

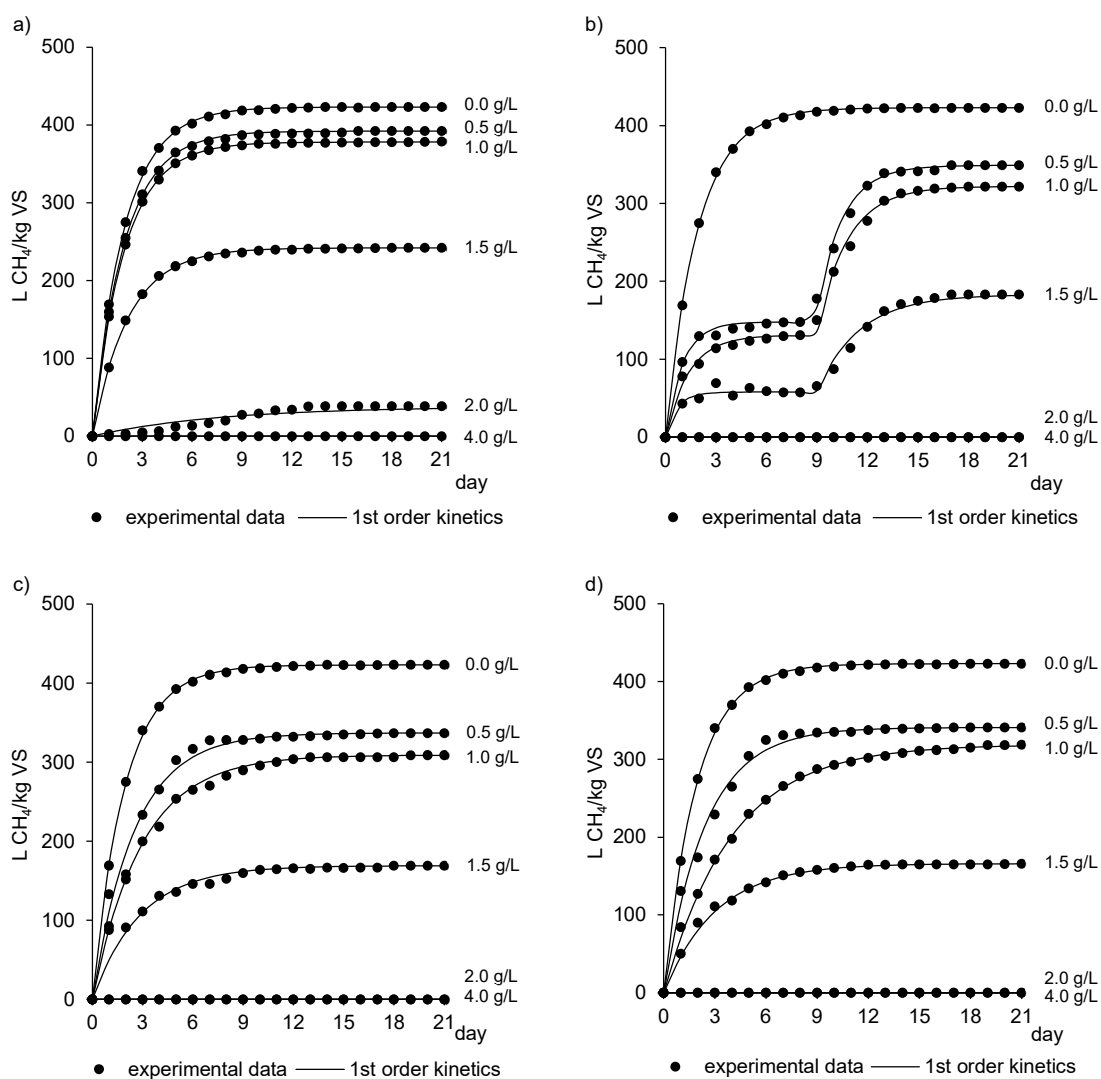
Individual phenolic acids in distillery stillage inhibit its biomethanization

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Supplementary Materials



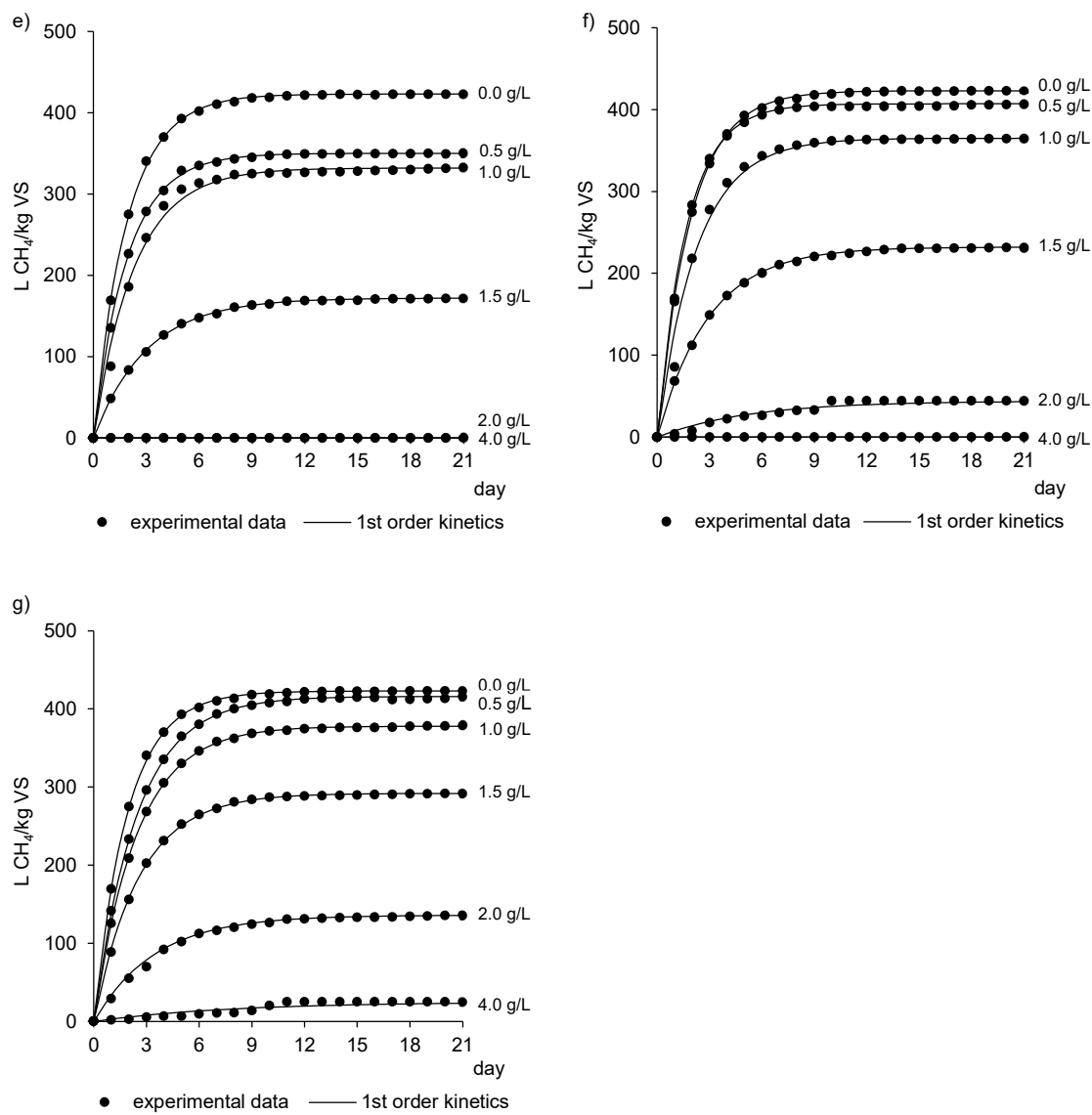


Figure S1. Time course of methane production from distillery stillage with a) *p*-OH benzoic, b) vanillic, c) ferulic, d) syringic, e) *p*-coumaric, f) sinapic, g) mixture of phenolic acids

Table S1. Biogas production

Type of sample	Biogas production	
	L/kg VS	L/kg Fresh Mass
control sample	544.88	43.25
0.5 g/L p-OH benzoic	510.20	40.50
1 g/L p-OH benzoic	497.87	39.52
1.5 g/L p-OH benzoic	395.33	31.38
2 g/L p-OH benzoic	70.81	5.62
4 g/L p-OH benzoic	0	0
0.5 g/L vanillic	469.42	37.26
1 g/L vanillic	445.44	35.36
1.5 g/L vanillic	303.52	24.09
2 g/L vanillic	0	0
4 g/L vanillic	0	0
0.5 g/L ferulic	457.62	36.32
1 g/L ferulic	428.74	34.03
1.5 g/L ferulic	289.11	22.95
2 g/L ferulic	0	0
4 g/L ferulic	0	0
0.5 g/L syringic	463.95	36.83
1 g/L syringic	437.45	34.72
1.5 g/L syringic	276.39	21.94
2 g/L syringic	0	0
4 g/L syringic	0	0
0.5 g/L <i>p</i> -coumaric	481.61	38.23
1 g/L <i>p</i> -coumaric	462.54	36.71
1.5 g/L <i>p</i> -coumaric	285.87	22.69
2 g/L <i>p</i> -coumaric	0	0
4 g/L <i>p</i> -coumaric	0	0
0.5 g/L sinapic	531.02	42.15
1 g/L sinapic	484.54	38.46
1.5 g/L sinapic	361.49	28.69
2 g/L sinapic	79.40	6.30
4 g/L sinapic	0	0
0.5 g/L mixture of phenolic acids	539.38	42.81

1 g/L mixture of phenolic acids	496.30	39.39
1.5 g/L mixture of phenolic acids	428.67	34.03
2 g/L mixture of phenolic acids	215.78	17.13
4 g/L mixture of phenolic acids	48.58	3.86

Table S2. Characteristics of digestate in series 1 and 2

Type of sample	Removal efficiency (%)					Anaerobic digestion indicators				
	TS	VS	COD	TOC	DOC	pH	Alkalinity (meq/L)	VFAs (mg/L)	Ammonium nitrogen (mg/L)	TP (mg/L)
control sample	54.1	57.2	54.7	65.1	59.5	7.42	191.5	1547.8	342.2	192.7
0.5 g/L p-OH benzoic	52.1	57.5	53.7	65.8	58.3	7.39	186.4	1623.9	302.0	195.3
1 g/L p-OH benzoic	50.3	55.4	51.5	62.9	56.4	7.38	176.0	1845.34	385.6	218.7
1.5 g/L p-OH benzoic	47.5	53.8	51.3	60.5	53.7	7.34	169.1	2037.4	435.9	257.3
2 g/L p-OH benzoic	45.8	46.5	42.9	51.2	48.9	7.35	158.8	2579.0	548.7	289.1
4 g/L p-OH benzoic	18.2	21.4	25.8	27.1	23.4	7.29	135.4	3056.2	632.6	315.1
0.5 g/L vanillic	50.3	55.9	53.7	61.4	55.3	7.42	184.2	1396.8	312.5	187.3
1 g/L vanillic	49.2	54.4	52.7	60.4	54.7	7.40	175.4	1436.9	368.2	191.2
1.5 g/L vanillic	47.2	53.2	51.0	58.1	52.3	7.36	162.2	1968.3	465.7	199.8
2 g/L vanillic	44.9	47.2	41.5	49.2	47.6	7.29	151.6	2498.7	501.4	256.4
4 g/L vanillic	16.6	20.3	27.3	25.2	21.3	7.18	134.5	3125.7	598.7	298.7
0.5 g/L ferulic	46.7	50.2	49.7	58.5	51.1	7.38	180.5	1498.7	294.7	202.4
1 g/L ferulic	46.4	51.1	49.3	55.5	51.8	7.35	165.8	1758.3	385.7	257.2
1.5 g/L ferulic	45.4	51.2	47.4	55.6	52.4	7.23	148.2	2145.1	537.3	289.5
2 g/L ferulic	37.3	43.0	40.5	48.4	44.7	7.04	135.2	2745.4	602.7	328.7
4 g/L ferulic	12.2	16.3	23.6	25.3	19.5	6.89	127.4	3423.5	658.2	368.6
0.5 g/L syringic	47.3	50.5	50.3	60.1	53.2	7.35	182.1	1475.7	285.5	189.7
1 g/L syringic	46.6	50.5	50.2	60.2	52.4	7.35	168.7	1859.3	367.0	199.0

1.5 g/L syringic	46.7	49.9	48.5	57.2	52.0	7.29	154.2	2036.4	498.4	222.8
2 g/L syringic	39.3	44.9	41.2	47.7	42.3	6.98	139.5	2746.9	572.1	243.7
4 g/L syringic	15.1	17.8	22.3	26.8	21.4	6.88	132.3	3356.3	682.7	287.5
0.5 g/L <i>p</i> -coumaric	48.2	53.3	53.3	57.3	53.5	7.32	181.5	1368.5	302.2	192.7
1 g/L <i>p</i> -coumaric	47.9	52.5	52.3	57.7	51.4	7.29	179.0	1689.6	375.2	195.4
1.5 g/L <i>p</i> -coumaric	46.7	52.4	51.3	56.4	50.5	7.21	157.4	2584.0	453.3	207.1
2 g/L <i>p</i> -coumaric	39.0	42.6	39.6	49.4	42.9	7.01	139.9	2987.7	503.5	267.0
4 g/L <i>p</i> -coumaric	13.2	18.4	23.9	25.6	19.8	6.85	128.6	3398.9	628.0	330.2
0.5 g/L sinapic	52.5	55.4	53.2	62.5	57.0	7.42	185.2	1589.6	298.8	189.6
1 g/L sinapic	51.2	54.4	53.4	59.7	55.6	7.41	168.2	1687.6	328.5	193.6
1.5 g/L sinapic	43.0	54.0	53.5	57.7	52.8	7.38	159.1	1789.6	402.9	201.3
2 g/L sinapic	42.8	45.7	41.6	49.9	47.6	7.29	142.8	2368.9	447.2	231.6
4 g/L sinapic	17.5	19.5	24.9	26.5	23.1	7.13	138.2	2975.4	587.6	304.8
0.5 g/L mixture of phenolic acids	50.4	57.3	51.0	63.4	58.2	7.36	191.7	1565.3	306.3	168.0
1 g/L mixture of phenolic acids	49.2	57.6	52.5	64.6	58.4	7.38	183.6	1668.6	357.5	181.3
1.5 g/L mixture of phenolic acids	46.6	55.4	52.5	65.7	57.5	7.31	163.4	1863.9	405.6	195.7
2 g/L mixture of phenolic acids	44.7	45.4	43.7	52.0	48.3	7.18	150.1	2038.5	501.2	278.6
4 g/L mixture of phenolic acids	18.3	21.6	27.7	29.4	23.3	7.09	134.2	3075.3	625.4	358.5