

## Supplementary material

Table S.1. Results from ANOVA General Linear Model effect on mussel survival days at 30 °C with 2 fixed factors: origin (DK *M. edulis*, NL *M. edulis*, PT *M. galloprovincialis*) and food level (low and high). Significant level for  $p < 0.05$ .

### Tests of Between-Subjects Effects

Dependent Variable: Mussel Survival Days (transformed)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	42,712 <sup>a</sup>	5	8,542	8,122	,001
Intercept	212,027	1	212,027	201,592	,000
origin	36,087	2	18,043	17,155	,000
food	,223	1	,223	,212	,653
origin * food	6,402	2	3,201	3,043	,085
Error	12,621	12	1,052		
Total	267,360	18			
Corrected Total	55,333	17			

a. R Squared = ,772 (Adjusted R Squared = ,677)

### Multiple Comparisons

Dependent Variable: Mussel Survival Days (transformed)

Bonferroni

(I) origin	(J) origin	Mean Difference		Sig.	95% Confidence Interval	
		(I-J)	Std. Error		Lower Bound	Upper Bound
DK	NL	-1,4277	,59210	,099	-3,0735	,2180
	PT	-3,4512*	,59210	,000	-5,0969	-1,8054
NL	DK	1,4277	,59210	,099	-,2180	3,0735
	PT	-2,0235*	,59210	,015	-3,6692	-,3777
PT	DK	3,4512*	,59210	,000	1,8054	5,0969
	NL	2,0235*	,59210	,015	,3777	3,6692

Based on observed means.

The error term is Mean Square(Error) = 1,052.

\*. The mean difference is significant at the .05 level.

Table S.2. Results from ANOVA General Linear Model effect on growth rate with 3 fixed factors in the Netherland experiment: origin or species (DK *M. edulis*, NL *M. edulis*, PT *M. galloprovincialis*, *O. edulis*, *C. gigas*), food level (low and high), and temperature (3, 8, 15, 20, 25 and 30°C). Significant level for  $p < 0.05$ .

### Tests of Between-Subjects Effects

Dependent Variable: Mussel Weight Growth (transformed)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	37,643 <sup>a</sup>	29	1,298	2,854	,000
Intercept	498,660	1	498,660	1096,285	,000
origin	2,227	2	1,113	2,448	,087
temp	9,480	4	2,370	5,210	,000
food	9,431	1	9,431	20,734	,000
origin * temp	5,702	8	,713	1,567	,131
temp * food	2,900	4	,725	1,594	,174
origin * food	2,573	2	1,286	2,828	,060
origin * temp * food	5,331	8	,666	1,465	,166
Error	395,731	870	,455		
Total	932,035	900			
Corrected Total	433,374	899			

a. R Squared = ,087 (Adjusted R Squared = ,056)

### Tests of Between-Subjects Effects

Dependent Variable: Mussel Length Growth (transformed)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	5,042 <sup>a</sup>	29	,174	2,902	,000
Intercept	714,477	1	714,477	11926,748	,000
origin	,239	2	,120	1,999	,136
temp	1,321	4	,330	5,511	,000
food	,707	1	,707	11,810	,001
origin * temp	,730	8	,091	1,523	,145
temp * food	1,338	4	,334	5,582	,000
origin * food	,232	2	,116	1,939	,144
origin * temp * food	,474	8	,059	,990	,442
Error	52,118	870	,060		
Total	771,636	900			
Corrected Total	57,160	899			

a. R Squared = ,088 (Adjusted R Squared = ,058)

### Tests of Between-Subjects Effects

Dependent Variable: Oyster Weight Growth (transformed)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	30,314 <sup>a</sup>	23	1,318	8,663	,000
Intercept	285,176	1	285,176	1874,433	,000
origin	,033	1	,033	,218	,641
temp	16,298	5	3,260	21,425	,000
food	8,903	1	8,903	58,520	,000
origin * temp	,337	5	,067	,444	,818
temp * food	3,857	5	,771	5,070	,000
origin * food	,330	1	,330	2,167	,141
origin * temp * food	,556	5	,111	,731	,601
Error	105,890	696	,152		
Total	421,380	720			
Corrected Total	136,203	719			

a. R Squared = ,223 (Adjusted R Squared = ,197)

\*. The mean difference is significant at the .05 level.

### Tests of Between-Subjects Effects

Dependent Variable: Oyster Length Growth (transformed)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	6,988 <sup>a</sup>	23	,304	8,329	,000
Intercept	575,809	1	575,809	15785,860	,000
origin	,065	1	,065	1,776	,183
temp	1,768	5	,354	9,694	,000
food	1,682	1	1,682	46,116	,000
origin * temp	,802	5	,160	4,397	,001
temp * food	2,185	5	,437	11,981	,000
origin * food	,007	1	,007	,205	,651

origin * temp * food	,478	5	,096	2,623	,023
Error	25,387	696	,036		
Total	608,184	720			
Corrected Total	32,375	719			

a. R Squared = ,216 (Adjusted R Squared = ,190)

Table S.3. Results from ANOVA General Linear Model effect on growth rate and condition index with 4 fixed factors: origin (DK *M. edulis*, NL *M. edulis*), food level (low and high), oxygen saturation (high, medium and low) and temperature (15, 20, and 25°C). Significant level for  $p < 0.05$ . Data weight growth, length growth and CI SQRT transformed.

**Effect Tests – SQRT growth weight** (Studentized residuals normally distributed: Anderson Darling A2 = 0.549,  $p = 0.140$ )

Source	DF	L-R ChiSquare	Prob>ChiSq
Origin	1	326.43169	<.0001*
Food	1	230.69303	<.0001*
Oxygen	2	19.290625	<.0001*
Temperature	2	4.0663529	0.1309
Food*Oxygen	2	25.050208	<.0001*
Oxygen*Temperature	4	12.924133	0.0117*
Food*Temperature	2	0.9099825	0.6345
Origin*Temperature	2	2.0688761	0.3554
Origin*Food	1	20.68308	<.0001*
Origin*Oxygen	2	1.9221429	0.3825
Origin*Food*Oxygen	2	3.2031633	0.2016
Food*Oxygen*Temperature	4	8.1049238	0.0878
Origin*Food*Temperature	2	0.3542195	0.8377
Origin*Oxygen*Temperature	4	8.4004153	0.0780
Origin*Food*Oxygen*Temperature	4	2.5064856	0.6435

**Effect Tests – SQRT growth length DK only** (Residuals normally distributed: Anderson Darling A2 = 0.202,  $p = 0.8840$ )

Source	DF	L-R ChiSquare	Prob>ChiSq
Food	1	289.5631	<.0001*
Oxygen	2	38.739002	<.0001*
Temperature	2	84.501769	<.0001*
Oxygen * Temperature	4	20.812386	0.0003*
Food* Oxygen	2	49.080309	<.0001*
Food* Temperature	2	2.7173214	0.2570
Oxygen * Temperature *Food	4	6.8376452	0.1447

**Effect Tests – SQRT growth length NL only High Food** (Residuals normally distributed: Anderson Darling A2 = 1.647,  $p < 0.001$ )

Source	DF	L-R ChiSquare	Prob>ChiSq
O2	2	48.982794	<.0001*
Temp	2	35.794419	<.0001*
O2*Temp	4	14.46606	0.0059*

**Effect Tests – SQRT growth length NL only Low Food** (Residuals normally distributed: Anderson Darling A2 = 1.73,  $p < 0.001$ )

Source	DF	L-R ChiSquare	Prob>ChiSq
O2	2	0.9790905	0.6129
Temp	2	16.146585	0.0003*
O2*Temp	4	4.2745545	0.3701

**Effect Tests – SQRT CI** (Residuals normally distributed: Anderson Darling A2 = 0.607,  $p = 0.1240$ )

Source	DF	L-R ChiSquare	Prob>ChiSq
Origin	1	31.955541	<.0001*
Food	1	96.902011	<.0001*
Oxygen	2	13.033315	0.0015*
Temperature	2	23.327957	<.0001*
Food*Oxygen	2	12.321801	0.0021*
Oxygen*Temperature	4	6.7708315	0.1485
Food*Temperature	2	3.8799409	0.1437
Origin*Temperature	2	1.3359522	0.5127
Origin*Food	1	10.602198	0.0011*
Origin*Oxygen	2	1.173191	0.5562
Origin*Food*Oxygen	2	1.367347	0.5048
Food*Oxygen*Temperature	4	4.6221963	0.3283
Origin*Food*Temperature	2	0.4227915	0.8095
Origin*Oxygen*Temperature	4	1.2094877	0.8765
Origin*Food*Oxygen*Temperature	4	2.174744	0.7037

Table S.4. Results from ANOVA General Linear Model effect on condition index with 3 fixed factors: origin or species (DK M. edulis, NL M. edulis, PT M. galloprovincialis, O. edulis, C. gigas), food level (low and high), and temperature (3, 8, 15, 20, 25 and 30°C). Significant level for  $p < 0.05$ .

### Tests of Between-Subjects Effects

Dependent Variable: Condition Index Mussel (not transformed)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	25109843,158 <sup>a</sup>	29	865856,661	23,432	,000
Intercept	292414539,382	1	292414539,382	7913,478	,000

temp	6417106,364	4	1604276,591	43,416	,000
food	11449530,427	1	11449530,427	309,853	,000
origin	3854576,711	2	1927288,355	52,157	,000
temp * food	2087609,242	4	521902,311	14,124	,000
food * origin	92515,820	2	46257,910	1,252	,288
temp * origin	935470,778	8	116933,847	3,165	,002
temp * food * origin	912132,893	8	114016,612	3,086	,003
Error	7538097,492	204	36951,458		
Total	321021504,000	234			
Corrected Total	32647940,650	233			

a. R Squared = ,769 (Adjusted R Squared = ,736)

### Tests of Between-Subjects Effects

Dependent Variable: Condition Index Oyster (not transformed)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1167597,800 <sup>a</sup>	23	50765,122	40,462	,000
Intercept	6581559,098	1	6581559,098	5245,781	,000
temp	556996,974	5	111399,395	88,790	,000
food	344395,191	1	344395,191	274,498	,000
origin	84534,344	1	84534,344	67,377	,000
temp * food	55823,385	5	11164,677	8,899	,000
food * origin	23388,456	1	23388,456	18,642	,000
temp * origin	23881,980	5	4776,396	3,807	,003
temp * food * origin	14362,837	5	2872,567	2,290	,048
Error	213288,571	170	1254,639		
Total	7844124,000	194			
Corrected Total	1380886,371	193			

a. R Squared = ,846 (Adjusted R Squared = ,825)

Table S.5. Results from ANOVA General Linear Model effect on clearance rate with 3 fixed factors: origin or species (DK M. edulis, NL M. edulis, PT M. galloprovincialis, O. edulis, C. gigas), food level (low and high), and temperature (3, 8, 15, 20, 25 and 30°C). Significant level for  $p < 0.05$ .

### Tests of Between-Subjects Effects

Dependent Variable: Clearance Rate Mussels (not transformed)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	5591395,156 <sup>a</sup>	29	192806,730	6,597	,000
Intercept	17173228,844	1	17173228,844	587,567	,000
temp	1889878,600	4	472469,650	16,165	,000
food	1254576,400	1	1254576,400	42,924	,000
origin	475666,022	2	237833,011	8,137	,001
temp * food	876383,044	4	219095,761	7,496	,000
food * origin	367685,000	2	183842,500	6,290	,003
temp * origin	366674,867	8	45834,358	1,568	,154
temp * food * origin	360531,222	8	45066,403	1,542	,162
Error	1753662,000	60	29227,700		
Total	24518286,000	90			
Corrected Total	7345057,156	89			

a. R Squared = ,761 (Adjusted R Squared = ,646)

### Tests of Between-Subjects Effects

Dependent Variable: Clearance Rate Oysters (not transformed)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	13579816,000 <sup>a</sup>	23	590426,783	3,269	,000
Intercept	32950962,000	1	32950962,000	182,466	,000
temp	2920286,333	5	584057,267	3,234	,013
food	5717834,722	1	5717834,722	31,663	,000
origin	208442,722	1	208442,722	1,154	,288
temp * food	2374413,278	5	474882,656	2,630	,035
food * origin	183618,000	1	183618,000	1,017	,318
temp * origin	1259199,611	5	251839,922	1,395	,243
temp * food * origin	916021,333	5	183204,267	1,014	,420
Error	8668152,000	48	180586,500		
Total	55198930,000	72			
Corrected Total	22247968,000	71			

a. R Squared = ,610 (Adjusted R Squared = ,424)

Table S.6. Results from ANOVA General Linear Model effect on clearance rate with 4 fixed factors: origin or species (DK *M. edulis*, NL *M. edulis*), food level (reclassified from food: low < 4 and high > 6), oxygen saturation (high, medium and low) and temperature (15, 20, and 25°C). Significant level for  $p < 0.05$ . Average food range in the CR chambers: 3.46 to 8.23. Data standardized clearance rates SQRT transformed.

**Effect Tests – CR** (Residuals normally distributed: Anderson Darling A2 = 0.329,  $p = 0.548$ )

Source	DF	L-R ChiSquare	Prob>ChiSq
Origin	1	0.0511651	0.8210
temperature	2	12.266431	0.0022*
Oxygen	2	65.657818	<.0001*
temperature*Oxygen	4	30.253196	<.0001*
Food class	1	5.3440042	0.0208*
temperature*Food class	2	6.0035357	0.0497*
Oxygen*Food class	2	26.59073	<.0001*
temperature*Oxygen*Food class	4	31.873814	<.0001*

**Parameter Estimates**

Term	Estimate	Std Error	L-R ChiSquare	Prob>ChiSq	Lower CL	Upper CL
Intercept	1.9875703	0.0281445	466.61627	<.0001*	1.931985	2.0431556
Origin[DK]	-0.006306	0.0278775	0.0511651	0.8210	-0.061364	0.0487515
temperature[15]	0.1312559	0.0390954	10.795627	0.0010*	0.0540425	0.2084693
temperature[20]	-0.104504	0.0393031	6.8786697	0.0087*	-0.182128	-0.026881
Oxygen[H]	0.2475203	0.0393705	34.378422	<.0001*	0.1697636	0.3252769
Oxygen[L]	-0.35845	0.0397821	62.664286	<.0001*	-0.437019	-0.27988
temperature[15]*Oxygen[H]	-0.300779	0.0554611	26.434143	<.0001*	-0.410315	-0.191243
temperature[15]*Oxygen[L]	0.1604609	0.0546646	8.3345568	0.0039*	0.0524983	0.2684234
temperature[20]*Oxygen[H]	0.1883468	0.054944	11.234922	0.0008*	0.0798325	0.2968611
temperature[20]*Oxygen[L]	-0.020397	0.0562485	0.1314282	0.7170	-0.131488	0.0906936
Food class[H]	-0.065706	0.0281223	5.3440042	0.0208*	-0.121247	-0.010165
temperature[15]*Food class[H]	0.0749111	0.0391193	3.6146418	0.0573	-0.002349	0.1521717
temperature[20]*Food class[H]	0.0208552	0.039296	0.2813497	0.5958	-0.056754	0.0984648
Oxygen[H]*Food class[H]	0.1969831	0.0393674	22.836707	<.0001*	0.1192325	0.2747336
Oxygen[L]*Food class[H]	-0.02174	0.0397682	0.298493	0.5848	-0.100282	0.056802
temperature[15]*Oxygen[H]*Food class[H]	-0.166548	0.0554016	8.7278494	0.0031*	-0.275966	-0.05713
temperature[15]*Oxygen[L]*Food class[H]	-0.015532	0.0546189	0.0808361	0.7762	-0.123404	0.0923407
temperature[20]*Oxygen[H]*Food class[H]	-0.045208	0.0549677	0.6746121	0.4114	-0.153769	0.063353
temperature[20]*Oxygen[L]*Food class[H]	-0.117007	0.0561971	4.2621601	0.0390*	-0.227996	-0.006018

Table 6.7. Results from ANOVA General Linear Model effect on respiration rate with 3 fixed factors: origin or species (DK *M. edulis*, NL *M. edulis*), oxygen saturation (high, medium and low) and temperature (15, 20, and 25°C). Significant level for  $p < 0.05$ . Data standardized clearance rates SQRT

**Effect Tests – Oxygen Consumption** (Residuals normally distributed: Anderson Darling A2 = 0.426,  $p = 0.313$ )



Source	DF	L-R ChiSquare	Prob>ChiSq
Origin	1	0.2326532	0.6296
Temperature	2	22.948752	<.0001*
Oxygen	2	7.6703896	0.0216*
Temperature*Oxygen	4	8.8492843	0.0650

### Parameter Estimates

Term	Estimate	Std Error	L-R ChiSquare	Prob>ChiSq	Lower CL	Upper CL
Intercept	0.7758307	0.0318884	125.98366	<.0001*	0.7120853	0.839576
Origin[DK]	-0.015554	0.0322081	0.2326532	0.6296	-0.079938	0.0488306
Temperature[15]	-0.096369	0.0477509	3.9125635	0.0479*	-0.191824	-0.000915
Temperature[20]	-0.135293	0.0443294	8.5276636	0.0035*	-0.223908	-0.046678
Oxygen[H]	-0.063918	0.0474765	1.7798271	0.1822	-0.158824	0.0309881
Oxygen[L]	0.1273395	0.0443294	7.6261986	0.0058*	0.0387245	0.2159546
Temperature[15]*Oxygen[H]	-0.088693	0.0733795	1.439567	0.2302	-0.235379	0.0579938
Temperature[15]*Oxygen[L]	0.0866367	0.0658749	1.6998458	0.1923	-0.045048	0.2183215
Temperature[20]*Oxygen[H]	0.1783521	0.0634991	7.3147891	0.0068*	0.0514165	0.3052876
Temperature[20]*Oxygen[L]	-0.151055	0.0616323	5.6663393	0.0173*	-0.274259	-0.027852

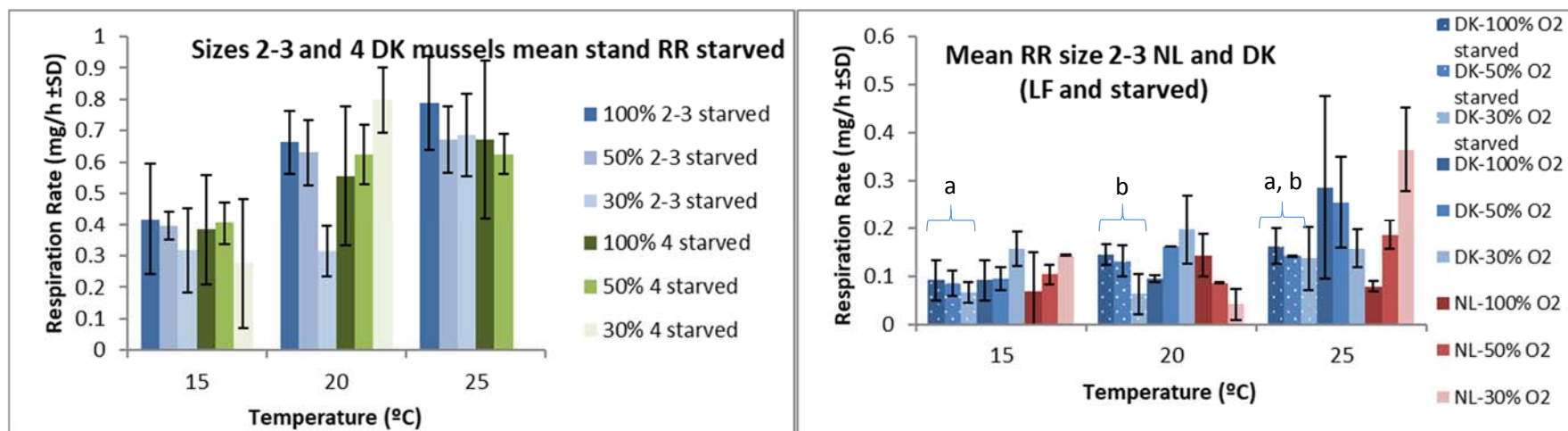


Figure S1. Oxygen consumption of *M. edulis* from Denmark (DK) and The Netherlands (NL), from Denmark exposed to different temperatures (15, 20 and 25°C), oxygen saturation (30, 50 and 100%) and low food (LF) concentrations (2 µg/L) for 21 to 28 days experiment or starved for 25 to 40 days. Small letters a and b indicate statistically different respiration rates for the starved mussels