



Retention time (min)	Organic acid
2.97	Tartaric
3.18	Malic
3.34	Lactic
3.65	Citric
3.97	Succinic
4.42	Fumaric
7.80	Butyric

Supplementary Figure 1. HPLC chromatogram of organic acids standards and retention times.

Supplementary Table S1. Cell viability and pH profile of the fermentations at the three different substrate concentrations (wheat and soy-flour) and MM for 24 h with the co-cultures

	Time (h)	0	4	8	12	24
MM	pH	6.12 ± 0.07	5.95 ± 0.08	5.40 ± 0.11	5.13 ± 0.07	4.06 ± 0.08
	viability	7.40 ± 0.33	8.01 ± 0.27	9.30 ± 0.24	10.39 ± 0.31	11.51 ± 0.47
Batch A	pH	6.24 ± 0.03	5.97 ± 0.05	5.66 ± 0.14	5.11 ± 0.02	4.14 ± 0.03
	viability	6.20 ± 0.26	7.01 ± 0.31	8.30 ± 0.35	8.34 ± 0.28	10.77 ± 0.45
Batch B	pH	6.24 ± 0.06	5.91 ± 0.11	5.74 ± 0.05	5.41 ± 0.09	4.23 ± 0.04
	viability	6.11 ± 0.13	6.42 ± 0.35	7.98 ± 0.26	8.50 ± 0.21	10.99 ± 0.37
Batch C	pH	6.25 ± 0.07	5.82 ± 0.14	5.41 ± 0.14	5.07 ± 0.11	4.22 ± 0.07
	viability	6.42 ± 0.19	6.87 ± 0.23	8.08 ± 0.28	8.46 ± 0.24	10.28 ± 0.41

Results (displayed as mean values ±SD, n = 3), MM – model media; batch A - 90% WF enriched with 10% SF; batch B - 95% WF enriched with 5% SF; batch C - 100% WF.

Supplementary Table S2. Standard deviation of storage (G') and loss (G'') shear moduli for 100% wheat flour with *LP + LC* co-cultures.

[rad/s]	SM.0	LM.0	SM.4	LM.4	SM.10	LM.10	SM.24	LM.24
0.943	455.73 ± 3.6	334.53 ± 4.6	439.19 ± 5.1	338.41 ± 3.3	572.67 ± 4.8	383.66 ± 5.1	381.33 ± 8.5	275.23 ± 4.1
1.73	481.85 ± 11	329.28 ± 7.2	426.23 ± 8.5	321.23 ± 5	606.1 ± 8.6	386.07 ± 4.4	450.05 ± 11	337.92 ± 4.6
2.13	484.07 ± 9.7	336.42 ± 5.6	466.37 ± 7.1	321.78 ± 2.8	630.62 ± 2.9	390.29 ± 1.7	461.89 ± 5.6	338.05 ± 3.9
3.91	497.02 ± 12	339.03 ± 4.3	467.86 ± 2.1	308.7 ± 9	649.06 ± 8.5	394.74 ± 3.9	484.22 ± 6.8	365.68 ± 6.8
7.19	521.71 ± 8.5	355.06 ± 8.4	510.92 ± 6.2	318.09 ± 1.8	710.96 ± 4.2	412.32 ± 2.8	509.26 ± 9.1	394.28 ± 5.5
13.2	546.24 ± 7.2	362.44 ± 6.6	522.44 ± 9.5	343.23 ± 8.5	743.5 ± 1.1	426.47 ± 7.5	523.24 ± 6.4	442.01 ± 10
24.3	564.6 ± 10.1	394.06 ± 5.8	568.28 ± 11	374.83 ± 3.3	769.93 ± 9.7	471.37 ± 11	555.6 ± 5.7	435.52 ± 11.1
54.8	571.57 ± 9.3	411.75 ± 9.1	566.03 ± 5.6	381.5 ± 6.8	822.22 ± 6.1	496.83 ± 2.3	585.65 ± 3.8	461.33 ± 8.9
67.2	623.09 ± 8.8	444.03 ± 11	582.56 ± 7.1	395.84 ± 2.3	868.43 ± 11	532.36 ± 5.2	594.5 ± 4.1	490.58 ± 7.1
82.3	653.68 ± 10	476.94 ± 7.3	600.05 ± 5.2	401.28 ± 4.3	928.59 ± 8.5	577.68 ± 7.1	608.17 ± 5.8	538.53 ± 4.9
101	687.55 ± 9.4	510.23 ± 7.7	592.38 ± 9.8	410.34 ± 5.2	973.16 ± 9.9	613.36 ± 9	691.85 ± 6.7	564.81 ± 6.1
124	701.91 ± 5.5	534.07 ± 6.8	624.91 ± 5.4	434.38 ± 9.5	1021.4 ± 3.6	678.67 ± 7.6	761.18 ± 3.5	601.12 ± 10
151	702.76 ± 6.4	556.42 ± 6.4	651.26 ± 6.3	462.61 ± 5.8	1121.8 ± 1.9	729 ± 11.3	846.64 ± 2.2	644.9 ± 13.4
186	713.51 ± 7.1	586.63 ± 7.1	674.34 ± 8.3	502.17 ± 8	1256 ± 4.1	797.55 ± 3.4	959.31 ± 3.8	697.17 ± 5.6
227	747.71 ± 12	613.76 ± 8.2	695.19 ± 9	551.57 ± 5.2	1435.6 ± 9.5	869.51 ± 6.7	1041.9 ± 4.9	725.08 ± 2.8
279	777.95 ± 9.9	634.3 ± 4.1	750.98 ± 1.2	599.03 ± 5.6	1715.8 ± 6.7	958.14 ± 5.5	1130.6 ± 6.7	742.41 ± 8.9
341	778.08 ± 14	665.96 ± 12	773.98 ± 4.1	620.61 ± 8.9	1924.1 ± 7.4	992.64 ± 2.4	1214.5 ± 3.2	771.98 ± 1.9
418	802.52 ± 8.7	679.9 ± 9.1	781.95 ± 5.7	648.57 ± 4.4	2557.7 ± 1.2	1089.9 ± 1.7	1332.4 ± 12	774.44 ± 5.1
513	811.12 ± 3.4	711.34 ± 1.7	779.87 ± 8.1	678.89 ± 3.2	3259.6 ± 8.9	1178.1 ± 6.7	1696.3 ± 7.8	843.59 ± 6.8
628	816.62 ± 11	742.19 ± 5.9	790 ± 12.2	709.63 ± 11	3578.6 ± 7.1	1398.6 ± 8.2	1743.4 ± 9.3	1102.4 ± 7.1

Results (displayed as mean values ±SD, n = 3), SM – storage modulus, LM – loss modulus.

Supplementary Table S3. Standard deviation of storage (G') and loss (G'') shear moduli for 95% wheat flour and 5% soy flour with $LP + LC$ co-cultures.

[rad/s]	SM.0	LM.0	SM.4	LM.4	SM.10	LM.10	SM.24	LM.24
0.943	1957.3 ± 9.9	821.35 ± 7.4	2014.2 ± 7.1	695.37 ± 8.1	1723.4 ± 3.5	645.69 ± 1.9	1126.5 ± 5.6	544.71 ± 13
1.73	2281 ± 8.3	841.82 ± 5.9	2120.8 ± 1.4	711.04 ± 4.6	1850.9 ± 8.2	650.08 ± 5.7	1227.3 ± 7.7	551.26 ± 5.6
2.13	2473.5 ± 7.4	899.06 ± 6.1	2213.9 ± 5.6	708.14 ± 3.1	1956.4 ± 2.6	648.03 ± 12.1	1319.8 ± 8.7	572.62 ± 3.7
3.91	2634.6 ± 11	944.89 ± 3.7	2278.7 ± 3.6	714.92 ± 9.4	2028.4 ± 4.7	696.45 ± 6.7	1413.6 ± 9.8	599.3 ± 6.8
7.19	2731.9 ± 5.6	996.57 ± 9.4	2394.5 ± 5.2	717.2 ± 11.6	2123.2 ± 5.6	740.62 ± 8.1	1476.5 ± 14	619.64 ± 9.9
13.2	2777.3 ± 4.3	1006.7 ± 7.5	2418.4 ± 5	746.26 ± 7.9	2217.2 ± 3.7	756.42 ± 9.8	1575.2 ± 5.6	636.56 ± 3.8
24.3	2859.4 ± 8.1	1016.1 ± 4.4	2507.1 ± 7.5	758.98 ± 6.8	2332.6 ± 5.5	807.5 ± 2.8	1650.5 ± 6.7	666.52 ± 3.7
54.8	2979 ± 7.9	1059.8 ± 9.2	2550 ± 7.2	773.56 ± 4.7	2462.8 ± 10	844.23 ± 4.4	1745.3 ± 7.4	692.26 ± 1.9
67.2	3106.8 ± 10	1068.9 ± 2.5	2653.1 ± 1.9	850 ± 12.3	2587 ± 9.1	892.4 ± 5.6	1791.2 ± 6.3	707.73 ± 3.6
82.3	3247.2 ± 1.3	1121.8 ± 5.1	2779.1 ± 5.1	879.54 ± 8.7	2725.6 ± 6.7	943.08 ± 7.4	1839.3 ± 3.7	733.24 ± 7.1
101	3397.9 ± 5.6	1181.2 ± 7.9	2914 ± 4.1	932.66 ± 3.9	2848.7 ± 1.9	1005.1 ± 6.5	1941.9 ± 6.6	773.45 ± 6.5
124	3602.4 ± 6.8	1272.9 ± 4.2	3056.6 ± 4.2	999.38 ± 9.1	2974.1 ± 2.6	1102.6 ± 3.7	2016.8 ± 9	832.18 ± 5.1
151	3847.3 ± 7.8	1372.3 ± 7.5	3206.8 ± 8.8	1078.2 ± 5.3	3164.2 ± 7.4	1190.8 ± 4.1	2141.2 ± 7.2	901.74 ± 3.7
186	3962.3 ± 5.5	1426.4 ± 2.7	3338 ± 2.7	1172.7 ± 5.9	3249.7 ± 8.7	1241.2 ± 3.7	2305.5 ± 5.9	985.19 ± 8.1
227	4103 ± 7.8	1496.1 ± 8.7	3493.9 ± 8.4	1284 ± 6.7	3337.1 ± 3.6	1297.5 ± 7.8	2482.7 ± 6.4	1073.3 ± 1.9
279	4288.7 ± 8.4	1563.9 ± 1.2	3632.9 ± 3.8	1398 ± 8.8	3551.8 ± 6.4	1418.8 ± 2.4	2752.2 ± 3.4	1187.2 ± 3.3
341	4508.7 ± 4.1	1640.1 ± 11	3663.9 ± 2.4	1537 ± 5.9	3671.2 ± 5.2	1486 ± 9.7	3136.4 ± 5.2	1308.4 ± 7.6
418	5033.9 ± 8.7	1779.9 ± 10.3	3749.1 ± 3.9	1692.4 ± 6	3814.4 ± 5.4	1540 ± 3.4	3372.3 ± 6.2	1353.6 ± 8.4
513	5483.4 ± 8.5	1953.3 ± 8.6	3898.6 ± 2.5	1840 ± 5.7	3944.4 ± 2.2	1603.9 ± 6.6	3830.8 ± 9.7	1503.9 ± 2.4
628	5509.4 ± 11.1	1905.9 ± 3.6	4017.4 ± 6.7	2121 ± 8.9	4079.7 ± 3.7	1792.4 ± 10	4225.2 ± 9.4	1726.7 ± 7.8

Results (displayed as mean values ±SD, n = 3), SM – storage modulus, LM – loss modulus.

Supplementary Table S4. Standard deviation of storage (G') and loss (G'') shear moduli for 90% wheat flour and 10% soy flour with $LP + LC$ co-cultures.

[rad/s]	SM.0	LM.0	SM.4	LM.4	SM.10	LM.10	SM.24	LM.24
0.943	1695 ± 1.8	691.2 ± 6.4	1522.6 ± 8.9	665.24 ± 2.9	2734 ± 7.2	891.39 ± 5.6	1853.9 ± 11	725.28 ± 7.7
1.73	1837.8 ± 7.4	707.1 ± 3.4	1661.9 ± 2.2	679.64 ± 5	2946.8 ± 7.7	931.88 ± 4.7	2046.8 ± 8.4	754.62 ± 8.4
2.13	1876.2 ± 13	715.4 ± 4.7	1705.1 ± 3.8	692.37 ± 3.5	3021.3 ± 13.1	941.34 ± 1.4	2106.3 ± 7.6	763.94 ± 10.6
3.91	2001.4 ± 2.6	758.6 ± 5.6	1834.6 ± 10.8	722.6 ± 8.8	3256.4 ± 10.7	1006.8 ± 5.4	2268.4 ± 2.8	817.31 ± 3.1
7.19	2141 ± 5.9	815.77 ± 11	1977.1 ± 7.1	763.36 ± 5.4	3458.1 ± 4.1	1103.7 ± 8.4	2432.8 ± 5.3	888.97 ± 13.5
13.2	2321.3 ± 6.9	899.93 ± 7.9	2129 ± 4.9	843.83 ± 7.4	3763.1 ± 7.2	1224.2 ± 7.1	2639.4 ± 5.9	980.64 ± 5.6
24.3	2495.7 ± 4.6	1000 ± 8.9	2286.1 ± 3.5	916.4 ± 4.8	4052 ± 7.9	1357.4 ± 9.4	2853 ± 14.1	1093.1 ± 6.7
54.8	2670.2 ± 5.9	1118.5 ± 6.4	2473.4 ± 4.4	1012 ± 8.5	4377.9 ± 3.1	1534.5 ± 5.7	3090.1 ± 6.8	1226.7 ± 8.7
67.2	2707.9 ± 9.2	1176.6 ± 5.4	2511.4 ± 9.3	1057.2 ± 4.4	4490.9 ± 9.8	1598 ± 3.7	3167.7 ± 6.5	1280.5 ± 3.9
82.3	2778.5 ± 4.7	1230.4 ± 3.1	2590.7 ± 6.8	1109.2 ± 3.1	4585.5 ± 15	1679.9 ± 8.1	3244.4 ± 5.3	1348.7 ± 4.5
101	2859.2 ± 3	1282.1 ± 9.8	2706.9 ± 6	1153.2 ± 8.4	4705.4 ± 9.7	1764.4 ± 5.9	3369.3 ± 1.5	1411.7 ± 6.1
124	2919 ± 12.4	1343.2 ± 6.1	2815.8 ± 5.1	1209.3 ± 2.4	4824.8 ± 6.4	1849.9 ± 4.9	3486.5 ± 4.3	1480.3 ± 7.4
151	2959.8 ± 5.6	1407 ± 5.3	2936.3 ± 9.3	1268.6 ± 5.6	4938.7 ± 4.1	1943.4 ± 3.7	3593.3 ± 4.8	1554.4 ± 8.9
186	2961.5 ± 7.1	1473.9 ± 6.1	3063.8 ± 6.9	1318.8 ± 3.8	4998.3 ± 7.8	2043.3 ± 5.3	3717.4 ± 8.4	1635.4 ± 10.6
227	2953 ± 10.5	1546.2 ± 7.2	3229.7 ± 1.4	1383 ± 5.6	5014.9 ± 3.3	2148.5 ± 9.1	3846.5 ± 8.9	1724.4 ± 5.9
279	2900.8 ± 9.8	1612.3 ± 8	3450.4 ± 14	1448.2 ± 1.8	5010.6 ± 1.6	2260.5 ± 8.8	4006.8 ± 13.2	1813.9 ± 9.7
341	2772.1 ± 4.8	1709.2 ± 3.6	3734.7 ± 101	1520.9 ± 2.2	4929 ± 3.6	2372 ± 5.3	4174.8 ± 8.9	1914.4 ± 8.4
418	2490.3 ± 7.4	1761.2 ± 8.6	4094.9 ± 3.7	1581.2 ± 6.1	4722.3 ± 11.2	2482.3 ± 3.7	4374.3 ± 9.6	2006.9 ± 4.6
513	1953.6 ± 7.9	1826.9 ± 3.5	4538.6 ± 2.1	1661.2 ± 5.9	4293.4 ± 6.6	2586 ± 4.7	4532.2 ± 5.7	2113.5 ± 3.2
628	1418.6 ± 8.8	1873.7 ± 3.1	5362.5 ± 5.5	1814.6 ± 6.7	3707.2 ± 11	2818.3 ± 9.7	4936.2 ± 8.7	2338.4 ± 2.4

Results (displayed as mean values ±SD, n = 3), SM – storage modulus, LM – loss modulus.