



Manure Cost, Value and Time Management Calculator

Recent increases in the cost of commercial fertilizer have resulted in a greater interest in using manure as a fertilizer substitute among both dairy and crop farmers. This fact sheet describes a stand-alone calculator that helps producers evaluate manure management decisions.

Manure Calculator

The calculator requires Microsoft Excel to be installed (Microsoft Office 2003® or 2007®) and can be used to answer these questions:

1. Fertilizer Replacement Value: What is the value of my manure (in terms of fertilizer replacement)? How far can I economically transport it (break-even hauling distance)? The goal is to determine if the operating expenses of applying manure in a specific field are greater than or smaller than the fertilizer replacement value of the manure (Figure 1).
2. Whole Farm Manure Cost: What are the operating and ownership costs for land application of my manure?
3. Export: What is the cost/value of exporting manure?
4. Time: How much time (machinery and labor) will it take to spread manure? Where are the bottle-necks, and how can I improve manure application efficiency?

Fertilizer Replacement Value:

Manure analysis · Crop nitrogen (N), phosphorus (P) and potassium (K) requirements · Cost of fertilizer (\$ per pound of N, P₂O₅, and K₂O) · Field size (acres) · Manure application rates · Spreader capacity (gallons or tons) · Fuel price and efficiencies · Hourly labor costs · Equipment speed.

Whole Farm Manure Cost:

Annual manure quantity · Acres where manure is surface-applied or incorporated · Hours required to haul, spread, and incorporate manure · Purchase and salvage values of equipment, lifespan, age, repair costs, equipment insurance cost, value of insured equipment.

Export:

Field size (acres) · Application rate · Distance from the manure source · Crop N, P, and K requirements.

Time:

Total loads of manure · Time for each trip · Speed of spreaders (loads per hour).

Usable output requires realistic inputs or in other words, the feasibility and quality of the output are dependent on the data used and are the responsibility of the person using the calculator.

The screenshot shows the 'Field Specific Fertilizer Replacement Value of Manure' worksheet. It is divided into four main sections: (1) Manure Nutrient Content, (2) Fertilizer Costs, (3) Crop Nutrient Needs, and (4) Manure Application. Section (1) lists nutrients like Ammonium-N, Organic-N, Total N, P₂O₅, K₂O, Total Solids, and Density. Section (2) shows fertilizer costs for N, P₂O₅, and K₂O, and the cost to supply crop nutrient needs. Section (3) shows crop nutrient requirements for N, P₂O₅, and K₂O. Section (4) includes application rate, spreader capacity, and a nutrient balance check table.

	N	P2O5	K2O	Units
Required	100	25	20	lbs/acre
Supplied	100	187	227	lbs/acre
Balance	0	162	207	lbs/acre

Figure 1. A screen shot of the top section of the Fertilizer Replacement Value Worksheet.

Information Requirements

Information needed for the program includes:

Fertilizer Replacement Value

The calculator displays the value that can be placed on manure as a substitute for commercial fertilizer. The value depends on how the user credits the nutrients in the manure compared to current year crop nutrient requirements of the field:

Manure Value

1. As-Applied Value:

"As-Applied Value" is the fertilizer replacement value of manure discounting N lost through volatilization and over-application but crediting all future organic-N and P₂O₅ and K₂O applied in excess of current year crop needs.

2. Currently Needed Value:

"Currently Needed Value" is the fertilizer replacement value of manure when only the nutrients that meet the current crop N, P₂O₅ and K₂O needs are credited (i.e. the value of the application for future crops is not taken into account).

Once the value of the manure is calculated, the spreadsheet calculates the break-even hauling distance (number of miles one way) where the cost of hauling is equal to the net manure value (manure value less loading, application and incorporation costs).

Whole Farm Manure Costs

Manure management operating costs (fuel and labor) are calculated from fuel and labor per unit costs, application rates and machinery efficiencies. Screen buttons help to:

1. Calculate the application rate to exactly balance the N, P, K needs of the field.
2. Display ammonium N credited to crop given alternative application methods and timing.
3. Compare nutrients provided by manure to crop requirements (Figure 2).
4. Determine application and incorporation speed and estimate the time required to perform manure spreading (this also serves as a "reality-check").

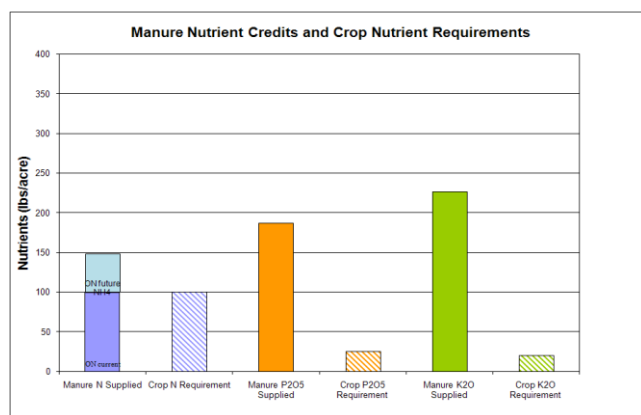


Figure 2: Graph of the manure nutrient credits as compared to current year crop nutrient requirements.

The Whole Farm Manure Cost Sheet calculates the annual operating and ownership costs associated with alternative manure machinery and labor complements. Ownership and operating costs are displayed on a whole-farm basis, per acre, and per gallon or ton. Equipment purchase price, age, life expectancy, capital interest rate, and insurance rates are used to calculate annual ownership costs.

Export

Determining the cost of applying manure off farm along with the value of that manure can be challenging. With this spreadsheet, the user can determine how much it will cost to export manure and what the manure is worth. Based on fertilizer costs and manure analysis, the Manure Export Sheet calculates the fertilizer replacement value of manure and the cost of hauling and applying it off-farm. The application rate, distance from the manure source, and crop needs of the field targeted for application are used to calculate the value of the manure and costs (operating and ownership) of export on a per load, per unit (gallons or tons), and per acre basis.

Time

The "Time Management" sheet calculates the total amount of time needed to complete manure handling with existing or alternative strategies, and provides estimates of required hired labor and equipment hours. The user can experiment with different machinery and labor combinations to identify and troubleshoot work-flow bottlenecks.

Availability

The Calculator and related educational materials are downloadable free of charge: <http://nmsp.cals.cornell.edu/software/calculators.html>. A user's guide and a tutorial, with three farm examples, are incorporated into the spreadsheet.

Disclaimer

This fact sheet reflects the current (and past) authors' best effort to interpret a complex body of scientific research, and to translate this into practical management options. Following the guidance provided in this fact sheet does not assure compliance with any applicable law, rule, regulation or standard, or the achievement of particular discharge levels from agricultural land.

For more information



Cornell University
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Nutrient Management Spear Program
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2010