

Animal Manure

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November 13, 2020



A historical source of vegetable garden fertilizer

Historically, when families had their own cows, horses and chickens, animal manures were the primary source of vegetable garden fertilizer. Many gardeners continue the practice today whether using material from a local farm or buying commercially bagged manure which is available at garden stores and nurseries.

Animal manures provide a plant's basic nutrient needs of nitrogen, phosphorus and potassium, micronutrients to increase plant growth and organic matter to improve soil structure. But all animal manures are not created equal and knowing the differences can be important for the health of your garden as well as the health of you and your family.

Animal manures come with heavy bacterial content which requires special handling. Always wear gloves and closed toe shoes or boots when working with manure and wash your hands thoroughly when you are done. It is important to know the purity of your manure source to avoid herbicide residues, growth hormones, heavy metals and other undesirable material that may be present. The type and age of the animal, the food it has eaten, the manure's moisture content, amount of bedding mixed in, the way the manure has been handled or stored, and its age are all factors to be considered.

Type of animal

The best animal manure fertilizers come from plant-eating herbivores such as cows, horses, chicken/poultry, sheep, and rabbits. Fish, worms and even bat guano can also be used. Never use manures from meat-eating carnivores, pigs, or pets such as dogs and cats because they can host pathogens and parasites that may infect humans and cannot be composted away.

Cows and horses eat grass and produce a carbon-rich manure for adding organic matter. Horse manure can be high in weed seed because their digestive system does not work as thoroughly as some animals. Poultry manure is high in ammonia and salts and will burn if over-applied, especially if fresh. Chicken manure has a high nitrogen content whereas dairy cows and horses provide more balanced soil nutrients. Sheep and goat manures also add nitrogen but contain more potassium than dairy or horse. Rabbit manure contains four times more nutrients than cow or horse manure, is twice as rich as chicken manure and doesn't need to be composted to use as fertilizer.

Fish manure, along with other fish byproducts such as fish meal and emulsion, is a fast-acting fertilizer, rich in nitrogen but with lower levels of macronutrients phosphorus and potassium. Many fish products are odiferous.



This horse manure pile is a mix of raw manure and wood shavings from horse stalls. The piles are turned regularly using a tractor and aged for over a year before being applied to gardens and pastures. *Photo by Kathy Wolfe / WSU Skagit County Extension Master Gardeners.*

Worm fertilizer production, called vermicomposting, can be done in small worm bins. The manure product is called worm castings and provides a balanced source of the prime nutrients as well as micronutrients and will not burn plants or their roots. Unlike fish fertilizer, worm castings are odorless.

Bat, seabird, and pigeon manures can be used as garden fertilizer, but their nutrient levels may vary. Bat and bird manure should always be composted or cured for several months before application because they contain high levels of urea which can burn plants.



Never use pig manure as fertilizer, as it may contain pathogens that might not be killed in the composting process. *Photo by Nancy Crowell / WSU Skagit County Extension Master Gardeners.*

Fresh manure or composted

Fresh manure has the potential of transmitting human pathogens, such as *E. coli*, or *Salmonella* that can be taken up into plant tissue and then consumed by humans. It typically has high amounts of ammonium or soluble nitrogen that can burn plants. Salt levels also tend to be high. Viable weed seeds can be present that will sprout later in your garden. Many fresh manures have offensive odor, attract flies and are difficult to transport. One of the challenges of using fresh manure directly in the garden is determining how much to apply, which will vary by the type of manure being used. Root crops react especially badly to fresh manure, becoming misshapen or scabby. Aged manure is not the same as composted manure, and the gardener cannot assume that pathogens in aged manure have been destroyed.

Incorporating garden soil into manure and aging the mixture for several months (at least 120 days) helps soil microorganisms clear out pathogens and reduce weed seeds by about 60%. Fully composting manure, using the same basic process as composting any other organic material, will allow your manure to heat up well enough to destroy more weed seeds and residual pathogens present.

Start by balancing your “greens” (such as grass clippings and food waste) with the “browns” (dry leaves, straw, wood chips, sawdust) elements. Raw manure would be considered “greens” unless it is already mixed with animal bedding such as wood shavings or straw from the stalls, in which case it would be a more balanced mixture of “greens” and “browns”. Keep your compost pile moist so microbes can stay alive and mix the pile well so air can penetrate.

To ensure pathogens have been killed, the compost pile must reach a high temperature between 135 - 145 degrees F for several weeks. Turning the compost regularly allows all portions of the manure to be sufficiently exposed to the high temperatures. The full composting process will take between six to nine months depending on how often the pile is turned. Fall is a good time to put together a manure composting system so it will have time to age and decompose before adding it to your garden.

As with the addition of any amendments into your garden, it is important to test your soil pH and nutrient status regularly to make sure you have the correct balance for your growing needs and are not over-fertilizing. Excess nutrients and phosphorus buildup, whether from composted manure or synthetic fertilizer, can leach into the environment and contaminate water sources.

RESOURCES:

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