Fall Grazing Management Affects Burdock in Pastures

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razing management can affect the prevalence of burdock in pastures. According to a study by University of Wisconsin researchers, shorter forage heights left in the fall can lead to higher burdock populations the following growing season.

Managed grazing can prevent weed establishment, as it is difficult for weeds to compete with a thick cover of healthy, established forages. But managed pastures are not immune to weed infestations, and herbicides are not always a viable weed control option. Common burdock (*Arctium minus*) is a widespread weed identified as a pasture problem in a 2006 producer survey. Pasture conditions present at the time of its germination in March through early April in Wisconsin can be key to its control.

Weed scientist Mark Renz and Agroecology researcher Marie Schmidt ran experiments to see if clipping pastures to different heights in the fall and the following grazing season influenced the establishment of burdock rosettes. It was hypothesized that fewer burdocks would become established in plots where the residual, or grass left behind after clipping, was taller and would block sunlight reaching the ground. The researchers also compared forage quality and quantity among treatments in this one-year study funded by GLCI, SARE, and CERES.

Research was conducted at two sites in southern Wisconsin. Plots were located at the Arlington Agricultural Research Station and the Franbrook Research Farm in New Glarus. Perennial ryegrass was the most common species in the Arlington pastures; tall fescue, meadow fescue, perennial ryegrass, orchardgrass, and Kentucky bluegrass made up the Franbrook pastures. Slow early growth and yellow leaves showed low fertility at Arlington, so ammonium nitrate fertilizer was applied at 50 lbs N/ac in late May and early July. The Franbrook pastures received no fertilization.

In November 2008, researchers clipped pasture plots to mimic grazing to five different residual heights: 2", 4", 6", 8", and an unclipped area. Clipping treatments were re-initiated in May at Franbrook and June at Arlington, and continued through August. Treatments consisted of clipping pastures, removing clipped biomass and leaving residual pasture grasses at the height assigned to each plot. During grazing, these simulated grazing events were based on plant growth and timed as close as possible to managed grazing of pastures near the study sites. The duration of the rest period between clippings, therefore, varied throughout the season.

Interception of Light

In order for burdock to germinate, light needs to reach the ground. Researchers measured the amount of light intercepted by foliage and thus not reaching the ground. In April 2009, before grass or weed growth had started, residual heights affected how much light reached the ground in pastures at both research farms. At Arlington, forages in the 2" and 4" treatments intercepted 41% less light, on average, than forages in the 6", 8" and unclipped treatments. At Franbrook, forages in the 4" treatment intercepted an average of 34% less light than the 6", 8", and unclipped treatments.

However, most of these differences diminished just before clipping resumed in May at Franbrook and June at Arlington. No differences in light interception were measured at that point at Franbrook, and at Arlington the only significant difference was found in the 4" treatment, with 17% less light intercepted when compared to the unclipped plots. This confirmed that the height of the residual left after fall grazing affects the amount of light that reaches the ground in early spring, but most or all of this difference diminishes by the time of the first grazing. Throughout the grazing season, immediately after a clipping, the pastures clipped to a lower height intercepted less light than the pastures with a taller residual, but rapid regrowth quickly diminished those differences. No burdock germination was observed after June 15, 2009.

Density of Burdock Rosettes

Researchers measured weed density by placing a 2.3' by 2.3' square in each plot and counting burdock rosettes within the square. Weed densities varied across treatments. At Arlington, reduced burdock density was observed with the 6" and 8" treatments compared to the 2" and 4" treatments. Fewer burdocks emerged in the unclipped plots compared to the plots clipped to 4". Although similar trends were seen at Franbrook, the differences were not statistically significant. Weed densities were higher at Arlington than at Franbrook, and the lower, more variable burdock germination at Franbrook likely contributed to the lack of significant differences. The greater diversity of plant species at Franbrook may have contributed to better weed suppression than at Arlington; other research has shown such a relationship.

Another explanation could be that pasture growth in the early grazing season at Arlington was one month behind other pastures in the area due to low fertility, and this could have led to its higher weed populations, although more research is needed to verify this.

Light & Burdock Density

At Arlington, researchers found a significant relationship between more light reaching the ground at shorter residual heights and higher burdock density. Using a linear least squares regression analysis on the data to look at the relationship between variables, researchers found that when 30% of the light was intercepted (typical at 2" and 4" heights), 0.46 burdock plants/ft² were predicted;

increasing the light intercepted to 75% (typical at 6" and greater) decreased predicted burdock density to 0.17 plants/ft². This relationship was not as clear at Franbrook, showing that it can be affected by site-specific factors.

Data from this project show that the 4" treatment had the highest level of burdock seed emergence, rather than the shortest (2") residual. This unexpected result could have come about because, as the researchers noted, the burdock seedlings were injured by clipping more in the 2" than the 4" residual treatment. Whether that damage would also occur with grazing to 2" is unknown.

Forage Yield & Quality

Grazing to residual heights of 6-8" can potentially reduce forage quantity. In this study, however, decreased forage yields were only observed in the fall of 2008, when the interval between the last grazing and the first clipping of this project was lengthened to ensure ample forage growth, and at the first spring clipping event at Franbrook. During the 2009 growing season, the 2" treatment at Franbrook was the only treatment to produce significantly more biomass at the first clipping. Arlington forage yields did not differ over the 2009 season.

Researchers measured Relative Forage Quality (RFQ) at the first and third clipping events. The recommended RFQ is based on the type of animal, how much dry matter (DM) an animal consumes, and animal body weight. For example, target RFQ values are 120 for a cow-calf beef pair and 150 for a milking dairy cow. At the first clipping, both farms had RFQ values between 138-169, with an average of 152.5, that did not differ among treatments. At the third clipping, forage quality differed among treatments at Franbrook, with RFQ values ranging from 110 in the 8" treatment to 138 for the 2" treatment. RFQ did not vary significantly among treatments at the third clipping at Arlington and ranged from 131-138. Researchers believe the shorter residuals induced the grass to send out new leaves with higher RFQ values, while the taller residual heights likely resulted in more stem tissue with lower RFQ values. Forage species composition and other site-specific variables explain the differences observed.

Conclusion

This study demonstrates that retaining a 6-8" residual height in the fall through the start of the following grazing season can decrease burdock establishment by an average of 82% compared to shorter residual heights. While these results are specific to common burdock, other biennial pasture weeds such as bull thistle and common mullein may react similarly.

Future research is needed to determine if these results hold up under actual grazing conditions. Livestock may preferentially avoid or eat burdock and do not graze to uniform heights, which would alter the results, and the soil disturbance caused by hoof action could also be an important factor influencing burdock germination.

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