**Supplemental data**

Table S1. Natural abundances of nitrogen stable isotopes in tissue proteins and faeces.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | *p* values |
|  | NF-NF | HF-NF | NF-HF | HF-HF | peri | post | peri x post |
| *n* | 9 | 8 | 7 | 8 |  |  |  |
| Protein ∆15N (‰) |  |  |  |  |  |  |  |
| Small intestine | 2.1± 0.3a | 2.0± 0.2a | 2.1± 0.2a | 2.5± 0.3b | <0.05 | <0.01 | <0.05 |
| Liver | 3.7± 0.15 | 3.7± 0.29 | 3.6± 0.17 | 3.7± 0.27 |  |  |  |
| AT | 3.1± 0.3a | 3.3± 0.2ab | 3.6± 0.2b | 3.4± 0.1b |  | <0.01 | <0.01 |
| TA muscle | 3.2± 0.2a | 3.2± 0.1a | 3.1± 0.2a | 3.5± 0.2b | <0.01 | <0.05 | <0.01 |
| G muscle | 3.5± 0.2 | 3.5± 0.2 | 3.5± 0.3 | 3.6± 0.1 |  |  |  |
| EDL muscle | 3.7± 0.1 | 3.7± 0.2 | 3.7± 0.1 | 3.8± 0.3 |  |  |  |
| S muscle | 4.2± 0.1 | 4.1± 0.2 | 4.2± 0.2 | 4.1± 0.1 |  |  |  |
| Heart | 5.1± 0.3 | 4.9± 0.4 | .5.0± 0.3 | 4.8± 0.3 |  |  |  |
| Plasma | 4.6± 0.2 | 4.6± 0.2 | 4.7± 0.1 | 4.7± 0.2 |  |  |  |
| RBC | 2.2± 0.1 | 2.2± 0.1 | 2.3± 0.1 | 2.3± 0.1 |  |  |  |
| Faeces Δ15N | 0.2± 0.3ab | 0.0± 0.3a | 0.4± 0.3b | 0.9± 0.3c |  | <0.0001 | <0.01 |

NF-NF, rats exposed to the normal-fat (NF) diet during the perinatal and post-weaning periods; NF-HF, rats exposed to the NF diet during the perinatal period and the high-fat (HF) diet during the post-weaning period; HF-NF, rats exposed to the HF diet during the perinatal period and the NF diet during the post-weaning period; HF-HF, rats exposed to the HF diet during both the perinatal and post-weaning periods. Different letters indicate significant differences between groups (*P*<0.05). Peri, perinatal diet; post, post-weaning diet. AT, adipose tissue; EDL, *Extensor digitorum longus*; G, *Gastrocnemius*; RBC red blood cells; S, *Soleus*; TA, *Tibialis anterior*. Protein and faeces ∆15N values are the differences between protein or faeces δ15N and dietary protein δ15N.

Table S2. Routing coefficients of dietary macronutrients to tissue proteins in rats fed a normal or high fat diet.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Small intestine | Liver | Plasma | RBC | TA muscle | G muscle | EDL muscle | S muscle | Heart |
| Trophic step (‰) |  | 0.70 | 0.99 | 0.88 | 0.12 | 0.61 | 0.55 | 0.80 | 0.52 | 0.53 |
| Protein routing (%) |  | 74.3 | 73.3 | 71.8 | 79.7 | 73.9 | 73.9 | 75.5 | 71.8 | 73.4 |
| CHO routing (%) | NF | 22.3 | 23.2 | 24.5 | 17.6 | 22.7 | 22.6 | 21.2 | 24.4 | 23.1 |
| HF | 13.6 | 14.2 | 15.0 | 10.8 | 13.9 | 13.8 | 13.0 | 14.9 | 14.1 |
| Lipid routing (%) | NF | 3.4 | 3.6 | 3.8 | 2.7 | 3.5 | 3.5 | 3.3 | 3.7 | 3.5 |
| HF | 12.1 | 12.6 | 13.3 | 9.5 | 12.3 | 12.3 | 11.5 | 13.2 | 12.5 |

The protein, CHO and lipid routings are the proportions of dietary protein, CHO and lipid carbon used for amino acid synthesis and consequently routed to carbon in tissue proteins, and the trophic step is the difference in δ13C between dietary and tissue proteins due to isotopic fractionation along metabolic pathways (i.e., the coefficients p, c, 1-p-c and TS of equation [6], see Materials and Methods). The protein routing and trophic step were assumed to be equal across the diets, while the CHO and lipid routings differed in rats fed with the normal-fat (NF) or high-fat (HF) diet.EDL, *Extensor digitorum longus*; G, *Gastrocnemius*; RBC red blood cells; S, *Soleus*; TA, *Tibialis anterior*.