ALABAMA A&M AND AUBURN UNIVERSITIES

Stocker Cattle

Performance and Calculated Pasture Costs

ALABAMA COOPERATIVE **Extension** SYSTEM

Alabama A&M and Auburn Universities

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Most livestock producers know, or can easily determine, which forage species and varieties are suited for land they have available for pasture. However, before choosing the one or ones to be grown, it is critically important to understand the level of animal performance expected from those forages and the cost of that production. Given the recent volatility in production input prices, this is more important than ever.

Many grazing experiments have provided stocker cattle performance data on various forage species. However, because of the expense of conducting grazing research, it is rare to see animal performance comparisons on more than two or three species or species mixtures at a time. Thus, it is difficult for livestock producers to obtain an overall view of the relative productivity of various forages.

This publication provides a comparison of stocker cattle performance criteria from several selected steer grazing experiments conducted in Alabama. It also provides pasture cost/acre and pasture cost/pound of gain information for the forage crops used in these tests, based on 2008 Auburn University enterprise budgets. Collectively, these data provide an interesting and useful comparison of many of the forage crops commonly used in the Southeast.

Studies Selected for Comparison

Auburn University scientists have conducted numerous steer grazing experiments that have involved various forage species. These studies have generally involved crossbred animals of similar breeding and weights, and they were conducted over multiple years. They provide a good basis for comparison of both the animal production potential and the production cost of various forage species commonly used in Alabama.

An early test at the Wiregrass Substation (WG) near Headland evaluated steer performance at four nitrogen levels on 'Coastal' bermudagrass and at three levels each on both 'Pensacola' bahiagrass and common bermudagrass. A later study at the Tennessee Valley Substation (TVS) near Belle Mina compared bermudagrass interseeded with either hairy vetch or 'Explorer' rye.

At the Black Belt Substation (BBS) near Marion Junction, the tall fescue varieties 'AU Triumph' (0 percent toxic fungal endophyte) and 'Kentucky 31' tall fescue (having approximately 1, 34, or 90 percent toxic endophyte) were compared. In another study, 'Kentucky 31' pastures having approximately 5 percent toxic endophyte and 94 percent toxic endophyte were tested. Also at that station, highly toxic endophyte-infected 'Kentucky 31' fescue and "AP-2," an experimental line of hardinggrass (*Phalaris*), were evaluated.

In addition, toxic endophyte-infected tall fescue was grazed in pure stands as well as with either ladino clover or birdsfoot trefoil at the Sand Mountain Substation (SMS) near Crossville. Steer gains on an orchardgrass-ladino clover mixture were obtained in a test at TVS. In another study at TVS, toxic endophyte 'Kentucky 31' tall fescue and common orchardgrass (both grown with and without 'Regal' white clover) were evaluated.

Continuously grazed 'AU Lotan' sericea lespedeza was tested against rotationally grazed 'AU Lotan' sericea, 'Serala' sericea, and 'Cimarron' alfalfa at the Upper Coastal Plain Substation (UCP) near Winfield. At TVS, 'Funk's 78F' sorghum-sudan was evaluated. Various winter annual mixtures including rye, oats, ryegrass, and crimson clover were tested at the Lower Coastal Plain Substation (LCP) near Camden.

Procedure

To get a clearer view of the performance of stocker cattle on forages, performance criteria for stocker steers grazing the 37 different pasture treatments used in these Auburn University grazing studies were summarized from various research reports and articles. These experimental results provide a basis for comparison of animal performance among the treatments (table 1).

Subsequently, Auburn University 2008 budget estimates for the various forage species or species mixtures involved in these studies were used to determine both the approximate pasture costs/acre and the pasture costs/lb of gain. This information, also in table 1, provides a basis for economic comparison. The ranking (least to most expensive) of variable and total pasture cost of gain for each forage species is also provided.

Animal Performance Comparisons

As expected, the animal performance reported in these experiments varied greatly among the various pasture species or mixtures. The number of calendar grazing days ranged from a low of 77 for sorghum-sudan at TVS to a high of 238 for an orchardgrass-white clover mixture, also at TVS.

The variation in calendar grazing days was greater among cool-season species and mixtures than it was among warm-season species. In comparisons of these studies, neither endophyte status nor presence of a legume companion species seemed to affect the number of grazing days obtained from pasture treatments involving tall fescue (although legumes can lengthen the grazing season in some situations).

High per-day gains (1.7 pounds or more) were obtained with alfalfa, continuously grazed 'AU Lotan' sericea lespedeza, tall fescue having low or medium endophyte infection, common orchardgrass, hardinggrass, orchardgrass with ladino clover, and tall fescue with ladino clover. In several cases in which ADG was high, a relatively short grazing season reduced gain per steer. In other cases, a lower ADG coupled with a long grazing season resulted in impressive gains per steer. It should be noted that winter annuals often produce higher individual animal gains than were obtained in the experiments selected for this exercise.

Table 1. Production and Economic Performance Data for Stocker Steers Using Various Forage Types and Varieties[a]

Description	Item no.	Pasture	Line or variety	Calendar days grazing	Average grazing dates	Years of data	Location[b]
Warm-Season Perennial Grasses (WSPG)	1	Bermudagrass	Coastal	168	NS[g]	4	WG
	2	Bermudagrass	Coastal	168	NS	4	WG
	3	Bermudagrass	Coastal	168	NS	4	WG
	4	Bermudagrass	Coastal	168	NS	4	WG
	5	Bahiagrass	Pensacola	168	NS	3	WG
	6	Bahiagrass	Pensacola	168	NS	3	WG
	7	Bahiagrass	Pensacola	168	NS	3	WG
	8	Bermudagrass	Common	168	NS	3	WG
	9	Bermudagrass	Common	168	NS	3	WG
	10	Bermudagrass	Common	168	NS	3	WG
WSPG W/Winter Annuals	11	Bermudagrass w/vetch	Coastal/Hairy	161	4/4 –9/27	8	TVS
	12	Bermudagrass w/rye	Coastal/Explorer	161	3/19–9/27	8	TVS
Summer Annuals	13	Sorghum-Sudan	Funks 78-F	77	6/6–8/22	3	TVS
Perennial Legumes	14	Alfalfa[h]	Cimarron	163	3/30–9/8	3	UCP
	15	Sericea Lespedeza[h]	Serala	139	4/22–9/8	3	UCP
	16	Sericea Lespedeza[h]	AU Lotan	139	4/22–9/8	3	UCP
	17	Sericea Lespedeza	AU Lotan	139	4/22–9/8	3	UCP
Cool-Season Perennial Grasses	18	Tall Fescue[i]	AU Triumph (0%)	161	10/5–12/26 & 2/28–5/27	3	BB
	19	Tall Fescue	KY 31 (1%)	161	10/5–12/26 & 2/28–5/27	3	BB
	20	Tall Fescue	KY 31 (34%)	161	10/5–12/26 & 2/28–5/27	3	BB
	21	Tall Fescue	KY 31 (90%)	161	10/5–12/26 & 2/28–5/27	3	BB
	22	Tall Fescue	KY 31(<5%)	172	10/23–12/24 & 2/26–6/16	4	BB
	23	Tall Fescue	KY 31 (94%)	172	10/23–12/24 & 2/26–6/16	4	BB
	24	Tall Fescue	KY 31 (>90%)	150	3/18–7/9 & 9/25–11/22	8	TVS
	25	Orchardgrass	Common	139	3/23–7/9 & 9/25–11/11	8	TVS
	26	Tall Fescue	KY 31 (0%)	177	10/17–12/26 & 3/7–5/19	3	BB
	27	Hardinggrass	AP-2	177	10/17–12/26 & 3/7–6/19	3	BB
	28	Tall Fescue	KY 31 (>90%)	206	10/15–1/15 & 3/15–7/19	2	SM
Cool-Season Perennial Grasses w/ Legumes	29	Orchardgrass w/Ladino	Hallmark/Regal	238	9/5–12/5 & 4/1–8/27	2	TVS
	30	Tall Fescue W/Ladino	KY 31/Regal	143	3/18–7/9 & 9/25–11/15	8	TVS
	31	Orchardgrass w/Ladino	Common/Regal	143	3/23–7/9 & 9/25–11/15	8	TVS
	32	Tall Fescue w/Ladino	KY 31/Regal	205	10/15–1/15 & 3/15–7/19	2	SM
	33	Tall Fescue w/Birdsfoot	KY 31/Fergus	194	10/15–1/15 & 3/15–7/19	2	SM
Winter Annuals	34	Rye, Oats & Crm. Clover[j]	NS	121	10/18 – 5/2	2	TVS
	35	Rye & Ryegrass[k]	NS	153	10/24–5/15	7	TVS
	36	Rye, Ryegrass & Crm Clover	NS	177	10/6–5/2	6	BB
	37	Oats & Crm Clover	NS	201	10/29–5/18	2	BB

[a]Data complied from AAES reports (see references). The majority of steers were crossbred with an initial weight of approximately 500 pounds.

[b]WG = Wiregrass; TVS = Tennessee Valley Station; UCP = Upper Coastal Plains; BB = Black Belt; SM = Sand Mountain

[c]Put-and-take grazing was employed in most of these tests, which precludes calculation of figures in this column from other data presented. For example, if you multiply Gain Per Steer times the Stocking Rate, the number does not necessarily equal Gain/Acre as it normally would.

[d]Variable costs (2008 estimates) include annual maintenance items such as fertilizer, mowing, etc. (excluding labor).

[e]Total costs (2008 estimates) include variable items plus fixed costs associated with establishment and ownership of machinery and equipment.

The ten lowest pasture costs/lb of gain are highlighted.

Table 1. (continued)

Item no.	Nitrogen rate	Stocking rate	Average daily gain[c]	Gain/ Acre[c]	Gain per steer[c]	Variable pasture costs[d]	Total pasture costs[e]	Variable pasture cost		Total pasture post	
								$/lb	Ranking[f]	$/lb	Ranking[f]
	Lb/A/Yr	Head/A	Lb/Head	Lb/A	Lb/Head	$/A	$/A	$/Lb		$/Lb	
1	0	1.40	NS	250	179	26.59	50.04	0.47	8	0.69	14
2	80	1.70	NS	340	200	50.22	75.32	0.54	14	0.71	17
3	160	2.60	NS	480	185	73.85	100.61	0.59	18	0.65	11
4	320	3.50	NS	620	177	121.11	151.18	0.60	19	0.73	18
5	0	1.20	NS	220	183	26.59	43.94	0.54	15	0.73	20
6	80	1.80	NS	290	161	50.22	69.22	0.63	22	0.80	24
7	160	2.00	NS	350	175	73.85	94.51	0.70	26	0.86	28
8	0	0.70	NS	100	143	26.59	43.83	1.18	35	1.33	35
9	80	1.40	NS	230	164	50.22	69.12	0.79	31	0.88	29
10	160	1.80	NS	300	167	73.85	94.40	0.82	32	0.90	30
11	0	2.26	1.29	493	218	47.46	73.05	0.35	5	0.47	4
12	150	2.45	1.30	530	216	94.89	123.81	0.49	9	0.62	9
13	100	2.80	1.10	210	84	78.96	93.89	1.18	36	1.35	36
14	0	1.30	2.16	475	352	51.49	131.51	0.51	10	0.91	31
15	0	1.30	1.39	248	193	21.49	37.54	0.42	7	0.60	7
16	0	1.20	1.65	276	229	21.49	37.54	0.37	6	0.54	6
17	0	1.20	1.87	306	260	21.49	37.54	0.34	4	0.49	5
18	200	1.54	2.09	519	336	89.85	112.01	0.55	17	0.65	12
19	200	1.32	2.16	462	348	89.85	112.01	0.61	21	0.73	19
20	200	1.40	1.76	397	283	89.85	111.44	0.71	28	0.85	26
21	200	1.77	1.41	370	227	89.85	111.44	0.77	30	0.91	32
22	200	1.32	1.82	426	323	89.85	112.01	0.67	25	0.79	23
23	200	1.73	1.00	301	174	89.85	111.44	0.94	34	1.12	34
24	150	2.13	1.31	268	126	75.08	95.64	0.91	33	1.11	33
25	150	1.27	1.77	200	157	75.08	97.00	1.22	37	1.49	37
26	200	1.40	1.78	434	310	89.85	112.01	0.65	23	0.78	21
27	200	1.26	1.73	347	275	89.85	112.86	0.70	27	0.85	27
28	150	1.76	1.06	374	218	75.08	95.64	0.65	24	0.79	22
29	0	1.97	1.62	576	292	38.83	58.85	0.22	2	0.30	2
30	0	1.81	1.46	244	135	38.83	57.49	0.52	12	0.71	16
31	0	1.46	1.83	244	167	38.83	58.85	0.52	12	0.71	15
32	0	1.63	1.53	582	314	38.83	57.49	0.22	1	0.30	1
33	0	1.24	1.51	398	293	57.43	77.40	0.32	3	0.44	3
34	130	2.00	1.37	544	272	97.07	111.50	0.59	18	0.65	10
35	130	1.86	1.36	528	278	91.71	105.77	0.54	16	0.60	8
36	100	1.31	1.57	364	278	94.85	109.13	0.76	29	0.85	25
37	100	1.38	1.60	443	321	86.04	99.70	0.61	20	0.68	13

[f]Ranking Based on lowest to highest; fractional differences not shown allowed separation of treatments rounded to the same cost/lb.
[g]NS = Not Specified.
[h]Rotationally grazed.
[i]Tall fescue varieties, where indicated, are identified by percentage of endophyte infestation.
[j]Average of 78 days of grazing; dates not specified.
[k]Average of 52 days of grazing; dates not specified

The gain per acre was at least 475 pounds on ten of the pasture treatments. These were alfalfa, 'Coastal' bermudagrass receiving at least 160 pounds of nitrogen per acre, 'Coastal' bermudagrass overseeded with vetch or rye, endophyte-free 'AU Triumph' tall fescue, endophyte-infected tall fescue-white clover (SM), 'Hallmark' orchardgrass-white clover, and with two of the four winter annual mixtures. The lowest gain per acre (100 pounds) was obtained on common bermudagrass receiving no nitrogen fertilizer.

Notable Points Revealed

- The seven lowest total pasture costs/lb of gain and eight of the ten lowest total pasture costs/lb of gain involved legumes (Table 2).
- The range of total pasture costs/lb of gain (lowest to highest) is much broader than it was in the early 1990's when a similar exercise (calculating pasture costs using this data) was conducted. This provides evidence that as input costs increase, producers need to be increasingly focused on costs and returns to guide their decisions.
- Forage yield is an important economic factor, as evidenced by the fact that in the Wiregrass test, total pasture costs/lb of gain for 'Coastal' bermudagrass were less than for bahiagrass, and those for bahiagrass were less than for common bermudagrass. The forage quality of these three is similar, so the primary difference in pasture cost/lb of gain was forage production/acre. Data from this test also indicate that application of nitrogen is a more cost efficient practice (results in more dry matter production/lb of N applied) on some forages than on others.
- Coastal bermudagrass overseeded with vetch was a significantly lower-cost treatment than any of the other warm-season perennial grass treatments, which suggests that overseeding a legume can be a cost effective practice.
- Use of a sorghum/sudangrass hybrid was a very expensive option. Both average daily gain and calendar days of grazing provided by this grass were low compared to most other treatments.
- In general, the higher the percentage infection by toxic endophyte in tall fescue, the more costly the gains. For example, among treatments at the Black Belt the total pasture cost/lb of gain was almost double ($1.12/lb vs $0.65/lb) in the high versus low endophyte treatments.
- Adding legumes to either tall fescue or orchardgrass substantially lowered pasture cost/lb of gain. In fact, this management practice resulted in the lowest three pasture costs/lb of gain of the 37 forage alternatives evaluated.
- It appears that both improved forage quality and reduction of the amount of fertilizer nitrogen used were factors in substantially lowering total pasture cost/lb of gain when forage legumes were included in pastures for stocker cattle. An important concept is that stocker cattle producers who are able to increase animal performance via providing higher quality pasture and/or who are able to lower fertilizer inputs (with legumes or by other means) can achieve lower pasture costs/acre and lower costs/lb of gain.
- Of the 37 forage treatments, only five treatments had less than a $0.50 total cost/lb of gain. Careful assessment of performance and pasture cost/lb of gain are the crux of sound pasture decisions.

Table 2. Ten Lowest Calculated Pasture Costs/lb of Gain

Pasture type	Line or variety	Grazing days	Grazing dates	ADG	Pasture cost/Ac	Pasture cost/lb
Tall Fescue w/Ladino	'KY 31'/ 'Regal'	205	10/15–1/15 & 3/15–7/19	1.53	$172.26	$0.30
Orchardgrass w/Ladino	'Hallmark'/ 'Regal'	238	9/5–12/5 & 3/15–7/20	1.62	$172.08	$0.30
Tall Fescue w/Birdsfoot	'KY 31'/ 'Fergus'	194	10/15–1/15 & 3/15–7/20	1.51	$173.28	$0.44
Bermudagrass w/Vetch	'Coastal'/ Hairy	161	4/4–9/27	1.29	$230.75	$0.47
Sericea Lespedeza	'AU Lotan'	139	4/22–9/8	1.87	$148.84	$0.49
Sericea Lespedeza	'AU Lotan'	139	4/22–9/8	1.65	$148.84	$0.54
Sericea Lespedeza	'Serala'	139	4/22–9/8	1.39	$148.84	$0.60
Rye & Ryegrass	NS*	153	10/24–5/15	1.36	$318.34	$0.60
Bermudagrass w/Rye	'Coastal'/ 'Explorer'	161	3/19–9/27	1.30	$328.35	$0.62
Rye, Oats & Crim. Clover	NS*	121	10/18–5/2	1.37	$352.78	$0.65

*NS = None Stated

Other Factors to Consider

Various types and classes of livestock have different nutritional requirements. The data summarized in this publication pertain to stocker-steer tests. Nonetheless, this data has some relevance to other types of livestock operations, as it should facilitate obtaining a better understanding of the relative level and duration of nutrition provided by these forage species and mixtures.

The data summarized here are from multiple-year experiments at various locations and under environmental conditions unique to the years during which the studies were conducted. While valuable for the purpose of making general comparisons, any of various animal or plant factors can influence such results.

Pasture cost values provided were **calculated** assuming the application of recommended management practices with commercially purchased inputs as reflected in 2008 Auburn University forage crop budgets. In addition, although pasture cost/lb of gain is an important measure of production efficiency, it is not the only factor that affects profit. In particular, pasture cost/lb of gain does not take into consideration seasonal price fluctuations (buy-sell relationships) or other expenses associated with owning animals over time.

In addition, animal management and marketing costs should always be considered when evaluating forage and livestock systems. For example, the pasture costs/lb of gain for some of the warm-season perennial grass treatments are relatively low. In most years, however, few stocker cattle operations are in this circumstance because of unfavorable buy-sell price margins during this time of year. In addition, greater production and marketing risks are associated with higher stocking rates and higher nitrogen fertilization levels required for high per-acre gains with warm-season perennial forage species. Also, the market for animals coming off warm-season species is usually poorer than for animals coming off cool-season species. As a result, summer stocker programs are usually difficult to justify.

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