

Environmental Management Advancements in Ammonia Control in Poultry Litter

Historically, amendments used to control ammonia are based on specific commodity chemicals that have aided but are sometimes limited in controlling the complete ammonia cycle that produces odor. Litter Lock is capable of improving ammonia control and reducing energy cost for an extended grow out cycle.

Technological advancement in the broiler industry is the model of bringing combined innovations to agriculture. Improvements in genetics, nutrition and environmental management have been important keys to advancing efficient broiler production.

An environmental management approach combined with effective monitoring has led to new and larger houses. The new houses require fewer man hours of labor per bird with larger flock sizes.

The integrators and growers have recognized that effectively managing the environmental conditions reduces the cost of production and improves quality of the final product. They recognize a critical aspect of the process is that at each stage of the bird's growth and development there is a need to manage the "optimum temperature zone".

Equally important is to control excess carbon dioxide and ammonia. Environmental management provides both "optimum air quality" and an "optimum temperature zone" in which the bird makes the best use of feed energy for growth and keeping the flock healthy.

All producers know the cost of quality bedding material has risen and the availability has decreased. The problems that occur with litter re-use involve managing and dealing with pathogen carry over and utilizing strategies that break the disease conditions flock after flock. Litter Lock's innovative formula reduces disease conditions and aids in controlling pathogens and pests by more effectively controlling ammonia levels created during a grow out.



Litter Lock designed products are formulated based on a safe acid patent. The patent's unique buffering provides unprecedented extended ammonia control with safety for workers and poultry. The Litter Lock formulations are specifically designed to be consistent with findings from environmental studies for the use of recycled natural agricultural fertilizer and its relationship in controlling point source pollution including eutrophication of fresh waters.



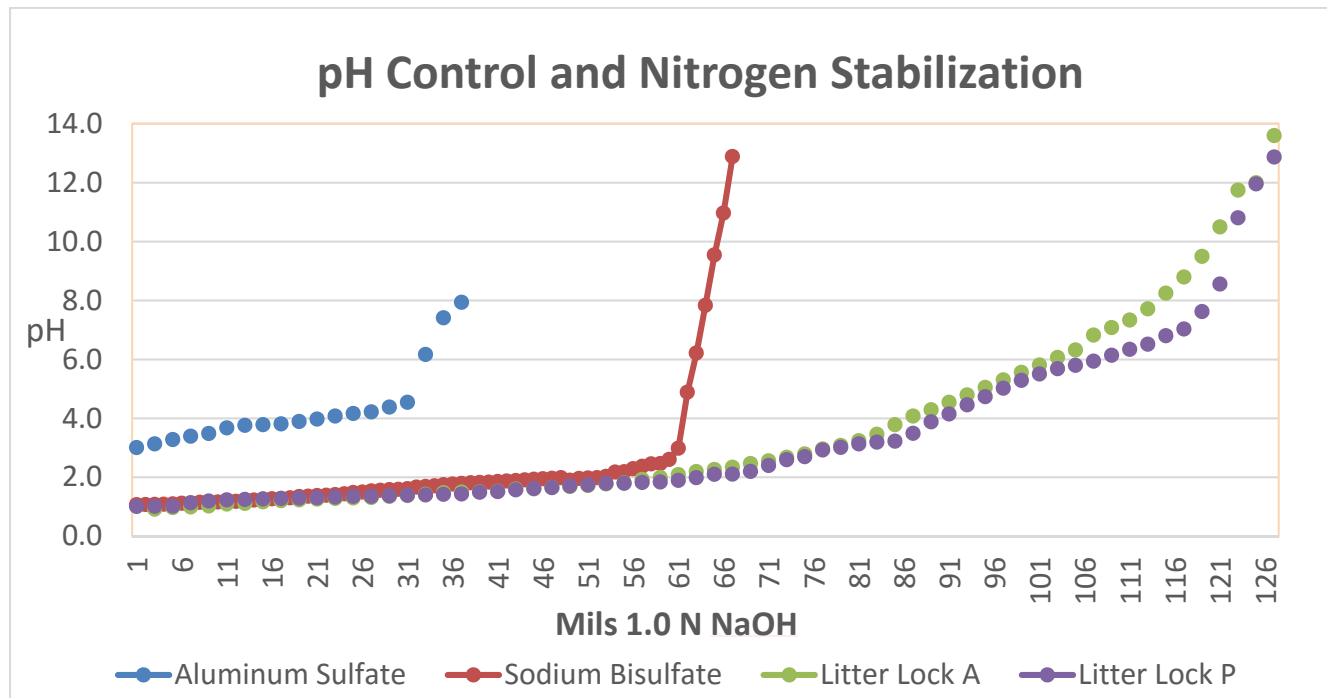
Litter Lock Product Options

Product	Patented, Safe and Buffered 4 Acid Blend	Maximizes Available Nitrogen as a Soil Amendment	Remark
Litter Lock A	Uses Aluminum Sulfate to Minimize Carryover Phosphates	Yes	Safe for watershed areas and grass crops.
Litter Lock P	Uses Phosphoric Acid to Maximize Available Phosphates	Yes	Safe for Row-Crops and areas where Phosphates are allowed.
Litter Lock Organic	All Organic Acid Formula	Yes	

Product Testing

Product Testing Comparisons:

Litter Lock 49.5 % active ingredients provide more effective buffering and resists change in pH. The Litter Lock design contains 4 acids in the proper proportion based on a patented blend that provides more H⁺ ions compared to all of the commercial products tested. Litter Lock A is used where phosphates are to be minimized as a soil amendment and Litter Lock P provides phosphates often needed in row crops.



Conclusion:

Litter Lock is at more than 3 times the pH control of aluminum sulfate (Alum) and 72% - 81% more effective at managing pH than sodium bisulfate (PLT). Litter Lock lasts longer by keeping the pH under control using 4 acid buffering. Different acid combinations are used in to provide the desired soil amendment NPK values.

- ✚ 100 lb/1000 sq. ft. **Alum Liquid** 48.5 % active is neutral (pH of 7.0) at **32** mils titrated with 1.0 N NaOH.
- ✚ 100 lb/1000 sq. ft. **PLT Dry** 99% is neutral (pH of 7.0) at **64** mils titrated with 1.0N NaOH
- ✚ 150 lb/1000 sq. ft. **Litter Lock A** 49.5 active is neutral (pH of 7.0) at **110** mils titrated with 1.0 N NaOH.
- ✚ 150 lb/1000 sq. ft. **Litter Lock P** 49.5 active is neutral (pH of 7.0) at **116** mils titrated with 1.0 N NaOH.

Both Litter Lock A and Litter Lock P proved to significantly reduce odor in the samples of poultry litter through pH reduction and nitrogen stabilization forming Ammonium, a form of nitrogen immediately available to plants.

Litter Lock provides unprecedented safety and improved ammonia control for the entire poultry growing process. Litter Lock more effectively reduces the ammonia odor, helps to prevent footpad lesions, stabilizes and preserves the NPK nutrient value while reducing corrosion of farm equipment with the addition of acid inhibitors.

In addition to odor control, the secondary reactions between the sulfate and phosphate ions (from the acids) with the ammonium ions (from the litter) provide two major components that are of value to the end user. Ammonium sulfate and ammonium dihydrogen phosphate are both commonly used as fertilizers. The compounds are mildly acidic in nature, which will lower the pH balance of the litter and buffer the soil to which the fertilizer is applied.

Innovation in Ammonia Control

Technological advancement in the broiler industry is the model of bringing combined innovations to agriculture. The industries efforts to improved genetics; nutrition, and environmental management have been important keys to advancing efficient broiler production.

The environmental management approach combined with effective monitoring has led to new larger houses. These new houses maximize the man hours of labor per bird, combined with larger flock sizes.

It is well established that effectively ventilating the house allows the required improvements in environmental conditions that reduces the cost of production.

A critical aspect of the process has been addressed by the integrators and growers that at each stage of the bird's growth and development there is a need to better manage the "optimum temperature zone".

Success is based on more than temperature and humidity management, it is equally important to control excess CO₂ and NH₃ (ammonia). Environmental management provides optimum air quality and "optimum temperature zone" in which the bird makes the best use of feed energy for growth.

Historically, amendments based on specific commodity chemicals have aided in the control of ammonia. Litter Lock is capable of providing extended ammonia control. Amendment's also aids in controlling pathogens and pests, while reducing ventilation cost for a full grow out. Litter Lock is the next step in extended environmental advancement for controlling ammonia and the environment for pathogens.

All producers know the cost of quality bedding material has risen while the availability has decreased. The problems that occur with litter re-use involve managing and dealing with pathogen carry over and utilizing strategies that break the disease conditions flock after flock. Litter lock is an chemical innovation used to maintain air quality effectively controlling ammonia and pathogens levels during a grow out.

Litter Lock designed products are formulated based on a safe acid patent. The patent's unique buffering provides unprecedented extended ammonia control with safety for workers and poultry.

The Litter Lock formulations are specifically designed to be consistent with environmental studies for the use of recycled natural agricultural fertilizer and its relationship in controlling point source pollution including eutrophication of fresh waters.

Innovation in Ammonia Control

Introducing Litter Lock, Available in 3 Product Options

Litter Lock P

Litter Lock P is formulated with phosphoric acid as one of the 4 acids meeting the safe acid patent design. Litter Lock P maximizes ammonia NH_3 reversion to ammonium NH_4 for a full grow out cycle. Litter Lock P maintains maximum available soluble phosphorous for plant growth. Litter Lock P is ideal for recycling as a soil amendment when placed in row crop field application where organic matter and additional phosphate is required to meet plant nutrient requirements.

Litter Lock A

Litter Lock A is formulated with liquid alum as one of the 4 acids meeting the safe acid patent design. Litter Lock A maximizes NH_3 reversion to ammonium NH_4 for a full grow out cycle. Litter Lock A aids in locking up the soluble phosphorous levels to protect ground water. Litter Lock A is ideal for recycling as a soil amendment when placed in grass crop field application or where maximum nitrogen is desired and controlling the soluble phosphate is required to meet the plants organic needs and nutrient requirements. Litter Lock A is important considering its relationship in controlling point source phosphate pollution including eutrophication of fresh waters.

Litter Lock Organic

Litter Lock Organic is formulated with a combination of 4 Organic acids meeting the safe acid patent design. Litter Lock Organic formulation is complying with natural synthesis meeting the approved chemical requirements specified in CFR Title 7, Agriculture National Organic Program. The Organic acids were selected based on fermented not chemically synthesized Organic acids