AEN-138

Cooperative Extension Service

Protecting Pastured Cattle Using Windbreaks and Mounds

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One of the most challenging aspects of cattle production in Kentucky is the weather. The climate is temperate and humid, with a high amount of precipitation distributed equally throughout the year. Challenges include hot, humid summers that can lead to heat stress and cold, wet winters that can lead to muddy conditions. Kentucky is also known for its often unpredictable changes in weather patterns that lead to intense thunderstorms, droughts, freezing rain, high winds, hail, and occasional snow and ice storms. These seasonal and short-term fluctuations in weather greatly influence cattle production efficiency.

Research shows that cattle benefit from summer shade and winter shelter. Pastured cattle seek shelter around structures, under trees, and in forested streamside zones. These areas are often heavily trafficked and become muddy, compacted loafing areas. Mud creates further stress on cattle and compounds the problems of temperature stress and feed inefficiencies. One option that could be used to lure cattle from these areas and provide winter shelter and summer shade is a constructed windbreak fence on a mound.

Cold winter temperatures combined with strong winter winds are harmful to cattle and newborn calves. In Kentucky, cold temperatures and wet conditions can lead to mud. Cattle exposed to mud eat less, gain less weight, and have increased occurrence of foot rot and other ailments. Windbreak fences and mounds are an important option for protecting cattle from frigid winter temperatures and winds. Advantages of providing pastured cattle windbreaks include providing shelter from the elements, improving animal health, reducing stress, and increasing feed efficiency. This publication is intended to provide cattle producers with information on a windbreak mound and fence structure that protects against wind and gets pastured cattle out of heavily trafficked, muddy areas.

Effects of Cold on Cattle

Cattle are adapted to handle winter conditions. Cattle have winter coats that protect them down to temperatures around 18 degrees Fahrenheit. However, a summer or wet coat only provides protection to a lower critical temperature of 59 degrees Fahrenheit. Cattle maintain their body temperature in these winter temperatures by burning more calories, which requires them to consume more feed. Cold temperatures can be physically stressful to cattle, which affects overall production. When exposed to cold winter winds, stress can reach extreme levels. Cattle exposed to cold, windy conditions will attempt to reduce their stress levels by not eating and lying down in low areas. This is counterproductive because once the animal is stressed, it must increase feed consumption and utilize more energy to maintain body temperature. The increased caloric requirement for heating means less energy is devoted to the production of meat and milk. For example, for an 880-pound cow, every degree below 32 degrees Fahrenheit increases feed requirements by 1.1 percent—and adding in a wind chill factor further exacerbates this problem. Wind also dries feed, which causes it to lose nutrients, further increasing production costs.

Effects of Mud on Cattle

Muddy conditions can negatively affect cattle production. Research has shown that cattle in 4 to 8 inches of

mud reduced their feed intake by 8 to 15 percent and their daily gains by 14 percent. At the same time, these cattle needed approximately 13 percent more feed to compensate for being held and fed in muddy conditions. Cattle in 12 to 24 inches of mud required 20 to 25 percent more feed, but their feed intake was reduced by 30 percent and their daily gains by 25 percent. It has been determined that, for beef cattle, every four days spent in a muddy pen adds one day to the total time required in the feedlot to reach slaughter (Sweeten et al., 1979). It is estimated that a 500- to 600-pound steer requires 10 percent more energy to compensate for the decline in production associated with mud. With the prevalence of mud in Kentucky, this loss of efficiency may be greater.

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. It has been observed that calves spend up to 52 minutes per day grooming, and adult cattle lick themselves more than 150 times per day and scratch nearly 30 times to groom themselves of mud and excreta (Fraser, 1980). The addition of mud increases unproductive grooming time. Mud in the coat can also negatively affect the coat's ability to insulate the animal, leading to even more energy being required to maintain body temperature. The sale price of cattle at the stockyards can also be affected by mud or hanging tags in the coat, because cattle with hanging tags (combination of mud and manure stuck to the coat) can receive a discounted sale price.

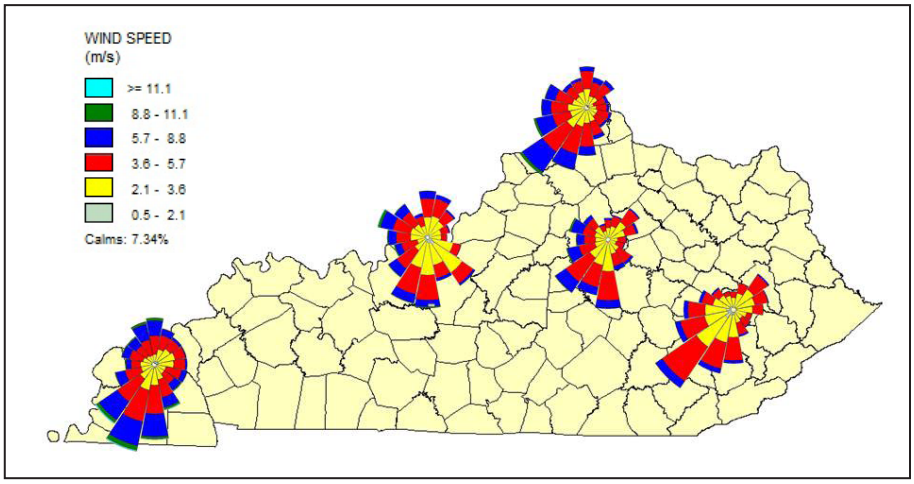

Figure 1. Wind rose plots showing the prevailing wind direction across Kentucky. Graphic created by Stephanie Mehlhope.

Figure 2. Cattle utilizing a windbreak fence and mound. Photo by Steve Higgins.

Benefits of Windbreaks

The installation of a windbreak fences and mound structures can help protect your cattle from the elements and get them out of the mud. Benefits to providing windbreaks and mounds to pastured cattle include:

- Reduced discomfort and heat loss for cattle
- Increased productivity and growth rate
- Increased calf survival
- Reduced need for additional maintenance feed intake in response to mud and cold
- Increased pasture grazing area

Location

To be effective, the windbreak needs to be located so that it actually provides protection from the wind, so knowing the predominant wind direction for winter months is essential. A wind rose is a graphic representation of wind speed and direction in a particular location. Figure 1 shows a wind rose indicating that in Kentucky the primary direction of wind is from the south/southwest, and wind speeds average less than 10 miles per hour. The length of each arm of the wind rose represents the frequency that winds blow into that location from a given direction. The colors on the arms represent wind speed ranges. Variations occur in the winter months, causing the winds to shift to the north and northeast. These data support the best position for construction of a windbreak along an approximate east-west axis (perpendicular to the prevailing wind) to allow cattle access to each side for protection, depending on the direction of the wind. The position of the windbreak can be adjusted to site-specific prevailing wind direction conditions if there is an observed deviation from the trend. Even if the wind is blowing from the southeast or northwest, there will still be an area of protection, because winds will be greatly reduced in this wind shadow.

Construction

Site Preparation

It is not advisable to construct a windbreak in a pasture without first developing a solid foundation; otherwise, cattle will simply disturb the surrounding topsoil and create a muddy depression

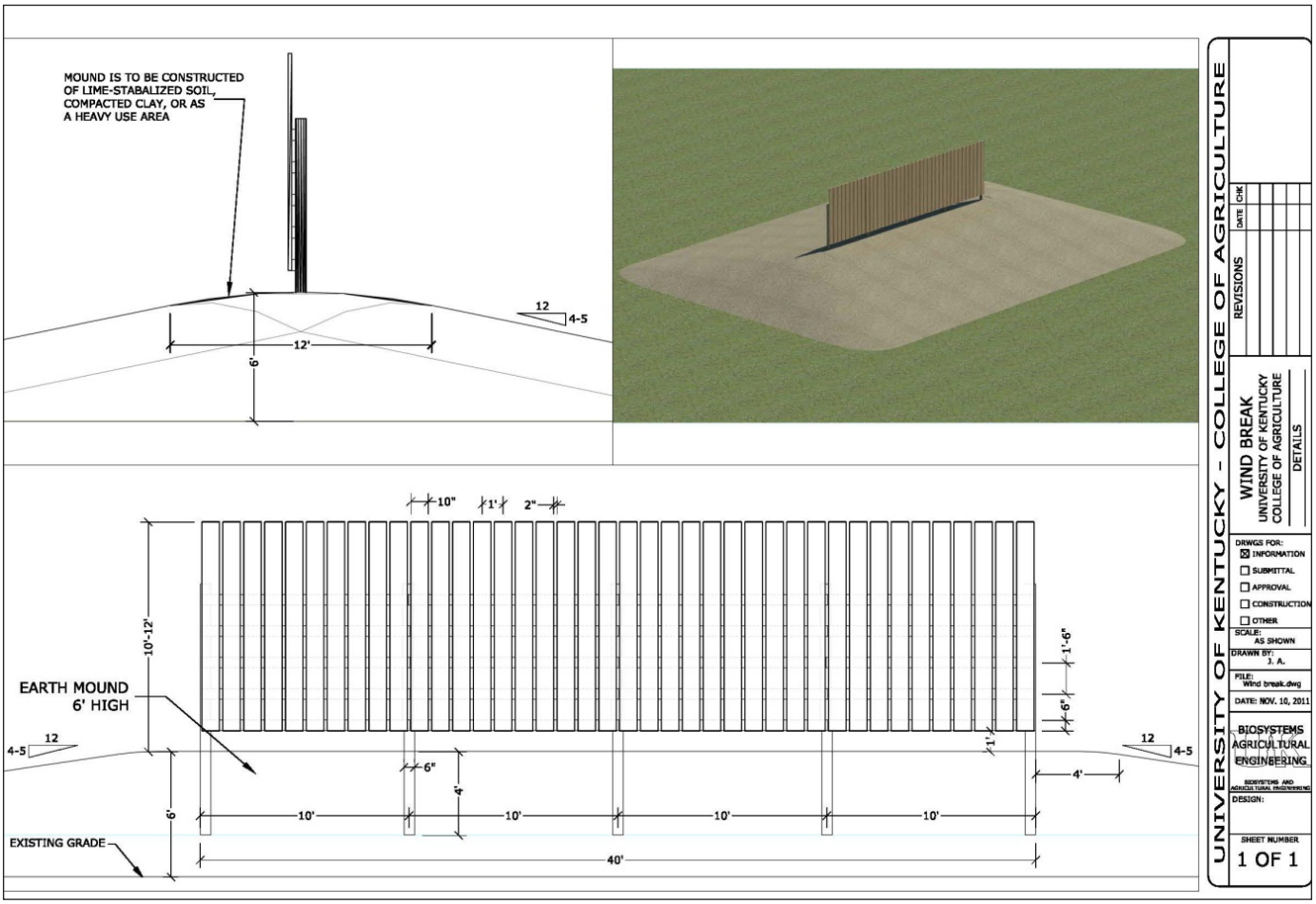

Figure 3. Schematic for a windbreak and mound structure. Drawing by Jimmy Ash.

that will hold water. Cattle will also use the structure for shade. Therefore, a windbreak should be constructed on a mound to provide positive drainage away from the structure (see Figure 2). Options are available to producers to construct a mound using a soil base (mostly clay soils) top dressed with a heavy use area pad (*All-Weather Surfaces for Livestock* [AEN-115]), soil cement (*Using Soil Cement on Horse and Livestock Farms* [ID-176]), or lime stabilized soils. The maximum height of the mound should be no more than 6 feet above the surrounding pasture. The slope of the mound should be approximately 4-5:12. After grading, the site should be stabilized and reseeded with a sturdy, sod-producing perennial grass.

Size of the Windbreak

The structure should be approximately 10 feet tall. A 10-feet-tall structure placed on a rise will provide at least 100 feet of protection downwind. If the downwind side is sloped, the protected area will be greater (approximately 300 feet). A windbreak with a length of 40 feet should provide protection for approximately 40 animals.

Materials

A wood slat construction for the fence is preferred, because the wall can be fabricated to create slots to allow some wind to move through the panels. Porosity in the fence is a benefit because it affects eddies, back drafts, and the location where snow drifts are created. Slots will also help dry out the northern side. Experiments have shown that an ideal porosity would be approximately 20 percent. Six-inch boards fastened with 1.5-inch slots in between will provide 20 percent porosity. Eight-inch boards should be placed 2 inches apart to provide 20 percent porosity. All wood should be pressure treated, weather resistant lumber, with posts rated for ground contact.

Assembly

Figure 3 shows a schematic for the construction of a windbreak structure suitable for a herd of 40 cattle. Posts (6" x 6") should be set securely into the ground using concrete on 8- or 10-foot centers. A gap of approximately 4 to 6 inches off the ground to facilitate drainage and prevent rotting of the bottom boards is recommended. Attach the vertical fence planks of your choice to the cross members (2" x 6") at the recommended spacing provided in the materials section. A horizontal rub rail should be installed along the backside approximately 3 feet from the ground, so the cattle will not push the planks off and ruin the integrity of the structure.

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