Trace Mineral Nutrition and Beef Cattle Health and Productivity

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Dillon MT
Multimin USA
Nutrition

• Fat
• Carbohydrate
• Protein
• Vitamins
• Minerals
Nutrition

• Fat
• Carbohydrate
• Protein
• Vitamins
• Minerals
  – Macrominerals
Nutrition

• Fat
• Carbohydrate
• Protein
• Vitamins
• Minerals
  – Macrominerals
  – Microminerals (Trace minerals)
Nutrition

- Fat
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  - Macrominerals
  - Microminerals (Trace minerals)
Nutrition

- Fat
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  - Macrominerals
  - Microminerals (Trace minerals)
Major Functions of Trace Minerals

**Zinc (Zn)**
- DNA handling
- Testicular development
- Sperm production
- Appetite
- Keratin (skin, hoof)
- Immune function
- *Pathogen killing*
- *Pathogen cleanup*
- Power plant control

**Manganese**
- Steroid hormones
- Reproduction
- Bone development
- Power plant control

**Selenium**
- Embryo survival
- Semen quality
- Immune function
- Power plant control

**Copper (Cu)**
- Embryo survival
- Nervous system development
- Structural - elastin
- Immune function
- *Pathogen capture*
- *Pathogen killing*
- *Pathogen cleanup*
- Power plant control

**KEY PARTS OF MANY IMPORTANT ENZYME SYSTEMS, STRUCTURAL COMPONENTS, SYNTHESIS OF REPRODUCTIVE HORMONES, AND BREAKDOWN OF METABOLIC “WASTE” PRODUCTS.**

<table>
<thead>
<tr>
<th>Trace Mineral</th>
<th>Major Functions</th>
<th>Major Antagonists</th>
<th>Absorption Coefficient</th>
</tr>
</thead>
</table>
| Zinc (Zn)     | • Component of more than 300 enzyme systems  
                • Normal testicular development  
                • Normal sperm production  
                • Normal appetite  
                • Proper skin and hair development  
                • Proper immune system functions | Calcium, Phosphorous, Iron, Sulphur, Fiber, Phytates (Soy Beans) | 10-20%* |
| Manganese     | Steroid hormones  
                • Reproduction  
                • Bone development  
                • Power plant control | Calcium, Phosphorous, Iron, Sulphur, Fiber | 0.15-1.2%* |
| Selenium (Se) | Embryo survival  
                • Semen quality  
                • Immune function  
                • Power plant control | Calcium, Phosphorous, Iron, Sulphur, Molybdenum | 1-5%* |
| Copper (Cu)   | Required for embryo survival  
                • Proper bone formation  
                • Proper nervous system development  
                • Proper immune function | Calcium, Iron, Sulphur, Molybdenum | 1-5%* |

*NRC 2001*

**MULTIMIN®90**
SURE Trace Mineral Supply by Timed Injection
Figure 3: Changes in liver and serum copper concentrations for beef cows (Swenson, 1998).

<table>
<thead>
<tr>
<th>Time of Sampling</th>
<th>Serum Cu, ppm</th>
<th>Liver Cu, ppm (DM basis)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-calving</td>
<td>0.65</td>
<td>110</td>
</tr>
<tr>
<td>Calving</td>
<td>0.8</td>
<td>80</td>
</tr>
<tr>
<td>Breeding</td>
<td>0.7</td>
<td>85</td>
</tr>
<tr>
<td>Weaning</td>
<td>0.65</td>
<td>120</td>
</tr>
<tr>
<td>Pre-calving</td>
<td>0.68</td>
<td>115</td>
</tr>
</tbody>
</table>
Trace Mineral Functions

- Normal Trace Mineral Intake:
  - Decreased Growth/Performance
  - Compromised Immunity
  - Reduced Fertility
  - Decreased Growth/Performance

- Subclinical Trace Mineral Intake:
  - Normal

- Clinical Trace Mineral Intake:
  - Clinical Signs

Wikse, 1992 Texas A&M Beef Cattle Short Course
Injectable Trace Mineral

MULTIMIN®90 SURE Trace Mineral Supply by Timed Injection
MULTIMIN® 90 provides Zinc, Copper, Manganese, and Selenium in a readily available injection.
• Absorption & Avail.

• Storage

• Utilization

• All start immediately
• Absorption peak 8-10 hours & finished 24 hours
• Storage packs away mineral not immediately used in the first day and keeps it available for 4-6 weeks
• Enzymes last 1-2 months
• Immediate boost provides benefit for 2-3 months
Multimin 90

• Does not replace year-round oral trace mineral supplementation program

• Designed to supplement oral program
  – Demands during high production
  – Demands during high stress
  – Where antagonistic minerals hinder absorption (in basin and range: iron, molybdenum, sulfur)
Multimin 90 in Cows
MULTIMIN® University Study Data

Overall pregnancy %

<table>
<thead>
<tr>
<th>Study Source</th>
<th>Overall Pregnancy %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Texas A&amp;M University</td>
<td>81%</td>
</tr>
<tr>
<td>Kansas State University</td>
<td>89.9%</td>
</tr>
<tr>
<td>NW-MO State University</td>
<td>65.2%</td>
</tr>
<tr>
<td></td>
<td>74.4%</td>
</tr>
</tbody>
</table>


2 J. Allen, “Effect of Multimin 90 on foot rot prevalence, health parameters, and growth parameters of beef cows and calves in Northwest Missouri.” Study data on file
Fixed Time AI Pregnancy Rates

MULTIMIN® treatment at preg-check and again 30 days before AI

Kansas State University

P = 0.05
MULTIMIN® University Study Data

Female calving %

Compressed Calving Distribution

Day 1-20: 65%
Day 21-40: 31.1%
Day 41-60: 19.9%

MULTIMIN®
Control (Saline)

Kansas State University6

P = 0.01

Eckerle, M.J. Macek, S.M. Ensley, L.J. Havenga, K.C. Olson, “Effects of prepartum and postpartum bolus injections of
trace minerals on performance of beef cows and calves grazing native range.” The Professional Animal Scientist 28
(2012):82-88

MULTIMIN®90 SURE Trace Mineral Supply by Timed Injection
HEIFERS

MULTIMIN® University Study Data

Pregnancy % to timed-AI after 14d CIDR-Protocol

MULTIMIN® treatment 33 days prior to AI

University of Idaho15
55%

MULTIMIN® treatment 33 days prior to AI

University of Illinois17
60%


17 University of Illinois study data on file
With Injectable Multimin 90

• You supplement every animal you inject
• You provide supplementation quickly
• You by-pass any antagonists
• You target periods of high challenge and demand for your cattle