Supplementary Table 1: Effects of dietary treatments on carcass measurements

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | Carcass yield (%) | Breast (%) | Leg (%) | Abdominal fat (%) | Liver (%) |
| Energy level | GAA(g/kg) | Day 15 | Day 35 | Day 15 | Day 35 | Day 15 | Day 35 | Day 15 | Day 35 | Day 15 | Day 35 |
| Energy level  |  |  |  |  |  |  |  |  |  |  |  |
| STD |  | 59.51 | 68.90 | 20.32 | 31.49 | 16.97 | 21.66 | 0.63 | 1.15a | 3.24 | 2.15 |
| LME |  | 59.92 | 70.51 | 19.58 | 32.40 | 17.56 | 22.10 | 0.81 | 0.92b | 3.28 | 2.22 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| GAA (g/kg) |  |  |  |  |  |  |  |  |  |  |  |
| 0 |  | 60.33 | 70.32 | 20.39 | 32.30 | 17.41 | 21.77 | 0.61 | 0.90 | 3.37 | 2.23 |
| 0.6 |  | 59.31 | 68.53 | 19.58 | 31.26 | 17.25 | 21.78 | 0.91 | 1.07 | 3.25 | 2.12 |
| 1.2 |  | 59.50 | 70.41 | 19.88 | 32.27 | 17.14 | 22.11 | 0.63 | 1.14 | 3.15 | 2.21 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| STD | 0 | 59.72 | 70.32 | 20.45 | 31.79 | 17.09 | 21.83 | 0.38 | 1.11ab | 3.49 | 2.20 |
| 0.6 | 59.13 | 67.44 | 20.25 | 31.16 | 17.13 | 21.42 | 0.88 | 1.05ab | 3.18 | 2.04 |
| 1.2 | 59.71 | 69.01 | 20.27 | 31.52 | 16.69 | 21.72 | 0.63 | 1.28a | 3.04 | 2.21 |
| LME | 0 | 60.82 | 70.30 | 20.34 | 32.82 | 17.73 | 21.72 | 0.85 | 0.69b | 3.26 | 2.25 |
| 0.6 | 59.52 | 69.61 | 18.91 | 31.36 | 17.36 | 22.14 | 0.93 | 1.08ab | 3.32 | 2.19 |
| 1.2 | 59.21 | 71.72 | 19.49 | 33.01 | 17.60 | 22.51 | 0.64 | 1.00ab | 3.26 | 2.22 |
| Pooled SEM |  | 0.860 | 2.171 | 0.788 | 0.935 | 0.330 | 0.575 | 0.287 | 0.105 | 0.237 | 0.107 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| *P*-value |  |  |  |  |  |  |  |  |  |  |  |
| Energy level |  | 0.708 | 0.094 | 0.154 | 0.185 | 0.123 | 0.052 | 0.139 | 0.017 | 0.729 | 0.400 |
| GAA |  | 0.716 | 0.185 | 0.421 | 0.364 | 0.842 | 0.400 | 0.089 | 0.087 | 0.351 | 0.506 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Energy level× GAA |  |  |  |  |  |  |  |  |  |  |  |
| Linear |  | 0.801 | 0.463 | 0.610 | 0.729 | 0.760 | 0.227 | 0.224 | 0.049 | 0.295 | 0.773 |
| Quadratic |  | 0.846 | 0.428 | 0.303 | 0.792 | 0.699 | 0.287 | 0.498 | 0.817 | 0.064 | 0.807 |

STD, a basal diet with energy level recommended by Ross 308 (2014) broiler manual (starter: 12.56 MJ/kg and grower: 12.97 MJ/kg); LME, a basal diet with energy reduction below the level recommended by Ross 308 (2014) broiler manual (starter: 11.93 MJ/kg and grower: 12.33 MJ/kg); GAA, guanidinoacetic acid

a,b Values in the same column not sharing a common superscript differ significantly (*P*<0.05).

Supplementary Table 2: Effects of dietary treatments on intestinal morphology

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | Duodenum | Jejunum |
| Energy level | GAA (g/kg) | VH (μm) | CD (μm) | V/C | VW (μm) | VSA (mm2) | VH (μm) | CD (μm) | V/C  | VW (μm) | VSA (mm2) |
| Energy level  |  |  |  |  |  |  |  |  |  |  |  |
| STD |  | 1307 | 207 | 6.5 | 134 | 0.54 | 1100a | 226a | 5.3 | 141 | 0.51 |
| LME |  | 1215 | 207 | 6.3 | 145 | 0.55 | 930b | 197b | 5.0 | 131 | 0.38 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| GAA (g/kg) |  |  |  |  |  |  |  |  |  |  |  |
| 0 |  | 1340 | 214 | 6.6 | 134 | 0.56 | 969 | 210 | 4.9 | 137 | 0.40 |
| 0.6 |  | 1205 | 190 | 6.6 | 152 | 0.57 | 977 | 193 | 5.4 | 130 | 0.40 |
| 1.2 |  | 1237 | 217 | 6.0 | 132 | 0.51 | 1098 | 231 | 5.2 | 141 | 0.54 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| STD | 0 | 1436 | 222 | 6.6 | 142 | 0.63 | 985 | 193 | 5.4 | 121 | 0.36 |
| 0.6 | 1230 | 179 | 6.9 | 134 | 0.50 | 1096 | 197 | 5.9 | 145 | 0.49 |
| 1.2 | 1255 | 221 | 5.9 | 125 | 0.50 | 1218 | 280 | 4.6 | 156 | 0.69 |
| LME | 0 | 1245 | 206 | 6.5 | 125 | 0.49 | 953 | 223 | 4.3 | 153 | 0.45 |
| 0.6 | 1181 | 201 | 6.3 | 169 | 0.64 | 859 | 188 | 4.8 | 116 | 0.36 |
| 1.2 | 1220 | 213 | 6.1 | 140 | 0.53 | 978 | 178 | 5.8 | 125 | 0.38 |
| Pooled SEM |  | 118.441 | 35.658 | 1.413 | 29.7785 | 0.127 | 83.200 | 13.686 | 1.275 | 42.698 | 0.210 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| *P*-value |  |  |  |  |  |  |  |  |  |  |  |
| Energy level |  | 0.207 | 0.984 | 0.768 | 0.380 | 0.963 | 0.022 | 0.034 | 0.397 | 0.574 | 0.149 |
| GAA |  | 0.196 | 0.420 | 0.559 | 0.216 | 0.582 | 0.253 | 0.288 | 0.581 | 0.872 | 0.394 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Energy level× GAA |  |  |  |  |  |  |  |  |  |  |  |
| Linear |  | 0.102 | 0.349 | 0.469 | 0.731 | 0.190 | 0.464 | 0.585 | 0.415 | 0.311 | 0.098 |
| Quadratic |  | 0.691 | 0.350 | 0.710 | 0.352 | 0.524 | <.001 | 0.002 | 0.379 | 0.350 | 0.067 |

STD, a basal diet with energy level recommended by Ross 308 (2014) broiler manual (starter: 12.56 MJ/kg and grower: 12.97 MJ/kg); LME, a basal diet with energy reduction below the level recommended by Ross 308 (2014) broiler manual (starter: 11.93 MJ/kg and grower: 12.33 MJ/kg); GAA, Guanidinoacetic acid; VH, villus height; CD, crypt depth; V/C, villus height to crypt depth ratio; VW, villus width; VSA, villus surface area

a,b Values in the same column not sharing a common superscript differ significantly (*P*<0.05).