts of each nutrient still needed by the crop are given in cells F27 through J27.
14. After reviewing the input data for accuracy, move to the *Summary* worksheet by clicking on the "Summary" tab at the bottom of the page.

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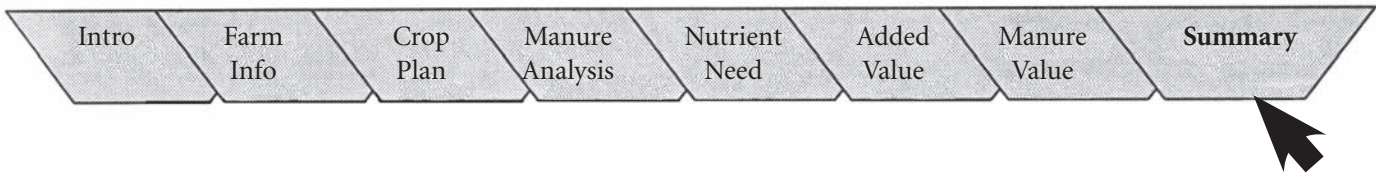
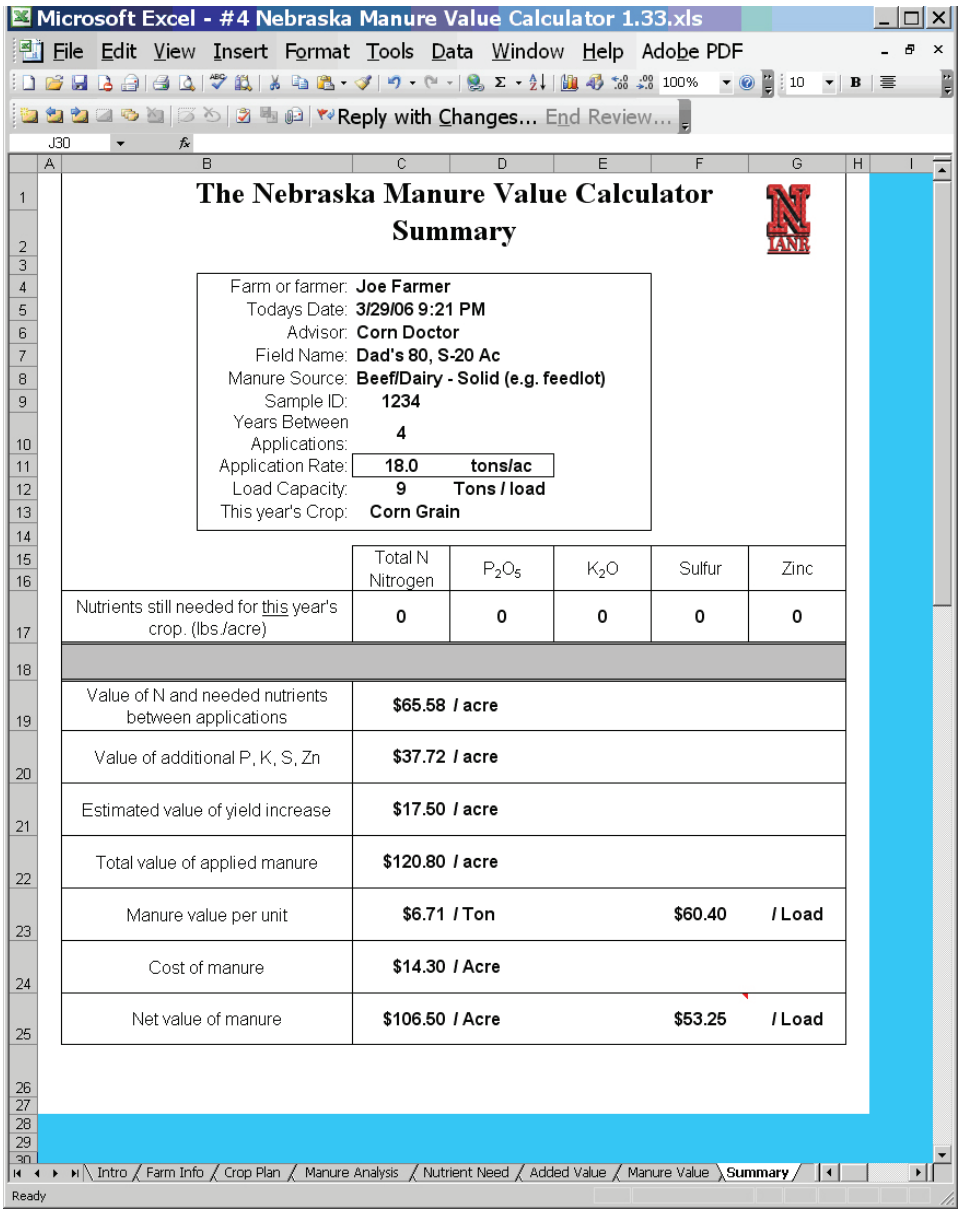
VIII. Summary Worksheet Instructions



Purpose

Summarize the value of the manure in question. These values are taken from the previous worksheet (*Manure Value*). This sheet can be printed for potential recipients of this manure for records on each of their fields (*Figure 19*).

You may want to try a different manure use scenario for a different application practice or another field. Save the current file, then click on "File" then "Save as" and give it a new name to create a new file. Only change the information appropriate for the new scenario and then compare the *Manure Value* results of the two scenarios.



The Nebraska Manure Value Calculator
Summary

Farm or farmer:	Joe Farmer
Todays Date:	3/29/06 9:21 PM
Advisor:	Corn Doctor
Field Name:	Dad's 80, S-20 Ac
Manure Source:	Beef/Dairy - Solid (e.g. feedlot)
Sample ID:	1234
Years Between Applications:	4
Application Rate:	18.0 tons/ac
Load Capacity:	9 Tons / load
This year's Crop:	Corn Grain

	Total N Nitrogen	P_2O_5	K_2O	Sulfur	Zinc
Nutrients still needed for this year's crop. (lbs./acre)	0	0	0	0	0

Value of N and needed nutrients between applications	$65.58 / acre		
Value of additional P, K, S, Zn	$37.72 / acre		
Estimated value of yield increase	$17.50 / acre		
Total value of applied manure	$120.80 / acre		
Manure value per unit	$6.71 / Ton	$60.40	/ Load
Cost of manure	$14.30 / Acre		
Net value of manure	$106.50 / Acre	$53.25	/ Load

Figure 19. Summary worksheet.

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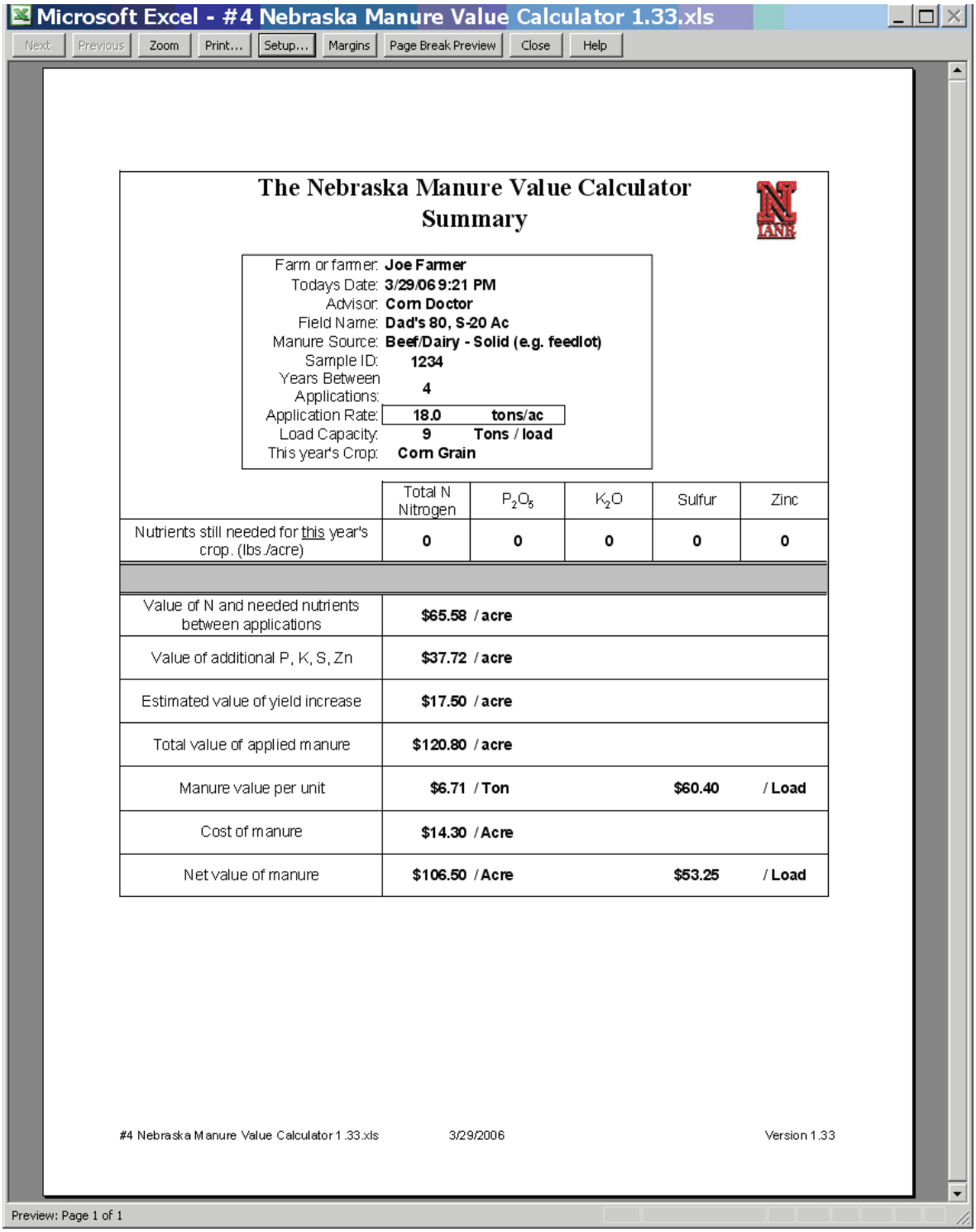
Figure 20 shows a print preview of the printed sheet that can be generated with this worksheet. To view the sheet click on "File" then "Print Preview." There are several choices to change the printout in setup. When the spreadsheet is how you want it, click print.



Microsoft Excel - #4 Nebraska Manure Value Calculator 1.33.xls

Next | Previous | Zoom | Print... | Setup... | Margins | Page Break Preview | Close | Help

The Nebraska Manure Value Calculator
Summary

Farm or farmer:	**Joe Farmer**
Todays Date:	**3/29/06 9:21 PM**
Advisor:	**Corn Doctor**
Field Name:	**Dad's 80, S-20 Ac**
Manure Source:	**Beef/Dairy - Solid (e.g. feedlot)**
Sample ID:	**1234**
Years Between Applications:	**4**
Application Rate:	**18.0 tons/ac**
Load Capacity:	**9 Tons / load**
This year's Crop:	**Corn Grain**

	Total N Nitrogen	P_2O_5	K_2O	Sulfur	Zinc
Nutrients still needed for this year's crop. (lbs./acre)	**0**	**0**	**0**	**0**	**0**

Value of N and needed nutrients between applications	**$65.58 / acre**		
Value of additional P, K, S, Zn	**$37.72 / acre**		
Estimated value of yield increase	**$17.50 / acre**		
Total value of applied manure	**$120.80 / acre**		
Manure value per unit	**$6.71 / Ton**	**$60.40**	**/ Load**
Cost of manure	**$14.30 / Acre**		
Net value of manure	**$106.50 / Acre**	**$53.25**	**/ Load**

#4 Nebraska Manure Value Calculator 1.33.xls 3/29/2006 Version 1.33

Preview: Page 1 of 1

Figure 20. Example of a print preview.

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IX. Credits and References

Credits

Brad Vogt — spreadsheet development (Norfolk, NE 68701)

Rick Koelsch and Charles Shapiro, UNL Extension soils specialist — spreadsheet reviewers

Tim Lemmons — spreadsheet revisions, version 1.33

References

Many of the UNL Extension publications cited below are available online at *http://extension.unl.edu/publications* or from your local Extension office.

[1]*Calculating the Value of Manure for Crop Production*, (G1519, Revised April 2005). This publication is based on a publication from the University of Missouri, *Calculating the Value of Manure as a Fertilizer Sourc*e (G9330).

[2]Sampling Manures for Nutrient Analysis, G1450

[3]Manure Testing: What to Request?, NF507

[4]Determining Crop Available Nutrients from Manure, G1335

[5]Nutrient Management for Agronomic Crops in Nebraska, EC155

[6]Fertilizer Suggestions for Corn G174 (revised November 2003)

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