Mineral Supplementation of Grazing Beef Cows in Florida

University of Florida
2010 Beef Cattle Shortcourse

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Macro-minerals

- Calcium, phosphorus, potassium, magnesium
- Phosphorus is typically the leading determinant of mineral supplement costs.
- What is the appropriate level?
  - High phosphorus > 10%
  - Moderate phosphorus 5 – 10%
  - Low phosphorus < 5%
Trace minerals
Selenium

- Selenium deficiency is common in grazing beef cattle throughout the world.
- Toxicity can also be a concern.
Cobalt

- Symptoms resemble starvation.
- Incidence is highly variable from year to year.
- Not typically a problem in Florida beef herds.
Hoof Integrity

Zinc is an important nutrient for the maintenance of hoof integrity.
Zinc

Essential for normal spermatogenesis
Effect of zinc level and source on yearling Angus bulls “classification deferred”

![Bar chart showing classification deferred percentages for different zinc sources and levels.]

- **Zn Sulfate, 40 ppm**: Classification Deferred, %
- **Zn Organic, 40 ppm**: Classification Deferred, %
- **Zn Sulfate, 60 ppm**: Classification Deferred, %

Legend:
- **a**: Significant difference
- **b**: Significant difference
Manganese

- Poorly absorbed and difficult to monitor in the live animal.
- Abnormal bone development is the most common deficiency symptom
- Typically supplemented via manganous oxide.
Copper

- Next to phosphorus, copper is typically the most limiting mineral nutrient.
- Estimated to be essential to over 30 enzymes.
- Essential for maintenance of reproduction, immunity, and growth.
- Typically supplemented via copper sulfate. Do not feed supplements containing copper oxide.
Loss of Hair Pigmentation

M. Hidiroglou in Copper deficiency in Ruminants
Loss of Hair Pigmentation
Stress Impacts Mineral Metabolism

- Weaning and transport is highly stressful.
- Research recognizes the increased need for trace minerals in stressed calves.
- NRC, 1996
Weaning and Transport
Urinary Zinc concentrations in stressed beef calves

Arthington et al., 1996
Organic Trace Minerals

Metal amino acid complex

Metal amino acid chelate

Metal proteinate

Metal polysaccharide complex
Organic Trace Minerals

- Research has not supported the use of organic minerals in healthy mature cows.

- However . . . .
  - Antagonists
  - Age
  - Stress
Effect of Cow Age and Mineral Source on Calving Interval

<table>
<thead>
<tr>
<th>Mineral source</th>
<th>Mature cows</th>
<th>Young cows&lt;sup&gt;1&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic</td>
<td>358</td>
<td>364&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Inorganic</td>
<td>354</td>
<td>380&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>1</sup>Young cows ≤ 4 years of age

Arthington and Swensen, 2004
Trace Mineral Antagonists

- Sulfur
- Molybdenum
- Iron
- Aluminum
Sulfur and Copper

- High sulfur is the most common link to copper deficiency.
- Without sulfur, molybdenum is not often a problem.
- Sulfur > 0.35 % of the total diet will induce copper deficiency, without molybdenum.
Pasture Fertilization
Effect on Cow Mineral Status

Sulfur concentration of bahiagrass

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Sulfur Concentration (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammon. Sulfate</td>
<td>0.50 %</td>
</tr>
<tr>
<td>Ammon. Nitrate</td>
<td>0.20 %</td>
</tr>
<tr>
<td>No Fertilizer</td>
<td>0.22 %</td>
</tr>
</tbody>
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Arthington et al., 2002
Effect of pasture fertilizer source on liver copper levels in grazing beef cows

Arthington et al., 2002
Sulfur Content of Feed Supplements

- Some feed supplements are high in sulfur
  - Molasses
  - Corn gluten feed
  - Distillers grains
  - Corn steep liquors
  - Feather meal
Forms of Trace Mineral Supplementation

- Free-choice, loose mineral supplement
- Trace mineral fortified salt blocks
- Drenches and injections
- Slow-release boluses
- Trace mineral fortified protein/energy supplements
Free-Choice Mineral Feeders
(the most common form of mineral supplementation)
Important Facts

• Cattle do not have the nutritional wisdom to consume mineral at the amounts needed.

• “Cattle are consuming a lot of mineral so they must need it.” This is not true!

• Cattle only have the nutritional wisdom to consume salt at the level of requirement.
Iron oxide is added to free-choice trace mineral supplements to provide a red color. This Iron is not available and provides no nutritional value.
Important Facts

- Pay attention to Copper and Zinc ratios, particularly in high-sulfur environments.
- Target a ratio of 1:3 (copper to zinc).
Thank you for your attention

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