Enhancing The Safety of Locally Grown Produce

Manure Use

Although manure is a valuable source of nutrients, it is also one of the greatest potential sources of pathogens that can cause foodborne illnesses. These pathogens can be found in the feces of humans, pets and wild animals. Manure can contain harmful bacteria such as *E. coli* O157:H7, *Salmonella* spp., *Campylobacter* spp. and *Listeria* spp. as well as viruses and parasites. Pathogens can survive in manure slurries or in the soil for three months or more. Human manure, raw or composted, should never be used on food crops because of the increased risk of contamination with harmful microorganisms that cause diseases in humans. The following steps will help you reduce potential contamination from other types of manure.

Composting

Proper composting of manure kills pathogens. For this to happen, the internal temperature of the compost pile needs to reach between 131°F and 170°F and be maintained at these temperatures for specific lengths of time. These time/temperature guidelines are recognized by both the U.S. Department of Agriculture and the U.S. Environmental Protection Agency as effective for killing pathogens.

Courtesy of Jay Payne, Cedar Grove Farm

▲ Turning the compost pile will aerate it. This pile is on a concrete pad to help prevent leachate from entering into the soil.

- If composting in a vessel or an aerated static pile, these temperatures have to be maintained for at least three days. If using a windrow or a pile that is not aerated, these temperatures have to be maintained for 15 days, and the pile has to be turned at least five times. Turning helps any material that would be on the exterior of the pile where temperatures are lower allowing pathogens to survive to be mixed into the interior during the composting process. Record when the pile is turned.
- For small scale composting, make sure the beginning pile is at least 5 x 5 x 5 feet. Smaller piles do not generally have enough mass to retain heat and reach the needed temperatures. A proper mix of materials with a carbon to nitrogen ratio of about 25:1 will help the pile heat up quickly.
- Use a thermometer to make sure the proper temperatures are reached, and keep a record of the temperatures. Compost thermometers with varying stem lengths can be purchased at gardening supply stores and on-line.
- Be sure the compost pile is located away from growing areas and where leachate or runoff from the pile does not reach growing areas.
- If buying compost that contains manure, ask for records to show the compost was produced according to the standards cited here.

Courtesy of Dr. Allen Harper, Virginia Tech

▲ Monitoring the temperature of the compost pile with a compost thermometer is necessary to determine if recommended temperatures have been maintained for the specific time required to eliminate pathogens.

Raw manure use

Raw manure can be used with certain precautions:

- Use raw manure to build fertility before planting with cover crops or crops that do not touch the soil.
- Do not topdress fruit and vegetable crops with raw manure.
- Incorporate manure into the soil. Wait at least two weeks before planting.
- Always wait at least 90 days before harvesting any crop where the edible portion does not come in contact with the soil after incorporation of raw manure, such as tomatoes, peppers, okra, etc.

- Always wait at least 120 days before harvesting if using raw manure with crops where the edible portion comes in contact with the soil, such as potatoes, carrots, beets, lettuce, etc.
- Store raw manure away from growing areas.
- Prevent runoff from manure piles from reaching growing areas.
- For dairy or hog slurry, use only material that has been stored for at least 60 days in the summer or 90 days in the winter.
- For poultry litter, use material that has been stacked for at least 8 days.
- Avoid tracking raw manure into active growing areas with machinery or boots.

▲ Beds growing root crops like carrots should only receive well-composted manures at planting. For fall-planted carrots, raw manure would need to be applied in the summer two months before planting to reach the 120 day waiting period.

Reducing contact of produce with animal feces

Wild animals are a part of farming and can play an important part in predator/prey relationships that can control some pests, but they can also bring pathogens into growing areas. Taking steps to exclude wild animals or discouraging their movement into growing areas, particularly near harvest time, will reduce potential contamination.

Courtesy of Jay Payne, Cedar Grove Farm

▲ Electric fencing to exclude deer is a relatively low cost way of managing this problem. This growing plot uses three strands in the inner fence and an outer fence with a single strand to confuse and discourage deer. Recommended heights of strands vary from as low as 6 inches to as high as 8 feet.

- Use fencing, netting, motion detectors connected to sprinklers or lights that frighten animals or other products to deter animals from growing areas.
- Check for signs of wildlife activity and do not harvest produce from areas where animal manure is present.

Domestic animals are also a potential source of pathogens, whether they are livestock such as poultry or pets like dogs and cats.

- Exclude poultry, pigs and other domestic livestock from growing areas.
- If using a chicken tractor for fertility and pest control or pigs for weed control, till the growing area to incorporate any manure and observe the proper 90 or 120 day waiting period before harvest, as appropriate for the crop.
- Exclude dogs and cats from the growing area. These animals can carry parasites and pathogens that infect humans.
- Never use dog or cat manures in composts.

Cross-contamination of raw manure and composted manure

Prevent cross-contamination from tools or equipment.

- Keep tools and equipment used to work with or transport raw manure separate from tools and equipment used with composted manure, or
- Thoroughly clean and sanitize these before use with composted manure.
- Be sure work boots, gloves and clothing are also cleaned after working with raw manure. Boots and gloves can be cleaned by scrubbing with a solution of 1 oz. powdered laundry detergent in one gallon of water and rinsing with a garden hose, followed by sanitizing.
- Sanitize using a solution of plain, unscented household chlorine bleach at a ratio of 2 tablespoons chlorine bleach per gallon of water. This solution can be applied by spraying or by immersion for 5 minutes. Allow to air-dry. Chlorine bleach and water sanitizing solutions degrade with time and with exposure to sunlight or heat. Therefore, sanitizing solutions should be made daily.

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