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PERFORMANCE OF STEERS GRAZING COOL-SEASON PERENNIAL GRASSES

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Story in Brief

A grazing trial was conducted during the spring of 1998 to evaluate three cool-season perennial grasses, Manska pubescent wheatgrass, Lincoln smooth bromegrass, and Paiute orchardgrass, as complementary forages for wheat pasture. Stocking rate was 2.14 steers/acre for all three grasses during the 56-d period (April 3 to May 29). Daily gain of steers and total gain/acre ranged from 2.01 to 2.21 lb and 241 to 265 lb/acre, respectively, and were not different among the three grasses. The spring grazing period was short-lived, and during this year the grasses did not produce sufficient forage to provide a grazing alternative for cattle removed from wheat pasture at the first hollow stem stage of maturity.

Key Words: Cool-season Perennial Grasses, Wheat Pasture

Introduction

Hard red winter wheat (*Triticum aestivum*) pasture is an important forage resource for stocker cattle producers in Oklahoma. Wheat can also serve a dual purpose by producing a grain crop in late spring. However, cattle must be removed from wheat pasture at the first hollow stem stage of maturity if reductions in grain yield are to be avoided. Grazing wheat beyond the first hollow stem stage of maturity has been shown to decrease grain yields by approximately 1.25 bushels/acre/d (Redmon et al., 1996). First hollow stem is defined as the time at which a hollow stem can first be identified above the crown in ungrazed wheat plants. This stage usually occurs in late winter in Oklahoma, approximately March 1 to March 20 (Krenzer, 1997). Warm-season perennial grasses are generally not ready for grazing until approximately May 15, and a forage resource that could "fill the gap" between the time of first hollow stem of wheat pasture and grazing of warm season perennials in the drier regions of Oklahoma would be very valuable. Several cool-season perennial grasses have been shown to produce adequate quantities of forage of high nutritive value in Oklahoma (Redmon, 1997) and may have potential to fill this gap. This study was conducted to evaluate weight gain of steers grazing three of these cool-season perennial grasses.

Materials and Methods

Study Site. The study site was located near Marshall, OK, at the Wheat Pasture Research Unit. Pastures of Manska pubescent wheatgrass (*Thinopyrum intermedium* (Host)), Lincoln smooth bromegrass (*Bromus inermis* (Leyss.)), and Paiute orchardgrass (*Dactylis glomerata* L.) were established in the fall of 1996. Pastures were previously grazed in the spring of 1997, but not in the following fall. In 1998, each grass type was subdivided into two experimental pastures and fertilized with 33 lb of urea-nitrogen/acre on March 3. Long-term average and 1998 precipitation data are presented in Figure 1. Six forage clippings were taken from each pasture on two dates, 3/30/98 and 5/29/98, to estimate standing dry matter in the pastures. All forage inside a 2 ft^2 frame was clipped to ground level, then dried and weighed.

Cattle. Ninety crossbred steers (average initial wt 569 ± 53 lb) were allocated randomly to pastures and stocked at 2.14 steers/acre (1218 lb of initial live weight/acre). Steers had

grazed dormant native range prior to the initiation of the present trial. Initial weights were the average of two full weights taken on consecutive days with a 2% mathematical shrink applied. Final weight was measured after a 16-h shrink in drylot during which both feed and water were withheld. Grazing was initiated on April 3, 1998, and steers were removed from the pastures on May 29, 1998.

Mineral Analysis. Samples of each grass species were hand clipped on three dates in the fall of 1997 and the spring of 1998. Samples were composited by season within species and microwave digested to a total pressure of 150 psi. Mineral content was determined by a SpectroFlame Inductively Coupled Plasma Spectrophotometer (ICP). High Purity standards, certified to ± .3%, were used for calibration.

Statistical Analysis. Data were analyzed using the GLM procedure of SAS (1990) with pasture used as the experimental unit.

Results and Discussion

There was no difference (P=.42; Table 1) in either ADG or gain per acre among the three grasses. Average daily gains were 2.21, 2.01, and 2.18 lb/d for wheatgrass, orchardgrass, and bromegrass, respectively. Gains were similar to gains of steers grazing Lincoln smooth bromegrass in Nebraska (Sindt et al, 1991). Weight gain/acre ranged from 241 to 265 lb and was excellent for the relatively short grazing period. Table 2 shows mineral content of the grasses in relation to the requirements of a 500-lb, medium-frame steer calf consuming 11 lb of feed DM and gaining 2.0 lb/d. In general, comparison of the mineral content of the grasses with the required values results in a good fit with exception of the high potassium content, which is characteristic of small grain forage and these grasses. The difference in standing dry matter was greatest for Manska (Table 3), and this difference tended to be significant (P=.10). Final standing dry matter was not different (P=.69) among the three grasses.

Spring growth of these grasses did not occur early enough to overlap with wheat pasture, therefore cattle could not be moved directly from wheat pasture to cool-season grass. First hollow stem was detected on February 20, 1998, on wheat pasture near the study site, while cool-season perennial grasses were not deemed ready for grazing until early April. However, grazing of cool-season perennials did overlap with availability of warm-season perennial grasses, indicating that cool-season perennials may serve as a complementary forage source for these summer grasses (Figure 2).

The summer of 1998 was one of the most extensive droughts on record for most of Oklahoma. This provided the opportunity to evaluate the grasses on an observational, rather than experimental, basis. While the pubescent wheatgrass and the smooth bromegrass survived the drought with minimal loss, Paiute orchardgrass was completely killed on the upland sites in our pastures. Some orchardgrass survived in the lower, wetter areas of the pastures. This may indicate that it was not the high temperatures alone that killed the orchardgrass, but rather the extreme lack of precipitation or a combination of precipitation and temperature. This result was similar to other orchardgrass stands in central Oklahoma. Wheatgrass and bromegrass stands appeared thinned by the drought, but recovered well in the fall. Stand persistence has been suggested to be one of the more important characteristics to consider when selecting forages for establishment (Miller and Stritzke, 1995). The observations here appear to favor pubescent wheatgrass and smooth bromegrass over orchardgrass for drought tolerance. However, it is important to remember that this was not a controlled experiment, but rather simple observation.

Management. For optimum production and stand life, grazing and fertility management of

cool-season perennial grasses requires more attention than traditional wheat pasture. Stand persistence, along with timing and/or quantity of forage production are probably the more important distinguishing characteristics of cool-season perennial grasses (Miller and Stritzke, 1995). Growth of cool-season perennial grasses is very rapid and dynamic, and a grazing plan should be developed prior to the spring grazing season. Delaying grazing can result in forage maturation and quality deterioration earlier in the grazing season.

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Table 1. Gain of growing steers grazing three cool-season perennial grasses[a].

	Grass Species[a]		
Item	Manska	Paiute	Lincoln
No. pastures	2	2	2
No. steers	30	30	30
Stocking rate, steers/acre	2.14	2.14	2.14
Initial wt, lb April 3	566	570	570
Final wt, lb May 29	690	683	692
ADG, lb (56 days)[b]	2.21	2.01	2.18
Gain/steer, lb[b]	124	113	122
Gain/acre, lb[b]	265	241	261

[a]Manska pubescent wheatgrass (*Thinopyrum intermedium*), Paiute orchardgrass (*Dactylis glomerata*), and Lincoln smooth bromegrass (*Bromus inermis*).

[b]Differences among means not significant (P=.42).

Table 2. Mineral content of three cool-season perennial grasses[ab].

	Manska		Paiute		Lincoln		Animal
Mineral, %DM	F	S	F	S	F	S	req.[c]
Calcium	.35	.28	.49	.33	.45	.4	.60
Phosphorus	.3	.29	.25	.29	.34	.25	.29
Sodium	.04	.01	.08	.12	.02	.06	.07
Potassium	2.29	2.17	2.24	2.72	2.99	2.69	.60
Magnesium	.24	.12	.31	.22	.25	.16	.10
Copper, ppm	20	15	19	13	19	16	10

[a]Manska pubescent wheatgrass (*Thinopyrum intermedium*), Paiute orchardgrass (*Dactylis glomerata*), and Lincoln smooth bromegrass (*Bromus inermis*).

[b]F = fall 1997; S = spring 1998.

[c]For 500lb, medium-frame steer calf gaining 2.0 lb/d and consuming 11 lb of DM/d (NRC, 1996).

Table 3. Forage standing crop, lb dry matter per acre[a].

	Manska	Paiute	Lincoln
Initial dry matter (3/30/98)	2293	1663	1859
Final dry matter (5/29/98)	1426	1521	1648
Standing dry matter decrease	867[b]	142[c]	211[c]

[a]Manska pubescent wheatgrass (*Thinopyrum intermedium*), Paiute orchardgrass (*Dactylis glomerata*), and Lincoln smooth bromegrass (*Bromus inermis*).

[b,c]Means tended to be different (P=.10).

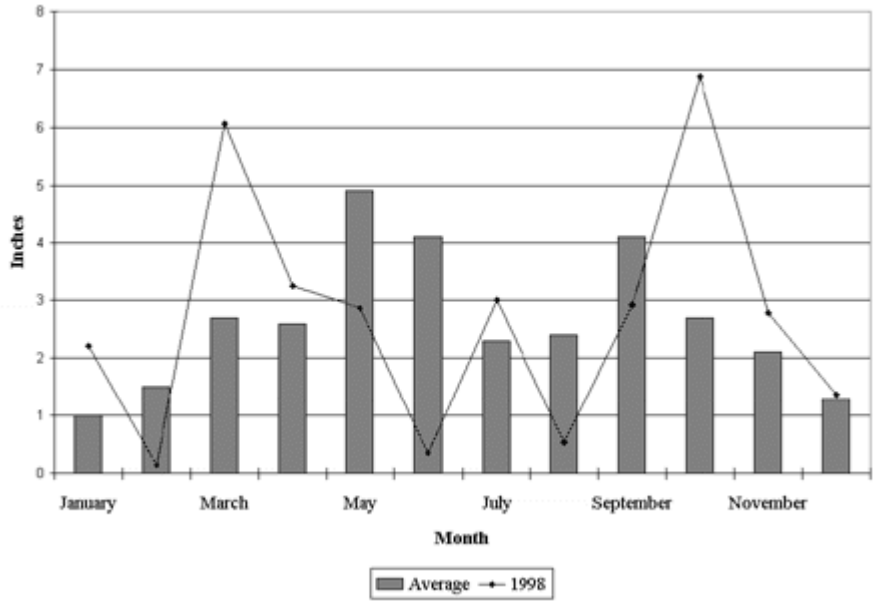

Figure 1. Long-term average and 1998 precipitation; Marshall, OK.

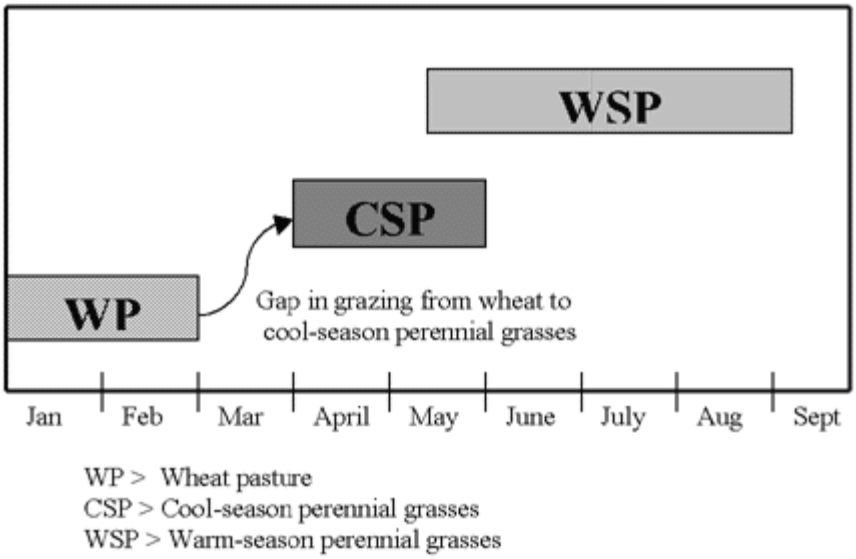

Figure 2. Timing of avilable grazing for three forage types.

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