

Refining Our Nutrition Program to Meet the Mineral and Vitamin Needs of Our Sheep Flocks

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IOWA STATE UNIVERSITY
University Extension

Refining our Nutrition Program

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Objective of Supplementation

Provide for animal needs

Low cost

Livestock do not read the labels

Types of Minerals

Macro

Ca, P, K, Mg, S

Required in %

.1 to .7%

Micro

Zn, Se, Co, Cu,

Mn, I, Fe

PPM or mg/kg

Do I have a problem?

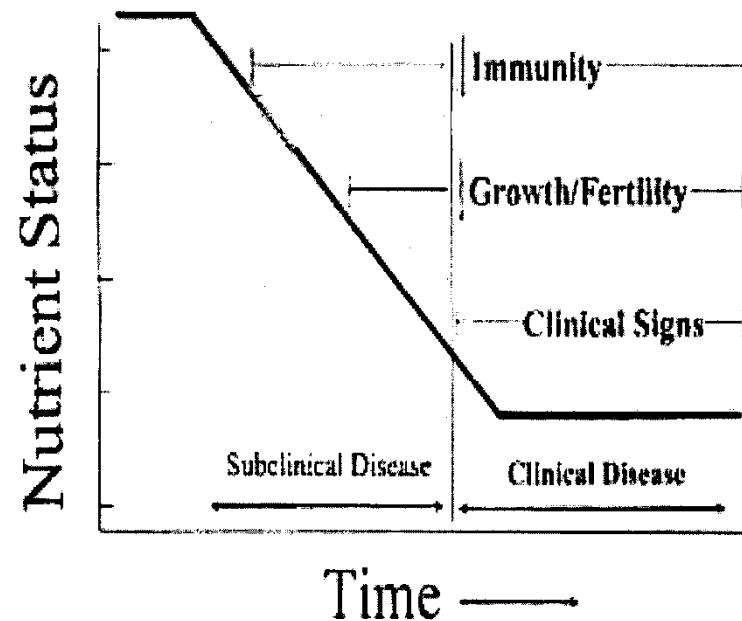
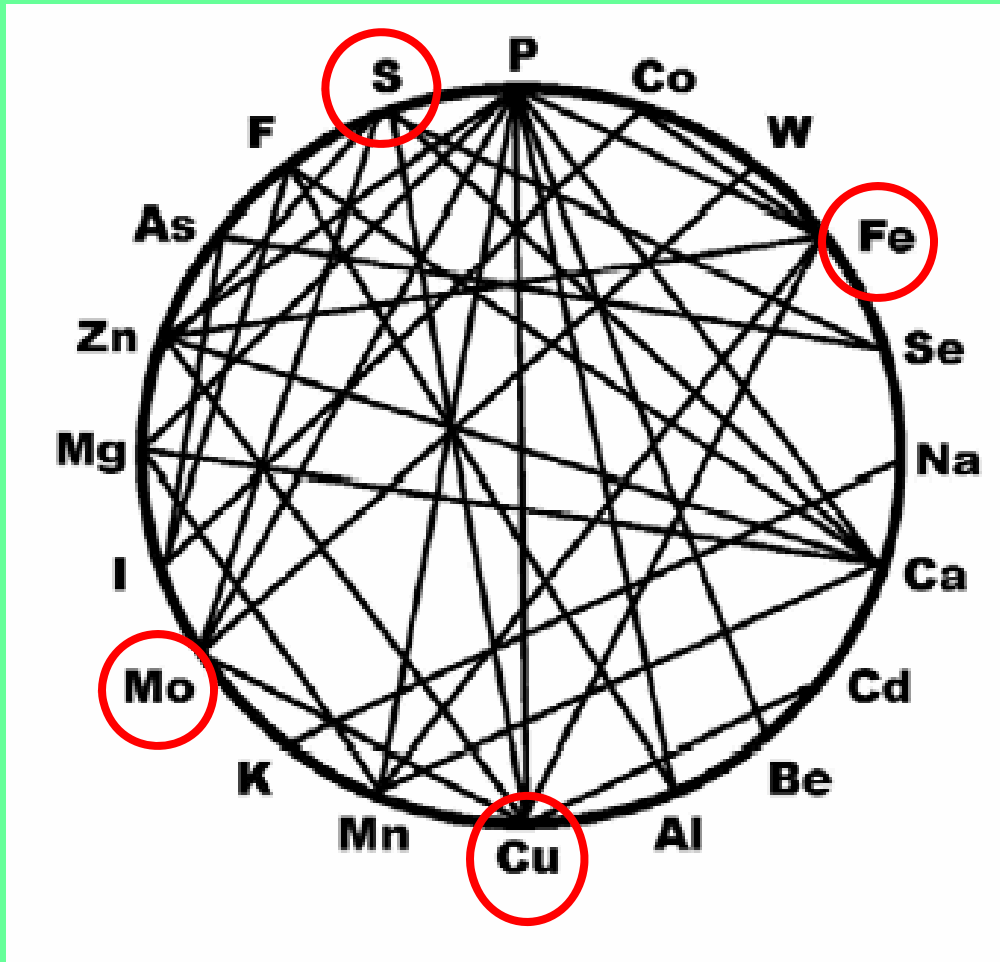


Figure 1. Schematic depiction of the relationship between nutrient status and presence of subclinical or clinical disease manifestations. (Redrawn from S. Wikse, 1992, Texas A&M University Beef Cattle Short Course).

Mineral Interactions



Copper Antagonist	Deficient	Ideal	<u>Antagonistic Level**</u>		MTC*
			Marginal	High	
Iron (ppm)	below 50	50-200	>200-400	>400	1000
Molybdenum (ppm)	---	below 1	1-3	above 3	5
Sulfur (% DM)	below .10	.15-.20	>.20-.30	>.30	.40

*Maximum Tolerable Concentration

**Levels above these can potentially adversely affect copper availability

Iowa Beef Center Forage Survey 2010

Type	Region	ppm							
		Mn	SD	Zinc	SD	Copper	SD	Iron	SD
Grass	1	77.7	53.3	31.5	6.4	8.6	2.3	312.7	242.1
Grass	2	77.1	21.1	27.1	5.7	9.8	2.4	532.2	297.0
Grass	3	108.6	53.8	30.3	10.4	9.8	2.0	304.0	103.1
Grass/Legume	1	45.9	6.8	27.7	2.2	14.8	10.6	492.8	137.5
Grass/Legume	2	70.7	23.6	28.7	5.0	10.5	2.7	299.0	126.8
Grass/Legume	3	115.3	58.0	49.5	67.4	9.3	2.0	551.4	414.1
Legume	1	34.1	2.0	31.1	4.9	16.3	9.2	241.1	104.7
Legume	2	45.4	17.5	28.6	5.8	8.8	0.9	444.7	296.6
Legume	3	65.5	17.0	28.9	1.1	9.3	0.8	551.2	181.3

Region 1: north of I-80; Region 2: southwest IA; Region 3: southeast IA

n = 3 per type per region

Mod. def

Mod. to high antagonism

Biologically Critical Times for Trace Minerals

Stress increases urinary excretion of Cu, Zn

Weaning, transport/shipping, parasitism and lactation

Reproduction (conception and fetal development, including fetal liver mineral storage)

Immune response (vaccination titer response, neutrophil function, other mechanisms?)

Animal Needs

Stage of production

Other mineral levels

Age

Level of production

Ewe Lambs vs Ewes

		Lambs	Ewes
E. Lactation	Ca	8.6g	12g
E. Lactation	P	7.9g	11g

Doing the math

Lactating ewes

4.5 lbs alfalfa hay and 2 lbs corn

$$4.5 \times .24\% \text{ P} = .01 \text{ lb P}$$

$$2.0 \text{ corn} \times .35\% \text{ P} = .007 \text{ lb P}$$

$$.017 \text{ lb P} \times 454 \text{ g/lb} = 7.7 \text{ g provided vs } 11 \text{ g req.}$$

Meeting animal needs

Mineral Consumption

Salt driven

grain byproducts

molasses

Mineral Density

Se 10-90 PPM

controlled by FDA .69mg intake/d

Mineral Sources

Feedstuffs

ex. alfalfa hay high calcium

Sheep Mineral contains

macro and micro minerals

10-12% calcium

6-10% phosphorous

10-35% salt

expensive \$20-50 per bag

Sheep Mineral, Kansas

GUARANTEED ANALYSIS

Calcium	7%
Phosphorous	5%
Salt	45%
Sulfur	1%
Magnesium	1%
Zinc	150 PPM short
Iodine	125 PPM okay
Cobalt	150 PPM okay
Selenium	10 PPM super, super short

Better mineral

Calcium not needed with legumes
Phosphorous not needed with corn ?
High salt equals lower intake levels ++

Mineral sources

Trace mineral salt

95-98% salt

only micro minerals

lower intake required

lower cost

approx. half price w/ lower intake (mostly salt)

total cost of mineral supp. 25%

Water also may provide minerals

Big Gain T.M. SALT w/ Selenium

T.M. Salt for sheep

GUARANTEED ANALYSIS

Salt, min	94.00%	
Salt, max	95.00%	
Zinc, min	0.60%	6000 PPM
Magnesium, min	0.52%	5200 PPM
Manganese, min	0.25%	2500 PPM
Iron, min	0.25%	2500 PPM
Iodine, min	0.01%	100 PPM <i>short</i>
Cobalt, min	0.003%	30 PPM
Selenium	90 PPM	.009% <i>max.</i>

PPM = mg/kg

INGREDIENTS

Salt, Vegetable Oil, Calcium Sulfate, Magnesium Oxide, Zinc Oxide, Ferrous Sulfate, Manganese Sulfate, Sodium Selenite, Cobalt Carbonate, Ethylenediamine Dihydroiodide, Sodium Molybdate.

FEEDING DIRECTIONS

Feed BG Sheep Trace Mineral Salt on a free choice basis to sheep. **Do not** permit excessive consumption. Intake of supplement trace mineral salt mixture should not exceed 0.3 PPM on a complete ration basis, or 0.69 milligrams per head per day. An intake of 1/4 oz. of this mineral per head daily will supply 0.63 milligrams.

What should You do?

Test forages

Macro minerals

Monitor mineral intake

put out set amounts, ex. Week's supply
monitor how long it lasts

Selenium Deficiency

Reproductive failure

Embryonic mortality (wks 3-4)

White muscle disease

Poor suckling reflex

Indirectly hypothermia/goiter

Deiodinase enzyme

I4 to I3 which is the biologically active form

BAT activity

Reduced growth

Reduced disease resistance

BMP Selenium

Read mineral tag

Monitor mineral intake

Add to grain mix and force feed

Eliminates animal to animal variation

Needed year round

Pre-caution, some is good more may not be better.

Toxic at 2 ppm

High S decrease absorption (DDGS)

also heavy metals

Iodine

Lactation Ration = .8 ppm or mg/kg

Most mineral mixtures are short
needs to be 140 ppm mineral
with .5 oz intake

Solution free choice iodized salt in LG

Copper Toxicosis

Breed Susceptibility

Mineral interactions-Mo & Su,

along with high Zn & Ca

Normal copper, low molybdenum

Copper Toxicosis...continued

Prevention

Sheep specific feeds

No additional copper

Feed some Mo

CU & MO are both toxic

CU:MO ratio range 6-1 up to 10-1

Vitamins

Fat Soluble

A, night blindness, green feeds

D, rickets, sunshine

E, white muscle, immune issues

K, blood clotting, body synthesis

B vitamins and C

No concern with healthy rumen

C is synthesized by the sheep

Vitamins in mineral sources

Vitamins are inactivated during storage

Half life 14-21 days

Do not count on them to help.

EX. 10 IU E per pound of mineral

Critical Nutrient, Vitamin E

White muscle disease

Interacts with Selenium

Oxidative stress and free radicals

Cellular level metabolism

Free radicals are a product of energy metabolism

Accumulation creates cell/muscle damage

ex. White muscle disease

Late gestation

Stressful which leads to reduced immunity

Cold stress

Milk fever

inadequate calcium or too much other minerals
cation-anion imbalance, see Dairy Nutritionist
occurs in late, late gestation mostly

Reduced immunity leads to more health issues,
(mastitis, respiratory, uterine infections)

Reallocation of nutrients

ISU Results - Serum E levels in ewes

ISU, 900 IU injected weekly

	Con	E-G	E-L	E-GL
Pretreatment	1.27	1.26		
Pre-lambing	1.51 ^a	1.91 ^b		
Post-lambing ^a	.93 ^a	1.13 ^b		
Mid-lactation	.97 ^a	.95 ^a	1.28 ^b	1.37 ^b
Milk e at 3 days	10.8	15.1		

^{a,b} Row means with different superscripts differ ($p < .05$).

Base ration was excellent alfalfa hay and corn

Results - Serum E lambs

<u>Age</u>	<u>Con</u>	<u>E-G</u>	<u>E-L</u>	<u>E-GL</u>
3 days	1.08	1.08		
28 days	.41	.38	1.33	1.33

BMP Vitamin E

Feed ewes >100 IU/hd/d

late gestation and lactation

Creep feed minimum 40K IU/ton

Up to 100K IU per ton

Do not count on E in mineral

Concentration is **way too low.**

Grazing on green grass no problem

What should You do?

Harvest kidney and liver from deads.

Sample forages

Trace minerals are around \$35-50 per sample

Read mineral tags

Monitor mineral intake

Plain salt is not enough

Sheep have zero nutritional wisdom

Consult a nutritionist

On farm vitamin fortification

50 ewes free choice mineral with .5 ounce intake

ADE premix 2 million A, .5 million D and 4000 E / lb

Vitamin E 20,000 iu/lb

Ewes need 3500 IU A and 150-300 IU E

Mineral recipe

.5 oz X 50 head X 7 days / 16oz = 10.9 lbs

add

.7 pounds Kent ADE Premix (storage)

2.5 pounds Vitamin E (20K IU/lb)

Provides ewes 3800 IU A, 960 D and 138 E

Cost per week \$3.00 or \$3.00 per ewe per
year

Good Scales



Questions?

