

BIOAKTIV FarEast

Germany: A Study by VTI Thuringian Process Engineering Institute



**VTI Thüringer Verfahrenstechnisches
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VTI Thuringian Process Engineering Institute for Environment and Energy e.V., Germany reported in December 2003 on their findings on the application of BioAktiv for Liquid Manure on pig manure.

The lab received the samples of liquid pig manure treated and untreated with BioAktiv for Liquid Manure, each about five litres, from Thuringian State Agency for Agriculture in Jena, and immediately began the fermentation test according to DIN 38414 part 8. For each manure sample, the lab team prepared three test samples in one-litre containers made up of 50% manure sample and 50% seed sludge and three test samples without seed sludge. The seed sludge used contained the necessary bacteria for biogas production. To negate the effect on gases produced by the seed sludge, they did a blank test (on seed sludge alone without anything added to it), and another test with microcrystalline cellulose to monitor its microbial activity.

Before fermentation, they evaluated the DM (dry matter) content, DOM (dissolved organic matter) and COD (chemical oxygen demand) of both samples. The results were as follows:

Parameter	BioAktiv	Control
Average DM content (%)	2.69	3.36
Average DOM/DM (%)	58.95	63.15
Average COD (g/l)	28.33	59.39

They accepted the unusually low DOM contents of both materials because the measurements were consistent among the test samples from both manure samples. Likewise, they also accept the results showing that the COD of BioAktiv-treated material was less than a half of the untreated material.

The fermentation tests done on all samples with or without seed sludge were under identical conditions, at a temperature of 37°C and lasted for 30 days. To ensure the fermentation process was according to the required standards, the lab monitored the pH and VOC/TIC (volatile organic compound total ion chromatogram) values of all samples. They collected the biogas produced in bags and analysed it for methane (CH₄), carbon dioxide (CO₂), oxygen (O₂) and hydrogen sulphide (H₂S) contents.

The table below shows the average values from three test samples of each manure sample without seed sludge.

Parameter	BioAktiv	Control
Biogas volume (l)	4.23	5.35
Biogas yield (l/kg DOM added)	544.23	549.19
Biogas yield (l/kg original substance added)	9.19	11.13
Methane volume (l)	2.63	3.41
Methane yield (l/kg DOM added)	336.38	352.35
Methane yield (l/kg original substance added)	5.71	7.10
Average methane content (%)	62.17	63.81
Average hydrogen sulphide content (ppm)	92.81	483.33
DOM degradation (%)	26	30
COD reduction (%)	16	22

In summary:

- The COD of untreated manure sample before fermentation was twice that of BioAktiv-treated manure sample.
- The untreated manure sample yielded 4.5% more methane than BioAktiv-treated manure sample, which was within the usual range of variation.
- The average methane content from both samples (62-64%) were relatively high.
- The conversion of organic compounds into methane reduced the DOM content in both samples. As untreated sample produced larger volume of biogas, its DOM degradation rate was higher than that of BioAktiv-treated sample.
- Similarly, the conversion of readily degradable organic compounds into methane also resulted in a lower COD after fermentation, hence COD reduction was greater in the untreated sample than in the BioAktiv-treated sample.
- While the high hydrogen sulphide content in the untreated sample was normal for liquid pig manure, the low hydrogen sulphide content in the BioAktiv-treated sample, which was only 20% of that of untreated sample, was remarkable.
- Assessing by smelling by several test persons showed no clear difference between both samples. Fermentation residues from both samples were naturally less malodorous than before fermentation, but again there were no clear difference between them.

The two tables below show the average values from three test samples of each manure sample with seed sludge.

Parameter	BioAktiv		Control	
	Before	After	Before	After
Average DM Content (%)	3.07	2.70	3.30	2.86
Average DOM/DM (%)	58.19	54.77	59.22	54.43
COD (g/l)	38.90	24.79	41.66	25.53

Test days	Sample	O ₂ (%)	CO ₂ (%)	CH ₄ (%)	H ₂ S (ppm)	Volume (l)
0 to 3	BioAktiv	3.2	28	42	283	1.25
	Control	3.0	28	49	1,137	1.72
4 to 8	BioAktiv	3.2	21	59	123	0.79
	Control	2.2	21	64	563	1.17
9 to 30	BioAktiv	1.4	20	69	0	2.82
	Control	2.0	20	70	90	3.09

[\[Original report\]](#)