EFFECT OF SUPPLEMENTAL COPPER BOLUSES ON COW AND CALF PERFORMANCE

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Story In Brief

One hundred sixteen spring-calving Salers and Salers crossbred cows and their calves in Trial 1 and 63 Santa Gertrudis spring-calving cows and their calves in Trial 2 were used to evaluate the effects of a copper bolus on weight gain of cows and their nursing calves. Trial 1 was conducted on native range in Osage County, Oklahoma and Trial 2 was on Bermuda-fescue pastures in LeFlore County. Trials lasted from mid-May to September or October. Each cow and calf was assigned to CONTROL (no bolus) or COPPER (one bolus containing 25 g of copper oxide needles for cows or 12.5 g for calves). Neither cow treatment or calf treatment affected cow weight gains. However, an interaction between cow treatment and calf treatment was detected for calf gain. CONTROL calves nursing COPPER-supplemented cows tended to gain less than other treatments. In Trial 2, administration of copper to cows or calves did not influence cow or calf weight gain and no interaction was detected. Results suggest that copper levels in forages consumed by cows and their calves in these studies were adequate to obtain normal growth rates.

(Key Words: Minerals, Copper, Selenium, Grazing, Beef Cattle.)

Introduction

Trace minerals are required by animals in very small quantities. These minerals are obtained primarily via the animal's diet. Although some data exist detailing levels of trace minerals in Oklahoma forages (Lusby and Selk, 1991), little information documents geographic areas where grazing cattle may be at risk of specific clinical or subclinical trace mineral deficiencies (Owens, 1988).

Copper deficiency often is suspected by producers of reducing animal performance. Copper is required for hemoglobin and connective tissue formation and iron absorption and utilization. Copper absorption and utilization are dependent on Cu source, dietary level, and presence and level of other cations; sulfur and molybdenum, are the most common antagonists.

Boluses can be used to supplement trace minerals. Selenium boluses increased blood Se levels in cattle with previously marginal blood levels (McCollum, 1992). Copper oxide needles increased serum ceruloplasmin and

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Cu concentrations in stocker cattle (Coffey et al., 1992). However, neither Cu or Se affected cattle performance in these trials. The purpose of our trials was to determine the effect of supplemental Cu on the performance of cows and their calves grazing forages suspected to contain marginal levels of Cu.

Materials and Methods

Trial 1. This trial was conducted on native range in the northwest section of Osage County in North Central Oklahoma. One hundred and sixteen cows with spring-born calves were used to evaluate the effects of a Cu bolus[2] on weight gain. Cows were Salers or Salers crossbreds, and calves were sired by Salers bulls. Cattle continuously grazed two pastures for the entire trial period with 28 pairs in one pasture and 88 pairs in another. On May 19, 1993, each cow and calf was weighed full and assigned randomly to CONTROL (no supplemental copper) or COPPER (a bolus containing 25 g of copper oxide needles for cows and 12.5 g for calves). Final weights were taken full on September 15, 1993, a total of 119 days.

At the start of the study, cows were dewormed with Valbazen, vaccinated for IBR, PI-3, Lepto-5 and Vibriosis[3]. All calves were given 7-way blackleg vaccine and identified individually with numbered ear tags. Bull calves were castrated and implanted with Synovex C. A salt-dicalcium phosphate mineral was available free-choice. Forage samples were collected in July for mineral and trace mineral analysis. Cows and calves were blocked by pasture within treatment groups. Because each calf and each cow was assigned to treatment, we had four treatment combinations, two within each age group.

Trial 2. One hundred and thirty Santa Gertrudis cow-calf pairs and 45 dry cows were used to evaluate the effects of supplemental Cu boluses on cow and calf weight gain. The trial began on May 17 and ended on October 14 for calves and October 15 for cows. All weights were taken full. At the beginning of the study, cows were dewormed with Valbazen and vaccinated for leptospirosis and vibriosis. Calves received a 7-way clostridia vaccine and were given a Synovex-C implant. Bull calves were castrated. All calves received numbered ear tags with cows retaining existing identification tags. Each cow and calf was assigned randomly to CONTROL or COPPER treatments as described for Trial 1. All procedures were the same as described for Trial 1 except that cows and their calves were grazed together in an 8-pasture rotation system on Bermuda-fescue pastures. Cows and their calves were paired via pasture observation of nursing activity in the weeks following initiation of the

[2]Copasture, Schering-Plough
[3]Cattlemaster 4 VL5

trial. Forage samples were taken periodically throughout the study. A mineral mixture containing salt, dicalcium phosphate and Se was offered free-choice.

Statistical analyses. Data were analyzed by least squares procedures of SAS. The model for cow and calf weight gains in Trial 1 included calf treatment, cow treatment, cow-calf interaction to check for overdose, pasture and calf sex; cow and calf initial weights as covariates. The model for Trial 2 did not include pasture.

Results and Discussion

Trial 1. Cows weighed about 950 lb and calves about 175 lb at the start of the study (Table 1). During the summer, cow weight gains were not different for CONTROL and COPPER (P=.63). No interaction between calf treatment and cow treatment was seen for cow weight gain. However, an interaction between cow treatment and calf treatment was detected for calf gain. CONTROL calves nursing COPPER-supplemented cows tended to gain less than other treatments. Neither cow treatment (P=.55) or calf treatment (P=.81) affected calf weight gains.

Trial 2. A large number of cows with nursing calves lost their ear tags with identification numbers and as a result their data were lost. No calf tags were lost. Data for cow-calf pairs completing the study (63 pairs) are shown in Table 2. As in Trial 1, administration of Cu to cows (P=.53) or calves (P=.45) did not influence cow weight gain. Similarly, calf gain was not affected by cow treatment (P=.95) or calf treatment (P=.86), No interaction between cow and calf treatments was detected. No effect of supplemental copper on weight gain of dry cows (Table 4) was noted.

Table 1. Effect of Copper boluses[a] on performance of cows and their calves. Trial 1, Osage County.

Cow Calf	Control Control	Control Copper	Copper Control	Copper Copper
No. cow-calf pairs	32	28	27	29
Initial cow weight, lb	947	946	961	957
Initial calf weight, lb	163	178	182	172
Cow weight gain, lb	140	139	138	129
Calf weight gain, lb	264	246	253	266

[a] COPPER, 25 g copper oxide needles for cows, 12.5 g for calves-Copasture, Schering-Plough.

Table 2. Effect of Copper boluses[a] on performance of cows and their calves Trial 2, LeFlore County.

Cow Calf	Control Control	Control Copper	Copper Control	Copper Copper
No. of animals	24	10	18	11
Initial cow weight, lb	1165	1237	1146	1179
Cow weight gain, lb	-32	-33	-24	-32
Initial calf weight, lb	198	206	213	195
Calf weight gain, lb	335	342	341	338

[a] Copper, 25 g copper oxide needles for cows, 12.5 g for calves-Copasture, Schering-Plough.

Table 3. Effect of copper boluses[a] on performance of nursing calves. Trial 2, LeFlore County.

Treatment group	Control	Copper
No. of animals	66	64
Initial calf weight, lb	202	207
Calf weight gain, lb	339	341

[a] Copper, 25 g copper oxide needles for cows, 12.5 g for calves-Copasture, Schering-Plough.

Table 4. Effect of Copper boluses[a] on performance of dry cows. Trial 2, LeFlore County.

Treatment group	Control	Copper
No. of animals	15	11
Initial calf weight, lb	1251	1187
Calf weight gain, lb	54	76

[a] Copper, 25 g copper oxide needles - Copasture, Schering-Plough.

Table 5. Forage mineral analyses (DM basis) and sampling dates[a].

	Cu PPM	P %	Ca %	K %	Mg %	S %	Na %	Zn PPM	Mn PPM	Fe PPM	Al PPM
Trial 1											
June	6	.16	.48	1.22	.12	.13	.02	.24	92	1040	830
July	4	.10	.31	1.03	.09	.08	.07	14	66	106	79
Trial 2 (May)											
Sample 1	4	.23	.60	1.85	.19	.15	.02	21	332	190	63
Sample 2	3	.24	.38	1.82	.19	.15	.02	18	245	173	77
(August)											
Sample 1	4	.18	.53	1.44	.26	.19	.05	31	186	100	38
Sample 2	5	.25	.42	1.38	.25	.21	.02	36	201	137	43

[a] Samples analyzed by Midwest Laboratories, INC. Omaha, NE.

Because no interaction between cow and calf treatments was seen for calf weight gains, gains of all calves completing the study (130 calves) were analyzed (Table 3). No effect of COPPER treatment was detected.

Results suggest that Cu levels in forages consumed by cows and their calves in these studies did not require Cu supplementation (Table 5).

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