**Supplementary data:**

**Supplementary Table S1: Effects of sex of sheep on different parameters**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | | SEM | *P* value | |
| Wether | Ewe | *Sex* | diet×env×sex |  |
| Plasma glucose concentration (mg/dL)  Plasma glucose turnover rate (mg/kg0.75/min)  Plasma glucose utilization rate (mg/kg0.75/min)  Response of glucose metabolism to insulin (mg/kg0.75/min)  Heart rate (beats/min)  Rectal Temperature (oC)  Respiration rate (breaths/min)  Plasma concentration of -tocopherol (g/L)  Plasma NEFA  Body weight change  Plasma retinol  Dry matter intake | 49.23  7.65  5.56  -1.82  68.92  39.20  55.69  2.53  0.245  -1.59  0.36  0.826 | 49.29  7.27  5.36  -1.72  65.54  39.47  48.19  2.71  0.251  -1.55  0.35  0.818 | 0.99  0.14  0.14  0.09  0.79  0.08  4.38  0.18  0.05  0.27  0.01  0.04 | 0.98  0.35  0.47  0.54  0.07  0.18  0.32  0.63  0.16  0.49  0.55  0.21 | 0.64  0.30  0.85  0.30  0.42  0.43  0.88  0.61  0.44  0.52  0.60  0.15 |