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CORN GLUTEN, CORN, AND SOYBEAN MEAL USED AS A SUPPLEMENT FOR FALL-BORN CALVES STOCKED ON TIFTON 85 BERMUDAGRASS

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Summary

Fall-born calves were stocked at five to six 700 lb hd/ac on Tifton 85 bermudagrass (PAS) from July through September and received varying, daily protein or energy supplementation (SUP) during each of three years. In 2005 (Trial 1), cracked corn (CRN) and pelleted corn gluten (GLU) fed daily at .8% body weight (BW) resulted in the greatest ADG of about 2 lbs/da. Other SUP of .4% BW of GLU, CRN, or soybean meal:corn (2:1) resulted in ADG of about 1.6 lbs/da. All SUP had higher ADG than PAS at about 0.8 lb/da. Stocker gain per acre during this 90-da period ranged from 412 lbs/ac for PAS to 1237 lbs/ac for .8% BW CRN. In both 2006 and 2007 (Trial 2), GLU fed at either .4% or .8% BW resulted in an additional .8 to .4 lbs/da compared to PAS. In Trial 2, supplement to extra gain was not as cost-effective as in 2005, and ranged from 3.3:1 with adequate available forage to nearly 16:1 for .8% BW with restricted forage.

Introduction

Supplementation for stockers grazing bermudagrass is often used as an opportunity to increase gain per animal or serve as a buffer for high stocking rates. However, supplementation on pasture creates management concerns for ingredients, delivery method, and amount fed. This three-year experiment was targeted at assessing the use of commercially-available, pelleted corn gluten at about 23% crude protein and without additional ingredients as a supplement for fall-born stockers on Tifton 85 bermudagrass.

Experimental Procedures

Trial 1
Fall-born ½ Simmental x ¼ Angus x ¼ Brahman steers and heifers were weaned in mid-June 2005. At weaning calves received a modified-live virus injection as described for the VAC-45 program, an 8-way clostridial vaccine, injectable dewormer, Revelor G ear implant, and a fly tag. During the dry lot, fenceline-weaning period, calves received ad libitum bermudagrass hay and 2 to 3 lbs/hd/da of a 1:1 corn gluten:corn supplement. Calves were weighed, body condition scored (BCS), and stratified by sex and weight to groups. The stratified groups consisting of 3steers and 2 heifers were randomly allocated to two replicates in 2005 of the following treatments: 1) Tifton 85 bermudagrass pasture (PAS) only; and daily, hand-fed supplement (SUP) which included: 2) .4% BW pelleted corn gluten (GLU) (23% protein); 3) .8% BW GLU; 4) .4% BW cracked corn (CRN) (8% protein); 5) .8% BW CRN; and 6) .4% BW of a 2:1 soybean meal:cracked corn (SBM) (36% crude protein) containing Rumensin 80, salt, magnesium oxide, and dicalcium phosphate. The SUP amount was adjusted after each 28-day weigh period to maintain the

targeted %BW SUP for the group. Tifton 85 bermudagrass pastures were fertilized with 200 lbs/ac 34-0-0 on both 6-02-05 and 7-21-05 for a total of 136-0-0 lbs/ac N-P_2O_5-K_2O.

Trial 2

A two-year study, 2006 and 2007, protocol was initialed on Tifton 85 bermudagrass as in Trial 1 except that stocking was initiated on 6-13-06 and 6-11-07, respectively. In 2006, 3 replicate pastures for each PAS and .8% BW GLU were used for stockers. For 2007, 2 replicate pastures for each PAS, .4% BW GLU, and .8% BW GLU were used to assess animal performance. Replicate pastures had 4 steers and 3 heifers in 2006 and 4 steers and 4 heifers in 2007. Tifton 85 bermudagrass was fertilized in 2006 on 6-14-06 and 8-2-06 with 200 lbs/ac of a urea-ammonium sulfate blend (33-0-0-11) due to restricted availability of ammonium nitrate. Total fertilizer for 2006 was 132-0-0-44 lb/ac of N-P_2O_5-K_2O-S. In 2007, 300 lb/ac of 21-8-17 was applied on 4-30-07, and 200 lbs/ac of 34-0-0 each on 7-10-07 and 8-22-07 for a seasonal total of 199-24-51 lbs/ac of N-P_2O_5-K_2O. Stocking was terminated on 9-12-06 and 9-18-07 due to restricted forage availability. Forage dry matter available for consumption was hand-clipped to ground level in each replicate pasture at monthly intervals for both Trials 1 and 2.

Results and Discussion

Trial 1

Pastures were stocked at 5 to 5.5 700-lb calves per acre, and reduced forage availability substantially diminished ADG from mid-September to termination (Table 1). Stocker ADG on PAS from July to mid-October was about .8 lbs/da with resultant liveweight gain per acre of 412 lbs (Table 2). All SUP increased ($P < .05$) ADG an additional .7 to 1.4 lbs/da. In general, the .8% BW CRN and .8% BW GLU SUP increased ADG more than the .4% BW of CRN, GLU or SBM. The SUP:extra gain ratios were lowest (best) for both the .4% BW CRN and SBM at about 4:1. The most cost-effective SUP was CRN at both .4% BW and .8% BW. The levels of crude protein in Tifton 85 bermudagrass are usually adequate to allow for conversion efficiencies and cost-effectiveness with an energy SUP. The .8% BW CRN along with both .4% BW and .8% BW GLU had SUP:extra gain ratios at 6:1 to 5:1. All SUP had an overall effect of doubling gain/ac over that of the 412 lbs/ac from PAS. The .8% CRN SUP produced more than a tripling of gain/ac at 1237 lbs. Depending upon supplement, costs may range from $200 to $300 per ton or an approximate cost of $0.10 to $0.15/lb for supplement. Using these general assumptions, the supplement costs for additional gain would range from $0.36 to $0.54/lb for the .4% BW CRN SUP to $0.61 to $0.92/lb for the .8% GLU SUP.

Trial 2

This 2-year experiment using GLU was targeted at assessing pasture only vs GLU SUP for potential direct harvest off pasture and/or to reduce residence feedlot time. Stocking rates of 5 hd/ac in 2006 and nearly 6.5 hd/ac in 2007 restricted ADG from PAS to less than a pound per day (Table 3). Both levels of GLU enhanced ADG by .3 to .9 lbs/day; however, the conversion of SUP to extra gain increased from about 7:1 to nearly 16:1. Thus, during these two years, stockers were substituting SUP for Tifton 85 bermudagrass forage. At these levels of substitution, there may be few situations in which management could show a positive economic return with supplementation. Stocker performance and efficiency of using .8% BW GLU was similar for both 2005 and 2006. For both 2005 and 2007, the final, off-pasture weights for these

11- to 12-mo old fall-born claves was about 900 lbs (Table 4). The drastically reduced forage DM available during August and September of 2006 profoundly reduced ADG and final weights. Using the same cost assumptions as those in Trial 1, the supplement:extra gain ratios at 7.3:1 in 2006 and more than 10:1 in 2007 showed these supplementation strategies to not be cost-effective.

Implications

Backgrounding fall-born calves on Tifton 85 bermudagrass is a viable management strategy to enhance animal performance for pre-conditioning marketings and/or continuous ownership. However, with fall-born calves and normal weaning times, the best potential use of Tifton 85 from mid-May to the first of July may not fit the time-schedule to be incorporated into the stocking management system. The use of various protein and energy SUP sources and daily levels had a positive impact by doubling or tripling gain per acre. With SUP costs of $200 to $300/ton the SUP costs/lb extra gain ranged from about $0.40/lb to $0.90/lb with adequate forage available. However, under reduced forage DM, increased SUP:extra gain ratios of more than 10:1 was not a viable positive economic option with supplement costs for additional gain at $1 to $1.50/lb.

Table 1. Tifton 85 bermudagrass dry matter (DM) available at monthly intervals during grazing period (Trials 1 and 2).

Year	Supplement	Stocking Rate[1]	June 22	July 26	Aug. 26	Oct. 14
		(hd/ac)	------------------------------DM (lbs/ac)-----------------------------			
2005	PAS	5.1	6134	8347	5305	2761
2005	.4 GLU	5.4	6165	8305	5543	3445
2005	.4 SBM	5.5	5810	8768	6689	3664
2005	.4 CRN	5.3	6624	9500	7315	3898
2005	.8 GLU	5.5	5353	8320	5938	3872
2005	.8 CRN	5.6	5612	8052	5286	4330
			June 12	July 5	Aug. 2	Sept. 15
			------------------------------DM (lbs/ac)-----------------------------			
2006	Pasture	5.0	5633	6828	3930	1365
2006	.8 GLU	5.4	5186	5758	3209	1099
2007	Pasture	6.5	8233	6078	3682	2836
2007	.4 GLU	6.4	9847	6696	3677	2845
2007	.8 GLU	6.4	8086	5827	3967	3306

[1] Stocking rate based on 700 lbs = 1 stocker.

Table 2. Performance of fall-born stockers on Tifton 85 bermudagrass and receiving varying daily allotments of corn gluten (GLU), cracked corn (CRN), and soybean meal-corn (SBM) Supplement (Trail 1).

Supplement	ADG	SUPP Gain	SUPP Intake	SUPP:Extra Gain	Gain/An	Stk Rate[3]	Gain/Ac
	(lb/da)	(lb/da)	(lb/hd/da)	(lb)	(lb)	(hd/ac)	(lb/ac)
Pasture	0.78 d[2]	-	-		82	5.11	412
.4 GLU	1.45 c	.67	3.4	5.1:1	151	5.41	813
.4 SBM[1]	1.64 bc	.86	3.6	4.2:1	170	5.47	929
.4 CRN	1.71 bc	.93	3.38	3.6:1	177	5.28	937
.8 GLU	1.89 ab	1.11	6.81	6.1:1	196	5.51	1081
.8 CRN	2.14 a	1.36	6.75	5.0:1	223	5.57	1237

[1] Soybean meal: cracked corn (2:1) with Rumensin 80 and minerals.
[2] Numbers followed by a different letter differ at $P < .05$.
[3] Stocking rate based on 700 lbs = 1 stocker.

Table 3. Two-year performance of fall-born stocker steers and heifers stocked on Tifton 85 bermudagrass and receiving a daily allotment of pelleted corn gluten (GLU) in Trial 2.

Year	Supplement[1]	ADG (lb/da)	SUPP Gain (lb/da)	SUPP Intake (lb/hd/da)	SUPP:Extra Gain (lb)	Gain/An (lb)	Stk Rate[3] (hd/ac)	Gain/Ac (lb/ac)
2006	Pasture	.82 b[2]	-	-	-	73	4.97	363
2006	.8 GLU	1.67 a	.85	6.22	7.3:1	149	5.38	802
2007	Pasture	.90 b	-	-	-	76	6.45	490
2007	.4 GLU	1.21 a	.31	3.35	10.8:1	102	6.44	657
2007	.8 GLU	1.32 a	.42	6.63	15.8:1	111	6.42	713

[1] Pelleted corn gluten (GLU) fed daily at allocated levels.
[2] Numbers within a year and followed by a different letter, differ at $P < .05$.
[3] Stocking rate based on 700 lbs = 1 stocker.

Table 4. Initial and final-off pasture weights of fall-born stockers on Tifton 85 bermudagrass (Trials 1 and 2).

Year	Supplement	Stocking Rate[1]	Initial Weight (lbs)	Final Weight (lbs)
2005	Pasture	5.1	773	855
2005	.4 GLU	5.4	748	899
2005	.4 SBM	5.5	761	931
2005	.4 CRN	5.3	741	918
2005	.8 GLU	5.5	756	952
2005	.8 CRN	5.6	750	973
2006	Pasture	5.0	701	760
2006	.8 GLU	5.4	715	864
2007	Pasture	6.5	782	849
2007	.4 GLU	6.4	799	900
2007	.8 GLU	6.4	803	914

[1] Stocking rate based on 700 lbs = 1 stocker.