



## HAWAII COOPERATIVE EXTENSION SERVICE

College of Tropical Agriculture and Human Resources

University of Hawaii

GENERAL HOME GARDEN SERIES No. 11

### ANIMAL MANURES

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Wherever animals are raised, manure accumulates. This becomes a surprising amount of material that must be disposed of each year. This manure contains primary (major) nutrients, secondary (minor) nutrients, and micronutrients (trace elements) for plants; organic matter; and water. In addition, it may contain disease organisms and be a source of flies and noxious odors. Where large numbers of animals are housed, disposal of their manure becomes a major problem, especially since quality of the environment is so important to each of us.

#### Manure Produced

The manure produced comes practically entirely from the food eaten by the animal. Fresh manure also contains a large amount of water derived from that which the animal drank. The amount of manure produced depends upon the kind and age of the animal, the kind and amount of food given to the animal, and the method of collecting, storing, and handling the manure. These same factors also affect the composition of the manure.

#### Value of the Manure Produced

The plant nutrients contained in the manure are worth money. In this period of short supplies of commercial fertilizers and increasing demand for organic fertilizers, careful consideration should be given to applying manure to the soil. Present environmental protection regulations require proper disposal of manure, and the cost of hauling manure for disposal is about the same as hauling manure and spreading it in the field. The average value of a ton of manure is based upon the current price of the plant nutrients contained in the material.

Most of the recent experimental work in the field of plant production has shown that the value of increased yields of crops exceeds the value of the plant nutrients contained in the manures. This is probably due to the organic matter content, which is an effective source of energy for soil microorganisms. It also increases the aggregation of soils and

gives greater stability of the aggregates formed, especially in those soils that contain the sticky and plastic montmorillonite type of clay. It is less effective in soils containing the oxides type of clay. Furthermore, the organic matter generally increases the water-holding capacity of the soil. This is of greatest importance in areas where extended dry periods occur and where water supplies are inadequate.

Another important factor to consider in determining the value of manure is the loss of plant nutrients. When manure is stored for extended periods of time, 20 to 60 percent of the nutrients originally contained may be lost. These losses are especially high when the manure is stored exposed to weather. The soluble constituents are lost by leaching, especially nitrogen and potassium. Nitrogen may be lost also by conversion to ammonia, which then escapes as a gas. Leaching loss may be prevented by protecting the manure from rain or by catching or recovering liquids from the manure for application to the soil. Ammonia loss may be decreased by adding superphosphate at the rate of 30 to 40 pounds per ton of manure. This not only conserves the nitrogen but also increases the phosphorus content of the manure, making it a more "balanced" and valuable source of plant nutrients. Ammonia loss also may be decreased by storing the manure in the shade or other cool areas. Other ways of reducing plant nutrient loss from manure are: use some absorbent bedding material to absorb the liquid material, waterproof floors or bedding areas to prevent liquids from leaching into the soil, spread manure as frequently as possible—daily is best, and spread manure evenly and not too thick. If spreading cannot be done, pack the manure in tight square piles or in well-packed animal pens. Where manure is spread on the soil and allowed to stand for some time, losses are high.

#### How To Use Manure

Manure should be hauled directly from the storage

area and spread thinly and evenly over the surface of the soil. It should then be plowed down as soon as possible to conserve the nutrients in the manure. The manure should be applied and worked into the soil to the depth where the major portion of the plant roots will develop—generally 6 to 10 inches for most crops. Manure should be applied 1 to 2 weeks before planting, depending upon the rate and type of manure used. The higher the rate and the higher the nitrogen content the longer you should wait to reduce the possibility of damage to young plants.

Manure is generally applied at the rate of 5 to 15 tons per acre. Rates higher than these may be applied for those crops requiring high organic matter or high nitrogen applications. For small garden plots, apply at the rate of 25 to 50 pounds per 100 square feet of garden area. For lawns, apply 50 to 70 pounds per 100 square feet of lawn area and mix thoroughly and evenly with top 4 to 6 inches of soil before planting. Manure may also be used as a top dressing for lawns, pastures, etc. However, manure generally is not satisfactory for side dressing of vegetables and other crops where a quick supply of available nitrogen or other nutrients is required.

This is due to the very low supply of soluble nutrients in manure and also because most of the nutrients must undergo microbiological decomposition before plants can utilize them. This requires 1 to 4 weeks, which is too slow to supply the needs of plants for a large supply of quickly available nitrogen.

Manure may also be used in a compost pile as a source of both nutrients and bacteria to hasten the decomposition of the compost material. Use a 1- or 2-inch layer of manure for each 4- to 6-inch layer of leaves or other organic residue. When composting is completed, the final product has about the same supply of nutrients and the same general characteristics as cow manure.

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**NOTE:** The use of trade names is for the convenience of readers only and does not constitute an endorsement of these products by the University of Hawaii, the College of Tropical Agriculture and Human Resources, the Hawaii Cooperative Extension Service, and their employees.

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