

Conservation Corner
Prince William Soil & Water Conservation District
By Kate Norris

Manure Management on Horse Farms

What do you do with all that manure? Pile it up just outside the barn door and try to ignore the ever growing “Muck Mountain?” What *should* you do? You need a plan for manure management that fits your operation.

Manure Management, Part I
Manure/Bedding Production
& Manure Storage

Got horses? Got manure. Horse farms that confine horses to stalls or sacrifice area paddocks for 12 or more hours a day will easily accumulate tons of manure and stall bedding per horse, per year. A thousand pound horse will produce approximately 45 pounds of manure per day, and depending on the type and amount you use, bedding can add another 20 +/- pounds (a prepackaged bale of shavings weighs 35 lbs). How much waste are you dealing with? Follow the example below to get an estimate.

45 lbs manure/day X 365 days/yr X ____ horses X ____% confinement = ____ lbs manure collected per year

____ lbs bedding/horse/day X 365 days X ____ horses = ____ lbs bedding collected per year

____ lbs manure + ____ lbs bedding = _____ lbs of animal waste to store & spread or remove per year (divide by 2000 to convert to tons)

Following this example, two horses confined to stalls or a paddock half the day year round, using an average amount of bedding, will produce 15.5 tons of waste per year! Horse waste is a big farm management issue. How much time, energy, or money are you allowing in your horsekeeping budget for responsibly dealing with it?

If the two horses in our example were kept turned out year round (in our area that would require approximately 3-4 acres per horse) a few things would change. For one thing we would not be using bedding, which accounted for nearly 50% of our waste. The remaining approximately eight tons of manure would be “spread” by the horses for us (leaving the owners to drag the fields) at a rate of about one ton per acre per year. Spreading manure at this rate will not overload the plants or cause water quality problems through runoff.

Consider an alternative, and fairly common, scenario with ten horses on a 10-acre property that has eight acres of open pasture. The horses are confined 60% of the time in stalls or paddocks to keep some ground cover on the pastures. The manure and stall waste generated by this herd is a staggering 86 tons per year! If the waste is spread on the pastures, which may or may not have a lot of grass cover to utilize the nutrients, the spreading rate would be 11 tons per year. Over time spreading manure at this rate will oversupply grass with nutrients that cannot be utilized, resulting in nutrient-rich runoff. The runoff will continue downhill until it reaches dense vegetation (a buffer) or waterway. The nutrients, and bacteria, in the manure that are not “captured” in buffers will cause problems for aquatic life in our streams.

What should you do with your manure? Start by considering storage. Ideally, manure should be kept in a storage structure with an impermeable floor and a roof. Protecting the pile from rainwater and runoff water will decrease the amount of nutrients that are leached through the pile into groundwater or carried away by runoff. The manure pile should be stored at least 100 feet from any ponds, streams, wetlands, drainage ways, and wells. Storing manure on a concrete pad with a tarp over the pile is a good, economical option. If you plan to actively compost your manure, by turning or aerating and monitoring temperature and moisture levels, a three-sided multi-bin storage structure will be helpful.

Manure storage structures, for farms that plan to spread their manure, should be sized to hold a minimum of 120 days of waste. Manure should only be spread when plants are actively growing (think about the months during which you have to mow). Manure spread when plants are dormant, or when soils are frozen or saturated with water, will runoff. A structure sized for 120 days of storage will provide adequate space to house manure through the winter months. To determine the appropriate structure size, use the following formula as a guide.
Hint: Check your wheelbarrow to see how many cubic feet it holds and note the average number of loads you fill per horse. Mine is an average size and it holds 6 cubic feet.

$$\text{___ cu ft of waste/day/horse} \times \text{___ horses} \times 120 \text{ days} = \text{___ cu ft of storage}$$

Then design your storage on paper. Consider whether you want to have a concrete pad, a single three-sided bin, or multiple bins and how high you can stack your manure. If you don't have a tractor with a bucket don't count on having manure stored five feet high. Multiply the length by the width by the height to determine cubic feet of space. Experiment with different sizes until you find a design that meets your needs.

If you've taken the time to work through the calculations, you should have a better idea about how important a manure management plan is for your operation. In part two, we'll continue with other issues in manure management. I'll provide you with information about nutrient cycling on traditional farms versus horse operations. This and other information will help you determine whether

spreading manure on your pastures or finding an “off-farm” use for your manure is the best option for your operation both short- and long-term. I’ll also tell you how to calibrate your manure spreader so that you can control the amount of animal waste (& nutrients) you apply per acre. And finally, I’ll discuss options for finding an “off-farm” use for manure that you don’t want to spread.

Part II

Nutrient Cycling & Manure Utilization

After reading Part I you should have a better idea of how much manure your operation produces as well as how that manure should be stored. **What should you do with all that stored manure?** Should you spread it, have it removed periodically, or some combination of both options? Before you decide, there’s another concept you need to be familiar with...nutrient cycling.

Nutrient cycling is the process by which nutrients move into, through, and off of a farm. The goal of the horse farm manager should be to balance the inputs and outputs so that soil nutrient levels remain optimal for pasture or hay production. In a traditional farming operation nutrient inputs come in the form of fertilizers, feed, and even in the animals. Cattle farmers bring in fertilizers to produce pasture and hay to feed to the cows and eventually remove the nutrients from the farm in the cattle when they are sold or slaughtered. A traditional farm has both inputs and outputs.

A horse farm is different. As horse owners we generally purchase hay and grain to feed to our horses. We may also purchase fertilizers. All of these things we bring onto the farm, including the horses themselves, contain nutrients. The cycle on the horse farm is a closed cycled. There are no outputs. If we then also reapply the horse manure to the land (a potential output), the soil nutrient levels build. Over a period of time the soil nutrient levels can build to a level beyond which the pasture vegetation can utilize it. The excess nutrients will then leave the farm in run-off. Not a good output. The same thing would apply even if you don’t collect and spread manure but you have a high stocking rate (too many horses, too little land) in a pasture-based system. The horses will “spread” their manure for you.

How do you know what your soil nutrient levels are? Soil nutrient levels can only be determined by having your soil tested. A nutrient management planner uses the soil analysis along with knowledge of the nutrient needs of different crops (including pasture and hayland) to determine your nutrient (fertilizer/manure) needs. Hayland has a much higher nutrient need than pasture, because nutrients are removed when the hay is harvested. Higher nutrient levels are also necessary when you are establishing pasture on a new area.

You may find that you need your manure. If so, how much should you apply? Well, remember horse manure has nutrients just like soil and those nutrient levels can vary from farm to farm. The next step in nutrient management is to have your *manure* analyzed. Analyzing a representative sample from your manure pile (including stall bedding) will determine the levels of Nitrogen (N) Phosphorus (P) and Potassium or Potash (K) that are “plant available.” The analysis will show you how much N, P, and K are in one ton of your stall waste. After calculating supply versus demand, the soil and manure nutrient levels and the plant nutrient needs, you can determine the spreading rate for applying your manure. In many cases, you may still need to apply the balance of the needed nutrients in the form of commercial fertilizers.

As soon as you have determined the rate at which you *should* spread, you will need to figure out exactly *how* to spread the manure at that specified rate (“X” tons per acre). Depending on the type, size, and adjustability of the spreader, it may take a little work to determine and then adjust your rate. You can figure out your spreading rate, no matter how “low-tech” your equipment is, by measuring (weighing on a tarp) the output of your spreader over a specified distance. Finally, adjust your spreading rate to match the prescribed rate. We will be happy to come to your farm and work with you.

What if your soil nutrient levels are already high and you shouldn't or, for other reasons, don't want to spread any or all of, your manure? In our area, you have a couple of options. The fact that we live in a diverse and rapidly urbanizing area can work to your advantage. There are many gardeners, new homeowners (trying to establish new lawns on fill dirt), farmers, sod producers, and landscaping companies that may want your “waste.”

The District's Urban Soil Enhancement (USE) Manure Program is our attempt to create a network through which manure producers (that's us) and manure users can cooperate. Although the District very actively advertises and promotes the program, unfortunately just adding your farm to our list won't guarantee a “manure-free” existence for your farm. It's also up to you to seek out and establish relationships with potential users in your local neighborhoods and communities. Several farms have told me about such mutually beneficial arrangements they have or have had in the past. You have to hustle a little.

Another, more costly, alternative is to have your manure removed periodically. In our area there are a few individuals that provide this service; some even include a metal dumpster in which you can store your manure. As with all services, pricing and customer service can vary.

The Prince William County does not accept manure at the landfill or composting center at this time. The District hopes to facilitate an agreement, on behalf of the many horse owners in the county, allowing manure to be taken to the composting center where it could be managed and recycled. We'll keep you posted.

In conclusion, manure is a significant environmental issue for horse farms. Manure management is one aspect of nutrient and overall farm management that deserves careful planning and plan execution. As I hope you are learning, the most common land management concerns on horse farms- pastures, manure, and even mud are interconnected. Having an overall farm plan, even if you are only able to implement it over time, in stages, is key.