

Online Supplementary Materials

Dietary soy and meat proteins induce distinct physiological and gene expression responses in rats

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Supplementary Figure S1. Network with all names of gene sets and upstream regulators for liver transcriptome of the rats fed soy and meat proteins compared to the rats fed casein.

This network was produced by using Cytoscape v3.2 and Enrichment Map plugin v2.1. Nodes represent enriched gene sets in gene set enrichment analysis of liver transcriptome in rat. The node size is proportional to the total number of genes within each gene set (from 15 to 500). The border area of the node represents the comparison of soy protein group to the casein group (Soy vs. Casein), whereas the inner area of the node represents the comparison of meat protein group to the casein group (Meat vs. Casein). The colors of nodes indicate the directions of changes of gene sets with red for up-regulation and blue for down-regulation. The enrichment P value is mapped to the node color as a color gradient. The color changes from light to bright with the P value decreasing from 0.05 to 0. The weighted grey lines between the round nodes represent the “overlap” score (Jaccard and overlap coefficients >0.375) depending on the number of genes two gene-sets share. The more genes two gene-sets share, the wider the line. The yellow triangles in the map represent the upstream regulators predicted by using Ingenuity Pathway Analysis, and they were overlapped with putative target genes in the genes sets using the Post Analysis tool in the Enrichment Map v2.1 plugin. Pink lines between round nodes and yellow triangles represent the overlap P value (Fisher’s Exact Test nominal $P < 0.05$) between the enriched gene sets and the upstream regulators. Nodes of high similarity were automatically arranged close together, and circles were semi-automatically annotated and manually labelled.



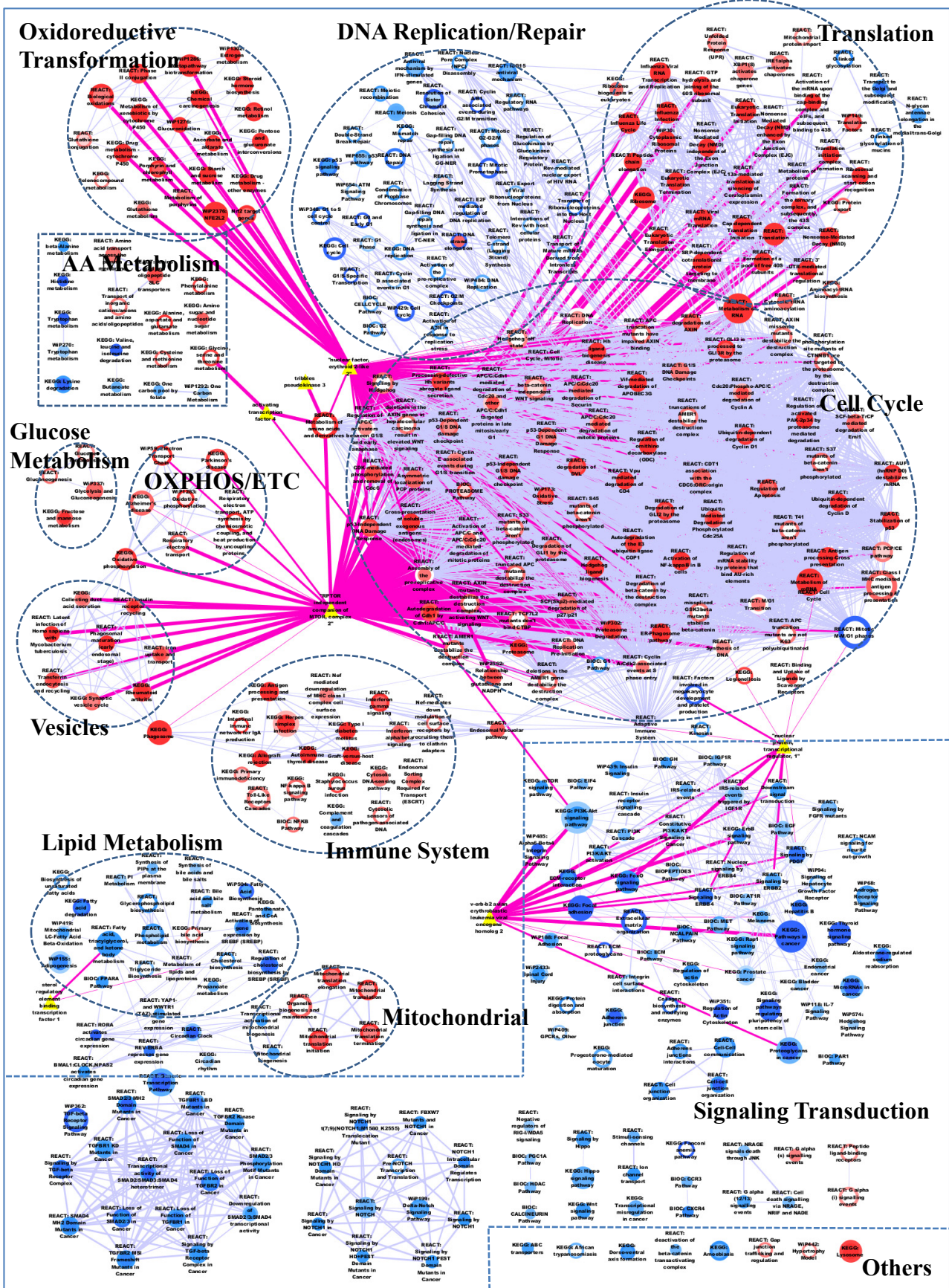
Soy vs. Casein
Meat vs. Casein



Up Down



Upstream Regulator



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Supplementary Table S1. All significantly regulated genes ($P < 0.05$) observed in rats after 1 week consumption of the soy and meat protein diets compared to the casein diet.

Due to the length of Supplemental Table S1, it is available as a separate supplemental Excel file.

Supplementary Table S2. All significantly gene sets ($P < 0.05$ & $FDR < 0.25$) obtained from the GSEA analysis of the liver transcriptomic data observed in rats after 1 week consumption of the soy and meat protein diets compared to the casein diet.

Due to the length of Supplemental Table S2, it is available as a separate supplemental Excel file.

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Supplementary Table S3. The mRNA expression of PPAR target genes in rat livers after 1 week consumption of the soy and meat protein diets compared to the casein diet.

Symbol	Full name	Soy vs. Casein		Meat vs. Casein	
		FC	P	FC	P
<i>Scd1</i>	stearoyl-Coenzyme A desaturase 1	-16.80	0.24	-3.56	0.060
<i>Txnip</i>	thioredoxin interacting protein	-13.51	0.35	-11.03	0.038
<i>Aqp7</i>	aquaporin 7	-6.53	0.09	-3.67	0.0042
<i>Fabp5</i>	fatty acid binding protein 5, epidermal	-6.31	0.23	-2.52	0.065
<i>Angptl4</i>	angiopoietin-like 4	-5.48	0.07	-6.00	0.00089
<i>Fabp1</i>	fatty acid binding protein 1, liver	-4.97	0.08	-2.85	0.0053
<i>Ehhadh</i>	enoyl-Coenzyme A, hydratase/3-hydroxyacyl Coenzyme A dehydrogenase	-4.63	0.16	-3.16	0.033
<i>Hprt1</i>	hypoxanthine phosphoribosyltransferase 1	-4.24	0.26	-3.29	0.025
<i>Apoc3</i>	apolipoprotein C-III	-4.21	0.15	-3.68	0.0024
<i>Klf10</i>	kruppel-like factor 10	-4.08	0.13	-2.95	0.012
<i>Acadl</i>	acyl-Coenzyme A dehydrogenase, long-chain	-4.08	0.14	-3.05	0.010
<i>Acsl3</i>	acyl-CoA synthetase long-chain family member 3	-3.90	0.03	-3.32	0.00057
<i>Acsl1</i>	acyl-CoA synthetase long-chain family member 1	-3.82	0.14	-3.37	0.0053
<i>Slc27a5</i>	solute carrier family 27 (fatty acid transporter), member 5	-3.82	0.17	-3.00	0.020
<i>Cyp27a1</i>	cytochrome P450, family 27, subfamily a, polypeptide 1	-3.72	0.22	-3.73	0.0083
<i>Etfdh</i>	electron-transferring-flavoprotein dehydrogenase	-3.70	0.21	-2.90	0.012
<i>Pten</i>	phosphatase and tensin homolog	-3.53	0.29	-2.93	0.013
<i>Cpt2</i>	carnitine palmitoyltransferase 2	-3.44	0.27	-3.36	0.0059
<i>Apoa1</i>	apolipoprotein A-I	-3.43	0.23	-3.01	0.010
<i>Cpt1a</i>	carnitine palmitoyltransferase 1a, liver	-3.42	0.29	-3.42	0.015
<i>Slc22a5</i>	solute carrier family 22 (organic	-3.32	0.27	-2.52	0.066

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	cation/carnitine transporter), member 5				
<i>Clu</i>	clusterin	-3.32	0.28	-3.73	0.0036
<i>Ppargc1b</i>	peroxisome proliferator-activated receptor gamma, coactivator 1 beta	-3.23	0.12	-2.85	0.026
<i>Slc27a2</i>	solute carrier family 27 (fatty acid transporter), member 2	-3.17	0.18	-2.71	0.011
<i>Acadm</i>	acyl-Coenzyme A dehydrogenase, C-4 to C-12 straight chain	-3.17	0.17	-3.60	0.0023
<i>Acs15</i>	acyl-CoA synthetase long-chain family member 5	-3.15	0.19	-2.50	0.039
<i>Ppargc1a</i>	peroxisome proliferator-activated receptor gamma, coactivator 1 alpha	-3.15	0.15	-2.35	0.077
<i>Eln</i>	elastin	-3.15	0.19	-2.54	0.028
<i>Ech1</i>	enoyl coenzyme A hydratase 1, peroxisomal	-3.14	0.31	-2.43	0.035
<i>Sirt1</i>	sirtuin (silent mating type information regulation 2 homolog) 1 (<i>S. cerevisiae</i>)	-3.14	0.22	-3.45	0.0043
<i>Acox1</i>	acyl-Coenzyme A oxidase 1, palmitoyl	-3.12	0.15	-3.39	0.0059
<i>B2m</i>	beta-2 microglobulin	-3.03	0.33	-2.70	0.022
<i>Hmgcs2</i>	3-hydroxy-3-methylglutaryl-Coenzyme A synthase 2 (mitochondrial)	-2.99	0.22	-3.32	0.0073
<i>Ppara</i>	peroxisome proliferator activated receptor alpha	-2.96	0.30	-2.82	0.027
<i>Ep300</i>	e1A binding protein p300	-2.96	0.28	-4.47	0.0052
<i>Fads2</i>	fatty acid desaturase 2	-2.96	0.15	-2.71	0.017
<i>Ppard</i>	peroxisome proliferator-activated receptor delta	-2.95	0.21	-2.95	0.010
<i>Actb</i>	actin, beta	-2.95	0.28	-3.09	0.0045
<i>Ilk</i>	integrin-linked kinase	-2.94	0.31	-3.15	0.012
<i>Fabp2</i>	fatty acid binding protein 2, intestinal	-2.83	0.21	-2.32	0.061
<i>Acaa2</i>	acetyl-Coenzyme A acyltransferase 2	-2.70	0.18	-2.96	0.0053
<i>Mlycd</i>	malonyl-CoA decarboxylase	-2.69	0.35	-3.45	0.016
<i>Hif1a</i>	hypoxia-inducible factor 1, alpha subunit (basic helix-loop-helix transcription factor)	-2.68	0.34	-2.946	0.012
<i>Lpin1</i>	lipin 1	-2.66	0.12	-2.80	0.024

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<i>Pdpk1</i>	3-phosphoinositide dependent protein kinase-1	-2.65	0.30	-3.14	0.011
<i>Crebbp</i>	CREB binding protein	-2.63	0.30	-3.15	0.0060
<i>Fabp7</i>	fatty acid binding protein 7, brain	-2.54	0.19	-2.81	0.013
<i>Ldha</i>	lactate dehydrogenase A	-2.51	0.22	-2.69	0.0061
<i>Fgr</i>	Gardner-Rasheed feline sarcoma viral (v-fgr) oncogene homolog	-2.49	0.26	-3.08	0.0086
<i>Nr1h3</i>	nuclear receptor subfamily 1, group H, member 3	-2.47	0.31	-3.00	0.0082
<i>Tgs1</i>	trimethylguanosine synthase homolog (<i>S. cerevisiae</i>)	-2.41	0.20	-2.62	0.020
<i>Rxra</i>	retinoid X receptor alpha	-2.40	0.18	-2.68	0.0064
<i>Hspd1</i>	heat shock protein 1 (chaperonin)	-2.28	0.28	-2.09	0.020
<i>ApoE</i>	apolipoprotein E	-2.23	0.36	-2.89	0.013
<i>ApoA5</i>	apolipoprotein A-V	-2.18	0.53	-3.35	0.0080
<i>Med1</i>	mediator complex subunit 1	-2.15	0.27	-2.65	0.020
<i>Rxrg</i>	retinoid X receptor gamma	-2.13	0.37	-2.68	0.011
<i>Acox3</i>	acyl-Coenzyme A oxidase 3, pristanoyl	-2.13	0.26	-2.87	0.0070
<i>Dgat1</i>	diacylglycerol O-acyltransferase homolog 1 (mouse)	-2.06	0.40	-2.61	0.020
<i>Slc27a1</i>	solute carrier family 27 (fatty acid transporter), member 1	-1.97	0.30	-1.18	0.63
<i>Acsl4</i>	acyl-CoA synthetase long-chain family member 4	-1.93	0.42	-2.61	0.019
<i>Fabp4</i>	fatty acid binding protein 4, adipocyte	-1.87	0.47	-2.87	0.0080
<i>Ncoa6</i>	nuclear receptor coactivator 6	-1.82	0.49	-2.69	0.011
<i>Creb1</i>	CAMP responsive element binding protein 1	-1.78	0.35	-2.38	0.0090
<i>Pck1</i>	phosphoenolpyruvate carboxykinase 1 (soluble)	-1.74	0.53	-2.54	0.019
<i>Pltp</i>	phospholipid transfer protein	-1.71	0.41	-2.32	0.045
<i>Rxrb</i>	retinoid X receptor beta	-1.69	0.42	-2.01	0.069
<i>Ncoa3</i>	nuclear receptor coactivator 3	-1.69	0.45	-2.15	0.036
<i>Cd36</i>	CD36 molecule (thrombospondin receptor)	-1.63	0.65	-1.84	0.26
<i>Gk</i>	glycerol kinase	-1.61	0.65]	-2.85	0.014

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<i>Pprc1</i>	peroxisome proliferator-activated receptor gamma, coactivator-related 1	-1.56	0.94	-1.88	0.44
<i>Lpl</i>	lipoprotein lipase	-1.50	0.85	-2.22	0.13
<i>Src</i>	v-src sarcoma (Schmidt-Ruppin A-2) viral oncogene homolog (avian)	-1.48	0.44	-2.08	0.017
<i>Sorbs1</i>	sorbin and SH3 domain containing 1	-1.48	0.35	-1.98	0.0096
<i>Fabp3</i>	fatty acid binding protein 3, muscle and heart	-1.41	0.44	-1.45	0.74
<i>Slc27a4</i>	solute carrier family 27 (fatty acid transporter), member 4	-1.26	0.79	-1.69	0.16
<i>Rplp1</i>	ribosomal protein, large, P1	-1.19	0.93	-1.84	0.067
<i>Smarcd3</i>	SWI/SNF related, matrix associated, actin dependent regulator of chromatin, subfamily d, member 3	-1.14	0.56	-1.29	0.24
<i>Cyp7a1</i>	cytochrome P450, family 7, subfamily a, polypeptide 1	-1.11	0.80	-2.94	0.023
<i>Mmp9</i>	matrix metalloproteinase 9	-1.05	0.36	-1.05	0.042
<i>Olr1</i>	oxidized low density lipoprotein (lectin-like) receptor 1	-1.04	0.36	-1.04	0.042
<i>Pyy</i>	peptide YY (mapped)	-1.04	0.36	-1.04	0.042
<i>Pparg</i>	peroxisome proliferator-activated receptor gamma	1.25	0.40	-1.70	0.16
<i>Cpt1b</i>	carnitine palmitoyltransferase 1b, muscle	1.38	0.42	1.03	0.73
<i>Pck2</i>	phosphoenolpyruvate carboxykinase 2 (mitochondrial)	1.43	0.35	-1.90	0.091
<i>Ucp1</i>	uncoupling protein 1 (mitochondrial, proton carrier)	1.66	0.36	1.16	0.63

FC: fold change; *P*: statistical significance analyzed by T test was set at 0.05.

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Supplementary Table S4. The amino acid compositions of the protein powders

%	Casein ¹	Soy	Pork	Beef	Chicken	Fish
Met	2.6	1.34±0.06 ^a	2.89±0.09 ^b	2.78±0.13 ^b	2.86±0.23 ^b	2.99±0.01 ^b
Lys	7.4	5.67±0.21 ^a	8.47±0.29 ^b	8.75±0.11 ^{bc}	8.67±0.58 ^{bc}	9.10±0.09 ^c
Pro	11.7	4.42±0.21 ^d	3.21±0.12 ^{bc}	3.43±0.04 ^c	2.90±0.19 ^a	2.98±0.03 ^{ab}
Val	5.7	3.06±0.17 ^a	3.17±0.19 ^b	3.12±0.07 ^b	2.90±0.28 ^b	3.06±0.06 ^b
Thr	3.8	3.43±0.20 ^a	4.48±0.20 ^b	4.53±0.11 ^b	4.30±0.27 ^b	4.30±0.03 ^b
Arg	3.6	7.01±0.44 ^b	6.30±0.36 ^a	6.43±0.12 ^{ab}	6.27±0.41 ^a	5.94±0.10 ^a
Asp	6.5	10.23±0.45 ^c	9.08±0.36 ^{ab}	9.11±0.14 ^{ab}	9.00±0.62 ^a	9.78±0.03 ^{bc}
Gly	1.8	3.74±0.16 ^a	3.96±0.18 ^{ab}	4.15±0.14 ^{bc}	3.76±0.23 ^a	4.33±0.05 ^c
Ser	5.4	4.60±0.32 ^b	3.79±0.23 ^a	3.82±0.14 ^a	3.71±0.16 ^a	3.88±0.09 ^a
Phe	5	4.70±0.16 ^b	3.89±0.14 ^a	3.92±0.04 ^a	3.79±0.29 ^a	3.99±0.04 ^a
Ile	4.8	3.90±0.10 ^a	4.33±0.09 ^{ab}	4.39±0.09 ^b	4.33±0.48 ^{ab}	4.10±0.10 ^{ab}
Leu	8.8	7.16±0.21 ^a	7.98±0.23 ^b	8.07±0.07 ^b	7.75±0.72 ^{ab}	7.88±0.17 ^b
Cys	0.4	1.36±0.11 ^b	0.86±0.08 ^a	0.92±0.27 ^a	0.76±0.11 ^a	0.88±0.02 ^a
Glu	20.8	18.22±1.34 ^b	15.47±1.03 ^a	16.12±0.74 ^a	14.94±0.58 ^a	15.35±0.45 ^a
Ala	2.6	3.85±0.17 ^a	5.46±0.23 ^b	5.64±0.07 ^b	5.47±0.34 ^b	5.65±0.03 ^b
Tyr	5.3	4.14±0.16 ^a	4.64±0.16 ^a	4.58±0.07 ^a	4.60±0.30 ^a	4.58±0.02 ^a
His	2.6	2.32±0.09 ^a	3.66±0.14 ^c	3.00±0.02 ^b	2.90±0.20 ^b	2.41±0.01 ^a

¹ values for casein were obtained from the company Dyets Inc. (Bethlehem, PA).

Values are shown as means ± SD. Different superscripts mean statistically significant difference at $P < 0.05$ tested by one-way ANOVA and LSD multiple comparisons.

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Supplementary Table S5. The amino acid compositions of the diets

%	AIN-93G	Soy	Pork	Beef	Chicken	Fish
Ala	0.62±0.01 ^a	0.76±0.01 ^b	1.06±0.01 ^c	1.13±0.02 ^d	1.09±0.02 ^c	1.12±0.01 ^d
Arg	0.71±0.01 ^a	1.31±0.02 ^d	1.15±0.02 ^b	1.23±0.02 ^c	1.2±0.02 ^c	1.13±0.00 ^b
Asp	1.42±0.02 ^a	2.03±0.03 ^e	1.77±0.01 ^b	1.84±0.03 ^c	1.79±0.04 ^b	1.95±0.02 ^d
Cys	0.37±0.03 ^c	0.22±0.01 ^b	0.15±0.01 ^a	0.14±0.01 ^a	0.15±0.00 ^a	0.15±0.01 ^a
Glu	4.85±0.09 ^d	3.81±0.05 ^c	3.16±0.07 ^a	3.44±0.05 ^b	3.15±0.06 ^a	3.25±0.03 ^a
Gly	0.37±0.01 ^a	0.74±0.01 ^b	0.78±0.01 ^c	0.83±0.01 ^d	0.75±0.01 ^b	0.87±0.01 ^e
His	0.55±0.01 ^c	0.45±0.01 ^a	0.69±0.01 ^e	0.59±0.01 ^d	0.56±0.01 ^c	0.47±0.00 ^b
Ile	0.97±0.02 ^e	0.78±0.02 ^a	0.85±0.01 ^{bc}	0.89±0.02 ^d	0.86±0.02 ^{cd}	0.83±0.01 ^b
Leu	1.92±0.03 ^d	1.47±0.02 ^a	1.6±0.02 ^b	1.69±0.02 ^c	1.6±0.03 ^b	1.63±0.02 ^b
Lys	1.57±0.02 ^b	1.07±0.02 ^a	1.6±0.00 ^b	1.69±0.03 ^c	1.66±0.03 ^c	1.76±0.01 ^d
Met	0.54±0.00 ^c	0.25±0.01 ^a	0.51±0.01 ^b	0.53±0.01 ^c	0.51±0.01 ^b	0.54±0.00 ^c
Phe	1.01±0.01 ^e	0.95±0.02 ^d	0.77±0.01 ^a	0.85±0.01 ^c	0.77±0.01 ^a	0.82±0.01 ^b
Pro	2.16±0.01 ^e	0.92±0.01 ^d	0.67±0.03 ^b	0.74±0.00 ^c	0.64±0.02 ^a	0.64±0.01 ^a
Thr	0.87±0.01 ^b	0.69±0.01 ^a	0.88±0.00 ^b	0.92±0.02 ^c	0.87±0.02 ^b	0.86±0.01 ^b
Ser	1.17±0.01 ^d	0.94±0.01 ^c	0.77±0.00 ^a	0.79±0.01 ^b	0.77±0.02 ^a	0.80±0.01 ^b
Tyr	0.80±0.01 ^c	0.45±0.01 ^b	0.41±0.02 ^a	0.44±0.03 ^{ab}	0.41±0.01 ^a	0.44±0.00 ^{ab}
Val	1.24±0.03 ^c	0.80±0.02 ^a	0.89±0.01 ^b	0.90±0.02 ^b	0.89±0.01 ^b	0.90±0.00 ^b

Values are shown as means ± SD. Different letters mean statistically significant difference at $P < 0.05$ tested by one-way ANOVA and LSD multiple comparisons.

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Supplementary Table S6. Amino acid ratios¹ of soy and meat proteins using casein+1.5%Cys (AIN93G) as the reference protein

%	Soy	Meat ²	Pork	Beef	Chicken	Fish
Met	52	111	111	107	110	115
Val	54	54	56	55	51	54
Ile	81	89	90	91	90	85
Leu	81	90	91	92	88	90
BCAA ³	73	79	80	81	78	78
Lys	77	118	114	118	117	123
His	89	115	141	115	112	93
Thr	90	116	118	119	113	113
Phe	94	78	78	78	76	80
Arg	195	173	175	179	174	165

Amino acid ratios¹ (%) = (mg of an essential amino acid in 1.0 g of test protein/mg of the same amino acid in 1.0 g of (casein + 1.5% Cys)) ×100; Meat²: it was calculated by combining value of meat proteins from pork, beef, chicken and fish together. BCAA³: it was calculated by combining value of Val, Ile and Leu together.

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Supplementary Table S7. Mineral composition of the protein powders

mg/K g	Casein ¹	Soy	Pork	Beef	Chicken	Fish
Ca	500.0	707.3±15.4 ^c	209.4±101.1 ^a	176.8±56.5 ^a	158.6±5.9 ^a	440.4±104.0 ^b
Cu	4.0	13.2±0.2 ^c	4.9±1.3 ^b	2.9±1.3 ^a	2.1±0.5 ^a	1.8±0.9 ^a
Cr	0.8	0.6±0.0	nd ²	0.9±0.4	0.8±0.1	0.7±0.1
Fe	7.0	150.4±7.6 ^c	35.7±1.9 ^a	78.0±25.6 ^b	20.3±5.5 ^a	18.0±2.2 ^a
K	50.0	389.3±7.9 ^a	9944.0±125.4 ^d	4438.8±183.1 ^b	6411.2±60.2 ^c	13375.5±267.6 ^e
Mg	30.0	405.6±3.7 ^a	983.2±30.3 ^c	676.8±32.6 ^b	1163.0±22.2 ^d	1187.8±35.6 ^d
Mn	1.6	11.4±0.1	0.7±0.3	nd	0.6±0.1	0.8±0.1
Na	100.0	8184.9±142.8 ^d	1192.4±202.4 ^c	486.0±108.2 ^a	685.0±101.1 ^{ab}	848.2±56.8 ^b
Ni	0.2	1.6±0.4	0.8±0.3	nd	0.8±0.2	nd
P	7500.0	6788.4±93.4 ^b	7217.4±351.7 ^{cd}	4741.4±147.8 ^a	7547.6±114.5 ^d	7131.5±201.0 ^{bc}
Se	0.5	nd	7.4±2.2	3.9±0.7	8.2±0.8	7.8±0.9
Zn	38.0	43.9±14.0 ^a	86.8±14.2 ^b	161.5±11.6 ^c	44.4±2.5 ^a	27.6±3.3 ^a

Minerals in protein powders were detected using inductively coupled plasma optical emission spectrometer (PerkinElmer, Optima 2100 DV). Casein¹: Value for casein was obtained from company Dyets Inc. (Bethlehem, PA); nd²: not detected. Values for soy and meat proteins are shown as means ± SD. Different superscripts mean statistically significant difference at $P < 0.05$ tested by one-way ANOVA and LSD multiple comparisons.

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Supplementary Table S8. Ingredient composition of mineral mixes of the six diets

Ingredients, g/Kg	Casein	Soy	Pork	Beef	Chicken	Fish
calcium carbonate, anhydrous, Ca 40.04%	357.00	390.17	320.43	326.06	371.41	268.99
potassium dihydrogen phosphate, P 22.76% K 28.73%	196.00	208.48	113.59	209.56	182.48	38.50
calcium phosphate, Ca 23.29% P 18.00%	0.00	0.00	166.18	90.08	54.27	274.10
potassium Citrate, K 36.16%	70.78	78.37	0.00	0.00	0.00	0.00
sodium chloride, Na 39.34%	74.00	0.00	68.16	71.80	73.42	76.24
potassium sulphate, S 18.39% K 44.87%	46.60	51.61	53.83	48.79	51.91	55.78
magnesium oxide, Mg 60.32%	24.00	22.02	17.85	18.90	15.29	16.22
iron citrate, Fe 16.5%	6.06	0.00	0.00	0.00	0.00	0.00
zinc carbonate, Zn 52.14%	1.65	1.67	1.34	0.35	1.77	2.12
manganous carbonate, Mn 47.79%	0.63	0.54	0.74	0.68	0.71	0.76
curpic carbonate, Cu 57.47%	0.30	0.21	0.34	0.32	0.35	0.38
potassium iodate, I 59.3%	0.01	0.01	0.01	0.01	0.01	0.01
sodium selenate, Se 41.79%	0.01025	0.01025	0.00000	0.00000	0.00000	0.00000
ammonium paramolybdate, 4 hydrate, Mo 54.34%	0.00795	0.00880	0.00918	0.00832	0.00886	0.00952
sodium meta-silicate, 9 hydrate, Si 9.88%	1.45	1.61	1.67	1.52	1.62	1.74
chromium potassium sulfate, 12 hydrate, Cr 10.42%	0.275	0.305	0.318	0.288	0.306	0.329
lithium chloride, Li 16.38%	0.0174	0.0193	0.0201	0.0182	0.0194	0.0208
boric acid, B 17.5%	0.0815	0.0903	0.0941	0.0853	0.0908	0.0976
sodium fluoride, F 45.24%	0.0635	0.0703	0.0733	0.0665	0.0707	0.0760
nickel carbonate, Ni 45%	0.0318	0.0352	0.0367	0.0333	0.0354	0.0381
ammonium vanadate, V 43.55%	0.0066	0.0073	0.0076	0.0069	0.0074	0.0079
suger	221.026	244.772	255.311	231.420	246.216	264.566
total	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00