MINERAL AMINO ACID CHELATES

Description, Mode of Action, Forms, Absorption and Impact on Productivity

Although minerals constitute a very small fraction of the body weight and of the diet, they are vital components of a wide variety of organism form and activity—from structural to cellular metabolism to a host of organ/tissue enzymatic functions.

Minerals in their natural state in plants and animal tissues exist as components of protein, carbohydrates or fatty acid complexes, in a **"naturally chelated"** form. Animals traditionally get their mineral supply from such food/feedstuff sources.

Intensification of production and dramatic improvement in weight gains and productivity also increased the mineral requirement , leading to the use of inorganic minerals (I.e. ferrous sulfate, zinc chloride, etc.) to fill the gap.

Recent studies have established that inorganic mineral supplements may not be as absorbable as expected and tend to cause undesirable interactions in the digestive system:

A. Inorganic minerals start precipitating at pH 5. More than 85% of inorganic minerals fed form precipitates at the intestinal pH of 7 and above. Average absorbability is <15%.

B. Interaction with vitamins leading to significant reduction in vitamin bioavailability

C. Buffering of gastric acid resulting to elevated gastric pH and reduced protein digestion

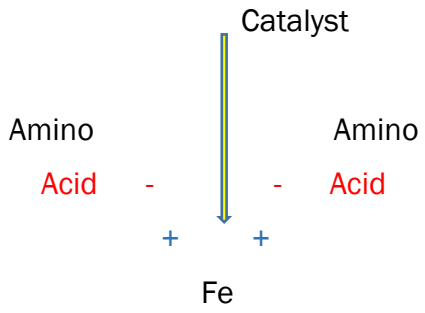
D. Precipitates form a magma which tend to inhibit normal intestinal absorption processes and initiate intestinal distress leading to diarrhea/constipation.

E. Increasing the dose of inorganic minerals merely increases the negative effects.

WHAT ARE MINERAL CHELATES?

These are mineral ions chemically attached to amino acid ligands, using a catalyst, to create coordinate covalent bonds for the purpose of increasing absorbability/bioavailability and preventing detrimental interactions with gastric acids, vitamins and other organic acids.

Example



Iron Amino acid chelate

The amino acid is accepted as a more superior choice among the present ligands, as amino acids create a more stable bond, possess higher absorbability character, and are absorbed in the intestines independent of digestive processes.

CHARACTERISTICS OF MINERAL AMINO ACID CHELATES

1. Non-buffering to gastric pH, helping maintain acidic state necessary for proper protein digestion
2. Non-reactive to vitamin and other organic acids in the gut resulting to unimpaired vitamin bioavailability
3. Non- precipitative in intestinal pH and do not form intestinal distress causing magma
4. Excellent mineral bioavailability (>90%) for enhanced productive and reproductive functions.
5. Stable and soluble in a wide range of pH.

** “True” chelates (catalyst bonded chelates) must be differentiated from “dry blends” - which are merely physical mixtures of ligands with minerals but are being presented as chelates. Dry blends easily break down into component parts in gastric/acidic media.

SUMMARY OF OBSERVED PRODUCTIVE AND REPRODUCTIVE IMPACT

PIGS

Wean to 1st service	-23.3%
1st service conception	+10.4%
Prewean mortality	-23.8%
Weaned pigs/litter	+8.1%
Weaning weight	+10.7
ADG	+6.75

POULTRY

Broiler		Layer	
Gain	+6.11%	Egg mass	+5.40%
FCR	+4.25%	Egg breakage	–21.9%
Breast yield	+4.58%	Peak Lay	prolonged
Carcass yield	+4.90%		

RECOMMENDED INCORPORATION RATES gm/ton

	Pig	Poultry
Iron chelate 20%	50-150	50-150
Copper chelate 15%	10-20	10-30
Zinc chelate 20%	30-60	30-80
Manganese chelate 20%	15-30	10-30
Magnesium chelate 20%	25-100	25-100
Selenium chelate 2%	5-10	5-10
Cobalt chelate 1%	6-10	6-10
Chromium chelate 1%*	20	20

In gms/ton of feed; Lower rate for regular supplementation; higher rate will supply 100% of bioavailable requirement/day

*Chromium dose as per NRC Rec. 98 of 200 ppb

Major Sources: Anderson et. Al. 1996; Deyhim, et.al. 1993-95; Lewis et .al. 1992; Mcdowell 1986; Fang, et.al 1995; USNRC 98; Wedekind, et.al. 1992; Seedstock 1996