Effects of Planting Date and Glyphosate Application on Performance of Stocker Cattle Grazing Cool-Season Annual Grasses Interseeded into Warm-Season Grass Sod

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Story in Brief

Normally, in southern Arkansas, interseeding of cool-season grasses is delayed until early to mid-October to reduce competition between warm-season grasses and cool-season annual grasses, which delays the initiation of grazing of these pastures. Sod-suppression using glyphosate has been suggested as a way to have an earlier sod-seeding date, thus improving fall forage production and animal performance. This research was conducted to determine the impact of an application of a low rate of glyphosate herbicide and planting date on performance of growing beef calves grazing interseeded cool-season annual pastures. Twenty, 2-acre bermudagrass/crabgrass pastures were planted to soft-red winter wheat (cv Roane, 120 lb/acre) and annual ryegrass (cv Marshall, 20 lb/acre) in mid-September or mid-October of 2005 using a no-till drill, with or without an application of 1 pint of glyphosate at planting. Planting date did not affect ($P \geq 0.07$) overall ADG, but ADG of calves grazing pastures planted in September was 0.62 lb/day greater ($P = 0.03$) from April to May than ADG of calves grazing pastures planted in October. Glyphosate application at planting increased ($P \leq 0.05$) overall ADG and ADG from mid- February to mid-March. Planting in September with an application of glyphosate increased ($P \leq 0.01$) grazing d/acre by 43 d compared to planting in September without glyphosate application or planting in October with or without glyphosate. Gain per acre was 146 lb greater ($P < 0.01$) for pastures planted in September with glyphosate application compared to planting in September without glyphosate application or planting in October with or without glyphosate.

Introduction

In the fall and early spring, grazing stocker calves on small grain pasture has been extensively used to improve net-farm income in the High Plains, this forage system is not as wide-spread in the Southeast. The improved net income comes from the availability of high-quality forage at a time of year when it is usually scarce and the availability of weaned calves at a seasonally low price. This fact suggests that BW gain during the fall and early winter is more valuable than gain during the spring. There are approximately 11.8 million acres of bermudagrass (*Cynodon dactylon* [L.] Pers.) grown in the southern United States. Because much of the land is not suited for cultivation, interseeding of small grains and annual ryegrass into warm-season grass sod, which has a low machinery requirement, is common throughout the southeastern United States. Normally in southern Arkansas interseeding is delayed until early to mid-October to reduce competition between warm-season grasses and cool-season annual grass seedlings. This delays the initiation of grazing of these pastures. Sod-suppression using glyphosate has been suggested as a way to have an earlier sod-seeding date, thus improving fall forage production and animal performance. This research was conducted to determine the impact of an application of a low rate of glyphosate herbicide and planting date on performance of growing beef calves grazing interseeded cool-season annual pastures.

Experimental Procedures

Twenty, 2-acre bermudagrass/crabgrass pastures were interseeded with soft red winter wheat (cv Roane, 120 lb/acre) and annual ryegrass (cv Marshall, 20 lb/acre) in mid-September or mid-October of 2005 using a no-till drill, with or without an application of 1 pint of glyphosate (Roundup, Monsanto Co., St. Louis, Mo.). In the fall before seeding, the pastures were grazed to reduce standing herbage mass in order to increase seed to soil contact and reduce shading of cool-season grass seedlings. Glyphosate was applied the day prior to planting. Approximately 1 month after seeding (on October 11 and November 11 for pastures planted in September and October, respectively), 200 lb/acre of 30-0-30 fertilizer was applied. Ammonium nitrate (150 lb/acre) was applied to all pastures on February 9.

Grazing was initiated when adequate forage was visually estimated to have accumulated to support 3 calves/pasture (2 heifers and 1 steer; average BW = 601 ± 11.8 lb) on January 18 or February 15 for pastures planted in September or October, respectively. Grazing was managed using the put-and-take method, where the 3 initial calves were used to measure performance and additional calves were added as necessary in order to equalize grazing pressure among pastures. The calves were fed 1 lb of corn-based supplement daily designed to supply required minerals, prorated for feeding 3 d/week. Forage DM yield was estimated during the trial using a rising-plate meter calibrated by clipping to ground level and regression equations were developed to estimate DM yield. Beginning, ending, and interim (28-d) BW were recorded unshrunk at 0800 h.

Calf ADG and total BW gain were analyzed using the MIXED procedure of SAS (SAS Inst., Inc., Cary, N.C.) and animal grazing day/acre, and gain/acre were analyzed by analysis of variance using the GLM procedure of SAS as a completely randomized design using a 2 x 2 factorial arrangement of treatments. Pasture was used as the experimental unit, and the random term for ADG and total BW gain was pasture within treatment. Because grazing day/acre and gain/acre were determined on a pasture basis, residual error was used as the error term. In the presence of a significant planting date by glyphosate application interaction ($P < 0.05$), least-squares means of the interactive effects were separated using predicted differences.

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Results and Discussion

There was no significant planting date by glyphosate application interaction (P > 0.22) for calf BW, ADG, or total BW gain during the grazing period, so the main effects of planting date and glyphosate application are shown in Tables 1 and 2, respectively. In February, March, April, and May, BW was greater (P ≤ 0.04) for calves grazing pastures planted in September than calves grazing pastures planted in October, because the calves began grazing 28-d earlier (Table 1). The initial grazing BW of all calves did not differ (P = 0.92) by planting date, averaging 600 lb. Planting date did not affect (P ≥ 0.07) overall ADG or ADG during the February to March or March to April grazing periods, but ADG of calves grazing pastures planted in September were 0.62 lb/day greater (P = 0.03) from April to May than ADG of calves grazing pastures planted in October. Total BW gain per calf was 75 lb greater (P < 0.01)for pastures planted in September than for pastures planted in October.

Application of glyphosate did not affect (P ≥ 0.18) BW of calves at anytime during the grazing study (Table 2). Glyphosate application at planting increased (P ≤ 0.05) overall ADG and ADG from mid-February to mid-March, but did not affect (P ≥ 0.22) ADG from January to February, March to April, or April to May. Total BW gain per calf was increased (P = 0.04) 28 lb by applying glyphosate at planting.

Because of significant planting date by glyphosate application interactions (P ≤ 0.04) grazing d/acre and BW gain/acre are shown in Figures 1 and 2, respectively, by planting date and glyphosate treatment. Planting in September with an application of glyphosate increased (P ≤ 0.01) grazing d/acre by 43 d compared to planting in September without glyphosate application or planting in October with or without glyphosate (Fig. 1). Body weight gain/acre was also increased (P < 0.01) 146 lb by planting in September with glyphosate application compared to planting in September without glyphosate application or planting in October with or without glyphosate (Fig. 2).

Following the September 19 planting, rains associated with hurricane Katrina caused the emergence of interseeded wheat and ryegrass, but warm weather following these rains also initiated regrowth of warm-season grasses in pastures that did not receive glyphosate treatment. The resultant competition for sunlight, water, and soil nutrients reduced the growth and winter-annual grass stand cover of these pastures, explaining the reduced number of grazing day/acre and less BW gain/acre produced. When planting was delayed until mid-October competition by warm-season grasses was reduced so glyphosate had little effect on stand development, although the glyphosate application increased ADG of calves grazing pastures planted in September by 0.21 lb/d, and by 0.42 lb/day for calves grazing pastures planted in October.

Implications

At a current cost of around $3.70/pint, it appears that planting date of interseeded cool-season grasses can be moved back to mid-September if warm-season grasses are sprayed with a low rate of glyphosate. By including this management practice, the initial stocking date can be earlier allowing more grazing days, increased ADG, and greater BW gain per acre.

Table 1. Main effect of planting date of wheat and ryegrass interseeded into warm-season grass sod on the performance of calves during the 2005-2006 grazing season.

	Planting Date[a]			
	September 19	October 19	SE[b]	P-value
Body Weight, lb				
January 18	601	-	8.33	-
February 15	669	599	17.00	0.01
March 15	720	653	17.48	0.02
April 12	799	744	17.57	0.04
May 10	851	779	17.10	< 0.01
On test BW	601	599	16.03	0.92
Average Daily Gain, lb				
Jan 18 to Feb 15	2.61	-	0.19	-
Feb 15 to Mar 15	1.80	1.93	0.18	0.61
Mar 15 to Apr 12	2.85	3.26	0.14	0.07
Apr 12 to May 10	1.86	1.24	0.18	0.03
Overall	2.28	2.14	0.09	0.32
Total BW gain per calf, lb	255	180	9.10	< 0.01

[a] Wheat and ryegrass were interseeded into bermudagrass/crabgrass sod on September 19 or October 19 with or without application of 1 pt/acre glyphosate.
[b] Standard error of the mean, n = 20.

Table 2. Main effect of glyphosate application prior to interseeding wheat and ryegrass into warm-season grass sod on the performance of calves during the 2005-2006 grazing season.

	Glyposate Application[a]			
	No	Yes	SE[b]	P-value
Body Weight, lb				
January 18	600	602	11.79	0.91
February 15	628	640	17.00	0.62
March 15	673	700	17.48	0.29
April 12	757	787	17.57	0.24
May 10	798	832	17.07	0.18
Average Daily Gain, lb				
Jan 18 to Feb 15	2.37	2.85	0.27	0.25
Feb 15 to Mar 15	1.60	2.13	0.18	0.05
Mar 15 to Apr 12	2.99	3.11	0.15	0.56
Apr 12 to May 10	1.49	1.61	0.18	0.66
Overall	2.06	2.36	0.09	0.04
Total BW gain per calf, lb	204	232	9.11	0.04

[a] Wheat and ryegrass were interseeded into bermudagrass/crabrass sod on September 19 or October 19 with or without application of 1 pt/acre glyphosate.
[b] Standard error of the mean, n = 20.

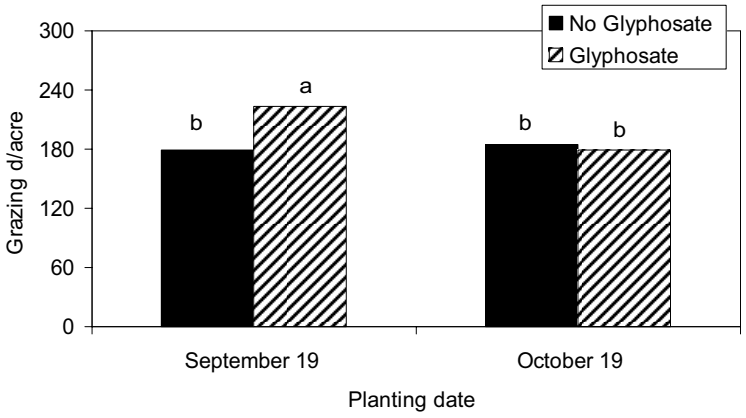

Fig. 1. Effect of planting date and glyphosate application at establishment of cool-season annual grasses interseeded into bermudagrass/crabgrass pasture on grazing days per acre of growing beef calves.
[a,b]Columns with differing letters differ (P < 0.01).

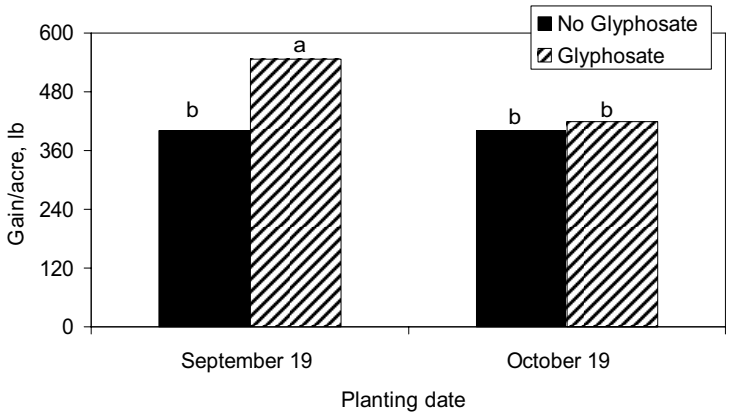

Fig. 2. Effect of planting date and glyphosate application at establishment of cool-season annual grasses interseeded into bermudagrass/crabgrass pasture on BW gain of growing beef calves per acre.
[a,b]Columns with differing letters differ (P < 0.01).