

Supplementary Table S1: Sample size (N) for each experimental diet.

P:C Ratio	Diet	Sex ¹	Number
(1:14.6)	360 g/l	F	1
(1:14.6)	90 g/l	F	6
(1:7.2)	180 g/l	F	8
(1:7.2)	360 g/l	F	11
(1:7.2)	90 g/l	F	8
(1:3.5)	180 g/l	F	18
(1:3.5)	360 g/l	F	34
(1:3.5)	45 g/l	F	2
(1:3.5)	90 g/l	F	15
(1:1.7)	180 g/l	F	24
(1:1.7)	360 g/l	F	26
(1:1.7)	45 g/l	F	1
(1:1.7)	90 g/l	F	27
(1.3:1)	180 g/l	F	26
(1.3:1)	360 g/l	F	26
(1.3:1)	45 g/l	F	4
(1.3:1)	90 g/l	F	54
(1.4:1)	180 g/l	F	29
(1.4:1)	360 g/l	F	25
(1.4:1)	45 g/l	F	14
(1.4:1)	90 g/l	F	54

P:C Ratio	Diet	Sex ¹	Number
(1:14.6)	180 g/l	M	2
(1:14.6)	90 g/l	M	6
(1:7.2)	180 g/l	M	6
(1:7.2)	360 g/l	M	14
(1:7.2)	90 g/l	M	12
(1:3.5)	180 g/l	M	20
(1:3.5)	360 g/l	M	21
(1:3.5)	90 g/l	M	16
(1:1.7)	180 g/l	M	27
(1:1.7)	360 g/l	M	22
(1:1.7)	90 g/l	M	16
(1.3:1)	180 g/l	M	27
(1.3:1)	360 g/l	M	16
(1.3:1)	45 g/l	M	15
(1.3:1)	90 g/l	M	59
(1.4:1)	180 g/l	M	16
(1.4:1)	360 g/l	M	20
(1.4:1)	45 g/l	M	7
(1.4:1)	90 g/l	M	30

¹M = male, F = female

Supplementary Table S2: *P*-values for pairwise contrast of allometric vectors between food-concentration allometries and P:C allometries, within each sex.

Females		Males	
Contrast ¹	<i>P</i> -value	Contrast	<i>P</i> -value
♀ 1.4:1 v. ♀ 45 g/l	0.5736	♂ 1.4:1 v. ♂ 45 g/l	0.1851
♀ 1.4:1 v. ♀ 90 g/l	0.001	♂ 1.4:1 v. ♂ 90 g/l	0.7416
♀ 1.4:1 v. ♀ 180 g/l	0.0151	♂ 1.4:1 v. ♂ 180 g/l	0.4728
♀ 1.4:1 v. ♀ 360 g/l	0.1145	♂ 1.4:1 v. ♂ 360 g/l	0.6233
♀ 1.3:1v. ♀ 45 g/l	0.0278	♂ 1.3:1v. ♂ 45 g/l	0.1699
♀ 1.3:1v. ♀ 90 g/l	0.0005	♂ 1.3:1v. ♂ 90 g/l	0.1076
♀ 1.3:1v. ♀ 180 g/l	0.0120	♂ 1.3:1v. ♂ 180 g/l	0.0152
♀ 1.3:1v. ♀ 360 g/l	0.0089	♂ 1.3:1v. ♂ 360 g/l	0.0418
♀ 1:1.7 v. ♀ 45 g/l	0.2879	♂ 1:1.7 v. ♂ 45 g/l	0.1273
♀ 1:1.7 v. ♀ 90 g/l	0.0078	♂ 1:1.7 v. ♂ 90 g/l	0.7077
♀ 1:1.7 v. ♀ 180 g/l	0.0180	♂ 1:1.7 v. ♂ 180 g/l	0.1606
♀ 1:1.7 v. ♀ 360 g/l	0.0518	♂ 1:1.7 v. ♂ 360 g/l	0.4288
♀ 1:3.5 v. ♀ 45 g/l	0.5783	♂ 1:3.5 v. ♂ 45 g/l	0.1277
♀ 1:3.5 v. ♀ 90 g/l	0.1481	♂ 1:3.5 v. ♂ 90 g/l	0.1747
♀ 1:3.5 v. ♀ 180 g/l	0.0975	♂ 1:3.5 v. ♂ 180 g/l	0.0925
♀ 1:3.5 v. ♀ 360 g/l	0.2406	♂ 1:3.5 v. ♂ 360 g/l	0.4657
♀ 1:7.2 v. ♀ 45 g/l	0.0551	♂ 1:7.2 v. ♂ 45 g/l	0.0137
♀ 1:7.2 v. ♀ 90 g/l	0.0302	♂ 1:7.2 v. ♂ 90 g/l	0.6201
♀ 1:7.2 v. ♀ 180 g/l	0.0377	♂ 1:7.2 v. ♂ 180 g/l	0.0876
♀ 1:7.2 v. ♀ 360 g/l	0.0153	♂ 1:7.2 v. ♂ 360 g/l	0.0950
♀ 1:14.6 v. ♀ 45 g/l	0.3980	♂ 1:14.6 v. ♂ 45 g/l	0.1441
♀ 1:14.6 v. ♀ 90 g/l	0.7136	♂ 1:14.6 v. ♂ 90 g/l	0.1106
♀ 1:14.6 v. ♀ 180 g/l	0.4007	♂ 1:14.6 v. ♂ 180 g/l	0.0038
♀ 1:14.6 v. ♀ 360 g/l	0.3231	♂ 1:14.6 v. ♂ 360 g/l	0.0118
Fisher's P	<0.0001	Fisher's P	<0.0001

Values in bold and in red cells are significant at $P < 0.05$.

¹ Allometries being compared. For food-concentration allometries the P:C ratio is given, for P:C allometries the food-concentration is given.

♀ is female and ♂ is male. Thus “♀ 1.4:1 v. ♀ 45 g/l” is the comparison of the female food-concentration allometry at a P:C of 1.4:1 with a female P:C allometry at a food-concentration level of 45 g/l.

Supplementary Table S3: *P*-values for meta-analysis of pairwise contrast of allometric vectors among P:C allometries, within each sex.

Females		Males	
Contrast ¹	<i>P</i> -value	Contrast ¹	<i>P</i> -value
♀ 45 g/l v. ♀ 90 g/l	0.6972	♂ 45 g/l v. ♂ 90 g/l	0.1163
♀ 45 g/l v. ♀ 180 g/l	0.7871	♂ 45 g/l v. ♂ 180 g/l	0.0868
♀ 45 g/l v. ♀ 360 g/l	0.8921	♂ 45 g/l v. ♂ 360 g/l	0.0001
♀ 90 g/l v. ♀ 180 g/l	0.5959	♂ 90 g/l v. ♂ 180 g/l	0.2864
♀ 90 g/l v. ♀ 360 g/l	0.5230	♂ 90 g/l v. ♂ 360 g/l	0.2226
♀ 180 g/l v. ♀ 360 g/l	0.3529	♂ 180 g/l v. ♂ 360 g/l	0.2004
Fisher's P	0.9234	Fisher's P	0.0003

Values in bold and in red cells are significant at $P < 0.05$.

¹ Allometries being compared. For P:C allometries the food- concentration is given. ♀ is female and ♂ is male. Thus “♀ 45 g/l v. ♀ 90 g/l” is the comparison of female P:C allometries at a food-concentration level of 45 g/l versus 90 g/l.

Supplementary Table S4: *P*-values for meta-analysis of pairwise contrast of allometric vectors among food-concentration allometries, within each sex.

Females		Males	
Contrast ¹	<i>P</i> -value	Contrast ¹	<i>P</i> -value
♀ 1.4:1 v. ♀ 1:1	0.1499	♂ 1.4:1 v. ♂ 1:1	0.5462
♀ 1.4:1 v. ♀ 1:1.7	0.0343	♂ 1.4:1 v. ♂ 1:1.7	0.6206
♀ 1.4:1 v. ♀ 1:3.5	0.0082	♂ 1.4:1 v. ♂ 1:3.5	0.4929
♀ 1.4:1 v. ♀ 1:7.2	0.0004	♂ 1.4:1 v. ♂ 1:7.2	0.7699
♀ 1.4:1 v. ♀ 1:14.6	0.1570	♂ 1.4:1 v. ♂ 1:14.6	0.1007
♀ 1.3:1 v. ♀ 1:1.7	0.0071	♂ 1.3:1 v. ♂ 1:1.7	0.1521
♀ 1.3:1 v. ♀ 1:3.5	0.0001	♂ 1.3:1 v. ♂ 1:3.5	0.0713
♀ 1.3:1 v. ♀ 1:7.2	0.0012	♂ 1.3:1 v. ♂ 1:7.2	0.1058
♀ 1.3:1 v. ♀ 1:14.6	0.0668	♂ 1.3:1 v. ♂ 1:14.6	0.0076
♀ 1:1.7 v. ♀ 1:3.5	0.0115	♂ 1:1.7 v. ♂ 1:3.5	0.5473
♀ 1:1.7 v. ♀ 1:7.2	0.0615	♂ 1:1.7 v. ♂ 1:7.2	0.2072
♀ 1:1.7 v. ♀ 1:14.6	0.1378	♂ 1:1.7 v. ♂ 1:14.6	0.0645
♀ 1:3.5 v. ♀ 1:7.2	0.0049	♂ 1:3.5 v. ♂ 1:7.2	0.1459
♀ 1:3.5 v. ♀ 1:14.6	0.2789	♂ 1:3.5 v. ♂ 1:14.6	0.1836
♀ 1:7.2 v. ♀ 1:14.6	0.4992	♂ 1:7.2 v. ♂ 1:14.6	0.0663
Fisher's P	<0.0001	Fisher's P	0.0040

Values in bold and in red cells are significant at $P < 0.05$.

¹Allometries being compared. For food-concentration allometries the P:C ratio is given. ♀ is female and ♂ is male. Thus “♀ 1.4:1 v. ♀ 1:1” is the comparison of female food-concentration allometries at a P:C level of 1.4:1 versus 1:1.

Supplementary Table S5: *P*-values for pairwise contrast of allometric vectors between males and female P:C allometries and food-concentration allometries.

Food-concentration Allometries		Food-Concentration Allometries	
Contrast ¹	<i>P</i> -value	Contrast ¹	<i>P</i> -value
♀ 1.4:1 v. ♂ 1.4:1	0.0001	♀ 45 g/l v. ♂ 45 g/l	0.0352
♀ 1.3:1 v. ♂ 1.3:1	0.0002	♀ 90 g/l v. ♂ 90 g/l	0.8323
♀ 1:1.7 v. ♂ 1:1.7	0.7562	♀ 180 g/l v. ♂ 180 g/l	0.1401
♀ 1:3.5 v. ♂ 1:3.5	0.1286	♀ 360 g/l v. ♂ 360 g/l	0.0017
♀ 1:7.2 v. ♂ 1:7.2	0.1683	Fisher's P	0.0025
♀ 1:14.6 v. ♂ 1:14.6	0.1511		
Fisher's P	<0.0001		

Values in bold and in red cells are significant at $P < 0.05$.

¹ Allometries being compared. For food-concentration allometries the P:C ratio is given, for P:C allometries the food concentration is given.

♀ is female and ♂ is male. Thus “♀ 1.4:1 v. ♂ 1.4:1” is the comparison of the female and male food-concentration allometries at a P:C of 1.4:1.

Supplementary Table S6: Pairwise comparisons of allometries generated in response to variation in caloric value (food-concentration allometries) at different P:C ratios and in response to variation in P:C ratio (P:C allometries) at different food concentrations, in males (♂) and females (♀), using only data from vials with >5 flies of the same sex.

		Food-concentration Allometries										P:C Allometries							
		♂ 1.4:1	♂ 1.3:1	♂ 1:1.7	♂ 1:3.5	♂ 1:7.2	♀ 1.4:1	♀ 1.3:1	♀ 1:1.7	♀ 1:3.5	♀ 1:7.2	♂ 45 g/l	♂ 90 g/l	♂ 180 g/l	♂ 360 g/l	♀ 45 g/l	♀ 90 g/l	♀ 180 g/l	♀ 360 g/l
Food-concentration Allometries	♂ 1.4:1		27.761	39.710	24.328	13.264	50.782	135.248	24.493	7.675	38.048	115.513	16.470	20.092	29.827	56.953	5.865	11.771	10.990
	♂ 1.3:1	0.409		44.981	26.527	28.441	42.899	140.162	14.853	24.465	29.959	114.264	17.787	38.698	25.042	72.782	16.875	21.115	21.897
	♂ 1:1.7	0.139	0.218		26.553	40.122	38.631	101.401	37.045	29.477	46.532	111.235	32.055	23.220	24.813	30.450	37.509	26.059	27.531
	♂ 1:3.5	0.419	0.344	0.363		31.380	50.607	127.020	30.201	7.951	39.909	127.622	12.103	22.516	12.031	46.034	15.902	11.665	12.684
	♂ 1:7.2	0.727	0.556	0.164	0.301		38.955	132.337	13.630	15.378	28.482	102.777	22.236	24.044	34.550	60.626	12.624	9.113	12.121
	♀ 1.4:1	0.023	0.000	0.029	0.054	0.456		102.015	30.727	49.315	33.785	80.346	47.314	46.312	44.837	65.974	49.933	40.318	43.424
	♀ 1.3:1	0.005	0.090	0.000	0.000	0.000	0.000		125.387	127.723	130.485	72.780	132.555	115.801	120.723	84.496	134.499	126.140	125.201
	♀ 1:1.7	0.073	0.040	0.007	0.047	0.665	0.118	0.000		25.291	31.378	99.249	21.355	30.108	23.766	66.519	21.541	18.889	19.464
	♀ 1:3.5	0.345	0.136	0.019	0.158	0.446	0.110	0.000	0.092		41.519	124.492	6.481	12.597	7.608	50.418	9.475	9.571	6.612
	♀ 1:7.2	0.680	0.767	0.557	0.385	0.542	0.480	0.000	0.362	0.109		93.258	36.816	45.165	42.933	71.586	40.068	33.469	39.205
P:C Allometries	♂ 45 g/l	0.000	0.000	0.000	0.000	0.000	0.099	0.087	0.000	0.000		120.777	114.787	124.043	133.410	119.265	116.587	118.473	
	♂ 90 g/l	0.176	0.098	0.013	0.471	0.500	0.000	<0.001	0.002	0.452	0.414	0.000		22.098	14.737	56.052	5.618	8.457	7.629
	♂ 180 g/l	0.336	0.258	0.051	0.307	0.431	0.012	<0.001	0.001	0.100	0.541	0.000	0.780		25.623	39.026	21.541	14.080	12.958
	♂ 360 g/l	0.353	0.155	0.259	0.408	0.472	0.001	<0.001	<0.001	0.411	0.675	0.000	0.194	0.247		46.801	14.652	9.605	5.595
	♀ 45 g/l	0.172	0.178	0.217	0.092	0.000	0.152	0.074	0.073	0.220	0.000	0.000	0.085	0.145	0.263		59.855	51.679	51.973
	♀ 90 g/l	0.303	0.006	0.038	0.149	0.732	0.009	0.000	0.202	0.805	0.380	0.000	0.231	0.030	0.007	0.347		13.258	10.278
	♀ 180 g/l	0.087	0.009	0.010	0.088	0.784	0.040	0.000	0.036	0.534	0.271	0.000	0.079	0.016	0.058	0.233	0.271		6.422
	♀ 360 g/l	0.051	0.000	0.011	0.063	0.685	0.167	0.000	0.279	0.652	0.268	0.000	0.084	0.005	0.286	0.341	0.570	0.629	

Angles between allometric vectors are shown above the diagonal and uncorrected *P*-values are shown below the diagonal. *P*-values <0.05 are shown in bold. The darker the cell the lower the *P*-value. Green cells show comparison among food-concentration allometries within each sex, purple cells show comparison among P:C allometries within each sex, blue cells show comparison between food-concentration and P:C allometries within each sex, and red cells shows comparisons between male and female allometries.

Supplementary Table S7: *P*-values for pairwise contrast of allometric vectors between food-concentration allometries and P:C allometries within each sex, using only data from vials with >5 flies of the same sex.

Females		Males	
Contrast ¹	<i>P</i> -value	Contrast ¹	<i>P</i> -value
♀ 1.4:1 v. ♀ 45 g/l	0.152	♂ 1.4:1v. ♂ 45 g/l	0.001
♀ 1.4:1 v. ♀ 90 g/l	0.009	♂ 1.4:1v. ♂ 90 g/l	0.176
♀ 1.4:1 v. ♀ 180 g/l	0.040	♂ 1.4:1v. ♂ 180 g/l	0.336
♀ 1.4:1 v. ♀ 360 g/l	0.167	♂ 1.4:1v. ♂ 360 g/l	0.353
♀ 1.3:1 v. ♀ 45 g/l	0.074	♂ 1.3:1v. ♂ 45 g/l	0.001
♀ 1.3:1 v. ♀ 90 g/l	0.001	♂ 1.3:1v. ♂ 90 g/l	0.098
♀ 1.3:1 v. ♀ 180 g/l	0.001	♂ 1.3:1v. ♂ 180 g/l	0.258
♀ 1.3:1 v. ♀ 360 g/l	0.001	♂ 1.3:1v. ♂ 360 g/l	0.155
♀ 1:1.7 v. ♀ 45 g/l	0.073	♂ 1:1.7 v. ♂ 45 g/l	0.001
♀ 1:1.7 v. ♀ 90 g/l	0.202	♂ 1:1.7 v. ♂ 90 g/l	0.013
♀ 1:1.7 v. ♀ 180 g/l	0.036	♂ 1:1.7 v. ♂ 180 g/l	0.051
♀ 1:1.7 v. ♀ 360 g/l	0.279	♂ 1:1.7 v. ♂ 360 g/l	0.259
♀ 1:3.5 v. ♀ 45 g/l	0.220	♂ 1:3.5 v. ♂ 45 g/l	0.001
♀ 1:3.5 v. ♀ 90 g/l	0.805	♂ 1:3.5 v. ♂ 90 g/l	0.471
♀ 1:3.5 v. ♀ 180 g/l	0.534	♂ 1:3.5 v. ♂ 180 g/l	0.307
♀ 1:3.5 v. ♀ 360 g/l	0.652	♂ 1:3.5 v. ♂ 360 g/l	0.408
♀ 1:7.2 v. ♀ 45 g/l	0.001	♂ 1:7.2 v. ♂ 45 g/l	0.001
♀ 1:7.2 v. ♀ 90 g/l	0.380	♂ 1:7.2 v. ♂ 90 g/l	0.500
♀ 1:7.2 v. ♀ 180 g/l	0.271	♂ 1:7.2 v. ♂ 180 g/l	0.431
♀ 1:7.2 v. ♀ 360 g/l	0.268	♂ 1:7.2 v. ♂ 360 g/l	0.472
Fisher's P	<0.0001	Fisher's P	<0.0001

Values in bold and in red cells are significant at $P < 0.05$.

¹ Allometries being compared. For food-concentration allometries the P:C ratio is given, for P:C allometries the food concentration is given.

♀ is female and ♂ is male. Thus “♀ 1.4:1 v. ♀ 45 g/l” is the comparison of the female food-concentration allometry at a P:C of 1.4:1 with a female P:C allometry at a food-concentration level of 45 g/l.

Supplementary Table S8: *P*-values for meta-analysis of pairwise contrast of allometric vectors among P:C allometries within each sex, using only data from vials with >5 flies of the same sex.

Female		Male	
Contrast ¹	<i>P</i> -value	Contrast ¹	<i>P</i> -value
♀ 45g v. ♀ 90g	0.347	♂ 45g v. ♂ 90g	<0.001
♀ 45g v. ♀ 180g	0.233	♂ 45g v. ♂ 180g	<0.001
♀ 45g v. ♀ 360g	0.341	♂ 45g v. ♂ 360g	<0.001
♀ 90g v. ♀ 180g	0.271	♂ 90g v. ♂ 180g	0.780
♀ 90g v. ♀ 360g	0.570	♂ 90g v. ♂ 360g	0.194
♀ 180g v. ♀ 360g	0.629	♂ 180g v. ♂ 360g	0.247
Fisher's P	0.4582	Fisher's P	<0.0001

Values in bold and in red cells are significant at $P < 0.05$.

¹ Allometries being compared. For P:C allometries the food- concentration is given. ♀ is female and ♂ is male. Thus “♀ 45 g/l v. ♀ 90 g/l” is the comparison of female P:C allometries at a food-concentration level of 45 g/l versus 90 g/l.

Supplementary Table S9: *P*-values for meta-analysis of pairwise contrast of allometric vectors among food-concentration allometries within each sex, using only data from vials with >5 flies of the same sex.

Females		Males	
Contrast ¹	<i>P</i> -value	Contrast ¹	<i>P</i> -value
♀ 1.4:1 v. ♀ 1.3:1	<0.001	♂ 1.4:1 v. ♂ 1.3:1	0.409
♀ 1.4:1 v. ♀ 1:1.7	0.118	♂ 1.4:1 v. ♂ 1:1.7	0.139
♀ 1.4:1 v. ♀ 1:3.5	0.110	♂ 1.4:1 v. ♂ 1:3.5	0.419
♀ 1.4:1 v. ♀ 1:7.2	0.480	♂ 1.4:1 v. ♂ 1:7.2	0.727
♀ 1.3:1 v. ♀ 1:1.7	<0.001	♂ 1.3:1 v. ♂ 1:1.7	0.218
♀ 1.3:1 v. ♀ 1:3.5	<0.001	♂ 1.3:1 v. ♂ 1:3.5	0.344
♀ 1.3:1 v. ♀ 1:7.2	<0.001	♂ 1.3:1 v. ♂ 1:7.2	0.556
♀ 1:1.7 v. ♀ 1:3.5	0.092	♂ 1:1.7 v. ♂ 1:3.5	0.363
♀ 1:1.7 v. ♀ 1:7.2	0.362	♂ 1:1.7 v. ♂ 1:7.2	0.164
♀ 1:3.5 v. ♀ 1:7.2	0.109	♂ 1:3.5 v. ♂ 1:7.2	0.301
Fisher's P	<0.0001	Fisher's P	0.315

Values in bold and in red cells are significant at $P < 0.05$.

¹ Allometries being compared. For food-concentration allometries the P:C ratio is given. ♀ is female and ♂ is male. Thus "♀ 1.4:1 v. ♀ 1:1" is the comparison of female food-concentration allometries at a P:C level of 1.4:1 versus 1:1.

Supplementary Table S10: *P*-values for pairwise contrast of allometric vectors between males and female P:C allometries and food-concentration allometries within each sex, using only data from vials with >5 flies of the same sex.

Caloric Allometries		P:C Allometries	
Contrast ¹	P-value	Contrast ¹	P-value
♀ 1.4:1 v. ♂ 1.4:1	0.023	♀ 45 g/l v. ♂ 45 g/l	0.001
♀ 1.3:1 v. ♂ 1.3:1	0.090	♀ 90 g/l v. ♂ 90 g/l	0.231
♀ 1:1.7 v. ♂ 1:1.7	0.007	♀ 180 g/l v. ♂ 180 g/l	0.016
♀ 1:3.5 v. ♂ 1:3.5	0.158	♀ 360 g/l v. ♂ 360 g/l	0.286
♀ 1:7.2 v. ♂ 1:7.2	0.542	Fisher's P	0.0006
Fisher's P	0.0024		

Values in bold and in red cells are significant at $P < 0.05$.

¹ Allometries being compared. For food-concentration allometries the P:C ratio is given, for P:C allometries the food concentration is given.

♀ is female and ♂ is male. Thus "♀ 1.4:1 v. ♂ 1.4:1" is the comparison of the female and male food-concentration allometries at a P:C of 1.4:1.