Supplementary Information for
"Carry-over effects of food supplementation on recruitment and breeding performance of long-lived seabirds"

Simone Vincenzi[1,2,3], Scott Hatch[4,5], Thomas Merkling[6,7], Alexander S. Kitaysky[3]

[1]Center for Stock Assessment Research, University of California Santa Cruz, 110 Shaffer Road, Santa Cruz, CA, US-95060, USA. email: simon.vincenz@gmail.com

[2]Dipartimento di Elettronica, Informazione e Bioingegneria, Politecnico di Milano, Via Ponzio 34/5, I-20133 Milan, Italy.

[3]Department of Biology and Wildlife, Institute of Arctic Biology, University of Alaska Fairbanks, 902 N. Koyukuk Dr, Fairbanks, AK, 99775, USA. email: askitaysky@alaska.edu

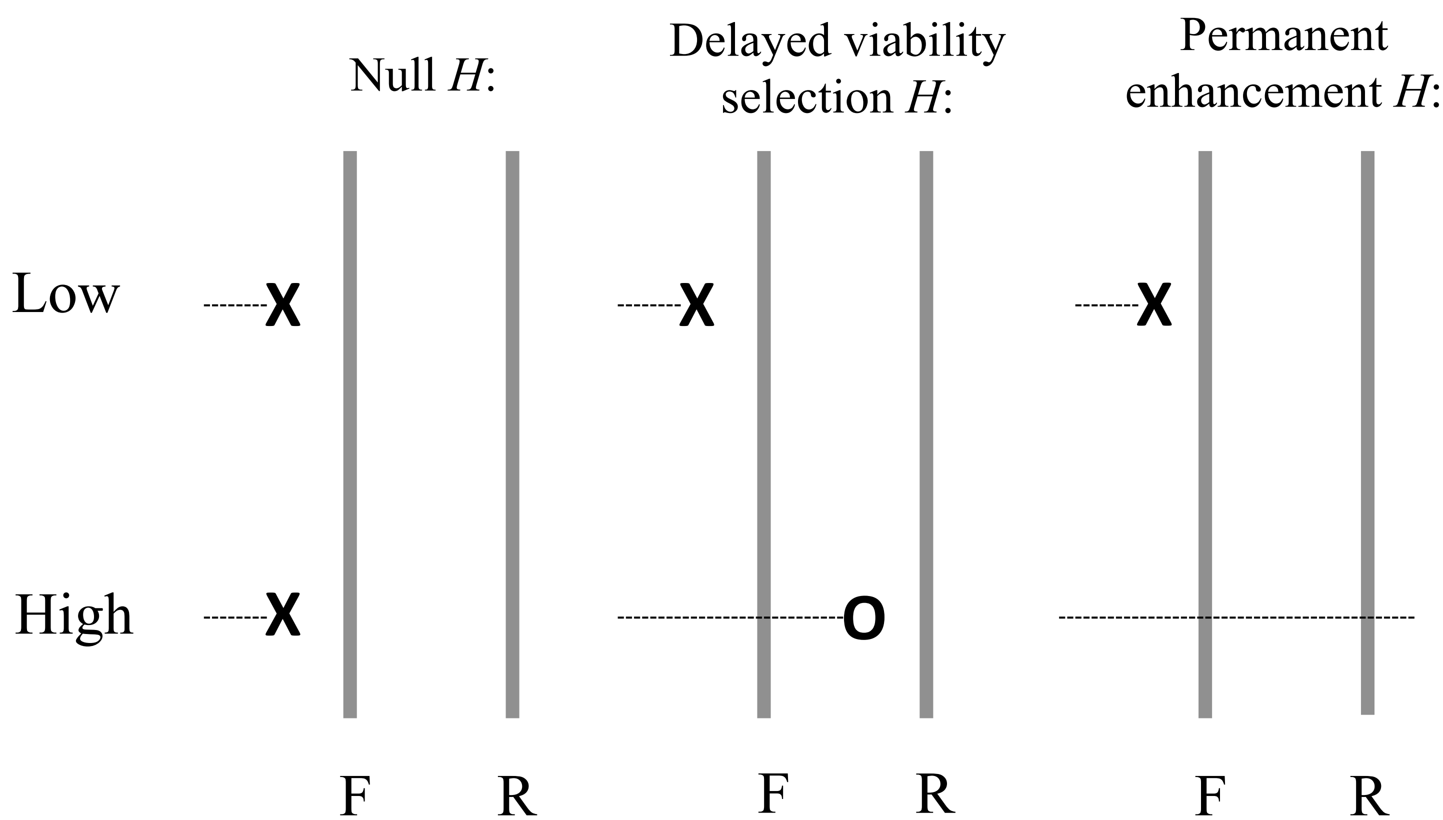
[4]U.S. Geological Survey, Alaska Science Center, 4210 University Drive, Anchorage, AK, US-99508, USA.

[5]Institute for Seabird Research and Conservation, 12850 Mountain Place, Anchorage, AK, US-99516, USA. email: shatch.isrc@gmail.com

[6]EDB (Laboratoire Evolution & Diversite´ Biologique), CNRS, UPS, ENFA, 118 route de Narbonne, F-31062 Toulouse, France. email: thomasmerkling00@gmail.com

[7]UMR5174, Université de Toulouse, 118 route de Narbonne, F-31062 Toulouse, France.

Figure S1. Alternative hypotheses on the consequences of different nutritional conditions during development (High *vs* Low food availability) for the fitness (here as survival to recruitment) of an individual of low intrinsic quality. Vertical lines represent the individual quality necessary to fledge (F) and recruit (R). Horizontal lines depict longevity of two individuals of low intrinsic quality subjected to Low or High food availability. **X** indicates that the individual died in the nest either pre- or post-fledging but prior to recruitment, while **O** indicates an individual surviving to recruit into the breeding population. (a) “Null hypothesis”: favorable foraging conditions do not increase the fitness of low-quality individuals; (b) “delayed viability selection hypothesis”: high food availability increases chances of surviving to fledge in the low-quality individual, but increases the probability of death prior to recruitment; and (c) “permanent enhancement hypothesis”: high food availability increases the chances of the low-quality individual fledging as well as its chances of subsequently recruiting into the breeding population.


Null H:
Delayed viability selection H:
Permanent enhancement H:
Low
High
X
X
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Text S1. Monte Carlo procedure to test the hypothesis of different number of breeders per nest between Fed and Unfed nests. For each treatment, we: (*i*) randomly drew, for each year from 1996 to 2006, a productivity estimate P_y from the normal distribution with mean equal to the mean estimate of productivity and standard deviation equal to the standard error of the estimate of mean productivity; (*ii*) computed the mean of the set (one for each year) of P_y, $\bar{P}_y$; (*iii*) randomly drew an estimate of probability of returning to breed in Middleton given fledging (R_M) from a normal distribution with mean equal to the estimated proportion of recruits R_E and standard deviation equal to the standard error of R_E; (*iv*) multiplied, under the assumption of independence, $\bar{P}_y$ by R_M to obtain the number of breeders per nest. We repeated steps (*i*- *iv*) 10^5 times for each feeding treatment to obtain a distribution of number of breeders per nest for that treatment (N_F and N_U). Then, (*v*) we use parametric (*t* test) and non-parametric (Mann-Whitney *U* test) tests to assess whether there were significant differences in the expected number of breeders per nest between Fed and Unfed nests. Specifically, we randomly drew a sample (n = 11, i.e. the number of years for which productivity data were available) with replacement from N_F and N_U and we then applied *t* and M-W U tests. The procedure was repeated 10^3 times to obtain a distribution of *p*-values and expected difference in number of breeders per nest Fed and Unfed.

Table S1. Classification error of a random forest classifier for sex (M = 167, F = 52) using as predictors mean, maximum and minimum growth in the nest, year of birth and hatching rank. Code can be found at http://dx.doi.org/10.6084/m9.figshare.1003898

F	M	Error
27	60	0.70
36	140	0.20

Table S2. Models for growth with ΔAICc < 3. Int = Intercept, Treat = Feeding treatment, PDO and hatching rank (H_R) as in the main text. + = Categorical predictor included in the model. NI = Parameter not included. df = Degrees of freedom of the model. logLik = log-likelihood. AICc = AIC corrected for small sample size. Weight = Akaike weights.

Int	Treat	PDO	H_R	Treat	Treat:Rank	df	logLik	AICc	DAICc	Weight
11.65	+	-0.44	+	+	+	9.00	-2263.17	4544.49	0.00	0.48
11.65	+	-0.42	+	+	NI	7.00	-2265.38	4544.85	0.36	0.40
11.67	+	-0.60	+	NI	+	8.00	-2265.58	4547.29	2.80	0.12

Table S3. Averaged model for growth during the nestling phase G_m on the reduced dataset using models with ΔAIC< 3. PDO refers to the PDO summer index. Symbol ": "denotes interaction between variables. We report importance of predictors and associated *p*-values, although *p*-values were not used in model selection. Terms with * are statistically significant at the 0.05 level, with ** at the 0.01 level.

Variable	Importance	Estimate ± se
Intercept	-	11.65 ± 0.09**
Unfed	1	-0.25 ± 0.12*
PDO	1	-0.45 ± 0.10**
H_R_B	1	-0.40 ± 0.14**
H_R_S	-	-0.46 ± 0.27
Unfed:PDO	0.88	-0.26 ± 0.12*
Unfed: H_R_B	0.60	-0.22 ± 0.22
Unfed: H_R_S	-	0.47 ± 0.31

Table S4. ANCOVA model for effect of the PDO index around the time of fledging and feeding treatment during nesting on recruited to fledged ratio R/F (on natural scale and logit-transformed), and ordinary least-square regression model (OLS) to test the effect of the PDO index on the year-of-birth specific difference in R/F between Fed and Unfed birds. Symbols for variables are as in Table S3.

	ANCOVA	ANCOVA	OLS
	natural scale	*logit-transformed*	-
	($R^2 = 0.33$, $p = 0.02$)	($R^2 = 0.41$, $p = 0.005$)	($R^2 = 0.51$, $p < 0.01$)
Variable	Estimate ± se	Estimate ± se	Estimate ± se
Intercept	0.13 ± 0.02***	-1.96 ± 0.19***	0.01 ± 0.01
PDO	-0.07 ± 0.02**	-0.71 ± 0.20**	-0.03 ± 0.01**
Unfed	0.01 ± 0.03	0.15 ± 0.27	-
Unfed:PDO	0.03 ± 0.03	0.38 ± 0.27	-

Table S5. Models for recruitment rate with ΔAICc < 3. Treat = Feeding treatment, PDO, G_m, G_{min}, G_{max}, and hatching rank as in the main text. Df, logLik, AICc, Weight as in Table S2.

Int	Treat	PDO	G_m	G_{max}	G_{min}	Treat	Treat: G_m	Treat: G_{max}	df	logLik	AICc	ΔAICc	Weight
-8.07	+	-0.91	0.25	0.14	NI	+	NI	+	7	-473.28	960.66	0.00	0.56
-8.06	+	-0.92	0.22	0.15	0.01	+	NI	+	8	-473.21	962.54	1.88	0.22
-8.36	+	-0.90	0.29	0.13	NI	+	+	+	8	-473.21	962.54	1.88	0.22

Table S6. Averaged model for the probability of recruiting a given fledging based on the reduced dataset using models with ΔAIC< 3. Symbols for variables are as in Table S3.

Variable	Importance	Estimate ± se
Intercept	-	-8.13 ± 1.19**
Unfed	1	3.73 ± 1.32**
PDO	1	-0.91 ± 0.22**
G_m	1	0.25 ± 0.09**
G_{max}	1	0.14 ± 0.04**
Unfed:PDO	1	0.84 ± 0.25**
Unfed:G_{max}	1	-0.13 ± 0.06*
G_{min}	0.22	0.01 ± 0.03
Unfed:G_m	0.22	-0.06 ± 0.14

Table S7. Poisson regression model for effects of food conditions at birth (Unfed) and at breeding (Unfed_R) on lifetime reproductive success of birds that have in 2014 have been missing for at least 3 consecutive years. Symbols for variables are as in Table S3.

Variable	Estimate ± se
Intercept	1.25 ± 0.17**
Unfed	0.16 ± 0.24
Unfed_R	-1.25 ± 0.38**
Unfed: Unfed_R	0.10 ± 0.45