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Effects of Various Grazing Systems on Grazing and Subsequent Finishing Performance

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Effects of Various Grazing Systems on Grazing and Subsequent Finishing Performance

Abstract
A total of 240 mixed black yearling steers were used to compare grazing and subsequent finishing performance from pastures with 'MaxQ' tall fescue, a wheat-bermudagrass double-crop system, or a wheat-crabgrass double-crop system in 2010, 2011, 2012, 2013, 2014, and 2015. Daily gains of steers that grazed MaxQ fescue, wheatbermudagrass, or wheat-crabgrass were similar ($P > 0.05$) in 2010. The daily gains of steers that grazed wheat-bermudagrass or wheat-crabgrass were greater ($P > 0.05$) than those that grazed MaxQ fescue in 2011 and 2012. The daily gains of steers that grazed wheat-crabgrass were greater ($P > 0.05$) than those that grazed wheat-bermudagrass and similar ($P > 0.05$) to those that grazed MaxQ fescue in 2013. The daily gains of steers that grazed wheat-crabgrass were greater ($P > 0.05$) than those that grazed wheatbermudagrass or MaxQ fescue in 2014, and daily gains of steers that grazed wheatcrabgrass were greater ($P > 0.05$) than those that grazed wheat-bermudagrass or MaxQ fescue and daily gain from wheat-bermudagrass was greater ($P > 0.05$) than those that grazed MaxQ fescue in 2015. Finishing gains were similar ($P > 0.05$) among forage systems in 2010, 2012, 2013, and 2014. Finishing gains of steers that grazed MaxQ fescue were greater ($P < 0.05$) than those that grazed wheat-bermudagrass in 2011 and greater ($P < 0.05$) than those that grazed wheat-bermudagrass or wheat-crabgrass in 2015.

Keywords
Beef cattle

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Summary

A total of 240 mixed black yearling steers were used to compare grazing and subsequent finishing performance from pastures with 'MaxQ' tall fescue, a wheat-bermudagrass double-crop system, or a wheat-crabgrass double-crop system in 2010, 2011, 2012, 2013, 2014, and 2015. Daily gains of steers that grazed MaxQ fescue, wheat-bermudagrass, or wheat-crabgrass were similar ($P > 0.05$) in 2010. The daily gains of steers that grazed wheat-bermudagrass or wheat-crabgrass were greater ($P > 0.05$) than those that grazed MaxQ fescue in 2011 and 2012. The daily gains of steers that grazed wheat-crabgrass were greater ($P > 0.05$) than those that grazed wheat-bermudagrass and similar ($P > 0.05$) to those that grazed MaxQ fescue in 2013. The daily gains of steers that grazed wheat-crabgrass were greater ($P > 0.05$) than those that grazed wheat-bermudagrass or MaxQ fescue in 2014, and daily gains of steers that grazed wheat-crabgrass were greater ($P > 0.05$) than those that grazed wheat-bermudagrass or MaxQ fescue and daily gain from wheat-bermudagrass was greater ($P > 0.05$) than those that grazed MaxQ fescue in 2015. Finishing gains were similar ($P > 0.05$) among forage systems in 2010, 2012, 2013, and 2014. Finishing gains of steers that grazed MaxQ fescue were greater ($P < 0.05$) than those that grazed wheat-bermudagrass in 2011 and greater ($P < 0.05$) than those that grazed wheat-bermudagrass or wheat-crabgrass in 2015.

Introduction

MaxQ tall fescue, a wheat-bermudagrass double-crop system, and a wheat-crabgrass double-crop system have been three of the most promising grazing systems evaluated at the Southeast Agricultural Research Center in the past 20 years, but these systems have never been compared directly in the same study. The objective of this study was to compare grazing and subsequent finishing performance of stocker steers that grazed these three systems.

Experimental Procedures

Forty mixed black yearling steers were weighed on two consecutive days each year and allotted on April 6, 2010 (633 lb); March 23, 2011 (607 lb); March 22, 2012 (632 lb); April 4, 2013 (678 lb); April 1, 2014 (636 lb); and March 31, 2015 (644 lb) to three 4-acre pastures of 'Midland 99' bermudagrass and three 4-acre pastures of 'Red River' crabgrass. These pastures had previously been no-till seeded with approximately 120 lb/a of 'Fuller' hard red winter wheat on September 30, 2009, and September 22,

2010; 130 lb/a, 95 lb/a, 85 lb/a, and 180 lb/a of 'Everest' hard red winter wheat on September 27, 2011, September 25, 2012, September 23, 2013, and September 29, 2014, respectively; and four 4-acre established pastures of MaxQ tall fescue (4 steers/pasture). All pastures were fertilized with 80-40-40 lb/a of N-P_2O_5-K_2O on March 3, 2010; January 27, 2011; January 25, 2012; February 19, 2013; January 28, 2014; and February 10, 2015. Bermudagrass and crabgrass pastures received an additional 46 lb/a of nitrogen (N) on May 28, 2010; June 10, 2011; May 18, 2012; July 3, 2013; June 2, 2014; and June 8, 2015. Fescue pastures received an additional 46 lb/a of N on August 31, 2010; September 15, 2011; September 18, 2013; September 4, 2014; and October 7, 2015. An additional 5 lb/a, 4 lb/a, 4 lb/a, 4 lb/a, and 4 lb/a of crabgrass seed was broadcast on crabgrass pastures on April 8, 2011, April 4, 2012, May 7, 2013, April 18, 2014, and June 4, 2015, respectively.

Pasture was the experimental unit. No implants or feed additives were used. Weight gain was the primary measurement. Cattle were weighed every 28 days, and forage availability was measured approximately every 28 days with a disk meter calibrated for wheat, bermudagrass, crabgrass, or tall fescue. Cattle were treated for internal and external parasites before being turned out to pasture and later were vaccinated for protection from pinkeye. Steers had free access to commercial mineral blocks that contained 12% calcium, 12% phosphorus, and 12% salt. Wheat-bermudagrass and wheat-crabgrass pastures were grazed continuously until September 14, 2010 (161 days); September 7, 2011 (168 days); September 10, 2013 (159 days); September 3, 2014 (155 days); and September 15, 2015 (168 days). The fescue pastures were grazed continuously until November 9, 2010 (217 days); October 21, 2011 (212 days); October 29, 2013 (208 days); October 14, 2014 (196 days); and November 10, 2015 (224 days). In 2012, all pastures were grazed continuously until August 23 (144 days), when grazing on all pastures was terminated due to limited forage availability because of below-average precipitation. Steers were weighed on two consecutive days at the end of the grazing phase.

After the grazing period, cattle were moved to a finishing facility, implanted with Synovex-S (Zoetis, Madison, NJ), and fed a diet of 80% whole-shelled corn, 15% corn silage, and 5% supplement (dry matter basis). Finishing diets were fed for 94 days (wheat-bermudagrass and wheat-crabgrass) or 100 days (fescue) in 2010, 98 days (wheat-bermudagrass and wheat-crabgrass) or 96 days (fescue) in 2011, 105 days in 2012, 105 days (wheat-bermudagrass and wheat-crabgrass) or 91 days (fescue) in 2013, 119 days (wheat-bermudagrass and wheat-crabgrass) or 106 days (fescue) in 2014, and 99 days (wheat-bermudagrass and wheat-crabgrass) or 97 days (fescue) in 2015. All steers were slaughtered in a commercial facility, and carcass data were collected.

Results and Discussion

Grazing and subsequent finishing performance of steers that grazed MaxQ tall fescue, a wheat-bermudagrass double-crop system, or a wheat-crabgrass double-crop system are presented in Tables 1, 2, 3, 4, 5, and 6 for 2010, 2011, 2012, 2013, 2014, and 2015, respectively. Daily gains of steers that grazed MaxQ tall fescue, wheat-bermudagrass, or wheat-crabgrass were similar ($P > 0.05$) in 2010, but total grazing gain and gain/a were greater ($P < 0.05$) for MaxQ tall fescue than wheat-bermudagrass or wheat-crabgrass because steers grazed MaxQ tall fescue for more days. Gain/a for MaxQ fescue, wheat-

bermudgrass, and wheat-crabgrass were 362, 286, and 258 lb/a, respectively. MaxQ tall fescue pastures had greater ($P < 0.05$) average available forage dry matter (DM) than wheat-bermudagrass or wheat-crabgrass. Grazing treatment in 2010 had no effect ($P > 0.05$) on subsequent finishing gains. Steers that grazed MaxQ were heavier ($P < 0.05$) at the end of the grazing phase, maintained their weight advantage through the finishing phase, and had greater ($P < 0.05$) hot carcass weight than those that grazed wheat-bermudagrass or wheat-crabgrass pastures. Steers that previously grazed wheat-bermudagrass or wheat-crabgrass had lower ($P < 0.05$) feed:gain than those that had grazed MaxQ.

In 2011, daily gains, total gain, and gain/a of steers that grazed wheat-bermudagrass or wheat-crabgrass were greater ($P < 0.05$) than MaxQ fescue. Gain/a for MaxQ fescue, wheat-bermudagrass, and wheat-crabgrass were 307, 347, and 376 lb/a, respectively. MaxQ tall fescue pastures had greater ($P < 0.05$) average available forage DM than wheat-bermudagrass or wheat-crabgrass. This was likely due to greater forage production by MaxQ and/or greater forage intake by steers grazing wheat-bermudagrass and wheat-crabgrass. Steers that grazed MaxQ had greater ($P < 0.05$) finishing gain than those that grazed wheat-bermudagrass and lower ($P < 0.05$) feed:gain than those that grazed wheat-bermudagrass or wheat-crabgrass. Carcass weight was similar ($P > 0.05$) among treatments.

In 2012, daily gains, total gain, and gain/a of steers that grazed wheat-bermudagrass or wheat-crabgrass were greater ($P < 0.05$) than MaxQ fescue. Gain/a for MaxQ fescue, wheat-bermudagrass, and wheat-crabgrass were 226, 325, and 313 lb/a, respectively. MaxQ tall fescue pastures had greater ($P < 0.05$) average available forage DM than wheat-bermudagrass or wheat-crabgrass. Grazing treatment had no effect ($P > 0.05$) on subsequent finishing performance or carcass characteristics.

In 2013, daily gain was greater ($P < 0.05$) for steers that grazed wheat-crabgrass than for those that grazed wheat-bermudagrass, and daily gain from MaxQ fescue and wheat-bermudagrass were similar ($P > 0.05$). Gain/a for MaxQ fescue, wheat-bermudagrass, and wheat-crabgrass were 338, 244, and 316 lb/a, respectively. Gain/a was greater ($P < 0.05$) for MaxQ fescue and wheat-crabgrass than for wheat-bermudagrass. Overall gain was not different between forage systems; however, steers grazed MaxQ fescue for 49 more days than wheat-bermudagrass or wheat-crabgrass. Overall daily gain was greater ($P < 0.05$) for wheat-crabgrass than for MaxQ tall fescue. MaxQ tall fescue pastures had greater ($P < 0.05$) average available forage DM than wheat-bermudagrass or wheat-crabgrass and wheat-bermudagrass pastures had more ($P < 0.05$) available forage DM than wheat-crabgrass. Grazing treatment had no effect ($P > 0.05$) on subsequent finishing daily gain or carcass characteristics.

In 2014, daily gain was greater ($P < 0.05$) for steers that grazed wheat-crabgrass than for those that grazed wheat-bermudagrass or 'MaxQ' fescue, and daily gain from MaxQ fescue and wheat-bermudagrass were similar ($P > 0.05$). Gain/a for MaxQ fescue, wheat-bermudagrass, and wheat-crabgrass were 370, 282, and 383 lb/a, respectively. Gain/a was greater ($P < 0.05$) for MaxQ fescue and wheat-crabgrass than for wheat-bermudagrass. Overall gain and overall daily gain for wheat-crabgrass were greater ($P < 0.05$) than

for wheat-bermudagrass or MaxQ fescue, while overall gain and overall daily gain for MaxQ fescue and wheat-bermudagrass were similar ($P > 0.05$). MaxQ tall fescue pastures had greater ($P < 0.05$) average available forage DM than wheat-bermudagrass or wheat-crabgrass and wheat-bermudagrass pastures had more ($P < 0.05$) available forage DM than wheat-crabgrass. Grazing treatment had no effect ($P > 0.05$) on subsequent finishing daily gain or carcass characteristics.

In 2015, daily gain was greater ($P < 0.05$) for steers that grazed wheat-crabgrass than for those that grazed wheat-bermudagrass or MaxQ fescue, and daily gain from wheat-bermudagrass was greater ($P < 0.05$) than for those that grazed MaxQ fescue. Gain/a for MaxQ fescue, wheat-bermudagrass, and wheat-crabgrass were 291, 337, and 396 lb/a, respectively. Gain/a was greater ($P < 0.05$) for wheat-crabgrass than for wheat-bermudagrass and MaxQ fescue and greater ($P < 0.05$) for wheat-bermudagrass than MaxQ fescue. Overall gain for 'MaxQ' fescue was greater ($P < 0.05$) than for wheat-bermudagrass or wheat-crabgrass, while overall gain for wheat-bermudagrass and wheat-crabgrass were similar ($P > 0.05$). Overall daily gains were similar ($P > 0.05$) among forage systems. MaxQ tall fescue pastures had greater ($P < 0.05$) average available forage DM than wheat-bermudagrass or wheat-crabgrass and wheat-bermudagrass pastures had more ($P < 0.05$) available forage DM than wheat-crabgrass. Slaughter weight, finishing gains, hot carcass weight, and ribeye area of steers that grazed MaxQ fescue were greater ($P < 0.05$) and feed:gain was less ($P < 0.05$) than those that grazed wheat-bermudagrass or wheat-crabgrass. Much of this difference in finishing performance can be attributed to muddier feedlot conditions during the time that the wheat-bermudagrass and wheat-crabgrass steers were being finished for slaughter than for the MaxQ fescue cattle.

Hotter, drier weather during the summer of 2011 and 2012 likely provided more favorable growing conditions for bermudagrass and crabgrass than for fescue, which was reflected in greater ($P < 0.05$) gains by cattle grazing those pastures. Lack of precipitation also reduced the length of the grazing season for MaxQ fescue pastures in 2012, which resulted in less fall grazing and lower gain/a than was observed for those pastures in 2010, 2011, 2013, 2014, and 2015.

Table 1. Effects of forage system on grazing and subsequent performance of stocker steers, Southeast Agricultural Research Center, 2010

	Forage system		
Item	MaxQ fescue	Wheat-bermudagrass	Wheat-crabgrass
Grazing phase			
No. of days	217	161	161
No. of head	16	12	12
Initial weight, lb	633	633	633
Ending weight, lb	995a	919b	891b
Gain, lb	362a	286b	258b
Daily gain, lb	1.67	1.78	1.60
Gain/a, lb	362a	286b	258b
Average available forage dry matter, lb/a	6214a	3497b	3174c
Finishing phase			
No. of days	100	94	94
Beginning weight, lb	995a	919b	891b
Ending weight, lb	1367a	1281b	1273b
Gain, lb	372	361	382
Daily gain, lb	3.72	3.84	4.07
Daily dry matter intake, lb	27.3a	24.6b	25.2b
Feed:gain	7.35a	6.42b	6.22b
Hot carcass weight, lb	847a	794b	790b
Backfat, in.	0.43	0.38	0.35
Ribeye area, sq. in.	12.5	12.5	12.2
Yield grade	2.8	2.5	2.5
Marbling score[1]	649	590	592
Percentage USDA choice grade	100	92	83
Overall performance (grazing plus finishing)			
No. of days	317	255	255
Gain, lb	734a	648b	640b
Daily gain, lb	2.32a	2.54b	2.51ab

[1] 500 = small, 600 = modest, 700 = moderate.
Means within a row followed by the same letter do not differ ($P < 0.05$).

Table 2. Effects of forage system on grazing and subsequent performance of stocker steers, Southeast Agricultural Research Center, 2011

	Forage system		
Item	MaxQ fescue	Wheat-bermudagrass	Wheat-crabgrass
Grazing phase			
No. of days	212	168	168
No. of head	16	12	12
Initial weight, lb	607	607	607
Ending weight, lb	914a	954b	982b
Gain, lb	307a	347b	376b
Daily gain, lb	1.45a	2.07b	2.24b
Gain/a, lb	307a	347b	376b
Average available forage dry matter, lb/a	5983a	4172b	3904c
Finishing phase			
No. of days	96	98	98
Beginning weight, lb	914a	954b	982b
Ending weight, lb	1355	1344	1385
Gain, lb	442a	389b	403ab
Daily gain, lb	4.60a	3.97b	4.11ab
Daily dry matter intake, lb	27.9	28.0	29.3
Feed:gain	6.09a	7.07b	7.13b
Hot carcass weight, lb	841	833	859
Backfat, in.	0.41	041	0.44
Ribeye area, sq. in.	12.9	13.0	13.3
Yield grade	2.6	2.7	2.8
Marbling score[1]	619	640	612
Percentage USDA choice grade	100	92	92
Overall performance (grazing plus finishing)			
No. of days	308	266	266
Gain, lb	749	737	779
Daily gain, lb	2.43a	2.77b	2.93b

[1] 600 = modest, 700 = moderate.
Means within a row followed by the same letter do not differ ($P < 0.05$).

Table 3. Effects of forage system on grazing and subsequent performance of stocker steers, Southeast Agricultural Research Center, 2012

	Forage system		
Item	MaxQ fescue	Wheat-bermudagrass	Wheat-crabgrass
Grazing phase			
No. of days	144	144	144
No. of head	16	12	12
Initial weight, lb	632	632	632
Ending weight, lb	858a	957b	945b
Gain, lb	226a	325b	313b
Daily gain, lb	1.57a	2.26b	2.17b
Gain/a, lb	226a	325b	313b
Average available forage dry matter, lb/a	5983a	4172b	3904c
Finishing phase			
No. of days	105	105	105
Beginning weight, lb	858a	957b	945b
Ending weight, lb	1355	1409	1431
Gain, lb	497	451	486
Daily gain, lb	4.73	4.30	4.63
Daily dry matter intake, lb	30.7	28.3	29.1
Feed:gain	6.53	6.61	6.28
Hot carcass weight, lb	840	873	887
Backfat, in.	0.44	0.38	0.45
Ribeye area, sq. in.	12.6	12.8	13.3
Yield grade	2.8	2.7	2.8
Marbling score[1]	625	591	603
Percentage USDA choice grade	100	83	92
Overall performance (grazing plus finishing)			
No. of days	249	249	249
Gain, lb	722	776	799
Daily gain, lb	2.90	3.12	3.21

[1] 500 = small, 600 = modest, 700 = moderate.
Means within a row followed by the same letter do not differ ($P < 0.05$).

Table 4. Effects of forage system on grazing and subsequent performance of stocker steers, Southeast Agricultural Research Center, 2013

	Forage system		
Item	MaxQ fescue	Wheat-bermudagrass	Wheat-crabgrass
Grazing phase			
No. of days	208	159	159
No. of head	16	12	12
Initial weight, lb	678	678	678
Ending weight, lb	1017a	923b	994a
Gain, lb	338a	244b	316a
Daily gain, lb	1.63ab	1.54a	1.99b
Gain/a, lb	338a	244b	316a
Average available forage dry matter, lb/a	6290a	3590b	2980c
Finishing phase			
No. of days	91	105	105
Beginning weight, lb	1017a	923b	994a
Ending weight, lb	1390	1387	1480
Gain, lb	374a	464b	486b
Daily gain, lb	4.11	4.42	4.63
Daily dry matter intake, lb	27.1	27.7	28.1
Feed:gain	6.64	6.29	6.09
Hot carcass weight, lb	862	860	918
Backfat, in.	0.40	0.38	0.46
Ribeye area, sq. in.	12.7	13.6	13.5
Yield grade	2.6	2.2	2.4
Marbling score[1]	594	599	612
Percentage USDA choice grade	94	100	92
Overall performance (grazing plus finishing)			
No. of days	299	264	264
Gain, lb	712	708	802
Daily gain, lb	2.38ac	2.68bc	3.04b

[1] 500 = small, 600 = modest, 700 = moderate.
Means within a row followed by the same letter do not differ ($P < 0.05$).

Table 5. Effects of forage system on grazing and subsequent performance of stocker steers, Southeast Agricultural Research Center, 2014

	Forage system		
Item	MaxQ fescue	Wheat-bermudagrass	Wheat-crabgrass
Grazing phase			
No. of days	196	155	155
No. of head	16	12	12
Initial weight, lb	636	636	636
Ending weight, lb	1006a	918b	1019a
Gain, lb	370a	282b	383a
Daily gain, lb	1.89a	1.82a	2.47b
Gain/a, lb	370a	282b	383a
Average available forage dry matter, lb/a	5733a	3344b	2509c
Finishing phase			
No. of days	106	119	119
Beginning weight, lb	1006a	918b	1019a
Ending weight, lb	1461a	1405a	1548b
Gain, lb	455a	487ab	529b
Daily gain, lb	4.29	4.09	4.45
Daily dry matter intake, lb	28.9	29.0	29.2
Feed:gain	6.80	7.08	6.57
Hot carcass weight, lb	906a	871a	960b
Backfat, in.	0.48a	0.49a	0.61b
Ribeye area, sq. in.	13.3a	12.4b	12.7b
Yield grade	2.6	2.7	3.3
Marbling score[1]	648	639	648
Percentage USDA choice grade	100	100	100
Overall performance (grazing plus finishing)			
No. of days	302	274	274
Gain, lb	825a	769a	912b
Daily gain, lb	2.73a	2.81a	3.33b

[1] 600 = modest, 700 = moderate.
Means within a row followed by the same letter do not differ ($P < 0.05$).

Table 6. Effects of forage system on grazing and subsequent performance of stocker steers, Southeast Agricultural Research Center, 2015

	Forage system		
Item	MaxQ fescue	Wheat-bermudagrass	Wheat-crabgrass
Grazing phase			
No. of days	224	168	168
No. of head	16	12	12
Initial weight, lb	644	644	644
Ending weight, lb	934a	982b	1040c
Gain, lb	291a	337b	396c
Daily gain, lb	1.30a	2.01b	2.36c
Gain/a, lb	291a	337b	396c
Average available forage dry matter, lb/a	6911a	3507b	3154c
Finishing phase			
No. of days	97	99	99
Beginning weight, lb	934a	982b	1040c
Ending weight, lb	1359a	1230b	1264b
Gain, lb	425a	248b	224b
Daily gain, lb	4.38a	2.51b	2.26b
Daily dry matter intake, lb	26.9a	25.4a	29.5b
Feed:gain	6.19a	10.29b	13.26c
Hot carcass weight, lb	843a	762b	784b
Backfat, in.	0.44	0.45	0.41
Ribeye area, sq. in.	12.6a	11.1b	11.2b
Yield grade	2.7	2.7	2.7
Marbling score[1]	635	599	597
Percentage USDA choice grade	94	100	100
Overall performance (grazing plus finishing)			
No. of days	321	267	267
Gain, lb	715a	586b	620b
Daily gain, lb	2.23	2.19	2.32

[1] 500 = small, 600 = modest, 700 = moderate.
Means within a row followed by the same letter do not differ ($P < 0.05$).