TEXAS A&M AGRILIFE RESEARCH

SOYBEAN MEAL-CORN SUPPLEMENT AND STOCKING RATE EFFECTS ON PEFORMANCE OF FALL-BORN CALVES STOCKED ON TIFTON 85 BERMUDAGRASS

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Summary

A three-year grazing study comparing Tifton 85 bermudagrass pasture (PAS) and a daily 36% protein supplement (SUP) of .4% body weight (BW) soybean meal:cracked corn (2:1) showed a .62 lbs/da increase in ADG using SUP for fall-born calves in Trial 1. The PAS ADG of 1.23 lb/da was increased to 1.84 lb/da with 3.3 lbs/da SUP, and the conversion of SUP:extra gain was 5.6:1. At stocking rates of 4.6 to 5.0 700-lb stockers/ac, gain per acre was increased from 523 lbs to 831 lbs/ac with SUP. In Trial 2, stocking rate (SR) x SUP showed decreased ADG as SR increased from 5 to 9 700-lb calves/ac. With increasing SR, extra gain due to SUP increased which resulted in improved SUP:extra gain ratios of 6.2:1, 3.3:1, and 3.4:1, respectively, for low, medium, and high SR. Gain per acre was maximum at medium SR plus SUP at 1161 lbs/ac during this 90-day period.

Introduction

The use of 2 lbs/hd/da of a 1:1 soybean meal: cracked corn (28% protein) ration increased stocker gain by about .3 lb/da in a 2-year trial with Tifton 85 bermudagrass (Rouquette, et al 2002). The use of a 2:1 soybean meal:corn (36% protein) supplement containing Rumensin 80 and minerals showed increased ADG using .4% BW and .8% BW compared to non-supplemented Tifton 85 bermudagrass pasture (Woods et al 2004). The objectives of this three-year study was to assess ADG and gain per acre using .4% BW of a 2:1 soybean meal:corn supplement (Trial 1); and to asses ADG from Tifton 85 bermudagrass pastures and supplement at different stocking rates (Trial 2).

Experimental Procedures

Trial 1

In 2003, 2004, and 2005, fall born ½ Simmental x ¼ Angus x ¼ Brahman steers and heifers were weaned in mid-June each year. During the 10- to 14- day weaning period, all calves received a modified-live virus injection as described for the VAC-45 program, a 7-way Clostridial vaccine, injectable dewormer, Revelor G ear implant, and a fly tag. During the fenceline-weaning process, calves received ad libitum bermudagrass hay and 2 to 3 lbs/hd/da of 3:1 corn:soybean meal supplement. For allotment into treatment groups, calves were weighed and body condition scored (BCS) and stratified into groups based on sex and weight. In all three years, there were 3 steers and 2 heifers in groups assigned to each replicate pasture. The stratified groups were randomly allocated to three replicate pastures each in 2003, and two replicate pastures each in 2004 and 2005 on Tifton 85 bermudagrass (PAS) and supplement (SUP). The SUP was .4% BW of a 2:1 soybean meal:corn mixture (36% crude protein) containing Rumensin 80, salt, magnesium oxide, and dicalcium phosphate. The SUP ingredients were intended to enhance

efficiency of digestion and forage utilization along with providing some minor palatability deterrent to excessive SUP intake by dominant animals. The SUP was group-fed daily at a level of .4% BW. The ration was adjusted after each monthly weigh period in an attempt to maintain the .4% BW relationship with amount of SUP offered per unit BW. Forage available for consumption was measured monthly from each pasture by clipping to ground level. Tifton 85 bermudagrass was fertilized during these three years as follows: 1) 2003; 200 lbs/ac 34-0-0 on both 7-15 and 9-5 for a total of 136-0-0 lbs/ac N-P_2O_5-K_2O; 2) 2004; 340 lbs/ac 21-8-17 on 5-27, and 200 lbs 34-0-0 on both 7-9 and 8-18 for a total of 207-27-58 lbs/ac N-P_2O_5-K_2O; and 3) 2005; 200 lbs/ac 34-0-0 on both 6-02 and 7-21 for a total of 136-0-0 lbs/ac N-P_2O_5-K_2O. Stocking rate of 700 lbs = 1 stocker were 4.5 to 5 hd/ac for each year.

Trial 2

This experiment was an extension of pasture and SUP treatments during 2004, and the animal and pasture protocol were identical to Trial 1. In addition to the fall-born Simmental-sired steers and heifers, yearling Brahman steers were also included as testers in each of the two replicate pastures of PAS and SUP. The 36% crude protein 2:1 soybean meal:corn ration was identical to Trial 1 and daily-fed allotments of .4% BW were adjusted after each monthly weigh period. Forage availability was measured from each replicate pasture at monthly intervals by clipping to ground level. Tifton 85 pastures were stocked at three rates of 5, 7, and 9 hd/ac, in two replicate pastures each for both PAS and SUP treatments. Stocking rate was defined as 700 lbs = 1 stocker. Fertilizer was described for 2004 in Trial 1 with a total application of 207-27-58 lbs/ac N-P_2O_5-K_2O.

Results and Discussion

Trial 1

The average daily gain (ADG) for fall-born, Simmental-sired steers and heifers was different among the 3-years (Table 1). The ADG on PAS ranged from 1.55 lb/da in 2003 to 0.78 lbs/da in 2005, and SUP ADG ranged from 2.02 lbs/da to 1.64 lbs/da for the same years. The lower overall ADG in 2005 was attributed to reduced forage growth during September, and forage availability restricted selection and intake (Table 2). The additional ADG due to SUP ranged from about .5 lb/hd/da in both 2003 and 2004 to about .9 lb/hd/da in 2005 (Table 1). The SUP:extra gain ratios followed these same year groupings with about 6:1 in both 2003 and 2004 and 4:1 in 2005. For a 3-year average, Tifton 85 bermudagrass when stocked at a low stocking rate of 4 to 5 700-lb stockers per acre during a 90-day period from July through September produced about 525 lbs/ac on pasture only and about 830 lbs/ac with the 2:1 soybean meal:corn supplement.

Trial 2

During the 2005 grazing experiment there were significant ($P < .05$) effects attributed to SUP and stocking rate from June-Sept (Table 3). There were no ADG differences due to breedtype of Brahman and Simmental-sired calves for the ADG 3 period. One of the most noteworthy ADG responses for fall-born stocker cattle and Tifton 85 bermudagrass when grazing is initiated in late June to early July was that the first 60 days on pasture had the greatest potential to enhance gain. There are other factors that affect ADG including forage nutritive value, reduced forage DM available, climatic condition (heat) effects on animals, as well as the overall age-weight of this

breedtype (Table 4). At time of termination of stocking in late September, the fall-born Simmental-sired cattle were approaching 12-mos age and about 900 lbs. With each stocking rate (SR) exhibiting different ($P < .05$) levels of ADG for the 6-28 to 9-28 period (ADG 3), the impact of SUP was assessed for each SR. For pastures stocked at 5 hd/ac (low), ADG on PAS was 1.4 lb/da and ADG from SUP was 1.9 lbs/da (Table 5). The additional half-pound per day gain from SUP was due to about 3 lbs/da of the 36% protein SUP and was converted to additional gain at 6.2:1. With increasing stocking rates to 7 hd/ac (medium) and to 9 hd/ac (high), ADG declined for stockers on both PAS and SUP. At both the medium and high SR, there was nearly a pound a day additional gain due to 3 lbs/da SUP. Thus, as SR increased, ADG declined, but the conversion of SUP:extra gain was improved to about 3.3:1 for cattle on both medium and high stocked pastures. Liveweight gain per acre showed a general negative, linear response for stockers on PAS. However, gain per acre for SUP exhibited a curvilinear response that was maximum for the medium SR at 1161 lbs/ac (Table 5). Thus, with the same pasture fertilization rate, 3.2 lbs/hd/da of the 36% protein soybean meal:corn supplement, and 7stockers/ac, gain per acre was nearly double that of the low stocked (5 hd/ac) PAS at 613 lbs/ac.

Fertilizer Costs

For both 2003 and 2005, the use of 136-0-0 lbs/ac N-P_2O_5-K_2O would project 2010 fertilizer costs per pound of gain of about \$0.16/lb on PAS and \$0.10/lb on SUP. During 2004, the use of 207-27-58 lbs/ac N-P_2O_5-K_2O would project 2010 fertilizer costs per pound of gain for low stocked PAS at \$0.26/lb and low stocked SUP at \$0.18/lb gain. Considering the medium stocked SUP gains, 2010 fertilizer costs per pound of gain would be about \$0.14/lb gain.

Implications

Under low stocking rate conditions, an additional 250 to 300 lbs/ac gain was possible using a .4% BW (about 3 lbs/hd/da) soybean meal:corn supplement. This supplement containing Rumensin 80 and minerals resulted in a 3-year average conversion of supplement:extra gain at about 5.6:1 under low stocking rates. With increased stocking rate, the ADG response to SUP was nearly tripled from 420 lbs/ac to 1160 lbs/ac. With most bermudagrass and stocker cattle ventures, the relative "ceiling" ADG of 1 to 1.5 lb/da for pasture-only scenarios, mandates that increased stocking rate and/or supplementation be considered by management as opportunities to enhance economic returns. Increases in stocking rate must be attentive to level of forage available for consumption to maintain positive gain per animal and per acre. For fall-born calves, the optimum backgrounding period may be 60 to 75-days to take advantage of the period of highest ADG.

Literature Cited

Rouquette, F.M., Jr., J.L. Kerby, G.H. Nimr, and W.C. Ellis. 2002. Tifton 85, Coastal bermudagrass, and supplement for backgrounding fall born calves during the summer. Beef Cattle Res. in TX. p.62-66.

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Table 1. Three year performance of fall-born stockers on Tifton 85 bermudagrass and receiving soybean meal:corn (2:1) supplement (Trial 1).

Year	Supplement[1]	ADG (lbs/hd/da)	SUPP Gain (lb/da)	SUPP Intake (lbs/hd/da)	SUPP:Extra Gain	Gain/An (lb)	Stk[3] Rate (hd/ac)	Gain/Ac (lb/ac)
2003	PAS	1.55 b[2]	-	-	-	140	4.01	561
2003	.4 SBM:CRN	2.02 a	.52	3.25	6.3:1	182	4.41	803
2004	PAS	1.39 b	-	-	-	128	4.79	613
2004	.4 SBM:CRN	1.88 a	.49	3.05	6.2:1	174	5.06	876
2005	PAS	.78 b	-	-	-	82	5.11	412
2005	.4 SBM:CRN	1.64 a	.86	3.60	4.2:1	151	5.41	813
3 YR AVE	PAS	1.23 b	-	-	-	115 b	4.64 a	523 b
3 YR AVE	.4 SBM:CRN	1.84 a	.62	3.30	5.6:1	169 a	4.96 a	831 a

[1] Supplement was soybean meal:cracked corn (2:1) with Rumensin 80 and minerals, and fed daily at .4% BW.

[2] Within a year, numbers followed by a different letter differ at $P < .05$.

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

Table 2. Tifton 85 bermudagrass DM available monthly during grazing period for pasture and .4% BW soybean meal:corn (SBM) (Trials 1 and 2).

Year	Supplement	Stocking Rate[1] (hd/ac)	June 25	July 26	Aug. 27	Sept. 30
			DM lbs/ac			
2003	Pasture	4.0	5720	7450	8025	6706
2003	.4 SBM	4.4	5140	7843	7863	7081
2004	Pasture	4.8	5158	9521	5674	4987
2004	.4 SBM	5.1	5757	9743	6404	5772
2004	Pasture	7.0	4896	7417	3760	1867
2004	.4 SBM	7.8	4831	8254	4254	2255
2004	Pasture	8.9	5587	7132	2758	1288
2004	.4 SBM	9.5	5726	7325	2806	1308
2005	Pasture	5.1	6134	8347	5305	2761
2005	.4 SBM	5.4	5810	8768	6689	3664

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

Table 3. Monthly average daily gain (ADG) of yearling Brahman steers and fall-born Simmental crossbred calves stocked on Tifton 85 bermudagrass at three intensities and with soybean meal:corn (2:1) supplement (.4 SBM:CRN) in 2004 (Trial 2).

Item	Factor	ADG1[1] (6-28 to 7-26)	ADG2 (6-28 to 8-23)	ADG3 (6-28 to 9-28)
		lbs/hd/da		
Supplement	Pasture[2]	2.25 b[3]	1.24 b	0.68 b
	.4 SBM:CRN	2.66 a	2.01 a	1.51 a
Stocking Rate	Low SR	2.43 a	1.96 a	1.64 a
	Med SR	2.41 a	1.60 b	1.14 b
	High SR	2.52 a	1.44 b	0.70 c
Breedtype	BRM	2.99 a	1.77 a	1.09 a
	SIMX	2.24 b	1.57 a	1.09 a
Sex	Steers	2.57 a	1.65 a	1.08 a
	Heifers	2.18 b	1.57 a	1.12 a

[1] ADG for approximate 30, 60, and 90-day intervals.
[2] Supplement was soybean meal:cracked corn (2:1) with Rumensin 80 and minerals fed daily at .4% BW.
[3] Within an item category and monthly ADG, numbers followed by a different letter, differ $P < .05$.

Table 4. Initial and final stocker body weights during stocking on Tifton 85 bermudagrass pasture and .4% BW soybean meal:corn (.4 SBM:CRN) (Trials 1 and 2).

Year	Supplement	Stocking Rate[1] (hd/ac)	Initial Weight (lbs)	Final Weight (lbs)
2003	Pasture	4.0	755	891
2003	.4 SBM-CRN	4.4	763	943
2004	Pasture	4.8	759	887
2004	.4 SBM-CRN	5.1	761	934
2004	Pasture	7.0	767	821
2004	.4 SBM-CRN	7.8	769	907
2004	Pasture	8.9	761	771
2004	.4 SBM-CRN	9.5	758	859
2005	Pasture	5.1	773	855
2005	.4 SBM-CRN	5.4	761	931

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

Table 5. Fall-born stocker performance on Tifton 85 bermudagrass and receiving soybean meal:corn (2:1) supplement (.4 SBM:CRN) and stocked at three levels (Trial 2).

Stocking Rate		Supplement[2]	ADG	SUPP Gain	SUPP Intake	SUPP: Extra Gain	Gain/An	Gain/Ac
Level	(hd/ac[1])		(lbs/hd/da)	(lb/da)	(lbs/hd/da)		(lb)	(lb/ac)
Low	4.79	PAS	1.39 b[3]	-	-	-	128	613
Low	5.06	.4 SBM:CRN	1.88 a	.49	3.05	6.2:1	174	876
Med	6.97	PAS	.66 b	-	-	-	61	418
Med	7.75	.4 SBM:CRN	1.63 a	.97	3.20	3.3:1	150	1161
High	8.91	PAS	.26 b	-	-	-	24	215
High	9.45	.4 SBM:CRN	1.15 a	.89	3.02	3.4:1	106	998

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

[2] Supplement was soybean meal:cracked corn (2:1) with Rumensin 80 and minerals fed at daily rate of .4% BW.

[3] Within a stocking rate category, numbers followed by a different letter differ at $P < .05$.