

MHaulCo\$T is a Microsoft Excel spreadsheet developed to determine the average cost per hour to haul manure using the farmer's tractor and spreader. MHaulCo\$T uses both the cost of chemical fertilizers and the manure's nutrient analysis to determine the value of the manure. Both the per hour spreading cost and manure value are required to determine the breakeven one-way hauling distance and time. In addition, MHaulCo\$T includes two line graphs that depict the sensitivities of breakeven time and distance to either fertilizer cost or per hour hauling cost.

The key assumptions of MHaulCo\$T are as follows:

- The farm has to spread the manure, and it would cost the same (\$/hr) to apply the manure on any field (i.e. the hourly in-field application cost does not vary between fields).
- The manure is valued on a fertilizer equivalent basis for the current crop year (nitrogen, phosphate, and potash), as this is the alternative nutrient application. The value of the micronutrients, organic matter, and future organic-N credits are not included in the value of the manure. Due to this, the manure is likely worth more to the crops per unit applied, than calculated by MHaulCo\$T.
- The manure spreading equipment is only used to apply manure. All ownership and operating costs for this equipment are allocated to manure application.
- The tractor ownership and operating costs are prorated for the number of hours spent spreading manure, and only those costs incurred due to manure application are included.

To aid in the use of MHaulCo\$T, remember the following tips:

- Data entry cells have a **yellow background**.
- All other cells are protected so that you cannot enter data or alter the formulas.
- The **blue boxes** allow the user to **navigate between specific worksheets** without using the tabs at the bottom of the screen.

Spreading Cost (\$ per hr) worksheet

This worksheet determines the per hour cost to spread manure using the tractor-manure spreader combination. All machinery budgeting formulas are based upon established machinery costing practices used in other extension literature and American Society of Agricultural and Biological Engineers (ASABE) standards. These expected costs are averages. Actual costs may vary due to management practices.

Option A

- Enter the purchase price, expected useful life (years), and total annual use (hours) for both the manure spreader and the tractor that is typically used to haul the spreader.
- Enter the rated PTO power for the tractor.
- Enter the spreader capacity.
 - Solid Manure Spreaders - The spreader capacity is in tonnes (ex. The value for a 7 tonne spreader would be 7)
 - Liquid Manure Spreaders - The spreader capacity is in thousands of liters (x1000L) (ex. The value for a 15,000L spreader would be 15). The density of liquid manure is close to that of water, so 1000L of manure weighs approximately 1000kg or 1 tonne.
 - * Note: 1 imp gallon equals 4.546L
 - * Note: 1 US gallon equals 3.785L
- Enter the average travel speed to the fields (km/hr). Base this upon the gear and throttle settings typically used when traveling to and from the field.
- Finally, and if desired, change the values for wages, fuel, and the “Housing, Interest, & Insurance Factor”. The default values are based upon typical values from other machinery costing literature.

Option B

- Enter the per hour cost of custom manure spreading (\$/hr). Only use the rate to haul the manure to the field. The spreading cost is assumed to be a necessary cost to the farm, regardless of where the manure is spread. When entered, MHaulCo\$T will use the custom manure spreading cost instead of the manure spreading cost determined through Option A.

Additional Fields worksheet

This worksheet determines, for both the tractor and spreader, the additional annual use (hours) that will result from spreading manure onto fields where it is not currently applied.

- For the first field, enter the field size (acres), one-way distance from the manure storage (km), and the annual spreading rate for that field (loads/acre).
- Repeat for each additional field.
- The additional annual use (hours) will be displayed on both the **Additional Fields** and **Spreading Cost** worksheets.
- Take the additional annual use value and add it to the total annual use (hours) for both the tractor and manure spreader.

Manure Value worksheet

This worksheet performs two functions. First, it determines the financial value of the manure based upon the cost of chemical fertilizers and the available nutrient content of the manure. Secondly, the worksheet determines the breakeven one-way travel time and distance to haul manure.

Option A

- Enter the current cost or purchase price of triple superphosphate, ammonium nitrate, and muriate of potash. These are the three base ingredients used to make most fertilizer blends.

Option B

- Enter any N-P-K fertilizer blend (ex. 5-10-30)
- Enter the value for nitrogen in the blend (ex. 5)
- Enter the value for phosphorous in the blend (ex. 10)
- Enter the value for potassium in the blend (ex. 30)
- Enter the price of the fertilizer blend (\$/tonne).

Once **Option A** or **Option B** is completed

- Enter the following nutrient values for the manure: total nitrogen, NH₄-N, phosphorous, and potassium. If possible, use the farm's manure analysis results. Make sure that the "as is" nutrient values are used. **Do not** enter manure nutrient values that have been expressed on a dry matter basis.
 - When actual manure analysis values are not available, click on the blue *Typical Manure Analysis* box and use the typical manure analysis values provided.
 - * Note: The value for organic-N does not need to be entered as it is automatically calculated by the spreadsheet.
- Determine and enter the availability coefficients for NH₄-N and organic-N. These values are located in the blue *Nitrogen Availability* box.

NH₄-N

- The NH₄-N availability coefficient is based on the temperature and rainfall during spreading, as well as the manure incorporation method used.

Organic-N

- The organic-N availability coefficient is based upon the date of manure application and the manure type. The C:N ratio can be determined from the manure nutrient analysis by dividing the amount of carbon by the amount of nitrogen. The C:N ratio of manure containing sand bedding will differ from that of manure containing sawdust or straw bedding, due to the lower carbon content of the sand.
- The **breakeven one-way hauling distance** is the maximum distance that a farmer can cost effectively haul manure to apply to a field. The distance depends on both the breakeven one-way hauling time and the travel speed.
- The **breakeven one-way hauling time** is the maximum amount of time that the farmer can cost effectively haul manure to apply to a field.

Changing Fertilizer Cost

- The graph (bright green tab) shows the effect of fertilizer price on the breakeven hauling distance and time.

Changing Spreading Cost

- The graph (bright green tab) shows the effect of spreading cost on the breakeven hauling distance and time.