Supplementation of monensin to beef cows consuming low-quality forage during late gestation and early lactation

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STORY IN BRIEF

This study was designed to determine the effects of feeding monensin to beef cows in late gestation through early lactation on cow performance, milk production, and calf growth performance. Spring calving Angus and Angus x Hereford cows and heifers (N = 84; initial body weight **(BW)** = 1177 lb; initial body condition scoring **(BCS)** = 5.27; initial age = 4.8 yr) were randomly allotted to one of two treatment combinations in a completely randomized design. Treatment supplements were 1) Cottonseed meal supplement with no monensin (**Control**); 2) Monensin added to control to supply 200 mg·head^{-1}·d^{-1} (**MON**). Supplements were individually fed at 1200 daily at a rate of 2.00 lb·head^{-1}·d^{-1} for 60 d. Cows had ad libitum access to prairie hay (CP, 4.5%; TDN, 55%; crude fat, 2.8%; DM basis). Milk production was measured by weigh-suckle-weigh procedure on April 19, 2013 and May 10, 2013. There were no differences ($P > 0.33$; Table 1) in cow BW or BCS at any time in the study. There were also no differences ($P > 0.19$) in cow BW or BCS change from d 0 to calving, calving to d 60, or d 0 to 60. Calf birth BW was not affected by dam dietary treatment ($P = 0.24$; Table 2); however, calves from dams consuming monensin weighed more ($P < 0.05$) at d 25 and 60 of the study. Calves from dams fed monensin also had greater ($P = 0.04$) ADG from birth to the end of the study. Milk production did not differ between cows on either of the treatments at any collection ($P > 0.26$). Feeding spring-calving beef cows monensin in the winter supplement will improve subsequent calf growth performance while maintaining cow performance.

Key words: beef cow, monensin

INTRODUCTION

Monensin is an ionophore that improves energetic efficiency by altering the VFA population of the rumen in grain-fed animals (Duffield et al., 2012; Sprott et al., 1988). Monensin debilitates gram positive bacteria in the rumen while gram negative bacteria are resistant, resulting in continual production of propionate from succinate and a reduction in methane production (Ellis et al., 2012). Monensin also improves nitrogen metabolism and reduces proteolysis of degradable intake protein because of its protein sparing characteristics. Ionophores such as monensin influence beef cow weight gain and feed efficiency without affecting fertility and milk production (Sprott et al., 1988). In a review on monensin by Bretschneider et al. (2008), ADG increased quadratically with increasing doses of monensin, without affecting DMI. Cows grazing native range and being fed monensin at 0, 50, or 200 mg/h/d demonstrated a decrease in forage intake as monensin increased while cow performance was similar between the control and 200 mg of monensin (Lemenager et al., 1978).

Studies from Clanton et al. (1981) and Turner et al. (1988) also demonstrated no impact on cow ADG when cows consumed 200 mg/h/d monensin in combination with forage. Feeding cows monensin in late gestation has also been shown to significantly increase birth weight (Clanton et al., 1981) and calf ADG (Lemenager et al., 1978); however, it has not been shown to influence milk production or quality in beef cows (Lemenager et al., 1978). Considering the limited and dated research on feeding monensin to beef cows, the objective of this experiment is to evaluate the impact of monensin on the performance and milk production of spring-calving beef cows consuming low quality forage, as well as the subsequent calf growth.

MATERIALS AND METHODS

This trial was conducted at the Range Cow Research Center, North Range Unit. Spring calving Angus and Angus x Hereford cows and heifers (N = 84; initial BW = 1177 lb; initial BCS = 5.27; initial age = 4.8 yr) were randomly allotted to one of two treatment combinations in a completely randomized design. Treatment supplements included 1) Cottonseed meal supplement with no monensin (Control); 2) Monensin added to control to supply 200 $mg \cdot head^{-1} \cdot d^{-1}$ (MON). Supplement was fed at a rate of 2 $lb \cdot head^{-1} \cdot d^{-1}$ for duration of the study. Prior to, during, and after the treatment period, cows were managed as a contemporary group. Cows had ad libitum access to prairie hay (CP, 4.5%; TDN, 55%; crude fat, 2.8%; DM basis). A mineral supplement was provided free choice (28.6% NaCl; 12.8% Ca; 8.5% P; 1.2% Mg; 1044 ppm Cu; 12 ppm Se; 3117 ppm Zn; DM basis). The experiment was initiated on March 11, 2013 and terminated on May 11, 2013, resulting in a 60 d treatment period. Average calving date was April 1, 2013 and March 28, 2013 for cows on the Control and MON supplements, respectively.

Cows were fed individually at 1200 daily in a barn containing 31 individual feeding stalls to ensure that each cow received the assigned amount of feed. Each day the cows were gathered from a pasture adjacent to the feeding barn and placed into a feeding stall, restrained, and allowed 20 min to consume their dietary supplement. Individual cow BW and BCS (BCS; scale 1-9; Wagner et al., 1988) were determined at study initiation and conclusion. Cow BW was recorded every two weeks after initiation, including at parturition. A birth BW was collected on the calf and a subsequent BW every two weeks until trial conclusion. Milk production was measured through weigh-suckle-weigh procedure on April 19, 2013 and May 10, 2013. For this procedure, only calves 30 d of age or older were included. The cow-calf pairs included in the first collection were also included in the second collection. The day preceding the data collection, calves were separated from cows at 2300. Calves were weighed at 0645 the following morning and then reunited with their dam to nurse until satiated. After nursing, the calf was immediately weighed and isolated from the dam until 1445. At this time calves were weighed and the process began again for a total of 3 collections over a 24 h period.

To evaluate the effects of monensin on spring-calving beef cow performance, calf growth performance, and milk production, the MIXED procedure of SAS (SAS Inc., Cary, NC) was used. For cow and calf performance, the model included treatment and cow age. For milk production, the model included treatment. Calf age, also indicating calving date, was used as a covariate where applicable. The alpha level to determine statistical significances was set to $\alpha = 0.05$.

RESULTS AND DISCUSSION

Time from study initiation to parturition did not differ among cows being fed either supplement ($P = 0.17$; data not shown). There were no differences ($P > 0.33$; Table 1) in cow BW or BCS at any time in the study. There were also no differences ($P > 0.19$) in cow BW or BCS change from d 0 to calving, calving to d 60, or d 0-60. Calf birth BW was not affected by dam dietary treatment ($P = 0.24$; Table 2); however, calves from dams consuming monensin weighed more ($P < 0.05$) at d 25 and 60 of the study. Calves from dams fed monensin also had greater ($P = 0.04$) ADG from birth to the end of the study. Milk production of cows was not influenced by treatment ($P > 0.41$; Table 3).

Table 1. Effects of feeding monensin to beef cows on cow performance

	Treatment[1]			
Item;	Control	Mon	SEM	*P*-value
No.	42	42		
D0 BW, lb	1279	1260	23.9	0.45
D17 BW, lb	1323	1310	26.9	0.62
Parturition BW, lb	1222	1219	26.1	0.94
D31 BW, lb	1272	1256	27.3	0.54
D45 BW, lb	1279	1259	25.8	0.45
D60 BW, lb	1181	1166	24.4	0.52
D0 BCS	5.4	5.2	0.14	0.33
D60 BCS	4.9	4.8	0.19	0.59
D0 – calving BW change, lb	-57	-44	10.0	0.19
Calving – D60 BW change, lb	-41	-56	12.4	0.21
D0 – 60 BW change, lb	-97	-97	11.4	0.99
D0 – 60 BCS change	-0.51	-0.51	0.14	0.97

[1]Treatment supplements included 1) Cottonseed meal supplement with no monensin (Control); 2) Monensin added to control to supply 200 mg·head^{-1}·d^{-1} (MON). Supplements were fed at a rate of 2.00 lb·head^{-1}·d^{-1} for duration of the study.

Table 2. Effects of feeding monensin to beef cows on calf growth performance

	Treatment[1]			
Item;	Control	Monensin	SEM	*P*-value
No.	42	42		
Birth weight, lb	84.6	87.3	2.30	0.24
D45 weight, lb	132.1	142.4	4.39	0.02
D60 weight, lb	156.2	166.8	4.96	0.04
D205 Adj Wean Wgt, lb				
D0-60 ADG, lb	1.20	1.33	0.06	0.04

[1]Treatment supplements included 1) Cottonseed meal supplement with no monensin (Control); 2) Monensin added to control to supply 200 mg·head^{-1}·d^{-1} (MON). Supplements were fed at a rate of 2.00 lb·head^{-1}·d^{-1} for duration of the study.

Table 3. Effects of feeding monensin to beef cows on milk production

Item;	Treatment Control	Monensin	SEM	*P*-value
April 19, 2013				
No. of cows	13	19		
Milk production, kg	14.1	15.0	1.22	0.47
May 10, 2013				
No. of cows	24	31		
Milk production, kg	10.7	11.4	0.80	0.41

[1]Treatment supplements included 1) Cottonseed meal supplement with no monensin (Control); 2) Monensin added to control to supply 200 mg·head^{-1}·d^{-1} (MON). Supplements were fed at a rate of 2.00 lb·head^{-1}·d^{-1} for duration of the study.

Cow performance was not impacted by monensin in late gestation and early lactation, nor was milk production influenced. However, feeding monensin to the dam improved growth performance of her offspring. Feeding monensin to spring-calving beef cows improved calf growth performance without changing milk production or cow performance, making it a viable option for improving preweaning calf efficiency.

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