

# **Effects of Beer Based Marinades on the Plasmalogen Content and Composition of Grilled Ruminant Meats**

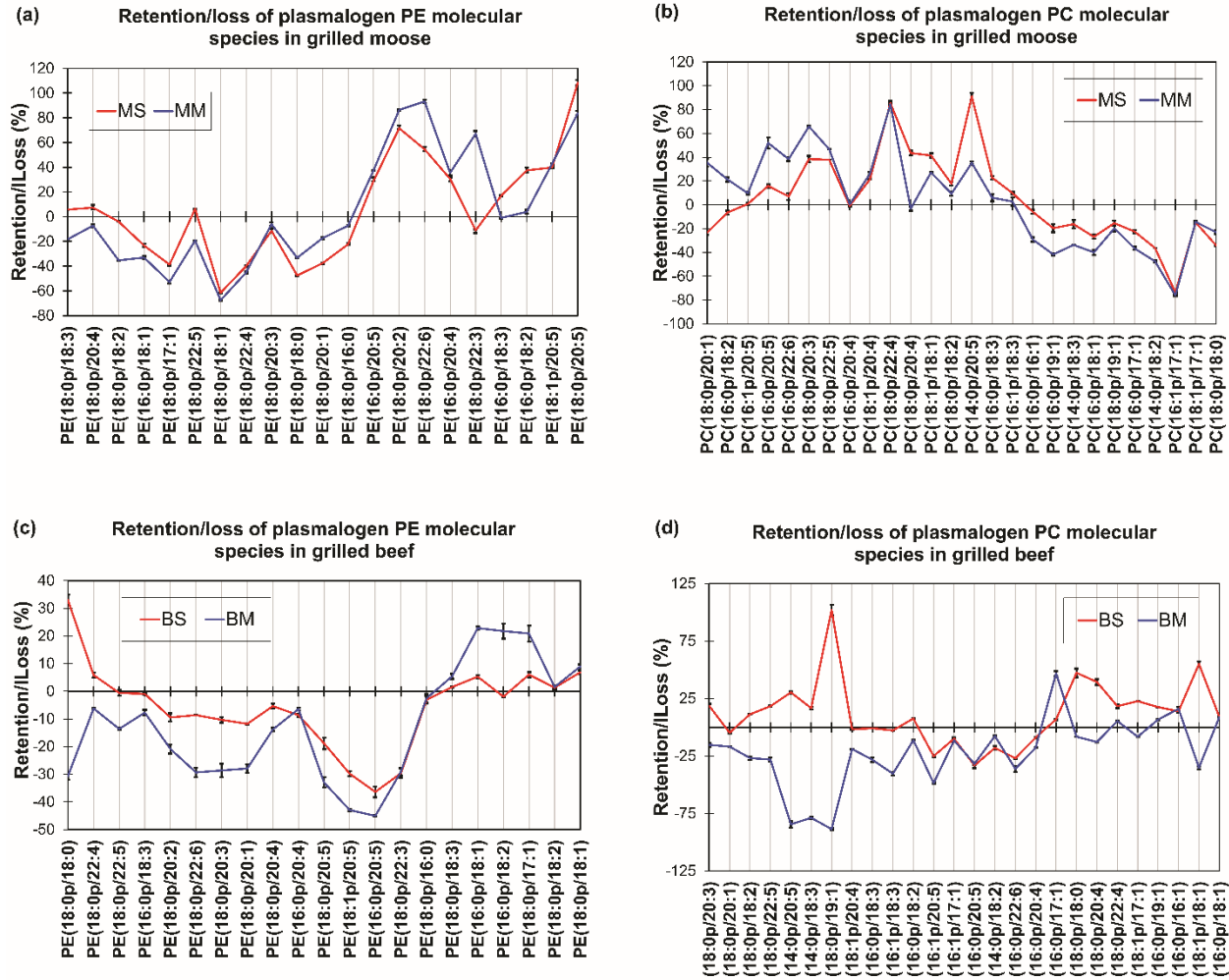
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## Supplementary Material



**Figure S1.** Marination effect on plasmalogen molecular species in grilled meats. Values in plots represent means  $\pm$  standard. Parallel plots showing retention/loss (%) of **a**) pPE molecular species in marinated grilled moose meats **b**) pPC molecular species in marinated grilled moose meats **c**) pPE molecular species in marinated grilled beef **d**) pPC molecular species in marinated grilled beef. [BU, MU] = unmarinated grilled beef and moose; [BM, MM] = India session ale unfiltered beer-based marinated grilled beef and moose; [BS, MS] = Wheat ale unfiltered beer-based marinated grilled beef and moose. PC = phosphatidylcholine. PE = phosphatidylethanolamine. p = Plasmalogen

**Table S1:** Pearson's correlation coefficients showing relationships between antioxidant activities, phenolic contents, oxygenated terpenes, oxidation status and preserved plasmalogen PE molecular species in grilled moose and beef

pPE-Moose	LAA <sup>a</sup>	HAA <sup>a</sup>	LPC	HPC	LAA <sup>b</sup>	HAA <sup>b</sup>	LOS	HOS	1	2	3	4	5	6	7
16:0p/20:5	0.80**	0.89**	0.74*	0.54	0.98**	0.95**	-0.81**	-0.83**	0.89**	0.02	0.59**	0.95**	0.76*	0.86**	0.82**
18:0p/20:2	0.91**	0.84**	0.83**	0.71*	0.96**	0.92**	-0.88**	-0.86**	0.87**	0.0056	0.86**	0.90**	0.77*	0.95**	0.80*
18:0p/22:6	0.77*	0.94**	0.54	0.46	0.95**	0.84**	-0.89**	-0.78*	0.64	0.20	0.67*	0.76*	0.51	0.83**	0.58
16:0p/20:4	0.59	0.51	0.37	0.35	0.62	0.67*	-0.47	-0.56	0.54	0.10	0.62	0.62	0.46	0.55	0.50
18:0p/22:3	0.20	0.80**	0.05	-0.21	0.71*	0.58	-0.49	0.65	0.40	-0.19	0.45	0.58	0.21	0.30	0.34
16:0p/18:2	0.43	-0.22	0.60	0.76*	-0.07	0.07	-0.10	0.16	0.24	0.32	0.16	0.06	0.38	0.37	0.27
18:0p/20:5	0.56	0.22	0.76*	0.61	0.47	0.44	-0.46	-0.70*	0.66	-0.45	0.57	0.54	0.61	0.61	0.57
18:1p/20:5	0.92**	0.84**	0.84**	0.72*	0.96**	0.96**	-0.85**	-0.79*	0.90**	0.14	0.90**	0.93**	0.81**	0.95**	0.84**
pPE-Beef	LAA <sup>a</sup>	HAA <sup>a</sup>	LPC	HPC	LAA <sup>b</sup>	HAA <sup>b</sup>	LOS	HOS	1	2	3	4	5	6	7
18:0p/18:1	-0.25	-0.24	-0.44	0.60	-0.09	0.11	-0.22	0.12	-0.29	-0.47	-0.56	-0.56	-0.56	-0.53	0.03
18:0p/17:1	-0.40	-0.34	-0.49	0.44	0.25	-0.13	0.04	0.40	-0.34	-0.62	-0.66	-0.99	-0.71*	-0.67*	-0.18
18:0p/18:2	0.85**	0.79*	0.91**	0.08	0.74*	0.36	-0.51	-0.71*	0.80**	0.94**	0.86**	0.94**	0.96**	0.95**	0.63
16:0p/18:2	0.79*	0.82**	0.91**	0.06	0.74*	0.38	-0.47	-0.72*	0.83**	0.87**	0.84**	0.82**	0.90**	0.89**	0.58
16:0p/18:1	0.66	0.62	0.78*	-0.021	0.52	0.24	-0.25	-0.55	0.64	0.82**	0.82**	0.85**	0.88**	0.86**	0.40
18:0p/18:3	0.85**	0.83**	0.93**	0.10	0.77*	0.43	-0.54	-0.76*	0.84**	0.95**	0.89**	0.93**	0.97**	0.96**	0.64
18:0p/22:4	0.56	0.58	0.70*	0.09	0.63	0.57	-0.41	-0.66	0.54	0.56	0.43	0.46	0.55*	0.55	0.32
18:0p/18:0	0.92**	0.97**	0.93**	0.59	0.95**	0.50	0.81**	-0.84**	0.97**	0.85**	0.73*	0.75*	0.81*	0.84**	0.89**

Values with \*: significant correlation ( $P < 0.05$ ); \*\*: significant correlation ( $P < 0.01$ ). **1** = linalool; **2** = endo-borneol; **3** = terpinen-4-ol; **4** = terpineol; **5** = carvacrol; **6** = carvacrol isomer-1; **7** = carvacrol isomer-2. P = Phosphatidyl; e = Ethanolamine; LAA = Lipophilic antioxidant activity; HAA = Hydrophilic antioxidant activity; LPC = Lipophilic phenolic content; HPC = Hydrophilic phenolic content; LOS = Lipophilic oxidant status; HOS = Hydrophilic oxidant status; <sup>a</sup> = ABTS antioxidant activity; <sup>b</sup> = FRAP antioxidant activity; p = plasmalogen

**Table S2:** Pearson's correlation coefficients showing relationships between antioxidant activities, phenolic contents, oxygenated terpenes, oxidation status and preserved plasmalogen PC molecular species in grilled moose

pPC-Moose	LAA <sup>a</sup>	HAA <sup>a</sup>	LPC	HPC	LAA <sup>b</sup>	HAA <sup>b</sup>	LOS	HOS	1	2	3	4	5	6	7
18:0p/20:1	0.17	-0.53	0.34	0.57	-0.39	-0.24	0.20	0.39	-0.08	0.31	-0.12	-0.25	0.14	0.09	0.00
16:0p/18:2	0.21	-0.26	0.26	0.47	-0.16	-0.08	-0.01	-0.07	0.07	-0.28	0.01	-0.07	-0.06	0.18	0.02
16:1p/20:5	0.48	-0.08	0.66	0.88*	0.07	0.20	-0.11	-0.16	0.34	0.12	0.31	0.21	0.47	0.52	0.43
16:0p/20:5	0.76*	0.08	0.84**	0.96**	0.29	0.41	-0.42	-0.19	0.52	0.34	0.47	0.38	0.64	0.69*	0.51
16:0p/22:6	0.56	-0.01	0.71*	0.79*	0.15	0.29	-0.20	0.01	0.37	0.55	0.35	0.26	0.66	0.54	0.47
18:0p/20:3	0.92**	0.38	0.92**	0.99**	0.57	0.62	-0.65	-0.47	0.69*	0.27	0.65	0.60	0.71*	0.88**	0.65
18:0p/22:5	0.95**	0.61	0.92**	0.94**	0.76*	0.78*	-0.77*	-0.65	0.77*	0.25	0.45*	0.75*	0.76*	0.97**	0.73*
16:0p/20:4	-0.08	-0.01	-0.06	-0.02	-0.03	-0.08	-0.00	-0.30	0.04	0.59	-0.05	-0.05	-0.29	0.02	-0.07
18:1p/20:4	0.97**	0.59	0.91**	0.93**	0.75*	0.79*	-0.78*	-0.56	0.75*	0.37	0.73*	0.72	0.78*	0.95**	0.70*
18:0p/22:4	0.97**	0.72*	0.91**	0.87**	0.86**	0.87**	-0.82**	-0.71*	0.83**	0.26	0.82**	0.83	0.82**	0.99**	0.78*
18:0p/20:4	0.28	0.76*	0.05	-0.11	0.67*	0.55	-0.41	-0.61	0.38	-0.12	0.43	0.54	0.21	0.35	0.34
18:1p/18:1	0.84**	0.86**	0.81**	0.65	0.96**	0.93**	-0.82**	-0.83**	0.86**	0.15	0.87**	0.91**	0.83**	0.92**	0.82**
18:0p/18:2	0.76*	0.84**	0.67*	0.50	0.91**	0.86**	-0.81	-0.68*	0.73*	0.30	0.75*	0.811**	0.73*	0.80**	0.68*
14:0p/20:5	0.65	0.90**	0.60	0.39	0.94**	0.88**	-0.64	-0.86**	0.80**	-0.05	0.83**	0.90**	0.72*	0.78*	0.80**
16:0p/18:3	0.62	0.89**	0.51	0.28	0.93**	0.85**	-0.78*	-0.79*	0.73*	-0.00	0.75*	0.84**	0.60	0.68*	0.63
16:1p/18:3	0.50	0.78*	0.54	0.25	0.83**	0.78*	-0.62	-0.72*	0.71*	0.02	0.73*	0.80**	0.69*	0.62	0.69*

Values with \*: significant correlation ( $P < 0.05$ ); \*\*: significant correlation ( $P < 0.01$ ). **1** = linalool; **2** = endo-borneol; **3** = terpinen-4-ol; **4** = terpineol; **5** = carvacrol; **6** = carvacrol isomer-1; **7** = carvacrol isomer-2. P = Phosphatidyl; C = Choline; LAA = Lipophilic antioxidant activity; HAA = Hydrophilic antioxidant activity; LPC = Lipophilic phenolic content; HPC = Hydrophilic phenolic content; LOS = Lipophilic oxidant status; HOS = Hydrophilic oxidant status; <sup>a</sup> = ABTS antioxidant activity; <sup>b</sup> = FRAP antioxidant activity; p = plasmalogen

1 **Table S3:** Pearson's correlation coefficients showing relationships between antioxidant activities, phenolic contents, oxygenated terpenes, oxidation status  
 2 and preserved plasmalogen PC molecular species in grilled beef

pPC-Beef	LAA <sup>a</sup>	HAA <sup>a</sup>	LPC	HPC	LAA <sup>b</sup>	HAA <sup>b</sup>	LOS	HOS	1	2	3	4	5	6	7
18:0p/20:3	0.75*	0.71*	0.4**	-0.10	0.63	0.21	-0.32	-0.57	0.69*	0.82**	0.76	0.80**	0.87**	0.88*	0.42
18:0p/20:1	-0.45	-0.35	-0.33	-0.67*	-0.48	-0.40	0.53	0.22	-29	-0.24	-0.13	-0.17	-0.14	-0.15	-0.43
18:0p/18:2	0.07	0.13	0.23	-0.65	-0.08	-0.17	0.35	0.04	0.15	0.28	0.53	0.37	0.39	0.35	-0.18
18:0p/22:5	0.32	0.34	0.50	-0.55	0.20	-0.03	0.12	-0.28	0.36	0.53	0.59	0.57	0.62	0.60	-0.00
14:0p/20:5	-0.02	0.00	0.17	-0.80**	-0.16	-0.23	0.45	0.04	0.03	0.22	0.35	0.33	0.33	0.30	-0.33
14:0p/18:3	-0.13	-0.15	0.07	-0.86**	-0.28	-0.24	0.52	0.11	-0.14	0.08	0.15	0.17	0.20	0.16	-0.48
18:0p/19:1	0.38	0.32	0.52	-0.50	0.22	-0.03	0.13	-0.17	0.29	0.51	0.54	0.54	0.59	0.55	-0.02
18:1p/20:4	-0.38	-0.39	-0.19	-0.97**	-0.51	-0.37	0.74*	0.37	-0.37	-0.15	-0.00	-0.05	-0.04	-0.08	-0.68*
16:0p/18:3	-0.33	-0.32	-0.15	-0.95**	-0.46	-0.40	0.70*	0.32	-0.31	-0.09	0.05	-0.00	-0.03	-0.15	-0.60
16:1p/18:3	-0.36	-0.36	-0.18	-0.97**	-0.49	-0.39	0.73*	0.36	-0.35	-0.13	0.02	-0.03	-0.02	-0.06	-0.65
16:0p/18:2	0.46	0.54	0.65	-0.41	0.35	0.16	-0.03	-0.38	0.45	0.63	0.65	0.66	0.69*	0.66	0.05
16:0p/17:1	0.39	0.38	0.20	0.92**	0.51	0.29	-0.72*	-0.41	0.34	0.16	-0.08	0.04	0.06	0.11	0.68*
18:0p/18:0	0.91**	0.96**	0.93**	0.53	0.92**	0.51	-0.81**	-0.87**	0.95**	0.90**	0.81**	0.84**	0.88**	0.90**	0.86**
18:0p/20:4	0.56	0.64	0.61	0.18	0.50	0.36	-0.36	-0.40	0.67*	0.61	0.84**	0.65	0.62	0.62	0.45
18:0p/22:4	0.64	0.70*	0.50	0.57	0.63	0.10	-0.61	-0.52	0.68*	0.54	0.49	0.47	0.54	0.57	0.85**
18:1p/17:1	0.94**	0.94**	0.99**	0.40	0.92**	0.53	-0.74*	-0.85**	0.97**	0.95**	0.86**	0.90**	0.93**	0.95**	0.76*
16:0p/19:1	0.87**	0.88**	0.77	0.89**	0.93**	0.56	-0.96**	-0.80**	0.88**	0.72*	0.56	0.62	0.65	0.68*	0.96**
16:0p/16:1	0.72*	0.71*	0.56	0.97**	0.80**	0.46	-0.91**	-0.65	0.68*	0.51	0.30	0.39	0.42	0.46	0.89**
18:1p/18:1	0.90**	0.91**	0.92**	0.27	0.83**	0.30	-0.61	-0.75*	0.90**	0.92**	0.84**	0.87	0.94**	0.94**	0.76*
16:0p/18:1	0.74*	0.74*	0.62	0.96**	0.82**	0.58	-0.91**	-0.64	0.72*	0.55	0.41	0.46	0.45	0.48	0.85**

Values with \*: significant correlation ( $P < 0.05$ ); \*\*: significant correlation ( $P < 0.01$ ). **1** = linalool; **2** = endo-borneol; **3** = terpinen-4-ol; **4** = terpineol; **5** = carvacrol; **6** = carvacrol isomer-1; **7** = carvacrol isomer-2. P = Phosphatidyl; C = Choline; LAA = Lipophilic antioxidant activity; HAA = Hydrophilic antioxidant activity; LPC = Lipophilic phenolic content; HPC = Hydrophilic phenolic content; LOS = Lipophilic oxidant status; HOS = Hydrophilic oxidant status; <sup>a</sup> = ABTS antioxidant activity; <sup>b</sup> = FRAP antioxidant activity; p = plasmalogen

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