

MU Guide

Break-even Hauling Distance: Tractor-Pulled Manure Spreaders

John Lory, Department of Agronomy and Commercial Agriculture Program
Ray Massey, Department of Agricultural Economics and Commercial Agriculture Program
Matt Herring, Department of Agronomy and Commercial Agriculture Program

Before disposing of manure on agricultural fields, livestock producers should consider making use of the nutrients in manure to meet fertilizer needs. Using manure as a fertilizer for crop production can offset some of the costs of hauling and applying it. This publication will help determine how far a producer can haul a load of manure with a tractor-pulled spreader without incurring additional hauling expenses.

The cost of manure application depends on the distance between manure source and the field where it is to be applied. The greater the distance, the greater the cost of labor, tractor road time and fuel use. Greater hauling costs can be worthwhile if manure has greater value on fields farther from the manure source.

Determining break-even hauling distance

Break-even hauling distance can be calculated using Table 1 and Equation 1. Variables needed for this calculation are tractor size (horsepower, hp), road speed (mph), number of loads applied per acre, and the value of the manure per acre (\$).

To calculate break-even hauling distance,

1. Locate the correct row in Table 1, depending on the size of tractor used to haul manure and the speed at which it will be driven to and from the field.
2. Locate the correct column in Table 1 based on the number of loads applied per acre.
3. Obtain the hauling factor from the intersection of the selected row and column.
4. Insert the hauling factor into Equation 1.

Equation 1:

$$\text{Break-even hauling distance} = \text{Hauling factor} \times \text{Selling price per acre (\$)}$$

Table 1. Chart to determine hauling factor used in Equation 1.

Tractor size	Road speed (mph)	Loads per acre*					
		0.5	1	2	3	4	5
		<i>Hauling factor</i>					
50 hp	8	0.52	0.26	0.13	0.09	0.07	0.05
	10	0.65	0.32	0.16	0.11	0.08	0.07
	12	0.78	0.39	0.19	0.13	0.10	0.08
	15	0.97	0.48	0.24	0.16	0.12	0.10
70 hp	8	0.46	0.23	0.11	0.08	0.06	0.05
	10	0.57	0.29	0.14	0.09	0.07	0.06
	12	0.69	0.34	0.17	0.11	0.09	0.07
	15	0.86	0.43	0.21	0.14	0.11	0.09
100 hp	8	0.30	0.15	0.07	0.05	0.04	0.03
	10	0.37	0.18	0.09	0.06	0.05	0.04
	12	0.44	0.22	0.11	0.07	0.06	0.04
	15	0.56	0.28	0.14	0.09	0.07	0.06
120 hp	8	0.24	0.12	0.06	0.04	0.03	0.02
	10	0.30	0.15	0.08	0.05	0.04	0.03
	12	0.36	0.18	0.09	0.06	0.05	0.04
	15	0.46	0.23	0.11	0.08	0.06	0.05

*use linear interpolation for intermediate values

Note:

Hauling factor assumes:

- labor = \$8.00/hr
- diesel fuel = \$1.00/gal
- tractor used 500 hours/year
- tractor value based on 1997 list prices and depreciated over 10 years

Example

A producer transports the manure at 10 mph, using a 70 hp tractor. The farmer receiving the manure is willing to pay \$15 per acre to have the manure transported and spread on a field at the rate of one load per acre. The hauling factor is 0.29 (from Table 1). Insert this factor into Equation 1.

$$\text{Break-even hauling distance} = 0.29 \times \$15 = 4.35 \text{ miles}$$

At \$15 per load, this manure seller can haul

manure to any field within 4.35 miles of the manure source and be compensated for the road transportation costs.

Interpretation

Break-even hauling distances calculated using this equation cover only road costs associated with traveling to and from a field used to spread manure. Other costs associated with manure management are not accounted for and remain an operating expense of the manure producer. Costs not accounted for in this analysis include equipment, fuel and labor costs for storing, loading, and spreading manure.

The calculated break-even hauling distance is the distance from the manure source where the value of the manure offsets the cost of hauling manure to the field. Hauling costs exceed the value of the manure anywhere beyond the break-even hauling distance. In the example above, manure can be hauled up to 4.35 miles from the source without adding to the cost of land application when the manure is sold for \$15 per load or reduces fertilizer expense by \$15 per acre.

Alternatively, the break-even hauling distance is the number of *additional* miles from a disposal field that manure can be profitably hauled. If a producer is currently hauling manure for disposal on a field 0.5 mile away, the break-even haul distance is the additional mileage manure can be hauled without incur-

ring additional manure hauling expenses. In the example above, if the manure currently has no value on a field half a mile from the source, it can be hauled up to 4.35 additional miles (4.85 miles total) without increasing land application costs when the manure is sold for \$15 per acre or reduces fertilizer expense by \$15 an acre on the more distant fields.

Additional information

This guide is for calculating break-even hauling distance for tractor-pulled manure spreaders. See also MU publication G 9330, *Calculating the Value of Manure as a Fertilizer Source*

Calculating the cost of manure application is a complicated process. This publication presents the simplest example of the costs associated with applying manure from one source to one field. There are computer programs and spreadsheets that will aid in more complex analyses.

Contact Ray Massey (phone: 573/884-7788, email: Ray_Massey@muccmail.missouri.edu) for a spreadsheet-based computer program that includes a more comprehensive analysis of the manure application costs for a field.

Contact John Lory (phone: 573/884-7815, email: lory@psu.missouri.edu) about computer programs that integrate information from multiple fields and multiple manure sources.

