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**Introduction**

One of the most challenging aspects of dairy farm nutrient management is developing a system for manure application on fields. This involves estimating the amount of manure produced on the farm, in conjunction with manure analysis; to plan for defined application rates for land in productivity. Manure management should be a top priority for any dairy farm. Mismanagement of manure can diminish its value while having adverse effects on the environment. When used appropriately, manure has significant agronomic and economic value. Manure improves soil biological activity, tilth, and chemical properties of the soil. The purpose of a manure inventory, in conjunction with a manure and soil analysis, is to estimate the amount of manure produced on a farm and therefore, to calculate the amount of nutrients excrete by dairy cows. A manure inventory will also assist in determining if sufficient land is available for agronomic utilization of manure nutrients.

Manure production and nutrient excretion value varies by body weight of the animal and often does not account for large variations in feeding types and amounts. Other factors such as, animal species, age, feed ration, bedding characteristics, storage structures, and manure handling will greatly effect manure production and nutrient levels.

**Calculations**

Each ton of manure produced by dairy cows contains approximately 10 pounds of nitrogen (N), 4 pounds of phosphorus (P<sub>2</sub>O<sub>5</sub>), and 8 pounds of potassium (K<sub>2</sub>O) (Table 1). The actual concentration of these nutrients in stored manure will be influenced by storage losses and dilution from water (rainfall and milk wash waste water) as well as bedding.

**Table 1:** Average daily manure production and nutrient content of manure. Values are based on animal unit (1000 lb) and do not include bedding\*.

\*Adapted from: The Agronomic Guide 2011-2012. College of Agricultural Sciences, Penn State University. <http://extension.psu.edu/agronomy-guide/cm/tables/table1-2-13.pdf>

Animal Type	Daily Production	Analysis Units	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O
Dairy Cow Lactating (liquid)	13 gal	lb/1000gal	28	13	25
Lactating (solid)	106 lb	lb/ton	10	4	8
Dry	82 lb	lb/ton	9	3	7
Calf and heifer	87 lb	lb/ton	7	2	7

**Manure production on a dairy farm can be estimated by using the following formula:**

**Manure production** = Number of Cattle x Average Weight of Cattle (lb) ÷ 1000 (animal unit) x Daily Manure Prod. x Manure Collection Period (days) + Estimated Percent of Bedding in Manure.

**Example:** You have 10 lactating cows, each with an average weight of 1250 pounds. The animals are on pasture for 5.5 months (mid April through early October). You usually add about 5% bedding to the manure. **Total annual collectable manure (without bedding) =**

10 (animals) x 1250 (avg. wt.) ÷ 1000 (animal unit) x 106 (daily manure prod. from Table 1) = 1325 (lb/day). 1325 x 195 (days kept in barn) = 258375 (lb manure/year).

**Total waste production (with bedding) =**

258375 x 0.05 = 12919 (lb bedding added to the manure).  
258375 + 12919 = 271294 (lb/year) or: 271294 ÷ 2000 = 136 (ton/year).

**In the above example, nutrient inventory for the farm can be calculated as:**

136 x 10 = 1360 lb N, 136 x 5 = 544 lb P<sub>2</sub>O<sub>5</sub>, and  
136 x 8 = 1088 lb K<sub>2</sub>O

**Considerations**

Manure nutrient inventory for a farm is only practical if used in conjunction with proper on-farm management practices including manure storage and handling, application method; correct timing for optimal crop uptake, and manure analysis.

**Resources**

Natural Resources Conservation Services. *Manure Inventory Sheets*.  
[http://www.ut.nrcs.usda.gov/technical/technology/planning/conservation\\_plan/CNMP\\_Inventory\\_Sheet.pdf](http://www.ut.nrcs.usda.gov/technical/technology/planning/conservation_plan/CNMP_Inventory_Sheet.pdf)

Penn State Agronomy Guide. Part 1, Section 2: Soil Fertility Management. *Manure Nutrient Content*.  
<http://extension.psu.edu/agronomy-guide/cm/sec2/sec29c>

For more information visit [www.umass.edu/cdl](http://www.umass.edu/cdl)

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