Growth Performance by Heifers Grazing Sod-Seeded Annual Ryegrass Pastures Fertilized with Nitrogen or Overseeded with Crimson, Ladino, or both Crimson and Ladino Clovers

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Introduction

Interest in substituting legumes in place of nitrogen (N) fertilizer in beef cattle grazing systems has increased with rising fertilizer prices. The objective of this study was to compare forage production and beef cattle gains from annual ryegrass pasture fertilized with N or overseeded with legumes. G. E. Briggs × Angus crossbred heifers (n = 40; 535.45 ± 21.41 lb initial BW) were assigned to 1 of 8, 5-acre pastures March 15, 2010. All pastures were overseeded with ‘Marshall’ annual ryegrass, and were not seeded with any clover (N) or overseeded with ‘Dixie’ crimson (C), ‘Osceola’ ladino (L), or a combination of crimson and ladino clover (CL). Both non-clover and clover pastures were fertilized in an attempt to keep grazing days equal. Heifers were not turned out until March 15, 2010 and grazed until May 11. Total BW gain was not significant (P = 0.99) among treatments. Also, ADG was not significant (P = 0.99). It appears that with an equal number of grazing days, clovers may not be able to totally eliminate the need for fertilizer, but they might be able to reduce the fertilizer requirement.

Experimental Procedures

Gelbvieh × Angus crossbred spring-born heifers (n = 40; 535.45 ± 21.41 lb initial BW) from the University of Arkansas Livestock and Forestry Research Station near Batesville, Ark. were transported approximately 225 miles to the Southeast Research and Extension Center (SEREC) in Monticello, Ark. Heifers remained as a group upon arrival at SEREC and were put on a dormant bermudagrass pasture and given bermudagrass hay ad libitum. The groups of heifers were then assigned randomly to 1 of 8, 5-acre pastures.

The experimental pastures consisted of common bermudagrass (Cynodon dactylon) that was sod-seeded by broadcasting with 30 lb/acre (actual seeding rate) of annual ryegrass (Lolium multiflorum cv. Marshall) after a light disking on September 28, 2009. The pastures were dragged to smooth the surface and improve the soil to ryegrass seed contact. After dragging, 2 pastures each were overseeded with either 9.8 lb/acre (pure live seed; PLS) of crimson clover (C; Trifolium incarnatum cv. Dixie), 4.5 lb/acre (PLS)³ of ladino clover (L; Trifolium repens cv. Osceola), or both crimson and ladino clover (CL; 9.8 lb and 4.5 lb/acre, respectively). The seeding rates for the ladino and crimson mixed pasture were not halved when combined in order for each species to fully represent its respective grazing period. The remaining 2 pastures received no clover and were fertilized with 300 lb/acre of 19-19-19 on November 9, 2009 (N), while C, L, and CL pastures were fertilized with 300 lb/acre of 6-24-24 on November 9, 2009. On March 5, 2010, 100 lb/acre ammonium nitrate (34 lb/acre actual N) was applied to C, L, and CL, and 180 lb/acre ammonium nitrate (61 lb/acre actual N) was applied to N pastures. Application of 34 lb actual N/acre on C, L, and CL pastures was deemed necessary after the previous year’s delay in the beginning of grazing because of reduced forage growth.

Heifers were stocked on their pastures on March 15, 2010 when forage biomass was great enough to begin rotationally grazing. The objective of fertilizing legume plots as well as control plots was to increase the number of grazing days for legume pastures in order to be consistent with control pastures. In 2010, grazing days were possibly affected across all pastures due to heavy use by native wildlife. The heifers stayed on their respective pastures until May 12, 2010. Each pasture was divided in half using temporary electric fencing. Calves were switched between the 2 cells every 14 d after initiation of grazing, and they were weighed every 28 days.

Calf BW, forage production, and species composition data were analyzed using PROC MIXED of SAS (SAS Inst., Inc., Cary, N.C.). The original pasture group was used as the experimental unit for all analyses.

Results and Discussion

Initial BW was not different (P = 0.99) among treatments (Table 1). Ending BW was not different (P = 0.99) among treatments (Table 1). Total BW gain and ADG (P = 0.99 and P = 0.99 respectively) did not differ among treatments (Table 1). It would seem that the less intensively fertilized legume pastures were able to produce basically equal results in terms of animal performance to traditionally fertilized pastures.

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³ The white clover seed contained a seed coating. The seeding rate of the actual product was 6.5 lb/acre.
pastures that did not contain any legumes. After the second year of study, the outlook of using clover to reduce nitrogen fertilizer input seems better. Nitrogen fertilizer must still be used but not in as much quantity as in pastures without any legumes. If the combined cost of legume seed, establishment, and fertilizer would be less expensive than buying an increased quantity of N fertilizer without having to establish legumes, it may be beneficial to use legumes in a pasture grazing system.

Implications

Producers may use legumes and a smaller amount of commercial N in a pasture system to obtain similar animal production in comparison to pastures without legumes that were fertilized at a higher rate. However, issues with establishment and persistence should still be taken into consideration when producers consider planting a stand of legumes to lessen N input.

Table 1. Growth performance by heifers grazing sod-seeded annual ryegrass pastures with either no legumes or overseeded with crimson, ladino, or both crimson and ladino clovers spring 2010.

<table>
<thead>
<tr>
<th></th>
<th>Nitrogen</th>
<th>Crimson</th>
<th>Ladino</th>
<th>Crimson + Ladino</th>
<th>SEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial wt., lb</td>
<td>531</td>
<td>540</td>
<td>536</td>
<td>535</td>
<td>21.4</td>
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<tr>
<td>End wt., lb</td>
<td>718</td>
<td>725</td>
<td>719</td>
<td>718</td>
<td>24.4</td>
</tr>
<tr>
<td>Total study gain, lb</td>
<td>187</td>
<td>184</td>
<td>183</td>
<td>183</td>
<td>14.6</td>
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<tr>
<td>Grazing days/acre</td>
<td>58</td>
<td>58</td>
<td>58</td>
<td>58</td>
<td>0.25</td>
</tr>
<tr>
<td>ADG, lbs/day</td>
<td>3.2</td>
<td>3.2</td>
<td>3.1</td>
<td>3.2</td>
<td>0.25</td>
</tr>
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