Minerals and Vitamins for Goats and Sheep

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Goat Program at Langston University

- Web site www.luresext.edu
- Research Nutrient Requirements
- Internal Parasites
- Field Day April 26th
- Newsletter
Nutrients Required by Animals

- Energy
- Protein
- Water
- Vitamins
- Minerals
Vitamins

- Fat soluble A, D, E, K
- Vit A deficient in bleached or weathered hay or stockpiled forage
- Vitamin D sunshine vitamin
- Vitamin E linked to Selenium
- Supplements and Mineral mix
- Body stores
General Recommended Vitamin Levels

- Vitamin A  5,000 IU/lb
- Vitamin D  2,000 IU/lb
- Vitamin E    80 IU/lb
B Vitamins

- Water soluble
- Synthesized by rumen microbes
- Deficiency of Thiamin
- Polioencephalomalacia
- Coccidiostat Corid Amprolium
- High concentrate diets especially with S-Molasses
Niacin

- Useful in lactating animals
- Increases milk production
- Reduces incidence of ketosis
- Feed .25-.50 g/d
Macro minerals

- Calcium, Phosphorus, Magnesium, potassium, sodium, Chloride, Sulfur
- Requirements: Cal Phos
- Dry: .4% .3%
- Lactating: .6 .4
- Ca:P 1.3-2.0
Calcium Level .4%

- Functions in bone, muscle and nerve contractions
- Deficiency causes rickets, bowed limbs, lameness
- Vitamin D necessary for calcium absorption
- Most grains are deficient in calcium
Phosphorus Level .3%

- Function in soft tissues and bone growth, body pH
- Deficiency reduces growth, pica, depraved appetite
- Expensive feed ingredient
- May be close to adequate if poultry manure has been applied
Magnesium Level .18-.4%

- Functions as a component of bones and function of nervous and muscle system
- Major deficiency symptom is grass tetany on lush cool-season pastures
- Excitability, staggering, confulsions loss of appetite
- Feed palatable mineral with high level of magnesium
Potassium, Sodium, Chloride .8-2.0%

- Electrolytes in body
- Minerals lost in diarrhea
- Deficiency causes reduced growth, pica-depraved appetite, stiffness
- Salt is sodium chloride
- Potassium seldom deficient
Sulfur Level .2-.32%

- Functions in protein synthesis, milk and hair production
- Deficiency causes poor performance, hair loss, excessive saliva and tears
- Feeds with natural protein sources provide sufficient sulfur
Providing for Macromineral Requirements

- Necessary to know hay and grass analysis
- Many protein supplements contain macro and trace minerals and vitamins
- Mineral supplement with min 12% calcium, 7% phosphorus
- Read the label
Urinary Calculi Prevention

- No supplemental P
- Add Ca to 2.0-2.5 Ca:P ratio
- No milking ration
- Plenty of clean liquid water
- Salt
- Ammonium chloride .5%
- Biochlor 4.0 oz./day
Problems With Goat Trace Mineral Nutrition

- Mineral requirements for goats are not well known
- Sheep requirements are better known.
- May be breed differences in requirements
- Stress increases mineral requirements?
- Poor and variable intake of mineral supplements by goats
Problems With Goat Trace Mineral Nutrition

- Differences in forage mineral content
- Major affect by geology
- Soil pH affects mineral availability
- Plant species, stage of maturity and environment
- Goats consume a variety of plants
Problems With Goat Trace Mineral Nutrition

Figure 5: Dependence of animal function on intake of an essential nutrient [Courtesy of W. Mertz, U.S. Department of Agriculture, Beltsville, Maryland].
MINERAL INTERRELATIONSHIPS

PHOSPHORUS

COBALT (Co)

POTASSIUM (K)

SELENIUM (Se)

SULFUR (S)

CALCIUM (Ca)

MOLYBDENUM (Mo)

SODIUM (Na)

MAGNESIUM (Mg)

COPPER (Cu)

MANGANESE (Mn)

FLUORINE (F)

ZINC (Zn)

CHLORINE (Cl)

OTHER MINERALS
Influence of pH on availability of plant nutrients

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dates: 11:305, 1976
Trace minerals

- Iron, Iodine, Copper, Molybdenum, Zinc, Manganese, Selenium
- Beef cattle recommendations
- NY Selenium, Iodine copper (between Cayuga and Seneca lakes)
- Plant analysis
- Blood calcium, phosphorus, sodium, zinc, potassium
- Bone calcium, phosphorus, magnesium
- Liver copper iron zinc manganese, selenium, cobalt
- Custom mineral formulation
Iron Level 50-1,000 ppm

- Component of hemoglobin in blood
- Deficiency results in anemia
- Iron is stored in liver, spleen and bone marrow
Copper  Level 10-80 ppm Sheep 5 – 15 ppm

- Formation of hemoglobin, enzyme function
- Deficiency anemia, rough bleached hair coat, diarrhea
- Goat requirements are similar to cattle
Cobalt Level .1-10.0 ppm

- Component of Vitamin B-12
- Deficiency anemia, loss of appetite, weakness
- Deficient in the US in few small areas
Zinc  Level 40-500 ppm

- Functions in immune system, skin integrity and reproduction and hooves
- Deficiency dermatitis, thick dry patches of skin, hair loss
- Often used to treat skin problems
Manganese  Level 40-1,000 ppm

- Function in bone production and reproduction
- Deficiency reluctance to walk, foreleg deformity, poor reproduction, low birth weight
- Motherhood mineral
Iodine Level 1.0-50. ppm

- Functions as a part of thyroid hormone and reproduction
- Deficiency causes goiter—enlarged thyroid gland—do not confuse with thymus gland in goats
- Deficiency reproduction problems, late abortions, hairless fetus
Molybdenum Level 0.1-3.0 ppm

- Function in enzyme xanthine oxidase
- Deficiency is very rare
- Depresses copper absorption
- Need four times copper level as molybdenum
Selenium Level .2 – 20. ppm

- Function in reproduction and membrane integrity
- Deficiency causes white muscle disease, poor reproduction and retained placenta
- Interacts with vitamin E
Copper Toxicity

- Angora goats more sensitive
- Meat and dairy goats tolerate as much as beef cattle do
- No need for sheep/goat mineral
- Goats need more Cu than sheep
- Breed and individual differences
Copper Toxicity

- Liver content best measure
- Treat with ammonium molybdate and sulfur.
- Know what is going on in your herd with copper.
- Use a mineral with appropriate copper level.
Sheep Macromineral Recommendations

- Calcium: 0.20-.82%
- Phosphorus: 0.16-.38%
- Magnesium: 0.12-.18%
- Potassium: 0.50-.80%
- Sulfur: 0.14-.26%
- Sodium: 0.09-.18%
Sheep Micromineral Requirements

- **Mineral**          | **Requirement** | **Toxicity**  
- Iodine              | .10-.80 ppm    | 50 ppm       
- Iron                | 30-50 ppm      | 500 ppm      
- Copper              | 7.1-11. ppm    | 25 ppm       
- Molybdenum          | .50 ppm        | 10. ppm      
- Cobalt              | .1-.2 ppm      | 10 ppm       
- Manganese           | 20-40 ppm      | 1,000 ppm    
- Zinc                | 20-33 ppm      | 750 ppm      
- Selenium            | .1-.2 ppm      | 20 ppm       
- Fluorine            |               | 60-150 ppm   


Forage Mineral Deficiencies in AR

- Selenium  60% of hay samples
- Copper     52% of hay samples
- Zinc           41% of hay samples
- Magnesium 30% of forage samples
- Calcium 27% of forage samples
- Phosphorus 19% of forage samples
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<th>Min Req Goat</th>
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<tr>
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<td>1.6%</td>
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<tr>
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<td>.1</td>
<td>3.8</td>
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<tr>
<td>Cu</td>
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<td>28</td>
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<tr>
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<td>Fe</td>
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<tr>
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<tr>
<td>Se</td>
<td>.2</td>
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Wholesale cost of providing 100% of the minerals for a 150 lb goat

- Calcium $1.15
- Phosphorus 4.50
- Salt .40
- Magnesium 1.11
- Potassium 1.50
- Trace minerals .45
- Total $9.70
Providing Trace Minerals for Goats

1. Use mineral supplement containing the minerals needed - copper, zinc, and selenium
2. Monitor consumption over a period of time - calculate how long it should take to consume a 50 lb bag
3. Cattle mineral consumption can be increased with dried molasses
4. Avoid excesses and extremes
Conclusion

- Provide sufficient protein and energy to keep goats in reasonable body condition
- Provide an appropriate mineral supplement ie 13-7 and monitor consumption
- Good nutrition is the first step toward a healthy, productive goat