

USDA
NATURAL RESOURCES
CONSERVATION SERVICE

DELAWARE CONSERVATION
PRACTICE STANDARD

**AMENDMENTS FOR TREATMENT
OF AGRICULTURAL WASTE**

CODE 591
(Reported by Animal Units)

DEFINITION

This practice treats manure, wastewater, runoff from lots or other high intensity areas, and other wastes with chemical or biological additives.

PURPOSES

To alter the physical and/or chemical characteristics of the waste stream to facilitate the implementation of a waste management system to:

- Improve poultry health by decreasing ammonia volatilization.
- Increase the proportion of nitrogen in the manure, making the manure a more valuable and balanced fertilizer.
- Reduce the ventilation needed to maintain proper indoor air quality and conserve heating and electrical energy cost.
- Protect the water quality by reducing the quantity of litter and the need for frequent litter removal and reduction in phosphorus solubility.

**CONDITIONS WHERE PRACTICE
APPLIES**

This practice applies where the use of a chemical or biological amendment will alter the physical and chemical characteristics of the waste stream as a part of a planned waste management system. This practice applies to

those amendments added to the waste stream after excretion.

This practice may be used to treat poultry litter where high ammonia emissions are a water and air concern. This practice may also be used in poultry houses where the continuous reuse of litter produces high ammonia and unfavorable growing conditions.

This practice may be used to reduce leaching and runoff of soluble phosphorus.

CONSIDERATIONS

The use of amendments to suppress ammonia volatilization from litter will reduce emissions from poultry facilities. In these confined spaces, they may improve air quality for poultry living and humans working in this environment. Additionally, some amendments suppress bacterial pathogens in litter and may improve poultry health. With the reduction in ammonia in houses, the ventilation may be reduced resulting in potential energy savings.

The use of an amendment may alter the composition of the waste stream. The use of amendments should be limited to situations where impacts of the altered waste stream on other aspects of the planned system have been identified.

Some amendments have been shown to effectively impact multiple purposes of this standard and other aspects of a livestock production operation. Preference should be given to amendments with the greatest environmental and economic benefit.

The use of amendments to reduce ammonia and other emissions from manure in confined spaces may allow altered ventilation strategies at an appreciable energy savings. The reduction of ammonia emissions will also increase the proportion of nitrogen in the manure.

The selection of amendments should be mutually agreed by all contractual parties and compatible with the intended end use of the litter.

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

CRITERIA

Criteria Applicable to All Purposes

Refer to Table 1 for a list of acceptable amendments. The amendments address the rate, timing, method, and safety concerns of the products.

Use of amendments as a part of a waste management system shall be planned and implemented to meet all federal, state, and local laws, rules, and regulations.

Products to be used as manure amendments shall be labeled or accompanied by instructions contain-ing the following information as a minimum:

1. Active ingredients and their percentage of the whole. Proprietary terminology may be used as long as the actual chemical and/or biological names are included.
2. The purpose(s) for which the amendment is intended.
3. Recommended application rate(s) to achieve the intended purpose(s).
4. Application timing and methodology to optimize the effectiveness of the amend-ment.
5. Incorporation requirements.
6. Special handling and storage requirements for the amendment.
7. Any safety concerns relating to the use of the amendment and recommended measures to overcome the safety concern, including any required personal protective equipment.

Validation of Product. The specific rate, timing, and application methodology of an amendment to achieve a needed level of treatment addressing a specific purpose must be documented by the University of Delaware animal specialist or other independent research entity acceptable to the NRCS. Documentation from peer-reviewed journals is preferable. The effectiveness of the amendment under different climatic factors shall be included in the

documentation, or if there is no difference in effectiveness, the documentation shall so state. Potential adverse impacts of the amendment on the environment shall also be identified in the documentation. It shall be the responsibility of the amendment provider to furnish the documentation to the NRCS.

SPECIFICATIONS

Plans and specifications for this practice shall be prepared in accordance with the previously listed criteria. Plans and specifications shall contain sufficient detail to ensure successful implementation of this practice. Documentation shall be in accordance with the section “Supporting Data and Documentation” in this standard.

OPERATION AND MAINTENANCE

An operation and maintenance (O&M) plan shall be developed and reviewed with the operator and owner prior to implementation of the practice. The O&M plan shall be consistent with the purposes of the practice, safety considerations, label directions, and other instructions provided by the vendor.

The O&M plan shall detail all safety precautions necessary when handling the specific chemicals or biological amendments to be used.

The O&M plan shall provide for record keeping in sufficient detail to document the product used, the date, location, rate, and method of application.

SUPPORTING DATA AND DOCUMENTATION

The following is a list of the minimum data and documentation to be recorded in the case file:

1. Location of the practice on the conservation map.
2. Assistance notes. The notes shall include dates of site visits, name or initials of the person who made the visit, specifics as to alternatives discussed, decisions made, and by whom.

3. The name of the amendment, the purpose(s) for its use, and the product rate and form.
4. Application methodology, including timing, equipment mixing, instructions, etc.

REFERENCES

1. Agricultural Waste Management Field Handbook, April 1992.
2. Cotterill, O.J. and A.R. Winter. Some Nitrogen Studies of Built-Up Litter. *Poultry Sci.* 32:365-366. 1953.
3. Moore. Symposium: Focus on Phosphorus. pg. 696-698.
4. G.W. McWard, D.R. Taylor. Acidified Clay Litter Amendment, *Journal of Applied Poultry Research*. 9:518-529, 2000.
5. Kristin E. Staats, Yuji Arai, Donald L. Sparks. Aluminum Amendment Effects on Phosphorus Release and Distribution in Poultry Litter–Amended Sandy Soils, *Journal of Environmental Quality* 33: 1904-1911. 2004.
6. Moore, P.A., T.C. Daniel, D.R. Edwards and D.M. Miller. Evaluation of Chemical Amendments to Reduce Ammonia Volatilization from Poultry Litter. *Poultry Sci.* 75:315-320. 1996.
7. Moore, P.A., T.C. Daniel, and D.R. Edwards. Reducing Phosphorus Runoff and Improving Poultry Production with Alum. *Poultry Science*. 78:692-698, 1999.
8. Pope, M.J. and T.E. Cherry. An Evaluation of the Presence of Pathogens on Broilers Raised on Poultry Litter Treatment – Treated Litter. *Poultry Sci.* 79:1351-1355. 2000.
9. Terzich, M. Poultry Litter Treatment – PLT. Proceedings to the 1998 National Poultry Waste Management Symposium. pp. 108-116.
10. USDA, NRCS. Agronomy Technical Note No. 3. Treating Poultry Litter with Aluminum. May 6, 2003.
11. Worley, J.W., M.L. Cabrera and L.M. Risse. Reduced Levels of Alum to Amend Broiler Litter. *Applied Engineering in Agriculture*. 16:441-444, 2000.

Table 1 – Poultry Acidifying Litter Amendments Choices¹

Product Trade Name/Active Ingredient-Chemistry	PLT/ Sodium Bisulfate- NaHSO ₄	Poultry Guard/ Acidified Clay- 46% H ₂ SO ₄	Al ⁺ Clear/ Dry Alum- Al ₂ (SO ₄) ₃ -14H ₂ O	Liquid Al ⁺ Clear A7/ Acid + Liquid Alum- 7% H ₂ SO ₄ + 36% Al ₂ (SO ₄) ₃ -14H ₂ O
Container Size	50 lb bag, 2000 lb super sack	50 lb bag, 1000 and 2000 lb super sacks	50 lb bag, 2000 lb super sack, and bulk	bulk
Purpose	Decrease litter pH, bind ammonia	Decrease litter pH, bind ammonia	Decrease pH, bind ammonia and soluble phosphorus	Decreases litter pH, bind ammonia and soluble phosphorus
Rates of application²	93 lbs per 1000 sq ft	93 lbs per 1000 sq ft	100 lbs per 1000 sq ft	25 gal per 1000 sq ft
Time of application in brood and growout chambers	Apply to whole house as close to chick placement as possible and not more than 1-day prior. For split applications, apply in off-chamber as close to bird migration as possible. Can be applied in the presence of birds.	Apply as close to chick placement as possible or movement to growout chambers and not more than 3 days prior. For split applications, apply one day before movement into off-chamber while birds are separated by curtains.	Apply whole-house 1-7 days before chick placement. Apply 5-7 days for dry litter and consider liquid acid alum for very dry litter.	Apply whole-house 1-5 days before chick placement, 1-2 days if wet litter, 3-5 days if dry litter. Cannot be used when birds are in the house.
Method of application	Spinner or drop spreader, no incorporation	Spinner or drop spreader, no incorporation	Spinner or drop spreader, incorporate top 1 inch if dry litter	Certified applicator, no incorporation
Safety concerns	Wear gloves, goggles, particle mask, and clothing to protect exposed skin	Wear gloves, goggles, particle mask, and clothing to protect exposed skin	Wear gloves, goggles, particle mask, and clothing to protect exposed skin	Wear gloves, goggles, particle mask, and clothing to protect exposed skin
Special handling/storage	Hygroscopic, store in dry location.	Hygroscopic, store in dry location. DOT – HAZMAT	Hygroscopic, store in dry location.	Requires special equipment and trained applicator. DOT - HAZMAT

¹Other products with ammonia and/or phosphorus-binding efficacy may be added when scientific documentation becomes available.

²Rates adjusted to provide same acid strength (McWard and Taylor, 2000). One gallon of Al⁺ Clear A7 has acid content as 5.4 lbs of dry Al⁺ Clear (General Chemical).