**Table S1.** Ingredients and chemical composition of the diets

| Item | Diet |
|---|---|
| Ingredients, g/kg of DM | |
| Corn grain | 141.3 |
| Steam-flaked corn | 101.2 |
| Bran | 7.40 |
| Soybean meal | 94.6 |
| Extruded Soybean | 31.2 |
| Rapeseed meal | 23.1 |
| Sugar beet meal | 64.4 |
| DDGS | 23.4 |
| Corn silage | 243.4 |
| Alfalfa hay | 160.2 |
| Oat hay | 47.4 |
| Premix concentrate[a] | 62.3 |
| Chemical composition, g/kg of DM unless noted | |
| Organic matter | 927.1 |
| Crude protein | 174.0 |
| Neutral detergent fiber | 284.2 |
| Acid detergent fiber | 156.4 |
| Ether extracts | 21.8 |
| $NE_L$[b], Mcal/kg of DM | 1.70 |

[a]Formulated to contain (per kilogram of premix concentrate) 365 g of soybean meal; 182.5 g of fat powder; 73 g of $CaHCO_3$; 146 g of $NaHCO_3$; 92 g of stone powder; 87.6 g of NaCl; 36.5 g of $MgO_2$; 30 mg of Se; 15 mg of Co; 385 mg of Cu; 61 mg of Fe; 1065.5 mg of Mn; 58 mg of I; 2459 mg of Zn; 730,000 IU of vitamin A; 1750,000 IU of vitamin D; 458 IU of vitamin E.

[b]Calculated based on Ministry of Agriculture of P. R. China recommendations [1].

**Table S2.** The relative proportion of bioactive compounds in *Perilla frutescens* leaf (PFL) using UHPLC-QTOF-MS

| Bioactive compounds | Proportion, % |
|---|---|
| Clareolide | 13.10 |
| Betaine | 8.26 |
| Sucrose | 7.48 |
| Scutellarin | 6.15 |
| Apigenin | 5.24 |
| L-Valine | 4.79 |
| Caffeic acid | 4.69 |
| 2-Pyrrolidinecarboxylic acid | 3.56 |
| L-Phenylalanine | 2.88 |
| L-Tryptophan | 2.61 |
| Adenosine | 2.38 |
| Luteolin 7-glucuronide | 2.25 |
| 5-Acetylsalicylic acid | 2.20 |
| Citric acid | 2.03 |
| L-Leucine | 1.85 |
| Stachydrine | 1.61 |
| Apigenin 7-O-glucuronide | 1.54 |
| Oroxylin A | 1.48 |
| Adenine | 1.40 |
| 7-Hydroxycoumarin | 1.24 |
| Esculetin | 1.11 |
| Luteolin | 1.04 |
| Orsellinic acid | 0.94 |
| Cynaroside | 0.87 |
| Chrysin | 0.71 |
| Vicenin II | 0.66 |
| Kaempferol-7-O-β-D-glucopyranoside | 0.59 |

| | |
|---|---|
| Gossypol-acetic acid | 0.59 |
| Baicalin | 0.58 |
| L-Tyrosine | 0.57 |
| L(-)-Carnitine | 0.48 |
| Manninotriose | 0.48 |
| α-Cyperone | 0.47 |
| Nicotinic acid | 0.46 |
| p-Hydroxybenzaldehyde | 0.46 |
| Rosmarinic acid | 0.44 |
| Nicotinamide | 0.41 |
| Dihydroartemisinic acid | 0.41 |
| Kaempferol | 0.39 |
| Isovitexin | 0.39 |
| Azelaic acid | 0.39 |
| Hydroxygenkwanin | 0.38 |
| Uridine | 0.38 |
| Salicylic acid | 0.37 |
| Protocatechualdehyde | 0.36 |
| Senkyunolide | 0.35 |
| Danshensu | 0.32 |
| 5-Hydroxymethylfurfural | 0.30 |
| Gentisic acid | 0.28 |
| Maleic acid | 0.27 |
| Guanosine | 0.25 |
| Pinocembrin | 0.25 |
| Glabrolide | 0.24 |
| L-Glutamic acid | 0.23 |
| 18 β-Glycyrrhetintic Acid | 0.22 |
| Scutellarein | 0.21 |

| | |
|---|---|
| β-Elemonic acid | 0.21 |
| Ligustilide | 0.21 |
| 3-n-Butylphathlide | 0.20 |
| Calcium pantothenate | 0.20 |
| Oleanonic acid | 0.19 |
| 6-Shogaol | 0.18 |
| Quillaic acid | 0.18 |
| Hispidulin | 0.18 |
| Vitexin | 0.18 |
| 3,5-Dimethoxy-4-hydroxybenzaldehyde | 0.17 |
| Curcumenol | 0.16 |
| Germacrone | 0.15 |
| Perillene | 0.15 |
| α-Linolenic acid | 0.15 |
| Ursonic acid | 0.15 |
| 1-Caffeoylquinic acid | 0.14 |
| Camphor | 0.14 |
| Pectolinarigenin | 0.14 |
| (+)-Nootkatone | 0.13 |
| 4-Hydroxybenzoic acid | 0.13 |
| Quercetin 3-O-β-D-Glucuronide | 0.13 |
| Ursolic acid | 0.13 |
| Cytidine | 0.12 |
| Astragalin | 0.12 |
| p-Hydroxy-cinnamic acid | 0.12 |
| Methyl rosmarinate | 0.11 |
| Diosmetin | 0.11 |
| Propylparaben | 0.10 |
| Vanillin | 0.10 |

| | |
|---|---|
| 6-Gingerol | 0.10 |
| Isoguanosine | 0.09 |
| Curcumol | 0.09 |
| Abscisic acid | 0.08 |
| 7,8-Dihydroxycoumarin | 0.08 |
| Sec-O-Glucosylhamaudol | 0.08 |
| Aurantio-obtusin | 0.08 |
| Artemisinic acid | 0.07 |
| Formononetin | 0.07 |
| 3,4-Dihydroxyphenylethanol | 0.07 |
| Genkwanin | 0.07 |
| Amygdalin | 0.07 |
| 2-Adamantanone | 0.07 |
| Ferulic acid | 0.07 |
| Arglabin | 0.05 |
| Sinapic acid | 0.05 |
| Scoparone | 0.05 |
| Protocatechuic acid | 0.05 |
| Pinoresinol 4-O-glucoside | 0.05 |
| Dehydroandrographolide | 0.04 |
| Genistein | 0.04 |
| Isoquercitrin | 0.04 |
| Atractylodin | 0.04 |
| Phenethyl caffeate | 0.04 |
| p-Coumaric acid | 0.04 |
| Naringenin chalcone | 0.04 |
| Lupenone | 0.04 |
| Quinic acid | 0.04 |
| Asiatic acid | 0.04 |

| | |
|---|---|
| Isoferulic acid | 0.03 |
| Ethyl caffeate | 0.03 |
| Citropten | 0.03 |
| Artemisinin | 0.03 |
| Lovastatin | 0.03 |
| Guanine | 0.03 |
| (+)-Pinoresinol | 0.03 |
| Eriodictyol | 0.02 |

## Reference

1. MOA (Ministry of Agriculture of P.R. China). 2004. Feeding Standard of Dairy Cattle (NY/T 34–2004). MOA, Beijing, China.