

BiOWiSH™ Manure & Odor (Swine)

BiOWiSH™ helps to control ammonia emissions

Slurry Liquid Fertilizer Plant reduces odor by over 70%

Executive Summary

BiOWiSH™ Manure & Odor (Swine) was introduced to a South Korean Slurry Liquid Fertilizer Plant. The goal was to reduce odor by 70%. BiOWiSH™ Manure & Odor (Swine) met and exceeded this goal in 3 weeks by reducing ammonia emissions (NH₃ gas). Not only did the bioaugmentation process reduce odor, the improved biological processing also resulted in better liquid fertilizer quality.

Background

Over the past decade, odor emissions at a Slurry Liquid Fertilizer Plant in rural Hwasung city, Kyounggi Province, South Korea became a critical issue both for the industrial complex and for the surrounding residential areas. The plant, in operation for over 20 years, has tried numerous alternatives to mitigate odors from different unit operations including odor-control equipment and a broad range of chemical and biological processes. None of the solutions proved to be successful.

Objectives

The key objectives behind the BiOWiSH™ bioaugmentation program were:

- Reduce the odor levels by 70% (measured as detectable ammonia concentration)
- Improve general air quality for plant workers and nearby residents
- Improve the quality of liquid fertilizer by enhancing fermented composting.

Plant Description

The plant receives a flow of approximately 70–100 m³/day. The incoming material is 100% liquid swine manure, with an average water content of 95%. The treatment plant consists of 5 fermenting tanks, which provide sufficient retention time to promote waste digestion. The final fluid from the fermentation process (now considered liquid fertilizer) is delivered to farms free of charge.

BiOWiSH™ Manure & Odor (Swine)



- Accelerates the decomposition of organic waste
- Reduces the need for sludge pump outs
- Reduces Biological Oxygen Demand (BOD) and Total Suspended Solids (TSS)
- 100% natural and non-toxic



Process Flow Diagram

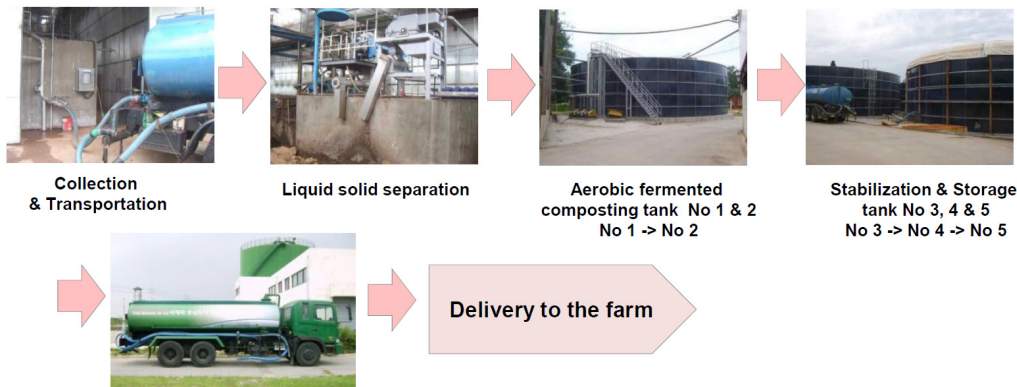


Fig. 1. Process flow from collection to delivery

Ammonia generation increases gradually from tank 1 to tank 4. Tank 5 has significantly lower residual organic matter and always has been the least problematic stage.

Odor Measurement

For measuring odor generation, a GASTEC Gas Detector was used. Ammonia (NH_3), Hydrogen Sulfide (H_2S) and Methyl mercaptan (CH_3SH) were the main gases monitored. Initial measurements showed that NH_3 was the only gas detectable in high enough concentrations to contribute to odor from the tanks.

Model: GV-100S



Odor measurement

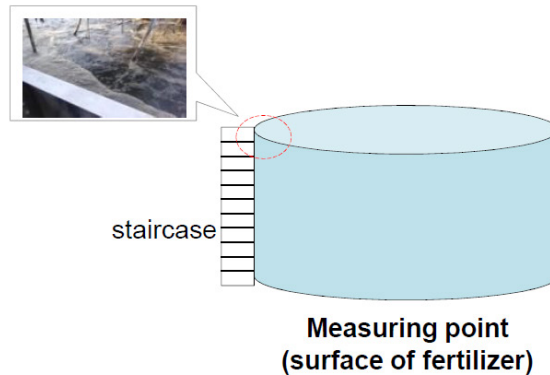


Fig. 2. Gas detector and measuring point

Implementation Program

BiOWiSH™ Manure & Odor (Swine) was the selected technology for this project. The following dosing plan was suggested.

Day	Dosage
Day 1	Shock dosing: 8 kg / tank (tanks 1, 2 and 3)
Day 2 – Day 30	500 g / day in tank 1 only

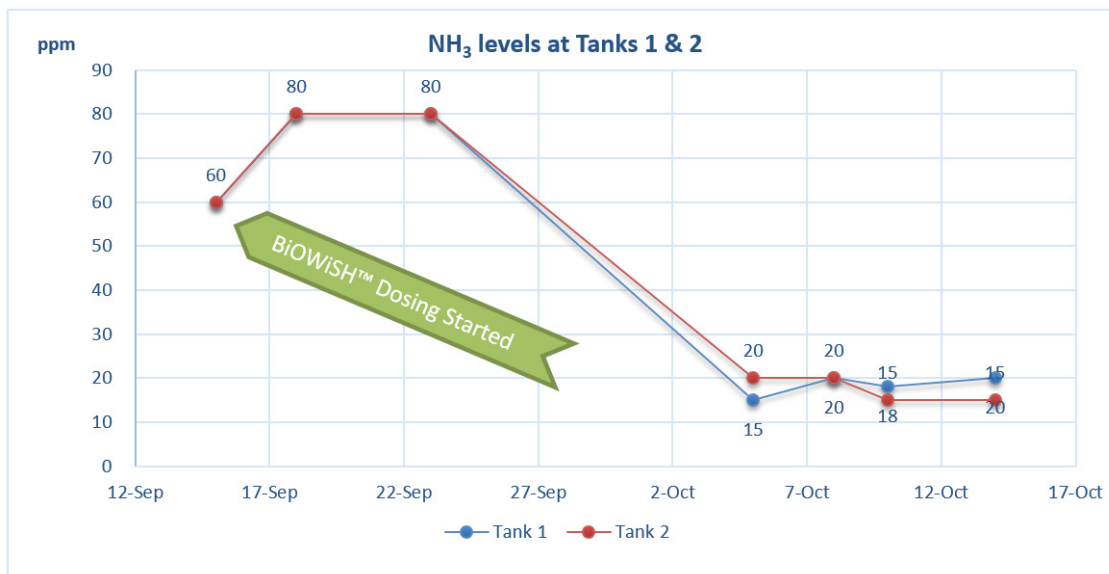
Table 1. Dosage of BiOWiSH™ Manure & Odor (Swine) by day and weight

Results

The following table and graph show the reduction in ammonia levels (as ppm) during the trial period.

Date	Ammonia Level		
	Tank 1	Tank 2	Tank 4
September 15	60 ppm	60 ppm	50 ppm
September 18	80 ppm	80 ppm	
September 23	80 ppm	80 ppm	
October 5	15 ppm	20 ppm	
October 8	20 ppm	20 ppm	
October 10	18 ppm	15 ppm	
October 14	20 ppm	15 ppm	8 ppm
% Reduction	66%	75%	84%

Table 2. Ammonia levels in ppm from throughout the trial period by tank



Graph 1. The progress and reduction of BiOWiSH™ Manure & Odor (Swine) from Sept. 15 - Oct. 14

Three weeks after the initial dosing, the objective—70% odor reduction—was exceeded, and BiOWiSH™ Manure & Odor (Swine) proved to be able to sustain low ammonia emissions at all tanks.

Other improvements were reported during the trial period as well. Aside from the noticeable improvements in air quality, Plant Operations reported increased aeration efficiency, as evidenced in the microbubbles observed on each tank's surface.

Day 1



Day 29



Fig. 3. Comparison of tanks 1-4 before dosing (Day 1) and after dosing (Day 29)

Key Benefits

- Improved air quality for plant operations and residential neighbors.
- Avoided the introduction of chemicals into the fertilizer, which will be used for food production.
- Improved biological processing efficacy resulting in better end-product (liquid fertilizer) quality.
- Reduced odor generation in all tanks.
- Improved installed aeration efficacy at no additional cost.



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