**Dynamics of the mineral composition and deposition rates in the empty body of entire males, castrates and female pigs**

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Supplementary Material S1 Detailed description of the data handling on mineral amount in the empty body (EB) in order to correct for the corresponding standardized empty body weight (EBW) categories.

1. A preliminary allometric regression (Y= a×EBWb) was calculated for each mineral (ash, Ca, P, Mg, K, Na, Cu, Fe, Mn and Zn) amount in the EB according to gender (female (FE), entire male (EM) and castrated (CA) pigs) within dietary treatment (control, C and low protein, LP) (C-FE, C-EM, C-CA, LP-FE, LP-EM and LP-CA).
2. The mean EBW was calculated per BW category from 20 to 140 kg EBW (18.3, 39.8, 56.7, 78.3, 95.9, 116.0, 133.9 kg), as well as the mean protein amount (3133, 6151, 9659, 12812, 16024, 19234, 21806 g)
3. These average EBW data were used, together with the preliminary allometric equations, to calculate the amount of ash, Ca, P, Mg, K, Na, Cu, Fe, Mn and Zn in the EB per gender and diet at each EBW category. The average protein amount were used in the same way to calculate the amount of ash, Ca and P in the EB per gender and diet at each EBW category.
4. This preliminary equation was used to estimate the amount of each mineral in the EB for each animal according to its own EBW as well as the amount of ashes, Ca and P for each animal according to its own protein amount.
5. The difference between the estimated amount of mineral in the EB per animal according to its effective EBW and the corresponding amount of mineral in the component (carcass, organs and empty intestines, blood and bile) of each mean EBW, was used to correct the individual amounts of ash, Ca, P, Mg, K, Na, Cu, Fe, Mn and Zn in the EB assuming that all pigs would have had precisely the same EBW at slaughter.

**Supplementary Table S1** *Average macro mineral (g/kg empty BW) concentration of the pig’s empty body of female, entire male and castrated pigs1 fed the control or low CP diets1 and slaughtered either the day of birth and at different body weight categories.*

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **BW category (kg)** | **Live BW (kg)** | **EBW2** |  | **Ash** | **Ca** | **P** | **Mg** | **K** | **Na** |
|  | C | LP | C | LP |  | C | LP | C | LP | C | LP | C | LP | C | LP | C | LP |
| **EM** | **birth** | 1.5 |  | 1.4 |  |  | 36.4 |  | 10.40 |  | 6.36 |  | 0.27 |  | 1.89 |  | 1.83 |  |
|  | **10** | 9.5 |  | 8.9 |  |  | 31.0 |  | 8.90 |  | 5.77 |  | 0.28 |  | 2.34 |  | 1.38 |  |
|  | **20** | 19.6 |  | 18.3 |  |  | 28.7 |  | 7.44 |  | 4.98 |  | 0.26 |  | 2.41 |  | 1.28 |  |
|  | **40** | 41.7 | 38.6 | 39.8 | 36.1 |  | 30.5 | 30.0 | 8.35 | 8.55 | 5.66 | 5.62 | 0.30 | 0.28 | 2.62 | 2.34 | 1.20 | 1.16 |
|  | **60** | 59.5 | 63.0 | 56.7 | 59.1 |  | 29.8 | 31.3 | 8.44 | 8.59 | 5.53 | 5.81 | 0.29 | 0.30 | 2.52 | 2.58 | 1.12 | 1.12 |
|  | **80** | 82.3 | 84.1 | 78.3 | 78.8 |  | 30.5 | 32.1 | 8.35 | 8.90 | 5.61 | 5.87 | 0.29 | 0.30 | 2.42 | 2.44 | 1.05 | 1.13 |
|  | **100** | 100.4 | 99.9 | 95.9 | 95.5 |  | 30.1 | 29.4 | 8.09 | 8.42 | 5.40 | 5.39 | 0.29 | 0.28 | 2.45 | 2.28 | 1.02 | 1.03 |
|  | **120** | 119.8 | 120.4 | 116.0 | 115.8 |  | 27.4 | 31.0 | 7.37 | 8.84 | 4.92 | 5.83 | 0.28 | 0.30 | 2.33 | 2.37 | 0.97 | 1.01 |
|  | **140** | 138.3 | 142.9 | 133.9 | 137.5 |  | 29.8 | 28.5 | 8.39 | 8.14 | 5.49 | 5.36 | 0.29 | 0.27 | 2.51 | 2.22 | 1.02 | 0.98 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **CA** | **10** | 9.9 |  | 9.0 |  |  | 30.2 |  | 8.21 |  | 5.53 |  | 0.28 |  | 2.32 |  | 1.41 |  |
|  | **20** | 21.2 |  | 19.9 |  |  | 30.7 |  | 8.14 |  | 5.40 |  | 0.28 |  | 2.51 |  | 1.25 |  |
|  | **40** | 40.4 | 40.7 | 38.5 | 37.8 |  | 30.4 | 32.5 | 8.46 | 9.16 | 5.64 | 5.92 | 0.30 | 0.30 | 2.54 | 2.33 | 1.10 | 1.12 |
|  | **60** | 63.1 | 60.4 | 60.2 | 57.7 |  | 31.0 | 29.6 | 8.55 | 8.12 | 5.73 | 5.49 | 0.29 | 0.27 | 2.44 | 2.25 | 1.01 | 1.03 |
|  | **80** | 80.5 | 81.0 | 77.3 | 77.3 |  | 30.1 | 29.5 | 8.43 | 8.52 | 5.57 | 5.45 | 0.29 | 0.27 | 2.46 | 2.33 | 1.02 | 0.99 |
|  | **100** | 102.2 | 100.9 | 97.7 | 97.1 |  | 29.3 | 30.6 | 8.33 | 10.00 | 5.47 | 6.05 | 0.29 | 0.32 | 2.37 | 2.19 | 0.98 | 0.99 |
|  | **120** | 117.9 | 120.9 | 114.3 | 116.2 |  | 30.0 | 32.0 | 8.80 | 9.67 | 5.52 | 6.06 | 0.27 | 0.31 | 2.27 | 2.25 | 0.91 | 0.97 |
|  | **140** | 139.6 | 143.1 | 136.2 | 138.0 |  | 27.1 | 29.3 | 7.52 | 8.29 | 4.96 | 5.51 | 0.27 | 0.28 | 2.07 | 2.04 | 0.86 | 0.88 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **FE** | **birth** | 1.3 |  | 1.3 |  |  | 37.7 |  | 10.61 |  | 6.79 |  | 0.31 |  | 1.95 |  | 1.87 |  |
|  | **10** | 9.6 |  | 8.7 |  |  | 32.6 |  | 9.12 |  | 5.84 |  | 0.29 |  | 2.33 |  | 1.33 |  |
|  | **20** | 21.6 |  | 20.2 |  |  | 31.4 |  | 8.46 |  | 5.65 |  | 0.29 |  | 2.52 |  | 1.26 |  |
|  | **40** | 40.9 | 39.7 | 39.1 | 36.1 |  | 30.6 | 31.9 | 8.42 | 8.92 | 5.79 | 5.76 | 0.30 | 0.30 | 2.62 | 2.41 | 1.10 | 1.10 |
|  | **60** | 64.2 | 61.6 | 61.3 | 59.1 |  | 28.1 | 33.8 | 7.29 | 9.64 | 5.15 | 5.92 | 0.28 | 0.31 | 2.53 | 2.32 | 1.02 | 1.04 |
|  | **80** | 79.4 | 79.3 | 76.0 | 78.8 |  | 31.1 | 30.8 | 9.10 | 8.73 | 5.99 | 5.77 | 0.31 | 0.30 | 2.45 | 2.39 | 1.02 | 1.03 |
|  | **100** | 100.8 | 102.4 | 96.5 | 95.5 |  | 29.4 | 32.2 | 8.65 | 9.62 | 5.50 | 6.16 | 0.30 | 0.30 | 2.39 | 2.25 | 0.96 | 0.96 |
|  | **120** | 118.0 | 122.4 | 114.2 | 115.8 |  | 28.5 | 30.3 | 8.15 | 8.64 | 5.47 | 5.43 | 0.29 | 0.28 | 2.33 | 2.30 | 0.93 | 0.96 |
|  | **140** | 141.2 | 141.0 | 134.9 | 137.5 |  | 27.2 | 30.1 | 7.46 | 8.13 | 5.05 | 5.29 | 0.26 | 0.29 | 2.20 | 2.23 | 0.89 | 0.90 |

1 FE = females; EM = entire males; CA = castrates; C = Control diets formulated to meet nutrient requirements; LP = Reduced protein diet formulated to contain, 80% of digestible dietary CP, lysine, methionine+cystine, threonine and tryptophan of C.

2 EBW = Empty body weight

**Supplementary Table S2** *Average trace mineral (mg/kg empty BW) concentration of the pig’s empty body of female, entire male and castrated pigs1 fed the control or low CP diets*1 *and slaughtered either the day of birth and at different body weight categories.*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **BW category (kg)** | **Live BW (kg)** | **EBW2** |  | **Cu** | **Fe** | **Mn** | **Zn** |
|  | C | LP | C | LP |  | C | LP | C | LP | C | LP | C | LP |
| **EM** | **birth** | 1.5 |  | 1.4 |  |  | 4.46 |  | 51.51 |  | 1.14 |  | 13.97 |  |
|  | **10** | 9.5 |  | 8.9 |  |  | 0.76 |  | 27.90 |  | 0.12 |  | 16.97 |  |
|  | **20** | 19.6 |  | 18.3 |  |  | 1.39 |  | 35.54 |  | 0.33 |  | 17.00 |  |
|  | **40** | 41.7 | 38.6 | 39.8 | 36.1 |  | 1.09 | 0.42 | 34.87 | 33.79 | 0.55 | 0.24 | 19.06 | 18.39 |
|  | **60** | 59.5 | 63.0 | 56.7 | 59.1 |  | 0.86 | 0.67 | 33.25 | 31.26 | 0.19 | 0.09 | 19.04 | 19.70 |
|  | **80** | 82.3 | 84.1 | 78.3 | 78.8 |  | 0.98 | 1.21 | 32.96 | 32.17 | 0.36 | 0.33 | 20.09 | 19.54 |
|  | **100** | 100.4 | 99.9 | 95.9 | 95.5 |  | 0.51 | 0.43 | 31.94 | 31.93 | 0.08 | 0.09 | 19.78 | 18.47 |
|  | **120** | 119.8 | 120.4 | 116.0 | 115.8 |  | 1.11 | 0.53 | 30.75 | 29.98 | 0.08 | 0.04 | 19.35 | 20.58 |
|  | **140** | 138.3 | 142.9 | 133.9 | 137.5 |  | 0.71 | 0.50 | 30.64 | 31.66 | 0.35 | 0.38 | 20.60 | 19.12 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **CA** | **10** | 9.9 |  | 9.0 |  |  | 0.78 |  | 29.39 |  | 0.19 |  | 16.21 |  |
|  | **20** | 21.2 |  | 19.9 |  |  | 1.07 |  | 36.08 |  | 0.48 |  | 17.84 |  |
|  | **40** | 40.4 | 40.7 | 38.5 | 37.8 |  | 0.87 | 0.61 | 31.18 | 29.33 | 0.52 | 0.10 | 19.58 | 19.12 |
|  | **60** | 63.1 | 60.4 | 60.2 | 57.7 |  | 1.28 | 1.35 | 29.56 | 30.95 | 0.58 | 0.56 | 20.42 | 19.90 |
|  | **80** | 80.5 | 81.0 | 77.3 | 77.3 |  | 0.71 | 0.60 | 33.40 | 31.78 | 0.33 | 0.09 | 19.37 | 20.33 |
|  | **100** | 102.2 | 100.9 | 97.7 | 97.1 |  | 0.74 | 0.62 | 30.59 | 30.99 | 0.02 | 0.51 | 20.47 | 20.44 |
|  | **120** | 117.9 | 120.9 | 114.3 | 116.2 |  | 0.72 | 0.87 | 31.26 | 31.29 | 0.05 | 0.10 | 20.11 | 21.43 |
|  | **140** | 139.6 | 143.1 | 136.2 | 138.0 |  | 0.56 | 0.90 | 26.94 | 29.84 | 0.02 | 0.38 | 20.78 | 19.86 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **FE** | **birth** | 1.3 |  | 1.3 |  |  | 4.96 |  | 56.43 |  | 1.09 |  | 14.80 |  |
|  | **10** | 9.6 |  | 8.7 |  |  | 0.79 |  | 25.74 |  | 0.18 |  | 16.31 |  |
|  | **20** | 21.6 |  | 20.2 |  |  | 1.10 |  | 37.27 |  | 0.48 |  | 18.60 |  |
|  | **40** | 40.9 | 39.7 | 39.1 | 36.1 |  | 1.56 | 0.27 | 33.13 | 33.10 | 0.37 | 0.15 | 18.72 | 20.26 |
|  | **60** | 64.2 | 61.6 | 61.3 | 59.1 |  | 1.09 | 0.65 | 32.09 | 29.35 | 0.39 | 0.13 | 18.87 | 19.23 |
|  | **80** | 79.4 | 79.3 | 76.0 | 78.8 |  | 0.40 | 0.63 | 31.82 | 31.31 | 0.05 | 0.08 | 19.51 | 20.26 |
|  | **100** | 100.8 | 102.4 | 96.5 | 95.5 |  | 0.55 | 0.30 | 29.80 | 29.46 | 0.05 | 0.09 | 19.75 | 18.73 |
|  | **120** | 118.0 | 122.4 | 114.2 | 115.8 |  | 0.42 | 1.30 | 29.95 | 31.07 | 0.50 | 0.28 | 18.61 | 20.64 |
|  | **140** | 141.2 | 141.0 | 134.9 | 137.5 |  | 0.70 | 0.54 | 29.53 | 29.57 | 0.06 | 0.14 | 19.61 | 19.55 |

1 FE = females; EM = entire males; CA = castrates; C = Control diets formulated to meet nutrient requirements; LP = Reduced protein diet formulated to contain, 80% of digestible dietary CP, lysine, methionine+cystine, threonine and tryptophan of C.

2 EBW = Empty body weight

**Supplementary Table S3** *Average macro mineral (g/kg empty BW) concentration of the carcass1 of female, entire male and castrated pigs2 fed the control or low CP diets*2 *and slaughtered either the day of birth and at different body weight categories.*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **BW category (kg)** | **Fraction weight (kg)** |  | **Ash** | **Ca** | **P** | **Mg** | **K** | **Na** |
|  | C | LP |  | C | LP | C | LP | C | LP | C | LP | C | LP | C | LP |
| **EM** | **birth** | 1.0 |  |  | 46.07 |  | 13.87 |  | 8.05 |  | 0.33 |  | 1.96 |  | 2.19 |  |
|  | **10** | 6.8 |  |  | 37.51 |  | 11.55 |  | 7.06 |  | 0.33 |  | 2.44 |  | 1.37 |  |
|  | **20** | 13.6 |  |  | 34.73 |  | 9.99 |  | 6.17 |  | 0.31 |  | 2.47 |  | 1.25 |  |
|  | **40** | 30.5 | 27.6 |  | 36.29 | 35.68 | 10.83 | 11.14 | 6.84 | 6.91 | 0.36 | 0.34 | 2.72 | 2.45 | 1.16 | 1.11 |
|  | **60** | 45.0 | 46.5 |  | 34.79 | 36.59 | 10.60 | 10.88 | 6.58 | 6.98 | 0.34 | 0.35 | 2.61 | 2.72 | 1.04 | 1.08 |
|  | **80** | 62.4 | 62.4 |  | 35.77 | 37.90 | 10.44 | 11.20 | 6.68 | 7.04 | 0.33 | 0.36 | 2.53 | 2.58 | 0.98 | 1.10 |
|  | **100** | 77.3 | 76.3 |  | 34.82 | 34.53 | 10.01 | 10.50 | 6.37 | 6.39 | 0.34 | 0.32 | 2.55 | 2.35 | 0.95 | 0.97 |
|  | **120** | 94.3 | 94.3 |  | 31.87 | 36.03 | 9.01 | 10.80 | 5.75 | 6.85 | 0.32 | 0.34 | 2.44 | 2.45 | 0.92 | 0.95 |
|  | **140** | 109.7 | 111.9 |  | 34.43 | 33.08 | 10.21 | 9.96 | 6.40 | 6.28 | 0.33 | 0.30 | 2.60 | 2.28 | 0.93 | 0.94 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **CA** | **10** | 6.8 |  |  | 36.28 |  | 10.81 |  | 6.80 |  | 0.33 |  | 2.33 |  | 1.37 |  |
|  | **20** | 14.9 |  |  | 36.67 |  | 10.84 |  | 6.66 |  | 0.34 |  | 2.58 |  | 1.22 |  |
|  | **40** | 29.9 | 29.3 |  | 35.62 | 38.61 | 10.84 | 11.83 | 6.82 | 7.24 | 0.35 | 0.35 | 2.65 | 2.43 | 1.06 | 1.10 |
|  | **60** | 48.3 | 46.1 |  | 36.10 | 34.38 | 10.62 | 10.12 | 6.77 | 6.52 | 0.33 | 0.31 | 2.51 | 2.33 | 0.96 | 0.97 |
|  | **80** | 62.9 | 62.8 |  | 34.52 | 34.14 | 10.31 | 10.44 | 6.52 | 6.39 | 0.34 | 0.30 | 2.56 | 2.39 | 0.96 | 0.93 |
|  | **100** | 80.8 | 80.1 |  | 33.60 | 35.20 | 10.04 | 12.06 | 6.33 | 7.03 | 0.33 | 0.37 | 2.45 | 2.25 | 0.95 | 0.96 |
|  | **120** | 95.6 | 97.4 |  | 34.16 | 36.58 | 10.48 | 11.50 | 6.35 | 6.99 | 0.31 | 0.35 | 2.36 | 2.32 | 0.87 | 0.94 |
|  | **140** | 114.3 | 115.5 |  | 30.84 | 33.48 | 8.92 | 9.88 | 5.67 | 6.36 | 0.30 | 0.31 | 2.12 | 2.10 | 0.83 | 0.84 |
| **FE** | **birth** | 1.0 |  |  | 48.14 |  | 14.24 |  | 8.64 |  | 0.38 |  | 2.03 |  | 2.24 |  |
|  | **10** | 7.0 |  |  | 38.02 |  | 11.38 |  | 6.88 |  | 0.33 |  | 2.34 |  | 1.32 |  |
|  | **20** | 15.4 |  |  | 37.58 |  | 11.13 |  | 6.90 |  | 0.34 |  | 2.55 |  | 1.20 |  |
|  | **40** | 30.7 | 28.9 |  | 35.76 | 37.81 | 10.68 | 11.40 | 6.95 | 6.96 | 0.35 | 0.36 | 2.73 | 2.49 | 1.06 | 1.06 |
|  | **60** | 49.5 | 47.3 |  | 32.31 | 39.46 | 8.99 | 11.87 | 6.02 | 7.00 | 0.32 | 0.36 | 2.64 | 2.40 | 0.96 | 1.00 |
|  | **80** | 61.6 | 61.0 |  | 35.96 | 35.89 | 11.22 | 10.75 | 7.08 | 6.80 | 0.36 | 0.35 | 2.55 | 2.48 | 0.96 | 0.97 |
|  | **100** | 79.9 | 80.4 |  | 33.53 | 37.03 | 10.41 | 11.58 | 6.35 | 7.17 | 0.34 | 0.34 | 2.46 | 2.32 | 0.89 | 0.91 |
|  | **120** | 94.6 | 96.3 |  | 32.49 | 34.78 | 9.81 | 10.43 | 6.32 | 6.27 | 0.33 | 0.32 | 2.40 | 2.34 | 0.87 | 0.89 |
|  | **140** | 112.2 | 113.5 |  | 31.05 | 34.47 | 8.94 | 9.69 | 5.83 | 6.09 | 0.29 | 0.33 | 2.27 | 2.32 | 0.84 | 0.85 |

1 Carcass including head without brain, tail and feet.

2 FE = females; EM = entire males; CA = castrates; C = Control diets formulated to meet nutrient requirements; LP = Reduced protein diet formulated to contain, 80% of digestible dietary CP, lysine, methionine+cystine, threonine and tryptophan of C.

**Supplementary Table S4** *Average trace mineral (mg/kg empty BW) concentration of the carcass1 of female, entire male and castrated pigs2 fed the control or low CP diets*2 *and slaughtered either the day of birth and at different body weight categories.*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **BW category (kg)** | **Fraction weight (kg)** | **Cu** | **Fe** | **Mn** | **Zn** |
|  | C | LP | C | LP | C | LP | C | LP | C | LP |
| **EM** | **birth** | 1.0 |  | 0.83 |  | 39.84 |  | 0.70 |  | 15.56 |  |
|  | **10** | 6.8 |  | 0.29 |  | 11.04 |  | 0.00 |  | 18.38 |  |
|  | **20** | 13.6 |  | 1.43 |  | 10.64 |  | 0.39 |  | 18.13 |  |
|  | **40** | 30.5 | 27.6 | 1.24 | 0.40 | 9.49 | 7.70 | 0.65 | 0.28 | 19.15 | 18.33 |
|  | **60** | 45.0 | 46.5 | 0.88 | 0.64 | 8.29 | 7.65 | 0.18 | 0.05 | 18.30 | 19.98 |
|  | **80** | 62.4 | 62.4 | 1.05 | 1.33 | 9.78 | 7.41 | 0.43 | 0.37 | 20.10 | 20.01 |
|  | **100** | 77.3 | 76.3 | 0.51 | 0.40 | 7.61 | 6.08 | 0.09 | 0.08 | 19.78 | 18.92 |
|  | **120** | 94.3 | 94.3 | 1.15 | 0.48 | 7.63 | 6.31 | 0.05 | 0.01 | 19.60 | 20.92 |
|  | **140** | 109.7 | 111.9 | 0.69 | 0.43 | 8.16 | 7.74 | 0.40 | 0.43 | 20.90 | 19.37 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **CA** | **10** | 6.8 |  | 0.42 |  | 10.49 |  | 0.10 |  | 17.02 |  |
|  | **20** | 14.9 |  | 1.24 |  | 10.08 |  | 0.58 |  | 18.46 |  |
|  | **40** | 29.9 | 29.3 | 0.98 | 0.65 | 8.85 | 8.38 | 0.64 | 0.07 | 19.58 | 19.07 |
|  | **60** | 48.3 | 46.1 | 1.43 | 1.51 | 8.87 | 8.36 | 0.68 | 0.66 | 19.54 | 19.42 |
|  | **80** | 62.9 | 62.8 | 0.75 | 0.56 | 9.18 | 8.79 | 0.34 | 0.08 | 18.73 | 20.39 |
|  | **100** | 80.8 | 80.1 | 0.75 | 0.60 | 8.92 | 7.15 | 0.00 | 0.57 | 20.45 | 20.55 |
|  | **120** | 95.6 | 97.4 | 0.72 | 0.86 | 7.79 | 7.13 | 0.00 | 0.05 | 20.06 | 21.84 |
|  | **140** | 114.3 | 115.5 | 0.54 | 0.87 | 6.57 | 6.86 | 0.00 | 0.38 | 21.39 | 20.33 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **FE** | **birth** | 1.0 |  | 0.44 |  | 43.52 |  | 0.82 |  | 16.45 |  |
|  | **10** | 7.0 |  | 0.46 |  | 12.08 |  | 0.11 |  | 16.90 |  |
|  | **20** | 15.4 |  | 1.21 |  | 10.53 |  | 0.57 |  | 18.83 |  |
|  | **40** | 30.7 | 28.9 | 1.80 | 0.15 | 8.75 | 8.86 | 0.42 | 0.07 | 18.70 | 20.19 |
|  | **60** | 49.5 | 47.3 | 1.18 | 0.59 | 8.40 | 7.21 | 0.44 | 0.09 | 18.80 | 19.22 |
|  | **80** | 61.6 | 61.0 | 0.38 | 0.61 | 7.07 | 6.91 | 0.04 | 0.07 | 18.97 | 20.42 |
|  | **100** | 79.9 | 80.4 | 0.50 | 0.20 | 6.79 | 5.53 | 0.02 | 0.06 | 19.81 | 18.86 |
|  | **120** | 94.6 | 96.3 | 0.39 | 1.34 | 5.12 | 7.24 | 0.59 | 0.20 | 18.14 | 20.41 |
|  | **140** | 112.2 | 113.5 | 0.68 | 0.47 | 5.91 | 6.88 | 0.00 | 0.12 | 19.50 | 19.29 |

1 Carcass including head without brain, tail and feet.

2 FE = females; EM = entire males; CA = castrates; C = Control diets formulated to meet nutrient requirements; LP = Reduced protein diet formulated to contain, 80% of digestible dietary CP, lysine, methionine+cystine, threonine and tryptophan of C.

**Supplementary Table S5** *Average macro mineral (g/kg) concentration of the viscera1 of female, entire male and castrated pigs2 fed the control or low CP diets*2 *and slaughtered either the day of birth and at different body weight categories.*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **BW category (kg)** | **Fraction weight (kg)** |  | **Ash** | **Ca** | **P** | **Mg** | **K** | **Na** |
|  | C | LP |  | C | LP | C | LP | C | LP | C | LP | C | LP | C | LP |
| **EM** | **birth** | 0.2 |  |  | 12.46 |  | 0.59 |  | 2.20 |  | 0.14 |  | 2.49 |  | 1.17 |  |
|  | **10** | 1.5 |  |  | 9.44 |  | 0.12 |  | 1.92 |  | 0.13 |  | 2.23 |  | 1.04 |  |
|  | **20** | 3.3 |  |  | 12.60 |  | 0.12 |  | 1.99 |  | 0.13 |  | 2.42 |  | 1.08 |  |
|  | **40** | 6.6 | 5.9 |  | 12.32 | 13.24 | 0.14 | 0.13 | 2.20 | 1.88 | 0.14 | 0.13 | 2.45 | 2.21 | 1.14 | 1.09 |
|  | **60** | 8.1 | 8.7 |  | 11.66 | 13.14 | 0.14 | 0.14 | 1.89 | 1.93 | 0.14 | 0.12 | 2.40 | 2.25 | 1.22 | 1.11 |
|  | **80** | 10.7 | 11.4 |  | 10.49 | 10.28 | 0.13 | 0.15 | 1.81 | 1.77 | 0.15 | 0.13 | 2.15 | 2.05 | 1.10 | 1.02 |
|  | **100** | 12.9 | 13.3 |  | 11.17 | 9.08 | 0.14 | 0.19 | 1.80 | 1.80 | 0.13 | 0.14 | 2.08 | 2.08 | 1.08 | 1.06 |
|  | **120** | 14.9 | 15.0 |  | 7.72 | 8.59 | 0.22 | 0.20 | 1.64 | 1.69 | 0.12 | 0.11 | 1.89 | 2.05 | 1.01 | 1.07 |
|  | **140** | 16.4 | 17.9 |  | 8.68 | 7.93 | 0.18 | 0.18 | 1.75 | 1.65 | 0.14 | 0.14 | 2.09 | 1.96 | 1.13 | 1.01 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **CA** | **10** | 1.5 |  |  | 11.49 |  | 0.10 |  | 2.06 |  | 0.14 |  | 2.60 |  | 1.15 |  |
|  | **20** | 3.6 |  |  | 14.36 |  | 0.12 |  | 2.09 |  | 0.14 |  | 2.51 |  | 1.09 |  |
|  | **40** | 5.9 | 6.1 |  | 13.47 | 13.92 | 0.13 | 0.14 | 1.95 | 1.91 | 0.14 | 0.13 | 2.32 | 2.22 | 1.00 | 1.05 |
|  | **60** | 8.2 | 7.9 |  | 11.32 | 11.69 | 0.14 | 0.14 | 1.98 | 1.85 | 0.13 | 0.14 | 2.33 | 2.14 | 1.05 | 1.03 |
|  | **80** | 9.7 | 10.0 |  | 11.87 | 9.48 | 0.17 | 0.17 | 1.84 | 1.74 | 0.14 | 0.13 | 2.08 | 2.08 | 1.09 | 1.02 |
|  | **100** | 11.3 | 11.7 |  | 9.18 | 8.95 | 0.17 | 0.20 | 1.81 | 1.76 | 0.13 | 0.12 | 2.04 | 1.93 | 0.95 | 0.92 |
|  | **120** | 12.8 | 12.8 |  | 8.44 | 7.66 | 0.20 | 0.22 | 1.62 | 1.60 | 0.10 | 0.11 | 1.85 | 1.85 | 0.88 | 0.90 |
|  | **140** | 15.2 | 15.7 |  | 7.02 | 6.97 | 0.19 | 0.17 | 1.49 | 1.43 | 0.12 | 0.11 | 1.73 | 1.63 | 0.86 | 0.82 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **FE** | **birth** | 0.2 |  |  | 11.37 |  | 0.23 |  | 2.17 |  | 0.13 |  | 2.52 |  | 1.15 |  |
|  | **10** | 1.4 |  |  | 10.63 |  | 0.10 |  | 2.03 |  | 0.13 |  | 2.45 |  | 1.09 |  |
|  | **20** | 3.4 |  |  | 13.42 |  | 0.15 |  | 2.27 |  | 0.15 |  | 2.70 |  | 1.20 |  |
|  | **40** | 5.8 | 5.5 |  | 12.64 | 11.97 | 0.13 | 0.14 | 1.97 | 1.97 | 0.14 | 0.14 | 2.40 | 2.34 | 1.03 | 1.07 |
|  | **60** | 8.0 | 7.7 |  | 11.61 | 10.56 | 0.14 | 0.16 | 1.98 | 1.78 | 0.13 | 0.13 | 2.23 | 2.10 | 1.06 | 1.01 |
|  | **80** | 9.7 | 9.8 |  | 11.11 | 9.07 | 0.15 | 0.15 | 1.85 | 1.75 | 0.13 | 0.12 | 2.15 | 2.07 | 1.04 | 1.05 |
|  | **100** | 11.1 | 11.3 |  | 10.07 | 8.86 | 0.16 | 0.28 | 1.84 | 1.74 | 0.11 | 0.13 | 2.01 | 2.02 | 0.96 | 1.00 |
|  | **120** | 13.2 | 13.8 |  | 9.08 | 9.08 | 0.18 | 0.20 | 1.77 | 1.90 | 0.12 | 0.12 | 2.00 | 2.23 | 1.01 | 1.17 |
|  | **140** | 15.4 | 14.6 |  | 8.46 | 7.51 | 0.24 | 0.15 | 1.59 | 1.56 | 0.11 | 0.09 | 1.78 | 1.82 | 0.89 | 0.96 |

1 Viscera including heart, kidneys, liver, lungs, tongue, spleen, eyes, brain, ear, mesentery, belly fat, empty bladder, empty gallbladder, empty stomach, empty large intestine and empty hindgut.

2 FE = females; EM = entire males; CA = castrates; C = Control diets formulated to meet nutrient requirements; LP = Reduced protein diet formulated to contain, 80% of digestible dietary CP, lysine, methionine+cystine, threonine and tryptophan of C.

**Supplementary Table S6** *Average trace mineral (mg/kg) concentration of the viscera1 of female, entire male and castrated pigs2 fed the control or low CP diets*2 *and slaughtered either the day of birth and at different body weight categories.*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **BW category (kg)** | **Fraction weight (kg)** |  | **Cu** | **Fe** | **Mn** | **Zn** |
|  | C | LP |  | C | LP | C | LP | C | LP | C | LP |
| **EM** | **birth** | 0.2 |  |  | 4.68 |  | 122.69 |  | 0.79 |  | 13.98 |  |
|  | **10** | 1.5 |  |  | 4.03 |  | 18.3 |  | 0.56 |  | 16.36 |  |
|  | **20** | 3.3 |  |  | 1.14 |  | 36.1 |  | 0.55 |  | 17.86 |  |
|  | **40** | 6.6 | 5.9 |  | 1.19 | 0.68 | 39.1 | 49.15 | 1.16 | 0.75 | 20.41 | 17.68 |
|  | **60** | 8.1 | 8.7 |  | 1.64 | 1.89 | 48.1 | 44.01 | 0.72 | 1.69 | 21.97 | 17.67 |
|  | **80** | 10.7 | 11.4 |  | 1.43 | 1.36 | 38.3 | 48.99 | 0.36 | 0.46 | 21.06 | 17.04 |
|  | **100** | 12.9 | 13.3 |  | 0.95 | 1.48 | 43.8 | 48.04 | 0.06 | 0.17 | 19.94 | 18.00 |
|  | **120** | 14.9 | 15.0 |  | 2.30 | 2.30 | 36.9 | 47.11 | 1.20 | 0.88 | 17.63 | 18.97 |
|  | **140** | 16.4 | 17.9 |  | 2.13 | 1.81 | 41.4 | 44.31 | 0.82 | 0.59 | 19.49 | 18.75 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **CA** | **10** | 1.5 |  |  | 3.10 |  | 24.3 |  | 0.60 |  | 18.41 |  |
|  | **20** | 3.6 |  |  | 1.10 |  | 37.0 |  | 0.89 |  | 19.14 |  |
|  | **40** | 5.9 | 6.1 |  | 0.63 | 0.77 | 31.9 | 37.85 | 0.66 | 1.08 | 19.73 | 18.73 |
|  | **60** | 8.2 | 7.9 |  | 0.66 | 1.15 | 37.9 | 42.49 | 1.11 | 0.42 | 24.21 | 20.53 |
|  | **80** | 9.7 | 10.0 |  | 1.36 | 1.20 | 47.6 | 40.75 | 1.21 | 0.81 | 23.98 | 18.95 |
|  | **100** | 11.3 | 11.7 |  | 1.40 | 1.34 | 39.9 | 46.62 | 0.45 | 0.54 | 20.47 | 20.01 |
|  | **120** | 12.8 | 12.8 |  | 1.54 | 1.51 | 46.8 | 49.07 | 4.25 | 0.48 | 20.18 | 18.81 |
|  | **140** | 15.2 | 15.7 |  | 1.21 | 1.25 | 41.3 | 54.70 | 0.45 | 0.75 | 16.98 | 15.65 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **FE** | **birth** | 0.2 |  |  | 5.62 |  | 136.18 |  | 0.58 |  | 14.78 |  |
|  | **10** | 1.4 |  |  | 3.27 |  | 32.2 |  | 0.54 |  | 17.04 |  |
|  | **20** | 3.4 |  |  | 1.66 |  | 42.1 |  | 0.69 |  | 21.96 |  |
|  | **40** | 5.8 | 5.5 |  | 0.98 | 1.01 | 33.7 | 43.72 | 0.88 | 0.81 | 21.05 | 18.88 |
|  | **60** | 8.0 | 7.7 |  | 1.93 | 0.93 | 40.7 | 47.44 | 1.58 | 0.80 | 20.17 | 18.38 |
|  | **80** | 9.7 | 9.8 |  | 0.89 | 1.49 | 40.7 | 50.02 | 0.31 | 0.68 | 23.15 | 20.01 |
|  | **100** | 11.1 | 11.3 |  | 1.99 | 1.55 | 41.9 | 50.77 | 0.12 | 0.90 | 19.56 | 18.02 |
|  | **120** | 13.2 | 13.8 |  | 0.82 | 4.01 | 44.5 | 54.97 | 0.37 | 4.54 | 21.85 | 21.19 |
|  | **140** | 15.4 | 14.6 |  | 0.86 | 2.46 | 47.8 | 57.87 | 0.40 | 1.18 | 18.83 | 17.92 |

1 Viscera including heart, kidneys, liver, lungs, tongue, spleen, eyes, brain, ear, mesentery, belly fat, empty bladder, empty gallbladder, empty stomach, empty large intestine and empty hindgut.

2 FE = females; EM = entire males; CA = castrates; C = Control diets formulated to meet nutrient requirements; LP = Reduced protein diet formulated to contain, 80% of digestible dietary CP, lysine, methionine+cystine, threonine and tryptophan of C.

**Supplementary table S7** *Preliminary allometric relationships1 of the amounts of ash, macro- and trace minerals in the empty body of female, castrated and entire male pigs2 fed the control or low CP diets2.*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Item | Diet2 | Gender2 | a | ASE3 of a | b | ASE3 of b | R2 |
| Ash | C | EM | 33.41 | 6.525 | 0.972 | 0.0422 | 0.977 |
|  |  | CA | 43.12 | 7.356 | 0.914 | 0.0369 | 0.976 |
|  |  | FE | 42.14 | 5.397 | 0.916 | 0.0278 | 0.988 |
|  | LP | EM | 37.96 | 7.029 | 0.948 | 0.0399 | 0.978 |
|  |  | CA | 31.76 | 6.782 | 0.991 | 0.0459 | 0.969 |
|  |  | FE | 40.67 | 6.261 | 0.941 | 0.0333 | 0.984 |
| Macro minerals |  |  |  |  |  |  |  |
| Calcium | C | EM | 8.51 | 2.392 | 0.988 | 0.0607 | 0.955 |
|  |  | CA | 11.19 | 3.036 | 0.932 | 0.0587 | 0.944 |
|  |  | FE | 11.66 | 2.812 | 0.920 | 0.0523 | 0.960 |
|  | LP | EM | 9.41 | 2.507 | 0.977 | 0.0573 | 0.959 |
|  |  | CA | 8.19 | 3.336 | 1.021 | 0.0875 | 0.904 |
|  |  | FE | 12.51 | 3.419 | 0.922 | 0.0591 | 0.949 |
| Phosphorus | C | EM | 6.02 | 1.224 | 0.974 | 0.0439 | 0.975 |
|  |  | CA | 7.88 | 1.319 | 0.916 | 0.0362 | 0.977 |
|  |  | FE | 7.78 | 1.306 | 0.920 | 0.0364 | 0.980 |
|  | LP | EM | 6.26 | 1.455 | 0.975 | 0.0500 | 0.968 |
|  |  | CA | 5.27 | 1.426 | 1.019 | 0.0581 | 0.954 |
|  |  | FE | 8.08 | 1.704 | 0.921 | 0.0457 | 0.969 |
| Magnesium | C | EM | 0.30 | 0.044 | 0.992 | 0.0323 | 0.987 |
|  |  | CA | 0.36 | 0.069 | 0.943 | 0.0411 | 0.972 |
|  |  | FE | 0.42 | 0.065 | 0.913 | 0.0334 | 0.983 |
|  | LP | EM | 0.34 | 0.072 | 0.962 | 0.0457 | 0.973 |
|  |  | CA | 0.27 | 0.067 | 1.016 | 0.0527 | 0.962 |
|  |  | FE | 0.36 | 0.052 | 0.958 | 0.0317 | 0.986 |
| Potassium | C | EM | 2.59 | 0.277 | 0.987 | 0.0230 | 0.993 |
|  |  | CA | 4.18 | 0.550 | 0.867 | 0.0286 | 0.984 |
|  |  | FE | 3.83 | 0.422 | 0.893 | 0.0239 | 0.991 |
|  | LP | EM | 3.27 | 0.425 | 0.926 | 0.0280 | 0.989 |
|  |  | CA | 3.43 | 0.426 | 0.903 | 0.0269 | 0.986 |
|  |  | FE | 3.01 | 0.333 | 0.941 | 0.0239 | 0.992 |
| Sodium | C | EM | 1.85 | 0.197 | 0.872 | 0.0232 | 0.991 |
|  |  | CA | 2.28 | 0.253 | 0.808 | 0.0243 | 0.985 |
|  |  | FE | 2.15 | 0.253 | 0.822 | 0.0257 | 0.987 |
|  | LP | EM | 1.96 | 0.259 | 0.862 | 0.0287 | 0.986 |
|  |  | CA | 2.06 | 0.384 | 0.834 | 0.0403 | 0.962 |
|  |  | FE | 2.05 | 0.202 | 0.836 | 0.0214 | 0.991 |
| Trace minerals |  |  |  |  |  |  |  |
| Iron | C | EM | 49.22 | 6.635 | 0.903 | 0.0292 | 0.987 |
|  |  | CA | 53.77 | 14.123 | 0.872 | 0.0570 | 0.937 |
|  |  | FE | 50.63 | 6.594 | 0.889 | 0.0283 | 0.987 |
|  | LP | EM | 38.89 | 6.221 | 0.954 | 0.0345 | 0.983 |
|  |  | CA | 39.58 | 7.651 | 0.946 | 0.0417 | 0.971 |
|  |  | FE | 41.78 | 7.508 | 0.931 | 0.0389 | 0.977 |
| Zinc | C | EM | 14.74 | 2.159 | 1.065 | 0.0315 | 0.989 |
|  |  | CA | 15.29 | 4.133 | 1.061 | 0.0581 | 0.959 |
|  |  | FE | 17.80 | 2.646 | 1.017 | 0.0321 | 0.988 |
|  | LP | EM | 16.77 | 2.604 | 1.032 | 0.0333 | 0.987 |
|  |  | CA | 16.82 | 4.306 | 1.042 | 0.0549 | 0.962 |
|  |  | FE | 18.42 | 2.560 | 1.015 | 0.0299 | 0.989 |

1 The allometric regression used was Y = a × EBWb, where Y = predicted amount (g) of minerals in the EB; EBW = empty body weight (kg); b = allometric coefficient; a = constant. R2 based on the original and untransformed data.

2 FE = females; EM = entire males; CA = castrates; C = Control diets formulated to meet nutrient requirements; LP = Reduced protein diet formulated to contain, 80% of digestible dietary CP, lysine, methionine+cystine, threonine and tryptophan of C.

3 ASE= Asymptotic standard error

**Supplementary table S8** *Preliminary allometric relationships1 of the amount of ash, calcium and phosphorus relative to protein in the empty body of female, castrated and entire male pigs2 fed the control or low CP diets2.*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Item | Diet2 | Gender | a | ASE3 of a | b | ASE3 of b | R2 |
| Ash | C | EM | 0.32 | 0.127 | 0.934 | 0.0403 | 0.978 |
|  |  | CA | 0.29 | 0.080 | 0.951 | 0.0287 | 0.987 |
|  |  | FE | 0.32 | 0.077 | 0.936 | 0.0246 | 0.991 |
|  | LP | EM | 0.32 | 0.104 | 0.943 | 0.0332 | 0.985 |
|  |  | CA | 0.19 | 0.068 | 1.000 | 0.0364 | 0.980 |
|  |  | FE | 0.34 | 0.093 | 0.941 | 0.0285 | 0.988 |
| Calcium | C | EM | 0.07 | 0.039 | 0.956 | 0.0563 | 0.959 |
|  |  | CA | 0.06 | 0.030 | 0.982 | 0.0513 | 0.963 |
|  |  | FE | 0.08 | 0.035 | 0.954 | 0.0474 | 0.970 |
|  | LP | EM | 0.07 | 0.033 | 0.976 | 0.0518 | 0.967 |
|  |  | CA | 0.04 | 0.029 | 1.044 | 0.0791 | 0.923 |
|  |  | FE | 0.11 | 0.058 | 0.928 | 0.0551 | 0.956 |
| Phosphorus | C | EM | 0.06 | 0.023 | 0.938 | 0.0412 | 0.977 |
|  |  | CA | 0.05 | 0.013 | 0.952 | 0.0265 | 0.989 |
|  |  | FE | 0.05 | 0.016 | 0.948 | 0.0301 | 0.988 |
|  | LP | EM | 0.05 | 0.019 | 0.972 | 0.0439 | 0.976 |
|  |  | CA | 0.03 | 0.012 | 1.036 | 0.0469 | 0.971 |
|  |  | FE | 0.08 | 0.032 | 0.919 | 0.0434 | 0.972 |

 The allometric regression used was Y = a × amount of protein in the EBb, where Y = predicted amount of minerals; b = allometric coefficient and a = constant. R2 based on the original and untransformed data.

2 FE = females; EM = entire males; CA = castrates; C = Control diets formulated to meet nutrient requirements; LP = Reduced protein diet formulated to contain, 80% of digestible dietary CP, lysine, methionine+cystine, threonine and tryptophan of C.

3 ASE= Asymptotic standard error