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2010 FORAGE RESEARCH TRIALS AND DEMONSTRATIONS UPDATE

Mississippi State University Forage Extension Program

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Acknowledgement: Special thank you to Jeremy Duckworth and Brenan Booker (Research Associates) and Jesse Morrison (Graduate Student). Thank you to the student workers, Chad Cutrer, Jonathan Gray, Isaac Picket, Parker Evans, Tommy Moore, and Daniel Moore for their collaboration on planting, plot maintenance, and data collection.

1. EVALUATION OF ANNUAL RYEGRASS PRODUCTION UNDER N FERTILIZATION AND CLOVER PRODUCTION (RESEARCH).

Start date: Fall 2008.
End date: Spring 2011.

Marshall annual ryegrass (ARG) was planted at a 25 lb/ac in the fall of 2008 and 2009 at the MSU South Farm Forage Research Unit. The experiment design was a randomized complete block design replicated three times. The experiment included 16 treatments (9 Nitrogen fertility regimes and 7 clover mixtures) (**Table 1**) planted in 11 ft x 6 ft plots. Nitrogen applications consisted of 0, 25, 50, 75, and 100 lb N/ac in split applications in the fall at the third leaf stage and in the spring after the first harvest. Yield data was collected from four harvests in March, April, and May (**Table 2**). Tissue samples were collected and saved for future forage quality analysis. The objective was to determine economical nitrogen applications and to determine if clover additions will have yield advantages over conventional fertilization practices.

Table 1. Treatment applications and seeding rates of clovers.

Treatments[1]	N Application (lb N/ac)		Seeding Rate (lb/ac)
	Fall	Spring	
Nitrogen			
ARG + 0 N	--	--	--
ARG + 25 N	--	25	--
	25	--	--
ARG + 50 N	50	--	--
	--	50	-
	25	25	--
ARG + 75 N	25	50	--
	50	25	--
ARG + 100 N	50	50	--
Clovers			
ARG + Arrowleaf (Apache)	--	--	10
ARG + Crimson	--	--	15
ARG + Ball	--	--	3
ARG + Berseem (CW-9092)	--	--	10
ARG + Hairy Vetch	--	--	20
ARG + Red (Cinamon Plus)	--	--	8
ARG + White (Regalgraze)	--	--	3

[1]All treatments received 100 lb of 15-5-10 at time of establishment.

Note: The names of varieties mentioned on this report are for testing and management purposes only. No direct endorsement of these products is intended by Mississippi State Forage Extension Program. Other varieties available in the market with similar traits may provide similar performance.

Table 2. Effect of N treatment and clover in annual ryegrass (ARG) forage production.

Treatments	Total Yield (lb/ac)[1]	
	2008-2009	2009-2010
Nitrogen		
ARG + 0-0	2239^{d}	1982de
ARG + 25-0	3457^{abc}	2277^{bcde}
ARG + 0-25	2887^{bcd}	1956de
ARG + 25-25	3939^{ab}	2531^{abcde}
ARG + 0-50	3513^{abc}	2888^{abc}
ARG + 50-0	3477^{abc}	2639^{abcd}
ARG + 50-25	3856^{ab}	2289^{bcde}
ARG + 25-50	3550^{abc}	3346^{a}
ARG + 50-25	3856^{ab}	2289^{dcde}
ARG + 50-50	4109^{a}	2250^{bcde}
Clovers		
ARG + Arrowleaf (Apache)	2539^{cd}	1696^{e}
ARG + Ball	2521^{cd}	3044^{ab}
ARG + Berseem (CW-9092)	2306^{d}	2177^{cde}
ARG + Crimson	3192^{abcd}	1844de
ARG + Hairy V.	3232^{abcd}	1796de
ARG + Red (Cinamon Plus)	2748^{cd}	2076^{cde}
ARG + White (Regalgraze)	2350^{d}	1740^{e}

[1]Letters are for mean comparison within year.

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2. EVALUATION OF IMPROVED CONVENTIONAL ALFALFA VARIETIES IN MISSISSIPPI (RESEARCH).

Start date: Fall 2008.
End date: Summer 2010.

Ten conventional varieties were established at the White Sand Research Station in Poplarville, MS. Alfalfa was planted in a prepared seedbed at a seeding rate of 20 lb/ac in 15 ft x 6 ft plots. The experimental design was a randomized complete block design replicated four times. **Table 3** includes a description of the alfalfa varieties. Alfalfa was harvested three times in 2009 and three times in 2010. Stand ratings were taken at each harvest. Plots were monitored for persistence and productivity. The fourth harvest in 2009 was deferred due to livestock accidentally grazing the plots. Study was ended in the summer of 2010 due to stand loss of the varieties. Plots were harvested using a sensation mower by cutting a 42-inch swath at a 3-inch height. Tissues samples were collected and saved for forage quality analysis. The objective is to determine the productivity and persistence of conventional lines across different environment in MS.

Table 3. Total yield of alfalfa varieties planted at White Sand Branch Experiment Station, White Sand, MS.

		Total Yield (lb/ac)[1]	
Variety	**Fall Dormancy**	**2009[2]**	**2010[3]**
CW-500	5	4334[ab]	3848[b]
CW-909	9	4480[ab]	4293[ab]
GA-505	8	4552[ab]	5779[a]
PGI-345LH	3	4461[ab]	3765[b]
PGI-459	4	4013[b]	3451[b]
PGI-608	7	4426[ab]	4670[ab]
PGI-801	8	4219[ab]	4298[ab]
PGI-1007BA	10	4271[ab]	3484[b]
Phoenix	5	4736[a]	3306[b]
Rugged	5	4324[ab]	3824[b]

[1]Letters are for mean comparison within year; [2]Harvest dates: April 24, May 25, and July 20; [3]Harvest dates: March 19, April 29, and June 14.

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3. EFFECT OF PLANTING DATES AND SEEDING RATES ON PERFORMANCE OF SUMMER ANNUAL GRASSES (RESEARCH).

Start date: Summer 2009.
End date: Fall 2010.

Six summer annuals were established at four different planting dates and two seeding rates at the Mississippi State South Farm Forage Research (**Table 4**). The experimental design was a split-bock design where plot where the planting rates and the subplots were the seeding rates. Phosphorus and potassium levels were adjusted based on soil test recommendations. Plots were 11 ft x 6 ft. Each plot was fertilized with 150 lbs of ammonium nitrate (34-0-0) two weeks after establishment. Plots were harvested when they reached 48 inches. Yield data was collected using a carter harvested and harvesting a 3-foot swath in the center of each plot at a 6-inch height. No differences were observed among seeding rates within each plating date. Planting dates showed a significant effect on yield production (**Table 5 and 6**).

Table 4. Planting dates and seeding rates of different summer annuals in 2009 at Starkville, MS.

Planting Dates		**Variety**	**Seeding Rates (lb/ac)**	
2009	**2010**			
		Cowvittles II Forage Sorghum	10	15
June 17	June 17	Forage King Sorghum-sudangrass		
June 30	July 1	FSG 300 Pearl Millet		
July 15	July 19	Green Grazer V Sorghum-sudangrass	35	45
July 31	July 30	Hay King BMR Sudangrass (Promax)		
		Piper Sudangrass		

Note: The names of varieties mentioned on this report are for testing and management purposes only. No direct endorsement of these products is intended by Mississippi State Forage Extension Program. Other varieties available in the market with similar traits may provide similar performance.

Table 5. Effect of planting date on total yield of different summer annuals in 2009. Data averaged over seeding rates.

Variety	Planting Dates				Mean
	June 17	June 30	July 15	July 31	
	---------- Total Yield lb/ac ----------				
Cowvittles II Forage Sorghum	7386	6443	8235	4703	6692
Forage King Sorghum-sudangrass	9345	6495	10481	3491	7454
FSG 300 Pearl Millet	7320	9702	7669	4413	7276
Green Grazer V Sorghum-sudangrass	7590	8599	6890	4048	6782
Hay King BMR Sudangrass (Promax)	7677	7823	5782	4431	6428
Piper Sudangrass	7739	9355	8627	4374	7523
$LSD_{0.05}$	1902	1984	2169	NS	952
Mean	7843	8070	7947	4243	--

Note: The names of varieties mentioned on this report are for testing and management purposes only. No direct endorsement of these products is intended by Mississippi State Forage Extension Program. Other varieties available in the market with similar traits may provide similar performance.

Table 6. Effect of planting date on total yield of different summer annuals in 2010. Data averaged over seeding rates.

Variety	Planting Dates				Mean
	June 17	July 1	July 19	July 30	
	---------- Total Yield lb/ac ----------				
Cowvittles II Forage Sorghum	9520	6513	6943	5159	7034
Forage King Sorghum-sudangrass	9357	8705	5881	4935	7220
FSG 300 Pearl Millet	6452	8337	6972	4906	6667
Green Grazer V Sorghum-sudangrass	7812	9674	6223	5969	7420
Hay King BMR Sudangrass (Promax)	7787	7300	6064	5837	6745
Piper Sudangrass	7517	6337	6912	4642	6352
$LSD_{0.05}$	NS	NS	NS	891	--
Mean	8074	7811	6500	5241	--

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4. NUTRIENT MANAGEMENT EFFECT BERMUDAGRASS HAY PRODUCTION (RESEARCH).

Project in Collaboration with Dr. David Lang (Associate Research Professor, Forages) and Dr. Keith Crouse (Extension Associate Professor, Soils).

A. STUDY #1: EFFECT OF FERTILIZER SOURCE AND RATE ON BIOMASS PRODUCTION OF HYBRID BERMUDAGRASS.

Start date: Summer 2010
End date: Fall 2012

The experiment was conducted at the Mississippi State South Farm Research Station. Six varieties of hybrid bermudagrass (Alicia, Coastal, Lott, McDonald, Sumrall, and Tifton 44) were used on this study. The experimental design was a randomized complete design in a split-plot arrangement replicated three times. The main plots were the bermudagrass varieties and sub-plots were the four fertilizer treatments. Fertilizer treatment plots were 6 ft x 15 ft. The fertilizer treatments consist of a control and three nitrogen sources. The fertilizer sources will be ammonium nitrate (AN) [NH_4NO_3 (34-0-0)], urea ammonium sulfate (UAS) [33-0-0S], and Urea (U) [46-0-0]. Nitrogen was applied at a rate of 50 lb N/ac after each harvest. The experiment was started on June 1, 2010. Soil samples were taken in each plot prior to treatment applications in the spring. Lime and potassium were applied at rates of 2 ton/ac and 180 lb K/ac according to soil test recommendations. Plots were harvest at 4 to 5 weeks interval throughout the growing season. Plots were harvested using a sensation mower by cutting a 42-inch swath at a 3-inch height. Subsamples were saved for forage quality and mineral analysis. The objective of the study was to determine efficiency of different fertilizer sources in bermudagras production.

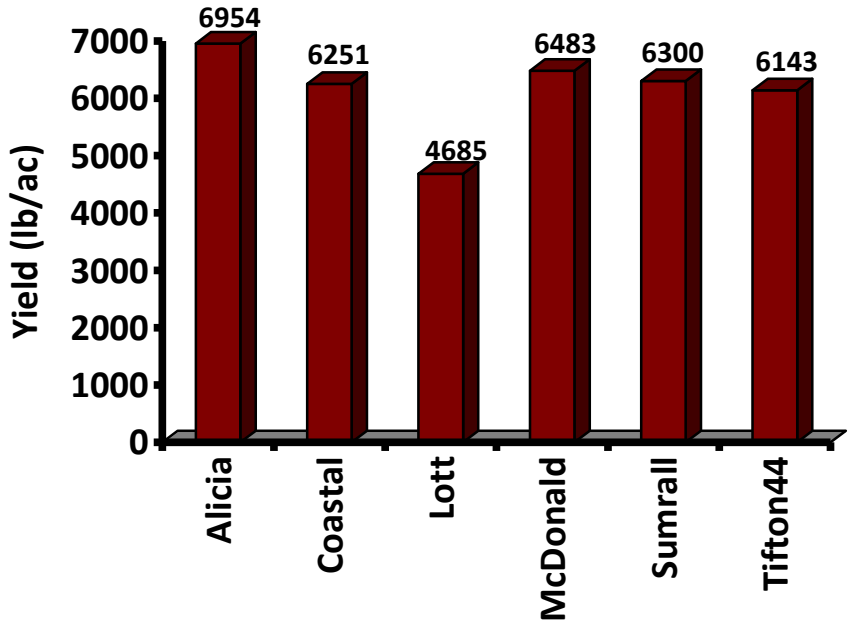

Figure 1. Yield production of different bermudagrass varieties. Data average across nitrogen sources.

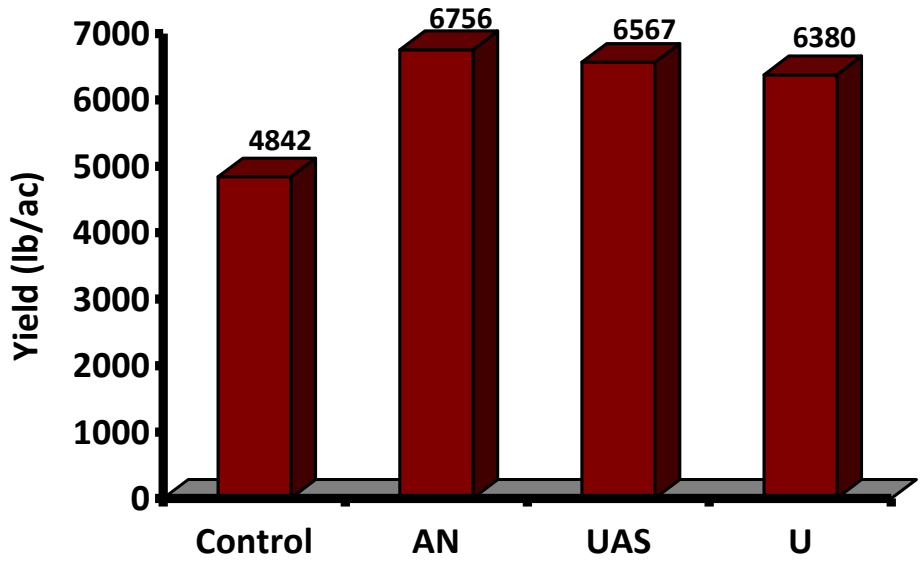

Figure 2. Effect of nitrogen sources on bermudagrass yield. Data averaged over bermudagrass varieties.

B. STUDY #2: EFFECT OF LIME AND pH ON BERMUDAGRASS PRODUCTION.

Start date: Summer 2010
End date: Fall 2012

The experiment was conducted at the Mississippi State South Farm Research Station. Six varieties of hybrid bermudagrass (Alicia, Coastal, Lott, McDonald, Sumrall, and Tifton 44) were used on this study. The experimental design was a randomized complete block design in a split-plot arrangement replicated twice. The main plots were the bermudagrass varieties and sub-plots were four applied treatments. Fertilizer treatment plots were 6 ft x 15 ft. The fertilizer treatments consist of ammonium nitrate (AN), AN + Lime (2 ton/ac), AN + potassium (180 lb K/ac), and AN + Lime + K. Nitrogen was applied to all plots at a rate of 50 lb N/ac after each harvest. The experiment was started on June 1, 2010. Lime and K were applied at the beginning of the experiment. Soil samples were taken in each plot prior to treatment applications in the spring. Soil pH at the beginning of the experiment was 5.5. Plots were harvest at 4 to 5 weeks interval throughout the growing season. Plots were harvested using a sensation mower by cutting a 42-inch swath at a 3-inch height. Subsamples were saved for forage quality and mineral analysis. The objective of the study was to effect of pH and potassium application in bermudagrass production.

Table 7. Variety and treatment effect on bermudagrass yield at different harvest dates.

	Harvest			
	Jul. 6	**Aug. 4**	**Sep. 3**	**Oct. 14**
Variety	---------- Yield (lb/ac) ----------			
Alicia	2436	1912	1188	967
Coastal	1765	1461	866	452
Lott	2324	1636	825	534
McDonald	2424	2062	985	836
Sumrall	2371	2485	1007	710
Tifton 44	1786	1636	921	569
Treatment[1]				
Control	2067	957	685	315
Lime	2287	2171	1154	914
K	2116	1952	970	691
Lime + K	2267	2115	1052	792

[1]All treatments received 50 lb N/ac of ammonium nitrate (34-0-0) at the beginning of experiment and after each harvest.

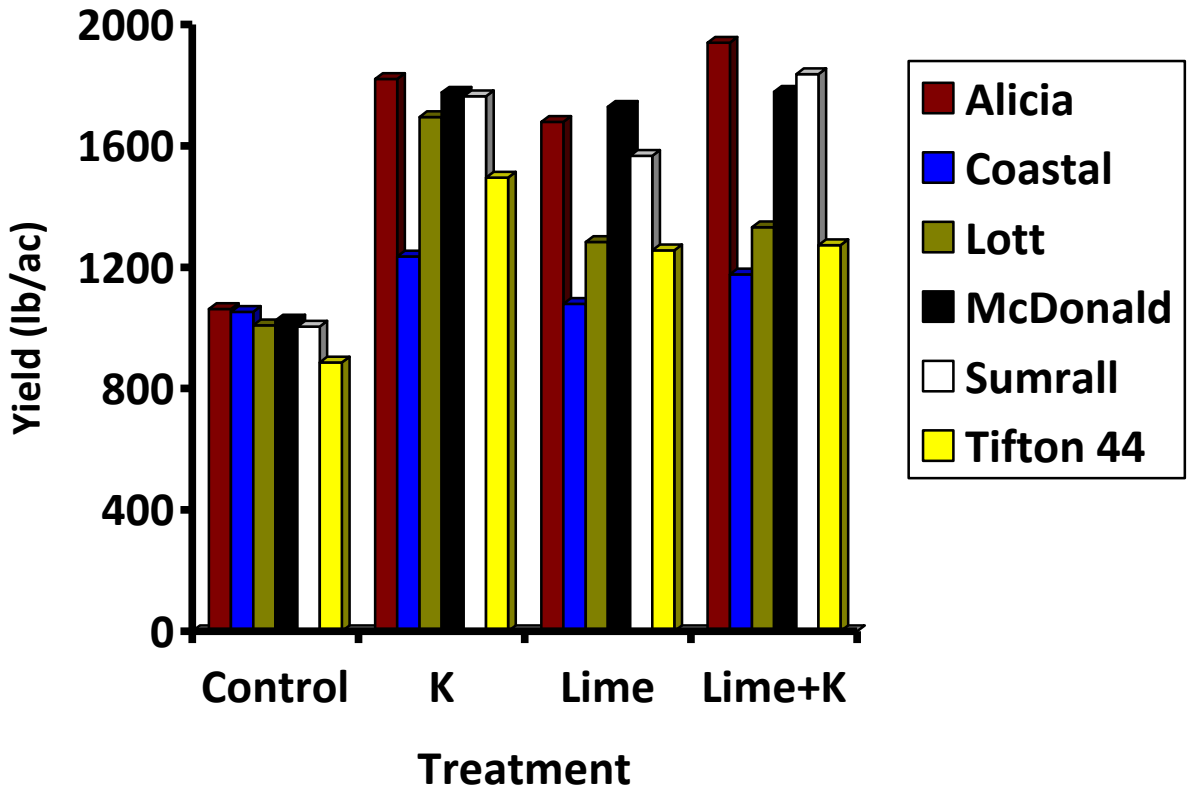

Figure 3. Effect of lime and K in forage production of different hybrid bermudgrass.

5. EFFECT OF NITROGEN APLICATION IN CRABGRASS AND TEFFGRASS BIOMASS PRODUCTION (RESEARCH).

Start Date: Summer 2010
End date: Fall 2011

The experimental design was randomized complete block design replicated three times. Two crabgrass varieties ('Red River and "Quick-N-Big') and a teffgrass variety ('Tiffany Teff') were planted at the South Farm Forage Unit on June 8 at a rate of 10 lb/ac. Plots were 11 ft x 6 ft. Six nitrogen treatments were applied two weeks after emergence. The treatments consisted of a control and ammonium nitrate applied at a rate of 30, 60, and 90 lb N/ac in a single application and the the 60 and 90 lb N/ac rates also applied in a split application (first application two weeks after emergence and second application after the first harvest). Plots were harvested twice in 2010 due to late planting and droughty summer conditions. Plots were harvested using a sensation mower by cutting a 42-inch swath at a 3-inch height. Subsamples were saved for dry matter determination and forage quality analysis. The objective of this study was to measure the effect of nitrogen applications on biomass production of summer annual grasses.

Teffgrass had a total biomas production of 3591 lb/ac while the two crabgrasses, 'Red River' and 'Quick-N-Big' had a biomass production of 3193 and 3125 lb/ac, respectively. No variety x nitrogen interaction was observed. Nitrogen treatments had a significant effect in the overall biomass production (**Fig. 4**).

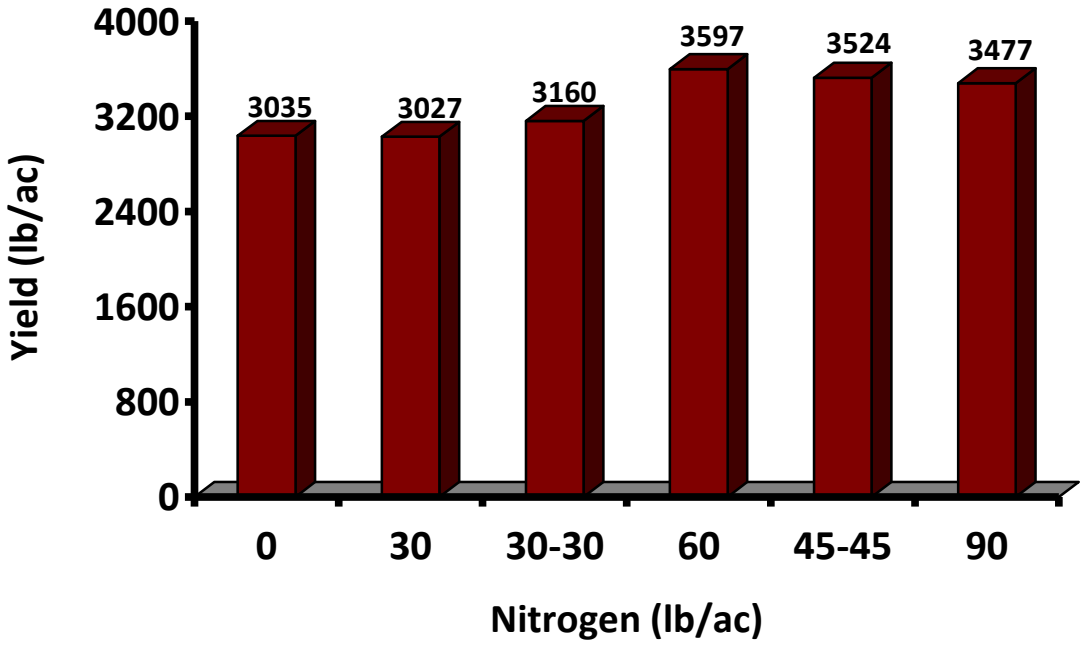

Figure 4. Effect of Nitrogen application in overall biomass production. Data averaged over varieties.

6. ENHANCING FORAGE QUALITY AND CONSUMPTION OF POOR QUALITY HAY (DEMONSTRATION).

Project in Collaboration with Mr. Jimmy Ray Parish (Forage Variety Test Manager).

Start date: December, 2009
End date: January, 2010.

The experiment was designed to measure visual hay preference and to estimate forage consumption (visual rating as percentage) of different types of hay quality. Three types of hay quality were made available to 45 heads of cattle with an average live weight of 1300 lbs. The types of hay include good tall fescue hay, poor quality sorghum-sudan/Johnsongrass mixed hay, and poor quality sorghum-sudan/Johnsongrass mixed hay injected with a HayMaster's solution (HayMaster Nutrition Injection Systems, Inc.). The three types of hay were available at the same time and side by side on hay rings to the herd to measure animal preference. Estimated forage consumption in each hay ring was rated two days after feeding. After two days, hay will be replaced with new hay bales and observations recorded. To determine changes on forage quality and the effect on preference and consumption, hay bales will be fed at 1, 15, 30, and 45 days after injection. Forage quality samples were collected at each feeding period. Samples will be analyzed for CP, ADF, NDF, and TDN. Twenty rolls of each type of hay were available for the experiment. A total of five bales from each treatment were available for each feeding period. The round bales are 5'x6' (~1200 lbs). Bales were treated with 3 gallons of total solution injected at one of the bale using a three-point hitch injection system (HayMaster's HH Model). The solution consisted of a mixing ratio of 2 gallons of water to one gallon of concentrate.

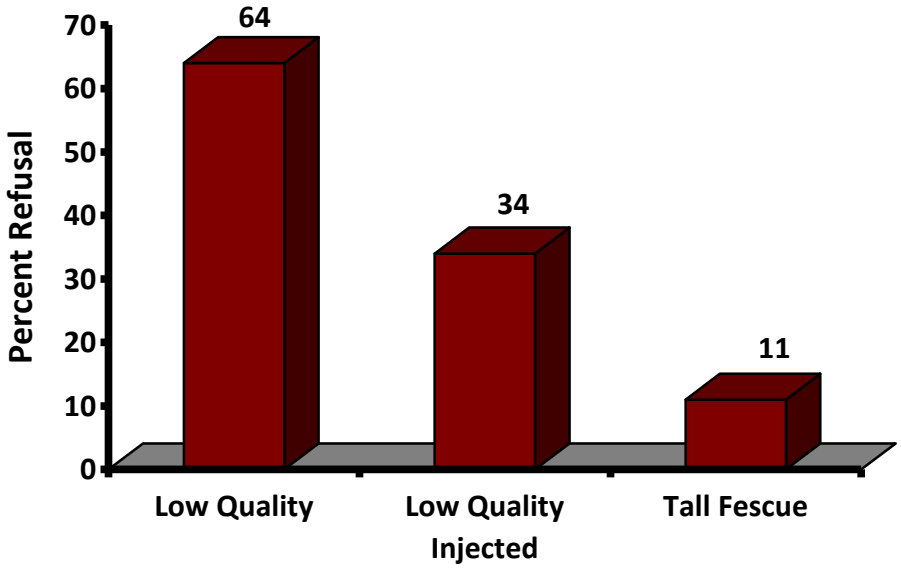

Figure 5. Hay refusal of livestock being feed with different treated hay systems.

7. EVALUATION OF RYEGRASS MANAGEMENT ON GROWTH AND PERFORMANCE OF GROWING BEEF HEIFERS (DEMONSTRATION).

Project in Collaboration with Dr. Daniel Rivera (Assistant Research and Extension Professor, Animal Science) and Mr. Billy Johnson (Research Associate III).

Start date: December, 2009
End date: May, 2010.

The demonstration was conducted at the Newton Experiment Station, Newton, MS. The purpose was to evaluate which ryegrass management strategy might result in the most profitable enterprise for growing young beef heifers. Six two-acre paddocks were used for the study. The experimental design was randomized complete design with three treatments replicated twice. The treatments include ryegrass (R) fertilized with commercial fertilizer, ryegrass + arrowleaf clover (R + AC), and ryegrass + berseem clover (R + BC). Ryegrass was planted at a 50 lb/ac rate, while arrowleaf clover and berseem clover were planted at a 10 and 15 lb/ac, respectively. The ryegrass + commercial fertilizer treatment was fertilized with 100 lb N/ac in a split application of 50 lb N/ac in the fall after establishment and 50 lb N/ac in the spring after the first grazing period. The clover treatments received 20 lb N/ac at time of establishment to allow ryegrass and clovers getting established. The initial stocking rate was approximately 1200 lb of beef per acre (two 600 lb animals) with a 50% utilization rate. The target grazing period is 28 days with a 20-day rest period, but to be adjusted depending on environmental conditions. Animals will be exposed to a uniform hay ration during the rest period. Phosphorus and potassium levels on each paddock were adjusted based on soil test recommendations. Treatments were established by seed broadcast into an existing sod of mix warm-season grass. Glyphosate will be applied 3 weeks before planting for weed control and reduce biomass present.

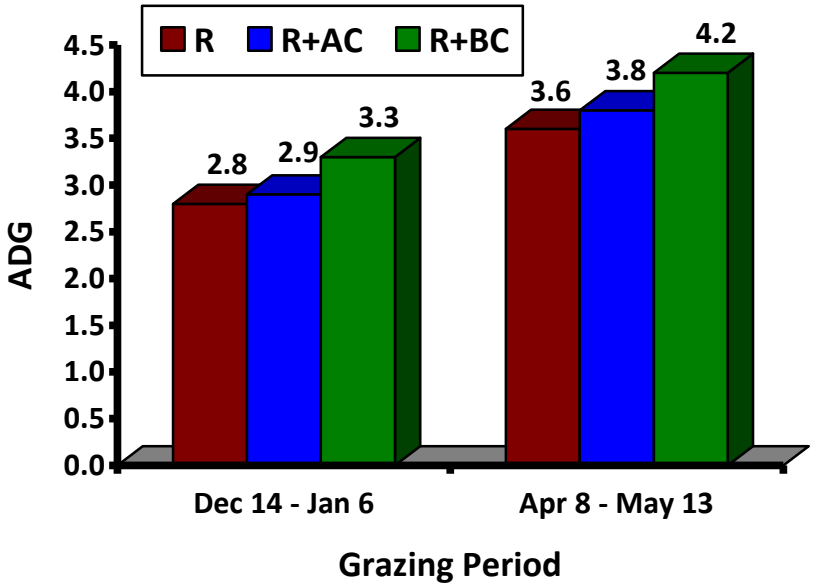

Figure 6. Animal Daily Gain on growing heifers when grazing different annual cool-season grass systems.