

Table S1. Concentration of nutrients in the substrates used in A reactors and content of nutrients in the digestate produced at the end of Phase 2 and Phase 4.

Parameter	Unit	Phase 2			Phase 4		
		Substrate	Digestate	Digestate	Substrate	Digestate	Digestate
		A	A _{Ref}	A _{Temp}	A	A _{Ref}	A _{Temp}
TS ¹	% of ww	9.9	7.6	7.4	9.7	7.7	7.3
VS ¹	% of ww	8.2	5.7	5.7	7.9	5.8	5.5
NH ₄ ⁺ -N ¹	g/L	2.4	2.9	3.0	2.1	2.6	2.7
Protein	% of TS	30.4	39.9	41.7	27.9	40.1	39.0
Sugar	% of TS	0.6	0.6	0.4	0.1	0.1	0.0
Starch	% of TS	1.0	0.4	0.3	1.0	0.3	0.4
Cellulose	% of TS	20.8	17.4	16.8	20.2	17.7	15.5
Hemicellulose	% of TS	18.2	15.2	12.3	15.2	16.5	11.8
Lignin	% of TS	7.4	9.2	9.3	7.3	9.6	10.6
Ca	g/kg TS	11	20	20	13	23	21
K	g/kg TS	39	71	74	40	65	70
Mg	g/kg TS	6	10	10	6	11	11
Na	g/kg TS	4	8	9	6	10	11
P	g/kg TS	7	13	13	7	13	13
S	g/kg TS	5	9	9	5	9	9
Cu	mg/kg TS	371	734	711	526	887	960
Fe	mg/kg TS	6561	12071	12051	6899	12844	12758
Mn	mg/kg TS	305	548	564	348	640	664
Zn	mg/kg TS	247	456	479	271	511	546

¹ TS=total solids, VS=volatile solids, NH₄⁺-N = Ammonium-nitrogen

Table S2. Concentration of nutrients in the substrates used in B reactors and content of nutrients in the digestate produced at the end of Phase 2 and Phase 4.

Parameter	Unit	Phase 2			Phase 4		
		Substrate	Digestate	Digestate	Substrate	Digestate	Digestate
		B	B _{Ref}	B _{Temp}	B	B _{Ref}	B _{Temp}
TS ¹	% of ww	10.3	6.2	7.3	10.4	8.5	8.5
VS ¹	% of ww	8.6	4.7	5.8	8.4	6.6	6.6
NH ₄ ⁺ -N ¹	g/L	1.7	1.8	1.9	1.8	2.0	2.0
Protein	% of TS	23.2	33.5	29.6	26.4	29.2	30.1
Sugar	% of TS	0.0	0.0	0.0	0.0	0.0	0.0
Starch	% of TS	1.3	0.2	0.1	0.2	0.3	0.3
Cellulose	% of TS	23.9	16.8	21.5	20.1	18.8	16.9
Hemicellulose	% of TS	20.2	14.7	15.4	17.6	17.0	14.4
Lignin	% of TS	8.0	11.8	11.9	8.4	10.5	12.5
Ca	g/kg TS	16	31	24	17	23	23
K	g/kg TS	33	71	53	33	45	44
Mg	g/kg TS	6	13	10	7	9	9
Na	g/kg TS	7	14	11	6	8	8
P	g/kg TS	6	11	9	5	7	7
S	g/kg TS	5	9	7	5	7	7
Cu	mg/kg TS	540	1055	849	383	446	443
Fe	mg/kg TS	2334	8752	7045	2505	4876	5251
Mn	mg/kg TS	182	367	303	197	276	293
Zn	mg/kg TS	159	335	267	134	188	193

¹ TS=total solids, VS=volatile solids, NH₄⁺-N = Ammonium nitrogen

Table S3. Concentration of nutrients in the solid and liquid substrates used in reactor B.

		Manure		
Parameter	Unit	Liquid	Liquid	Solid
		Phase 1,2	Phase 3,4	Phase 1-4
TS ¹	% of ww	8.7	8.4	20.4
VS ¹	% of ww	6.9	7.0	17.0
NH ₄ ⁺ -N ¹	g/L	1.6	1.5	1.4
Protein	% of TS	28.2	24.5	16.1
Sugar	% of TS	0.0	0.0	0.0
Starch	% of TS	0.2	0.2	0.0
Cellulose	% of TS	18.5	22.8	29.3
Hemicellulose	% of TS	17.2	20.2	20.3
Lignin	% of TS	8.5	8.0	7.8
Ca	g/kg TS	20	18	4
K	g/kg TS	36	37	13
Mg	g/kg TS	8	7	2
Na	g/kg TS	6	8	1
P	g/kg TS	6	6	2
S	g/kg TS	6	5	2
Cu	mg/kg TS	428	620	116
Fe	mg/kg TS	1176	816	10389
Mn	mg/kg TS	218	202	73
Zn	mg/kg TS	148	180	51

¹ TS=total solids, VS=volatile solids, NH₄⁺-N = Ammonium nitrogen

Table S4. Diffences¹ in mean values for parameters between Phase 2 and Phase 4 for each reactor. Negative value represents a decrease in mean value.

Parameter ²	Reactor			
	A _{Ref}	A _{Temp}	B _{Ref}	B _{Temp}
GP	2686***	3442***	1283***	1835***
SMP	2	13**	-27***	-13**
VFA	0.21	0.29	-0.02	0.08
DD	-6	-7**	-7*	-3
H ₂ S	-38*	-85**	174***	226***
CH ₄	14*	10**	9*	7
CO ₂	4***	4***	3***	3***
pH	0.01	-0.09	-0.06	0.01

¹Significance level: ***P<0.001, **P<0.01, *P<0.05.

²GP =daily biogas production (normalised), SMP=specific methane production (normalised), VFA=total fatty acid concentration, DD=degree of degradation.

Table S5. Pearson's partial correlation coefficients for operating parameters¹ evaluated from Phase 1, 2 and 4.

	SMP	BMP	RMP	VFA	CH ₄	H ₂ S	pH	DD	HRT	OLR	Eff
GP	0.12	0.05	0.74	0.29	0.80	0.11	-0.21	-0.45	-0.81	0.77	-0.30
SMP		0.65	-0.01	0.38	0.30	-0.73	0.58	0.63	0.46	-0.52	0.80
BMP			0.14	0.16	0.33	-0.67	0.15	0.55	0.37	-0.33	0.47
RMP				0.58	0.49	0.28	0.02	-0.35	-0.62	0.64	-0.59
VFA					0.25	-0.02	0.62	-0.01	-0.02	-0.02	-0.03
CH ₄						-0.03	-0.13	-0.13	-0.49	0.51	0.00
H ₂ S							-0.11	-0.49	-0.43	0.61	-0.74
pH								0.54	0.55	-0.52	0.42
DD									0.79	-0.75	0.73
HRT										-0.95	0.70
OLR											-0.76

¹SMP-Specific methane potential, BMP-Biological methane potential, VFA –Short chain fatty acids, DD-Degree of degradation, HRT-Hydraulic retention time, OLR-Organic loading rate, Eff- Efficiency value according to Rico et. al (2015)

Table S6. Concentration of nutrients in digestates taken after RMP tests, originating from reactors A and B and evaluated at different temperatures.

			TS	VS	NH ₄ ⁺ -N	Protein	Cellulose	Hemicellulose	Lignin
Reactor	Temperature (°C)	Phase	% of ww	% of ww	g/L	% of TS	% of TS	% of TS	% of TS
A _{Ref}	20	2	6.7	4.8	3.2	46.1	10.3	10.3	11.0
A _{Temp}	20	2	6.5	4.6	3.2	48.3	11.4	8.0	12.0
A _{Ref}	38	2	6.3	4.6	3.2	47.4	14.2	11.3	10.0
A _{Temp}	52	2	6.4	4.7	3.1	46.1	13.4	6.8	11.8
A _{Ref}	38	4	6.1	4.2	3.0	46.9	13.9	10.8	10.3
A _{Temp}	52	4	6.1	4.2	3.0	46.0	12.1	6.3	11.4
B _{Ref}	20	2	6.3	4.7	2.0	35.4	13.0	23.9	12.2
B _{Temp}	20	2	6.1	4.5	2.1	36.5	14.7	23.3	12.5
B _{Ref}	42	2	5.8	4.3	2.2	38.0	13.6	22.9	12.6
B _{Temp}	52	2	5.6	4.2	2.1	38.1	16.8	21.5	13.5
B _{Ref}	42	4	6.7	5.1	2.2	37.2	14.4	23.4	11.9
B _{Temp}	52	4	6.5	4.8	2.1	39.0	15.4	21.2	13.8

¹ TS=total solids, VS=volatile solids, NH₄⁺-N = Ammonium nitrogen