

Poultry Manure as a Fertilizer ¹

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Animal manures have been used as natural crop fertilizers for centuries. Because of poultry manure's high nitrogen content, it has long been recognized as one of the most desirable manures. Besides fertilizing crops, manures also supply other essential plant nutrients and serve as a soil amendment by adding organic matter, which helps improve the soil's moisture and nutrient retention. Organic matter persistence will vary with temperature, drainage, rainfall, and other environmental factors.

The most common procedure for determining the amount of manure to add per acre is to consider the manure's nitrogen content and the crop's nitrogen needs. Typical nutrient compositions of poultry manure can be found in Table 1. These values are averaged, and the manure's actual nutrient composition may vary depending on the manure-to litter-material ratio, litter (manure) handling, and the type of bird, feed, and litter material.

The nitrogen recommendations for selected crops and manure application rates can be found in Table 2. Poultry manure is high in phosphorus. In areas with high levels of phosphorus as determined by a soil test or in areas where phosphorus movement offsite is a concern (e.g., areas with poor drainage, a high slope, or an adjacent water body), phosphorus rather than nitrogen should determine the manure's application rate.

Fertilizer grades for manure can be calculated by comparing the total amounts of nitrogen, phosphorus, and potassium as a simple ratio. For example, given the nutrient

composition values of Table 1, broiler house litter has a fertilizer grade of 3-3-2. Note that not all nitrogen in the manure will be in the same form. Some nitrogen in poultry manure will be in the form of ammonium ($\text{NH}_4\text{-N}$). The ammonium state is volatile, so there will be some loss of this nitrogen form to the atmosphere. Environmental conditions, such as rainfall, wind, and sunlight, will also affect the availability of organic nitrogen, phosphorus, and potassium. Because of this, assume during the first year available nitrogen will be at 65% of total nitrogen and available phosphorus and potassium will be at 75% of the total available quantities applied as manure.

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Table 1. Average nutrient composition of chicken manures¹

Manure Type	Total N	Ammonium (NH ₄ -N)	Phosphorus (P ₂ O ₅)	Potassium (K ₂ O)
Broiler	lb/ton			
Fresh (no litter)	26	10	17	11
Broiler house litter ²	72	11	78	46
Breeder house litter ²	31	7	54	31
Stockpiled litter ²	36	8	80	34
Layer	lb/ton			
Fresh (no litter)	26	6	22	11
Undercage scraped ³	28	14	31	20
Highrise stored ⁴	38	18	56	30
	lb/1,000 gallons			
Liquid slurry ⁵	62	42	59	37
Anaerobic lagoon sludge	26	8	92	13
	lb/acre-inch			
Anaerobic lagoon liquid	179	154	46	266

¹Source: Biological and Agricultural Engineering Dept., North Carolina State University, as reported in "Poultry Manure as a Fertilizer Source," Soil Facts fact sheet authored by J.P. Zublena, J.C. Baker and T.A. Carter, North Carolina Coop. Ext. Serv., Raleigh (<http://www.soil.ncsu.edu/publications/Soilfacts/AG-439-05/>)

²Annual manure and litter accumulation; typical litter base is coarse sawdust, wood shavings, or peanut hulls.

³Manure collected within two days.

⁴Annual manure accumulation on unpaved surfaces.

⁵Six to 12 months of manure accumulation, excess water usage, and storage-surface rainfall surplus; does not include fresh water for flushing.

Table 2. Nitrogen recommendations and suggested application rates of layer manure and broiler litter for selected crops

Crop ¹	Recommended N (lbs/acre)	Layer manure (tons/acre)	Broiler manure with litter (tons/acre)
Improved perennial grasses	160	4 - 6	3 - 5
Oranges, mature	200	4 - 6	3 - 5
Grapefruit, mature	160	4 - 6	3 - 5
Pine	100 - 200	2 - 6	3 - 5
Corn, non-irrigated 15,000 plants/acre	180	3 - 7	2 - 5
Corn, irrigated 30,000 plants/acre	240	6 - 10	5 - 7
Vegetable garden	100	2 - 5	2 - 4

¹Due to the timing needs for nitrogen and the high value of commercial vegetable crops, manure is not recommended as the sole source of nitrogen for those crops.