

# An Analysis of Operation Conditions and Microbial Characteristics in Swine Wastewater Treatment Plants with Spontaneously Enriched Anammox Bacteria

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## Appendix

**Appendix Table A1:** Anammox activity and deoxyribonucleic acid (DNA) copy number for each biofilm sample

Facility	Activity represented as <i>mean ± sd</i> ( $\mu\text{mol-N}_2/\text{g-IL/h}$ )	DNA copy numbers represented as <i>mean ± sd</i> (copies/g-IL)
Iba-1	549 ± 38	5.3×10 <sup>11</sup> ± 4.0×10 <sup>11</sup>
Iba-2	523 ± 113	1.5×10 <sup>11</sup> ± 9.6×10 <sup>9</sup>
Sai-1	278 ± 23	5.5×10 <sup>10</sup> ± 6.3×10 <sup>9</sup>
Shizu-1	339 ± 73	1.8×10 <sup>10</sup> ± 2.2×10 <sup>9</sup>
Shizu-2	192 ± 14	1.2×10 <sup>10</sup> ± 3.3×10 <sup>8</sup>
Shizu-3	57 ± 7	1.1×10 <sup>10</sup> ± 2.1×10 <sup>8</sup>
Miya-1	129 ± 12	4.3×10 <sup>8</sup> ± 3.1×10 <sup>8</sup>
Miya-2	843 ± 21	1.6×10 <sup>12</sup> ± 4.7×10 <sup>11</sup>

**Appendix Table A2:** Water characteristics of influent (inf) and effluent (eff) samples investigated in the facilities

Facility		pH	EC	SS	VSS	BOD	NH <sub>4</sub> <sup>+</sup> -N	NO <sub>2</sub> <sup>-</sup> -N	NO <sub>3</sub> <sup>-</sup> -N	BOD/TN	N removal ratio	Sampling date	Reference
		(-)	(mS/cm)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(-)	(%)		
Iba-1	inf	7.2	-*	6250	5000	4525	4931	0	12	0.9	98	Nov 2014	[11]
	eff	7.2	-	200	200	53	10	62	4				
	inf	7.6	-	3250	2800	-	4065	0	0.2		-	Feb 2015	[11]
	eff	-	-	-	-	-	-	-	-				
Iba-2	inf	8.4	-	600	600	400	1730	0	6	0.2	93	Nov 2014	[11]
	eff	7.3	-	1850	1850	204	22	99	5				
	inf	8.5	-	1600	1400	4645	1992	0	0	2.3	50	Feb 2015	[11]
	eff	8.7	-	800	600	480	1001	0	0				
	inf	8.2	11.1	2315	1750	5435	1337	0	1	3.4	93	Jun 2016	This study
	eff	7.5	1.84	760	675	169	5	0	54				
Sai-1	inf	8.2	8.5	700	500	2790	897	0	5	2.8	73	Nov 2016	This study
	eff**	7	3.6	-	-	-	22	5	212				
Shizu-1	inf	8.1		2125	1500	1285	465	0	0.9	2.8	80	Oct 2014	[11]
	eff***	7.7		2525	1825	169	68	17	7.6				
	inf	8.8		1950	1650	845	658	0.4	1	1.3	48	Feb 2015	[11]
	eff***	8.3		50	50	68	206	97	38				
Miya-2	inf	8.1	1.86	100	83	1724	601	0	0	2.8	99	Jun 2019	This study
	eff***	7.9	2.04	54	23	46	0	1	0.3				

\* No data available.

\*\* Samples in the first aeration tank.

\*\*\* Samples in the first sedimentation tank.

**Appendix Table A3:** DO concentrations in aeration tanks on the investigated facilities

<b>Facility</b>	<b>DO concentration (mg/L)</b>	<b>Note</b>
<b>Iba-1</b>	0.23	
<b>Iba-2</b>	0.19, 0.25, and 0.2	In the first three tanks, respectively
<b>Sai-1</b>	0.24	No aeration period; approximately half day, in the first tank
<b>Shizu-1</b>	$0.31 \pm 0.39$	In the first tank, an average of 2 years monitoring <sup>a</sup> [14]
<b>Shizu-2</b>	1.06	In the second tank
<b>Shizu-3</b>	0.4 and 0.3	For the first and second tanks, respectively
<b>Miya-1</b>	No data	
<b>Miya-2</b>	0.44–1.0	In the second area of the first aeration tank <sup>b</sup>

<sup>a</sup> The data for this facility was obtained from [14]

<sup>b</sup> Measurement day for this facility was June 18, 2019; other samples were measured as same as in Table 1.