

Table S1. Feed ingredient and nutrient levels of the basal diet (%), as-fed basis.

Item	content
Ingredients, %	
Corn	63.5
De-hulled soybean meal (46%)	26
Wheat bran	5
Soybean oil	2
L-Lys HCl (98%)	0.23
DL-Methionine (99%)	0.03
L-Threonine (98.5%)	0.04
CaHPO ₄	1
Limestone	0.9
NaCl	0.3
Vitamin and mineral premix ¹	1
Total	100.00
Calculated nutrient composition ² , %	
DE ³ , MJ/kg	14.21
Ca	0.66
Available P	0.31
Standardized ideal digestible AA, %	
Lys	1.14
Met	0.33
Thr	0.73
Trp	0.22
Analyzed nutrient composition ⁴	
Dry matter, %	86.39
Crude protein, %	17.69
Crude fat, %	2.28
Crude ash, %	8.28

¹Supplied per kilogram of complete diet: vitamin A, 15,500 IU; vitamin D3, 3,500 IU; vitamin E, 37.5 mg; vitamin K₃, 6.25 mg; vitamin B₁, 3.75 mg; vitamin B₂, 12.5 mg; vitamin B₆, 10 mg; vitamin B₁₂, 0.05 mg; niacin, 50 mg; calcium pantothenate, 18.75 mg; folic acid, 1.25 mg; biotin, 0.1 mg; Cu (CuSO₄·5H₂O), 9.6 mg; Fe (FeSO₄·H₂O), 78 mg; Zn (ZnSO₄·H₂O), 54 mg; Mn (MnSO₄·H₂O), 42 mg; I (KI), 0.42 mg; Se (Na₂SeO₃), 0.29 mg; Co (CoCl₂), 0.24 mg. ²Values were calculated using the feed composition and nutritive values provided by Feed Database in China (2020). ³DE, digestible energy. ⁴Analyzed results obtained according to the analytical methods in AOAC (2007).

Table S2. Primer sequences used for qRT-PCR assay

Genes	GenBank ID	Primer sequence (5'→3')	Product size
β-actin	XM_003357928.1	Forward: GGACTTCGAGCAGGAGATGG Reverse: GCACCGTGTGGCGTAGAGG	233
SLC1A3 (EAAT1)	XM_021076550.1	Forward: GCAAGCACTCGTCACAGCTC Reverse: GGAGACGAATCTGGTGACA	115
SLC7A8 (LAT2)	XM_003128550.5	Forward: ACTACCTCTTCTATGGCATCAC Reverse: GCAAGTAGATGATGGGAACAG	111
SLC38A2 (SNAT2)	XM_003126626.5	Forward: TTCATTCTTCATCTGCCTTC Reverse: GGGCATTGTGTACCCAATC	154
SLC1A5 (ASCT2)	XM_003127238.4	Forward: CGATTGTTCTGGATCTTG Reverse: TAGGACGTCGCGTATGAG	81
SLC7A1 (CAT1)	AY371320	Forward: GTCGGITGCAAAGACCATT Reverse: GAGCGGTGCTGACAACAGTA	329
ASS1	XM_005660523	Forward: CCCTCACTTGCCTCATCTCT Reverse: CCCTACCCTCCGTTGCT	163
SLC3A1 (rBAT)	NM_001123042.1	Forward: CAATGCAGTGGGACAACAG Reverse: GGC GTGAAGCAAAC TTA ATT C	158
SLC7A7 (γ ⁺ LAT1)	NM_001110421.1	Forward: CTCTGCTGTTCAATGGTCTC Reverse: ATAGAGCTGACCCACGATAG	125
SLC7A9 (b ^{0,+AT})	EF127857.1	Forward: CGGAGAGAGGATGAGAAGT Reverse: GCCCGCTGATGATGATGA	562

Note: β-actin was used as an internal control. *SLC38A2* (SNAT2), solute carrier family 38 member 2; *SLC1A5* (ASCT2), solute carrier family 1 member 5; *SLC7A9* ($b^{0,+}AT$), solute carrier family 7 member 9; *SLC3A1* (rBAT), solute carrier family 3 member 1; *SLC1A3* (EAAT1), solute carrier family 1 member 3; *SLC7A8* (LAT2), solute carrier family 7 member 8; *SLC7A1* (CAT1), solute carrier family 7 member 1; *SLC7A7* (γ^+LAT1), solute carrier family 7 member and *ASS1*, ar-gininosuccinate synthetase 1.

Table S3. The serum differential metabolites were identified according to the standard of VIP > 1.0 and $P < 0.05$ between the Con and Mag groups.

Metabolites	VIP ¹	p-value	KEGG ²	Trend (Mag ³ vs. Con ⁴)
Estrone-3-glucuronide	2.65	0.000	C11133	Up
Adipic acid	2.02	0.001	C06104	Down
Jasmonic acid	2.07	0.002	C08491	Down
Alpha-hydroxyhippuric acid	2.16	0.003	—	Down
3-hydroxybenzoic acid	1.87	0.010	C00587	Down
2-phenylacetamide	1.77	0.011	C02505	Up
Thymine	1.81	0.012	C00178	Down
L-arginine	1.73	0.014	C00062	Up
Phenylacetylglycine	1.71	0.018	C05598	Down
Acetophenone	1.57	0.020	C07113	Down
N6,N6,N6-trimethyl-L-lysine	1.68	0.026	C03793	Down
Creatinine	1.59	0.029	C00791	Down
Ribonolactone	1.74	0.030	C02674	Down
2-oxoglutaric acid	1.63	0.034	C00026	Down
Hippuric acid	1.71	0.035	C01586	Down
N-a-acetyl-L-arginine	1.44	0.036	—	Up
Creatine	1.60	0.036	C00300	Down
2-hydroxyquinoline	1.64	0.043	—	Down
Alpha-hydroxyisobutyric acid	1.50	0.044	—	Down
4-nitrophenol	1.48	0.046	C00870	Down

¹VIP: Variable importance in the projection. ²KEGG: Kyoto Encyclopedia of Genes and Genomes. ³Mag: a basic diet food with 0.04% magnolol. ⁴Con: a basic diet.