ID-171

UK UNIVERSITY OF KENTUCKY College of Agriculture

Using Dry Lots to Conserve Pastures and Reduce Pollution Potential

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Managing horses can be a rewarding experience, but it can also be challenging. Improper pasture management of horses during the winter and early spring months can adversely affect pasture quality and the environment. Horse owners can elect to use a dry lot during increased rain or drought periods, when pastures need to be protected. Dry lots are designed as permanent heavy traffic/use areas and are often used on cattle farms. They keep animals in a confined area to prevent them from damaging the entire pasture. A typical dry lot would contain water sources, feeders, and mineral supplement. The area can be used for wintering animals, handling animals for medical treatments, reducing calorie intake for obese horses, etc.

Justification for a Dry Lot

Congregating horses around feeding and watering areas can create mud, increase soil compaction, eliminate desired vegetation, and lead to increased weed infestation. Simply put, overgrazing and wintering horses on pastures can be problematic in Kentucky, because of the weather. One reason is the relationship between precipitation and evapotranspiration (ET), the process of losing water from wet surfaces and vegetation due to evaporation and transpiration. In the early summer months, plants survive by using their roots to remove water and nutrients from the soil. An intense rainfall event can produce runoff when the infiltration rate is exceeded, but this can be filtered by the existing vegetation. In late fall, precipitation begins to exceed ET, and the soil water becomes recharged (Figure 1). By winter time, ET has diminished, but precipitation is still occurring. The surface of the soil remains wet for longer periods and less water can be stored in the soil, increasing the potential for runoff. These wet conditions reduce soil strength and allow mud to develop if the vegetation is severely grazed, trampled, or removed. Grazing too many horses on a limited area over long periods of time during these wet periods creates muddy conditions for horse owners/operators (Figure 2). More important, increased traffic during wet periods increases the bulk density and reduces aeration of the soil, making it more difficult for root growth and water infiltration.

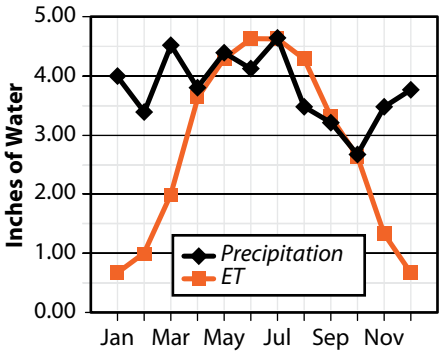


Figure 1. Rainfall and evapotranspiration by month.

Precipitation data provided by the UK Agricultural Weather Center, averaged on a per-month basis from 1895 to 2007. http://wwwagwx.ca.uky.edu/.

Figure 2. An overgrazed field with too many horses. In the background hay is fed on the ground for supplemental feeding.

While the wintertime water movement is occurring and mud is accumulating, the horses in the pastures should being supplemented with additional feed to make up for the decrease in actively growing vegetation. However, the horses don't stop feeding on the remaining forage. There is limited vegetation to reduce surface runoff, allowing sediment, manure, pathogens, and nutrients to flow off the soil surface and travel off-site. At this point, increased soil compaction is probaby preventing absorption of water and nutrients into the soil. Meanwhile the streams are reaching the top of their banks and removing the water and contaminants from the watershed. Erosion of the soil, if allowed to go unchecked, can lead to environmental impacts such as the removal of soil and nutrients.

To prevent overgrazing, refer to College of Agriculture's publication *Using a Grazing Stick for Pasture Management* (AGR-191). This publication provides useful information regarding the stocking density for pastures and when to remove animals when forage becomes limited.

By spring, the once-green pasture is mostly bare with compacted soils. Weeds, which are very efficient at converting nutrients and sunlight into vegetative mass, are now able to propagate in the bare areas. In the areas that were used for feeding hay, a thick mat of uneaten material may have smothered the soil and vegetation. The area now holds moisture and has kept the soil temperatures cooler, preventing the reestablishment of a desired vegetative cover. The end results are fields that have soil and nutrient losses that will require more management and money to eliminate weeds and reestablish grass.

Benefits of Dry Lots

The use of dry lots can:

- Maintain forage and reduce mud on a larger pasture scale, thereby controlling the amount that an animal consumes. (Controlling the amount of forage consumed is especially important for older animals that require weight control.)
- Prevent erosion around the fence line, gates, waterer, and other high traffic areas.
- Reduce the need for vegetation maintainance. (Unlike pasture, any vegetation that does emerge is a weed and can be sprayed with a broad spectrum herbicide according to manufacturer's recommendations.)
- Function as central locations for watering and supplemental feeding for several pastures.
- Provide shade.
- Reduce the need to renovate pastures.
- Act as an outdoor facility that can be used to manage animals.
- Allow other pastures to be rested and fertilized to provide additional yield for the following year. (*Stockpiling for Fall and Winter Pasture* [AGR-162] is designed for cattle producers, but the concepts can be applied to horse production.)

How to Construct a Dry Lot

A dry lot is removed from a larger pasture area by a fenced boundary. A dry lot can also be set up as a hub for a series of paddocks. In either situation, horses are allowed access to the dry lot through one or two gates that lead from the existing pasture or pastures. The area is used year-round to provide access to water and supplements, but it can also be used during the winter and early spring months as a confined feeding area.

Figure 3 shows an ideal location for a dry lot that is in close proximity to the barn to reduce labor. This particular dry lot is intended to provide water, feed buckets, salt/mineral block, shade structure, and possibly a hay ring feeder. The size and layout of the dry lot allows gates, feed, and water to be adequately spaced to limit overcrowding that may expose the horses and handlers to risk. Farm gates are used to allow freedom to move from the dry lot to the pasture or as a means of limiting access to the much larger pasture area.

Location

Depending on the layout of a paddock, the location of the dry lot can be easily determined. Topography and environmentally sensitive areas should be considered when planning the location. The location of the dry lot should be a well drained area that is relatively flat and does not have a drainage swale or ditch running through or across it. The logical location of the dry lot would be around an area where the water source is located. An ideal location is on a summit or flat area on top of a hill, as long as there is some protection from the wind (structure, trees, etc.). A summit location usually provides a long distance for any runoff to travel before it reaches a stream or waterway. Farm managers should not place a dry lot near a stream or where the

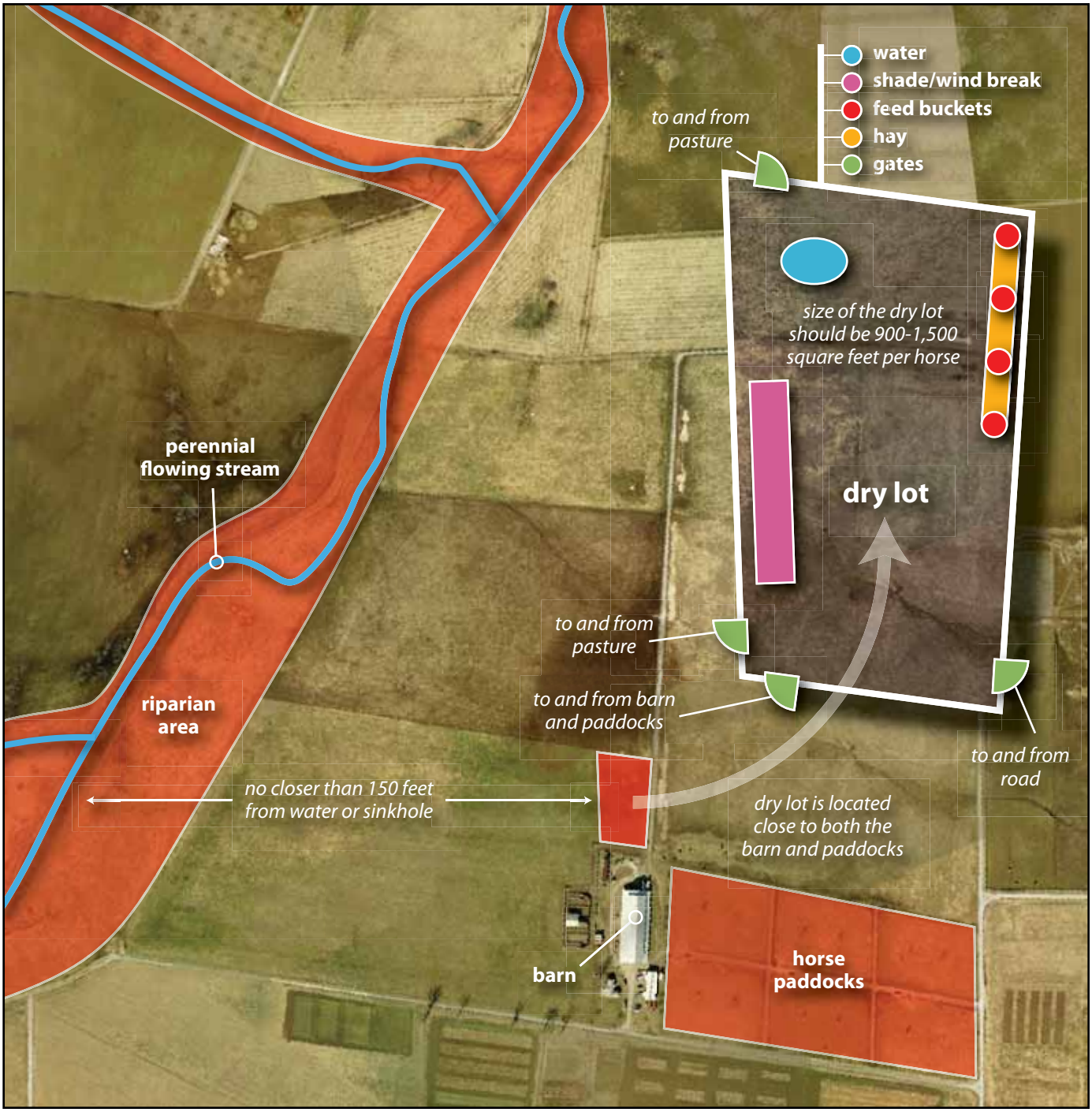


Figure 3. A dry lot placed away from environmentally sensitive areas but close to horse operation.

drainage to a stream or sinkhole is less than 150 feet away. If a stream is located nearby, producers should consider installing a riparian area (dense vegetation along a body of water) to protect water quality.

Figure 3 shows the location of a dry lot placed away from environmentally sensitive areas but close to the horse operation. This area already suffers from high traffic and could have a heavy traffic area installed to reduce mud. Ideally, the dry lot would be placed on a summit and should not be adjacent to a barn, because roof runoff can have an adverse effect if allowed to flow through any part of the dry lot. However, the dry lot should be close to the farm operations to save time. Drainage water should move off the area as sheet flow and drain into a buffer strip. Clean water should be diverted from the dry lot.

Size

Size should be considered in the design to provide adequate space for the planned number of animals to move around freely to eat, drink, and socialize. An area of at least 900 to 1,500 sq ft per horse is recommended. The size is dependent upon the age, type, size, number, and temperament of the horses as well as the area available for enclosure. Keep in mind that most horse operations that have constructed pads regret not making the sites bigger. If other uses are planned for the pad, the size of the area should be adjusted accordingly.

Construction

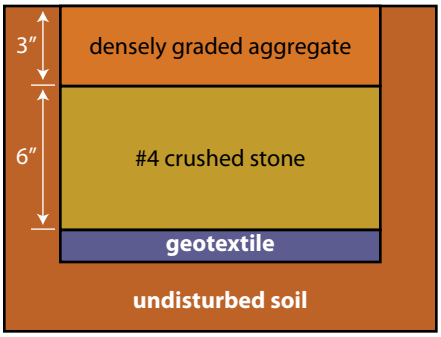
Individuals skeptical of the benefits of having horses on gravel instead of mud can opt to create an area that is only partially graveled. Construction can begin once the dry lot has been justified, located, and sized.

Excavation of the topsoil is required to construct the heavy use traffic pad. The topsoil is removed down to a soil horizon with a higher clay content and more stable surface. Producers have used track and skidsteer loaders to excavate the soil down to a clay layer. Some producers have used plows to till the soil and to make it easier for the soil to be removed by skidsteer loaders. Producers installing these areas should strongly consider where the spoils will be placed. Producers may even want to consider selling the topsoil removed from these areas.

After excavation, geotextile fabric should be laid down over the exposed soil to prevent rock from sinking into the ground and soil from moving up through the matrix. The National Resources Conservation Service (NRCS) recommends a non-woven, non–heat bonded, and needle-punched geotextile fabric under all treatment areas unless the foundation is rock or concrete is used as the surface treatment. The fabric should have the minimum material requirements as specified in Table 1. A weight for the geotextile fabric is usually not specified, because the specific material features are different from one manufacturer to another. The fabric should be at least a 6 oz/sq yd weight fabric to meet the requirements in the above table. Your local agriculture and natural resources extension agent, NRCS district conservationist, agricultural supply store, concrete supply store, etc., are potential sources of information on where geotextile fabric can be purchased.

A base layer of large rock (i.e. #2 or #4s) should be laid on top of the fabric, to a depth of at least 6 inches (Figure 4). Caution should be taken when spreading the base layer not to disturb the geotextile fabric. After the base layer, a top layer of 3 inches (minimum) of dense grade aggregate (DGA) should be spread over the area (Figure 4). This will provide a solid, stable surface for feeding over the winter. It may also be desirable to extend the geotextile fabric and rock out past the gates into the pasture, as these areas will see heavy traffic, especially if only one entrance to the pad exists. Further criteria and considerations for the construction of the dry lot surface can be found in NRCS Conservation Practice Standard Code 561, Heavy Use Protection Area, and the College of Agriculture publication *High Traffic Area Pads for Horses* (ID-164).

Figure 4. Construction details for high traffic area pads.



Fences and Gates

A wide range of fencing options exists, depending on the desires of the horse owner/operator. However, dry lots are permanent structures and should not be constructed using temporary or only electric tape materials. In a situation where the animals are crowded it is very important to think of horse and handler safety. Corners and metal T-posts should be avoided. Normally, the dry lot will have a gated access from a farm road or farmstead. Gates and fences should be designed to accommodate truck and tractor access to facilitate feeding and cleaning. It should also have at least one gated access from the dry lot to the remaining pasture. Further information for the construction of fences can be found in NRCS Conservation Practice Standard Code 382.

Costs

The cost of installing a high traffic area pad for a dry lot will be approximately $0.80/sq ft (Table 2); a concrete pad would cost about $4.00/sq ft. Costs of the project can be reduced by excavating the site yourself and possibly selling the topsoil. Costs of the project can be justified by the money that would typically be spent renovating lost pasture and the forage that would be saved. Forage

Table 1. Minimum Requirements for Non-Woven Geotextile.

Property	Test Method	Value
Tensile Strength (pounds)[1]	ASTM D 4632 Grab Test	150 min
Bursting Strength (psi)[1]	ASTM D 3786 Diaphragm Tester	320 min
Elongation @ Failure (percent)[1]	ASTM D 4632 Grab Test	> 50
Puncture (pounds)[1]	ASTM D 4833	80 min
Ultraviolet Light (% residual tensile strength)	ASTM D 4755 150 hours exp.	70 min
Apparent Opening Size - AOS	ASTM D 4751	# 40 max[2]
Permittivity (1/sec)	ASTM D 4491	0.70 min

1. Minimum average roll value (weakest principal direction)
2. U.S. standard sieve size
Source: NRCS Conservation Practice Standard, Heavy Use Area Protection Code 561.

losses can be reduced by 25 to 50% when feeding on a dry lot surface or from hay feeders placed on a dry lot surface rather than from muddy surfaces. Horses placed on dry lots may also lose fewer shoes in the mud, which is another savings.

Dry Lot Management Strategies

A dry lot is typically designed to keep horses off a pasture to prevent them from harming the vegetation. When managed in this manner the animals are fed supplemental feed (hay) on the dry lot until the conditions change. However, more management is required to prevent the animals from eating too much grass after being fed hay, because it could lead to colic, founder, and possibly death of the horse. Horses are not required to spend all of their time in the dry lot during the winter months. A good time to allow the horses to have access to pasture is when the field is frozen, because it is possible that they could still graze without harming the surface of the paddock. Getting the horses off of a gravel surface is also a good management practice when the gravel surface is frozen. During these times, the gravel can act as an abrasive surface that could wear and damage hooves. The chances of this occurring depend on the amount of manure and forage residue cushioning the gravel surface as well as whether the horses' hooves are protected by shoes.

Dry lots have been used as locations to provide lighting for open mares. Usually the horses are brought up from a pasture and placed under the lights before evening. This method has been used as an alternative to housing the mares in stalls through the night.

Dry lots can also be managed to prevent or restrict horses that are overweight or susceptible to founder from eating grass pastures during certain times. On average, in Kentucky, these animals would be held off pasture from the time grass begins to grow vigorously (April) until the time it begins to slow (June) and then again when the forage begins growing again in the fall. During the remaining times the horses can usually be placed on pasture without a significant chance that they will overeat.

Another approach to managing a dry lot is to allow the horses to freely move from the dry lot area to a pasture through an open gate year round. Ideally, the dry lot would be set up as a hub for several pastures to provide a rotational grazing system. In this case the dry lot is used more as a heavy traffic area pad for feeding and watering the horses. Although not considered a normal dry lot, it is a useful area for managing the horses and controlling mud.

Table 2. High traffic area pad costs.

Item	Cost (/sq ft)
Geotextile Filter Fabric	$0.06
Rock Base (No. 4 Crushed Limestone)	$0.25
Densely Graded Aggregate	$0.14
Total Materials	$0.45
Labor/Grading Work	$0.35
TOTAL COST	$0.80

Maintenance of the Dry Lot

Maintenance of the dry lot should include scraping up manure and unused hay on an "as needed" basis. The pad should be periodically cleaned to prevent the buildup of manure and the possible mixing of the manure with the rock surface. How often the pad needs to be cleaned depends on several factors, including the number of horses, the size of the pad, how long the horses are on the pad, the amount of feeding and wasted hay, etc. When removing the manure and wasted forage, try to remove as little rock from the surface as possible. The areas with the highest concentration of manure and wasted forage should be cleaned on a regular basis. Typically, this will not involve cleaning the entire pad.

If possible, the manure should be stored in a covered structure until it can be properly disposed. One of the best methods is land application to cropland or pasture based on crop removal rates and soil test fertility levels. Manure applications should be preceded by soil test results. For more information see *2008-2009 Lime and Nutrient Recommendations* (AGR-1) and *Soil Testing: What It Is and What It Does* (AGR-57) for how to collect soil samples. All manure applications should follow the NRCS Code 590 Nutrient Management recommendations. The manure could also be composted prior to land application. (See *Composting Horse Muck* [ID-168] for more information.)

Through proper operation and maintenance, the dry lot could provide a stable and secure area for winter feeding and year round watering for many years without the need for significant repairs or additions. Maintenance may include periodically top dressing with DGA, applying moisture, and compacting the area.

Further Reading

2008-2009 Lime and Nutrient Recommendations (AGR-1). http://www.ca.uky.edu/agc/pubs/agr/agr1/agr1.pdf.

Composting Horse Muck (ID-168). http://www.ca.uky.edu/agc/pubs/id/id168/id168.pdf.

High Traffic Area Pads for Horses (ID-164). http://www.ca.uky.edu/agc/pubs/id/id164/id164.pdf.

Nutrient Management (NRCS Code 590). http://efotg.nrcs.usda.gov/references/public/IL/590.pdf.

Soil Testing: What It Is and What It Does (AGR-57). http://www.ca.uky.edu/agc/pubs/agr/agr57/agr57.pdf.

Stockpiling for Fall and Winter Pasture (AGR-152). http://www.ca.uky.edu/agc/pubs/agr/agr162/agr162.pdf.

Using a Grazing Stick for Pasture Management (AGR-191). http://www.ca.uky.edu/agc/pubs/agr/agr191/agr191.pdf.

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