



supplementation. These types of compounds alone, however, do not meet the mineral requirements of today's animals. Bioavailability of elemental minerals ranges from 3% to 60%.

### What is a chelated (ke-lated) mineral?

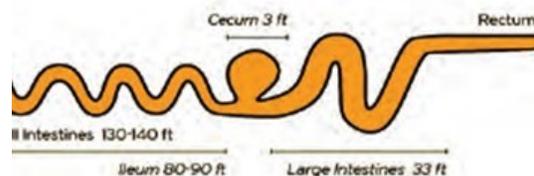


A mineral is chelated in a chemical reaction where an elemental mineral is combined with an amino acid. Glycine and other single amino acids are used for optimum chelation because they are very small molecules. Additionally, glycine is not

susceptible to rumen degradation or ingestion by rumen bacteria. Single amino acids and zinc (or another element) create a stable molecule that is absorbed in the jejunum and ileum (very long part of the small intestine). This chelation process makes it nearly 100% bioavailable to the animal.

### How are minerals absorbed into the body?

Elemental and chelated minerals are absorbed by the body differently. Elemental minerals are absorbed in the first part of the small intestine where the environment is very acidic. Metal Amino Acid Chelates are absorbed later in the small intestine after the bile inclusion point. They are then carried across the intestinal walls as amino acids (the building blocks of protein).





### What are minerals?

Minerals are defined as solid, crystalline substances with a definite chemical composition (copper, zinc, manganese, etc.). Minerals come from the earth as both metal and non-metallic elements. They must be utilized as natural elements of nature. There are seven macro minerals (Ca, Cl, Na, K, P, Mg, S) and ten trace minerals (Co, Cr, Cu, Fe, F, I, Mn, Mo, Se, Zn), required for animal life. Remember, all minerals are elements but not all elements are minerals.

Ca - Calcium	Cl - Chloride
Na - Sodium	K - Potassium
P - Phosphorous	Mg - Magnesium
S - Sulfur	Co - Cobalt
Cr - Chromium	Fe - Iron
F - Fluorine	I - Iodine
Mn - Manganese	Mo - Molybdenum
Se - Selenium	Zn - Zinc

### Why are minerals important?

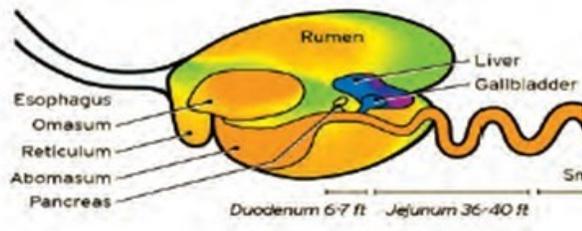
Every system in the body is dependent upon minerals to function properly. The immune, reproductive, hormonal, digestive, nervous, skeletal, etc. systems are all affected by minerals. Four elements (carbon, hydrogen, oxygen and nitrogen) compose 96% of the body's makeup. The remaining 4% of the body is composed of minerals.

### Why the need for mineral supplementation?

There are deficiencies of minerals in common feedstuffs. The only way for animals to receive sufficient minerals for optimum production is through mineral supplementation.

### What types of minerals are available for supplementation?

Elemental minerals have been used for years; salt or sodium chloride being the most common. Copper sulfate and zinc sulfate are other examples and have been the best options for mineral





## What are the signs that my animals may be mineral deficient?

### COPPER

- Changes in hair coat
- Increased early embryonic death
- More calves with pneumonia and scours
- Decreased weaning weights (50-100 lbs.)
- Reduction in fertility
- Increased susceptibility to diseases

### MANGANESE

#### Calves:

- Weak calves at birth
- Skeletal defects in calves
- Enlarged, stiff joints

#### Cows:

- Small ovaries
- Irregular or delayed estrus
- Embryonic death and abortion

#### Bulls:

- Impaired spermatogenesis
- Testicular degeneration
- Decreased libido

### ZINC

#### Calves:

- Stiff joints and swollen hocks
- Delayed wound healing
- Skin lesions

#### Cows:

- Cystic ovaries
- Abnormal estrus
- Soft and/or cracked hooves

#### Bulls:

- Decrease in testicular size
- Retarded growth
- Delayed onset of puberty
- Soft and/or cracked hooves



## Understanding Trace Minerals

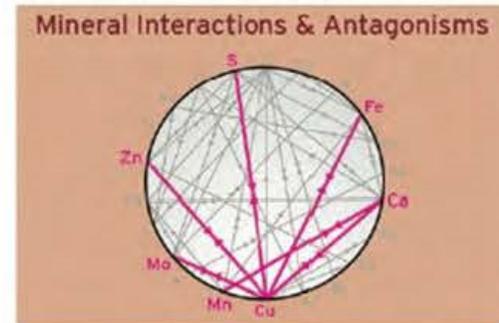
HIGHLY BIOAVAILABLE AMINO ACID  
CHELATED TRACE MINERAL  
FOR USE IN ALL ANIMAL FEEDS

### Should I only use chelated minerals for my supplementation needs?

Use both chelated and elemental minerals to complete your supplementation programs. Take advantage of the differences in absorption sites between chelated and elemental minerals to meet your animal's nutritional requirements.

### Why can't I just feed more elemental minerals to address deficiencies?

Adding additional elemental minerals can cause significant antagonistic activities between minerals as shown in the diagram. For example, if you add too much copper sulfate to the diet it can result in copper toxicity issues or a decrease in rumen bacterial populations. With the formation of an electrically neutral chelated mineral, antagonism does not occur. This is the result of stabilization of the element with glycine.

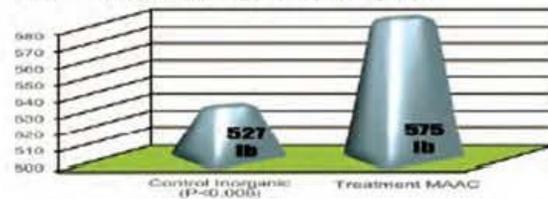


### Does it pay to include true amino acid chelates in your mineral program?

It pays to have a comprehensive mineral program with Tracer chelated minerals in terms of reproduction, immunity, and overall performance.

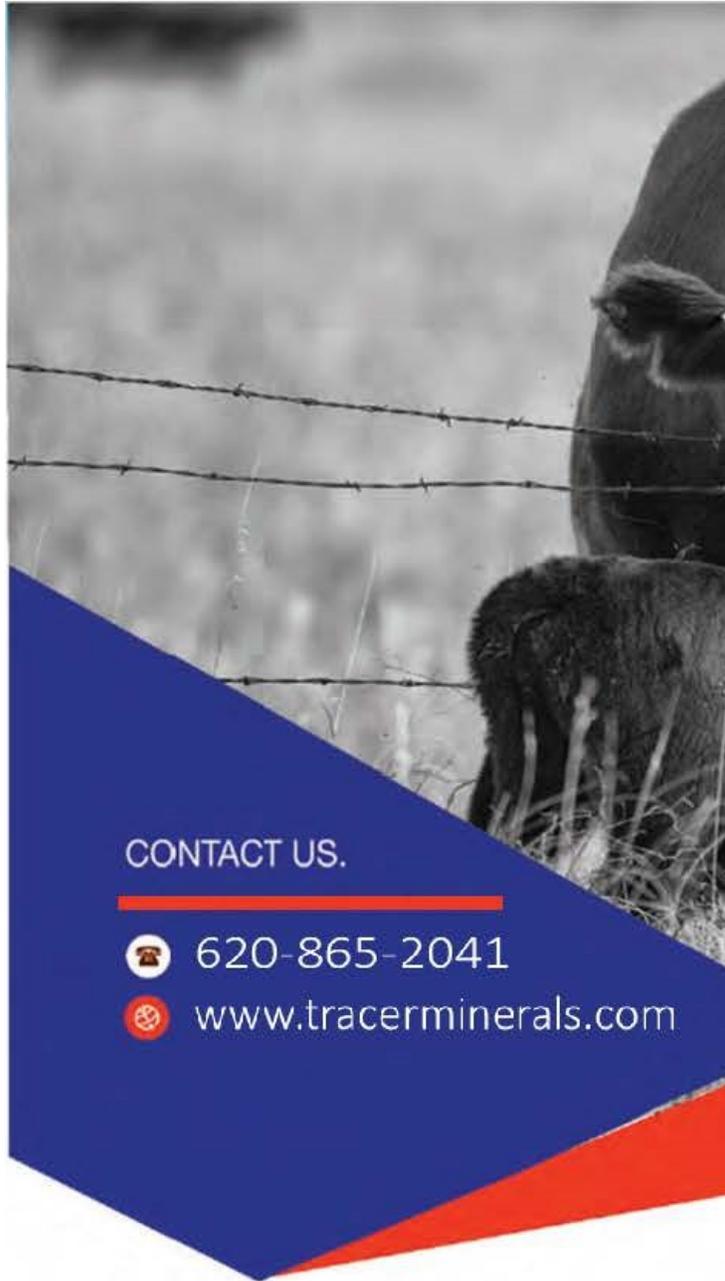
### Heavier Weaned Calves

Oklahoma State University Beef Breeding Trial



### How can I be sure I'm Feeding a truly chelated trace mineral?

Check the feed tag! Chelated trace mineral ingredients are listed specifically. Check your mineral tag under the feed ingredients list, if it shows "(metal) amino acid chelate" then you can be assured you are getting a true chelate.



CONTACT US.



620-865-2041



[www.tracerminerals.com](http://www.tracerminerals.com)

**"YOU CAN TRACE EVERY SICKNESS,  
EVERY DISEASE, AND EVERY AILMENT  
TO A MINERAL DEFICIENCY."**

DR. LINUS PAULING, NOBEL PRIZE WINNER

