




### Mud is a problem because:

- Unhealthy environment for horses
  - Mud Fever or scratches
  - Rain Scald
  - Thrush
  - Abscesses
  - Internal Parasites
- A pain for owners
- Unsightly for your farm and neighborhood
- Impacts the environment
  - Causes runoff of sediments and nutrients
  - Contaminates surface water and maybe your drinking water



### Recipe for Mud

- Increase of surface water
- Highly organic soil (vs. gravelly, well-drained soil)
- Build-up of manure
- Decomposed organic material
- High traffic areas
- Compaction (causes an impervious surface)
- Break down of vegetation (that stabilizes soil)

### Create a Sacrifice Area


- Pasture that is going to be “sacrificed to save the others!”  
OR
- Small, non-irrigated, non-grazing areas
- Constructed with footing materials

**AKA:**

- Turnout, Corral, Paddock, Run, Holding pen
- So named because you sacrifice the grass here to save it elsewhere
  - “Beat it up, and clean it up”

### Why should I?

- Maintain healthy pastures
- Good for water quality
- Keep nutrients, sediments and pathogens out of the water
- Cleaner, healthy farm for animals and people
- Less work!



### Sacrifice Areas Must be MANAGED:

- Animals are kept on it during wet periods.
- Animals kept on it whenever grass is not growing (winter) or when pastures are below 3” to 4” (summer, fall).
- Feed hay. If possible, don't feed on the ground.
- Pick up manure.

## Techniques for Reducing Mud

1. Establish a sacrifice area
2. Use footing for paddocks
3. Use footing in other high traffic areas
4. Install gutters & downspouts
5. Use vegetation as a mud manager
6. Pick up manure regularly

## All-Weather Paddocks Determining the Right Size

- Approximately 300 to 400 square feet per horse
- Larger exercise area that allows for running and playing might be 20-30 feet wide by up to 100 feet long
- Individual area attached to stall may be 16' x 16'

## Location

- High ground away from water and wells
- Level to slightly sloped area for drainage
- Consider depth to ground water
- Convenient location close to barn
  - Easy care of horses
  - Maintenance and cleaning
- Avoid north side of barn structures
- Avoid septic system and drain field

## Site Preparation

- Scrape off accumulated mud, manure and other organic matter
- If possible, gently slope away from the barn (1 to 2 %), no more than 5%
- Select “hoof friendly” footing materials, especially in high use areas
- General rule of thumb min. 2:1 ratio of footing to mud

## Popular Footing Options:

- Hog fuel
  - Wood chips, shredded bark
  - Fairly inexpensive
  - Reduces urine odors
  - Provides a cushioned surface
  - Packs down and decomposes
  - Not all hog fuel is the same!
  - 6" minimum, 12" for longevity
  - Add new layer every year or two



## Popular Footing Options:

- Gravel (crushed rock)
  - 3/8-inch minus to 5/8-inch minus crushed gravel
  - 6 to 8 inches for longevity
  - Gravel migrates into soil
  - More expensive than hog fuel
  - Lasts many years if managed correctly
  - Larger gravel may be used for a base with smaller on top

## Popular Footing Options:

- Sand
  - Coarse, washed sand (fill sand)
  - Easier to scoop up manure
  - Less potential for sharp edges
  - Best if applied on top of a gravel base
  - Potential for injury if deeper than 4-inches
  - Do NOT feed directly on the sand (potential for sand colic)

## Sand



Shadysprings Farm

- Inexpensive
- Use coarse sand (fill sand)
- 4 inches deep
- Add more when needed
- If used on top of gravel, easier to scoop manure

## Geotextile Fabrics

- Synthetic material, filter fabric
- Small holes so that water can pass through, but not soil particles
- Soil stability and load distribution
- Provides separation
  - Prevents the base material from mixing with the footing material

## Geotextile Fabrics

- Roll out the fabric smoothly
- Overlap the edges 12-inches
- May need to use staples to tack it down
- Spread footing material over the fabric



Shadysprings Farm

## Dual Purpose Areas

- Round pen
- Arena

Be aware of sharp edges, nails, boards, metal T posts, etc...

## Rain Gutters and Downspouts

- The Problem
  - 1" of rain on a 20'x50' barn roof produces 620 gallons of water.
  - 21" of rain per year
  - 13,000 gallons of extra water !





## Grassy Buffer Strips

- Healthy grassy areas
- Down slope from heavy use areas
- Pasture, lawn, or landscape



Shady Springs Farm



## Using Vegetation (and fencing!)



- Helps capture polluted run-off
- Vegetation utilizes water and helps keep areas drier
- Provides a buffer or filter
- May even provide shade
- Helps protect water quality

## Scooping Poop

- Scoop up manure every 1 to 3 days
  - Avoids habitat for parasites
  - Gets rid of the organic material
- Pick up waste feed
- Feeding plan

## Good Manure Management

- Keeps horses healthy
- Keeps your farm looking nice
- Returns nutrients to the soil
- Improves pastures and gardens



## Manure is an issue because:

- Animals get sick
- Unsanitary conditions
- Complaints from neighbors, which drives regulatory programs
- Increased insect and parasite populations
- Harms environment and water quality

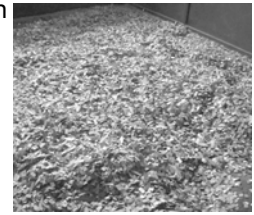


### Horse manure production

- 1 horse, 1200 pounds
  - WEIGHT: 50 pounds manure & urine/day
  - VOLUME: 1 cubic feet/day
- WEIGHT: 50 lbs/day x 30 days/month x 4 months = **6000 pounds of manure**
- VOLUME: 1 cu ft/day x 30 days/month x 4 months = **120 cubic feet of manure**

### Bedded stall or barn

- With bedding added in you can easily have twice as much material to handle
- 240 cubic feet/horse in four winter months



[www.nationalhorrestalls.com](http://www.nationalhorrestalls.com)

### Manure is a resource

- Returning manure to soil promotes soil fertility and plant growth
- Important nutrients
  - Nitrogen (N)
  - Potassium (K or K<sub>2</sub>O)
  - Phosphorus (P<sub>2</sub>O<sub>5</sub>)



[www.senecaway.com/compost.htm](http://www.senecaway.com/compost.htm)

### Nutrient value of manures

Animal	N lbs/ton	P <sub>2</sub> O <sub>5</sub> lbs/ton	K <sub>2</sub> O lbs/ton
Beef	11.3	8.4	9.5
Chicken	27.3	23.5	13.2
Goat	22.0	5.4	15.1
Horse	12.1	4.6	9.0
Sheep	22.5	7.6	19.5

### Questions to Ask Yourself?

- How much will you have?
- Can I use it all on my property?
- Where can you safely store or compost it?



### Storing Manure

- Determine a safe place to store manure.
  - Distance from streams, ponds, wells
  - Prevailing wind direction (neighbors)
  - Slope of ground
  - Soil type
- Do not store manure in a low area or where it mixes with water



### Cover the Piles

- Management-
  - Weighted tarp or plastic
  - During wet season
- Better Management-
  - Concrete pad with curbs
  - Weighted tarp or plastic
- Best Management-
  - Concrete pad with curbs
  - Roof with gutters and downspouts



### What to do with the Manure?

- Apply it to your property
- Compost it
- Arrange with gardeners, landscapers, or farmers to remove it
- Craigslist
- Haul it away yourself
- Pay someone else to haul it



### Benefits of Composting

- Reduces volume by 50%
- Kills parasites
- Reduces weed seeds
- Reduces odor
- Improves handling qualities
- Provides slow release fertilizer
- A valuable product



### Composting Process

- Oxygen
- Moisture
- Ideal carbon to nitrogen ratio (30:1)
- Temperature (130-150 F)



### Carbon to Nitrogen Ratios

Pig manure	7:1
Poultry manure	10:1
Coffee grounds	20:1
Grass clippings	12 to 25:1
Horse manure	25:1
Tree leaves	30 to 60:1
Straw	40 to 100:1
Wood chips/Sawdust	200 to 500:1
Wood	700:1

Making and Using Compost, University of Missouri Columbia

### Tips for Composting

- The more the pile is turned, the quicker it will compost (4 to 10 weeks)
- Could install perforated pipe in the middle of the pile to increase airflow
- Moisture content is important
  - Ideal 50 to 60%
  - Should feel like a wrung out sponge
  - Too wet or too dry-microbs may die



### Tips for safe manure/compost application

- Buffer from water source (if flat ground)
- Away from natural drainages
- Apply ¼ to ½ -inch at a time to pastures in spring or late summer



### Too much product?

- Can't change the amount of manure a animal produces so...
- Reduce the amount bedding materials
  - Use rubber stall mats
  - Use alternative bedding options! Beyond sawdust and shavings
  - Only small amount of bedding for urine adsorption

### Shadysprings Farm Karin Hunt

- Boarding facility
- Mud in winter and dust in summer
- Concerns with the growing manure pile
- Tried different footing combinations



### Sand Only



- Inexpensive
- Use coarse sand (fill sand)
- 4 inches deep
- Add more when needed

### Gravel With Sand



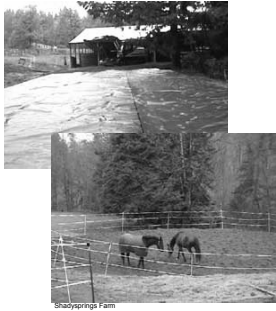
- 4 to 6-inches of 3/4" minus gravel
- Pack gravel
- 4-inches of fill sand
- Gravel will mix with sand
- Have not had an increase of bruising or abscesses from gravel

### Gravel with Woodchips



- 1 ½-inch minus gravel layer ≥ 4 inches
- Pack gravel
- Added a 12-inches of wood chips (used cedar chips)

### Geotextile with Gravel & Sand



- Woven geotextile fabric
- Overlap pieces 12 inches
- 4 to 6-inches  $\frac{3}{4}$ -inch minus gravel
- Pack gravel
- 4-inches of fill sand

### Karin says:

[www.shadyspringsfarm.com](http://www.shadyspringsfarm.com)

- “I have seen the light!
- Used to have lots of mud in winter and dusty dirt in summer.
- Now I have healthy horses”



### Shadysprings Farm on Manure and Bedding:

- Some people build mountains
- Some pay to have it leave
- We chose to implement it into our farm . . . .



### Composting Area--



- 36' x 36' covered structure
- Pile is reduced in half
- Applied to pastures
- Save \$ on fertilizer
- Used as mulch
- Extra compost is sold or given to neighbors

### Shadysprings Farm

- Leave vegetative buffers along streams
- Fence
- Use grass for buffer strips



### Three Cedars Farm

Dani and Ralph Zack



Dressage and jumping training facility with covered arena, 15 box stalls, 7 paddock stalls and 4 run-in shed paddocks.



### Paddock Stalls

- First 7 stalls have attached paddocks
- All stalls have mats
- Bedded with sawdust
- Outside doors are closed at night
- Outside paddocks are:
  - Geotextile fabric
  - 3/8" round rock
  - 4-5" deep



### Run-in Sheds and Pens



- 4 Outside Pens with Run-in Sheds
- Pens measure 40' x 24'
- Land slopes into Pasture
- Pen Footing:
  - Geotextile Fabric
  - 3/8" Round Rock 4-5" deep

### Run-in Footing



1                      2                      3

- 1--before footing installation—original gravel too thin with no underlying fabric
- 2--re-used some of the original gravel over fabric
- 3--finished with clean 3/8" minus round rock and held in place by a 2" x 6" treated wood edging board

### What we learned

- Geotextile is worth it!
- Kickboards needed for round rock
- Threshold between stall & paddock helps keep shavings out of gravel & vice-versa
- Rock must be deep enough to protect fabric
- Horses paw & play with fabric!
- Maintenance is required



### Turnout Paddocks

- Grass paddocks closed for winter
- "sacrifice" paddocks have 5-6" cedar hog fuel cover to suppress mud
- All paddocks must be picked weekly
- Replenishment will be required before spring
- Spent hog fuel goes where??



### The Swale

- Captures run-off from barn roof via 11 downspouts
- Slows water movement for soak-in & cleansing
- Gravel for mud suppression for horses going to turnout
- Grasses & water plants to hold soil and absorb water, give shade etc.



## The Road

- Road from manure dock to compost bins gets 3x daily use
- Spread 1" quarry rock by truck over road



## The Compost Bins



## What we've learned...

- Manure is not sitting around the horse barn area or leaching into ground water, pond etc.
- Fly problems were minimal in summer (we used fly predators in compost bin 1)
- Compost is GOLDEN!
- Adding water at turning is important to speed breakdown, even in winter and under roof and tarp. Adding other nutrients could give even better results (more N, P, Ca, kelp etc.)
- Composting takes space and **must** be roofed and/or tarped
- Composting is somewhat labor and fuel-intensive.

## Karen Kohler's Story



- 3 horses on 2 acres
- Very small pasture area
- Two biggest concerns:
  - Mud and manure accumulation
  - Horses access polluted stream
- Wanted to use local resources and keep costs down!

## In the beginning--

- Used old carpet scraps as the separation fabric



## Under construction--

- Packed 6 inches of quarry crush, road base (3" rock chunks)
- 2 to 3 inches of cheap quarry tailings from ¾" minus gravel
  - Sharper edges
  - Packed down (drove on it, then let horses out)



- Installed telephone poles for kickboards to keep footing in place



### Construction Completed--

- For easier cleaning, 4-inches of sand
- Coarse/washed
- Not dusty



### Gutters and Downspouts



### Fencing, Kickboards & Gates



### Constructing Manure Storage


- Installed concrete floor and curbs
- Set posts for walls



- Sloped entry for easy access when unloading wheelbarrow





- Slatted wood sides to allow for air movement




### Construction Completed--

- Turns the regularly
- Has to add some water
- Compost is used for landscapes and gardens





### Karen's Vegetated Buffer

- Pasture area is located near the Little Pudding River
- Water quality is not good
- Didn't want horses in the water for 2 reasons
  - Horse safety
  - Avoid being a contributor to the problem




### The project--

- Planted willow stakes in February-March
- Create a natural fence and buffer



### The Bottom Line...

- Managing mud and manure reduces flies and pathogens
- Healthier farm for animals and people
- Helping out the environment too!



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