Supplementary Material

**Table 1.** The composition and nutrition level of the basal diets (air-dry basis, %）

|  |  |  |
| --- | --- | --- |
| **Items** | **Late gestation** | **Lactation** |
| **Composition** |  |  |
| Corn | 50.04 | 47.65 |
| Barley | 17.4 | 18 |
| Soybean meal | 17.2 | 19 |
| Expanded soybean | 6 | 6 |
| Fish meal | 2 | 2 |
| NaCl | 0.4 | 0.4 |
| CaHPO4 | 1.4 | 1.4 |
| Limestone | 1.6 | 1.6 |
| Lys | 0.26 | 0.25 |
| Soybean oil | 2.7 | 2.7 |
| Premix1 | 1 | 1 |
| Total | 100.00 | 100.00 |
| **Nutrition level2** |  |  |
| DM (MJ/kg) | 14.20 | 14.30 |
| CP | 15.40 | 15.90 |
| EE | 5.00 | 5.10 |
| Ash | 5.80 | 5.90 |
| CF | 3.90 | 3.50 |
| Ca | 1.07 | 1.20 |
| P | 0.50 | 0.59 |
| AP | 0.40 | 0.45 |
| Lys | 1.14 | 1.17 |
| Met | 1.10 | 0.99 |

Note: 1Premix during pregnancy: Cu 5 mg, I 0.15 mg, Fe 83mg, Mn 20 mg, Zn 128 mg, VA 13400 IU, VD3 2800 IU, Choline chloride 1000 mg, VE 22.4 mg, VK3 3 mg. Lactation premix: Cu 15 mg, Fe 82 mg, I 0.13 mg, Mn 20 mg, Zn 128 mg, VA 10000 IU, VD3 2000 IU, VK3 1.5 mg, VE 30 mg.

2 The DE was calculated and others were measured.

**Table 2.** Effects of QZGSP on sow’s reproductive performance during late gestation and lactation

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Items** | **CON** | **TRT1** | **TRT2** | **TRT3** | **TRT4** | ***P*-value** |
| **Litter, no** |  |  |  |  |  |  |
| Total born | 14.42 | 14.75 | 14.58 | 14.91 | 15.08 | 0.612 |
| Born alive | 13.42 | 13.92 | 13.67 | 14.17 \* | 14.42 \* | <0.01 |
| Healthy born | 12.92 | 13.42 | 13.17 | 13.58 \* | 13.75 \* | <0.01 |
| BW< 800 g | 0.50 | 0.50 | 0.50 | 0.58 | 0.67 | 0.791 |
| Still born | 0.92 | 0.75 | 0.83 | 0.58 | 0.58 | 0.978 |
| **BW, kg** |  |  |  |  |  |  |
| Piglet birth weight | 1.31 | 1.30 | 1.33 | 1.29 | 1.28 | 0.260 |
| Litter birth weight | 17.52 | 18.11 | 18.14 | 18.32 | 18.48\* | 0.161 |
| **Farrowing time, min** |  |  |  |  |  |  |
| Farrowing duration | 266.33 | 238.25 \* | 255.75 # | 205.42 \*# | 214.83 \*# | *<*0.01 |
| Farrowing interval | 18.58 | 15.72 \* | 17.56 # | 13.63 \*# | 13.98\*# | *<*0.01 |
| **ADFI at lactation, kg** | 5.52 | 5.77 \* | 5.58 # | 5.97 \*# | 5.89 \*# | *<*0.01 |
| **Backfat thickness, mm** |  |  |  |  |  |  |
| Day 100 of lactation | 17.58 | 17.42 | 17.33 | 17.50 | 17.58 | 0.977 |
| After farrowing | 18.25 | 18.50 | 18.33 | 18.83 | 18.75 | 0.247 |
| At weaning | 14.58 | 15.75\* | 14.75# | 16.42\* | 16.25\* | <0.01 |
| Lactation loss | 3.67 | 2.75 \* | 3.58 # | 2.33\* | 2.50\* | <0.01 |
| **Average milk yield, kg/d** | 6.28 | 7.17 \* | 6.31# | 8.07\*# | 7.71\*# | <0.01 |

BW: body weight. ADFI: average daily feed intake.

Control (CON, basal diet), treatment group 1 (TRT1, basal diet + 2 kg/t BZP), treatment group 2 (TRT2, basal diet + 1 kg/t QZGSP), treatment group 3 (TRT3, basal diet + 2 kg/t QZGSP), and treatment group 4 (TRT4, basal diet + 3 kg/t QZGSP).

“\*”: indicates a significant difference compared with mean values in CON (*p*<0.05), “#”: indicates a significant difference compared with mean values inTRT1 (*p*<0.05).

**Table 3.** Effects of dietary QZGSP supplementation on alpha diversity of milk microbiota for sows

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Items** | **CON** | **TRT1** | **TRT2** | **TRT3** | **TRT4** | ***P*-value** |
| 0d | Chao1 | 519.47 | 485.80 | 414.39 | 424.18 | 472.38 | 0.253 |
| Ace | 540.32 | 514.63 | 442.21 | 447.25 | 493.80 | 0.178 |
| Shannon | 3.18 | 2.67 | 2.87 | 3.02 | 3.13 | 0.324 |
| Simpson | 0.82 | 0.72 | 0.74 | 0.76 | 0.79 | 0.350 |
| 11d | Chao1 | 777.91 | 1040.89 | 1042.48 | 688.99 | 1241.56\* | 0.101 |
| Ace | 822.00 | 1107.10 | 1082.71 | 731.89 | 1290.63\* | 0.104 |
| Shannon | 6.75 | 6.51 | 6.69 | 5.38 | 7.18 | 0.133 |
| Simpson | 0.98 | 0.96 | 0.96 | 0.91\* | 0.98 | 0.160 |
| 21d | Chao1 | 937.99 | 635.84 | 923.45# | 1021.50# | 993.69# | 0.009 |
| Ace | 980.72 | 678.18 | 990.76# | 1084.43# | 1075.49# | 0.007 |
| Shannon | 5.19 | 6.05 | 3.60\*# | 5.44 | 5.30 | 0.039 |
| Simpson | 0.86 | 0.94 | 0.71# | 0.90 | 0.91 | 0.037 |

Control (CON, basal diet), treatment group 1 (TRT1, basal diet + 2 kg/t BZP), treatment group 2 (TRT2, basal diet + 1 kg/t QZGSP), treatment group 3 (TRT3, basal diet + 2 kg/t QZGSP), and treatment group 4 (TRT4, basal diet + 3 kg/t QZGSP).

“\*”: indicates a significant difference compared with mean values in CON (*p* < 0.05), “#”: indicates a significant difference compared with mean values inTRT1 (*p* < 0.05).