Research Notes

Arm & Hammer Animal and Food Production

CERTILLUS Eco Alters Nutrient Composition Related to Odors in Swine Manure Storage Systems

CERTILLUS™ Eco contains scientifically selected strains of *Bacillus subtilis* and *Bacillus licheniformis* for use in swine production to reduce ammonia emissions and increase nitrogen retention in manure.

STUDY OVERVIEW

- A field study[1] was conducted to determine the effect of CERTILLUS Eco on nutrients and odor-causing compounds in deep pit swine manure storage systems.
- Deep pit manure storage systems were sampled from 217 grow-finish swine barns in the Midwest—141 of the samples were from barns in which the pigs were fed CERTILLUS Eco and 76 of the barns sampled were from control barns housing pigs that were not fed CERTILLUS Eco.
- CERTILLUS Eco was administered in the feed of grow-finish pigs to provide 1 x 10^5 CFU/g feed, whereas pigs in control barns were fed corn/soybean meal-based diets typically formulated for commercial swine production with dried distillers grains with solubles (DDGS) inclusion ranging from 8% to 18% of the diet.
- Manure samples were obtained from each pit by sampling the entire depth of the manure storage pit with a 6'-long PVC sampling rod.
- Manure nutrient and volatile fatty acids (VFA) analyses were conducted by A&L Great Lakes Laboratories (Fort Wayne, IN) using accredited methodologies.

RESULTS

- CERTILLUS Eco reduced (P<0.01) dry matter content, neutral detergent fiber (NDF), acid detergent fiber (ADF) and viscosity of swine manure pit samples (Table 1), indicating less solids buildup and easier pump-out ability.
- The nitrogen content was greater (P=0.10) in swine manure pit samples from barns housing grow-finish pigs fed CERTILLUS Eco, specifically the aqueous ammonia-bound nitrogen (ammonia N) and nitrogen bound to fiber (ADF_N), indicating CERTILLUS Eco results in greater nitrogen retention in the manure (Table 1).

TABLE 1. SOLIDS, NITROGEN AND FIBER COMPOSITION IN SWINE MANURE PIT SAMPLES

	CONTROL	CERTILLUS ECO	SE	P =
Dry Matter, %	8.55	6.57	0.16	0.001
Viscosity, cps	400.0	213.7	13.5	<0.001
Nitrogen (%)				
Total N	7.64	8.80	0.36	0.430
Ammonia N	5.81	8.19	0.16	<0.001
ADF_N	0.56	0.75	0.04	0.106
Fiber, %				
Crude fiber	12.64	11.26	0.22	0.123
NDF	39.70	33.64	0.59	0.001
ADF	17.94	15.81	0.20	<0.001

- Fat content and odor-causing volatile fatty acids were numerically reduced in swine manure pit samples from barns housing pigs fed CERTILLUS™ Eco (Table 2).

CONCLUSIONS

- Shifts in nutrients present from undigested feed alter the microbial ecology in swine manure pit storage systems by changing substrate availability for microbial growth.
- Microorganisms present in manure storage systems utilize substrates, such as volatile fatty acids, as a nutrient source for growth.
- Volatile fatty acids are the odor-causing compounds associated with swine manure and reductions in the quantity of these compounds reduces odor intensity in hog operations.

TABLE 2. FAT AND VOLATILE FATTY ACID (VFA) COMPOSITION (%) IN SWINE MANURE PIT SAMPLES

	CONTROL	CERTILLUS ECO	SE	*P* =
Crude fat	11.54	10.12	0.32	0.473
Total VFA	0.50	0.42	0.03	0.297
Acetate	0.34	0.29	0.02	0.268
Propionate	0.14	0.11	0.01	0.847
Butyrate	0.01	0.01	0.001	0.714
Iso-Valerate	0.02	0.02	0.004	0.110

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1 Davis ME, et al. Effect of a *Bacillus*-based direct-fed microbial feed supplement on growth performance and pen cleaning characteristics of growing-finishing pigs. *J Anim Sci* 2008;86:1459-1467.