Supplementary Information Bajagain, R.; Gautam, P.; Le, T.T.N.; Dahal, R.H.; Kim, J.; Jeong, S.-W. Isolation and Screening of Odor-Reducing Microbes from Swine Manure and Its Role in Reducing Ammonia Release in Combination with Surfactant Foam. *Appl. Sci.* **2022**,

Table S1. Degradation of ammonia (NH_3) by different microbial strains.

SN	Strain name	Description (Closest species)	Ammonia test in the open jar at 22 °C (NH_3 concentration, ppm)						
			Initial	Bacteria*	1 h	12 h	24 h	36 h	48 h
0	Control	Media	1000 ± 00.0^{Aa}	320 ± 50.0^{BCa}	340 ± 36.1^{Ba}	240 ± 45.8^{CDa}	160 ± 17.3^{DEab}	120 ± 30.0^{EFa}	70 ± 10.0^{Fab}
1	TP1	*Saccharomyces cerevisiae*	1000 ± 00.0^{Aa}	120 ± 34.6^{BCfg}	180 ± 40.0^{Bfg}	140 ± 30.0^{BCbcd}	80 ± 20.0^{CDcd}	50 ± 10.0^{Dbc}	50 ± 10.0^{Dab}
2	**TP3**	***Lactococcus lactis***	**1000** $\pm 00.0^{Aa}$	**80** $\pm 20.0^{Cg}$	**120** $\pm 20.0^{Bgh}$	**50** $\pm 10.0^{Ce}$	**10** $\pm 10.0^{De}$	**10** $\pm 10.0^{Dc}$	**10** $\pm 5.8^{Dc}$
3	TP4	*Bacillus paramycoides*	1000 ± 00.0^{Aa}	150 ± 26.5^{Befg}	180 ± 17.3^{Bfg}	80 ± 20.0^{Ccde}	60 ± 10.0^{Cde}	50 ± 10.0^{Cbc}	40 ± 10.0^{Cbc}
4	**TP5**	***Lactobacillus argentoratensis***	**1000** $\pm 00.0^{Aa}$	**0** $\pm 00.0^{Dh}$	**100** $\pm 20.0^{Bh}$	**60** $\pm 10.0^{Cde}$	**10** $\pm 00.0^{De}$	**10** $\pm 00.0^{Dc}$	**10** $\pm 00.0^{Dc}$
5	YI2-3	*Rhodococcus gordoniae*	1000 ± 00.0^{Aa}	200 ± 34.6^{Ccde}	280 ± 20.0^{Babcd}	180 ± 20.0^{Cab}	120 ± 20.0^{Dabcd}	80 ± 10.0^{DEab}	50 ± 10.0^{Eab}
6	YI 1-2	*Hydrogenophaga temperata*	1000 ± 00.0^{Aa}	250 ± 17.3^{BCabcd}	300 ± 20.0^{Babc}	200 ± 40.0^{CDab}	140 ± 26.5^{DEabc}	100 ± 20.0^{EFab}	70 ± 10.0^{Fab}
7	HW4	*Acidovorax delafieldii*	1000 ± 00.0^{Aa}	300 ± 20.0^{Bab}	340 ± 17.3^{Ba}	180 ± 40.0^{Cab}	140 ± 20.0^{CDabc}	100 ± 30.0^{DEab}	70 ± 20.0^{Eab}
8	Buk3	*Shinella zoogloeoides*	1000 ± 00.0^{Aa}	260 ± 20.0^{BCabc}	300 ± 34.6^{Babc}	220 ± 40.0^{CDab}	160 ± 34.6^{DEab}	120 ± 20.0^{EFa}	70 ± 10.0^{Fab}
9	HW3	*Pedococcus soli*	1000 ± 00.0^{Aa}	300 ± 17.3^{Bab}	320 ± 20.0^{Bab}	220 ± 20.0^{Cab}	180 ± 20.0^{Ca}	120 ± 20.0^{Da}	80 ± 10.0^{Da}
10	TP2	*Pichia sorbitophila*	1000 ± 00.0^{Aa}	180 ± 20.0^{Bdef}	200 ± 36.1^{Bef}	150 ± 20.0^{BCbc}	100 ± 20.0^{CDbcd}	60 ± 26.5^{Dabc}	50 ± 10.0^{Dab}
11	YI1-4	*Sphingopyxis granuli*	1000 ± 00.0^{Aa}	260 ± 20.0^{BCabc}	300 ± 20.0^{Babc}	240 ± 17.3^{Ca}	120 ± 26.5^{Dabcd}	100 ± 20.0^{Dab}	70 ± 10.0^{Dab}
12	YI1-6	*Sphingobacterium humi*	1000 ± 00.0^{Aa}	180 ± 20.0^{Cdef}	240 ± 26.5^{Bcdef}	200 ± 20.0^{BCab}	120 ± 17.3^{Dabcd}	70 ± 26.5^{DEabc}	40 ± 20.0^{Ebc}

13	YI5-4	*Nocardioides aromaticivorans*	1000 ± 00.0^{Aa}	200 ± 34.6^{BCcde}	260 ± 20.0^{Bbcde}	220 ± 20.0^{Bab}	140 ± 20.0^{CDabc}	100 ± 34.6^{DEab}	60 ± 17.3^{Eab}
14	S1	*Sphingobacterium faecium*	1000 ± 00.0^{Aa}	240 ± 10.0^{BCbcd}	280 ± 20.0^{Babcd}	200 ± 34.6^{Cab}	120 ± 20.0^{Dabcd}	80 ± 20.0^{DEab}	60 ± 10.0^{Eab}
15	TP8	*Nocardioides dubius*	1000 ± 00.0^{Aa}	160 ± 17.3^{BCef}	210 ± 26.5^{Bdef}	150 ± 36.1^{Cbc}	120 ± 20.0^{CDabcd}	80 ± 20.2^{DEab}	40 ± 10.0^{Ebc}
16	Buk 2	*Phreatobacter stygius*	1000 ± 00.0^{Aa}	300 ± 20.0^{Bab}	320 ± 20.0^{Bab}	180 ± 34.6^{Cab}	160 ± 10.0^{CDab}	120 ± 20.0^{DEa}	70 ± 10.0^{Eab}

**After adding 10 mL of the bacteria ($2.3\times10^6 – 3.6\times10^6$ cells/1 mL) for trial or 10 mL water for control*

The values are mean ± standard deviation. Different superscript lowercase letters within a column indicate statistically significant differences among the strains in the same evaluation periods ($p < 0.05$). Different superscript capital letters within a row indicate statistically significant differences among the different evaluation periods of a strain ($p < 0.05$).

Table S2. Degradation of NH_3 in the capped jar (conducted at 22°C) .

No.	**Strain name**	**NH_3 concentration (ppm) at ambient temperature**				
		Initial	**Bacteria***	**12 h**	**24 h**	**36 h**
1	**TP1**	1000 ± 00.0^{Aa}	480 ± 26.5^{Ca}	580 ± 20.0^{Ba}	560 ± 20.0^{Ba}	550 ± 30.0^{Ba}
2	**TP3**	1000 ± 00.0^{Ab}	120 ± 17.3^{Cb}	220 ± 26.5^{Bb}	200 ± 26.5^{Bb}	180 ± 20.0^{Bb}
3	**TP5**	1000 ± 00.0^{Ab}	100 ± 20.0^{Db}	210 ± 10.0^{Bb}	$180 \pm 20.0B^{Cb}$	150 ± 10.0^{Cb}

**After adding 10 mL of the bacteria ($2.3\times10^6 – 3.6\times10^6$ cells/1 mL) for trial or 10 mL water for control*

The values are mean ± standard deviation. Different superscript lowercase letters within a column indicate statistically significant differences among the strains in the same evaluation periods ($p < 0.05$). Different superscript capital letters within a row indicate statistically significant differences among the different evaluation periods of a strain ($p < 0.05$).

Table S3. Degradation of NH_3 in the capped jar (conducted at 30 °C).

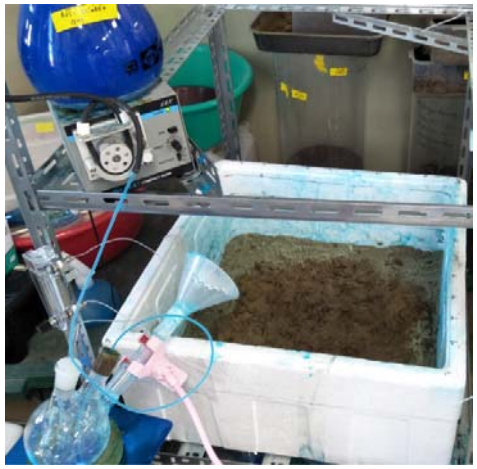
No.	Strain name	NH_3 concentration (ppm) at 30 °C				
		Initial	**1h (Bacteria*)**	**12 h**	**24 h**	**36 h**
1	**Control**	1000 ± 00.0^{Aa}	400 ± 91.7^{Ca}	560 ± 20.0^{Ba}	520 ± 34.6^{BCa}	520 ± 20.0^{BCa}
2	**TP1**	1000 ± 00.0^{Aa}	500 ± 34.6^{Ba}	540 ± 26.5^{Ba}	520 ± 17.3^{Ba}	510 ± 26.5^{Ba}
3	**TP3**	1000 ± 00.0^{Aa}	100 ± 20.0^{Db}	190 ± 10.0^{Bb}	140 ± 10.0^{Cb}	100 ± 10.0^{Db}
4	**TP5**	1000 ± 00.0^{Aa}	100 ± 20.0^{CDb}	150 ± 10.0^{Bb}	$120 \pm 20.0B^{Cb}$	80 ± 10.0^{Db}

**After adding 10 mL of the bacteria ($2.3\times10^6 – 3.6\times10^6$ cells/1 mL) for trial or 10 mL water for control*

The values are mean ± standard deviation. Different superscript lowercase letters within a column indicate statistically significant differences among the strains in the same evaluation periods ($p < 0.05$). Different superscript capital letters within a row indicate statistically significant differences among the different evaluation periods of a strain ($p < 0.05$).

Figures

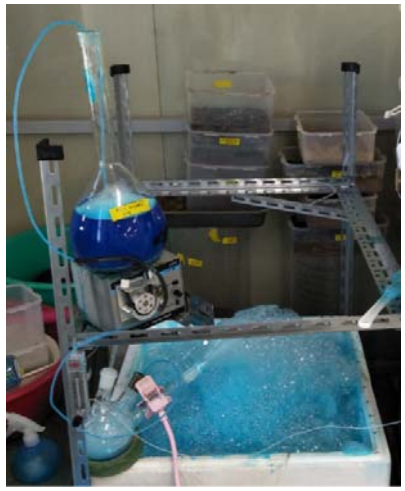
(A)



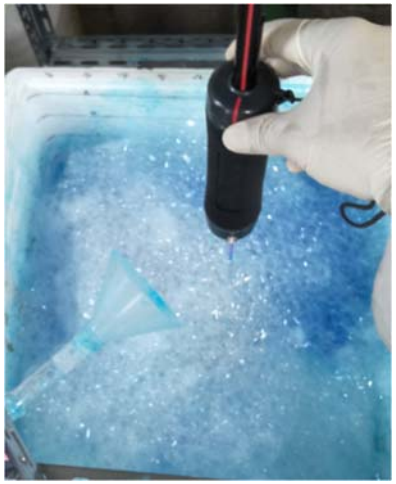
(B)

(C)

(D)

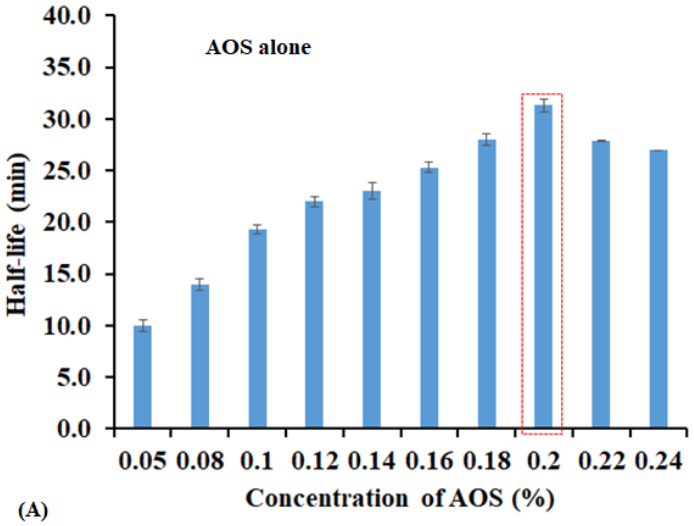


(E)



(F)

Figure S1. Laboratory odor reduction test; (A) experimental set-up using soil/swine manure in the polystyrene box; (B) initial sampling before foam spraying; (C) initial NH_3 concentration (pink color changed to yellow); (D) covering the manure with surfactant foam spraying technology; (E) sampling after foam spraying; and (F) NH_3 concentration after foam spraying or final sampling (no change in pink color, 0 ppm).



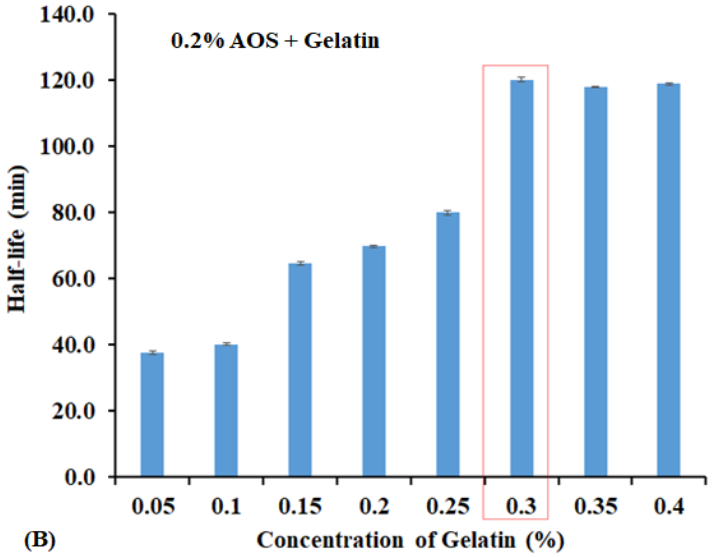


Figure S2. Effect of (A) AOS concentration and (B) AOS + gelatin concentration on foam stability

Text S1. Physiochemical properties of the soil used

In this experiment, the soil contaminated with NH_3 solution was sandy loam having an organic matter content of 4.05%. The pH , EC and water content were 3.00, 101.59 μs/cm and 0.06 g/g respectively. The bulk density of the soil was 1.10 g/cm^3 and porosity was 35.9% as shown in the Table below.

Soil properties	**Unit**	**Value**
Soil texture		Sandy loam
Organic matter	%	4.05 ± 0.02
pH		3.00 ± 0.22
EC	μs/cm	101.59 ± 2.98
Gravimetric water content	g/g	0.06 ± 0.00
Bulk density	g/cm3	1.10 ± 0.01
Porosity	%	35.9 ± 0.95

Text S2. Reagent and materials

In this experiment, ammonia solution was used as extra pure brought from Daejung Chemicals as shown in the Table below. Gelatin was brought in from Germany having 100% purity. Surfactant (AOS) was obtained from AK chemicals, South Korea. Surfactant was obtained in powdered form. Sandy loam soil was prepared (To make ammonia contaminated soil) by mixing fine sand, peatmoss (<2 mm) and kaolin clay in the proportion of 80:10:10 by weight. For the preparation of sandy loam soil, research grade sand was obtained from KSL, South Korea. Similarly peat-moss was brought in from Germany which was prepared in Lithuania (reseach grade) and kaolin clay was extra pure and obtained from Samchun Chemicals, South Korea.

Reagents and materials	**Grade**	**Company**	**%purity**
Ammonia solution (NH4OH)	Extra pure	Daejung chemicals, South Korea	NM
Gelatin	Pure	Gelita, Germany	100
Sodium alpha olefin sulfonate (AOS)	Pure	AK Chemicals, South Korea	35% Solubility
Fine sand (KSL 5100)	Research Grade	KSL, South Korea	NM
Peat-moss	Research Grade	Prepared in Lithuania (Durpeta), supplied by emijja, Germany.	Highly recommended
Kaolin clay	Extra pure	Samchun chemicals, South Korea	NM