

How to Reduce Ammonia Emission from Turkey Houses

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Species:	Turkeys.
Use Area:	Poultry Litter
Technology Category:	Litter Amendment.
Air Mitigated Pollutants:	NH ₃

Description:

Intensive and sustainable animal production is very crucial for agricultural based economies. Gaseous ammonia is a byproduct of animal production that has to be managed for the well being of the animals and the environment. Various chemical amendments have been used to minimize ammonia gas release (Arogo et al., 2001) Excessive ammonia level compromise bird health and the health and safety of workers in the poultry environment (Carlile 1984). The handling and storage of manure generated from turkeys production buildings has become a major concern and in some cases a major expense for producers. The application of large amounts of turkey litter to fields is thought to contribute to odors and other environmental concerns. Treatment methods such as composting can be used to reduce the odors, pathogenic bacteria and insect eggs thereby improving the economic value of the final material. However, at present only a small percentage of turkey producers compost their manure. Composting is a biological process that requires the carbon nitrogen ratio, moisture, microbial populations and aeration all be in the proper proportions to initiate the aerobic process and produce an acceptable end product. Poorly composted turkey litter does not reach and maintain high temperatures and thus requires much more time to complete the process. Slow, extended compost periods also tend to result in higher concentrations of offensive odors and ammonia. In most manure composting management plans, the microbial population is secondary and receives little or no attention. However, the types and numbers of microorganisms determine the extent and efficiency of the compost process which significantly influences the characteristics of the end product.

Mitigation Mechanism:

Gram negative bacteria are highly prevalent in poultry litter and waste. These Gram negative bacteria convert uric acid in the poultry waste to make harmful ammonia. Application of MicroTreat P[®] to poultry litter lowers the gram negative counts in the litter and poultry waste. The reduction in Gram Negative bacterial population helps in nitrogen retention and reduced ammonia production. MicroTreat P[®] is a biological litter treatment product that utilizes the activity of specifically selected bacteria to control the gram-negative microorganisms in poultry litter.

Applicability:

Ammonia reduction interventions using microbial products are suitable and safe in all animal production systems. It is also specially suited for conventional turkey production facilities that are computer controlled to allow for air exchange. MicroTreat P[®] is effective in reducing the level of gram negative bacteria present in turkey litter. Gram negative bacteria are known to have detrimental effects on bird health due to the fact that many pathogenic bacteria affecting turkeys are classified as gram negative. Besides this direct effect upon bird health, gram negative bacteria also indirectly reduce bird performance by adversely impacting the bird's environment. Gram negative bacteria have the ability to break down the uric acid excreted by turkeys and convert it to the end product of ammonia. It is well documented, high ammonia levels decrease bird health and performance and also can be a health hazard for farm workers. Regulations restricting ammonia emissions are being worked on by EPA and by many states. Because MicroTreat P[®] reduces the poultry litter gram negative bacterial population, there are less gram negative bacteria present to break down the uric acid and produce ammonia. MicroTreat P[®] is applied to the litter either directly or through the drinking water. The timing of the application is at the beginning of the production phase, brooder or finisher, and is a one time application for each phase.

Research with MicroTreat P[®] has consistently shown a 50-90% reduction in total gram negative bacterial litter levels. The reduction of gram negative bacteria has been correlated in an improvement in production cost of \$0.0055 / lbs. This cost savings has been demonstrated in paired house testing up to large field trials and entire integrator usage that resulted in 1000's of flocks being tested. The reduction of ammonia with the use of MicroTreat "P" has been well documented within several poultry integrators. MicroTreat P[®] use typically results in a 40-60% reduction of in-house ammonia levels.

Limitations:

There are no known limitations of this technology. The bacterial organisms are listed as GRAS (Generally Regarded As Safe). Unlike chemical amendments, microbiological additives work in the turkey production environment reducing the cumulative ammonia emission.

Cost:

MicroTreat P[®] comes in foil packs and is concentrated for convenient use. The application rate is based on type of poultry and fecal material produced. Typically the treatment costs are as follows: Turkeys \$0.055 (40 pound tom) and \$0.028 (16 pound hen).

Implementation:

MicroTreat P[®] is a litter additive that utilizes the enzyme producing activity of specifically selected strains to enhance live performance, control manure decomposition and thus reduce ammonia and odors associated with the storage of turkey manure. The MicroTreat P[®] strains were selected on their ability to produce proteolytic and amylolytic enzymes. Turkey trials have consistently demonstrated a 40-60% reduction in the level of ammonia in production facilities.

Technology Summary:

Future Environmental Regulations will force the animal production industry to find new interventions that will provide improvements in the decomposition of stored manure. A by product of the decomposition of stored manure is ammonia. Ammonia will play a key role in the regulation of confined animal facilities. Commercial products will need to be targeted to lower the level of ammonia in the confined animal facilities and more importantly, lower the overall amount of ammonia that is generated at each facility. Regulations will be based upon total production of ammonia from each facility. In addition, regulations will also include other compounds (gases, odors) emitted from confined animal feeding operations. Agtech possess a portfolio of products and bacterial species (Bacillus and Propionibacteria) that alter ammonia formation and have efficacy in the area of ammonia and odor production.

References

Arogo, J., P.W. Westerman, A.J. Heber, W.P. Robarge, and J.J. Classen. 2001. *Ammonia in Animal Production*. ASAE Paper No. 014089, Sacramento, CA.

Carlile, F.S. 1984. *Ammonia in Poultry Houses: A Literature Review*. World's Poultry Science Journal. 40 : 99-113.

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