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Abstract

Beef producers can lower feed costs by extending the grazing period and reducing the need for harvested forages. Complementary forage systems extend the native range grazing season; wheat pasture is common in the southern portion of the High Plains. Anecdotal reports have been made concerning lowered fertility in beef cows bred on lush forage such as wheat pasture; however, ruling out other possible causes of low fertility is difficult. In lactating dairy cows, fertility is lower during consumption of high-protein diets that result in high blood urea nitrogen content. Lower uterine pH that in turn affects embryo survival is thought to be the general mechanism responsible for lower fertility. Little information is available on the fertility of beef cows consuming high-protein diets. Therefore, the objective of this study was to compare pregnancy rates of springcalving cows consuming either wheat pasture or native range before and during the early breeding season.

Keywords

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Grazing Wheat Did Not Reduce Beef Cow Pregnancy Rates

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Introduction

Beef producers can lower feed costs by extending the grazing period and reducing the need for harvested forages. Complementary forage systems extend the native range grazing season; wheat pasture is common in the southern portion of the High Plains. Anecdotal reports have been made concerning lowered fertility in beef cows bred on lush forage such as wheat pasture; however, ruling out other possible causes of low fertility is difficult.

In lactating dairy cows, fertility is lower during consumption of high-protein diets that result in high blood urea nitrogen content. Lower uterine pH that in turn affects embryo survival is thought to be the general mechanism responsible for lower fertility. Little information is available on the fertility of beef cows consuming high-protein diets. Therefore, the objective of this study was to compare pregnancy rates of spring-calving cows consuming either wheat pasture or native range before and during the early breeding season.

Experimental Procedures

This study was conducted at the Kansas State University Agricultural Research Center–Hays from 2001 to 2005. Primiparous and multiparous (all second parity) crossbred cows were assigned to one of two grazing systems by age, sire breed, and calving date. Cows remained in their respective treatment groups throughout the study. The number of cows used each season ranged from 93 to 105. Whenever possible, contemporaries of the original group of cows were used to replace open or dead cows to maintain group size. Grazing treatments were (1) grazing mixed-grass native rangeland from early spring until late fall in a season-long continuous grazing system (Native) or (2) grazing winter annual wheat in early spring followed by mixed-grass native rangeland until late fall in a seasonal complementary forage system (Wheat). Japanese brome and western wheatgrass (cool-season grasses) were available in small proportions to the Native group early in the spring in warm-season grass-dominated native rangeland pastures.

Cows in the Wheat group were placed on winter annual wheat pasture in late March or April each season (when growth had reached a height of 6 in.) in 6 replicates of 8 to 10 head. Wheat cows were allowed access to free choice sorghum-sudangrass hay the first two weeks of grazing wheat to slow passage rate. Average initial wheat grazing date and removal date was April 11 and June 11, respectively, and varied depending on the year. In 2001 and 2002, half of the Wheat group was moved from rangeland to graze sudangrass for 30 to 40 days in August and early September and then were placed back on the native rangeland.

Cows in the Native group were placed on native pasture in three replicates of 13 to 14 head on the same grazing initiation dates as the Wheat group. Weights and body conditions scores (1 = thin, 9 = very fat) of all cows were assessed at the initiation of wheat grazing. Native cows were stocked at 10.0 acres per pair from April through October, whereas the Wheat group was stocked at 1.4 acres per pair from April through June and 4.2 acres per pair through October on native rangeland. The Wheat cows that grazed sudangrass during 2001 and 2002 also were stocked at 1.4 acres per pair while on sudangrass.

At the end of the grazing season, all cows were placed in wintering pasture lots and fed a diet of sorghum-sudangrass hay and oat hay supplemented with vitamin- and mineral-fortified 26% protein range cubes as needed until being placed back into wheat pasture or native rangeland the following spring. Calving occurred in the wintering lots prior to wheat and native rangeland grazing.

The breeding season began between May 15 and May 20 each year. Cows in the Wheat group grazed on wheat 21 to 50 days prior to breeding, depending on the year. The first day of the breeding season consisted of a fixed-time artificial insemination (AI) of all cows following a melengestrol acetate (MGA)-Select protocol (Pfizer Animal Health, New York, NY). The MGA-Select protocol consisted of 0.5 mg MGA in 4 lb of a 26% crude protein cube per head per day from day -36 to day -22. Cubes were fed by hand daily to all pasture groups. Cows received 100 μg gonadotropin-releasing hormone (GnRH) intramuscularly on day 10 and 25 mg prostaglandin F (PGF) on day -3. Cows were inseminated to a single Angus sire on day 0, 72 hours following PGF, concurrent with 100 μg GnRH.

A total of three cleanup bulls were used each breeding season and turned in with cows 10 days after fixed-timed AI. One cleanup bull was used for the Native group, whereas cows in the Wheat group were divided into two groups of 30 head, each with one cleanup bull. Cows on wheat at the time of breeding remained on wheat an average of 25 days following AI. Pregnancy was determined by transrectal ultrasonography 30 to 40 days after timed AI to determine pregnancy rate to AI and on days 76 to 141 to determine final pregnancy rate.

Results and Discussion

Pregnancy rate to AI of cows that grazed sudangrass in August and September was equal to cows that grazed only wheat the first two years of the study, so the data were pooled and values are presented together in Table 1 as a single Wheat group. Cows that grazed wheat before and during breeding had a similar pregnancy rate to fixed-time AI as cows that grazed native rangeland before and during breeding, 51.7% and 57.7%, respectively. Pregnancy rates averaged across grazing groups tended ($P<0.11$) to vary between years, mostly because of lower AI pregnancy rates the first year of the study when cows were all 2- and 3-year-olds (Table 1). A separate simple regression analysis showed that a one-unit increase in body condition score improved AI pregnancy rate by just over 10% (Figure 1). Cows were thinner (Table 2) and weighed less (Table 3) prior to breeding in 2001, which reflected the high nutrient demand of young lactating cows. Final pregnancy rate was not different between the two grazing groups, and over all years averaged 94.4 and 95.9% for the Wheat and Native groups, respectively (Table 1). Cow weight prior to breeding was higher for Native cows in years 2003, 2004, and 2005, but had no effect on either AI or final pregnancy rate. Average days postpartum at breeding was not different between groups (Table 4).

Implications

Cows grazing wheat pasture prior to and during the early breeding season had similar pregnancy rates as cows grazing native mixed-grass rangeland. Timing of peak protein content of wheat would have varied with the annual growing conditions and was not controlled in relationship to start of the breeding season. It is not known if the 3 weeks or more differential between the timing of AI and the timing of the initiation of wheat grazing influenced the potentially negative impacts of a high-protein diet.

Table 1. Pregnancy rate to fixed-time artificial insemination (AI) and final pregnancy rate (AI plus natural service) for cows grazing either wheat pasture or native mixed-grass rangeland for 21 to 50 days prior to day of AI

	AI pregnancy rate, %		Final pregnancy rate, %	
Year	Wheat	Native	Wheat	Native
2001	43.3	35.0	91.7	97.5
2002	50.8	66.7	91.5	93.3
2003	52.5	64.4	94.8	100.0
2004	63.3	60.0	95.0	91.1
2005	47.9	60.0	100.0	97.8
Average	51.7	57.7	94.4	95.9

Table 2. Pre-breeding body condition score for cows grazing either wheat pasture or native mixed-grass rangeland for 21 to 50 days prior to fixed-time artificial insemination

	Cow body condition score[1]	
Year	Wheat	Native
2001	4.6±0.1[a]	4.5±0.2[a]
2002	5.2±0.1[a]	5.2±0.1[a]
2003	5.9±0.1[b]	6.5±0.1[a]
2004	5.9±0.1[b]	7.0±0.1[a]
2005	6.1±0.1[b]	6.5±0.1[a]
Average	5.5[b]	5.9[a]

[1] 1 = thin, 9 = very fat.

[ab] Values within a row followed by the same letter are statistically similar (P>0.05).

Table 3. Pre-breeding body weight for cows grazing either wheat pasture or native mixed-grass rangeland for 21 to 50 days prior to fixed-time artificial insemination

	Cow weight, lb	
Year	Wheat	Native
2001	989±21[a]	1003±24[a]
2002	1198±17[a]	1148±21[a]
2003	1287±18[b]	1327±20[a]
2004	1353±16[b]	1436±20[a]
2005	1290±16[b]	1351±20[a]
Average	1224[a]	1253[a]

[ab] Values within a row followed by the same letter are statistically similar (P>0.05).

Table 4. Days postpartum at artificial insemination (AI) for cows grazing either wheat pasture or native mixed-grass rangeland for 21 to 50 days prior to fixed-time AI

	Days postpartum	
Year	Wheat	Native
2001	88±7	88±8
2002	68±2	69±4
2003	66±3	72±4
2004	73±4	77±6
2005	72±3	73±4
Average	73	76

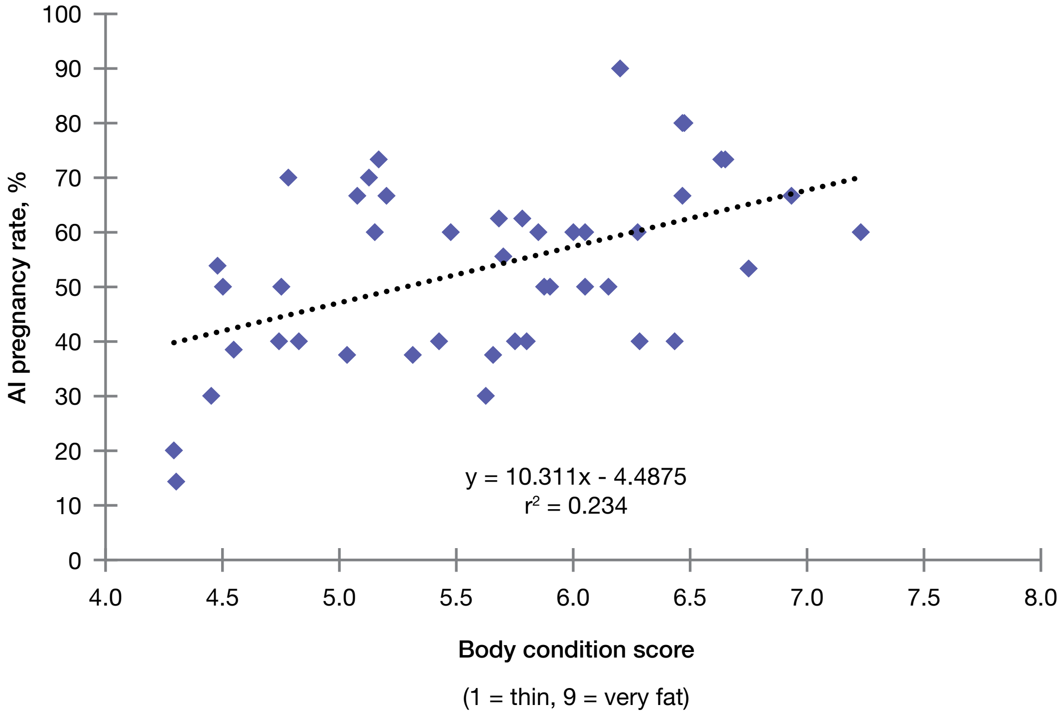

Figure 1. Relationship between cow body condition score and pregnancy rate to fixed-time artificial insemination (AI) for beef cows grazing wheat or native mixed-grass rangeland for 21 to 50 days prior to fixed-time AI.