

Managing Manure on Horse & Livestock Farms in Clallam County

Managing manure on farms in Clallam County can be challenging, especially for small acreage landowners. Many landowners have more animals than their land can support and a substantial amount of manure to deal with. For example, a 1,000-pound horse produces about 50 pounds of manure per day; about 8 tons of manure per year! Not having a system for dealing with manure can quickly result in an unsightly mess and pose a health risk to you, your animals and your neighbors.



1 hen produces about 1 cubic foot of manure every 6 months!

Creating a Manure Management Plan for Your Farm

There are 3 main steps for developing an effective manure handling program on your farm:

1. **Collection** – Where are you picking up the manure from? How often will you be picking up and what equipment will you use?
2. **Storage** – Where will you store the manure? Is the storage location easily accessible year-round?
3. **Application** – How and where will you use the manure? Can you use it all on your land?



1 horse produces about \$150 worth of fertilizer per year so collect that manure & put it to work!

Why Manage Manure?

- **Animal Health**—Living in manure creates an unhealthy environment for livestock and can lead to parasite infestation and hoof disease. Manure can be a breeding ground for many annoying insects such as filth flies.
- **Manure & Mud**—Manure contains moisture and organic material which creates mud. Horse manure contains about 63% moisture and cattle manure contains about 88% moisture. Manure filled paddocks will quickly turn into a muddy mess during the rainy season.
- **Manure & Water Quality**—Runoff from manure piles and manure filled paddocks can pollute nearby streams and ground water with nutrients, bacteria, and sediments. Excess nutrients in waterways can cause algae growth and deplete oxygen levels and can make water unsafe to drink and swim in and can harm aquatic life as well.
- **Manure & Drinking Water**—Runoff from manure piles can leach through soil and into groundwater. The risk increases if you have well-drained, gravelly soils. Polluted runoff from manure piles can lead to high levels of nitrates in drinking water, leading to potential human health risks.
- **Farm Management & Aesthetics**—Stinky manure piles can lead to cranky neighbors and cause excessive flies. Manure management can be very challenging if you do not have a clear plan and facility to do so.
- **Valuable Fertilizer**—Manure contains nutrients that are essential for plant growth. The same nutrients that can pollute waterways can actually do wonders for producing healthy pastures. Spreading manure back onto pastures creates a natural nutrient cycle.



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Manure Collection

Manure should be collected from stalls, paddocks, and pens every 1-3 days. Worm eggs hatch every 3 days; so by collecting manure within that time period you should be able to eliminate parasite reinfestations. Manure deposited in healthy, productive pastures (dense stands of grass at least 3 in. tall) does not need to be collected. Dragging pastures periodically will help break up clumps of manure and evenly distribute the nutrients.

Collection Tips

- Invest in a good manure fork and wheelbarrow. Overly large wheelbarrows can be very hard to maneuver and push when full. Many livestock owners use motorized equipment such as a tractor with front-end loader or an ATV with an attached dump trailer.
- Rubber stall mats will minimize the amount of bedding material you use, significantly reducing the volume of material you need to handle.
- Install outdoor lighting so you can easily clean paddocks in the evenings.



Manure forks with 5/16" tine spacing makes cleaning llama, alpaca, sheep and rabbit manure much easier than using a horse manure fork.

Manure Storage

By building a well-designed manure storage structure, you will create a neat, tidy spot to store manure as well as prevent polluted runoff from entering surface or groundwater.

Location of Manure Storage

When deciding where to store your manure, consider the following:

- Pick a high, dry location away from wells or surface water (minimum of 100 feet), further if land is sloped.
- Choose a spot that is close to where you will be collecting the manure from; don't push your wheelbarrow any farther than you have to! Ensure year-round access is available for a truck and/or tractor.
- Prevailing wind direction – away from your home and your neighbors

Composted rabbit manure makes a great fertilizer!



Storage Structures—Options

There are numerous options and designs for manure storage structures. The design you choose should meet your management needs. Regardless of what design you choose for your storage, **any concentrated pile of manure should be covered with a roof or tarp.**

- **Compost Bins** – There are a variety of shapes and styles of compost bins and we recommend a minimum of 2 bins so raw manure can be loaded into one bin while finished compost can be removed from the second bin. Composting is discussed in more detail later in this handout.
- **Long Term Storage** – A concrete base and durable walls (made of cinder blocks, concrete or treated timbers) is recommended.
- **Temporary Storage** – Can be a simple pile covered with a tarp or a portable structure.

Manure Storage Structures— Base

Manure should be stored on a concrete slab, especially if you live on well-drained or gravelly soils. By storing your pile on a slab, you will minimize the risk of polluted runoff leaching into ground water.

Sizing Manure Storage Structures

We recommend that you size your storage structure to store a minimum of 6 months worth of manure production. **The Conservation District can help you determine how much manure your animals produce and how large your storage structure should be.**

Design manure storage structures large enough to provide 6 months worth of manure storage and be sure to cover it with a tarp or roof.



Covering your manure pile with a tarp will retain the valuable nutrients that your plants need to grow and will protect the environment by minimizing polluted runoff.

Application

Knowing what to do with the manure will keep your manure pile from turning into a manure mountain. Below are some options for utilizing livestock manure:

Apply it to your pastures – If you manage your pastures for grass production (rather than an exercise area for your horses), you can spread fresh or composted manure back onto your pastures. Most of the nutrients that animals eat end up in their manure. For example, more than 75% of the nitrogen that a steer eats will be passed into the manure. Manure can be spread onto pastures using manure spreaders or can simply be flung with a manure fork. Follow the tips below when spreading manure onto your pasture:

Refer to the “Managing Healthy Pastures in Clallam County” guide to learn more.

- **Only apply manure to pastures during the growing season.** This is generally March – October. Manure should not be applied to pastures during the winter because grass is dormant and will not uptake the nutrients. Excess nutrients on winter pastures can runoff and pollute nearby streams or leach into groundwater.
- **Take a soil test.** A soil test will provide information on your pasture’s current nutrient levels and how much fertilizer/nutrients you need to apply for optimum grass growth. The Conservation District offers a low-cost soil testing service (see *Soil Testing* brochure).
- **Only apply manure to healthy, productive pastures.** There should be at least 3 inches of grass before manure is applied to a pasture. Applying manure to overgrazed pastures can lead to pollution of surface and groundwater with excess nutrients and bacteria.

Give it away – Your neighbors and friends might appreciate using manure on their properties. Many gardeners compost manure and use it on their gardens and flower beds. The Conservation District’s “Manure Share Program” links livestock owners who have extra manure with those who want it.

Manure Share Program

To utilize the Conservation District’s Manure Share Program, simply call the office and asked to be added to the “Supplier List”. This list, along with your phone number and a general description of the manure & your location, will be distributed to local gardeners and residents who will contact you directly to make arrangements for pick-up.

Compost – Composting is nature’s recycling process. This biological process utilizes heat, moisture, oxygen, and microbial organisms to decompose plant and animal material. When the correct ratio of carbon (found in “brown” material like straw), nitrogen (found in “green” material like manure), moisture, and oxygen are mixed, microorganisms break-down the manure into soil-like material. Compost is a rich soil enhancer which improves the health of both plants and the soil. Turn your compost pile on a regular basis to aerate the pile and allow the material on the outside of the pile to heat up.

Benefits of Composting

- Composting reduces the volume of material you need to handle. On average, composting can reduce the size of a manure pile by about 50%.
- Reduces flies by eliminating their breeding ground and reduces the chance of parasite reinfestation (the heat generated during the compost process kills worm eggs).
- Kills most weed seeds.
- Reduces the chance of manure contaminated runoff from your property reaching surface and groundwater.
- Compost is a stable source of nutrient-rich soil amendment and fertilizer.

Composting Tip:

An easy way to ensure that oxygen reaches the center of your compost pile is to drill holes in a 4” PVC pipe and then insert that pipe into



Composting—How To

1. Determine the number of bins you need (see page 5). You will need a minimum of two bins to successfully compost. The more bins you have, the easier it will be to continuously compost livestock manure.
2. Ensure that you have the correct carbon to nitrogen ration (C:N). Generally speaking, the desirable ratio is about 25:1. Horse manure nearly contains the correct ratio, but needs slightly more carbon (which can come from shavings or straw).
3. Keep your compost pile about as damp as a wrung out sponge. This will require that you water the pile during the dry months. Keeping your pile covered with a tarp will help retain moisture, speed up the composting process, and keep your pile from becoming saturated during the wet months which can lead to anaerobic conditions (and a foul smell).



4. Turn your compost pile on a regular basis (at least once every few weeks). Turning will allow the material on the outside of the pile to heat up, as well as distribute oxygen throughout the pile. The organisms that are hard at work in the pile need plenty of oxygen to do their job. An easy way to help oxygen reach the center of your compost pile is to insert a 4" PVC pipe drilled with holes into your pile.
5. Finished compost will have an earthy smell and a crumbly, dark texture. This highly valued material can be used on pastures, lawns, gardens, flower beds, and flower boxes.

Composting can reduce the size of a manure pile by about 50%.

Conclusion

Developing and following a well thought-out manure management plan will help create a healthy farm for you, your family, your livestock, and the environment. Contact Clallam Conservation District for free assistance with developing a site-specific manure management plan for your land.

TROUBLESHOOTING THE COMPOSTING PROCESS

SYMPTOM	PROBLEM	SOLUTION
The compost has a bad odor.	Not enough air.	Turn the pile, add more PVC pipes.
The compost has a bad odor and is soggy.	Not enough air and/or too wet.	Mix in dry ingredients like straw or shavings, add PVC pipes and cover with a tarp.
The inside of the pile is dry.	Not enough water.	Add water when turning the pile. Should be as damp as a wrung out sponge.
The compost is damp and warm in the middle, but nowhere else.	Pile is too small.	Collect more raw material and mix it with the old ingredients. Piles smaller than 3' square have trouble holding heat.
The pile is damp and smells fine, but is not heating up.	Too many shavings, wood chips or bedding (carbon source) and not enough manure (nitrogen source).	Mix in a nitrogen source (fresh manure, fresh grass clippings, blood meal or ammonium sulfate).

EXAMPLES OF MANURE MANAGEMENT ON FARMS IN CLALLAM

Location: Agnew area Horse Farm

Problem: Horse manure and stall waste were stored in an old, timber structure located along an irrigation ditch. The walls of the storage structure had failed, allowing manure to topple into the irrigation ditch. Manure-contaminated runoff flowed off the pile and into the ditch during storms.

Solution: The landowners worked with the Conservation District to identify an area for a new manure storage structure that was both convenient for cleaning and did not pose a risk to ground or surface water quality. A new storage structure, which consisted of concrete floor with ecology block walls, was constructed in a location 130 feet away from the irrigation ditch. The concrete floor protects groundwater from nutrients that can leach off the pile and provides a durable surface for the tractor to load and unload the manure.



Location: Agnew area Hobby Farm

Problem: The landowners collected manure from their four donkeys, one horse, and goats and sheep, and piled it on native soil in a corner of their property. This corner became very muddy because of heavy traffic and roof runoff, which flowed off a nearby barn and into this area. Runoff from the manure pile posed a threat to the water quality of a nearby pond and to groundwater.

Solution: The landowners worked with the Conservation District to develop a farm plan that led to the construction of a heavy use area, drastically improved pasture production, eliminated muddy areas, and resulted in the construction of a new composting structure for manure. The new structure consists of three, 5'x5'x4' pressure-treated wooden bins with a roof. The boards are removable, allowing the landowners to easily load fresh manure into a bin and remove finished compost out of the other bins. Roof runoff water from the barns were directed into drywells which protected the quality of the clean rainwater and reduced muddy areas on the farm.



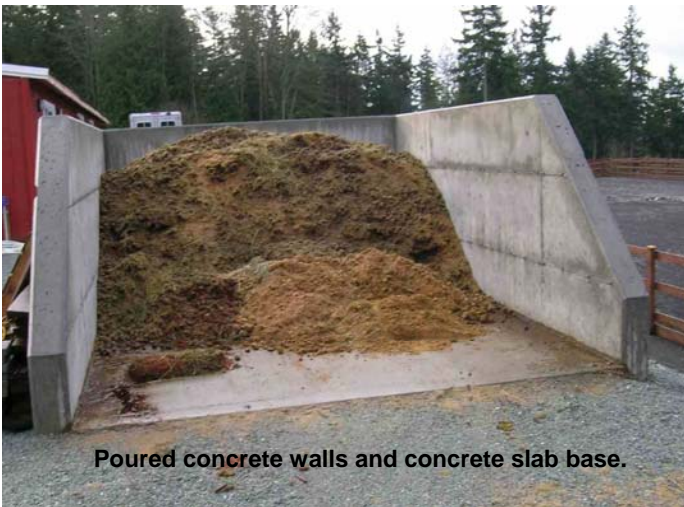
Location: Horse Boarding Farm near Carlsborg

Problem: Horse manure and stall waste was stored in a pile near a drainage ditch. The pile often tumbled into the drainage ditch and manure-contaminated runoff impacted the water quality of the ditch.

Solution: A new manure storage structure was constructed with a concrete slab, ecology block walls, and a curb to retain runoff. This new structure provides a defined, safe space to store the manure, preventing contaminated runoff from entering the ditch. A grassy filter strip was installed between the manure storage structure and the drainage ditch to help collect and utilize nutrients in runoff before they enter the waterway.



SAMPLE MANURE STORAGE STRUCTURES & COMPOST BINS



Poured concrete walls and concrete slab base.



Pressure treated wood walls, attached roof, concrete apron and base.



Three-bin compost system with ecology block walls, adjustable timber fronts, attached roof, and concrete base.



Two-bin compost system with equipment storage area. Slats added to front gates to aid with air circulation, attached roof, concrete paving stones used as base.



Pressure treated timber compost bins on compact native soil, covered with a tarp.



Basic manure pile covered with tarps. At a minimum, manure should be covered with a tarp to minimize polluted runoff.

Manure Management Plan

Designing a Manure Storage Structure for Your Farm

Name: _____ Property Size: _____
 Acres of Pasture: _____

1. Fill in the table below. Refer to the table below for waste generated per month.

Animal	Number	Waste/month (cu. ft.)	Storage Needed per Month
TOTAL			

Waste generated per month by livestock type:

Animal	Weight (Lbs)	Waste (Cu. ft. per month)
Beef	1000	28.5
Horse	1000	24.3
Pony	700	16.8
Sheep	100	1.8
Llama	330	6.93

2. Decide how many months of storage you will need. **We recommend that you plan for a manure storage structure that will hold 6 months worth of manure.** Multiply your total monthly storage needs by the number of months you are planning to store the manure. Enter that number here: _____ cu. ft.

3. Now that you know how much manure you need to store, determine the size and number of bins you will need. The size of the bin you choose is flexible.
Remember: length x width x height = volume

Bin	Length feet	Width feet	Height feet	Volume (cubic feet)
Example Bin	6	6	4	144
Bin 1				
Bin 2				
Bin 3				
TOTAL	_____	_____	_____	

Cut Here



Utilizing Manure on Your Farm—Pasture Application

1. The table below lists the amount of nutrients produced annually by different livestock. These numbers are based on the size of the animal. Fill in the blank table to determine the pounds of nutrients produced on your farm each year.

Animal	Nitrogen (lbs/year)	Phosphorus (lbs/year)	Potassium (lbs/year)
Horses (1,000 lbs.)	102	18.25	69
Cow (1,000 lbs.)	120	44	95
Sheep (100 lbs. each)	16	2.5	11
Pig (150 lbs.)	26	8	16

Livestock Type	Number of Animals	Nitrogen (lbs/year)	Phosphorus (lbs/year)	Potassium (lbs/year)
TOTAL	_____			

2. Fill in the blank table below. Use the data from the table below to determine how much pasture you need in order to apply all the manure generated by your livestock. Remember, these numbers are based on whether your pasture is in fair or good condition. We do not recommend spreading manure on poor pastures.

Livestock Type	Number of Animals	Acres of Good Pasture Needed	Acres of Fair Pasture Needed
Horse	1	1.0	1.5
Cow	1	1.0	3.0
Goats	5	1.0	3.0
Sheep	5	1.0	3.0

Your Livestock Type	Number of Animals	Acres of Pasture Available	Acres of Pasture Needed
TOTAL			