

Advancing Sustainable Poultry Litter Management: Use of TERRA LIFE and MICRO-D for Commercial Poultry Operations

Executive Summary

TERRA LIFE (U.S.-sourced clinoptilolite zeolite) and MICRO-D (beneficial microbial blend) form a complete, natural, chemical-free litter amendment system that keeps ammonia below 25 ppm, eliminates the need for acidifiers, and turns spent poultry litter into a high-value, slow-release soil amendment.

Real-world commercial-scale results:

- Up to 60% average reduction in ammonia emissions
- Tennessee pilot house achieving <5 ppm for a full 47-day flock (80%+ reduction vs. control) measured using photoacoustic IR sensor
- 70% binding of leachable nitrogen and phosphorus
- Zero footpad dermatitis

After the one-time Year-1 loading dose, ongoing costs drop by one-half, making the system one of the most cost-effective long-term solutions available to commercial broiler growers.

The Challenge in Today’s Broiler Houses

Growers need a solution that is effective, bird-safe, cost-effective over multiple flocks. Modern broiler production routinely faces:

- Ammonia spikes above 50–100 ppm in untreated built-up litter
- Footpad dermatitis and respiratory stress that reduce weight gain and feed conversion
- Nutrient-rich litter that requires careful management
- Rising costs and labor from repeated applications of chemical acidifiers

How TERRA LIFE and MICRO-D Work Together

Product	Key Component	Primary Mechanism	Result
TERRA LIFE	Clinoptilolite zeolite (15.7 m ² /g surface area, high CEC)	Adsorbs NH ₄ ⁺ , traps moisture, inhibits nitrification	Immediate and persistent ammonia capture
MICRO-D	Bacillus spp., Pseudomonas fluorescens, Azotobacter, Paenibacillus + natural extracts	Accelerates uric acid breakdown, stabilizes pH 6.5–8.0, colonizes zeolite pores	Prevents new ammonia formation, suppresses pathogens

The synergy is critical: zeolite traps ammonia while beneficial microbes prevent its formation and out-compete pathogens such as Salmonella and E. coli. MICRO-D salmonella study conducted by integrator is available by request.

Commercial-Farm Results

- South Carolina Commercial Pilot (2024) – 60'×600' ft house, full flock
TERRA LIFE + MICRO-D; year-long monitoring using photoacoustic IR sensor
→ >50% ammonia reduction (8–14 ppm range)
→ Zero footpad dermatitis
- Tennessee Head-to-Head Pilot (2023) – Two identical 45'×550' ft houses
House 1: TERRA LIFE
House 2: Conventional chemical acidifier
→ House 1: <5 ppm ammonia for entire 47-day flock (80%+ reduction vs. control's 15–25 ppm)
→ House 2: 15–25 ppm average; significant ammonia-level fluctuations
→ TERRA LIFE house had 20% drier litter and 13–14% higher retained N, P, K, Ca; ammonia level monitoring using photoacoustic IR sensor

Both pilots used standard pine-shavings built-up litter and normal ventilation practices, conditions identical to most U.S. broiler houses. Ammonia concentrations measured using photoacoustic IR, which measures ammonia at bird level down to 1 ppm. See: TOMIGUNN BLACK BOX: <https://tomigunn.com/black-box/>

WAYPOINT SOIL DATA

Shelbyville, TN

Soil test reports for a farm located in Shelbyville, TN. Waypoint soil data reflect results following one flock, 47 days. There are two files:

- H1: TERRA LIFE only
- H2: No TERRA LIFE or MICRO-D

		2790 Whitten Road, Memphis, TN 38133 Main 901.213.2400 * Fax 901.213.2440 www.waypointanalytical.com		
LAND APPLICATION ANALYSIS				
Client: name removed for confidentiality	Grower: XXX Farms	Report No: 23-096-0118	Cust No: 01334	
Shelbyville, TN 37160	Shelbyville, TN 37160	Date Printed: 04/14/2023	Date Recd: 4/6/2023	
	PO:	Page:	1 of 3	

Lab Number : 93651 Sample Id : H1

Test	Analysis		Pounds Per Ton	
	As Received	Dry Basis	As Received	Dry Basis
Total Nitrogen (N) %	3.73	5.15	74.6	103
Ammonium Nitrogen (NH ₄ -N) %	0.84	1.16	16.8	23.2
Organic Nitrogen				
Phosphorus, P %	1.08	1.49	49.7 P ₂ O ₅	68.6
Potassium, K %	2.23	3.08	53.5 K ₂ O	73.9
Sulfur, S				
Magnesium, Mg				
Calcium, Ca				
Sodium, Na				
Iron, Fe				
Aluminum, Al				
Manganese, Mn				
Copper, Cu				
Zinc, Zn				
Boron, B				

Test	Result	Additional Information	Result
Moisture %	27.6	Type	Dry Basis
Solid %	72.4		

Additional Tests	Result
Digestion	Digested

Comments :
 RMMA Recommended Methods of Manure Analysis, Peters et al. 2002, In Press
 SW USEPA, SW-846, Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods, 3rd Ed.
 Current Revision

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Shelbyville, TN 37160	Shelbyville, TN 37160	Date Printed: 04/14/2023	Date Recd: 4/6/2023	
	PO:	Page:	3 of 3	

Lab Number : 93653 Sample Id : H2

Test	Analysis		Pounds Per Ton	
	As Received	Dry Basis	As Received	Dry Basis
Total Nitrogen (N) %	0.70	0.59	14.0	17.9
Ammonium Nitrogen (NH ₄ -N) %	0.55	0.70	11.0	14.1
Organic Nitrogen				
Phosphorus, P %	1.30	1.67	59.8 P ₂ O ₅	76.7
Potassium, K %	2.89	3.71	69.4 K ₂ O	88.9
Sulfur, S				
Magnesium, Mg				
Calcium, Ca				
Sodium, Na				
Iron, Fe				
Aluminum, Al				
Manganese, Mn				
Copper, Cu				
Zinc, Zn				
Boron, B				

Test	Result	Additional Information	Result
Moisture %	22.0	Type	Dry Basis
Solid %	78.0		

Additional Tests	Result
Digestion	Digested

Comments :
 RMMA Recommended Methods of Manure Analysis, Peters et al. 2002, In Press
 SW USEPA, SW-846, Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods, 3rd Ed.
 Current Revision

Oscar Ruiz

Scientific Validation

Research underscores the benefits of clinoptilolite zeolite as a poultry litter treatment and soil amendment:

- **Ammonia Control and Litter Quality**
Clinoptilolite reduces ammonia emissions by up to 60% in broiler houses via NH_4^+ adsorption.
<https://www.sciencedirect.com/science/article/abs/pii/S0960852497000059>

- University of Idaho trials demonstrate 14.4% NH_3 cuts and tripled nitrate retention.
https://objects.lib.uidaho.edu/etd/pdf/deHaroMartxED_idaho_0089E_11361.pdf
- **Air Pollutant Adsorption**
U.S. EPA (1998) – zeolite ion exchange for ammonia and odor compounds
<https://www.zeolite-products.com/wp-content/uploads/epazeolite.pdf>.
- **Nutrient Leaching Prevention**
Reduces nitrate leaching by up to 50% and preserves 20–40% more ammonia over short-term storage.
<https://www.ars.usda.gov/research/publications/publication/?seqNo115=309809>

<https://pmc.ncbi.nlm.nih.gov/articles/PMC4352482/>
- **Odor and VOC Control**
Iowa State University (2007) – reductions of up to 80% in indole and skatole at 5–10% rates.
<https://access.onlinelibrary.wiley.com/doi/pdf/10.2134/jeq2006.0052>
- **Soil Amendment for Nutrient and Water Efficiency**
Slow-release carrier with up to 50% water-holding capacity increase.
https://www.researchgate.net/publication/325544295_Zeolites_Potential_soil_amendments_for_improving_nutrient_and_water_use_efficiency_and_agriculture_productivity
- **Pathogen Control**
Modified clinoptilolite achieves >99% kill rates of E. coli; beneficial microbes suppress Salmonella.
<https://www.unbc.ca/newsroom/unbc-stories/research-indicates-magic-mineral-can-kill-bacteria-contaminated-water>

<https://www.frontiersin.org/articles/10.3389/fvets.2019.00157/full>
- **Zeolite Feed Supplement in Rose Acre Farm Layer Operations**
Two-year study showed 21–46% higher manure TKN and 23% lower aerosol ammonia. Study is available upon request.



Economic Advantage for Commercial Broiler Growers

The TERRA LIFE + MICRO-D system is designed as a one-time-plus-maintenance program:

- Year 1: Full loading dose establishes long-term ammonia capture and nutrient binding
- Year 2 and beyond: TERRA LIFE dose is cut in half; only MICRO-D is reapplied between each flock

Growers have no corrosion, no pH rebound, and no weekly re-applications. Additional revenue streams as slow-nutrient-release soil amendment accelerate payback.

- 15–20% higher litter resale value as premium slow-release soil amendment
- Improved weight gain, feed conversion, and tournament ranking
- Pursuing NRCS EQIP Eligibility

Contact TOMIGUNN for delivered-price quote and custom payback calculator based on your farm's location and current litter program. See TERRA LIFE label for application rates:

<https://tomigunn.com/wp-content/uploads/2024/06/TERRA-LIFE-label-6x8-in.pdf>

and MICRO-D, which is applied between each flock: <https://tomigunn.com/wp-content/uploads/2024/10/Micro-D-label-6x8-IN.pdf>

Conclusion

TERRA LIFE and MICRO-D deliver a natural, one-time-plus-maintenance system that keeps ammonia <25 ppm, eliminates footpad issues, and turns litter into a revenue-generating soil amendment. The technology has been extensively studied and proven in commercial pilots. Now is the time for real-world impact.

For more information or pricing, contact TOMIGUNN:

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 <https://tomigunn.com/contact/>

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