



# Variability of Cool-season Grazing Systems

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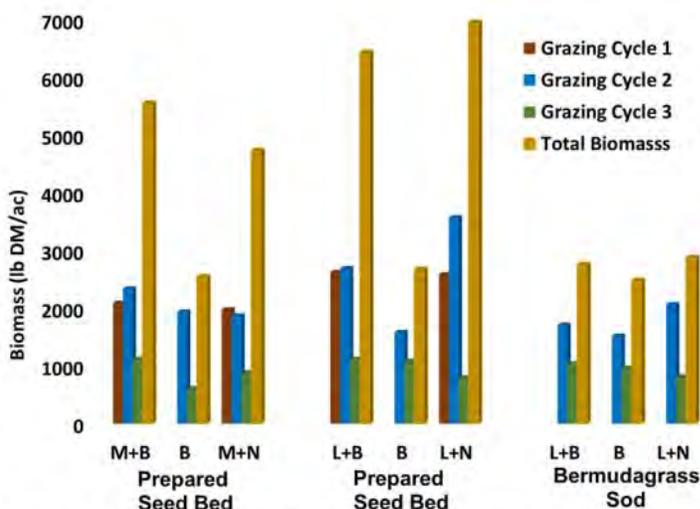
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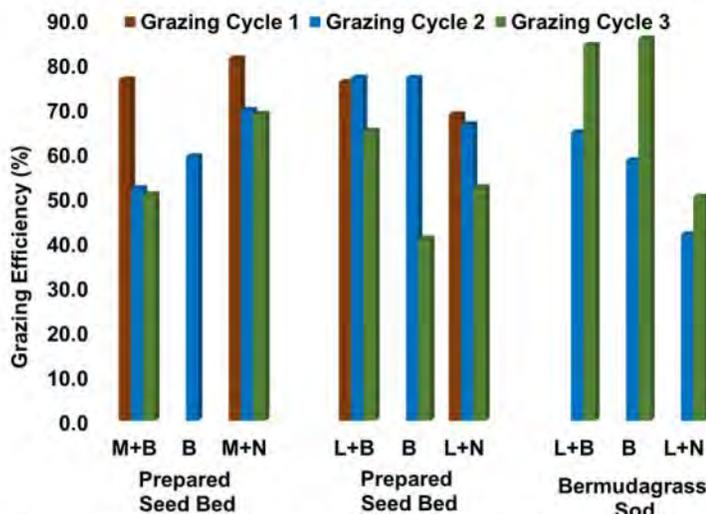
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The cost of chemical fertilizers has increased exponentially in the last decade, impacting forage production and grazing systems during the winter. Winter annual forages are an important part of Mississippi's forage production, especially for the stocker cattle. Although they can decrease the dependence on hay and feed supplementation, their availability could be affected by how they are planted and fertilized. When planning a winter grazing system, producers need to evaluate when most of the forage is needed and be aware of the benefits and disadvantages of the chosen system. For example, planting in a prepared seed bed can provide much earlier grazing, but at the same time it means that a dedicated field that is rotated with a summer annual grass might be required. On the hand, when interseeding into a dormant warm-season grass pasture, producers can have a delay in grazing until the spring and could potentially delay the greenup of the perennial warm-season grasses. It is important that to maintain these systems productive, fertility becomes a major component. A way to mitigate this expense is by incorporating legumes into the system.

Cool-season forage legumes have much to offer, but are overseeded on warm-season perennial grass sods much less frequently. One of the advantages to utilizing clovers is the potential to fix a significant amount of nitrogen; therefore,



**Figure 1.** Biomass production per grazing cycle and seasonal biomass production for the 2014-15 grazing season in Starkville, MS. M+B = Marshall ryegrass and berseem clover; M+N = Marshall ryegrass plus nitrogen; L+B = LoneStar ryegrass plus berseem clover; L+N = LoneStar plus nitrogen; B = Bermseem clover.



**Figure 2.** Percent grazing efficiency (GE) for each of the grazing cycle during the 2014-15 growing season at Starkville, MS.

reducing nitrogen inputs. In addition, depending on the establishment method (prepared seed bed or sod seeding into perennial pastures) and grass companion forages, clovers have the potential of extending the grazing season, improving forage quality, and increasing dry matter production per acre. There is potential to expand cool-season forage opportunities by evaluating new annual clover varieties under grazing conditions in Mississippi. Understanding how berseem clover, compared to traditional clovers (crimson and arrowleaf), fit into grazing systems in Mississippi is imperative for improving grazing potential and reducing the need for hay supplementation.

A grazing demonstration was conducted from October 2014 to May 2015 at Mississippi State University. Two, two-acre paddocks were used for conventional seeding and one 2-acre bermudagrass paddock was used for sod-seeding. Each paddock was divided in approximately 0.67 acre to establish three treatments. The treatments include annual ryegrass (LoneStar and Marshall), annual ryegrass + Frosty berseem clover, and Frosty berseem clover

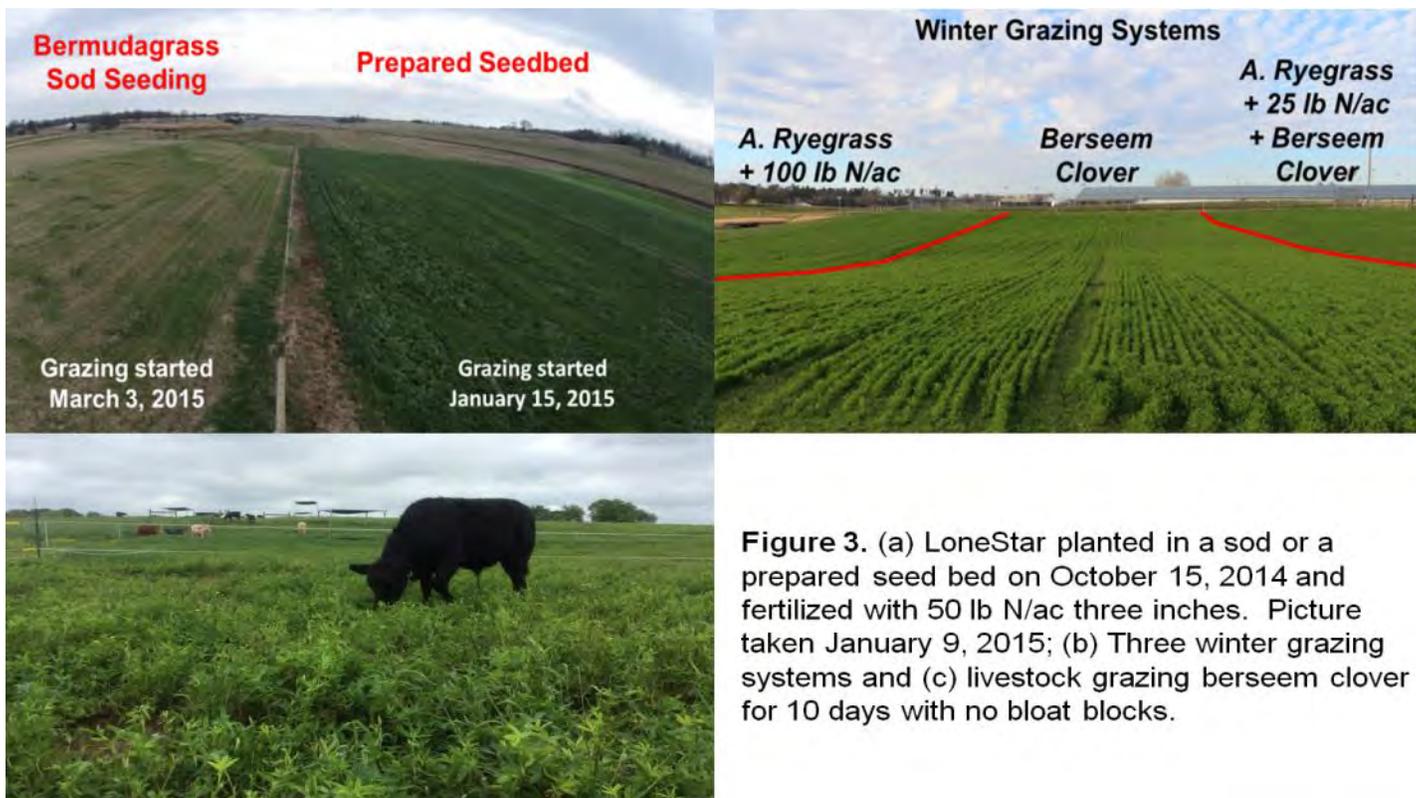
**Table 1.** Estimated cost of establishment and cost of gain for the grazing demonstration during the 2014-15 grazing season at Starkville, MS.

Establishment	Annual		Nitrogen (lb/ac)	Calendar Days of Grazing	Grazing head days	Total gain per acre (lb of beef/ac)	ADG (lb/ac)	Total Pasture Cost (\$/ac) <sup>1</sup>	Cost of gain (\$/lb)
	Ryegrass	Clover							
Prepared Seed Bed	Marshall	Berseem	25	98	98	383.58	3.91	109.85	0.29
	--	Berseem	0	--	--	--	--	--	--
	Marshall	--	100	105	105	423.88	4.04	125.20	0.30
Prepared Seed Bed	Lonestar	Berseem	25	93	117	650.75	5.56	110.45	0.17
	--	Berseem	0	68	64	222.39	3.47	95.20	0.43
	Lonestar	--	100	93	147	689.55	4.69	125.95	0.18
Bermudagrass Sod	Lonestar	Berseem	25	34	34	158.21	4.65	129.20	0.82
	--	Berseem	0	34	34	102.98	3.03	111.20	1.08
	Lonestar	--	100	34	79	216.42	2.74	128.70	0.59

<sup>1</sup>Pasture include seed cost and fertilizer cost. Labor, equipment and land rent were not included in the analysis.

alone. Treatments containing LoneStar annual ryegrass were only planted in the bermudagrass paddock. Seeding rates for the conventional planting were 25 lb/ac when ryegrass was planted alone. Ryegrass plus berseem clover in the conventional planting were planted at 20 and 15 lb/ac, respectively. In the bermudagrass sod-seeding, annual ryegrass alone was planted at 30 lb/ac. Subsequently, annual ryegrass plus berseem clover 25 and 20 lb/ac in the sod-seeding systems. Berseem clover was planted at 20 and 25 lb/ac in the conventional and sod-seeding system, respectively.

Treatments containing annual ryegrass were fertilized with 50 lb N/ac when grass reached three inches after planting and 50 lb N/ac after the first grazing cycle. Treatments containing ryegrass + bermseem clover were fertilized with 25 lb N/ac when grass reached three inches after planting. No N was applied to pure stand of berseem clover. Grazing in



**Figure 3.** (a) LoneStar planted in a sod or a prepared seed bed on October 15, 2014 and fertilized with 50 lb N/ac three inches. Picture taken January 9, 2015; (b) Three winter grazing systems and (c) livestock grazing berseem clover for 10 days with no bloat blocks.

each treatment was done by using a put and take system. The initial stocking rate was approximately 500-550 lb of beef per ac and varied within each grazing cycle. There were three grazing cycles: (1) GC1 (Dec 17 to Jan 30), (2) GC2 (Mar 17 to Apr 20), and (3) GC3 (Apr 20 to May 5). Prior to and after each grazing cycle, three random forage samples were collected in each paddock using a 2-ft<sup>2</sup> quadrat.

Preliminary data indicated that treatments established in a prepared seed bed had higher biomass production compared to the treatments established in the bermudagrass sod (Fig. 1). Overall average forage production of LoneStar (with berseem or N) was 30% higher than Marshall in the paddocks planted in a prepared seed bed. Overall forage production in the bermudagrass sod was 42% and 97% lower compared to the Marshall or LoneStar treatments in the prepared seed bed.

All treatments displayed consistency in forage quality within each grazing cycle. Crude protein declined with each grazing cycle, although grazing cells containing only berseem clover maintained higher CP throughout the study (data not shown). Grazing efficiency (GE) varied with grazing cycle (Fig. 2). During the grazing cycle 1 (GC1), GE ranged from 68 to 81%. During the grazing cycle 2 (GC2), GE ranged from 42 to 77%. The cost of gain (\$/lb of beef produced) was much lower with the prepared seed bed, except for the berseem grazing cell in the Marshall annual ryegrass due to lack of forage production and grazing availability (Table 1). Higher biomass production with LoneStar in the prepared seed bed along with a longer grazing season resulted in an increased total gain per acre and lowering the cost of gain.

This demonstration provided some information on grazing management practices where the use of grass/clover mix can provide a competitive advantage to producers in a prepared seed bed and reduce hay feeding intervals. LoneStar provided a slight grazing advantage early in the season with earlier biomass production compared to Marshall, although such advantage was not present during the second grazing cycle. The demonstration also served as a tool to indicate that dedicated fields to annual ryegrass with a summer annual crop rotation might provide better forage utilization than planting into an existing summer perennial grass sod.

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