**Supplementary Material**

***Table S1*** *Summary statistics for the number of females housed, number of inseminations to conception, conception rate, the average weaning to partum interval, and the average partum interval for LP and V females housed at heat (HC), normal (NC) or nutritional challenging environmental conditions.*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Environment1 | HC | | NC | | NF | | Parameter |
| Line2 | LP | V | LP | V | LP | V |
| *Number of females housed* | | | | | | | *Total* |
| 1st partum | 31 | 29 | 26 | 25 | 28 | 25 | 164 |
| 2nd partum | 28 | 22 | 24 | 21 | 25 | 25 | 145 |
| 3rd partum | 26 | 21 | 21 | 19 | 24 | 24 | 135 |
| *Number of inseminations* | | | | | | |  |
| 1st partum | 37 | 35 | 28 | 27 | 30 | 28 | 185 |
| 2nd partum | 46 | 42 | 38 | 33 | 41 | 44 | 244 |
| 3rd partum | 35 | 34 | 32 | 26 | 37 | 38 | 202 |
| *Conception rate (%)* | | | | | | | *Average* |
| 1st partum | 83.8 | 82.9 | 92.9 | 92.6 | 93.3 | 89.3 | 89.1 |
| 2nd partum | 60.9 | 52.4 | 63.2 | 63.6 | 61.0 | 56.8 | 59.6 |
| 3rd partum | 74.3 | 61.8 | 65.6 | 73.1 | 64.9 | 63.2 | 67.1 |
| *Average interval between (days)* | | | | | | | *Std. Dev.* |
| 1st weaning and 2nd partum | 27.5 | 34.3 | 27.5 | 26.0 | 27.7 | 30.8 | 13.6 |
| 2nd weaning and 3rd partum | 22.0 | 28.7 | 25.1 | 23.1 | 26.1 | 28.5 | 12.6 |
| *Average interval between (days)* | | | | | | |  |
| 1st to 2nd partum | 55.5 | 62.2 | 55.5 | 54.0 | 55.7 | 58.8 | 13.6 |
| 2nd to 3rd partum | 50.0 | 56.7 | 53.2 | 51.1 | 54.1 | 56.5 | 12.6 |

1Environment: HC: high room temperature (25 - 35 ºC) and diet C (11.6 MJ DE/ kg DM); NC: normal room temperature (18 - 24 ºC) and diet C; and NF: normal room temperature and diet F (9.1 MJ DE/ kg DM). 2Line LP, founded on reproductive-longevity criteria and then selected for litter size at weaning during 6 generations; and line V, founded on litter size at weaning and then selected during 36 generations.

***Table S2*** *Effect of environment and genetic line on serum concentration of total T3, leptin, non-esterified fatty acids (NEFA), β-OH-butyrate, lactate and glucose of rabbit does during first and second reproductive cycle. Parity order effect and parity order within environment and line not shown.*

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Environment1 | HC | | NC | | NF | | P-value of contrasts | | | SEM2 |
| Line | LP | V | LP | V | LP | V | NC - HC | NC - NF | LP - V |
| *First reproductive cycle (from 1st to 2nd partum)* | | | | | | |  |  |  |  |
| Total T3 (log10 nM) | 0.229 | 0.233 | 0.299 | 0.262 | 0.244 | 0.271 | 0.07 | 0.40 | 0.93 | 0.065 |
| Leptin (log10 ng/ml) | 0.230b | 0.249b | 0.276b | 0.230b | 0.080a | 0.158ab | 0.75 | 0.01 | 0.64 | 0.109 |
| NEFA (log10 µ.ekv/l) | 2.55ab | 2.52ab | 2.58b | 2.56ab | 2.50a | 2.57ab | 0.18 | 0.15 | 0.73 | 0.074 |
| *β-OH-butyrate*3 (log10 mM) | 1.88a | 1.90a | 1.98ab | 1.81a | 2.17bc | 2.30c | 0.93 | <.01 | 0.90 | 0.182 |
| Lactate (log10 mM) | 0.514ab | 0.557abc | 0.631c | 0.614bc | 0.545abc | 0.509a | 0.02 | 0.01 | 0.91 | 0.089 |
| Glucose (mM) | 6.16ab | 5.85a | 6.13ab | 5.87a | 6.22b | 6.08ab | 0.97 | 0.22 | 0.03 | 0.305 |
| *Second reproductive cycle (from 2nd to 3rd partum)* | | | | | | |  |  |  |  |
| Total T3 (log10 nM) | 0.210a | 0.253ab | 0.302b | 0.272ab | 0.263ab | 0.252ab | 0.04 | 0.28 | 0.98 | 0.065 |
| Leptin (log10 ng/ml) | 0.189 | 0.259 | 0.274 | 0.228 | 0.153 | 0.191 | 0.54 | 0.08 | 0.57 | 0.108 |
| NEFA (log10 µ.ekv/l) | 2.57bc | 2.62c | 2.57bc | 2.53ab | 2.46a | 2.52ab | 0.08 | 0.08 | 0.36 | 0.074 |
| *β-OH-butyrate*3 (log10 mM) | 1.90bc | 1.94bc | 1.76ab | 1.64a | 2.04c | 2.09c | 0.01 | <.01 | 0.85 | 0.183 |
| Lactate (log10 mM) | 0.454ab | 0.526bc | 0.496abc | 0.562c | 0.416a | 0.531bc | 0.29 | 0.13 | 0.01 | 0.089 |
| Glucose (mM) | 6.10 | 5.97 | 6.10 | 5.77 | 5.81 | 5.87 | 0.43 | 0.42 | 0.20 | 0.306 |

1Environment: HC: high room temperature and diet C; NC: normal room temperature and diet C; and NF: normal room temperature and diet F. 2SEM: Pooled standard error of means. 3To back transform the β-OH-butyrate to normal scale apply [(10X + 5) / 1000], where x is the tabulated value. a – c Values within a row with different superscripts differ significantly at P<0.05.