Table S1 Ingredients and chemical composition of the experimental diets.

Item	LOFLOP	LOFHIP	HIFLOP	HIFHIP
Ingredients (g/kg as-fed basis)				
Wheat starch	233	167	66	0
Whole grain wheat (roller milled)	150	150	150	150
Wheat bran (finely milled)	125	125	125	125
Enzyme-treated wheat bran	-	-	200	200
Wheat gluten	65	65	32	32
Fish meal	20	20	20	20
Whey protein hydrolysate	-	68	-	68
Fructose	200	200	200	200
Lard	150	150	150	150
Vitamins and minerals	57	56	57	56
Chemical composition (g/kg DM)				
DM (g/kg as-fed basis)	913	913	919	919
Ash	62	65	73	76
Crude protein (N × 6.25)	113	179	114	175
HCL fat	174	180	188	187
Available carbohydrates	577	522	456	387
Sugars				
Fructose	225	223	224	221
Glucose	1	1	7	7
Sucrose	7	7	9	8
Starch	344	292	216	150
Dietary fibre[1]	100	106	191	205
NSP (soluble NSP)	69 (8)	75 (12)	136 (22)	136 (15)
AX (SAX)	44 (5)	46 (7)	86 (16)	85 (12)
AXOS	5	3	12	17
Fructans	6	8	11	9
Klason lignin	19	20	30	41
RS[2]	2	1	1	1
Gross energy (MJ/ kg DM)	20.7	21.5	21.3	21.7

LOFLOP, low fibre low protein diet; LOFHIP, low fibre high protein diet; HIFLOP, high fibre low protein diet; HIFHIP, high fibre high protein diet. NSP, total non-starch polysaccharides; AX, arabinoxylan; RS, resistant starch; A:X, arabinose:xylose; AXOS, low molecular weight arabinoxylan-oligosaccharides.

[1]Dietary fibre = NSP + fructans + RS + AXOS + Klason lignin.

[2]Determined by enzymatic resistant starch assay (AOAC method 2002.02).

Table S2 Compound-dependent LC-MS/MS parameters, declustering potential (DP), entrance potential (EP), collision energy (CE) and cell exit potential (CXP).

Item	Q1 mass	Q3 mass	DP	EP	CE	CXP
Acetic acid quantifier	193.8	151.9	-80	-15	-15	-15
Acetic acid qualifier	193.8	46.0	-80	-15	-50	-15
$^{13}C_2$ acetic acid quantifier	196.0	152.0	-100	-15	-24	-13
$^{13}C_2$ acetic acid qualifier	196.0	121.8	-100	-15	-24	-10
Propionic acid quantifier	208.0	136.9	-20	-10	-24	-9
Propionic acid qualifier	208.0	46.0	-20	-10	-50	-20
$^{13}C_1$ propionic acid quantifier	209.0	137.0	-20	-10	-25	-9
$^{13}C_1$ propionic acid qualifier	209.0	165.1	-20	-10	-18	-11
Isobutyric acid quantifier	221.9	178.9	-100	-2	-18	-15
Isobutyric acid qualifier	221.9	42.0	-60	-2	-70	-19
Butyric acid quantifier	221.9	178.9	-100	-2	-18	-15
Butyric acid qualifier	221.9	42.0	-60	-2	-70	-19
$^{13}C_2$ butyric acid quantifier	224.0	205.8	-100	-10	-20	-12
$^{13}C_2$ butyric acid qualifier	224.0	180.0	-100	-10	-18	-15
Succinic acid quantifier	387.1	234.1	-30	-10	-25	-12
$^{13}C_2$ succinic acid qualifier	387.1	97.8	-30	-10	-47	-10
$^{13}C_2$ succinic acid quantifier	389.1	99.9	-145	-10	-40	-10
Succinic acid qualifier	389.1	236.1	-145	-10	-24	-15
Isovaleric acid quantifier	235.9	137.0	-15	-15	-30	-15
Isovaleric acid qualifier	235.9	46.0	-15	-15	-40	-15
Valeric acid quantifier	235.9	137.0	-15	-15	-30	-15
Valeric acid qualifier	235.9	46.0	-15	-15	-40	-15
$^{13}C_3$ valeric acid quantifier	239.0	136.9	-120	-10	-27	-15
$^{13}C_3$ valeric acid qualifier	239.0	151.8	-120	-10	-24	-12

Table S3 Pool size (mmol) of short chain fatty acid in caecum and entire colon of Göttingen Minipigs fed diets low or high in dietary fibre and protein.

Item	Diet[1]				*P*-value[2]		
	LOFLOP	LOFHIP	HIFLOP	HIFHIP	F	P	F×P
Caecum							
Total SCFA	9.1 ± 1.5	8.1 ± 1.6	9.7 ± 1.3	13 ±1.3	0.077	0.29	0.13
Acetate	6.2 ± 1.0	5.3 ± 1.1	6.3 ± 0.89	8.8 ± 0.93	0.091	0.29	0.10
Propionate	1.6 ± 0.29	1.5 ± 0.31	1.4 ± 0.27	2.3 ± 0.27	0.29	0.090	0.080
Butyrate	1.1 ± 0.23	0.97 ± 0.25	1.4 ± 0.21	1.6 ± 0.22	0.048	0.80	0.37
BCFA	0.11 ± 0.02	0.11 ± 0.02	0.08 ± 0.02	0.11 ± 0.02	0.28	0.26	0.33
Entire colon							
Total SCFA	29^{b} ± 5.0	27^{b} ± 5.0	29^{b} ± 4.7	50^{a} ± 4.7	0.023	0.052	0.024
Acetate	18^{b} ± 3.0	17^{b} ± 3.0	18^{b} ± 2.8	30^{a} ± 2.8	0.032	0.064	0.023
Propionate	5.0 ± 1.2	4.7 ± 1.2	5.9 ± 1.1	10 ± 1.1	0.007	0.092	0.058
Butyrate	4.5 ± 1.2	4.3 ± 1.2	5.7 ± 1.1	7.6 ± 1.1	0.040	0.41	0.32
BCFA	0.68 ± 0.12	0.73 ± 0.12	0.52 ± 0.11	0.98 ± 0.11	0.68	0.028	0.072

[1]The individual minipig was regarded as the experimental unit, 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). Data are shown as mean ± SEM.

[2]F, fibre effect; P, protein effect; F × P, fibre × protein interaction. Different superscript letters in a row are presented for the significant interaction ($P < 0.05$) after adjustment for multiple comparisons by the Tukey–Kramer post hoc test.

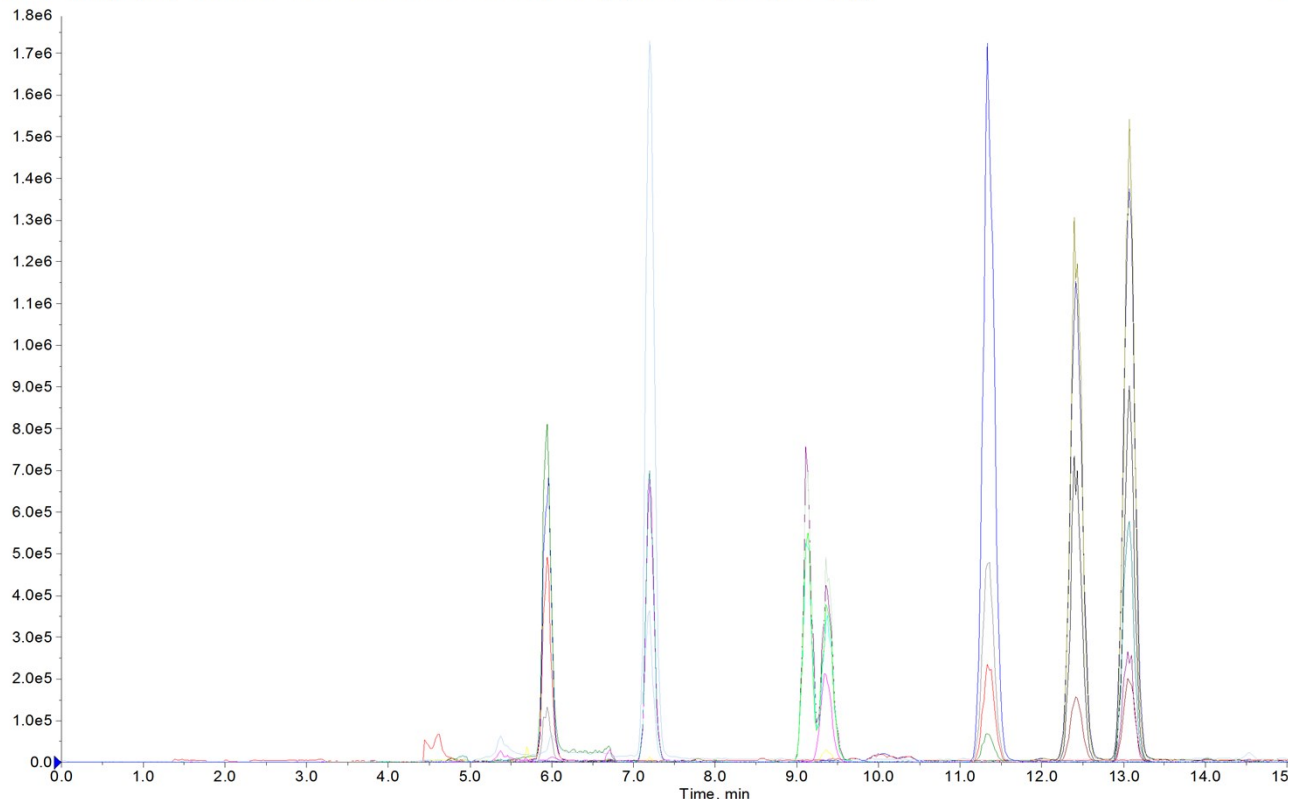

Fig. S1 The representative MRM chromatogram of SCFA standards.

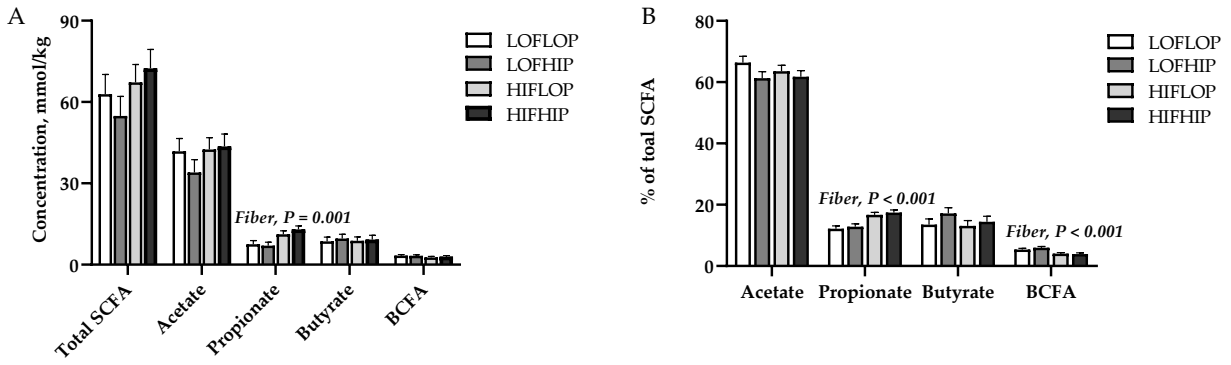

Fig. S2 Concentrations of total SCFA, acetate, propionate, butyrate and BCFA (A) and distribution of total SCFA (B) in faeces of Göttingen Minipigs. Data are shown as mean ± SEM represented by vertical bars. The individual minipig was regarded as the experimental unit, n = 10 for low fibre low protein 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 are presented in the figure.

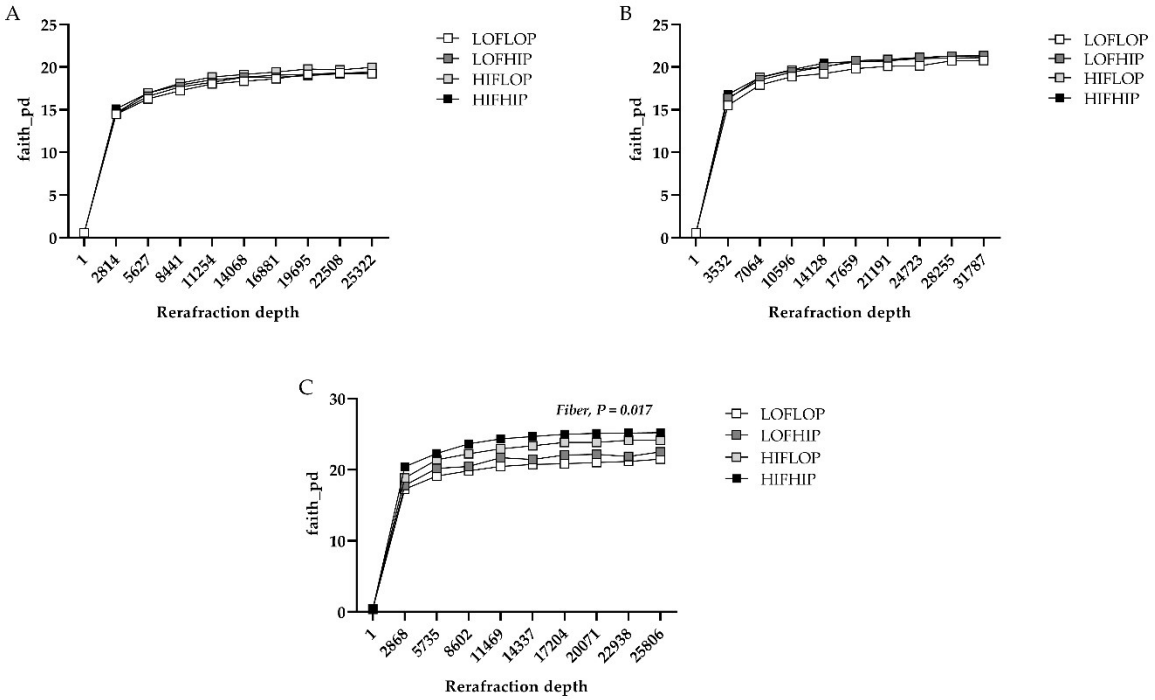

Fig. S3 Alpha rarefaction curves for each diet, showing the Faith's phylogenetic diversity (faith_ph) (y axis) as a function of sequencing depth (x axis). Samples were rarefied to 25322 sequences for caecum (A), 31787 sequences for mid colon (B) and 25806 for faecal samples (C), which means the minimum sequence per sample depth in the dataset. The individual minipig was regarded as the experimental unit, 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). One digesta sample from mid colon in LOFLOP group (n = 9) was omitted due to low-quality reads. Only significant P -values are presented in the figure.

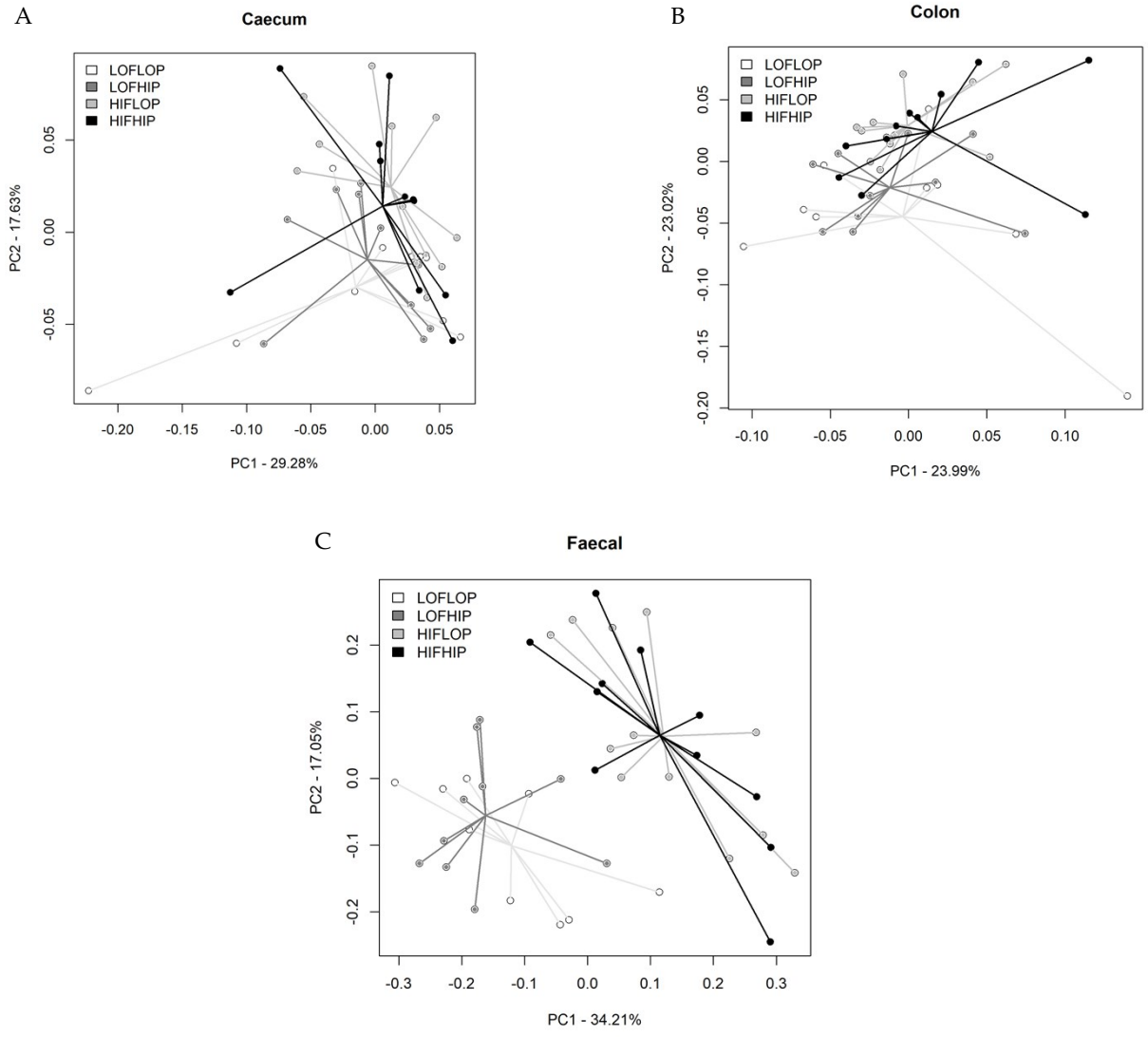

Fig. S4 Principal coordinate analysis plot of the weighted Unifrac metric. The grey, yellow, red and blue line with points represented caecum (A), mid colon (B) and faecal (C) communities of individual minipig after feeding low fibre low protein diet (LOFLOP, n = 10), low fibre high protein diet (LOFHIP, n = 10), high fibre low protein diet (HIFLOP, n = 12) and high fibre high protein diet (HIFHIP, n = 11), respectively. One digesta sample from mid colon in LOFLOP group (n = 9) was omitted due to low-quality reads. Only significant fibre effect was observed in principal coordinate analysis plot of caecum, colon and faecal communities ($P < 0.01$).

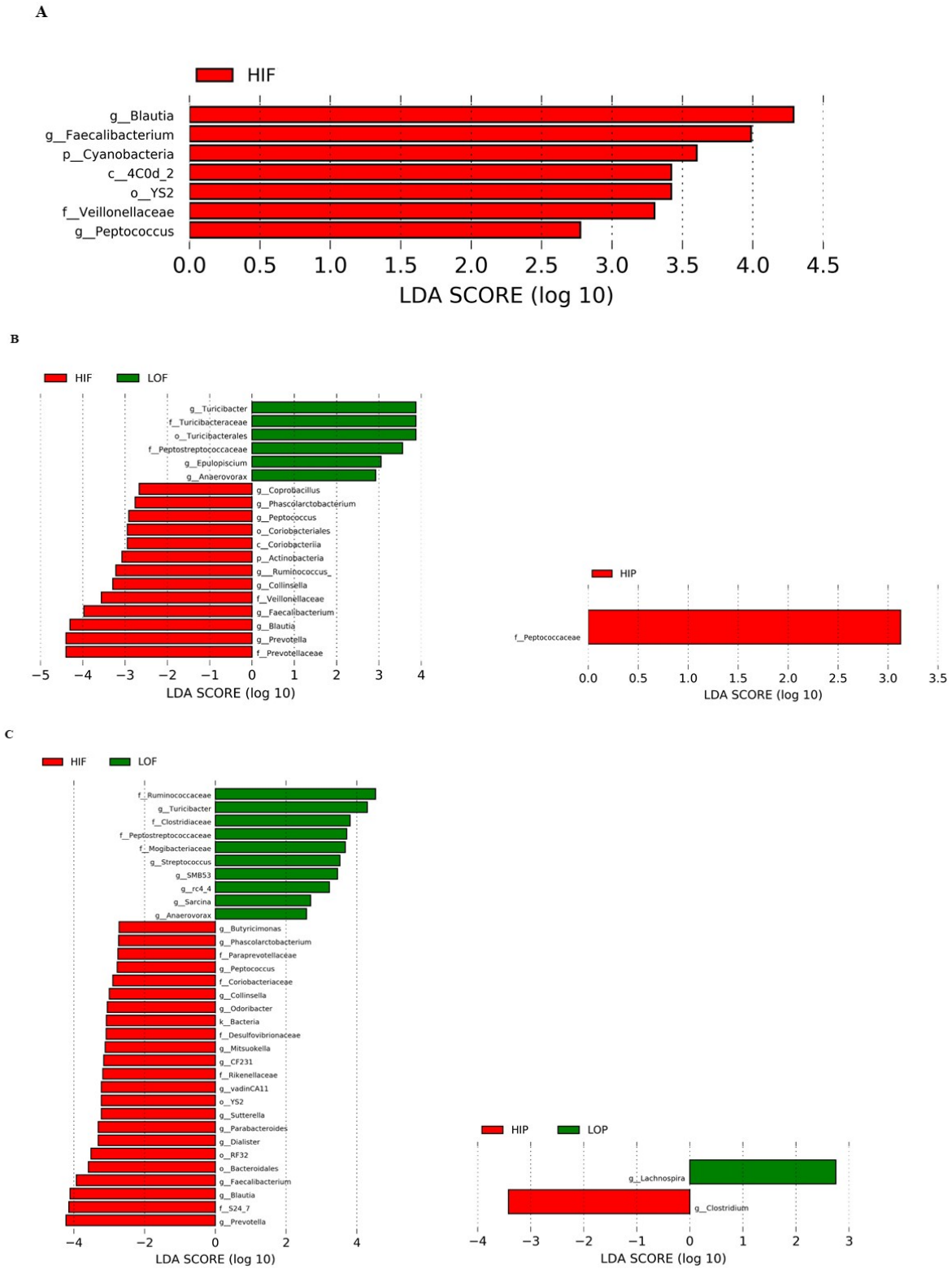

Fig. S5 Identification of the most differentially abundant genera in caecum (A), mid colon (B) and faecal samples (C) in Göttingen Minipigs fed low or high fibre and protein diets. The plot was generated from Linear Discriminant Analysis Effect Size (LEfSe) analysis with CSS-normalized OTU table and displays taxa with LDA scores above 2.0 and *P*-values below 0.01. Genera enriched

in the samples with low fibre (LOF) or low protein (LOP) are indicated with green bars, and genera enriched in the samples with high fibre (HIF) or high protein (HIP) are indicated with a red bars. The individual minipig was regarded as the experimental unit, $n = 20$ for LOF, $n = 23$ for HIF, n = 22 for LOP and n = 21 for HIP. One digesta sample from mid colon in LOFLOP group ($n = 19$ for LOF) was omitted due to low-quality reads.