**Table S1.** Ingredients and nutrient composition of the maternal gestation and lactation diet (as-fed basis)**\***

|  |  |
| --- | --- |
| Ingredients | g/kg |
| Maize | 824.37 |
| Soyabean meal (48% crude protein) | 118.43 |
| L-LysmHCl | 1.00 |
| Monocalcium phosphate | 13.55 |
| Ground limestone | 8.65 |
| Maize oil | 10.00 |
| Sodium chloride | 4.00 |
| UW VTMM-S, (without D)†‡ | 20.00 |
| Total | 1000.00 |
| Calculated analysis§ |  |
| Ca | 7.0 |
| Total P | 6.0 |

NRC, National Research Council.

\* Diet formulations were based on the standard gestation and lactation diets routinely used at the UW Swine Research and Teaching Center with exception of the use of maize oil *v.* Max-Fat (a blend of animal and vegetable fats, Maxco, Inc.) and the inclusion of vitamin D. Sows were fed 2.2 kg/d during gestation and allowed continuous access to feed during lactation.

†The University of Wisconsin vitamin trace mineral mix-sow (UW VTMM-S), without D is a custom mixed vitamin-trace mineral premix for gestation and lactation without vitamin D. The premix provided the following nutrients (mg/kg diet): retinol, 1680; cholecalciferol, 0 (see footnote ‡); DL-α-tocopherol, 54; menadione nicotinamide bisulphite, 0.75; nicotinamide, 22; biotin, 0.40; choline, 1350; folic acid, 2.2; pantothenic acid, 24; riboflavin, 11; cyanocobalamin, 0.043; Cu, 4; I, 0.3; Fe, 74; Se, 0.2; Mn, 22; and Zn, 90.

‡Vitamin D3 was added to UW VTMM-S to supply either 0 (-D), 8**.**125 (+D) or 43**.**750 (++D) µg cholecalciferol/kg complete diet for the +D gestation and lactation diets (1 IU of vitamin D3 is defined as the biological activity of 0.025 µg cholecalciferol) but was omitted in the -D diets.

§ Calculated analysis based on nutrient composition of feed ingredients in NRC(17). Analyzed values averaged across diet mixes were as follows: 6.7 g Ca/kg diet; 5.6 g P/kg diet; 0.35, 10.4, and 40.5 µg D3/kg for –D, +D, and ++D diets, respectively.

**Table S2**. Ingredients and nutrient composition of nursery diets (as-fed basis)\*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Ingredients | -DLCaP (g/kg) | -DHCaP (g/kg) | +DLCaP (g/kg) | +DHCaP (g/kg) |
| Maize | 663.61 | 643.42 | 663.61 | 643.42 |
| Soyabean meal (48% crude protein) | 297.83 | 299.57 | 297.83 | 299.57 |
| L-LysmHCl | 1.00 | 1.00 | 1.00 | 1.00 |
| Monocalcium phosphate | 8.43 | 15.63 | 8.43 | 15.63 |
| Ground limestone | 5.13 | 16.37 | 5.13 | 16.37 |
| Maize oil | 10.00 | 10.00 | 10.00 | 10.00 |
| Sodium chloride | 4.00 | 4.00 | 4.00 | 4.00 |
| UW VTMM-G, without D† | 10.00 | 10.00 | 0.00 | 0.00 |
| UW VTMM-G, with D‡ | 0.00 | 0.00 | 10.00 | 10.00 |
| Total | 1000.00 | 1000.00 | 1000.00 | 1000.00 |
| Calculated analysis§ |  |  |  |  |
| Ca | 5.2 | 10.5 | 5.2 | 10.5 |
| P | 5.7 | 7.2 | 5.7 | 7.2 |

-DLCaP, 0 µg cholecalciferol/kg diet and 75% of Ca and 95% of P requirements; -DHCaP, 0 µg cholecalciferol/kg diet and 150% of Ca and 120% of P requirements; +DLCaP, 7**.**0 µg cholecalciferol/kg diet and 75% of Ca and 95% of P requirements; +DHCaP, 7**.**0 µg cholecalciferol/kg diet and 150% of Ca and 120% of P requirements; (1 IU of vitamin D3 is defined as the biological activity of 0.025 µg cholecalciferol); NRC, National Research Council.

\*The Ca and total P requirements for 10 to 20 kg pigs is 7.0 g Ca/kg and 6.0 g P/kg diet respectively(17).

† The UW VTMM-G, without D is a custom mixed vitamin-trace mineral premix for growth without vitamin D. The premix provided the following nutrients (mg/kg diet): retinol, 840; cholecalciferol, 0; DL-α-tocopherol, 14; menadione nicotinamide bisulphite, 0.75; nicotinamide, 22; pantothenic acid, 12; riboflavin, 8; cyanocobalamin, 0.033; Cu, 1.5; I, 0.3; Fe, 38; Se, 0.2; and Zn, 90.

‡ The UW VTMM-G with D provided the same nutrients as indicated in footnote † with the exception of the addition of vitamin D3, 7**.**0 µg/kg diet.

§ Calculated analysis based on nutrient composition of feed ingredients in NRC(17). Analyzed values across the diet mixes were as follows: 5.4 and 10.3 g Ca/kg diet for LCa and HCa diets, respectively; 5.5 and 7.0 g P/kg diet for LP and HP diets, respectively; vitamin D analysis of nursery diets was not available.

**Table S3**. Primer sequences for housekeeping genes and genes of interest for quantification by real time quantitative PCR (qPCR)\*

|  |  |  |
| --- | --- | --- |
| Primer | Forward (5´ to 3´) | Reverse (5´ to 3´) |
| *CYP27B1* | GAAAACCATGGTCCATTTGC | TCCGACTAGGAACCATGAGG |
| *CYP24A1* | GCAAGAATGAAGCTTTTGGC | AGACACCAAGGTCAACCAGG |
| *VDR* | TTGCCAAACACCTCAAGCACAAGG | TGCTCTACGCCAAGATGATCCAGA |
| *OCN* | CATAGCCTAGACCTCGCAGC | GATGGGGACCTTACACTTGC |
| *HPRT1* | GGACTTGAATCATGTTTGTG | CAGATGTTTCCAAACTCAAC |
| *RPS18*  *CYCLOA* | ACAGAGGATGAGGTGGAACG  GTCTCCTTCGAGCTGTTTGC | AGGACCTGGCTGTACTTCCC  CCATAGATGGACTTGCCACC |

*CYP27B1*, 1-alpha hydroxylase; *CYP24A1*, 24-hydroxylase; *VDR*, vitamin D receptor; *OCN*, osteocalcin; *HPRT1*, hypoxanthine phosphoribosyltransferase 1; *RPS18*, ribosomal protein S18; *CYCLOA,* cyclophilin A.

\* Forward and reverse sequences for primers used to analyze mRNA content using qPCR.