

# Are your animals reaching their full genetic potential? **Know the differences between minerals to maximize performance.**



**Many nutritionists are faced with a plethora of mineral choices with not much information on the differences between them. The differences between minerals have different results and should be understood in order to maximize profitability.**

## Frequently Asked Questions

### **What is an organic trace mineral (OTM)?**

Organic minerals are best described as trace minerals that are chemically bonded with a ligand (organic molecule), such as an organic acid, protein or amino acid. The ligand functions as a delivery vehicle to the small intestine for absorption, resulting in greater production benefits. Inorganic minerals, on the other hand, are absorbed less easily because, without a ligand, they are unprotected against many antagonisms in the gut like phytate, other minerals, sulfur and fiber during the travel to the small intestine, which hinder their ability to be absorbed. The most effective OTMs can avoid dietary antagonisms in the digestive system, and thus provide a more useable mineral for optimum animal performance. However, many OTMs available on the market still fail to provide these benefits.

### **Why is MINTREX® different?**

#### *Methionine Hydroxy Analog Ligand:*

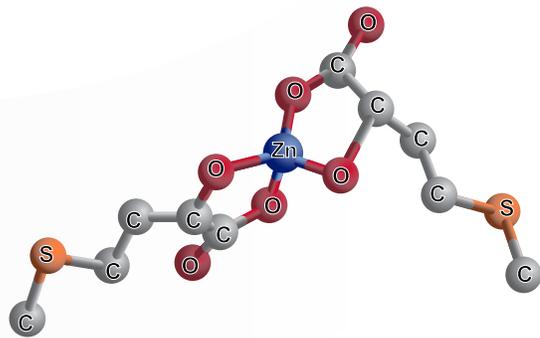
MINTREX® chelated trace mineral uses methionine hydroxy analog (HMTBa) as the

ligand, which brings substantial advantages in terms of gastric stability over other ligands such as amino acids, proteins or carbohydrates. It also provides the additional benefit of replacing a portion of the supplemental synthetic methionine needed in the diet, helping reduce costs while boosting performance.

#### *Defined Molecular Structure:*

If the molecular structure is not understood, how can one predict how it will function in the animal? Among the many OTMs, MINTREX is the only one with two ligands chelated to each mineral ion, as proven by the X-ray crystallography technique. This test gives an actual image of the molecular structure (Figure 1), and is a way to verify true chemical chelation. This unique structure maximizes gastric stability and allows consistent and unmatched results in animal production.

**Figure 1:** Metal Methionine Hydroxy Analog Chelate



Research done by the University of Missouri proved MINTREX has two ligands chelated to each mineral ion utilizing the X-ray crystallography method.

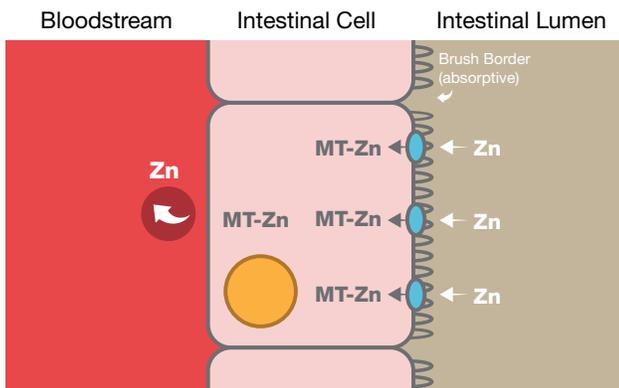
## What are the advantages of MINTREX®?

### Superior Bioavailability:

Feeding high amounts of a less bioavailable mineral will not meet the animal's requirements for optimum performance, because the multiple negative interactions in the gut decrease mineral absorption. Therefore, feeding not only the correct amount, but also a highly bioavailable trace mineral source is key for achieving optimal production. Several animal trials have shown the excellence of MINTREX® over other mineral sources in varying geographies and species.

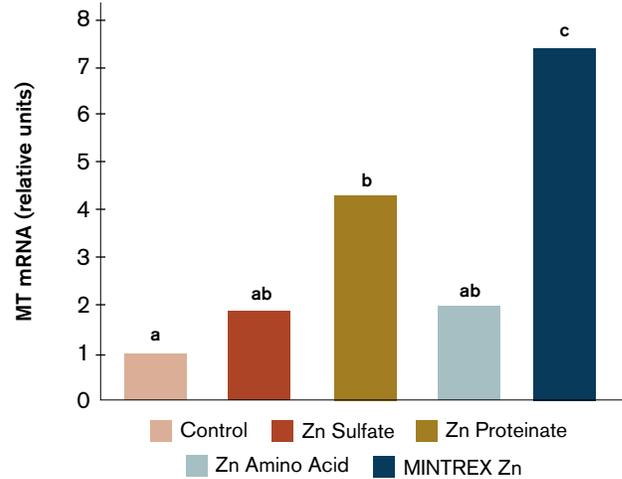
A broiler trial with leading OTM brands evaluated bioavailability using metallothionein (MT) assay (Richards et al., 2008). MT is the transporter of minerals through the small intestine lining cells. Greater MT mRNA expression indicates greater mineral absorption overall (Figure 2). Only MINTREX had significantly greater mineral absorption than sulfates (Figure 3).

Figure 2. Methallothionein (MT) Function



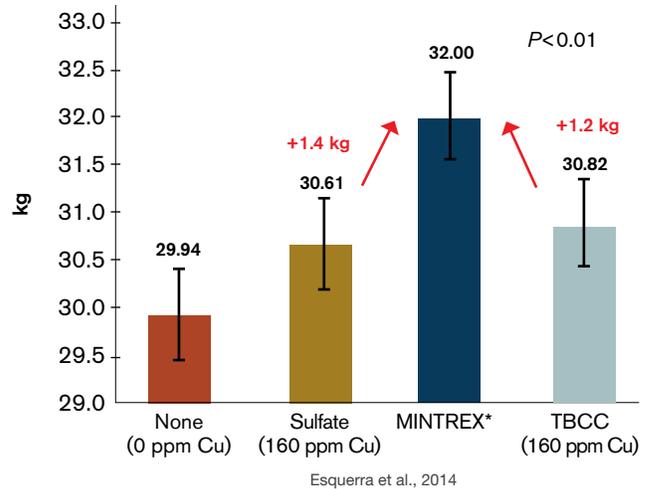
The more dietary minerals are absorbed, the more intestinal lining cells produce MT.

Figure 3. Zn Absorption Comparison Between MINTREX and Leading OTM Brands



Only MINTREX had Greater Zn absorption than Zn sulfate (Richards et al., 2008).

Figure 4. Piglet Bodyweight at Nursery Exit



MINTREX supplementation to piglets maximized bodyweight at nursery exit (70 day) compared to other mineral sources (Esquerria et al., 2014).

\*MINTREX Cu dietary inclusion was 150, 80 and 50 ppm for phase 1, 2 and 3, respectively

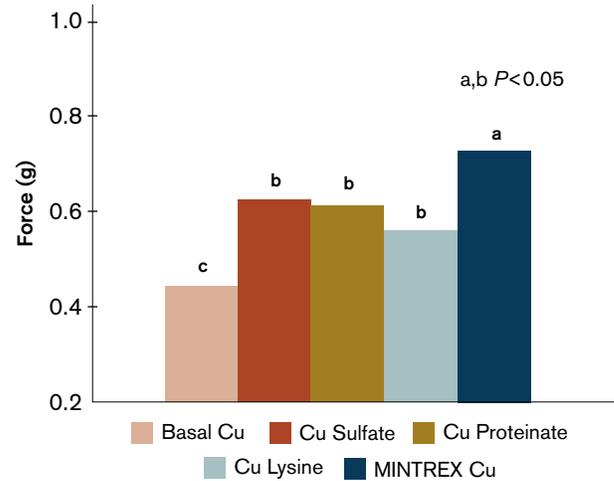
### Superior Animal Results:

When highly bioavailable trace minerals are fed, animals can perform to their full genetic potential, which ultimately leads to a more profitable operation. If mineral needs are not met due to underfeeding or feeding minerals with low bioavailability, the results are depressed performance, lower reproduction, depressed immune system, joint lesions, ill health and increased mortality, which altogether hurt profitability. Studies have shown the highly bioavailable MINTREX® helped support maximized bodyweight in piglets at nursery exit (Figure 4), supported broilers' gut health, even when challenged with coccidiosis (Figure 5), and helped to minimize oxidative stress in broilers (Figure 6).

### Summary

Trace minerals come in various forms and structures, but selecting the one to optimize animal performance is key. Inorganic trace minerals and OTMs of poor quality are not well protected through the digestive tract against the many antagonisms, which leads to poor animal performance. Greater absorption means more of the positive benefits of OTMs can be translated into end profitability and performance. MINTREX has been proven to have an advantageous molecular structure that enables superior bioavailability and superior animal end results when supplemented compared to other OTMs and ITMs. As producers consider OTMs for production, paying attention to molecular structure and bioavailability could enable animals to reach their full genetic potential and boost profitability.

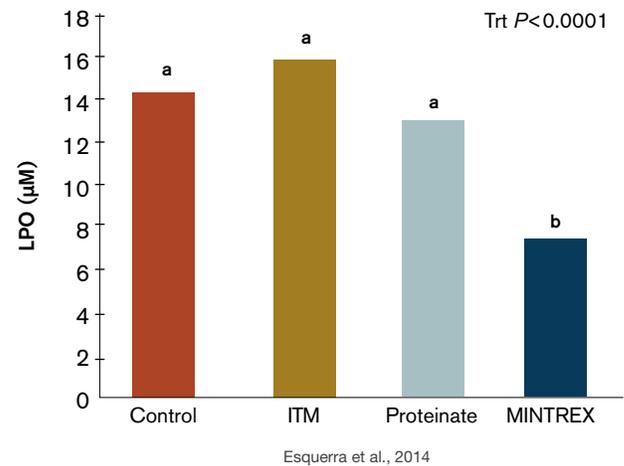
Figure 5. MINTREX Cu Effects on Gut Health in Broilers



MINTREX supplementation maximized gut health of birds challenged with coccidiosis, compared with leading OTM brands (Richards et al., 2010).

Gut health was assessed by ileum breaking strength.

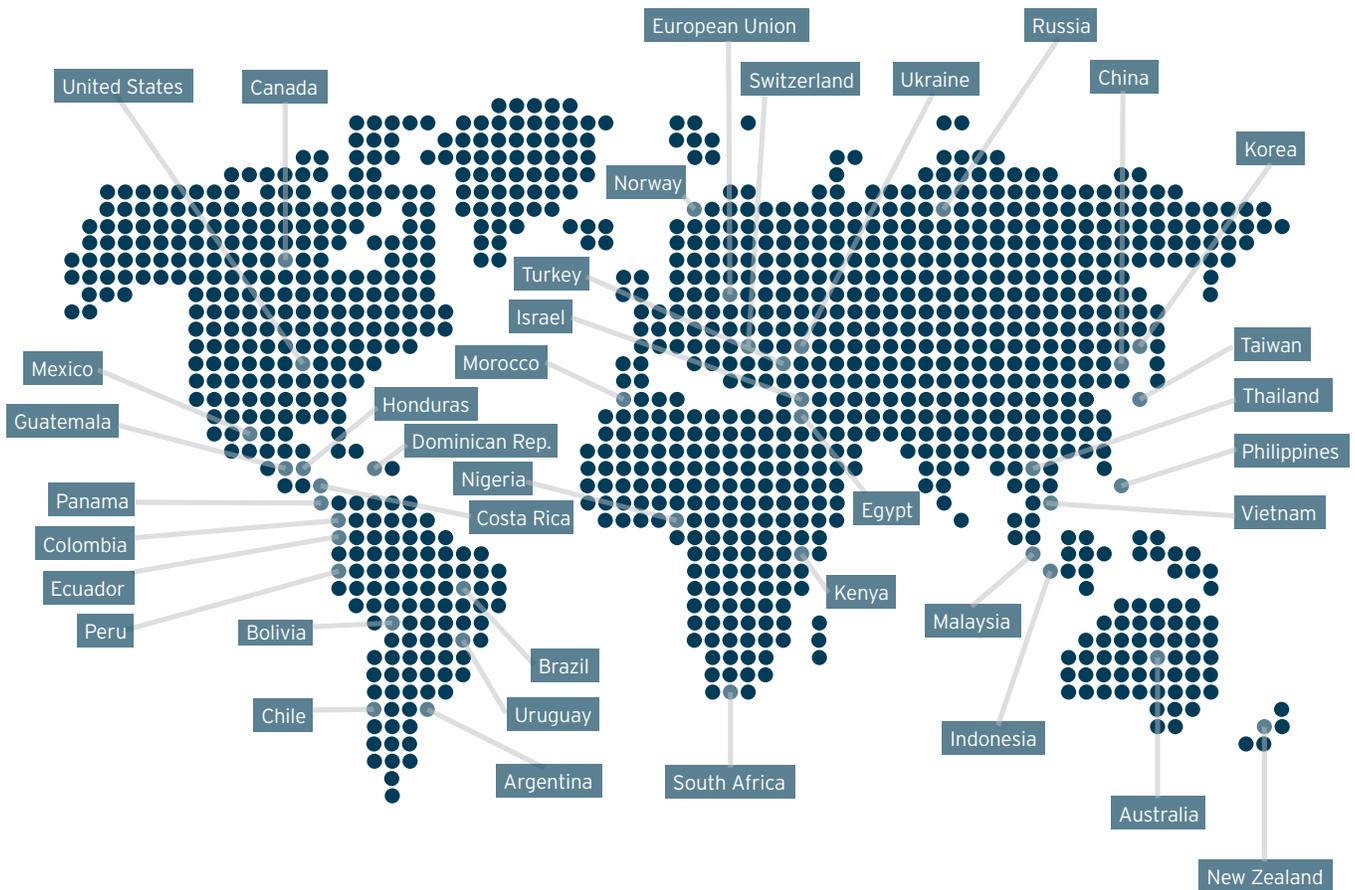
Figure 6. Mineral Effects on Oxidative Stress Levels in Broilers\*



MINTREX supplementation minimized oxidative stress in broilers compared to other mineral sources (Richards et al., 2010).

\*Oxidative stress assessed by measuring blood lipid peroxidation

# Global availability of **MINTREX**<sup>®</sup>



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Contact your Novus sales representative directly or call Novus Customer Service at 800.568.0088.

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