Supplementary Material

Transcriptome analyses reveal metabolic syndrome of adulthood with intrauterine growth restriction in a pig model

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**Supplementary Table S1. Fornula milk**

|  |  |
| --- | --- |
| Ingredients | Percent(%) |
| Whole milk powder | 58.00  |
| Whey protein concentrate | 25.00  |
| Casein | 5.70  |
| Coconut oil | 10.00  |
| CaH2PO4 (22%P) | 0.10  |
| Choline chloride | 0.10  |
| Vitamin mixture1 | 0.10  |
| Mineral mixture2 | 0.50  |
| L-Arg | 0.06  |
| DL-Met | 0.06  |
| L-Lys.HCl | 0.30  |
| L-Thr | 0.03  |
| L-Trp | 0.05  |
| Total | 100.00  |
| Nutrient content3 | Content |
| Crude protein, % | 25.30  |
| Digestible energy, MJ/kg | 18.39  |
| Calcium, % | 1.02  |
| Total phosphorus, % | 0.81  |
| Available phosphorus, % | 0.67  |
| Digestive-Lysine, % | 1.93  |
| Digestive -Methionine, % | 0.63  |
| Digestive -Arginine, % | 0.86  |

Note 1: Contents per kg of diet: vitamin A, 0.94 mg; vitamin E, 20 mg; vitamin D3,10 μg; vitamin B1, 1.50 mg; vitamin B2, 5 mg; vitamin B6, 2 mg; vitamin B12, 40 μg; vitamin K3, 1 mg; folic acid, 1.50 mg; nicottinic acid, 20 mg; pantothenic acid, 15 mg; biotin, 0.1 mg. Note 2: contents per kg of diet: Zn, 90 mg; Mn, 4.0 mg; Fe, 90 mg; Cu, 6.0 mg; Se, 0.3 mg; I, 0.2 mg. Note 3: Nutrient levels were calculated values.

**Supplementary Table S2. Ingredient composition and nutrient levels of expreimental diets (as fed basis,%)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Ingredients** | **7-11kg** | **11-25kg** | **25-50kg** | **50-75kg** | **75-100kg** |
| Corn grain | 27.19  | 35.00  | 68.57  | 75.13  | 78.03  |
| Expand corn | 25.00  | 23.68  | 0.00  | 0.00  | 0.00  |
| Soybean oil | 2.50  | 1.80  | 3.00  | 3.00  | 3.00  |
| Sucrose | 2.00  | 2.00  | 2.00  | 0.00  | 0.00  |
| Wheat bran | 0.00  | 0.00  | 3.00  | 3.00  | 5.00  |
| Whey powder | 12.00  | 7.00  | 0.00  | 0.00  | 0.00  |
| Soybean meal | 8.00  | 12.00  | 18.20  | 15.50  | 10.90  |
| Full-fat soybean | 5.00  | 8.00  | 0.00  | 0.00  | 0.00  |
| Soy protein concentrate | 5.00  | 3.00  | 0.00  | 0.00  | 0.00  |
| Whole milk powder | 3.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| Fishmeal (CP 62.5 %) | 4.00  | 3.00  | 2.00  | 0.00  | 0.00  |
| Plasma protein powder | 3.00  | 1.00  | 0.00  | 0.00  | 0.00  |
| L-Lys·Hcl | 0.45  | 0.46  | 0.42  | 0.44  | 0.40  |
| DL-Met | 0.15  | 0.16  | 0.14  | 0.12  | 0.10  |
| L-Thr | 0.15  | 0.16  | 0.14  | 0.15  | 0.14  |
| L-Try | 0.01  | 0.02  | 0.03  | 0.03  | 0.03  |
| Choline chloride 50% | 0.15  | 0.10  | 0.10  | 0.10  | 0.10  |
| CaCO3 | 1.00  | 0.92  | 0.90  | 0.89  | 0.80  |
| CaHPO4 | 0.10  | 0.40  | 0.70  | 0.84  | 0.70  |
| NaCl | 0.30  | 0.30  | 0.30  | 0.30  | 0.30  |
| Premix1 | 1.00  | 1.00  | 0.50  | 0.50  | 0.50  |
| Total | 100.00  | 100.00  | 100.00  | 100.00  | 100.00  |
| **Nutrient levels2** |  |  |  |  |  |
| DE（Kcal/kg） | 3.58  | 3.48  | 3.39  | 3.40  | 3.39  |
| CP（%） | 19.55  | 18.35  | 15.68  | 13.73  | 12.18  |
| Ca（%） | 0.79  | 0.71  | 0.66  | 0.59  | 0.52  |
| STTD P（%） | 0.39  | 0.34  | 0.31  | 0.27  | 0.25  |
| SID Lys（%） | 1.36  | 1.23  | 0.98  | 0.85  | 0.73  |
| SID Met+cys（%） | 0.74  | 0.69  | 0.55  | 0.55  | 0.42  |
| SID Thr（%） | 0.80  | 0.73  | 0.58  | 0.52  | 0.46  |
| SID Trp（%） | 0.22  | 0.20  | 0.17  | 0.15  | 0.13  |

Note 1: Contents per kg of diet for 7-25 kg BW Period: Fe, 150 mg; Cu, 195 mg; Zn, 150 mg; Mn, 30 mg; I, 0.3 mg; Se, 0.3 mg; vitamin A, 12000 IU; vitamin D, 3200 IU; vitamin E, 80 mg; vitamin K3, 32.50 mg; vitamin B1, 2.30 mg; vitamin B2, 6.50 mg; vitamin B6, 5 mg; vitamin B12, 50 μg; nicotinic acid, 45 mg; pantothenic acid, 20 mg, folic acid, 1.50 mg; biotin, 0.15 mg; enzyme preparation and preservatives. Contents per kg of diet for 7-25 kg BW Period: Fe, 120 mg; Cu, 17 mg; Zn, 100 mg; Mn, 25 mg; I, 0.3 mg; Se, 0.2 mg; vitamin A, 5512 IU; vitamin D, 2250 IU; vitamin E, 24 mg; vitamin K3, 3 mg; vitamin B2, 6 mg; vitamin B6, 3 mg; vitamin B12, 24 μg;pantothenic acid, 15 mg, folic acid, 1.20 mg; biotin, 0.15 mg; enzyme preparation and preservatives. Note 2: Nutrient levels were calculated values.

**Supplementary Table S3. Information of primers used to perfrom Q-PCR**

|  |  |  |
| --- | --- | --- |
| Gene symbol | Forword primer | Reverse primer |
| *ATP6* | AAGCAAGGGTTCTCAAACTCG | CGGCGCAAACTAAACCAACTC |
| *COX2* | GCACCCCGACATAGAGAGC | CTGCGGAGTGCAGTGTTCT |
| *GCG* | GAATCAACACCATCGGTCAAAT | CTCCACCCATAGAATGCCCAGT |
| *HSD17B2* | TCTTCTCGGTGTCATGCTTCC | CAAAACTCCGGCAAATACCGT |
| *IGFBP2* | GACAATGGCGATGACCACTCA | CAGCTCCTTCATACCCGACTT |
| *HGD* | CCCGTCGTCATGGATCTCAC | GCTGACAATCTCCCTGTGGA |
| *NNMT* | GAGATCGTCGTCACTGACTACT | CACACACATAGGTCACCACTG |
| *DAO* | AATCTCGGGCTACAACCTCTT | TCAGCTTCCGAAATCCCAGAA |
| *GNMT* | CTGGGGTGGACTCCATTATGC | GATGACCCACTTGTCGAAGGC |
| *FOXO1* | GCGTGCCCTACTTCAAGGATAA | TCCCACTCTTGCCTCCCTCT |
| *GSR* | TGACTATGGCTTTCAGAGTTGTG | GCCGTGGATGATTTCTATGTG |
| *TOP2A* | CGAAATGACAAGCGAGAAGT | CTGACCAATGGGCTGTAAGA |
| *TCN1* | TCAGAGGGAACTATTCAATCA | GTCAGAGCAAGAACAGCCAC |
| *KCNIP3* | CTTCCTGTTCAATGCCTTCG | TAGCCATCCTTGTTAATGTCGTAG |
| *HAMP* | TCTCCCATCCCAGACAAGACAG | GACAGCAGCCGCAGCAGAAG |
| *ACTB* | TCTGGCACCACACCTTCT | TGATCTGGGTCATCTTCTCAC |
| *TBP* | GATGGACGTTCGGTTTAGG | AGCAGCACAGTACGAGCAA |
| *TOP2B* | AACTGGATGATGCTAATGATGCT | TGGAAAAACTCCGTATCTGTCTC |

*ATP6*: ATP synthase F0 subunit 6; *COX2*: cytochrome c oxidase subunit I; *GCG*: glucagon; *HSD17B2*: hydroxysteroid 17-beta dehydrogenase 2; *IGFBP2*: insulin like growth factor binding protein 2; *HGD*: homogentisate 1,2-dioxygenase; *NNMT*: nicotinamide N-methyltransferase; *DAO*: D-amino acid oxidase; *GNMT*: glycine N-methyltransferase; *FOXO1:* forkhead box O1; *GSR:* glutathione-disulfide reductase; *TOP2A:*  DNA topoisomerase II alpha; *TCN1*: transcobalamin 1; *KCNIP3:* potassium voltage-gated channel interacting protein 3; *HAMP:* hepcidin antimicrobial peptide; *ACTB*: actin beta; *TBP*: TATA-box binding protein; *TOP2B*: DNA topoisomerase II beta.

**Supplementary Table S4. Distuibutuion of genes expression (FPKM)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Sample | 0-0.1 | 0.1-0.3 | 0.3-3.57 | 3.57-15 | 15-60 | >60 |
| Normal-1 | 18183(15.02%) | 17054(14.09%) | 65447(54.06%) | 12987(10.73%) | 4897(4.05%) | 2487(2.05%) |
| Normal-2 | 15005(12.40%) | 14286(11.80%) | 71180(58.80%) | 14207(11.74%) | 4325(3.57%) | 2052(1.70%) |
| Normal-3 | 14361(11.86%) | 13047(10.78%) | 73879(61.03%) | 13879(11.47%) | 3989(3.30%) | 1900(1.57%) |
| IUGR-1 | 15329(12.66%) | 14830(12.25%) | 70836(58.52%) | 13462(11.12%) | 4455(3.68%) | 2143(1.77%) |
| IUGR-2 | 17844(14.74%) | 17732(14.65%) | 65521(54.12%) | 12808(10.58%) | 4766(3.94%) | 2384(1.97%) |
| IUGR-3 | 17283(14.28%) | 16802(13.88%) | 66627(55.04%) | 13383(11.06%) | 4614(3.81%) | 2346(1.94%) |

Note, FPKM: Reads Per Kilobase of exon model per Million mapped reads



**Supplementary Figure S1. The distribution of reads in genome sites.**



**Supplementary Figure S2. Validation of DEGs by qPCR. The *r* value represents the Pearson correlation coefficient between two methods**