Improvement in Fertilizer Value of Manure Treated with Microbe-Lift Bacterial Consortiums

Background

Biotechnology products from Ecological Laboratories are widely used in the livestock industry for the treatment of hog, dairy farm, and other organic waste. The product is a blend of naturally occurring bacteria and other natural compounds selected for their ability to break down organic waste, including volatile solids, such as those which are found in livestock manure. Among the benefits of product use are improved digestion of solids, improved fluid characteristics of manure making it more pumpable and easier to handle, reduced crust formation, and enhanced fertilizer value of the treated manure. These benefits are well documented. In addition, there is documented evidence that the bacteria in the Microbe-Lift Hog Plus, DFP, and IND once inoculated into the soil through the manure, will lead to better nutrient uptake and enhanced crop yield, further enhancing the benefit. This in-field report will deal primarily with the benefits of enhanced fertilizer value of the treated manure.

To demonstrate the improvement in fertilizer value for manure treated with Microbe-Lift biotechnology products, two operations, both with single wide hog finishing barns were selected by Ohio State University MNM Specialist, Kendall Stucky serving Crawford, Sandusky, Seneca, and Wyandot SWCD. The barns selected were at a Seneca County farm and Crawford County farm, respectively.

Seneca County Farm

At the Seneca County Operation, the additive was applied in the west barn, which was built in 2001, starting in May 2013. The east barn, built in 1998, was not treated. The product was applied as follows:

Day 1	8 gallons
Day 7	2 gallons
Day 14	2 gallons
Maintenance	2 gallons monthly

All pits were half full when the product was applied. The Seneca farm had good agitation before pumping. Samples were taken from the pits and analyzed for ammonia nitrogen (NH_4^+), organic nitrogen (O-N), phosphate (P_2O_5), potassium(K_2O) and the average reported per 1,000 gallons of manure. This data was

summarized and a comparison was made for the average values of the samples for the indicated parameters. Results for the Seneca farm appear in Table 1. All values are reported in lbs. per 1,000 gallons of manure. The biggest difference was in the ammonia nitrogen levels, where there was an average increase of 3.9 lbs. per 1,000 gallons.

Average of samples	Treated barn	Non-treated barn	Difference in treated vs non-treated	Difference in Value per 1000 gallon
NH4	33.57	29.72	3.84	$1.62
O-N	6.85	6.89	(.04)	$(.008)
P205	22.42	19.85	2.57	$1.34
K20	32.99	30.1	2.89	$1.01
Moisture	95.7	97.	(1.3)	3.96

Table 1 – Comparison of Fertilizer Values of Manure for Treated and Non-Treated barn at Seneca farm

per 1,000 gallons. Organic nitrogen levels were the same while P_2O_5 and K_2O values increased by 2.5 lbs per 1,000 gallons and 2.9 lbs. per 1,000 gallons, respectively.

Based on current fertilizer costs this equated to an increase in value of the manure as fertilizer of $3.96 per 1,000 gallons of manure.

Crawford Farm

In the Crawford County Farm application, the product was applied at the same rates as in the Seneca farm application. The Crawford farm did not agitate the contents of the pit. Results from the Crawford farm appear in Table 2. The increase in ammonia nitrogen was not as great as at the Seneca farm, but the organic nitrogen levels were higher offsetting most of the reduction in ammonia nitrogen levels.

This may vary from site to site depending on the stage of digestion, manure composition, agitation, etc. The important thing is that in both cases the combination of ammonia nitrogen and organic nitrogen was higher in both cases.

Average of samples	Treated barn	Non-treated barn	Difference in treated vs non-treated	Difference in Value per 1000 gallons
NH4	24.4	23.93	.55	.233
O-N	7.12	4.995	2.13	.297
P205	11.06	7.73	3.33	1.73
K20	22.29	23.32	(1.03)	(.36)
Moisture	98.14	98.15	(.01)	1.90

Table 2 – Comparison of Fertilizer Values of Manure for Treated and Non-Treated barn at Crawford farm

For the Crawford farm sample, the potassium levels in the treated pit were slightly lower than in the untreated pit while the phosphate levels showed a nice increase of just over 3 lbs. per 1,000 gallons of manure.

Economic Analysis

There was an average cost to the farmer of approximately $26.00 per gallon. With the initial inoculation the cost for the first year's of use in the pits involved in this study was approximately $830. After the first year, assuming continuous use and no requirement for a future inoculation phase dosing the maintenance costs would be approximately $624 per year.

Based on these costs, **in the Seneca barn using an average manure production and application rate of 450,000 gallons per year, the increased value of the fertilizer from the treated pit would be $1,782.** This represents a return on investment (ROI) of slightly more than 2 to 1, based on first year costs, and almost 3:1 based on Maintenance costs.

For the Crawford farm, the increased fertilizer value increase, again assuming comparable product cost, and 450,000 gallons of manure hauled showed an increase in fertilizer value of $855 at current fertilizer costs. This represents a return of investment of a little more than 1 to 1, based on first year costs and almost 1.5 to 1 based on maintenance costs.

The return on investment in both of these cases is based solely on the increased fertilizer value and does not take into consideration the benefits of savings in handling with improved slurry characteristics, H_2S, and odor reduction. The farms will also be asked to monitor the crop yield and nutrient uptake to see if the same results observed on other farms is realized, further adding to the return on investment. These results may vary from site to site, but both sites showed improvements in this case.

Ecological Laboratories would like to thank Aaron Humbert and Gene Bruase, producers for the use of their barns.