Agricultural Experiment Station U. S. Department of Agriculture

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CLAYTON LIVESTOCK RESEARCH CENTER

PROGRESS REPORT

Route 1 Box 109 Clayton, New Mexico 88415 505-374-2566

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A Mineral Supplement for Cattle Grazing Wheat Pasture: Composition and Consumption

S. A. Gunter, M. L. Galyean, K. J. Malcolm-Callis, and D. R. Garcia

The two minerals of greatest concern for cattle grazing wheat pasture are calcium and magnesium. The analyzed mineral composition of wheat forage indicates that it contains sufficient phosphorus and magnesium, excess potassium, and inadequate calcium for growing cattle (.33, .15, 4.0, and .35% of forage dry matter, respectively; Horn, 1992). Hence, calcium is most likely the limiting mineral for cattle grazing wheat pasture. If a 400-lb steer gaining 2.2 lb/day consumes wheat pasture at 3.0% of its body weight, it would consume 19 grams of calcium/day. The calcium requirement for this steer would be 31 grams/day (NRC, 1984). The additional calcium the steer requires to optimize performance can be included in a mineral supplement as calcium carbonate.

Wheat pasture poisoning is a metabolic disorder that occurs most often in mature cows that are in late-pregnancy or are nursing calves, but it is extremely rare in stocker cattle (Horn, 1992). Hypomagnesemia (low blood magnesium) is associated with wheat pasture poisoning, but some data indicate that hypocalcemia (low blood calcium) may be the primary cause of this metabolic disorder (Bohman et al., 1983). Contreras et al. (1982) demonstrated that hypomagnesemia decreased the mobilization rate of calcium from the bone. Hence, the hypomagnesemia condition noted in cows up to 1 week before the onset of tetany may promote the hypocalcemic condition (Bohman et al., 1983). Therefore, magnesium can be provided to prevent hypomagnesemia, and subsequently hypocalcemia. Moseley (1980) suggested that magnesium intake should be at least two times the recommended level (NRC, 1984) to prevent grass tetany.

No mineral supplement is effective if cattle refuse to consume it. To supply 12 grams of calcium/day, the percentage of calcium required in mineral supplements must be based on estimated consumption. Table 1 shows the effect of level of mineral supplement intake on the percentage of calcium required to supply 12 grams of calcium/day.

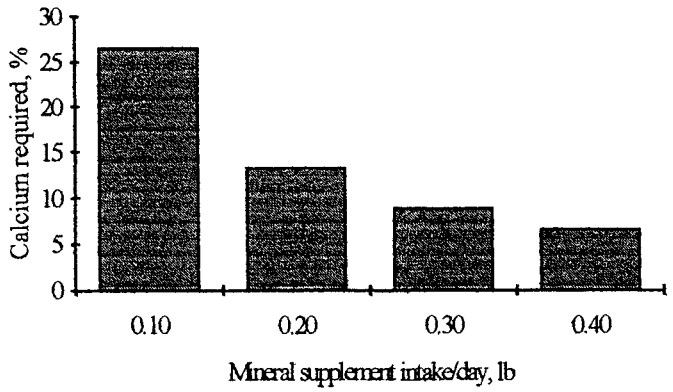

Figure 1. Percentage calcium required in a mineral supplement to supply 12 grams of calcium/day.

Table 1. Composition of wheat pasture mineral supplement.

Ingredient	% of dry matter	Dry matter[a], %	Pounds/1,000 lb batch
Dicalcium phosphate	27.4	96.7	276
Limestone	21.9	99.8	214
Magnesium oxide	21.4	99.0	211
Salt	15.0	99.9	146
Trace mineral premix[b]	2.3	98.8	22
Soybean meal	10.0	88.2	110
Fat	2.0	95.2	21

[a] Actual dry matter of ingredients will vary depending on source.

[b] Ruminant Trace Mineral Premix™, Feed Products Inc., 1000 W. 47th Ave., Denver, CO.; 4.40% Mn, .30% I, .20% Co, 6.60% Fe, 1.30% Cu, 12.00% Zn, and 20% Mg.

We formulated a wheat pasture mineral supplement (Table 1) to meet the requirements mentioned previously and measured intake by cattle grazing wheat pasture for 9,545 cattle/days. The calculated nutrient composition of the mineral supplement was 6% phosphorus, 14.5% calcium, 12.8% magnesium, .56% iron, .27% zinc, .09% manganese, .03% copper, .005% cobalt, and .006% iodine. ***This mineral contains copper and is not recommended for sheep.***

Free-choice consumption of the minerals ranged from .27 to .48 lb/day (Table 2). The cattle tended to consume more mineral supplement during the early part of the gazing season, which may have partially resulted from a initial craving for salt by the cattle. This level of intake was 56% greater than reported by Horn (1992), who evaluated consumption by cattle of three commercially prepared mineral supplements. In each period that consumption was measured, the steers consumed a sufficient amount of calcium to meet their daily requirement. Moreover, magnesium intake was 454% of the NRC (1984) recommendation, which should be sufficient to prevent wheat pasture poisoning. No cattle grazing

Table 2. Level of wheat pasture mineral supplement intake by stocker cattle.

Date	Intake, lb/day[a]	Grams of calcium/day[b]
3/24 to 4/1	.42	27
4/2 to 4/8	.48	31
4/9 to 4/18	.38	24
4/19 to 5/4	.27	18
Average	.39	25

[a] As-fed Basis.

[b] Dry matter basis.

on the test pasture had symptoms of wheat pasture poisoning while consuming this mineral supplement.

In conclusion, intake of this mineral supplement by cattle was sufficient to promote optimal performance and should provide protection from wheat pasture poisoning.

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Department Head
Animal and Range Sciences
New Mexico State University

Department of Animal and Range Sciences
New Mexico State University
Box 30003, Department 3-I
Las Cruces, NM 88003-0003

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