

Table 3 List of significantly changed compounds in sheep from overgrazing group and light grazing group

Ionization								
mode	Metabolites	Adduct	VIP	Fold change	<i>P</i> value	Retention time (S)	m/z	Related pathway
ESI (+)	Stearoylcarnitine	(M+H)+	1.5381	1.8064	0.0347	254.1865	428.3754	Fatty acid beta-oxidation
ESI (+)	L-Palmitoylcarnitine	(M+H)+	1.4626	1.6676	0.0158	263.4055	400.3447	Fatty acid beta-oxidation
ESI (+)	Cholic acid	(M+NH ₄)+	10.7858	3.6272	0.0358	383.6785	426.3243	Primary bile acid biosynthesis
ESI (-)	Taurine	(M-H)-	1.1519	1.3343	0.0687	537.531	124.0072	Primary bile acid biosynthesis
ESI (+)	Adenosine	(M+H-H ₂ O)+	1.2463	2.4131	0.0919	163.891	250.0973	Purine metabolism
ESI (-)	Hypoxanthine (HYPO)	(M-H)-	4.6457	0.4923	0.0350	304.1335	135.0318	Purine metabolism
ESI (-)	L-Tryptophan	(M-H)-	1.1472	0.8695	0.0608	469.231	203.0821	Biosynthesis of proteins
ESI (-)	D-Mannose	(M+CH ₃ COO)-	1.3052	0.7540	0.0746	560.7445	239.0763	Antioxidation
ESI (-)	4-Pyridoxic acid	(M-H)-	3.0237	0.5923	0.0002	69.6135	182.0455	Vitamin B6 metabolism
ESI (+)	4-Pyridoxic acid	(M+H)+	2.9734	0.5609	0.0001	67.7175	184.0648	Vitamin B6 metabolism
ESI (+)	1-Stearoyl-sn-glycerol 3-Phosphocholine (LPC)	(M-H+2Na)+	1.4861	1.4210	0.0037	283.888	568.3406	Major phospholipid components in serum (liver toxicity)
ESI (+)	1,2-Di-(9Z-octadecenoyl)-sn-glycero-3-phosphocholine (DOPC)	(M+H)+	11.7198	0.5475	0.0848	169.062	786.5999	Structure of cell membranes
ESI (+)	Acetylcarnitine	(M+H)+	3.1389	0.8104	0.0811	564.452	204.1271	Related to ammonia concentration
ESI (-)	Salicyluric acid	(M-H)-	2.9182	0.3989	0.0000	302.264	194.0461	Energy metabolism
ESI (-)	Salicylic acid	(M-H)-	7.7978	0.3045	0.0001	64.863	137.0247	Immune function modulation
ESI (-)	DL-Lactate	(M-H)-	11.3476	0.7210	0.0316	413.5235	89.02506	Central carbon metabolism in cancer