AEN-169

Cooperative Extension Service

Cattle Winter-Feeding Area Evaluation

Steve Higgins and Lee Moser, Biosystems and Agricultural Engineering

Winter feeding of cattle is necessary in Kentucky, since forages are dormant from late fall to spring. To prevent damage to multiple pastures by the creation of mud from livestock and tractor traffic, producers traditionally select a small area to "sacrifice" for this task. However, poorly chosen sites for winter feeding can lead to the accumulation of mud and loss of productivity of livestock. This publication should be used as a tool to evaluate the suitability of winter-feeding sites and to provide solutions for correcting deficiencies.

The main criteria for selecting a winter-feeding area should be effective water management and mitigation strategies. This is accomplished by selecting a site with soils that are moderately well drained. The amount of water that flows over, filters through, or remains within a column of soil will affect many mechanical properties of the soil. These mechanical properties include stickiness, plasticity, strength, trafficability, and compactibility. Producers interested in more information on soil mechanics should refer to the publication Understanding Soil Mechanics to Improve Beef Cattle Winter-Feeding Areas and Production (AEN-150).

Figure 1. A calf drinking contaminated water in a feeding area may cause scours or be a source of other waterborne pathogens.

Winter-Feeding Area Criteria

A winter-feeding area should consider all aspects of animal, soil, and land husbandry. Its location should be evaluated and chosen only if it meets certain standards. The following criteria should be considered:

- Avoid sites within a 100-year storm floodway or floodplain.
- Avoid sites susceptible to ponding or to the formation of ephemeral streams after storm events.
- Place the winter-feeding area on top of a hill to eliminate surface or runoff water from flowing through the feeding area as sheet or concentrated flow.
- Ensure a setback of at least 300 feet from residences and areas frequented by the public.
- Check that the soils for a feeding area are deep, moderately well drained to well drained, and free of any restrictive layer like a fragipan/hardpan. In addition, there should be five feet of soil before reaching bedrock. The soils should be classified as prime farmland and not highly erodible soils.
- Confirm that the soil hydrologic group for the area is classified as group B. (The designated soil hydrologic group for an area on a farm can be determined by locating the area of interest on a printed county soil survey or by accessing the Web Soil Survey.)
- Use a vegetative filter or buffer with at least 75 percent cover to separate the feeding area from any waterway, with a minimum distance of 300 feet between them. A fenced or excluded area, with thick vegetation, should be able to reduce the setback distance to 100 feet. Techniques for maintaining 75 percent cover will be discussed later in this publication.
- Limit the slope of the feeding site to 3 percent or less, with greater slopes requiring more buffering area below the feeding area.
- Create mounds in the feeding area, using soil or tree mulch, to provide positive drainage and relief for the animals. Periodically, the mulch/soil will need to be pushed up and reformed into a mound.
- Provide off-site watering sources—but not streams or ponds! Water sources should be at least 150 feet away from the feeding areas to encourage movement. Otherwise, animals may drink from adjacent mud puddles and footprints (Figure 1).
- Situate feeding areas at least 50 feet away from sinkholes and depressions to prevent groundwater contamination. Fifty percent of Kentucky has medium to high potential for karst feature development, such as sinkholes and depressions.
- Remove and spread waste hay and manure, when weather permits, to remove contamination potential and to facilitate the reestablishment of vegetative cover.

Farm Maps

The importance of the feeding location cannot be overstated. Maps are a useful tool for decision- making because they force us to look at data spatially. Maps are great for showing relationships, connections, and distances, as well as problems and their potential solutions. In this case, they can be used as part of a site evaluation method for planning where a feeding site should be placed. More information on farm maps can be obtained in the publication Maps for Farm Planning (AEN-141).

When selecting winter-feeding sites, the selection standard requires that soils have a moderately low runoff potential when thoroughly wet (hydrologic soil group B). The objective of the soil hydrologic criterion is to have soil with a good infiltration rate, but not so great that the infiltrated water passes easily through the soil profile. The goal is to have the water filtered as it passes through the soil profile. Conversely, soils with low infiltration rates increase runoff potential.

There are four basic soil hydrologic groups (see Table 1). Group B soils are the best for winter-feeding areas because the ability to drain moisture will also reduce the creation of mud while allowing for some filtration as the water passes through the soil profile. In the absence of hydrologic group B soils, group C soils are the next best option. Groups A and D should always be avoided.

Table 1. Characteristics of hydrologic soil groups, when soil is thoroughly wet.

Soil Classification	Runoff Potential	Water Transmission Through Soil	Suitability for Winter-Feeding Areas
Group A	Low	High infiltration rate	Not suitable. Soil that drains too quickly may have a high potential to release pollutants into the environment.
Group B	Moderately low	Moderately high infiltration rate	Most suitable. Moderately low runoff potential is best suited for reducing pollution runoff.
Group C	Moderately high	Somewhat restricted	Suitable if Group B soils are not available. Group C soils are more prone to pollution runoff and therefore less desirable.
Group D	High	Restricted or very restricted	Not suitable. Restricted or very restricted water movement through the soil results in the accumulation of mud.

Case Study

Figure 2 shows a boundary map of the Eden Shale Farm, located in Owenton, Kentucky. The map shows the soil hydrologic groups. The preferred group B soils are limited to a floodplain area. Although these soils are well drained, they are susceptible to flooding. Therefore, they are unsuitable for a winter-feeding site. In addition, the group B site is not centrally located to provide labor efficiency. The next best option is the hydrologic group C. Consequently, most of the feeding sites (marked with blue cow symbols) are located on group C soils.

Winter-Feeding Area Improvement

All-Weather Surfaces

Continuous animal traffic on a feeding area placed on unimproved earth will diminish the physical properties of the soil. Soils under heavy traffic will eventually subside and become compacted, and the soil will lose its ability to drain. In the past, producers would apply straw to these areas, referred to as "straw yards," to provide some relief for animals. However, instead of straw, producers today might use low-quality hay bales to provide bedding during extreme winter events to reduce stress on animals. Since these areas will have to be renovated every year, the lifespan of this practice is one year.

An earthen surface can be improved, and its lifespan extended, by hardening the

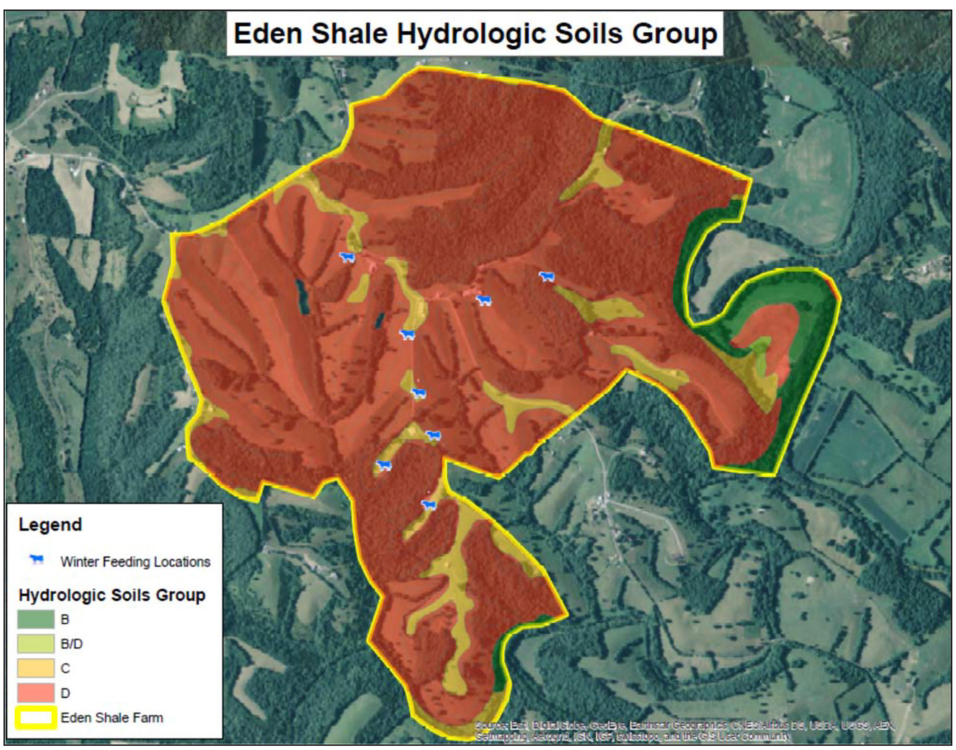

Figure 2. A map of the hydrologic soil groups at Eden Shale Farm. The map also shows the location of the existing feeding sites in relation to the hydrologic soil group ratings.

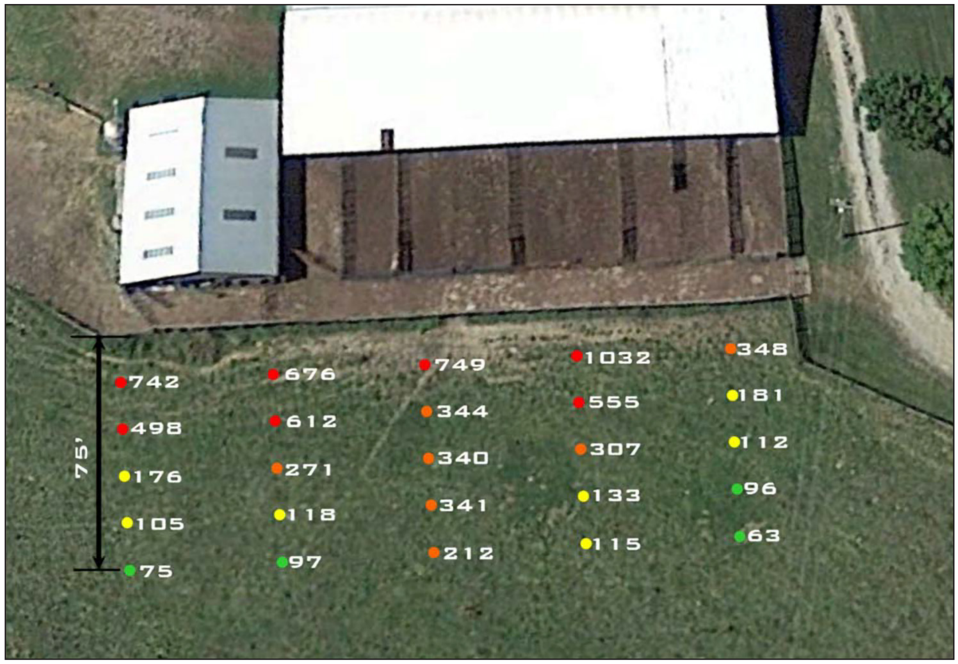

Figure 3. Soil test phosphorus concentrations in pounds per acre analyzed from soil samples. Phosphorus concentrations above 45 pounds per acre (all samples) do not contribute to vegetative production. Values over 200 pounds per acre (red and orange) may pollute runoff.

Figure 4. A view of a vegetative treatment strip, compared to a grazed pasture.

area. Properly installed heavy traffic pads consisting of geotextile fabric and rock will have a lifespan of five to seven years under heavy use. More information on all-weather surfaces can be obtained in the publication Appropriate All-Weather Surfaces for Livestock (AEN-115).

Concrete feeding pads are another option for a reinforced feeding surface. However, they are more expensive initially than any other hardened surface. Nevertheless, they are easy to clean, do not develop ruts, and can last for 30 years or more. Ultimately, covered areas with bedding and hardened flooring are the best over the long run, as far as maintenance and labor costs are concerned.

Vegetative Filter Strip

Another option is to establish an area below the site to provide infiltration and vegetative cover so runoff never reaches a sensitive area (e.g., a sinkhole, pond, or stream). It is important that the runoff be slowed to enable infiltration, treatment, and utilization of nutrients. Biological processes in the vegetative filter/buffer area should provide infiltration, which can also degrade harmful pathogens and utilize nutrients. The combination of these beneficial processes is why vegetative buffers are called treatment strips. An ideal vegetative treatment area is one that can provide infiltration, evapotranspiration, and nutrient uptake, as well as slow the water flow to allow for sedimentation and filtration of runoff water. To accomplish this, tall, stiff blade vegetation is needed. Rigid blades will provide the stability necessary so that the forage does not lay over during high-runoff events. Another important characteristic is to have sheet flow, in which the runoff flows across a wide area as a thin layer. The issue with this standard is that water follows a path of least resistance, and even if a level plain is provided, preferential flow will typically develop. More information on all-weather surfaces can be obtained in the publication Enhanced Vegetative Strips for Livestock Facilities (ID-189).

Figure 3 shows the nutrient concentration of soil test phosphorus in pounds per acre, based on soil samples taken from the Eden Shale Farm. The high concentrations are a result of runoff from the adjacent feeding area. Figure 4 shows the implementation of a vegetative filter strip to filter runoff from the feeding area. Figure 5 shows an aerial view of the filter strip and contrasts the vegetation with the adjacent field. Implementing this area was as simple as fencing the area off from livestock.

Creating a vegetative filter area does not mean the area is abandoned and cannot be used for production. Figure 6 shows cattle grazing the area and utilizing the tall, lush vegetation. Access to the vegetative filter is accomplished using a two-gate system. Figure 7 shows a traditional farm gate, which is closed to exclude livestock or opened to allow the herd to utilize the area. In addition to the traditional gate, a creep gate was incorporated in the design to allow calves to access the area, while excluding adult cattle. The concept of the gate system is to maintain a tall and thick vegetative stand by excluding livestock and to allow the area to work as a treatment system.

Although tall fescue is not an ideal vegetation for filtering, there is not a hardier variety of grass that can stand up to the abuse of trampling. It is also better than no vegetation at all. Producers should consider

Figure 5. An aerial view of a vegetative treatment strip used to filter runoff from a feeding area.

Figure 6. Vegetative treatment strips can still be used with controlled grazing.

Figure 7. A two-gate system used to control the height of vegetation in a vegetative treatment area.

installing vegetation that can remove mass amounts of nitrogen and phosphorus. The publication Enhanced Vegetative Strips for Livestock Facilities (ID-189) provides more information on this technique. The basic idea is to implement a vegetative filter downhill from winter-feeding areas to absorb, utilize, and treat runoff by providing an area for runoff to slow, filter, and infiltrate into the soil profile. The concept of a vegetative filter can also be applied to feeding areas within a field. Figure 8 is an illustration showing how a fenced-in vegetative filter can be implemented below a winter-feeding area.

Rotating Fields

The key to managing winter-feeding areas is to move the animals to different pastures often. Managing winter-feeding sites will reduce the risk and severity of disease in newborns/calves and environmental pollution. An ideal winter-feeding technique is to have a field for wintering and a field for calving and nursing. Having a field for calving where the cows' teats and calves' navels are not covered with mud at the time of calving will go a long way in preventing scours and other health problems. This also allows the producer to spread animals out by increasing the acres per head, which should reduce exposure to infectious diseases. Separating areas where animals feed and drink by at least 150 feet will also motivate them to leave the area and spread out their manure over a greater area.

Diversions

Another technique that can be used to reduce mud is to divert clean water from the upslope areas. Diversions or berms can be installed to prevent water from flowing through the winter- feeding site and should be the first practice that producers implement. This practice keeps the water clean and reduces runoff volume. Producers should consider using practices to divert gutters, surface drainage, interception ditches, and other sources away from the winter-feeding area.

Summary

Winter-feeding of cattle is a task that must be performed in Kentucky, since forages are dormant from late fall to spring. The producer's goal is to provide a winter-feeding site with positive drainage and a suitable all-weather surface. Well-drained

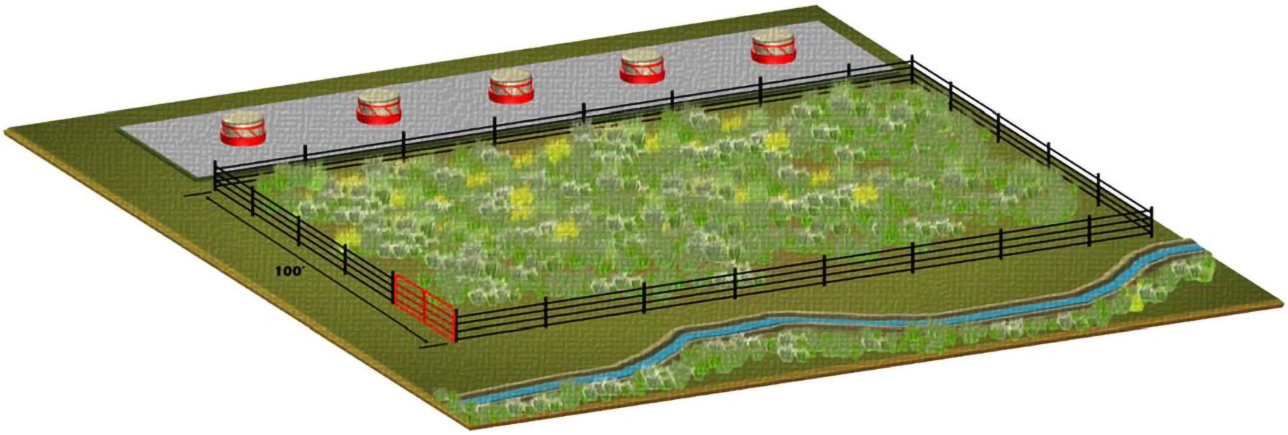

Figure 8. A conceptual illustration of a winter-feeding area with a vegetative treatment strip placed below to intercept and treat contaminated runoff. (graphic by Donnie Stamper)

soils are best for winter-feeding areas, producing crops, and providing the optimum environment for the mineralization of nutrients found in manures. The soil profile should not have a restrictive layer to a depth of 40 inches. A silt-loam texture is preferred. There should be no gray mottling throughout because this is an indication of poor drainage or flooding, and the area should never be placed in a floodplain. Likewise, the slopes should be no more than 3 percent.

Runoff from winter-feeding sites will contain phosphorus and nitrogen, which can cause eutrophication of water bodies and lead to algae blooms and oxygen depletion in water. The potential also exists for the transport of disease-causing pathogens that can be present in livestock manure. Runoff containing contaminants should not reach ponds used to water livestock. In addition, the creation of mud can reduce feed consumption, while at the same time increasing the energy requirement for cattle. In some cases, the creation of mud can increase animal morbidity and mortalities.

The excess work, mess, and drudgery of having an unimproved winter-feeding area could be reduced or eliminated if producers choose to feed cattle using well-designed facilities. The publications Fenceline Feeder Systems for Beef Cattle Production and Resource Conservation (AEN-134) and Reprogramming a Tobacco Barn to Hay Storage and Self-Feeding: An Eden Shale Case Study (AEN-164) are examples of functional winter-feeding practices.

An evaluation of a winter-feeding site is critical for avoiding the creation of mud and the spread of disease. Maps are useful tools for determining where a winter-feeding site should and should not be located. All-weather surfaces such as concrete or geotextile and rock feeding pads should be used over unimproved surfaces. Techniques such as the use of multiple pastures and vegetative filter treatment areas are good management practices for avoiding pollution while also utilizing nutrients in manures that are already on the farm.

References and Resources

Enhanced Vegetative Strips for Livestock Facilities (ID-189)

Fenceline Feeder Systems for Beef Cattle Production and Resource Conservation (AEN-134)

Maps for Farm Planning (AEN-141)

Reprogramming a Tobacco Barn to Hay Storage and Self-Feeding: An Eden Shale Case Study (AEN-164)

Understanding Soil Mechanics to Improve Beef Cattle Winter-Feeding Areas and Production (AEN-150)

Web Soil Survey

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