

The following supplement accompanies the article

Limited evidence for differential reproductive fitness of wild Atlantic cod in areas of high and low salmon farming density

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Table S1. Model summaries for linear regression of log-transformed weight-at-length relationships in female and male Atlantic cod from areas of high and low salmon farming density.

FEMALES				
Model term	Estimate	SE	t	p
Intercept	1.63	0.10	17	<0.0001
log(W)	0.32	0.01	26	<0.0001
Treatment(LFD)	-0.02	0.01	-2.5	0.014
R ² = 0.88		Residual df = 105		
MALES				
Model term	Estimate	SE	t	p
Intercept	1.56	0.96	19	<0.0001
log(W)	0.33	0.00	31	<0.0001
Treatment(LFD)	0.02	0.00	2.0	0.06
R ² = 0.95		Residual df = 45		

Table S2. Ovarian fatty acid profiles in cod (*Gadus morhua*) collected from areas of high and low salmon farming density. Fatty acids that represent less than 0.1 % of the total fatty acids are omitted. Data are presented as percentage of total fatty acids (mean \pm SD, n = 10 per group). Statistical comparisons are from univariate linear analyses of variance with 1 on 18 df.

Fatty acids	Low farm density	High farm density	F	p
14:0	1.63 \pm 0.36	1.53 \pm 0.39		
Iso 15:0	0.25 \pm 0.12	0.20 \pm 0.04		
Iso 16:0	0.17 \pm 0.06	0.15 \pm 0.04		
Iso 17:0	0.46 \pm 0.09	0.46 \pm 0.07		
Antiso 17:0	0.23 \pm 0.09	0.21 \pm 0.05		
17:0	0.37 \pm 0.06	0.41 \pm 0.08		
iso 18:0	0.18 \pm 0.05	0.19 \pm 0.04		
18:0	2.44 \pm 0.40	2.55 \pm 0.54		
ΣSFA	23.87 \pm 0.71	24.00 \pm 1.05	0.10	0.76
16:1 (n-11)	0.14 \pm 0.04	0.13 \pm 0.05		
16:1 (n-9)	1.27 \pm 0.13	1.30 \pm 0.28		
18:1 (n-9)	12.77 \pm 0.71	13.57 \pm 1.67	1.9	0.18
18:1 (n-7)	4.25 \pm 0.89	3.98 \pm 0.47		
18:1 (n-5)	0.28 \pm 0.04	0.31 \pm 0.07		
20:1 (n-11)	0.33 \pm 0.23	0.20 \pm 0.08		
20:1 (n-9)	1.02 \pm 0.56	0.61 \pm 0.23		
22:1 (n-11)	0.38 \pm 0.32	0.21 \pm 0.10		
22:1 (n-9)	0.08 \pm 0.04	0.07 \pm 0.01		
24:1 (n-9)	0.94 \pm 0.20	1.02 \pm 0.34		
24:1 (n-7)	0.24 \pm 0.05	0.32 \pm 0.12		
ΣMUFA	26.16 \pm 3.10	26.12 \pm 1.51	0.00	0.97
18:2 (n-6)	1.06 \pm 0.53	1.26 \pm 0.89	0.34	0.57
18:3 (n-6)	0.18 \pm 0.05	0.17 \pm 0.04		
20:2 (n-6)	0.32 \pm 0.15	0.25 \pm 0.07		
20:3 (n-6)	0.10 \pm 0.01	0.09 \pm 0.03		
20:4 (n-6)	3.90 \pm 0.69	4.11 \pm 1.72		
22:4 (n-6)	0.68 \pm 0.20	0.50 \pm 0.20		
22:5 (n-6)	0.36 \pm 0.04	0.40 \pm 0.05		
18:3 (n-3)	0.39 \pm 0.07	0.52 \pm 0.25		
18:4 (n-3)	0.44 \pm 0.13	0.68 \pm 0.59		
20:3 (n-3)	0.14 \pm 0.02	0.14 \pm 0.03		
20:4 (n-3)	0.45 \pm 0.11	0.50 \pm 0.19		
20:5 (n-3)	11.14 \pm 1.00	10.34 \pm 0.94		
21:5 (n-3)	0.19 \pm 0.04	0.17 \pm 0.03		
22:5 (n-3)	1.54 \pm 0.47	1.35 \pm 0.45		
22:6 (n-3)	26.64 \pm 3.43	26.87 \pm 2.08		
ΣPUFA	47.53 \pm 2.78	47.33 \pm 1.03	0.04	0.84
ΣPUFA (n-3)	40.92 \pm 3.26	40.57 \pm 2.34	0.08	0.78
ΣPUFA (n-6)	6.61 \pm 0.84	6.77 \pm 1.78	0.07	0.80
(n-3)/(n-6)	6.32 \pm 1.20	6.47 \pm 2.12	0.03	0.86
Fatty acids relative to sample wet weight (%)	2.12 \pm 0.47	2.27 \pm 0.73	0.32	0.58
Cholesterol relative to sample wet weight (%)	0.21 \pm 0.06	0.20 \pm 0.03	0.17	0.68

Table S3. Model summaries for effects of farm density on egg production, egg quality and larval quality of wild Atlantic cod. Model terms are Farm density group (LFD and HFD), Day, Time (early or late season sampling), total female length (TotalFL) and mean female length (MeanFL). Model summaries for X^2 likelihood ratio tests of model terms are omitted, as are model summaries for analyses within farm density groups.

Daily egg production (DEP)				
Model specification: DEP ~ Group + Day + TotalFL + (1 Group/Tank)				
Model term	Estimate	SE	z	p
Intercept	1.55	0.48	3.2	0.001
Group (LFD)	0.53	0.28	1.9	0.056
Day	-0.017	0.008	-2.0	0.042
TotalFL	0.008	0.006	14	<0.0001
Observations	420			
Residual df	413			
Relative daily egg production (RDEP)				
Model specification: RDEP ~ Group + Day + (1 Group/Tank)				
Model term	Estimate	SE	z	p
Intercept	5.32	0.19	27	<0.0001
Group (LFD)	0.12	0.18	0.7	0.52
Day	-0.07	0.007	-10	<0.0001
Observations	420			
Residual df	414			
Egg viability rate (ViablePr)				
Model specification: ViablePr ~ Group + Time + meanFL + (1 Group/Tank)				
Model term	Estimate	SE	z	p
Intercept	3.7	1.48	2.5	0.012
Group (LFD)	-0.09	0.18	-0.5	0.61
Time (late season)	-0.81	0.03	-6.3	<0.0001
MeanFL	-0.03	0.02	-1.4	0.18
Observations	348			
Residual df	341			
Egg diameter (EggSize)				
Model specification: EggSize ~ Group + Time + meanFL + (1 Group/Tank)				
Model term	Estimate	SE	z	p
Intercept	0.82	0.16	5.6	<0.0001
Group (LFD)	0.07	0.02	3.9	0.0001
Time (late season)	0.08	0.004	20	<0.0001
MeanFL	0.005	0.002	2.1	0.045
Observations	1038			
Residual df	1031			

Egg fertilisation rate (FertPr)

Model specification*: FertPr ~ Group + Time + (1|Group/Tank)

*MeanFL omitted due to poor model fit

Model term	Estimate	SE	z	p
Intercept	0.96	0.22	4.4	<0.0001
Group (LFD)	-0.16	0.25	-0.6	0.52
Time (late season)	-0.64	0.25	-2.6	0.009

Observations 72
Residual df 66

Egg symmetry rate (SymPr)

Model specification: SymPr ~ Group + Time + (1|Group/Tank)

Model term	Estimate	SE	z	p
Intercept	-2.0	2.7	-0.7	0.50
Group (LFD)	0.15	0.35	0.4	0.67
Time (late season)	0.36	0.26	1.4	0.18
MeanFL	0.05	0.04	1.3	0.20

Observations 72
Residual df 65

Egg survival rate during incubation (SurvPr)

Model specification: SurvPr ~ Group + Time + MeanFL + (1|Group/Tank)

Model term	Estimate	SE	z	p
Intercept	-2.2	3.6	-0.6	0.54
Group (LFD)	0.03	0.41	0.07	0.95
Time (late season)	-1.0	0.39	-2.7	0.007
MeanFL	0.06	0.06	1.0	0.31

Observations 23
Residual df 16

Egg hatching rate (HatchPr)

Model specification: HatchPr ~ Group + Time + MeanFL + (1|Group/Tank)

Model term	Estimate	SE	z	p
Intercept	3.1	2.6	1.2	0.24
Group (LFD)	0.13	0.30	0.43	0.67
Time (late season)	0.57	0.26	2.2	0.030
MeanFL	-0.02	0.04	-0.54	0.59

Observations 45
Residual df 38

Larval length (LarvL)

Model specification: LarvL ~ Group + MeanFL + (1|Group/Tank)

Model term	Estimate	SE	z	p
Intercept	6.4	1.7	3.6	0.0002
Group	0.46	0.21	2.2	0.029
MeanFL	-0.006	0.03	-0.2	0.83

Observations 356
Residual df 350

Maximum larval length (MaxLarvL)

Model specification: MaxLarvL ~ Group + MeanFL

Model term	df	SS	F	p
Group	1	0.39	1.6	0.24
MeanFL	1	0.01	0.04	0.84
Residuals	9	2.2		

Observations 12

Larval deformity rate (DeformPr)

Model specification: DeformPr ~ Group + MeanFL

Model term	Estimate	SE	z	p
Intercept	0.88	3.1	0.28	0.77
Group	-0.07	0.38	-0.18	0.85
MeanFL	-0.02	0.05	-0.31	0.75

Observations 12

Residual df 8

Larval phototaxis rate (PhotoPr)

Model specification: PhotoPr ~ Group + MeanFL

Model term	Estimate	SE	z	p
Intercept	0.07	3.3	0.02	0.98
Group	0.30	0.41	0.74	0.46
MeanFL	0.01	0.05	0.19	0.85

Observations 12

Residual df 8
