

# Manure

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**Manure** is organic matter, mostly derived from animal feces except in the case of green manure, which can be used as organic fertilizer in agriculture. Manures contribute to the fertility of the soil by adding organic matter and nutrients, such as nitrogen, that are trapped by bacteria in the soil. Higher organisms then feed on the fungi and bacteria in a chain of life that comprises the soil food web. It is also a product obtained after decomposition of organic matter like cow dung which replenishes the soil with essential elements and add humus to the soil.

In the past, the term “manure” included inorganic fertilizers, but this usage is now very rare.



Animal manure is often a mixture of animal feces and bedding straw, as in this example from a stable

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## Types

There are three main classes of manures used in soil management:

### Animal manure

Most animal manure consists of feces. Common forms of animal manure include farmyard manure (FYM) or farm slurry (liquid manure). FYM also contains plant material (often straw), which has been used as bedding for animals and has absorbed the feces and urine. Agricultural manure in liquid form, known as slurry, is produced by more intensive livestock rearing systems where concrete or slats are

used, instead of straw bedding. Manure from different animals has different qualities and requires different application rates when used as fertilizer. For example horses, cattle, pigs, sheep, chickens, turkeys, rabbits, and guano from seabirds and bats all have different properties.<sup>[1]</sup> For instance, sheep manure is high in nitrogen and potash, while pig manure is relatively low in both. Horses mainly eat grass and a few weeds so horse manure can contain grass and weed seeds, as horses do not digest seeds the way that cattle do. Chicken litter, coming from a bird, is very concentrated in nitrogen and phosphate and is prized for both properties.

Animal manures may be adulterated or contaminated with other animal products, such as wool (shoddy and other hair), feathers, blood, and bone. Livestock feed can be mixed with the manure due to spillage. For example, chickens are often fed meat and bone meal, an animal product, which can end up becoming mixed with chicken litter.

### Human manure

Some people refer to human excreta as human manure, and the word "humanure" has also been used. Just like animal manure, it can be applied as a soil conditioner (reuse of excreta in agriculture). Sewage sludge is a material that contains human excreta, as it is generated after mixing excreta with water and treatment of the wastewater in a sewage treatment plant.

### Compost

Compost is the decomposed remnants of organic materials. It is usually of plant origin, but often includes some animal dung or bedding.

### Green manure

Green manures are crops grown for the express purpose of plowing them in, thus increasing fertility through the incorporation of nutrients and organic matter into the soil. Leguminous plants such as clover are often used for this, as they fix nitrogen using *Rhizobia* bacteria in specialized nodes in the root structure.

Other types of plant matter used as manure include the contents of the rumens of slaughtered ruminants, spent grain (left over from brewing beer) and seaweed.

## Uses of manure

### Animal manure



Cement reservoirs, one new, and one containing cow manure mixed with water. This is common in rural Hainan Province, China.



Compost containing turkey manure and wood chips from bedding material is dried and then applied to pastures for fertilizer.

Animal manure, such as chicken manure and cow dung, has been used for centuries as a fertilizer for farming. It can improve the soil structure (aggregation) so that the soil holds more nutrients and water, and therefore becomes more fertile. Animal manure also encourages soil microbial activity which promotes the soil's trace mineral supply, improving plant nutrition. It also contains some nitrogen and other nutrients that assist the growth of plants.

Manures with a particularly unpleasant odor (such as slurries from intensive pig farming) are usually knifed (injected) directly into the soil to reduce release of the odor. Manure from pigs and cattle is usually spread on fields using a manure spreader. Due to the relatively lower level of proteins in vegetable matter, herbivore manure has a milder smell than the dung of carnivores or omnivores. However, herbivore slurry that has undergone anaerobic fermentation may develop more unpleasant odors, and this can be a problem in some agricultural regions.

Poultry droppings are harmful to plants when fresh but, after a period of composting, are valuable fertilizers.

Manure is also commercially composted and bagged and sold retail as a soil amendment.

Before motor vehicles became common, horse droppings were a big part of the rubbish that communities needed to clean off roads.

## Precautions

Manure generates heat as it decomposes, and it is possible for manure to ignite spontaneously if stored in a very large pile.<sup>[2]</sup> Once such a large pile of manure is burning, it will foul the air over a wide area and require considerable effort to extinguish. Therefore, large feedlots must take care to ensure that piles of fresh manure do not get excessively large. There is no serious risk of spontaneous combustion in smaller operations.

There is also a risk of insects carrying feces to food and water supplies, making them unsuitable for human consumption.

## Livestock antibiotics

In 2007, a University of Minnesota study<sup>[3]</sup> indicated that foods such as corn, lettuce, and potatoes have been found to accumulate antibiotics from soils spread with animal manure that contains these drugs.

Organic foods may be much more or much less likely to contain antibiotics, depending on their sources and treatment of manure. For instance, by Soil Association Standard 4.7.38, most organic arable farmers either have their own supply of manure (which would, therefore, not normally contain drug residues) or else rely on green manure crops for the extra fertility (if any nonorganic manure is used by organic farmers, then it usually has to be rotted or composted to degrade any residues of drugs and eliminate any pathogenic bacteria — Standard 4.7.38, Soil Association organic farming standards). On the other hand,



Manure on a wall.

as found in the University of Minnesota study, the non-usage of artificial fertilizers, and resulting exclusive use of manure as fertilizer, by organic farmers can result in significantly greater accumulations of antibiotics in organic foods.<sup>[3]</sup>

## See also

- Album graecum
- Anaerobic digestion
- Chicken manure
- Coprophilous fungi
- Cow dung
- Dry animal dung fuel
- ECODIPTERA
- Liquid manure
- Manure spreader

## Notes

- "Manure". Bbc.co.uk. Retrieved 2012-11-14.
- "Spontaneous Combustion of Manure Starts 200-Acre Blaze 1/08/07 |". *abc7.com*. Retrieved 2010-08-07.
- staff (2007-07-12). "Livestock Antibiotics Can End Up in Human Foods". Ens-newswire.com. Retrieved 2012-11-14.

## Further reading

- Winterhalder, B., R. Larsen, and R. B. Thomas. (1974). "Dung as an essential resource in a highland Peruvian community". *Human Ecology*. **2** (2): 89–104. doi:10.1007/BF01558115.

## External links

- Application and environmental risks of livestock manure (<http://link.springer.com/article/10.1007%2Fs13765-013-3184-8>)
- North American Manure Expo (<http://manureexpo.org>)
- Cornell Manure Program (<http://www.manuremanagement.cornell.edu/>)
- County-Level Estimates of Nitrogen and Phosphorus from Animal Manure for the Conterminous United States, 2002 (<http://purl.fdlp.gov/GPO/gpo38641>) United States Geological Survey
- Manure Management, Water Quality Information Center, U.S. Department of Agriculture (<http://wqic.nal.usda.gov/agricultural-environmental-management/manure-management>)
- Livestock and Poultry Environmental Learning Center (<http://www.extension.org/animal+manure+management>), an eXtension (<http://www.extension.org>) community of practice about animal manure management
- Antibiotics and Hormones in Animal Manure (Webcast) ([http://www.extension.org/pages/Antibiotics\\_and\\_Hormones\\_in\\_Animal\\_Manure\\_Webcast](http://www.extension.org/pages/Antibiotics_and_Hormones_in_Animal_Manure_Webcast)): A



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two part webcast series about the science available on potential risks and best management practices related to antibiotics and hormones from animal manure

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