NATIVE AND INTRODUCED FORAGE SYSTEMS FOR COW-CALF PRODUCTION

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ABSTRACT

The objectives of this study was to compare a highly productive introduced warm-season perennial grass to native range for cow-calf production over two years. Three systems, 1) native range with pelleted soybean or cottonseed meal as winter protein supplement (NC); 2) native range with wheat pasture (NW); and 3) Plains Bluestem with wheat pasture (PB) were compared. Protein supplements were given twice weekly and cows grazing wheat pasture were allowed 6 hrs to graze. Cows on NW were heavier with higher condition at breeding in the spring of 1994 than those on NC and cows on PB were heavier and fatter than those on NW. However, no differences were noted in the spring of 1995. Calves were lighter at weaning in 1994 for NW than for the other two systems, and heavier in 1995 for the NC system. The PB produced 2.5 times as much weaned calf per ha as native range and wheat pasture reduced costs of wintering cows. The PB system cost twice as much per cow, but enough hay was harvested to equalize the costs.

KEYWORDS

Cattle, native range, Bothriochloa, wheat pasture, protein supplementation

INTRODUCTION

Tallgrass native prairie has long provided the standard forage base for year-round cow-calf systems in the Southern Great Plains. Introduced warm season perennial grasses such as Plains Bluestem (*Bothriochloa ischaemum*, Var. ischaemum) have provided more response to summer rainfall and fertility and better late season productivity (Taliaferro et al., 1972). Gains per acre have ranged from four to eight times that of native range during the growing season (Phillips and Coleman, 1995) and in year long growth trials (Sims et al., 1985). The purpose of this study was to compare two forage systems based on native range to one using Plains Bluestem for year long cow-calf production.

METHODS

The study consisted of three forage systems with two replicates of each system. Each replicate of the (1) native control (NC) system consisted of 65 ha of native range in one pasture grazed by 16 cows fed a winter supplement of 1 kg of pelleted soybean or cottonseed meal (41% protein) per day; (2) native-wheat (NW) system consisted of 65 ha of native range in four pastures and four ha of wheat pasture grazed by 18 cows; and (3) Plains Bluestem (PB) system consisted of 23 ha Bluestem and 4 ha of wheat pasture grazed by 18 cows (rep 1) or 16.5 ha and 3 ha wheat pasture grazed by 13 cows.

All native pastures were dominated by big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium* (Michaux) Nash) and Indiangrass (*Sorgastrum nutans* (L.) Nash). The stocking rate for NC (4 ha/cow) is typical for the region. The two extra cows were added to the NW and PB systems based on the extra forage in the wheat pasture. The PB pastures received 84 kg/ha N as urea in April each year, and one half of each replicate was cut for hay in July of each year. After haying the entire pasture was grazed. During the winter, cows on PB were given 4.5 kg of the Plains Bluestem hay which had been cut from the pastures during the growing season. All protein supplements, pellets or wheat, were provided twice weekly after the first freeze (or when wheat pasture was available) and ended when wheat pasture was exhausted, usually about May 1.

The cows were produced over three years (1989-1991) from Angus-Hereford dams bred to either Charolais, Gelbvieh, Angus or Hereford sires to provide a range of body size and production potential. At the beginning of the study, 120 cows were randomly assigned within age and breed to one of the three treatments with the extra 21 cows kept as replacements for those lost due to death or culling. Cows were culled if they were open two consecutive years. All were bred to Simmental bulls each year with the bulls being rotated among the treatments to avoid confounding.

Weights, heights, and condition score of cows was taken at breeding and weaning each year. Calf weights were taken at birth, at the beginning of the subsequent breeding season and at weaning. Heights were taken at weaning. Calf growth and changes in cow size and condition were statistically analyzed using analysis of variance with breed of sire and forage system as the main effects. Calving percentage and calf production per hectare were calculated from the treatment means. Out of pocket costs of production were determined, and all returns were determined on a land resource basis.

RESULTS AND DISCUSSION

The NC pastures were in excellent range condition at the beginning of the study and remained excellent, although some patch grazing was evident in the fall of 1995. The same 16 ha pasture from the NW system near the wheat pasture was grazed during winter each year. The remaining three, some of which were initially in poor range condition, were rotationally grazed during the growing season. Range condition increased during the study, and all of the pastures were rated low excellent or better in December, 1995.

Cow weights at breeding increased from 1993 to 1995 reflecting the maturing of the cows (Table 1). About 40% of the cows were nursing their first calf in 1993. In 1994, weight and condition scores were lowest for the NC group and highest for the PB group ($P < .05$). It was anticipated that the PB treatment would be most vulnerable to winter stresses, but the hay compensated adequately for the reduced amount of standing dry forage and winter annuals that were readily available in native pastures. Treatment did not affect weights or condition in the other years. Wheat pasture grazed ad libitum twice weekly supplied protein requirements as well as plant protein meal fed twice weekly. Coleman and Wyatt (1982) had previously shown that N utilization of wheat forage was similar when fed at 4-day intervals as when fed daily or twice daily. Calving percentage was rather low in 1994, possibly because of the youth of the cows, and was about average for the region in 1995. Cows on PB had the lowest calving percentage in both years, although a statistical analysis was not possible.

Cow weights at weaning were about 100 kg heavier that at breeding, indicating excellent quality forage during the growing season. In 1994, cow weights and condition scores reflected the same patterns as at breeding with PB supporting higher weights and condition ($P < .05$). Calf weaning weights and heights were lower for the NW system in 1994 ($P < .05$). Since height is normally not influenced by nutrition, the difference in weaning weight and daily gain was probably due to genetics, either to non-randomness of the cow allotment or to one of the bulls breeding a larger proportion of the cows on that treatment. In 1995, calves from the NC system gained faster and weighed more at weaning that the other two systems. Even though weaning weight was higher in 1995 than in 1994, rate of gain was lower because of delayed weaning.

The PB pastures produced 2.5 times as much weaned calf plus 1600 kg of hay (8.5% CP) per ha as the native pastures, but at a cost of N fertilizer and haying. Lawrence et al. (1995) used similar stocking rates with variable protein supplement and found similar production of cows on PB as on native. Milk production during the first 60 d increased with increasing protein from 25 to 175% of the requirements, but weaning weight was not affected.

Effect of sire breed was consistent in 1994 with Gelbvieh cows and calves being heavier followed by Charolais, Angus and Hereford. Similar trends were noted for heights, except that Herefords were taller than Angus. In 1995, Charolais cows were similar to Gelbvieh, but Gelbvieh calves were heavier at weaning. No interactions of genotype and forage system were evident except for calf weaning weight and gain in 1995.

The results of these two years data indicate that both native range and the introduced Plains Bluestem pastures can adequately support cow-calf production systems. However, haying is necessary for the Plains Bluestem, but production is higher per unit area of land and excess hay could be sold for a cash crop. Wheat pasture reduces costs over cottonseed cake for winter protein supplement.

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Table 1

Effect of forage system on weight and condition score of cows at breeding.[a]

Item	NC[b]			NW			PB		
	1993	1994	1995	1993	1994	1995	1993	1994	1995
Cow Weight, kg	375	418[c]	463	386	454[d]	490	390	488[e]	485
Condition score (1-10)	5.16	4.66[c]	4.51	5.25	5.01[d]	4.81	5.10	5.71[e]	4.87
Calves born, %	—	78.1	87.5	—	72.2	94.0	—	70.0	83.9

[a]Least square means.

[b]NC = native pasture with cottonseed cake winter protein supplement; NW = native pasture with wheat pasture protein supplement;PB = Plains Bluestem with wheat pasture protein supplement and hay.

[cde]Means in same row within year with different superscripts are different (P < .05).

Table 2

Effect of forage system on characteristics of cows and calves at weaning.[a]

Parameter	NC[b]		NW		PB	
	1994	1995	1994	1995	1994	1995
Cow weight, kg	505[c]	546	515[cd]	555	540[d]	560
Cow Height, cm	128	130	129	131	130	132
Cow Condition (1-10)	5.52[c]	5.24	5.51[c]	5.38	6.02[d]	5.32
Calf weight, kg	241[d]	296[d]	215[c]	280[c]	242[d]	276[c]
Calf height, cm	112[cd]	118	110[c]	117	113[d]	118
Calf daily gain, kg[f]	.99[d]	.77[d]	.83[c]	.69[c]	.97[d]	.68[c]
Calf production, kg/ha[g]	46	64	41	69	113	154
Cost per cow[h]	$70		$56		$59[i]	

[a]Least square means.

[b]NC = native pasture with cottonseed cake winter protein supplement; NW = native pasture with wheat pasture protein supplement;PB = Plains Bluestem with wheat pasture protein supplement and hay.

[cde]Means in same row within year with different superscripts are different (P < .05).

[f]Rate of gain from breeding to weaning.

[g]Calf weaning x weaning percentage / ha.

[h]NC system = cost of supplement; NW = cost of wheat pasture ($247/ha);PB = fertilizer, wheat pasture and hay.

[i]Total cost of $164 was reduced by value of harvested hay (2100 kg @ $.05 = $105).