

# Cobalt Supplementation on Nebraska Ranges<sup>1</sup>

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The natural supply of cobalt to ruminants comes from the soil through plants. According to Gilbert (1957) cobalt is found in practically all soils and vegetation. It is not uniformly distributed, however, and its presence in any particular soil is not fortuitous. It occurs in greater concentrations in basic rock, such as gabbro or serpentine, than in acidic rock, such as granite or sandstone. Cobalt is utilized by the microorganisms in the rumen of cattle and sheep for the production of the essential vitamin, B<sub>12</sub>.

In South Dakota lamb feeding trials, in which prairie hay was fed, a consistent and significant response was obtained when cobalt was added to the ration. The ration contained nearly the minimum requirement in terms of percentage cobalt (Jordan and Weakly, 1953).

In consistent results have been obtained by Embry and Dittman (1960 and 1961) when comparing steers treated with cobalt bullets and non-treated steers. These comparisons were made with yearling steers grazing native summer range in South Dakota. In a Minnesota experiment, yearling steers treated with cobalt bullets made faster summer gains than non-treated steers when grazing introduced grass pastures (Harvey *et al.*, 1961).

A single treatment with a cobalt bullet weighing 20 grams

and composed of 90 percent cobalt oxide corrected subclinical or gross cobalt deficiency in Australia (Skerman, *et al.*, 1959).

In light of the increased gains from cobalt supplementation in South Dakota and Minnesota experiments and the fact that Nebraska soils are of the nature that could be low in cobalt content, the following experiments were conducted.

## Procedure

Comparative experiments were conducted on two ranches in the Sandhills and at the Fort Robinson Research Station in northwestern Nebraska to determine if cobalt supplementation would increase gains in growing cattle.

A 20-gram bullet containing 90 percent cobalt oxide was used as the cobalt supplement. The bullet was administered with a balling gun. The weight of the bullet causes it to remain in the reticulum area of the stomach. The bullet is dissolved very slowly so that there is sustained release of cobalt in the rumen over a long period. Skerman *et al.* (1959) used x-ray fluoroscopy and slaughter techniques to study cobalt bullet retention. Eighty-six percent of the bullets administered to cattle between 6 and 20 months of age were retained by the animal at 3 to 7 months after treatment. The cobalt bullet is adapted for experimental work because it permits

control of the cobalt intake. It is known that each animal receives a given amount of supplement. Such control is not possible when using free choice mineral supplements.

In all of the experiments the cattle were individually identified with ear tags prior to the start of the experiment. The cobalt bullet was administered to alternate animals as they passed through a handling chute. They were weighed individually at the beginning and end of the experiment. When separate analyses of winter and summer gains were desired, the cattle were also weighed in the spring. Within each experiment the treated and non-treated animals grazed together.

The cattle were wintered on range with a protein supplement. Hay was fed in addition only during inclement weather. The forage was not analyzed for cobalt content.

## Results and Discussion

There were no significant differences in the winter or summer gains of cobalt treated calves and untreated calves at Ranch A in the Sandhills or at the Fort Robinson Research Station (Table 1). The calves at Ranch A were steers; those at Fort Robinson were heifers. Both

<sup>1</sup>Published with the approval of the Director as Paper No. 1271, Journal Series, Nebraska Agricultural Experiment Station. The cooperation of Don Cox and Reed Hamilton-Keith Dubry made the experiment possible. They owned the cattle and pasture and supplied the necessary labor and facilities to conduct the experiment at Ranches A and B.

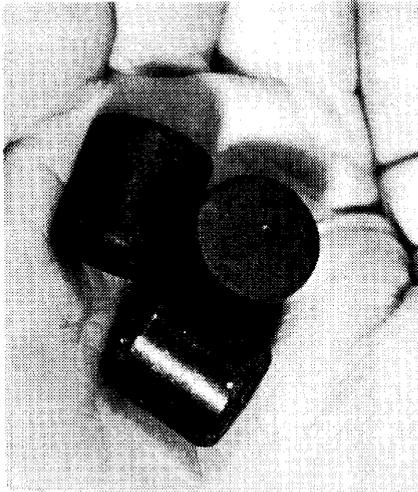


FIGURE 1. Cobalt Bullets Used in the Experiment.

Table 1. The Effect of Cobalt Supplementation on Average Daily Gains in Four Comparisons at Three Locations.

Ranch Location <sup>a</sup>	Class and No. of Cattle	Average Daily Gains, Pounds		
		Winter	Summer	Winter and Summer
A	Yearling steers	5/13/60-9/14/60		
Cobalt	42 head		2.12	
Control	44 head		2.16	
A	Steer calves	12/26/60-9/7/61		
Cobalt	38 head	0.37	1.90	1.10
Control	38 head	0.42	1.80	1.08
B	Yearling heifers	8/3/60-5/3/61		
Cobalt	31 head	0.32		
Control	32 head	0.31		
Fort Robinson	Heifer calves	12/12/60-9/7/61		
Cobalt	67 head	0.62	1.63	1.12
Control	66 head	0.60	1.61	1.10

<sup>a</sup>Ranches A and B were typical Sandhills ranches with predominantly tall grass vegetation. At Fort Robinson the vegetation was primarily short and mid-grasses.

comparisons were made during the winter of 1960-61 and the summer of 1961.

A group of yearling steers was treated at Ranch A in May 1960. Their summer gains were similar to a comparable group of steers that were not treated (Table 1). The two groups of steers ran together during the experiment.

At Ranch B replacement yearling heifers were used. One-half of the heifers were treated in August 1960 with a cobalt bullet. The gains of the two groups of heifers were similar from August 1960 to May 1961 (Table 1).

From these data it can be concluded that cobalt supplementation did not improve gains in growing cattle wintered on the range in Nebraska.

Comparisons were made on short- and mid-grass winter ranges (Fort Robinson) and on tall-grass winter and summer ranges (Ranches A and B). Soil type, rainfall and vegetative composition were different at the two extreme locations.

Ranches A and B were typical Sandhills ranches in southern Cherry county whereas the Fort Robinson ranch in Dawes and Sioux counties is not in the Sandhills.

### Summary

The use of a 20-gram cobalt bullet which contained 90 percent cobalt oxide, did not increase gains in calves and yearlings when tested during two years at three different locations in the range area of Nebraska. The treated and non-treated animals grazed together.

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