

## Improvement in Fertilizer Value of Manure Treated with PIT PERFECT®

*Seneca County Farm • Crawford County Farm, Ohio*

*Coordinated by Ohio State University MNM Specialist, Kendall Stucky*

### BACKGROUND

PIT PERFECT® is a biological treatment developed by Ecological Laboratories Inc. specifically for swine manure management. Among its well-documented benefits is an improvement in the fertilizer value of treated manure. This field report presents data from two Ohio hog finishing operations where PIT PERFECT was evaluated side-by-side with untreated control barns, coordinated by Ohio State University MNM Specialist Kendall Stucky.

### STUDY DESIGN

To evaluate the improvement in fertilizer value, Ohio State University MNM Specialist Kendall Stucky — serving Crawford, Sandusky, Seneca, and Wyandot SWCD — selected two single-wide hog finishing barn operations for comparison:

- Seneca County Farm — PIT PERFECT® applied in the west barn (built 2001) starting May 2013; east barn (built 1998) served as the untreated control. This farm practiced good agitation prior to pumping.
- Crawford County Farm — same dosage protocol applied. Key difference: the pit contents were not agitated prior to sampling, providing a useful secondary data point on performance without agitation.

Manure samples were drawn from both treated and untreated pits at each location and analyzed for ammonia nitrogen ( $\text{NH}_4$ ), organic nitrogen (O-N), phosphate ( $\text{P}_2\text{O}_5$ ), potassium ( $\text{K}_2\text{O}$ ), and moisture. Results are reported as averages per 1,000 gallons of manure.



*PIT PERFECT®-treated swine manure applied to crop fields — delivering higher fertilizer value per gallon and long-term soil microbial benefits.*

## PIT PERFECT APPLICATION PROTOCOL

The same dosage protocol was used at both farm locations. All pits were approximately half full at the time of the initial inoculation. PIT PERFECT® is a liquid biological treatment — no mixing required — applied directly at the pit inlet.

APPLICATION TIMING	PIT PERFECT® DOSE
Day 1 (Initial Inoculation)	<b>8 gallons</b>
Day 7	<b>2 gallons</b>
Day 14	<b>2 gallons</b>
Maintenance (Monthly)	<b>2 gallons / month</b>

*Dosage rates shown are for the pit sizes involved in this study. Refer to the PIT PERFECT® Application Guide for sizing based on your operation's pit or lagoon capacity.*

## RESULTS — SENECA COUNTY FARM

The Seneca farm (with pre-pump agitation) showed strong improvements across all key nutrient parameters. The most significant gain was in ammonia nitrogen, increasing by an average of +3.84 lbs per 1,000 gallons in the PIT PERFECT treated barn versus the untreated control. Phosphate and potassium also improved meaningfully, while organic nitrogen remained essentially unchanged.

Parameter	Treated Barn	Non-Treated Barn	Difference	Value Diff. / 1,000 gal
<b>NH<sub>4</sub> (Ammonia N)</b>	33.57 lbs	29.72 lbs	<b>+3.84 lbs</b>	<b>+\$1.62</b>
<b>O-N (Organic N)</b>	6.85 lbs	6.89 lbs	<b>(0.04 lbs)</b>	<b>(\$0.008)</b>
<b>P<sub>2</sub> O<sub>5</sub> (Phosphate)</b>	22.42 lbs	19.85 lbs	<b>+2.57 lbs</b>	<b>+\$1.34</b>
<b>K<sub>2</sub> O (Potassium)</b>	32.99 lbs	30.10 lbs	<b>+2.89 lbs</b>	<b>+\$1.01</b>
<b>Moisture</b>	95.7%	97.0%	<b>-1.3%</b>	<b>—</b>
<b>TOTAL GAIN</b>				<b>+\$3.96 / 1,000 gal</b>

*Table 1 — Fertilizer Value Comparison: Treated vs. Non-Treated Barn, Seneca Farm (lbs per 1,000 gallons of swine manure)*

## RESULTS — CRAWFORD COUNTY FARM

At the Crawford farm — operated without pre-pump agitation — the ammonia nitrogen increase was less pronounced than at Seneca. However, organic nitrogen levels in the treated barn were notably higher, largely offsetting the difference. Phosphate showed a strong improvement of +3.33 lbs per 1,000 gallons. This is consistent with how PIT PERFECT's biological activity can vary by site depending on agitation, manure composition, and stage of digestion. Importantly, the combined nitrogen fraction (NH<sub>4</sub> + O-N) remained higher in the treated pit at both locations.

Parameter	Treated Barn	Non-Treated Barn	Difference	Value Diff. / 1,000 gal
<b>NH<sub>4</sub></b> <b>(Ammonia N)</b>	24.40 lbs	23.93 lbs	<b>+0.55 lbs</b>	<b>+\$0.23</b>
<b>O-N (Organic N)</b>	7.12 lbs	4.995 lbs	<b>+2.13 lbs</b>	<b>+\$0.30</b>
<b>P<sub>2</sub>O<sub>5</sub></b> <b>(Phosphate)</b>	11.06 lbs	7.73 lbs	<b>+3.33 lbs</b>	<b>+\$1.73</b>
<b>K<sub>2</sub>O</b> <b>(Potassium)</b>	22.29 lbs	23.32 lbs	<b>(1.03 lbs)</b>	<b>(\$0.36)</b>
<b>Moisture</b>	98.14%	98.15%	<b>-0.01%</b>	<b>—</b>
<b>TOTAL GAIN</b>				<b>+\$1.90 / 1,000 gal</b>

Table 2 — Fertilizer Value Comparison: Treated vs. Non-Treated Barn, Crawford Farm (lbs per 1,000 gallons of swine manure)

### Key Finding

In both swine operations, the combined ammonia nitrogen and organic nitrogen was consistently higher in PIT PERFECT®-treated barns versus untreated controls. The degree of improvement varied by site — influenced by agitation practices, manure composition, and stage of digestion — but nutrient levels trended favorably in every monitored parameter at both locations.

## ECONOMIC ANALYSIS & RETURN ON INVESTMENT

The average product cost to the farmer was approximately \$26.00 per gallon. The initial inoculation program for the first year of use in the pits involved in this study totaled approximately \$830. After the first year, assuming continuous use with no requirement for a re-inoculation phase, maintenance costs were approximately \$624 per year.

These figures reflect fertilizer value improvements only. They do not include the additional economic benefits of improved slurry handling, reduced agitation costs (*up to 90% less agitation required with PIT PERFECT®*), reclaimed pit storage capacity, H<sub>2</sub>S and odor reduction, or improved crop yields from land-applied manure; all of which would further increase the true return on investment.

METRIC	SENECA COUNTY FARM	CRAWFORD COUNTY FARM
Manure Produced / Year	~450,000 gal	~450,000 gal
Fertilizer Value Increase / 1,000 gal	+\$3.96	+\$1.90
Total Annual Fertilizer Value Gain	\$1,782	\$855
Year 1 Product Cost	~\$830	~\$830
Ongoing Maintenance Cost / Year	~\$624	~\$624
ROI — Year 1 (fertilizer value only)	~2:1	~1:1
ROI — Maintenance Years	~3:1	~1.5:1

*△ ROI figures above are based solely on increased fertilizer value. Handling savings, odor control, and crop yield benefits are not captured and would increase total ROI further.*

## RESULTS AT A GLANCE

<b>+\$3.96</b> Fertilizer value gain per 1,000 gal (Seneca)	<b>2–3×</b> Return on investment (Seneca)	<b>\$1,782</b> Annual fertilizer value gain (Seneca)
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## ADDITIONAL BENEFITS BEYOND FERTILIZER VALUE

PIT PERFECT® is purpose-built for swine operations, and its benefits extend well beyond the nutrient improvements documented in this study. Both farms will continue to be monitored for the following outcomes — all of which have been observed in other PIT PERFECT® installations and align with the product's field-proven performance claims:

- Up to 90% less agitation required — reducing equipment wear, labor time, and fuel cost
- Up to 34% of pit storage capacity reclaimed through solids reduction
- Ammonia and hydrogen sulfide (H<sub>2</sub> S) reduction — improving herd health and worker safety
- Reduced odor — fewer neighbor complaints, better farm environment
- Improved nutrient uptake by crops when PIT PERFECT®-treated manure is land-applied
- Enhanced crop yield, extending the economic return on investment beyond the pit