**Table S1.** RT-PCR gene expression assays

|  |  |  |
| --- | --- | --- |
| Gene Symbol | Gene name | Assay ID1 |
| *Carbohydrate metabolism* | | |
| SLC2A5 | Solute Carrier Family 2 (Facilitated Glucose/Fructose Transporter) Member 5, Glut5 | Ss03377332\_u1 |
| SLC2A4 | Solute Carrier Family 2 (Facilitated Glucose Transporter) Member 4, Glut4 | Ss03373325\_g1 |
| SLC2A8 | Solute Carrier Family 2 (Facilitated Glucose Transporter) Member 8, Glut8 | Ss03374161\_m1 |
| HK1 | Hexokinase 1 | Ss04323453\_gH |
| FBP1 | Fructose-Biphosphatase 1 | Ss03393179\_u1 |
| PFKM | Phosphofructokinase, Muscle | Ss03380370\_u1 |
| *Fatty acid metabolism/ De Novo Lipogenesis* | | |
| ACACA | Acetyl-Coenzyme A Carboxylase Alpha | Ss03389962\_m1 |
| ACLY | ATP-citrate lyase | Ss03389566\_m1 |
| FASN | Fatty Acid Synthase | Ss03386194\_u1 |
| ADIPOR1 | Adiponectin receptor 1 | Ss03378803\_u1 |
| LEPR | Leptin Receptor | Ss03379257\_u1 |
| LEP | Leptin | Ss03392404\_m1 |
| ADIPOQ | Adiponectin | Ss03384375\_u1 |
| CIDEC | Cell Death-Inducing DFFA Like Effector C | Ss03389757\_m1 |
| *Lipid Transcription Factors* | | |
| PPARG | Peroxisome proliferator-activated receptor gamma | Ss03394829\_m1 |
| *Immune System/Inflammation* | | |
| CRP | C-reactive protein, pentraxin-related | Ss03390889\_m1 |
| IL6 | Interleukin 6 | Ss03384604\_u1 |
| TNF | Tumour Necrosis Factor | Ss03391318\_g1 |
| CCL5 | C-C Motif Chemokine Ligand 5/ encodes RANTES | Ss03648939\_m1 |
| *Housekeeping genes* | | |
| GAPDH | Glyceraldehyde 3-phosphate dehydrogenase | Ss03375629\_u1 |
| HPRT1 | Hypoxanthine phosphoribosyltransferase 1 | Ss03388274\_m1 |
| ACTB | β-actin | Ss03376563\_uH |

1 TaqMan Gene Expression Assay

**Table S2.** Baseline of body weight and clinical parameters in fasting plasma and urine at week 20.

|  |  |  |
| --- | --- | --- |
| Characteristics | Means or median | SD or interquartile range |
| Body weight (kg) | 31\* | 12 |
| Fasting plasma |  |  |
| Glucose (mM) | 6.1\* | 1.7 |
| Fructosamine (µM) | 258\* | 25 |
| NEFA (μM) | 179 | 94 |
| Lactate (mM) | 2.2 | 1.2 |
| Triglycerides (mM) | 0.57 | 0.20 |
| LDL (mM) | 1.4 | 0.70 |
| HDL (mM) | 1.9# | 0.42 |
| LDL:HDL | 0.75 | 0.31 |
| Total cholesterol (mM) | 4.3 | 1.6 |
| Albumin (g/L) | 37 | 7.3 |
| AST (U/L) | 27 | 9.7 |
| ALT (U/L) | 23 | 5.4 |
| GGT (U/L) | 66 | 21 |
| Ghrelin (pg/ml) | 13 | 7.8 |
| GIP (pg/ml) | 59# | 30 |
| GLP-1 (pg/ml) | 293 | 150 |
| C-peptide(pg/ml) | 32 | 19 |
| Glucagon (pg/ml) | 278\* | 103 |
| Insulin (pM) | 39\* | 20 |
| HOMA-IR | 1.6\* | 0.9 |
| HOMA-β | 55 | (26-60) |
| IL-2 (ng/ml) | 0.18 | (0.12-0.28) |
| IL-4 (ng/ml) | 0.33 | (0.22-0.95) |
| IL-10 (ng/ml) | 0.44 | 0.38 |
| IL-12 (ng/ml) | 0.67# | 0.23 |
| IL-18 (ng/ml) | 0.82 | 0.54 |
| IFN- γ (ng/ml) | 4.5 | 1.9 |
| Fasting urine |  |  |
| Creatinine (mM) | 11 | 5.8 |
| Glucose (mM) | 2.8\* | (0.47-29) |
| Protein (mM) | 141 | (101-399) |
| Glucose:creatinine1 | 0.40 | (0.04-3.5) |
| Protein:creatinine2 | 13 | (7.9-37) |

Minipigs were regarded as the experimental units, *n* = 43 for total groups. Data were expressed as means with standard deviation (SD) or median with 25th-75th interquartile range.

\*means characteristic levels increased with time over the 20 weeks’ high fat high fructose feeding.

#means characteristic levels decreased with time over the 20 weeks’ high fat high fructose feeding.





**Figure S1.** Length, chest circumference and abdomen circumference (**a**), pig obesity index and body surface area (**b**) and backfat thickness (**c**) of Göttingen Minipigs after 8-week fibre and protein intervention. All data were expressed as means ± standard error of means. Pigs were regarded as the experimental units, n = 10 for low fibre low protein diet (LOFLOP), n = 10 for low fibre high protein diet (LOFHIP), n = 12 for high fibre low protein diet (HIFLOP) and n = 11 for high fibre high protein diet (HIFHIP). Only significant P-values were presented in the figure.





**Figure S2.** Relative weight (% of body weight, BW) ofliver (**a**), heart (**b**) and kidney (**c**), small intestine length (m/kg BW) (**d**) and colon length (m/kg BW) (**e**) and liver fat percentage (**f**) at slaughter. Minipigs were regarded as the experimental units, n = 10 for low fibre low protein diet (LOFLOP), n = 10 for low fibre high protein diet (LOFHIP), n = 12 for high fibre low protein diet (HIFLOP) and n = 11 for high fibre high protein diet (HIFHIP). Values are least-squared means with standard errors represented by vertical bars. Only significant P-values are presented in the figure.

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**Figure S3.** Pearson correlation between delta glucose value (portal vein minus jugular vein) and daily starch intake of Göttingen Minipigs.