Supporting Information

Title: Accurate Lamb Origin Identification and Molecular Differentiation Analysis Using Rapid Evaporative Ionization Mass Spectrometry

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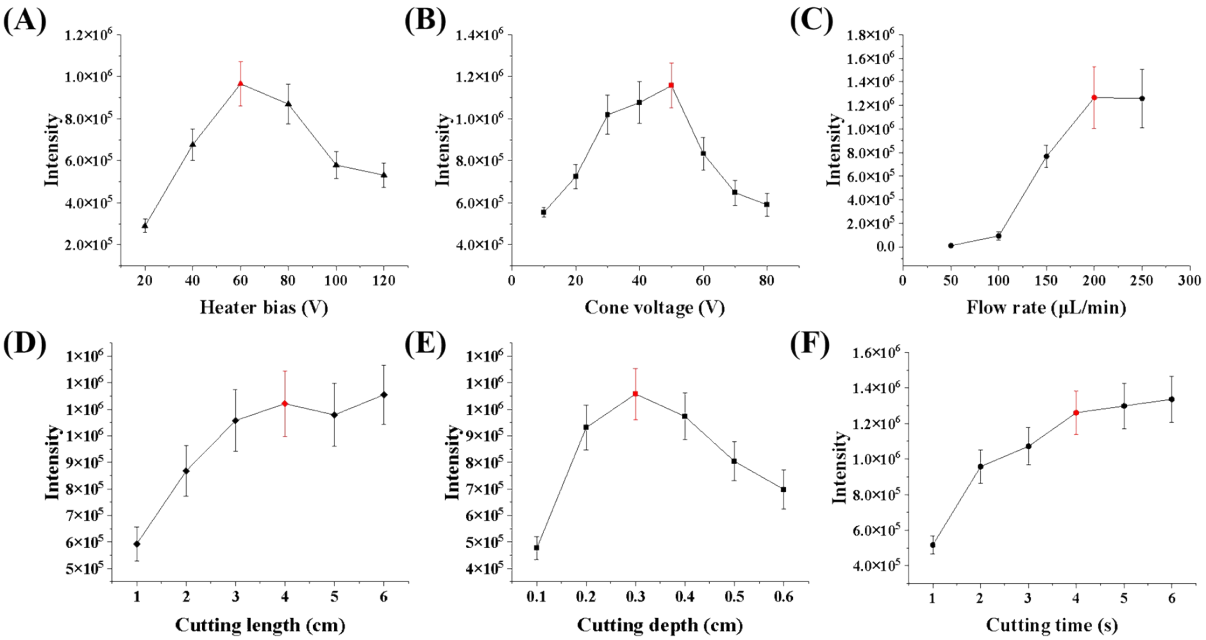

Figure S1. Optimization of REIMS parameters.

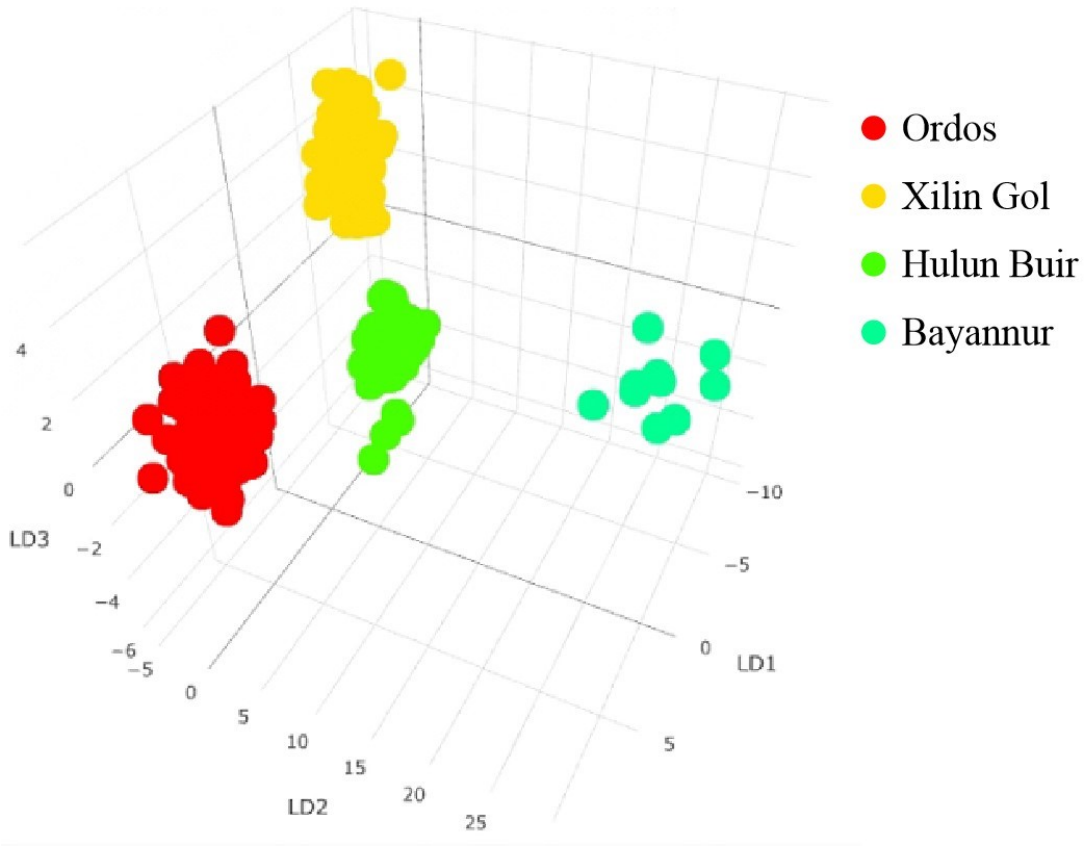

Figure S2. Clustering analysis results of lamb from the four regions.

Table S1 The identified compounds in lamb samples.

ID	Measured *m/z*	Compounds	Category	Formulas	Theoretical *m/z*	Relative error (ppm)
1	128.0351	Pyroglutamic acid	Amino acids	$C_5H_7NO_3$	128.0353	–1.7
2	128.0351	Pyrrolidonecarboxylic acid	Amino acids	$C_5H_7NO_3$	128.0353	–1.7
3	134.0467	Adenine	Small-molecule metabolites	$C_5H_5N_5$	134.0472	–3.9
4	135.0308	Hypoxanthine	Small-molecule metabolites	$C_5H_4N_4O$	135.0312	–3.2
5	225.0986	Carnosine	Small-molecule metabolites	$C_9H_{14}N_4O_3$	225.0993	–3.2
6	239.1150	Homocarnosine	Organic acids	$C_{10}H_{16}N_4O_3$	239.1150	0.2
7	239.1150	Anserine	Organic acids	$C_{10}H_{16}N_4O_3$	239.1150	0.2
8	255.2344	Palmitic acid	Fatty acids	$C_{16}H_{32}O_2$	255.2330	5.7
9	255.2344	Isopalmitic acid	Fatty acids	$C_{16}H_{32}O_2$	255.2330	5.7
10	269.2504	Heptadecanoic acid	Fatty acids	$C_{17}H_{34}O_2$	269.2486	6.7
11	277.2196	Alpha-Linolenic acid	Fatty acids	$C_{18}H_{30}O_2$	277.2173	8.3
12	279.2344	Linoleic acid	Fatty acids	$C_{18}H_{32}O_2$	279.2330	5.2
13	279.2344	Linoelaidic acid	Fatty acids	$C_{18}H_{32}O_2$	279.2330	5.2
14	279.2344	Octadecadienoic acid	Fatty acids	$C_{18}H_{32}O_2$	279.2330	5.2
15	279.2344	Bovinic acid	Fatty acids	$C_{18}H_{32}O_2$	279.2330	5.2
16	281.2496	Oleic acid	Fatty acids	$C_{18}H_{34}O_2$	281.2486	3.6
17	281.2496	Petroselinic acid	Fatty acids	$C_{18}H_{34}O_2$	281.2486	3.6
18	283.2655	Ethyl hexadecanoate	Fatty acids	$C_{18}H_{36}O_2$	283.2643	4.4
19	283.2655	16-Methylheptadecanoic acid	Fatty acids	$C_{18}H_{36}O_2$	283.2643	4.4
20	301.2205	Eicosapentaenoic acid	Fatty acids	$C_{20}H_{30}O_2$	301.2173	10.6
21	303.2361	Arachidonic acid	Fatty acids	$C_{20}H_{32}O_2$	303.2330	10.4
22	307.2763	Eicosadienoic acid	Fatty acids	$C_{20}H_{36}O_2$	307.2643	39.2

23	307.2763	Sclareol	Small-molecule metabolites	$C_{20}H_{36}O_2$	307.2643	39.2
24	327.2356	Docosahexaenoic acid	Fatty acids	$C_{22}H_{32}O_2$	327.2330	8.1
25	329.2520	Docosapentaenoic acid (22n-3)	Fatty acids	$C_{22}H_{34}O_2$	329.2486	10.3
26	478.2844	LysoPE(18:1(9Z)/0:0)	Lipids	$C_{23}H_{46}NO_7P$	478.2939	–19.9
27	514.2650	Taurocholic acid	Bile acids	$C_{26}H_{45}NO_7S$	514.2844	–37.7
28	655.4788	CerPE 34:3;O2	Lipids	$C_{36}H_{69}N_2O_6P$	655.4821	–5.0
29	655.4788	PA O-34:3	Lipids	$C_{37}H_{69}O_7P$	655.4708	12.2
30	657.4992	CerPE 34:2;O2	Lipids	$C_{36}H_{71}N_2O_6P$	657.4977	2.3
31	657.4992	PA O-34:2	Lipids	$C_{37}H_{71}O_7P$	657.4865	19.3
32	669.4905	PA 36:2	Lipids	$C_{39}H_{73}O_8P$	699.497	–9.3
33	669.4905	CerPE 36:3;O3	Lipids	$C_{38}H_{73}N_2O_7P$	699.5083	–25.4
34	671.5057	PA O-35:2	Lipids	$C_{38}H_{73}O_7P$	671.5021	5.4
35	671.5057	CerPE 35:2;O2	Lipids	$C_{37}H_{73}N_2O_6P$	671.5134	–11.5
36	671.5057	CerPE 34:3;O3	Lipids	$C_{36}H_{69}N_2O_7P$	671.477	42.7
37	673.4922	CerPE 34:2;O3	Lipids	$C_{36}H_{71}N_2O_7P$	673.4926	–0.6
38	673.4922	PA 34:1	Lipids	$C_{37}H_{71}O_8P$	673.4814	16.0
39	673.4922	PA O-35:1	Lipids	$C_{38}H_{75}O_7P$	673.5178	–38.0
40	679.4797	PA O-36:5	Lipids	$C_{39}H_{69}O_7P$	679.4708	13.1
41	679.4797	PG O-30:0	Lipids	$C_{36}H_{73}O_9P$	679.492	–18.1
42	679.4797	PG 29:0	Lipids	$C_{35}H_{69}O_{10}P$	679.4556	35.5
43	681.4939	PA O-36:4	Lipids	$C_{39}H_{71}O_7P$	681.4865	10.9
44	683.5057	PA O-36:3	Lipids	$C_{39}H_{73}O_7P$	683.5021	5.3
45	683.5057	CerPE 36:3;O2	Lipids	$C_{38}H_{73}N_2O_6P$	683.5134	–11.3
46	685.5098	PA O-36:2	Lipids	$C_{39}H_{75}O_7P$	685.5178	–11.7
47	685.5098	CerPE 36:2;O2	Lipids	$C_{38}H_{75}N_2O_6P$	685.529	–28.0
48	685.5098	DG 42:11	Lipids	$C_{45}H_{66}O_5$	685.4838	37.9
49	685.5098	PA 35:2	Lipids	$C_{38}H_{71}O_8P$	685.4814	41.4
50	687.5114	CerPE 35:2;O3	Lipids	$C_{37}H_{73}N_2O_7P$	687.5083	4.5
51	687.5114	DG 42:10	Lipids	$C_{45}H_{68}O_5$	687.4994	17.5
52	687.5114	PA 35:1	Lipids	$C_{38}H_{73}O_8P$	687.497	20.9
53	687.5114	PA O-36:1	Lipids	$C_{39}H_{77}O_7P$	687.5334	–32.0
54	687.5114	CerPE 36:1;O2	Lipids	$C_{38}H_{77}N_2O_6P$	687.5447	–48.4
55	693.4798	PG 30:0	Lipids	$C_{36}H_{71}O_{10}P$	693.4712	12.4

56	693.4798	PG O-31:0	Lipids	$C_{37}H_{75}O_9P$	693.5076	–40.1
57	693.4798	PA 36:5	Lipids	$C_{39}H_{67}O_8P$	693.4501	42.8
58	695.4822	PA 36:4	Lipids	$C_{39}H_{69}O_8P$	695.4657	23.7
59	697.4876	PA 36:3	Lipids	$C_{39}H_{71}O_8P$	697.4814	8.9
60	697.4876	PA O-37:3	Lipids	$C_{40}H_{75}O_7P$	697.5178	–43.3
61	699.5012	PA 36:2	Lipids	$C_{39}H_{73}O_8P$	699.497	6.0
62	699.5012	CerPE 36:3;O3	Lipids	$C_{38}H_{73}N_2O_7P$	699.5083	–10.1
63	699.5012	PA O-37:2	Lipids	$C_{40}H_{77}O_7P$	699.5334	–46.0
64	700.5091	PE 33:2	Lipids	$C_{38}H_{72}NO_8P$	700.4923	24.0
65	700.5091	PE O-34:2	Lipids	$C_{39}H_{76}NO_7P$	700.5287	–28.0
66	701.5231	CerPE 36:2;O3	Lipids	$C_{38}H_{75}N_2O_7P$	701.5239	–1.1
67	701.5231	PA 36:1	Lipids	$C_{39}H_{75}O_8P$	701.5127	14.8
68	701.5231	PA O-37:1	Lipids	$C_{40}H_{79}O_7P$	701.5491	–37.1
69	707.5138	PG O-32:0	Lipids	$C_{38}H_{77}O_9P$	707.5233	–13.4
70	707.5138	PA O-38:5	Lipids	$C_{41}H_{73}O_7P$	707.5021	16.5
71	707.5138	PG 31:0	Lipids	$C_{37}H_{73}O_{10}P$	707.4869	38.0
72	709.52	PA O-38:4	Lipids	$C_{41}H_{75}O_7P$	709.5178	3.1
73	723.5052	PA 38:4	Lipids	$C_{41}H_{73}O_8P$	723.497	11.3
74	724.5247	PE O-36:4	Lipids	$C_{41}H_{76}NO_7P$	724.5287	–5.5
75	724.5247	HexCer 35:3;O3	Lipids	$C_{41}H_{75}NO_9$	724.5369	–16.8
76	724.5247	PE 35:4	Lipids	$C_{40}H_{72}NO_8P$	724.4923	44.7
77	725.5229	PA 38:3	Lipids	$C_{41}H_{75}O_8P$	725.5127	14.1
78	726.5438	PE O-36:3	Lipids	$C_{41}H_{78}NO_7P$	726.5443	–0.7
79	726.5438	HexCer 35:2;O3	Lipids	$C_{41}H_{77}NO_9$	726.5526	–12.1
80	726.5438	PE 35:3	Lipids	$C_{40}H_{74}NO_8P$	726.5079	49.4
81	727.5434	CerPE 38:3;O3	Lipids	$C_{40}H_{77}N_2O_7P$	727.5396	5.2
82	727.5434	PA 38:2	Lipids	$C_{41}H_{77}O_8P$	727.5283	20.8
83	727.5434	PA O-39:2	Lipids	$C_{42}H_{81}O_7P$	727.5647	–29.3
84	727.5434	CerPE 39:2;O2	Lipids	$C_{41}H_{81}N_2O_6P$	727.576	–44.8
85	728.5602	PE O-36:2	Lipids	$C_{41}H_{80}NO_7P$	728.56	0.3
86	728.5602	CerP 42:1;O2	Lipids	$C_{42}H_{84}NO_6P$	728.5964	–49.7
87	742.5467	PE 36:2	Lipids	$C_{41}H_{78}NO_8P$	742.5392	10.1
88	742.5467	PE O-37:2	Lipids	$C_{42}H_{82}NO_7P$	742.5756	–38.9
89	743.546	PA 39:1	Lipids	$C_{42}H_{81}O_8P$	743.5596	–18.3
90	743.546	PG O-35:3	Lipids	$C_{41}H_{77}O_9P$	743.5233	30.5

91	743.546	CerPE 39:2;O3	Lipids	$C_{41}H_{81}N_2O_7P$	743.5709	–33.5
92	744.5573	PE 36:1	Lipids	$C_{41}H_{80}NO_8P$	744.5549	3.2
93	744.5573	PE O-37:1	Lipids	$C_{42}H_{84}NO_7P$	744.5913	–45.7
94	745.5579	PA 39:0	Lipids	$C_{42}H_{83}O_8P$	745.5753	–23.3
95	745.5579	PG O-35:2	Lipids	$C_{41}H_{79}O_9P$	745.5389	25.5
96	748.536	PE O-38:6	Lipids	$C_{43}H_{76}NO_7P$	748.5287	9.8
97	748.536	PS O-34:0	Lipids	$C_{40}H_{80}NO_9P$	748.5498	–18.4
98	748.536	PS 33:0	Lipids	$C_{39}H_{76}NO_{10}P$	748.5134	30.2
99	750.549	PE O-38:5	Lipids	$C_{43}H_{78}NO_7P$	750.5443	6.3
100	751.5144	PA 40:4	Lipids	$C_{43}H_{77}O_8P$	751.5283	–18.5
101	751.5144	PG O-36:6	Lipids	$C_{42}H_{73}O_9P$	751.492	29.8
102	752.5479	PE O-38:4	Lipids	$C_{43}H_{80}NO_7P$	752.56	–16.1
103	752.5479	HexCer 37:3;O3	Lipids	$C_{43}H_{79}NO_9$	752.5682	–27.0
104	752.5479	PE 37:4	Lipids	$C_{42}H_{76}NO_8P$	752.5236	32.3
105	754.5775	PE O-38:3	Lipids	$C_{43}H_{82}NO_7P$	754.5756	2.5
106	754.5775	HexCer 37:2;O3	Lipids	$C_{43}H_{81}NO_9$	754.5839	–8.5
107	754.5775	CerP 44:2;O2	Lipids	$C_{44}H_{86}NO_6P$	754.612	–45.7
108	766.5461	PE 38:4	Lipids	$C_{43}H_{78}NO_8P$	766.5392	9.0
109	766.5461	PE O-38:5;O	Lipids	$C_{43}H_{78}NO_8P$	766.5392	9.0
110	767.5388	PA 41:3	Lipids	$C_{44}H_{81}O_8P$	767.5596	–27.1
111	767.5388	PI O-30:0	Lipids	$C_{39}H_{77}O_{12}P$	767.508	40.1
112	768.5548	PE 38:3	Lipids	$C_{43}H_{80}NO_8P$	768.5549	–0.1
113	768.5548	PS O-36:4	Lipids	$C_{42}H_{76}NO_9P$	768.5185	47.2
114	769.509	PG 36:4	Lipids	$C_{42}H_{75}O_{10}P$	769.5025	8.4
115	769.509	MGDG 36:8	Lipids	$C_{45}H_{70}O_10$	769.4896	25.2
116	769.509	PA 42:9	Lipids	$C_{45}H_{71}O_8P$	769.4814	35.9
117	770.532	PS O-36:3	Lipids	$C_{42}H_{78}NO_9P$	770.5342	–2.9
118	770.532	PS 35:3	Lipids	$C_{41}H_{74}NO_{10}P$	770.4978	44.4
119	770.532	PE 38:2	Lipids	$C_{43}H_{82}NO_8P$	770.5705	–50.0
120	771.5215	PG 36:3	Lipids	$C_{42}H_{77}O_{10}P$	771.5182	4.3
121	771.5215	MGDG 36:7	Lipids	$C_{45}H_{72}O_{10}$	771.5053	21.0

122	771.5215	PA 42:8	Lipids	$C_{45}H_{73}O_8P$	771.497	31.8
123	771.5215	PG O-37:3	Lipids	$C_{43}H_{81}O_9P$	771.5546	–42.9
124	776.52529	PE 39:6	Lipids	$C_{44}H_{76}NO_8P$	776.5236	2.2
125	776.52529	PS 35:0	Lipids	$C_{41}H_{80}NO_{10}P$	776.5447	–25.0
126	776.52529	PE O-40:6	Lipids	$C_{45}H_{80}NO_7P$	776.56	–44.7
127	861.5624	PI 36:2	Lipids	$C_{45}H_{83}O_{13}P$	861.5499	14.5
128	861.5624	PI O-37:2	Lipids	$C_{46}H_{87}O_{12}P$	861.5862	–27.6
129	863.5775	PG 43:6	Lipids	$C_{49}H_{85}O_{10}P$	863.5808	–3.8
130	863.5775	PI 36:1	Lipids	$C_{45}H_{85}O_{13}P$	863.5655	13.9
131	863.5775	PI O-37:1	Lipids	$C_{46}H_{89}O_{12}P$	863.6019	–28.3
132	864.5829	PS 42:5	Lipids	$C_{48}H_{84}NO_{10}P$	864.576	8.0
133	885.5573	PI 38:4	Lipids	$C_{47}H_{83}O_{13}P$	885.5499	8.4
134	886.5632	PS 44:8	Lipids	$C_{50}H_{82}NO_{10}P$	886.5604	3.2
135	887.5758	PI 38:3	Lipids	$C_{47}H_{85}O_{13}P$	887.5655	11.6
136	888.5828	PS 44:7	Lipids	$C_{50}H_{84}NO_{10}P$	888.576	7.7
137	888.5828	SHexCer 42:2;O2	Lipids	$C_{48}H_{91}NO_{11}S$	888.624	–46.4