

Micronutrients

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TBCC Notes

Technical Information for Users of *Micronutrients TBCC*[®]

Blending Issues – Distribution of Copper in a Feed Mix

Micronutrients TBCC[®] (Tri-Basic Copper Chloride) is a neutral, inorganic salt of copper that has several advantages over the traditional sources of copper used in animal feed. One important advantage is improved blending, and therefore distribution in a feed mixture, while another is the ability of TBCC not to separate and concentrate in a mixture over time. Data from both commercial sources and research studies demonstrate this improvement.

Poultry Feed Mill Results

Recently, data was obtained from a large mill producing feeds for an integrated chicken production complex. This mill had a history of collecting Coefficient of Variation (C_v) data for copper distribution in their feed. A distinct improvement was noted after a switch to TBCC.

<u>Copper Source</u>	<u>N=</u>	<u>C_v</u>
Copper sulfate	31	13.5
TBCC	37	9.5

Research Study Results

The following results are from various studies done in different animal species. In each case, the experimental design was focused on animal growth performance and/or bioavailability of TBCC compared to copper sulfate. The data shows a clear pattern in consistency of copper reaching the animal. The difference between copper sources is due, in part, to better distribution in the feed.

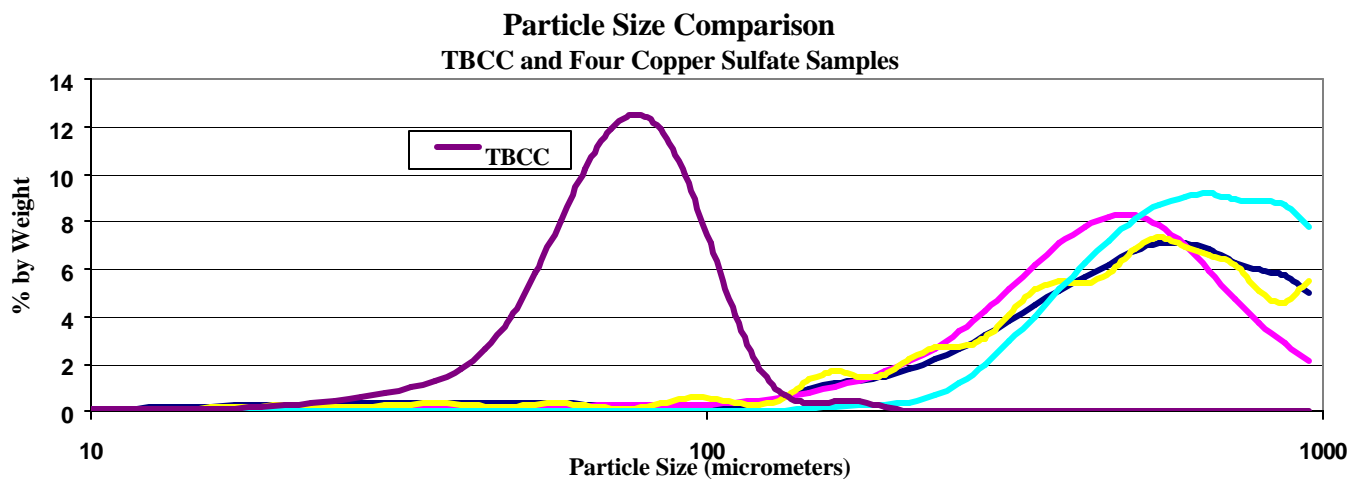
<u>Institution</u>	<u>Date</u>	<u>Animal Species</u>	<u>Copper Analyzed In</u>	<u>Copper Source</u>	<u>C_v at Copper concentration (ppm)</u>		
					<u>300</u>	<u>450</u>	<u>600</u>
U. of Florida	1994	Broilers	Feed; n = 3 ¹	Sulfate	7.51	5.77	23.0
				TBCC	1.45	1.13	2.85
			Liver; n = 7 ²	Sulfate	27.5	44.6	43
				TBCC	25.3	41.8	33

- Notes: 1. Each diet analyzed in triplicate.
2. Seven replicates each representing the means of analysis of four livers from each pen

<u>Institution</u>	<u>Date</u>	<u>Copper Analyzed In</u>	<u>Copper Conc. (ppm)</u>	<u>C_v vs. Copper Source</u>	
				<u>TBCC</u>	<u>CuSO₄</u>
PARC Institute	1999	Feed; n = 10	20	13.89	21.22
			188	9.46	16.61

Chemical and Physical Properties of TBCC

- **Particle shape** – TBCC particles are produced through a process of crystallization, creating a smooth, spherical shape that flows easily and disperses uniformly. Conversely, the majority of copper sulfate manufactured contains particles that are uneven and inconsistent.
- **Particle size** – TBCC has a particle size of 60 – 100 microns, optimum size for its specific density, enabling thorough and even distribution in a feed formulation, while copper sulfate particles range widely in size from about 400 – 1000 microns.
- **Particle size distribution** – Typically, greater than 90% of TBCC particles fall between 30 and 90 microns, providing a tight and consistent range that contributes to homogeneity in blending.
- **Hygroscopicity** – Copper sulfate is hygroscopic – it draws moisture from the air, causing lumping before, during and after mixing. TBCC is non-hygroscopic and thus is not affected by moisture or humidity, remaining smooth and free-flowing before, during and after mixing.



Overview

In attempting to feed animals correctly, a large number of components must be evenly distributed throughout a final mix. Consistency in achieving proper blending determines whether or not optimum nutrition is available for the animals on a daily basis. Copper, along with many other additives used at extremely low inclusion rates, presents three main challenges:

1. Providing final feed concentrations equal to formula specifications;
2. Achieving homogeneity in blending the formulation; and
3. Maintaining uniformity through transportation and conveying systems all the way to the animal.

TBCC can help optimize health and growth rates by ensuring that targeted copper levels actually reach each animal.