ID-188

University of Kentucky
College of Agriculture, Food and Environment
Cooperative Extension Service

Strategic Winter Feeding of Cattle Using a Rotational Grazing Structure

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Winter feeding of cattle is a necessary part of nearly all cow-calf operations. In winter months, livestock producers often confine animals to smaller "sacrifice" pastures to reduce the area damaged from winter feeding. A poorly chosen site for winter feeding can have significant negative impacts on soil and water quality. Such areas include locations in floodplains, such as those along creek bottoms or around barns near streams. These locations are convenient, flat areas for setting hay ring feeders; however, their negative effects on water quality outweigh the convenience.

In Kentucky, winter feeding of cattle on unfrozen ground almost always leads to mud. Combined with feces and urine deposited around hay rings or feeding areas, it can result in an area of concentrated pollutants that pose a threat to nearby water resources.

Livestock producers should consider re-evaluating historic winter feeding practices, especially when they could be detrimental to production and the environment.

This publication describes the problems with traditional winter pasture management and the benefits, construction, and implementation of a winter feeding structure that can be used in conjunction with managed grazing practices (Figure 1).

Figure 1. This winter feeding structure protects pastures, reduces labor, and decreases costs.

Problems with Traditional Winter Pasture Management

Production Losses

Production losses can occur if wintering cattle are haphazardly managed. When cattle are closely confined, especially in the winter, manure and wasted hay can accumulate. The manure contains bacteria, viruses, and protozoa that increase susceptibility to calf scours and other diseases such as navel ill and coccidiosis. When cattle are fed hay unrolled on the ground or in a ring feeder, the hay can become trampled and wet, until it is eventually rotten and unusable as feed.

The production system commonly used by producers also wastes energy. It takes time and fuel to haul feed to the cattle. It also takes additional energy for the cattle to walk through mud and maintain body temperature when the bottom third of the body is covered in mud. That extra energy requires more feed. Without it, performance can be reduced.

Environmental Impacts

Runoff from manured areas can contain infectious agents as discussed above, but this runoff also contains nutrients such as nitrogen and phosphorus, both of which negatively impact water quality if introduced to local waterways. Feeding densely stocked cattle concentrates all these pollutants, and transporting hay to the field adds to the problem. Tractors and other equipment create ruts, which encourages ponding and mud. Combined with the cattle foot traffic around the feeder, heavy equipment creates even more mud, destroys vegetation, and increases erosion, which degrades pasture quality and increases the chance of polluting surface water runoff. Sediment released from mud and eroded areas during storm events also destroys aquatic habitat and threatens valuable water resources.

A significant amount of pollution can occur if winter feeding is conducted around streams, water bodies, or other environmentally sensitive areas and if runoff from these areas is not managed. If pollution can be traced to a specific operation, the owner could be subject to a fine or be forced to implement corrective measures. The current Kentucky Division of Water fine for polluting the waters of the Commonwealth is $25,000 per day. Fines from other regulatory agencies, including the U.S. Environmental Protection Agency and county government offices, are also possible.

Benefits

This publication is based on the construction of a confined winter feeding structure that took place as part of a watershed project and involved the Kentucky Natural Resources Conservation Service (NRCS). The goal was to expand upon a typical feeding and heavy use area by adding concrete and an unroofed structure. This system allows cattle to come to the structure for feeding and then return to a vegetated pasture, making it easy to implement in combination with rotational grazing.

This type of system is ideal for a small cattle producer with less than 200 acres and split herds of no more than 25 cows. Cattle from multiple pastures can be managed to be totally confined, confined for a few hours, or free to enter and exit the structure as they please. The system is designed to elevate hay and feed and keep cattle from using the hay as bedding. This structure and complementary heavy use area pads form a solid footing area that protects pastures, reduces labor and expenses, and improves water quality and other natural resources when managed properly.

Pasture Protection

By limiting the number of animals in one area, damage to pastures is reduced. The structure can also be installed for use with multiple pastures, which reduces the amount of land degraded by densely stocked winter feeding. Pastures also improve because tractors do not rut the field and cattle foot traffic does not degrade land around multiple ring feeders or wagons. Traffic in areas near the structure increases as animals travel to and from the feeding structures, but if planned correctly, soil disturbance is minimized.

Feed Conservation

Feed and hay wastage is also reduced using this system because the hay and feed are not placed directly on the ground and the cattle are managed to utilize all feedstuffs. The forage placed in the structure can also be restricted by closing gates to the feeding area when hay supplies are limited due to a previous summer drought.

Energy Savings

Labor and fuel are reduced because the cattle come to the structure; there is no need to haul the hay to the cattle. This type of structure is ideal for part-time livestock producers who usually feed in the early morning before work or in the evening after coming home. The capacity of the structure can be designed to hold multiple roll bales. Based on 1,000-lb roll bales, 25 cattle, and a storage capacity of 6 roll bales, one feeding could last nearly seven days, which means a savings of pasture quality and time because producers could possibly postpone feeding time to the weekends. Pastures are additionally preserved because producers do not rut up fields in the evenings after work, after the soil has been warmed by the sun and the area is vulnerable to disturbance.

Manure Management

Manure management is also easier with this structure compared to small wintering pastures. Manure is easily collected from the structure and can be used as part of a nutrient management plan to fertilize pastures or hay fields to increase yields. Also, less manure needs to be collected from the structure if cattle use the pasture in combination with the feeding structure.

Environmental Protection

This system may well protect or improve water quality along with production. Potential water quality benefits depend on site-specific conditions, including the sites chosen for winter feeding areas and their proximity to environmentally sensitive areas like streams or karst features. The farther away a feeding area is from surface water and karst areas, the less likely water pollution is to occur. Another factor is the proximity of previous winter feeding sites and the location of drainage channels that may have carried pollutants off site. If the drainage of the new feeding area connects with previously established drainage, the new feeding area could contribute to water pollution just as the old system did. The degree and length of slope, stocking density, and size of area used are also important in gauging the environmental benefit of constructing a winter feeding area and implementing a rotational grazing system. If sited and managed properly and consciously, water quality and other natural resources will be protected as a result of the implementation of this new winter feeding management system.

Site Selection and Construction

Site Selection

The site for a winter feeding structure should be on a summit, well drained, easily accessible, and usable by at least two pastures. An ideal design should incorporate a rotational grazing system. Drainage should be considered so that there is no off-site runoff containing manure and nutrients draining to neighboring properties, streams, or other water bodies. Also consider modifying drainage to divert upland watershed areas so that they do not drain across the confinement area. This diversion will keep water clean and decrease the amount of contaminated runoff coming from the confinement facility.

Construction

Size

A standard structure for a herd of 20 to 25 head would need to be approximately 40 ft by 40 ft. Plans depicting a typical design can be found online at: https://www.uky.edu/bae/awqp-plans-drawings.

Materials

The confinement area should be constructed using concrete or another impervious material. The head gates and panels for the structure can be fabricated using treated wood, cable, guard rail, or purchased metal panels, depending on producer preferences.

Heavy Use Area Pads

Approaches to the structure for cattle and tractors should be constructed using a heavy traffic area design as specified by the NRCS (Figure 2). After excavation, geotextile fabric should be laid down over the exposed soil to prevent rock from sinking into the ground and soil moving up through the matrix. The NRCS recommends that a non-woven, non-heat bonded and needle-punched geotextile fabric be installed under all treatment areas unless a foundation of

Table 1. Minimum requirements for non-woven geotextile.		
Property	**Test Method**	**Value**
Tensile Strength (lb)[1]	ASTM D 4632 Grab Test	150 min
Bursting Strength (psi)[1]	ASTM D 3786 Diaphragm Tester	320 min
Elongation @W Failure (%)[1]	ASTM D 4632 Grab Test	>50
Puncture (lb)[1]	ASTM D 4833	80 min
Ultraviolet Light (% residual tensile strength)	ASTM D 4755 150 hours exp.	70 min
Apparent Opening Size	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 Code 561, Heavy Use Area Protection.

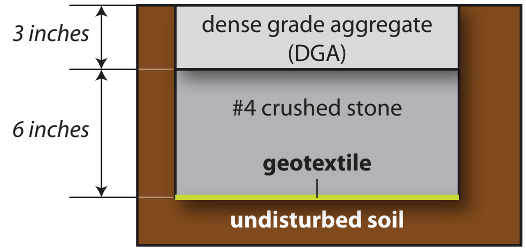

Figure 2. Construction details for heavy use area pads.

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 vary between manufacturers; however, the fabric should have at least a 6 oz/sq yd weight to meet the requirements in Table 1. Your local agriculture and natural resources extension agent, NRCS district conservationist, agricultural supply store, and concrete supply store are potential contacts for information on where geotextile fabric can be purchased.

A base layer of large rock (#2 or #4), at least 6 inches deep, should be placed on top of the fabric. Caution should be taken when spreading the base layer not to disturb the geotextile fabric. After the base layer is constructed, a layer of 2 to 3 inches of dense grade aggregate (DGA) should be spread over the area (Figure 3). This DGA layer provides a solid, stable surface for feeding over the winter. It may also be desirable to extend the geotextile fabric and rock past the gates into the pasture, especially if there is only one entrance to the pad, as these areas see heavy traffic.

Further criteria and considerations for the construction of the heavy use area surface can be found in the NCRS Conservation Practice Standard Code 561, Heavy Use Area Protection, and the the University of Kentucky Cooperative Extension publication *High Traffic Area Pads for Horses* (ID-164).

Management

This type of structure can be managed to feed backgrounding calves, but the best approach is to use the structure as the hub of a rotational grazing system. A system of creep gates and a concrete apron on the sides can be used for creep feeding fall calves.

The key to managing this structure in a way in which cattle freely come and go is to provide water and minerals away from the structure to entice cattle to eat in the structure and then move out and away. By providing these incentives, the volume of manure that must be managed is reduced because the cattle are spreading it throughout the fields. A comprehensive system can be created by incorporating additional features such as working facilities and loading chutes adjacent to the structure for treating cattle.

Manure from the area should be collected and stored until it can be land applied to a crop or forage to effectively utilize the nutrients. A nutrient management plan (NMP) should be developed to calculate land application rates based on soil test results, realistic crop yields, and the concentration and amount of nutrients in the manure. The main goal of the NMP should be to protect local surface and groundwater quality. A rotational grazing structure for winter feeding can help accomplish that goal, along with improving production and preserving pasture quality.

Figure 3. The heavy use area pad at the entrance of the structure provides a solid, stable surface that prevents cattle and equipment from creating mud.

The Authors would like to acknowledge these educational and technical service providers for their idea, design, and implementation of the feeding structure demonstration project on which this publication was based:

Bo Renfro, NRCS Lincoln County, District Conservationist
John Benson, NRCS Lincoln County, Technician
Paul Jeffries, Lincoln County Conservation District, 319 Watershed Coordinator
Dan Grigson, UK ANR Agent Lincoln County