Supplementary materials Table S2. Volatiles (GC-MS Peak Area × 10^6) detected in the native *SSP* & *FAAs* model under different heating conditions

No.	RT (min)	Substances	100 ℃, 30 min	100 ℃, 60 min	100 ℃, 90 min	100 ℃, 120 min	100 ℃, 150 min
1	3.704	2-methylfural	0.72 ± 0.02^{Dc}	2.27 ± 0.24^{Ca}	3.31 ± 0.02^{Ba}	5.19 ± 0.05^{Aa}	5.27 ± 0.09^{Aa}
2	7.139	Hexanal	0.97 ± 0.05^{Bb}	0.98 ± 0.04^{Bd}	0.84 ± 0.02^{Cd}	0.85 ± 0.01^{Cd}	1.05 ± 0.03^{Ad}
3	8.873	2-Heptanone	0.12 ± 0.03^{Ce}	0.14 ± 0.003^{BCf}	0.15 ± 0.002^{Bg}	0.16 ± 0.001^{Bf}	0.19 ± 0.004^{Ah}
4	8.906	Heptanal	0.2 ± 0.005^{Cd}	0.27 ± 0.01^{Be}	0.26 ± 0.003^{BCf}	0.45 ± 0.08^{Be}	0.31 ± 0.01^{Af}
5	9.573	Pyrazine	ND	ND	ND	ND	ND
6	9.857	2-pentylfural	1.24 ± 0.18^{Da}	2.13 ± 0.03^{Cb}	2.4 ± 0.13^{Cb}	3.52 ± 0.26^{Bb}	4.31 ± 0.01^{Ag}
7	10.915	2-methylpyrazine	ND	ND	0.13 ± 0.01^{Cg}	0.21 ± 0.05^{Bf}	0.36 ± 0.03^{Ae}
8	12.874	2,5(6)-dimethylpyrazine	ND	0.04 ± 0.002^{Dg}	0.05 ± 0.003^{Ch}	0.16 ± 0.002^{Bf}	0.18 ± 0.001^{Ah}
9	13.074	2-ethylpyrazine	ND	ND	ND	ND	ND
10	13.508	2,3-dimethylpyrazine	ND	ND	ND	ND	ND
11	14.933	Nonanal	1.30 ± 0.01^{Ca}	1.64 ± 0.004^{Bc}	1.64 ± 0.02^{Bc}	2.48 ± 0.12^{Ac}	2.52 ± 0.02^{Af}
12	15.108	2-ethyl-5-methylpyrazine	ND	ND	ND	ND	ND
13	15.508	2, 3, 5-trimethylpyrazine	ND	ND	ND	ND	ND
14	15.517	2-ethyl-3-methylpyrazine	ND	ND	ND	ND	ND
15	16.834	3-ethyl-2,5-dimethylpyrazine	ND	ND	ND	ND	ND
16	17.284	Furfural	ND	ND	ND	0.25 ± 0.01^{Af}	0.25 ± 0.03^{Ag}
17	17.860	2-methyl-5-propylpyrazine	ND	ND	ND	ND	ND
18	18.343	3,5-diethyl-2-methylpyrazine	ND	ND	ND	ND	ND
19	22.936	2-Furanylmethanol	ND	0.25 ± 0.01^{Ce}	0.51 ± 0.01^{Be}	0.93 ± 0.07^{Ad}	0.29 ± 0.004^{Cfg}
		Total pyrazines	0	0.04	0.18	0.37	0.54
		Pyrazines (%of total GC-MS peak area)	0	0.52	1.94	2.61	3.67

No.	RT (min)	Substances	110 ℃, 30 min	110 ℃, 60 min	110 ℃, 90 min	110 ℃, 120 min	110 ℃, 150 min
1	3.704	2-methylfural	2.99±1.02^{Ba}	5.78±0.08^{Aa}	5.78±2.64^{Aa}	6.07±0.07^{Aa}	0.80±0.01^{Ca}
2	7.139	Hexanal	1.32±0.02^{Ab}	0.92±0.06^{Be}	0.93±0.03^{Bc}	0.94±0.02^{Be}	0.08±0.001^{Cf}
3	8.873	2-Heptanone	0.17±0.01^{Bc}	0.17±0.002^{Bg}	0.17±0.001^{Bc}	0.2±0.004^{Ag}	0.04±0.001^{Cg}
4	8.906	Heptanal	ND	ND	ND	ND	ND
5	9.573	Pyrazine	ND	ND	ND	ND	0.04±0.002^{g}
6	9.857	2-pentylfural	2.54±0.02^{Da}	3.75±0.03^{Cb}	4.11±0.08^{Ba}	4.45±0.02^{Ab}	0.76±0.01^{Eb}
7	10.915	2-methylpyrazine	0.06±0.002^{Dc}	0.15±0.004^{Cg}	0.18±0.002^{Bc}	0.22±0.02^{Ag}	0.04±0.002^{Eg}
8	12.874	2,5(6)-dimethylpyrazine	0.03±0.002^{Dc}	0.04±0.001^{Ch}	0.06±0.001^{Bc}	0.07±0.003^{Ah}	0.01±0.001^{Eh}
9	13.074	2-ethylpyrazine	ND	ND	ND	ND	ND
10	13.508	2,3-dimethylpyrazine	ND	ND	ND	ND	ND
11	14.933	Nonanal	2.53±0.02^{Ba}	3.02±0.18^{Af}	2.64±0.004^{Bb}	3.28±0.28^{Ac}	0.32±0.02^{Cc}
12	15.108	2-ethyl-5-methylpyrazine	ND	ND	0.01±0.002^{Bc}	0.02±0.001^{Ah}	ND
13	15.508	2, 3, 5-trimethylpyrazine	ND	ND	ND	ND	ND
14	15.517	2-ethyl-3-methylpyrazine	ND	ND	ND	ND	ND
15	16.834	3-ethyl-2,5-dimethylpyrazine	ND	ND	ND	ND	ND
16	17.284	Furfural	0.11±0.01^{Dc}	0.3±0.002^{Bf}	0.28±0.005^{Cc}	0.43±0.02^{Af}	0.11±0.01^{De}
17	17.860	2-methyl-5-propylpyrazine	ND	ND	ND	ND	ND
18	18.343	3,5-diethyl-2-methylpyrazine	ND	ND	ND	ND	ND
19	22.936	2-Furanylmethanol	0.33±0.02^{Cc}	1.06±0.06^{Bd}	1.03±0.03^{Bc}	1.50±0.03^{Ad}	0.23±0.02^{Dd}
		Total pyrazines	0.09	0.19	0.25	0.31	0.09
		Pyrazines (%of total GC-MS peak area)	0.89	1.25	1.65	1.80	3.70

No.	RT (min)	Substances	120 ℃, 30 min	120 ℃, 60 min	120 ℃, 90 min	120 ℃, 120 min	120 ℃, 150 min
1	3.704	2-methylfural	2.67±0.13^{Da}	4.02±0.02^{Ba}	3.57±0.03^{Ca}	4.58±0.08^{Aa}	4.14±0.14^{Ba}
2	7.139	Hexanal	0.78±0.004^{Be}	0.59±0.001^{Ce}	0.58±0.08^{Ce}	1.18±0.10^{Ae}	1.10±0.04^{Ae}
3	8.873	2-Heptanone	0.14±0.004^{Ag}	0.13±0.002^{Bg}	ND	ND	ND
4	8.906	Heptanal	ND	ND	ND	ND	ND
5	9.573	Pyrazine	ND	ND	ND	ND	ND
6	9.857	2-pentylfural	2.00±0.03^{Ec}	3.10±0.02^{Bc}	2.54±0.04^{Dc}	3.52±0.06^{Ac}	3.03±0.03^{Cc}
7	10.915	2-methylpyrazine	0.06±0.002^{Ch}	0.14±0.003^{Ag}	0.12±0.01^{Bg}	0.11±0.002^{Bg}	0.12±0.01^{Bg}
8	12.874	2,5(6)-dimethylpyrazine	0.02±0.001^{Da}	ND	0.08±0.002^{Ch}	0.10±0.01^{Bg}	0.15±0.01^{Ag}
9	13.074	2-ethylpyrazine	ND	ND	0.02±0.001^{Bi}	0.04±0.002^{Ah}	0.02±0.001^{Ba}
10	13.508	2,3-dimethylpyrazine	ND	ND	ND	ND	ND
11	14.933	Nonanal	2.61±0.01^{Eb}	3.29±0.09^{Cb}	2.89±0.01^{Db}	4.37±0.03^{Ab}	3.91±0.01^{Bb}
12	15.108	2-ethyl-5-methylpyrazine	ND	ND	0.03±0.001^{Ai}	ND	0.03±0.003^{Ah}
13	15.508	2, 3, 5-trimethylpyrazine	ND	ND	ND	ND	ND
14	15.517	2-ethyl-3-methylpyrazine	ND	ND	ND	ND	ND
15	16.834	3-ethyl-2,5-dimethylpyrazine	ND	ND	ND	ND	ND
16	17.284	Furfural	0.29±0.004^{Df}	0.51±0.002^{Af}	0.44±0.004^{Bf}	0.50±0.01^{Af}	0.42±0.01^{Cf}
17	17.860	2-methyl-5-propylpyrazine	ND	ND	ND	ND	ND
18	18.343	3,5-diethyl-2-methylpyrazine	ND	ND	ND	ND	ND
19	22.936	2-Furanylmethanol	0.89±0.01^{Dd}	1.71±0.09^{Cd}	1.64±0.01^{Cd}	2.02±0.02^{Bd}	2.2±0.07^{Ad}
		Total pyrazines	0.08	0.14	0.25	0.25	0.32
		Pyrazines (%of total GC-MS peak area)	0.85	1.04	2.10	1.52	2.12

No.	RT (min)	Substances	130 ℃, 30 min	130 ℃, 60 min	130 ℃, 90 min	130 ℃, 120 min	130 ℃, 150 min
1	3.704	2-methylfural	3.06 ± 0.04^{Ea}	3.82 ± 0.08^{Da}	4.85 ± 0.09^{Cb}	6.14 ± 0.06^{Ab}	5.24 ± 0.11^{Bb}
2	7.139	Hexanal	0.51 ± 0.03^{Be}	0.46 ± 0.01^{Ce}	0.48 ± 0.01^{Ce}	0.73 ± 0.002^{Ae}	0.38 ± 0.01^{Dd}
3	8.873	2-Heptanone	ND	ND	ND	ND	ND
4	8.906	Heptanal	ND	ND	ND	ND	ND
5	9.573	Pyrazine	0.06 ± 0.002^{Eh}	0.11 ± 0.001^{Dg}	0.12 ± 0.01^{Ch}	0.14 ± 0.004^{Ai}	0.13 ± 0.001^{Bfg}
6	9.857	2-pentylfural	2.81 ± 0.01^{Eb}	3.59 ± 0.01^{Bb}	3.24 ± 0.02^{Dc}	4.71 ± 0.02^{Ac}	3.42 ± 0.004^{Cc}
7	10.915	2-methylpyrazine	0.06 ± 0.002^{Bh}	0.06 ± 0.001^{Bh}	0.07 ± 0.01^{Ai}	0.07 ± 0.002^{Aj}	0.07 ± 0.003^{Agh}
8	12.874	2,5(6)-dimethylpyrazine	0.05 ± 0.001^{Eh}	0.11 ± 0.01^{Dg}	0.16 ± 0.002^{Ch}	0.26 ± 0.001^{Bg}	0.31 ± 0.01^{Ae}
9	13.074	2-ethylpyrazine	0.01 ± 0.001^{Bi}	0.01 ± 0.002^{Bi}	0.25 ± 0.001^{Ag}	0.01 ± 0.001^{Bk}	0.01 ± 0.002^{Bh}
10	13.508	2,3-dimethylpyrazine	0.10 ± 0.002^{g}	ND	ND	ND	ND
11	14.933	Nonanal	2.06 ± 0.06^{Ec}	2.97 ± 0.03^{Dc}	5.07 ± 0.07^{Ca}	7.48 ± 0.02^{Aa}	6.72 ± 0.13^{Ba}
12	15.108	2-ethyl-5-methylpyrazine	0.06 ± 0.001^{Ch}	0.05 ± 0.002^{Dh}	0.04 ± 0.001^{Eij}	0.17 ± 0.003^{Bh}	0.19 ± 0.001^{Af}
13	15.508	2, 3, 5-trimethylpyrazine	ND	ND	ND	ND	ND
14	15.517	2-ethyl-3-methylpyrazine	ND	ND	ND	ND	ND
15	16.834	3-ethyl-2,5-dimethylpyrazine	ND	ND	ND	ND	ND
16	17.284	Furfural	0.37 ± 0.01^{Bf}	0.36 ± 0.001^{Bf}	0.41 ± 0.01^{Af}	0.36 ± 0.01^{Bf}	0.34 ± 0.02^{Ce}
17	17.860	2-methyl-5-propylpyrazine	ND	ND	ND	ND	ND
18	18.343	3,5-diethyl-2-methylpyrazine	ND	ND	ND	ND	ND
19	22.936	2-Furanylmethanol	1.41 ± 0.01^{Dd}	1.56 ± 0.004^{Bd}	1.72 ± 0.01^{Ad}	1.76 ± 0.01^{Ad}	1.5 ± 0.05^{Cd}
		Total pyrazines	0.34	0.34	0.64	0.65	0.71
		Pyrazines (%of total GC-MS peak area)	3.22	2.60	3.90	2.98	3.88

No.	RT (min)	Substances	140 ℃, 30 min	140 ℃, 60 min	140 ℃, 90 min	140 ℃, 120 min	140 ℃, 150 min
1	3.704	2-methylfural	2.73 ± 0.01^{Db}	2.59 ± 0.01^{Ea}	7.69 ± 0.03^{Ba}	15.16 ± 0.06^{Aa}	5.31 ± 0.09^{Ca}
2	7.139	Hexanal	-	-	2.19 ± 0.03^{Bd}	2.42 ± 0.01^{Ag}	ND
3	8.873	2-Heptanone	0.48 ± 0.002^{De}	0.51 ± 0.003^{Ce}	1.35 ± 0.001^{Bg}	1.37 ± 0.004^{Ah}	0.42 ± 0.01^{Ee}
4	8.906	Heptanal	ND	ND	ND	ND	ND
5	9.573	Pyrazine	0.08 ± 0.002^{Ef}	0.17 ± 0.001^{Ch}	0.39 ± 0.002^{Bj}	0.45 ± 0.001^{Am}	0.12 ± 0.001^{Dhi}
6	9.857	2-pentylfural	2.98 ± 0.02^{Ca}	2.45 ± 0.04^{Eb}	7.13 ± 0.13^{Bb}	14.13 ± 0.01^{Ab}	2.83 ± 0.02^{Dc}
7	10.915	2-methylpyrazine	0.04 ± 0.02^{Ci}	0.05 ± 0.002^{Cj}	1.08 ± 0.08^{Af}	0.85 ± 0.02^{Bk}	0.09 ± 0.005^{Cij}
8	12.874	2,5(6)-dimethylpyrazine	0.07 ± 0.001^{Egh}	0.19 ± 0.01^{Dg}	1.43 ± 0.02^{Be}	2.52 ± 0.08^{Af}	0.53 ± 0.02^{Ce}
9	13.074	2-ethylpyrazine	0.02 ± 0.001^{Da}	0.01 ± 0.001^{Dk}	0.32 ± 0.02^{Ak}	0.23 ± 0.004^{Ba}	0.15 ± 0.001^{Ch}
10	13.508	2,3-dimethylpyrazine	ND	ND	0.14 ± 0.004^{l}	ND	ND
11	14.933	Nonanal	1.16 ± 0.001^{Dd}	1.30 ± 0.01^{Cd}	4.95 ± 0.05^{Bc}	9.25 ± 0.09^{Ac}	4.94 ± 0.06^{Bb}
12	15.108	2-ethyl-5-methylpyrazine	0.06 ± 0.001^{Ej}	0.13 ± 0.002^{Di}	0.54 ± 0.001^{Bi}	1.01 ± 0.01^{Aj}	0.22 ± 0.002^{Cg}
13	15.508	2, 3, 5-trimethylpyrazine	ND	ND	ND	0.69 ± 0.01^{Al}	0.07 ± 0.001^{Bj}
14	15.517	2-ethyl-3-methylpyrazine	ND	ND	0.45 ± 0.01^{j}	ND	ND
15	16.834	3-ethyl-2,5-dimethylpyrazine	ND	ND	0.88 ± 0.01^{Bh}	2.86 ± 0.04^{Ae}	0.54 ± 0.002^{Ce}
16	17.284	Furfural	0.42 ± 0.02^{Cf}	0.36 ± 0.004^{Df}	1.04 ± 0.04^{Bg}	1.27 ± 0.03^{Ai}	0.38 ± 0.02^{CDf}
17	17.860	2-methyl-5-propylpyrazine	ND	ND	0.17 ± 0.03^{Bl}	0.24 ± 0.02^{An}	ND
18	18.343	3,5-diethyl-2-methylpyrazine	ND	ND	0.20 ± 0.003^{Bl}	0.24 ± 0.003^{An}	ND
19	22.936	2-Furanylmethanol	1.70 ± 0.003^{Bc}	1.70 ± 0.02^{Bc}	1.29 ± 0.01^{Df}	6.72 ± 0.08^{Ad}	1.39 ± 0.02^{Cd}
		Total pyrazines	0.27	0.55	5.60	9.09	1.72
		Pyrazines (%of total GC-MS peak area)	2.77	5.81	17.93	15.3	10.12

Numbers are represented as the means ± standard deviations.

Mean values with different superscript capital letters in the same row have significant differences *($p<0.05$)*.

Mean values with different superscript small letters in the same column have significant differences at the same temperature *($p<0.05$)*.