



Technical Updates

ABSORPTION

Inorganic and metal amino acid chelated minerals are primarily absorbed in the small intestine of animals. The small intestine is divided into three parts; the duodenum, jejunum and the ileum (respectively). Inorganic minerals are mainly absorbed in the duodenum. Tracer AAC minerals can be absorbed throughout the small intestine but are mainly absorbed in the jejunum of animal species. The small intestine in cattle is generally 130-140 feet long. The duodenum is 6-7 feet, the jejunum is 36-40 feet and the ileum is roughly 80-90 feet.

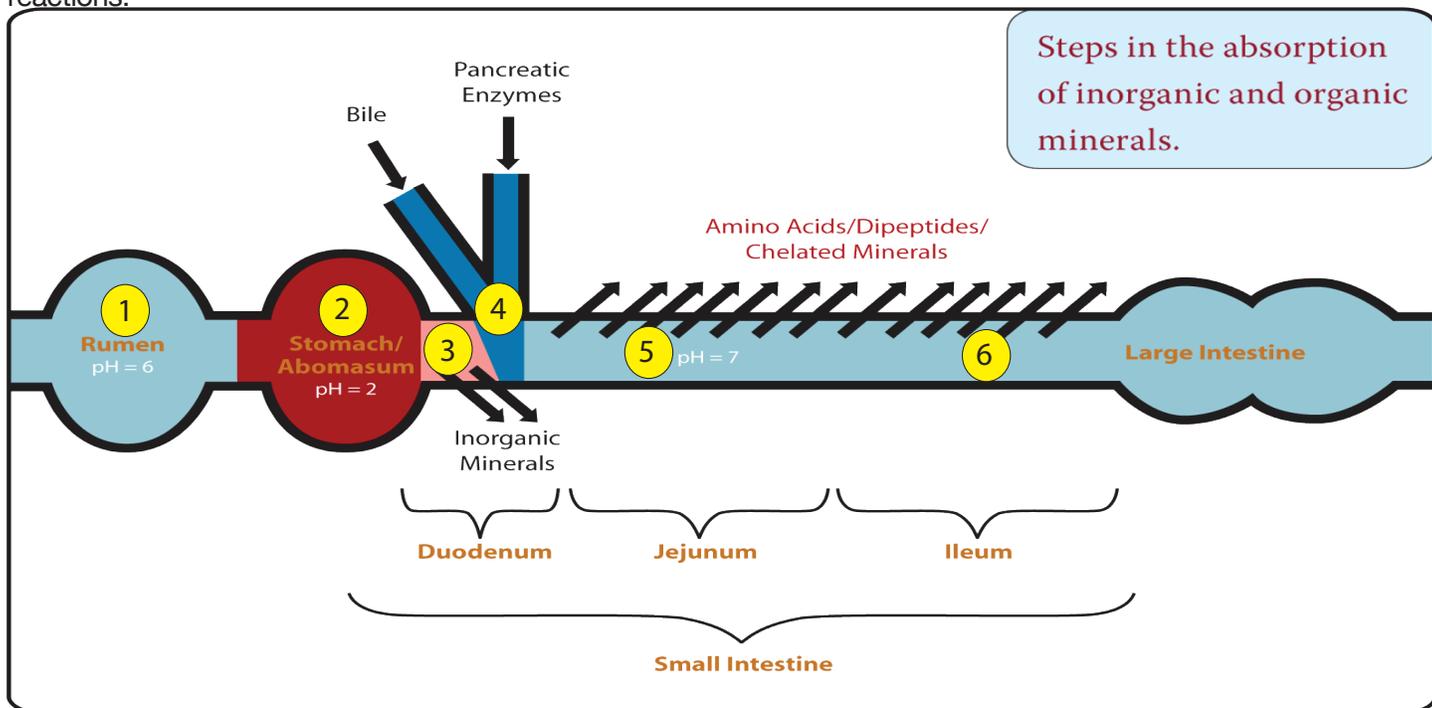
In ruminant animals, after the digesta leaves the rumen and enters the abomasum (stomach) the digestive system mostly follows the same process in the majority of other animal species.

1. Ruminates Only- When inorganic minerals mix with the fluid in the rumen contents, they become susceptible to the interfering and complexing inhibitory properties of certain metal groups (iron, sulfur and molybdenum) as well as plant phytates. This can result in the inorganic minerals becoming un-available for absorption in the animal. Tracer AAC minerals are not as susceptible to these reactions.

2. Digesta including inorganic mineral sources pass into the stomach where the low pH (of 2) causes the solubilization of the inorganic minerals. This environment keeps the inorganic minerals soluble until bile and pancreatic enzymes are introduced at the junction of the duodenum and jejunum. True Amino Acid Chelated minerals do not react in this low pH (chelated) environment and molecule remains intact.

3. The digesta moves from the stomach to the duodenum. The low pH (of 2) of the digesta allows the inorganic minerals to remain soluble thus allowing for absorption. As pancreatic juices and bile from the gall-bladder enter the system, they act as buffers at the end of the duodenum which then in turn raises the pH of the digesta and the pH rises from approximately a pH of 2 to a pH of 7 resulting in the digesta becoming pH neutral before moving to the jejunum.

4. As the pH becomes more neutral, solubility and absorption of inorganic minerals decreases. Whatever inorganic minerals were not absorbed the duodenum are excreted as waste. Inorganic minerals are either rendered unabsorbable by antagonistic minerals (Fe,





Mo and S) and plant compounds called phytates. The short length of the duodenum results in limited ability for mineral absorption. Amino Acid Chelated minerals are unaffected by these factors.

5. The jejunum is the main absorption site of amino acids, peptides and dipeptides. The length of the jejunum and how it recognizes the Amino Acid Chelated minerals (Amino Acid) make the jejunum the primary location for Tracer AAC mineral absorption.

6. The advantage of Tracer Amino Acid Chelated mineral's structure results in a unique recognition allowing for absorption in the ileum. After materials enter

the large intestine, virtually no mineral will be absorbed. *Tracer* Amino Acid Chelated minerals have the advantage over inorganic minerals by 1) remaining intact in the presence of antagonistic mineral complexing as well as phytates and other feed ingredients such as mycotoxin inhibiting compounds 2) the ability to be absorbed in the jejunum and ileum 3) being recognized as an amino acid.

Chelation of minerals is a very precise science. Only the resulting specific amino acid chelate can resist digestion and maintain its integrity as it travels thru the digestive system and is ultimately absorbed through the gut.

Intact absorption is faster, easier, and requires less metabolic energy, provided the chelate is under 1000 Daltons in size.

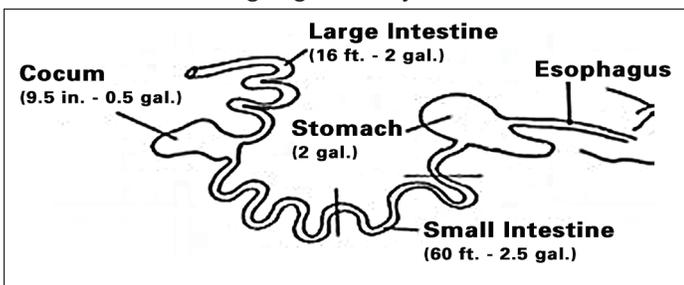
Compare Amino Acid Chelated and inorganic minerals, once the research is presented, there is limited dispute about which is absorbed faster. Meticulous isotope testing has shown the following increases in per-

Advantages of Metal Amino Acid Chelates

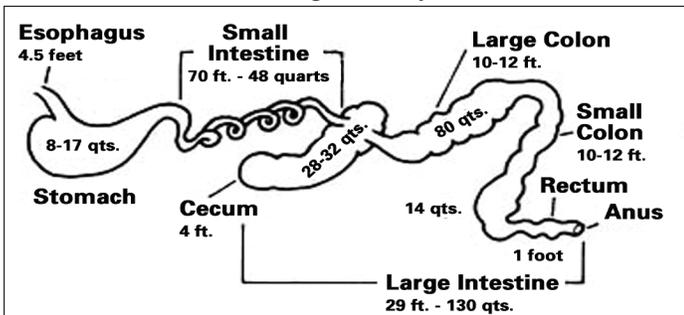
Metal pulled into the system with the Amino Acid

- Mostly highly absorbed form of Organic Trace minerals
- Ligand (Glycine is not broken down in rumen)
- Minimum - 1:1 molar ratio
- Electrically neutral - less susceptible to antagonisms such as Iron, Sulfur, Molybdenum, and mycotoxin binders

Pig Digestive System



Horse Digestive System



cent absorption of Amino Acid Chelated trace minerals when compared with inorganic trace mineral sources.

- Iron 490% greater
- Copper 580% greater
- Magnesium 410% greater
- Calcium 421% greater
- Manganese 340% greater

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Use the science and chemistry provided by *Tracer* Amino Acid Chelated trace minerals. Get more mineral into your animals system to improve energy utilization, hormone production and immunity. The results are real and significant. *Tracer* . . . Making Mineral Better