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Abstract

Feeding the ionophore monensin to yearling beef bulls improved (P<.05) weight gain by 4.2%. Final hip height was similar between treatments, but bulls fed monensin had almost 1 cm greater (P<.01) scrotal circumference and more than 10 cm 2 larger (P<.01) pelvic area. Semen characteristics generally were unaffected by treatment. However, bulls fed monensin had less (P<.01) semen motility than controls. Approximately 30 sperm morphology traits were evaluated; values were similar between treatments except for those traits listed. Collection date tended to influence (P<.15) volume, concentration, motility, and postfreeze characteristics.

Keywords

Cattlemen's Day, 1994; Kansas Agricultural Experiment Station contribution; no. 94-373-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 704; Beef; Bulls; Performance; Monensin; Semen; Ionophore; Morphology

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EFFECT OF MONENSIN ON WEIGHT GAIN, GROWTH TRAITS, AND SEMEN CHARACTERISTICS IN YEARLING BEEF BULLS [1]

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Summary

Feeding the ionophore monensin to yearling beef bulls improved (P<.05) weight gain by 4.2%. Final hip height was similar between treatments, but bulls fed monensin had almost 1 cm greater (P<.01) scrotal circumference and more than 10 cm^2 larger (P<.01) pelvic area. Semen characteristics generally were unaffected by treatment. However, bulls fed monensin had less (P<.01) semen motility than controls. Approximately 30 sperm morphology traits were evaluated; values were similar between treatments except for those traits listed. Collection date tended to influence (P<.15) volume, concentration, motility, and postfreeze characteristics.

(Key Words: Bulls, Performance, Monensin, Semen, Ionophore, Morphology.)

Introduction

The ionophore monensin has been used widely to improve gain and feed conversion by beef cattle. The vast majority of finishing cattle and many stocker cattle are fed an ionophore to improve performance. Previous research has suggested that the onset of puberty is hastened in developing heifers fed monensin. The objective of this trial was to evaluate the impact of monensin on weight gain, growth traits, and semen characteristics in yearling beef bulls.

Experimental Procedures

Forty-four, spring-born, yearling bulls were allotted by weight, breed, sire, and birthdate and assigned randomly to each of two dietary treatments: 1) a 13.5% crude protein control supplement consisting of corn, oats, and soybean meal (CON); or 2) the control supplement plus the ionophore monensin (Rumensin®) fed at 200 mg per head per day (RUM). Each treatment group contained 15 Angus, five Hereford, and two Polled Hereford bulls. Bulls averaged 838 lb at the beginning of the trial. They were weaned approximately on September 15 and fed the control supplement and hay ad libitum until 2 weeks prior to the start of the trial (December 14). Bulls fed monensin were allowed a 4-day warm-up period with monensin fed at 100 mg per head per day. All bulls were housed in dry lot; the remainder of the diet was native prairie hay fed ad libitum.

Data collection. Averages of two weights on consecutive days at the beginning and end of the trial were used as initial and final weights. Hip heights and scrotal circumferences were measured at the beginning and end of the trial. Measures of pelvic area and breeding soundness evaluations were made at the end of the trial. Semen was collected twice during the last 3 weeks of the trial using restrained cows and an artificial vagina. Bulls whose semen was

[1]Appreciation is expressed to Kansas Artificial Breeding Service Unit, Manhattan, KS, for semen collection and evaluation and Select Sires, Inc., Plain City, OH for assessment of sperm morphology.

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not collected successfully on the first attempt were tested again 21 days later; bulls whose semen was not collected successfully with the artificial vagina were subjected to electroejaculation. Raw semen was processed on site, and ejaculate volume, sperm motility, and sperm concentration were determined. At the Kansas Artificial Breeding Service Unit, cryopreservation was attempted with all successful collections. Semen remained frozen for 24 hours before sperm morphology was further evaluated immediately postthaw and after incubation for 2 to 4 hours.

Results and Discussion

Overall weight gain and average daily gain were greater (P=.03) for bulls fed RUM compared to CON (Table 1). At the beginning of the trial, hip height and scrotal circumference were similar between treatments. Final hip height did not differ between treatments, but measurements of scrotal circumference and pelvic area were greater (P<.01) for bulls fed RUM.

Semen collection data are presented in Table 2. Semen was collected from more (P=.06) bulls fed CON on the first attempt than from bulls fed RUM. However, no differences existed in the number from each treatment whose semen was collected successfully by artificial vagina.

The morphological abnormalities that approached significance (P<.15) are listed in Table 3. Detailed are the number of bulls from each treatment that possessed each particular abnormality. Also presented is the percentage of abnormal sperm for traits that approached significance (P<.15). No consistent differences were present between treatments. Further analysis revealed that collection date (first or second attempt) had a greater (P<.10) influence on semen characteristics than dietary treatment. Feeding RUM promoted greater weight gain and enhanced growth traits in yearling bulls, with no general effect on semen traits.

Table 1. Effect of Monensin on Weight Gain and Growth Traits in Yearling Beef Bulls

Item	Control	Monensin	SE	Significance[a]
Final wt, lb	1208	1222	8	.23
Total wt gain, lb	371	386	5	.03
Avg daily gain, lb/d	3.64	3.78	.05	.03
Initial hip height, in	46.3	46.1	.1	.39
Hip height change, in	+ 4.1	+ 4.3	.1	.12
Initial SC[b], cm	29.2	29.2	.2	.95
Final SC, cm	34.8	35.7	.2	.01
Pelvic width, cm	11.0	11.4	.1	.01
Pelvic height, cm	14.4	14.8	.1	.01
Pelvic area, cm^2	158.9	169.1	1.1	.01

[a]Probability associated with treatment effect.
[b]SC=scrotal circumference.

Table 2. Effect of Monensin on Collection and Semen Characteristics in Yearling Beef Bulls

Item	Control	Monensin	SE	Significance[a]
BSE[b]	84.6	86.8	2.9	.59
Volume, ml/ejaculate	2.69	3.11	.26	.27
Concentration, %	64.0	69.9	2.9	.16
Motility, %	45.8	34.6	3.3	.02
Collected on first date	11/22	5/22		.06
Collected by AV[c]	19/22	18/22		.68

[a]Probability associated with treatment effect.

[b]BSE=breeding soundness examination score.

[c]AV=artificial vagina.

Table 3. Effect of Monensin on Sperm Morphology in Yearling Beef Bulls

Item	Control	Monensin	SE	Significance[a]
Number of bulls producing sperm with respective abnormality				
Tapered heads	15	18		.04
Asymmetrical heads	12	12		.82
Diadem (equatorial craters)	6	2		.13
Head and tail separated	19	16		.14
Protoplasmic droplets	11	15		.09
Percentage of sperm possessing abnormality				
Tapered heads	3.27	4.89	.70	.11
Asymmetrical heads	2.42	1.50	.43	.14
Diadem (equatorial craters)	4.67	1.00	1.5	.15
Head and tail separated	4.16	5.19	.88	.42
Protoplasmic droplets	6.36	10.73	4.05	.45

[a]Probability associated with treatment effect.