

# Livestock Efficiency

## STRATEGIC SUPPLEMENTATION: MINERAL NUTRITION WITH A SELF FED LOOSE SALT-MINERAL MIX

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**THE STORY IN BRIEF:** Deciding on a dependable mineral program for a range cow herd can be confusing. Neighboring ranches and in fact pastures within a ranch may have important mineral composition differences. The Corona Range and Livestock Research Center has developed a mineral that complements the mineral deficiencies of the year long diet.

**THE PROBLEM:** Mineral nutrition can be complex. Consumption of mineral is the sum of vegetation, soil, water and supplement intake. Concentration of minerals in the diet and diet requirements fluctuates through the year. Designing a simple and easy to manage mineral program that succeeds may involve on the ranch testing for a couple of years. The form of All of these factors add to the challenges in formulating an effective mineral.

**OBJECTIVES:**

To develop a sensible low cost effective/simple mineral supplementation program for the cow herd at the Corona Range and Livestock Research Center.

**EXPECTED OUTCOMES:**

To maintain a sustainable mineral program that minimizes cost yet promotes animal health and productivity.

**DURATION:** 1992 to present (ongoing)

**APPROACH:** Vegetation diet samples have been collected with ruminally cannulated cows. The mineral content of their diet was compared to the requirements for cows, calves, yearlings and heifers. The difference was used to determine the amount of mineral needed in a self fed salt mineral mix. After a couple of years the cattle were biopsied at the liver to determine animal status. If the liver storage was determined to be adequate to meet production goals then the formula remained unchanged for that mineral. Daily intake per cow is continually monitored.?

**RESULTS:** To minimize the risk of imbalances, a yearlong mineral program should be a part of normal management. In New Mexico we know that phosphorus, potassium, magnesium, sodium, selenium and zinc are deficient in over 70% of the state's forages and copper is deficient in 40%. (Mathis et al. 2004) The foundation of a balanced range nutrition management plan is to supply needed minerals. We do this with a self-fed salt/mineral mix that is consumed at 60 g per day per cow averaged over an entire year. In addition, we will add mineral to cubes or blocked supplements. Once a mineral program is created and implemented then we must assess forage availability and quality..

On a yearly basis cow intake of our mineral is 1.8 ounces per head per day. (For example the average yearlong intake was 2004 mature cows was 1.91 oz/hd/d.) This is at least 90% of the targeted amount. This amount has been very consistent year after year even though there is extreme variation within a year. The results of our liver biopsies in cows and yearlings indicates that our mineral mix minimizes the loss of production that could occur do to the low concentration of minerals found in grazed forage diets (phosphorus, magnesium, copper, manganese and zinc). Example of our formula is listed below:

### **The Rapidly Increasing Cost of Phosphorus**

Historically, these inorganic phosphorus products, dical, defluor and monocal, have met the demand for supplemental phosphorus cost-effectively, so other options had not been aggressively pursued. In recent years, however, their costs have increased dramatically. As an example, the cost of monocal has increased from approximately US\$200 per ton just a few years ago to more than US\$900 per ton today. Considering the staggering amounts of these products that are used by today's producers, this type of cost increase is now forcing everyone to look for more cost-efficient solutions.

There are a couple primary reasons for the price increases related to these inorganic supplemental phosphorus products. One reason is clearly the increased demand for the phosphates used as fertilizers, specifically to supply the new demand for corn used in the production of ethanol. Corn production requires twice the amount of phosphorus than soybeans, wheat and some other crops, so as more fields are being used for corn to supply the growing ethanol market, more phosphorus is being channeled into higher margin fertilizers, rather than being used for feed. Thus, the reduced phosphorus supply remaining for feed production has increased in price as one would expect based on the elementary concepts of supply and demand.

Another reason for the dramatic price increase of inorganic supplemental phosphorus rests on the supply side. Sulfuric acid is an indispensable ingredient in the manufacture of these phosphates, and its price has skyrocketed 2,000% in the last year. Sulfur, which is later processed into sulfuric acid, is a by-product of the oil and gas discovery and refining industries, where little new activity has occurred in recent years. With a total of 46 tons of sulfur required to produce 100 tons of monocal, it is easy to see how the increasing cost of this material has a dramatic effect on the price of phosphorus.

### **Changes to The Corona Mineral Formula**

In order to adapt to the higher cost of phosphorus we have reluctantly lowered our minimum for phosphorus to 4%. This should have a significant influence on cost with (hopefully) no influence on production. We however have not completed this research and will begin it with our next order of mineral.

NEW MEXICO STATE UNIVERSITY

CORONA RANGE AND LIVESTOCK RESEARCH CENTER

MINERAL TO SUPPLEMENT RANGE CATTLE and SHEEP

Desired consumption: 2 ounces per head per day cattle

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Custom Formula

GUARANTEED COMPOSITION AND FORTIFICATION  
concentration

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*RangeMin - 05*

Calcium, maximum %	11.5
Calcium, minimum %	5.8
Phosphorus, maximum(1) 8 %	
Phosphorus, minimum 4 %	
Magnesium, minimum 2 %	
Potassium %	2
Copper ppm	2000
Zinc ppm	1000
Manganese ppm	2500
Selenium ppm	13
Vitamin A, units/lb.	120,000

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1. Amounts and kinds of phosphorus (excluding rock phosphate) may vary if phosphorus concentration is maintained. Calcium is not required.
2. Amounts and kinds of trace mineral may vary if minimums are maintained. Fortify with copper chloride and zinc sulfate or oxide (exclude copper oxide).
3. Fortify with ruminant trace mineral premix for 2 oz. consumption/hd/day.

**EXAMPLE FORMULA**

Proceedings, Corona Range and Livestock Research Center – Field Day

<b>Ingredient</b>	<b>Percent as is</b>
White salt	38.7 to
50	
Dicalcium phosphate	45.0 to
23	
Wheat millrun	2.0
Potassium chloride	4.0
Magnesium oxide	
6.6	
Ruminant trace mineral premix	
2.5	
Copper sulfate	.4
Zinc oxide	.2
Manganese oxide	
.3	
Mineral oil, gallons per ton	6

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**POTENTIAL APPLICATION:** Our mineral program costs less than \$7.50 per cow per year. On a year long basis intake is repeatable. The mix is not too palatable so over consumption is not a problem.

**EDUCATIONAL PLAN:**

8. Cooperating with Dr Mathis in preparing an Extension publication on mineral nutrition in the state.

**REFERENCES:** R.C. Waterman\*, J.E. Sawyer, T.L. Dean, J.B. Taylor, L.A. Balstad, D. Bradden, G.B. Donart, J.R. Strickland, and M.K. Petersen. 1999. Evaluation of a Biopsy Procedure for Collection of Liver Samples. Proceedings, Western Section, American Society of Animal Science Vol. 50; 129-133.