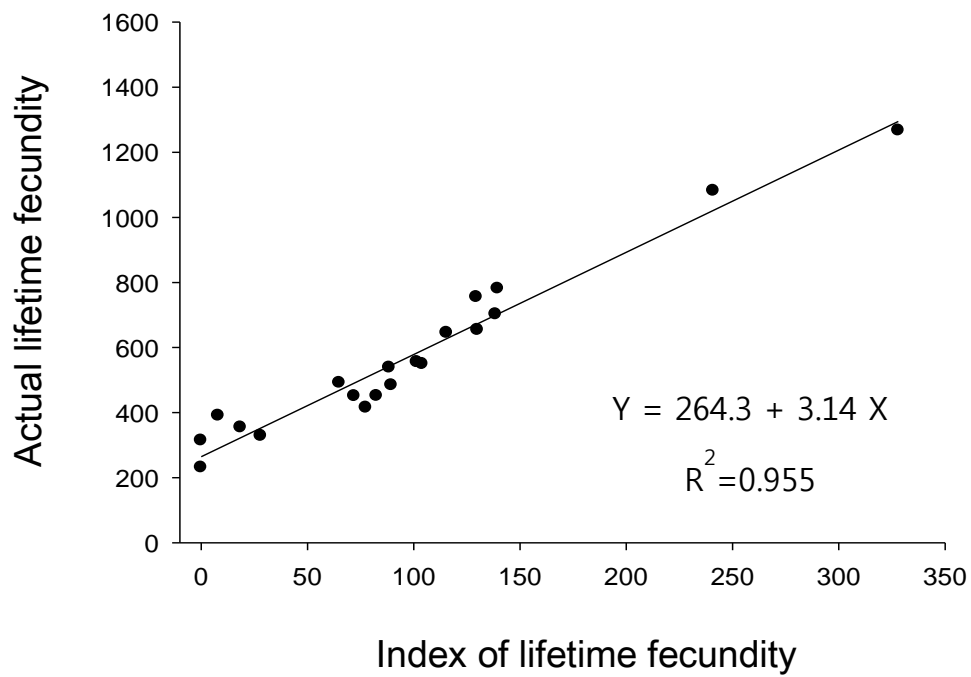
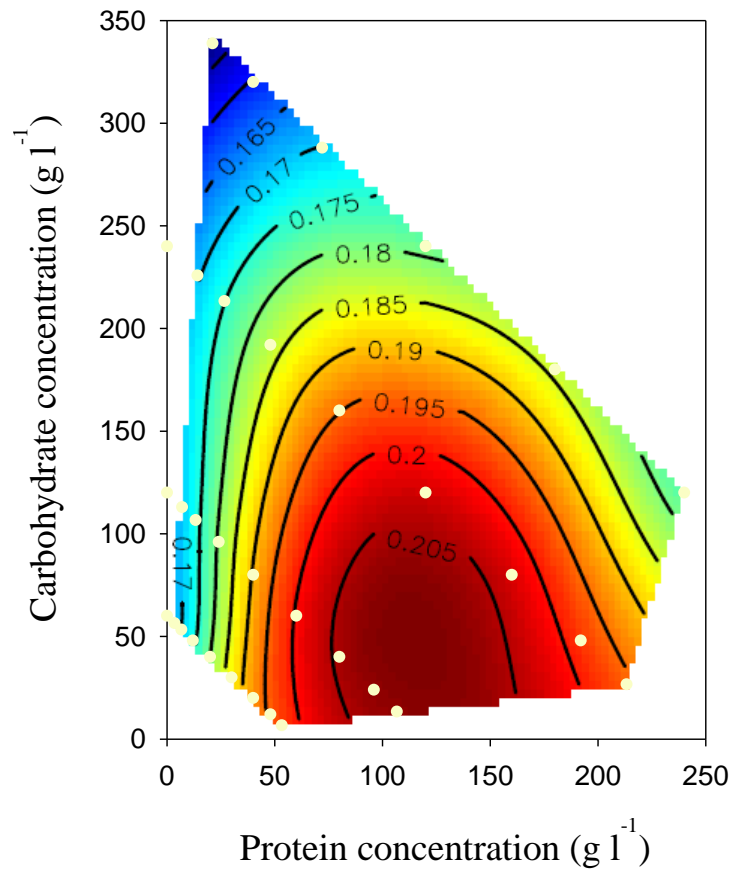


**Figure S1.** The relationship between the index and actual measurement of lifetime fecundity recorded from 20 male-female pairs of *D. melanogaster*. Regression line is fitted to indicate that there was a highly positive linear association between the two variables.



**Figure S2.** Thin plate spline response surface plotted for the body mass of newly eclosed male *D. melanogaster* expressed across 34 chemically defined diets. The highest values of the trait are given dark red and the lowest values are given in dark blue. Contours are indicated by solid lines and the values are written along contours. Diets are indicated as points.



**Table S1. Summary of the mean values of measured life-history traits expressed across 34 chemically defined diets.**

Dietary composition				Larval life-history traits			Adult life-history traits		
P+C (g l <sup>-1</sup> )	P:C	Protein (g l <sup>-1</sup> )	CHO (g l <sup>-1</sup> )	Egg-to-adult viability (%)	Developmental rate (h <sup>-1</sup> )	Body mass (mg) *	Lifespan (day)*	Egg production rate (no. day <sup>-1</sup> )	Lifetime fecundity
360	2:1	240	120	62.5	5.108 × 10 <sup>-3</sup>	0.249	32.1	2.167	51.364
	1:1	180	180	54.7	4.831 × 10 <sup>-3</sup>	0.291	42.5	11	96.067
	1:2	120	240	30.4	3.970 × 10 <sup>-3</sup>	0.266	39.6	15.382	62.917
	1:4	72	288	57.5	3.706 × 10 <sup>-3</sup>	0.251	40.8	12.567	36.8
	1:8	40	320	25.5	3.167 × 10 <sup>-3</sup>	0.184	52.9	5.55	33.267
	1:16	21.18	338.82	18.1	2.818 × 10 <sup>-3</sup>	0.157	44.8	1.117	7.333
	0:1	0	360	0	-	-	23.6	0.25	2.4
240	8:1	213.33	26.67	75.8	5.727 × 10 <sup>-3</sup>	0.242	14.8	9.873	35.583
	4:1	192	48	71.7	5.709 × 10 <sup>-3</sup>	0.257	25.9	16.164	72.583
	2:1	160	80	74.0	5.591 × 10 <sup>-3</sup>	0.281	46.1	31	92.267
	1:1	120	120	73.4	5.711 × 10 <sup>-3</sup>	0.303	42.5	29.183	64.929
	1:2	80	160	61.8	5.211 × 10 <sup>-3</sup>	0.272	55.2	17.509	46.929
	1:4	48	192	65.6	4.767 × 10 <sup>-3</sup>	0.240	67.5	5.767	33.539
	1:8	26.67	213.33	64.4	4.005 × 10 <sup>-3</sup>	0.227	59.1	3.3	24.214
	1:16	14.18	225.82	31.3	2.667 × 10 <sup>-3</sup>	0.174	52.1	1.017	8.072
0:1	0	240	0	-	-	26.6	0.083	2.467	
120	8:1	106.67	13.33	83.4	6.659 × 10 <sup>-3</sup>	0.271	22.8	54	75.154
	4:1	96	24	80.8	7.165 × 10 <sup>-3</sup>	0.279	26.7	49.783	65.786
	2:1	80	40	74.5	6.820 × 10 <sup>-3</sup>	0.289	38.0	28.95	64.308
	1:1	60	60	73.7	6.971 × 10 <sup>-3</sup>	0.299	46.0	17.4	52.929
	1:2	40	80	87.2	6.119 × 10 <sup>-3</sup>	0.285	50.5	13.067	42.5
	1:4	24	96	82.5	5.713 × 10 <sup>-3</sup>	0.274	56.2	7.083	26
	1:8	13.33	106.67	76.3	5.044 × 10 <sup>-3</sup>	0.262	53.3	2.983	10.533
	1:16	7.06	112.94	53.7	3.943 × 10 <sup>-3</sup>	0.222	57.1	1.417	5.333
0:1	0	120	0	-	-	31.2	0.167	1.467	
60	8:1	53.33	6.67	82.9	7.192 × 10 <sup>-3</sup>	0.264	15.2	31.117	45.333
	4:1	48	12	81.2	7.209 × 10 <sup>-3</sup>	0.269	22.8	22.691	45.077
	2:1	40	20	79.8	7.365 × 10 <sup>-3</sup>	0.264	31.6	18.9	62.6
	1:1	30	30	83.8	6.705 × 10 <sup>-3</sup>	0.274	33.3	15.117	49.643
	1:2	20	40	82.9	6.392 × 10 <sup>-3</sup>	0.251	41.1	6.733	33.8
	1:4	12	48	54.4	5.661 × 10 <sup>-3</sup>	0.250	45.2	3.75	24.333
	1:8	6.67	53.33	49.1	4.428 × 10 <sup>-3</sup>	0.207	46.8	1.65	19.917
	1:16	3.53	56.47	30.7	3.228 × 10 <sup>-3</sup>	0.179	49.5	1.05	7.133
0:1	0	60	0	-	-	27.9	0.283	1.6	

\*Measured from females only