Choosing the right Organic Trace Mineral for Dairy Animals

The changing trends in animal production require animals to become more efficient in all aspects of the production cycle. Major contributors to economic returns include reproduction and nutritional management of the herd. To maintain high milk output, cows should give birth at the shortest possible interval, which means that various events like taking account of post-partum uterine involution, coming into heat, conception and the duration of pregnancy in the cow have to keep repeating in a fairly tight schedule. The time of re-breeding may coincide with a period of high milk production and possibly with a period of negative energy balance. These nutritional stresses can affect the reproductive system and may be manifested as delayed return to the ovulation cycle and failure to become pregnant. Successful establishment of pregnancy requires a series of coordinated signals involving brain, ovary and uterus, all of which may be influenced nutritionally at the macro or micro level. Efficient production in an animal requires the essential nutrients in a diet be provided in appropriate amounts and in forms that are most biologically available.

Mineral nutrition is a vital part of the dairy cow’s overall nutritional profile which includes nearly every process in the body. The potential for minerals to play a significant role in herd fertility is indisputable.

Organic minerals have been shown to have beneficial effects under a wide range of applications in ruminants. These include higher production, increase in quality of milk, higher reproductive efficiency and better mammary health. A relative bioavailability value of Cu and Zn from Cu-methionine and Zn-methionine was found to be 33% and 52% higher than from inorganic copper and zinc sulphate, respectively in ewes (Pal et al., 2010).

Different categories of Organic Trace Mineral

There are various types of organic trace minerals but all are not equally bioavailable. Bioavailability depends on the type of organic compound used, type of bonding between mineral and the organic compound and overall molecular size of the organic trace mineral. Association of American Feed Control Officials (AAFCO) has defined various categories of organic trace minerals:

- Metal (specific amino acid) complexes
- Metal amino acid complexes
- Metal amino acid chelates
- Metal Proteinates
- Metal Polysaccharide complexes
- Metal Propionates
- Yeast derivative complexes
The primary role of OTMs is to increase the bioavailability of supplemental trace minerals from the diet. The beneficial effects of OTMs are attributed to the association of the metal with an organic molecule, the ligand. Molecular size of an OTM is critical to the performance of the product. A properly designed, well manufactured OTM with optimum molecular size will meet the design criteria of increased solubility, greater stability, and enhanced absorption. OTMs with optimum molecular size are more bioavailable than inorganic and bigger organic forms.

Metal amino acid complexes result from complexing a specific soluble metal salt (such as Zn, Cu, Mn, Se) with an amino acid. These metal-amino acid complexes are manufactured using a new patented “amino acid extraction process” that breaks down a pure source of protein into an intermediate product containing only free amino acids, without dipeptides, tripeptides or larger protein fragments. The free amino acids are then complexed in a one-to-one ratio – one amino acid molecule bonded to one metal ion. Metal specific amino acid complexes result from complexing a soluble metal salt with a specific known amino acid.

Chelates are formed from the reaction of a metal ion from a soluble metal salt with one, two or three (preferably two) molecules of amino acids to form covalent – covalent bonds. Chelates are generally having a bigger molecular size than metal – amino acid complexes. Similarly protein, polysaccharides, propionates and yeast protein are also larger sized molecules. Moreover there is a wide variation in their size. Their weight may vary from few hundred Daltons to thousands of Daltons depending on their size. As per the AAFCO standards, OTM molecules within the size of 300 Daltons are preferred as they are readily absorbed and therefore all the more bioavailable. Only the first two categories given by AAFCO i.e. metal – specific amino acid and metal – amino acid complexes fulfill this desired size criteria. The Millepore filter is used to determine the molecular size of OTMs. OTMs passing through the 300 Dalton sieve filter reflect a molecular size believed to be the best for maximum absorption.

Zinpro Corporation pioneered the science of organic trace minerals over 40 years ago. To consistently produce Performance Minerals, Zinpro manufactures products through a patented complexing technology that provides the most consistent and reliable animal performance in the industry. This process breaks down an extremely pure source of protein to yield free amino acids. These amino acids then are bonded with specific trace minerals, using Zinpro's patented complexing technology.
Availa-4 is a nutritional feed ingredient for dairy animals that contains a combination of organic zinc, manganese and copper. It also contains Cobalt in inorganic form (as Glucoheptonate) for improving the microbial growth and health in the rumen. Availa Zn another product from Zinpro for dairy provides zinc alone in a complexed form. These trace minerals are required by animals for numerous functions including: immunity, reproduction, skin and hoof integrity, growth and muscle development, milk production, fiber digestion and energy metabolism. In addition, when an animal has the proper balance of trace minerals it is better able to cope with the challenging effects of stress.

Availa-4 and Availa Zn from Zinpro are built on a unique, patented molecule that consists of one metal ion bound to one amino acid ion – called a metal amino acid complex. Zinpro Performance Minerals are the most bioavailable and stable trace minerals in the market, which means most of the minerals are absorbed by the animal to deliver their full benefit. Zinpro Performance Minerals also have a much higher stability constant, that allow for a rumen bypass of about 95%. For over 40 years, Zinpro Performance Minerals have delivered a positive animal performance response and a strong return on investment in operations around the world. A quarter-century of extensive university and commercial research done by Zinpro resulting in over 175 peer reviewed articles across species continues to demonstrate the superior, predictable results that Avitech’s customers in India have got accustomed to expect.