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Animal Manure As Fertilizer

A value that is often overlooked by people producing animals on a small scale is the potential of the manure as a source of fertilizer. For example, a 1,000-pound cow will produce 15 tons of manure per year. This 15 tons (based on a feedlot source) contains an equivalent of 213 pounds of nitrogen (N), 192 pounds of phosphate ($P_2 05$) and 267 pounds of potassium ($K_2 0$).

In addition to the three major elements of nitrogen, phosphorous and potassium, manure also contains essential micronutrients. The average pounds per ton of these nutrients is shown in Table 2.

Other animal manures may offer fertilizer benefits.

Moose droppings have the following fertilizer equivalent values during the months of May and June: moisture, 74 percent; nitrogen, 2.5 percent; phosphate ($P_2 0_5$), 1.8 percent; potassium ($K_2 0$), 1.2 percent; zinc, 0.6 percent; calcium, 1.6 percent; and magnesium, 0.7 percent. The nutrient values for moose droppings during the winter months is less than 50 percent of the summer values.[1]

[1] U.S. Forest Service Research, Anchorage

Table 1 — Composition of Manures and Waste Materials*

		N		$P_2 0_5$		$K_2 0$	
Source	% moisture	%	lbs. per ton	%	lbs. per ton	%	lbs. per ton
Beef feedlot	68	0.7	14.2	0.6	12.8	0.9	17.8
Dairy	79	0.6	11.2	0.2	4.6	0.6	12.0
Liquid dairy	91	0.2	4.8	0.05	0.1	0.2	4.6
Swine	75	0.5	10.0	0.3	6.4	0.5	9.2
Liquid swine	97	0.1	0.2	0.1	0.1	0.1	0.2
Horse	70	0.7	13.8	0.2	4.6	0.7	14.4
Sheep	65	1.4	28.0	0.5	9.6	1.2	24.0
Poultry (no litter)	54	1.6	31.2	0.9	18.4	0.4	8.4
Liquid poultry	92	0.2	3.2	0.04	0.8	0.3	5.8

* Adapted from L.S. Murphy in *Fertilizer Solutions* magazine, March-April 1972. Found in *Western Fertilizer Handbook: Horticulture Edition*, 1990, p. 143.

Table 2 — Micronutrients in Animal Manure (pounds/ton)*

Animal	Boron	Calcium	Copper	Iron	Magnesium	Manganese	Mo	Sulfur	Zinc
Horses	.03	15.7	.01	.27	2.8	.02	.002	1.4	.03
Cattle	.03	5.6	.01	.08	2.2	.02	.002	1.0	.03
Sheep	.02	11.7	.01	.32	3.7	.02	.002	1.0	.05
Hogs	.08	11.4	.01	.56	1.6	.04	.002	2.7	.12
Laying Hens	.12	74.0	.03	.93	5.8	.18	.011	6.2	.18
Broilers	.08	29.0	.06	2.00	8.4	.46	.007	—	.25

* USDA Research Data, Ohio

Animal manure also supplies valuable organic matter. Organic matter improves soil tilth, increases water-holding capacity, lessens erosion, improves soil aeration and has a beneficial effect on soil microorganisms and plants.

The value of animal manure is based on:

1. Class of animal
2. Kind of feed consumed
3. Kind of bedding used
4. Method of handling
5. Rate and method of application.
6. Kind of soil and crops on which it is used

Research has shown that manure will lose approximately one-third of its fertilizer and organic matter value in three months, one-half in six months and even more over a longer period. When manure is exposed to the weather, ammonia gas is released and nitrates leach out with the rain, phosphorous is washed or drained away with the liquid portion, potassium is either washed away or carried off in the urine, and organic matter is rotted away.

To reduce manure losses, the following steps are recommended:

1. Use ample bedding to absorb liquid manure.
2. Store manure in straight-sided, well-packed piles.
3. Store manure in an area that has a water-tight bottom and provide overhead protection from weather.
4. Keep livestock on pasture as much as possible in summer months.
5. Add phosphate to manure pile to trap nitrogen, at a rate of 20 pounds of 0-46-0 per ton of manure.

Table 3 — Average Nutrient Analysis of Some Other Animal Manures*

	N	P_2O_5	K_2O
	---------- % ----------		
Fresh manure with normal quantity of bedding or litter			
Duck	1.1	1.5	0.5
Goose	1.1	0.6	0.5
Turkey	1.3	0.7	0.5
Rabbit	2.0	1.3	1.2

* Taken from *Western Fertilizer Handbook–Horticulture Edition*, 1990, p. 144.

6. Use plenty of bedding and let manure accumulate in stables until it can be hauled and spread directly in the fields.

Other points to consider when handling manure include:

1. Avoid spreading manure on frozen ground.
2. Avoid spreading manure when the wind is blowing toward your neighbor's house.
3. Avoid spreading manure within 100 feet of streams, lakes or ponds.
4. Incorporate manure by disking and plowing when practical.
5. Do not exceed 12 tons per acre or 550 pounds per 1,000 square feet when applying manure.
6. Manure that comes from animals that consume hay may contain weeds and grass seeds, which can germinate and contaminate your fields. Chickweed and quack grass are two examples.
7. The application of cat and dog manure on soil used for human food is not recommended. These animals have diseases and parasites that can be transmitted to humans through their manure.

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