

ZnoNova Technical & Commercial Dossier

Technical Dossier: Super Zinc 5.3nm Nano Zinc Oxide for Antibiotic-Free Animal Nutrition

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1. Executive Summary & Industry Challenge

Modern poultry and swine producers face escalating pressure to eliminate antibiotic growth promoters (AGPs) while simultaneously complying with environmental mandates capping dietary zinc levels. - Traditional high-dose zinc oxide (typically **2,000–3,000 ppm**) fed to post-weaning piglets and young broilers leads to severe environmental heavy metal excretion in manure, potential heavy metal accumulation, and bacterial antimicrobial resistance. - Conventional coarse ZnO particles ($>1\text{--}10\text{ }\mu\text{m}$) exhibit poor solubility and mucosal bioavailability, requiring massive pharmacological overdosing to achieve gut astringency.

Super Zinc is a food-grade, water-dispersible 5.3 nm spherical nano-zinc oxide engineered to deliver superior biological efficacy at an ultra-low active inclusion rate of only **10 – 25 ppm** (10–25 g active Nano-ZnO per metric ton, corresponding to **100 – 250 g/MT** of the commercial 10% water-dispersible premix concentrate) in complete feed or drinking water.

2. Quantitative Comparison: Super Zinc vs. Conventional High-Dose ZnO

Parameter	Conventional Feed-Grade ZnO	Zinc Methionine / Glycinate	ZnoNova Super Zinc (5.3nm)
Particle Size	1,000 – 10,000 nm (1–10 μ m)	Molecular chelate	5.3 nm (Narrow mono-dispersion)
Dietary Inclusion Rate	2,000 – 3,000 ppm	80 – 120 ppm	10 – 25 ppm Active (100–250 g/MT 10% Premix)
Bioavailability Index	100% (Baseline)	125% – 140%	>450% (High mucosal cellular uptake)
Environmental Fecal Zinc Output	Severe (>1,800 mg/kg manure)	Moderate (~80 mg/kg manure)	Minimal (<15 mg/kg manure, >95% reduction)
Heavy Metal Impurities (Pb, Cd, As)	Often present near regulatory limits	Variable depending on ligand	Undetectable (SGS Food Testing Standard)
Pathogen Inhibition (E. coli)	Moderate via chemical astringency	Negligible	>99.9% bactericidal kill (SGS Certified)
Barn Ammonia Gas Reduction	Baseline (0%)	10% – 20%	96% Ammonia Reduction (Intertek Certified)

3. Empirical 38,000-Bird Commercial Broiler Field Trial

A rigorous commercial flock trial was conducted across 38,000 commercial broilers in an Antibiotic-Free (ABF) production environment:

Key Production Metrics (35-Day Cycle)

Metric	Control Group (Standard Feed)	Super Zinc Trial Group (15 ppm in Water)	Empirical Difference
Final Body Weight (g)	2,120 g	2,396 g	+13.0% Weight Gain (+276 g/bird)
Feed Conversion Ratio (FCR)	1.62	1.51	-6.8% FCR Improvement
Livability / Survival Rate (%)	95.2%	97.8%	+2.6% Survival Improvement
European Production Factor (EPEF)	454	506	+11.5% Overall Production Score
Foot-Pad Dermatitis Incidence	18.4%	3.2%	-82.6% Reduction (Dryer Litter)

Intestinal Histomorphology Findings:

- Duodenal villus height increased by **+24.2%** (1,180 µm vs 950 µm);
- Crypt depth decreased by **-14.8%**;
- Villus height-to-crypt depth ratio (V/C) improved from 4.13 to **6.02**, confirming enhanced nutrient absorptive surface area and tight-junction mucosal integrity.

4. Safety & Toxicology Profile (SGS Laboratory Verification)

Super Zinc is synthesized under strict quality controls and tested per international food-grade standards:

- **Lead (Pb):** < 0.05 mg/kg (Not Detected)
- **Cadmium (Cd):** < 0.01 mg/kg (Not Detected)
- **Arsenic (As):** < 0.05 mg/kg (Not Detected)
- **Mercury (Hg):** < 0.01 mg/kg (Not Detected)
- **Pathogen Control:** Verified > 99.9% kill against *Escherichia coli* (ATCC 25922) and *Salmonella enterica* (ATCC 14028).

5. Standard Farm & Feed Mill Dosing Protocol

1. Poultry Drinking Water System (Direct Dosing):

- Active Nano-ZnO Target: **10 – 25 ppm** in final drinking water (10–25 g pure active 5.3 nm Nano-ZnO per 1,000 liters of drinking water, or **100–250 g of the 10% water-dispersible premix concentrate** per 1,000 liters).
- Readily dispersible; zero sedimentation and will not clog nipple drinkers or water filters.

2. Commercial Toll Feed Mill Premix Inclusion:

- Active Inclusion Rate: **10 – 25 g/MT** of pure active 5.3 nm Nano-ZnO, which equals **100 g to 250 g per metric ton** of complete finished feed when using the commercial **10% water-dispersible premix concentrate**.
- Blend with carrier (corn starch, wheat middlings, or limestone) at a 1:10 pre-dilution ratio before adding to the micro-bin mixer.

6. Commercial Supply & Trial Packs

- **1.0 kg Evaluation Farm Trial Pack:** Supplied with measuring spoon and water-dispersion guide for 10,000–50,000 bird trials.
- **25.0 kg Heavy-Duty Moisture-Proof Bags:** For feed mill batching and large-scale commercial integrators.
- **Certificate of Analysis (CoA):** Provided per manufactured batch with ICP zinc content and heavy metal analysis.

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