

Immune function differs among tropical environments but is not downregulated during reproduction in three year-round breeding equatorial lark populations

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ESM Table 3a. Coefficient estimates, standard error, t and P values for models with immune indices (haptoglobin, nitric oxide, agglutination and lysis), and body mass as dependent variables and the different explanatory variables in the study investigating i) the effect of breeding (non-breeding, chick-feeding), location, sex and their two way interaction in the case of sexes-combined dataset, and ii) the effect of breeding (non-breeding, incubating and chick-feeding), location and their interaction in the case of female-only dataset, on immune function that we carried out from January 2011 to March 2014 in three climatically-distinct locations: cool and wet South Kinangop (SK), cool and dry North Kinangop (NK) and warm and dry Kedong (KE). Significant P values are in bold

i)

Haptoglobin: male and female					
Model	Explanatory variables	Estimate	SE	t	P
lm(log10(hp)~Location*breedingStatus+Location*sex+breedingStatus*sex+plasma sample age+redness_450)	(Intercept)	-0.89	0.15	-6.04	< 0.001
	LocationNK	-0.38	0.16	-2.48	0.01
	LocationSK	-0.06	0.17	-0.36	0.72
	breedingStatusChick-feeding	0.19	0.12	1.56	0.12
	sexM	0.05	0.11	0.43	0.67
			<0.00		
	sample_age	0.001	1	3.70	< 0.001
	redness_450	1.11	0.31	3.65	< 0.001
	LocationNK:breedingStatus				
	Chick-feeding	0.08	0.16	0.49	0.62
(starting model before elimination of interaction Location:breedingStatus)	LocationSK:breedingStatus				
	Chick-feeding	-0.15	0.18	-0.84	0.40
	LocationNK:sexM	0.43	0.16	2.63	0.01
	LocationSK:sexM	0.28	0.17	1.61	0.11
	breedingStatusChick-feeding:sexM	-0.18	0.14	-1.33	0.19
lm(log10(hp)~Location*sex+breedingStatus*sex+sample_age+redness_450)	(Intercept)	-0.89	0.15	-6.09	< 0.001
	LocationNK	-0.32	0.12	-2.79	0.01
	LocationSK	-0.17	0.12	-1.34	0.18
	breedingStatusChick-feeding	0.18	0.11	1.70	0.09
	sexM	0.05	0.11	0.41	0.68

(model after elimination of interaction Location:breedingSt atus)	Plasma sample age	0.001	<0.00 1	3.83	<0.001
	Plasma sample redness_450	1.09	0.30	3.60	<0.001
	LocationNK:sexM	0.41	0.16	2.57	0.01
	LocationSK:sexM	0.29	0.17	1.67	0.10
	breedingStatusChick- feeding:sexM	-0.18	0.14	-1.32	0.19

lm(log10(hp)~Locat ion*sex+plasma sample age+redness_450)	(Intercept)	-0.87	0.15	-5.94	<0.001
	LocationNK	-0.30	0.12	-2.62	0.01
	LocationSK	-0.14	0.12	-1.16	0.25
	breedingStatusChick- feeding	0.09	0.08	1.09	0.28
	sexM	-0.03	0.09	-0.37	0.71
(Final model: model after elimination of interaction breedingStatus:sex)	plasma sample age	0.001	0.00	3.87	<0.001
	redness_450	1.14	0.30	3.76	<0.001
	LocationNK:sexM	0.38	0.16	2.40	0.02
	LocationSK:sexM	0.25	0.17	1.45	0.15

Nitric oxide: male and female

	(Intercept)	-2.02	0.08	-25.62	<0.001
	LocationNK	-0.25	0.15	-1.72	0.09
	LocationSK	-0.71	0.17	-4.17	<0.001
lm(log10(Nox)~Loc ation*breedingStatu s+Location*sex+bre edingStatus*sex)	breedingStatusChick- feeding	-0.22	0.10	-2.08	0.04
	sexM	-0.06	0.10	-0.59	0.56
	LocationNK:breedingStatus Chick-feeding	0.57	0.15	3.68	<0.001
(starting model before elimination of interaction breedingStatus:sex)	LocationSK:breedingStatus Chick-feeding	0.47	0.17	2.73	0.01
	LocationNK:sexM	-0.11	0.15	-0.73	0.47
	LocationSK:sexM	0.11	0.16	0.69	0.49
	breedingStatusChick- feeding:sexM	0.08	0.13	0.61	0.54

	(Intercept)	-2.04	0.07	-28.18	<0.001
	LocationNK	-0.26	0.14	-1.82	0.07
lm(log10(Nox)~Loc ation*breedingStatu s+Location*sex)	LocationSK	-0.72	0.17	-4.34	<0.001
	breedingStatusChick- feeding	-0.18	0.08	-2.12	0.04
	sexM	-0.02	0.08	-0.29	0.77
(model after elimination of interaction breedingStatus:sex)	LocationNK:breedingStatus Chick-feeding	0.57	0.15	3.72	<0.001
	LocationSK:breedingStatus Chick-feeding	0.48	0.17	2.81	0.01
	LocationNK:sexM	-0.10	0.15	-0.66	0.51
	LocationSK:sexM	0.13	0.16	0.83	0.41

lm(log10(Nox)~Location*breedingStatus) (Final model: model after elimination of interaction Location:sex)	(Intercept)	-2.04	0.07	-30.77	<0.001
	LocationNK	-0.32	0.11	-2.83	0.01
	LocationSK	-0.64	0.14	-4.66	<0.001
	breedingStatusChick-feeding	-0.18	0.08	-2.13	0.04
	sexM	-0.02	0.06	-0.34	0.73
	LocationNK:breedingStatus Chick-feeding	0.59	0.15	3.95	<0.001
	LocationSK:breedingStatus Chick-feeding	0.46	0.17	2.73	0.01

Agglutination: male and female

lm(AvAgglut2~Location*breedingStatus+Location*sex+breedingStatus*sex+plasma sample age) (starting model before elimination-of interaction Location:breedingStatus)	(Intercept)	8.20	0.89	9.20	<0.001
	LocationNK	-0.85	1.17	-0.73	0.47
	LocationSK	-0.25	1.22	-0.20	0.84
	breedingStatusChick-feeding	-0.61	0.76	-0.80	0.42
	sexM	-0.35	0.77	-0.46	0.64
	sample_age	-0.003	0.001	-3.74	<0.001
	LocationNK:breedingStatus Chick-feeding	0.32	1.19	0.27	0.79
	LocationSK:breedingStatus Chick-feeding	-0.56	1.29	-0.44	0.66
	LocationNK:sexM	-1.14	1.18	-0.97	0.33
	LocationSK:sexM	-1.20	1.21	-0.99	0.32
	breedingStatusChick-feeding:sexM	0.96	0.98	0.98	0.33

lm(AvAgglut2~Location*sex+breedingStatus*sex+ plasma sample age) (model after elimination of interaction Location:breedingStatus)	(Intercept)	8.20	0.87	9.44	<0.001
	LocationNK	-0.60	0.83	-0.72	0.47
	LocationSK	-0.66	0.82	-0.80	0.43
	breedingStatusChick-feeding	-0.65	0.67	-0.98	0.33
	sexM	-0.37	0.76	-0.49	0.62
	sample_age	-0.003	0.001	-3.74	<0.001
	LocationNK:sexM	-1.22	1.15	-1.06	0.29
	LocationSK:sexM	-1.20	1.20	-1.00	0.32
	breedingStatusChick-feeding:sexM	1.00	0.96	1.04	0.30

lm(AvAgglut2~breedingStatus*sex+plasma sample age) (Final model: model after elimination of	(Intercept)	8.28	0.87	9.57	<0.001
	LocationNK	-1.21	0.58	-2.09	0.04
	LocationSK	-1.19	0.61	-1.96	0.05
	breedingStatusChick-feeding	-0.51	0.66	-0.78	0.44
	sexM	-0.77	0.69	-1.12	0.27

interaction Location:sex)	sample_age	-0.003	0.001	-3.65	< 0.001
	breedingStatusChick- feeding:sexM	0.70	0.93	0.75	0.45
lm(AvAgglut2~Loc ation+breedingStatu s+sex+ plasma sample age)	(Intercept)	8.05	0.81	9.96	< 0.001
	LocationNK	-1.23	0.58	-2.13	0.04
	LocationSK	-1.18	0.61	-1.94	0.05
	breedingStatusChick- feeding	-0.18	0.49	-0.37	0.71
(Final model: model after elimination of interaction breedingStatus:sex)	sexM	-0.39	0.46	-0.83	0.41
	sample_age	-0.003	0.001	-3.61	< 0.001

Lysis: male and female

	intercept	4.24	1.12	3.80	< 0.001
glm(AvLysis2~Loc ation+breedingStatu s+sex+Location:bree dingStatus+Locati on:sex+breedingSta tus:sex+plasma sample age, binomial)	LocationNK	-2.06	1.30	-1.59	0.11
	LocationSK	-2.90	1.32	-2.20	0.03
	breedingStatusChick- feeding	-1.45	0.77	-1.88	0.06
	sexM	-0.55	0.80	-0.68	0.49
	sample_age	-0.005	0.001	-4.82	< 0.001
	LocationNK:breedingStatus Chick-feeding	2.55	1.26	2.02	0.04
	LocationSK:breedingStatus Chick-feeding	4.23	1.37	3.09	< 0.001
(starting model before elimination of interaction breedingStatus:sex)	LocationNK:sexM	0.25	1.18	0.22	0.83
	LocationSK:sexM	1.11	1.17	0.95	0.34
	breedingStatusChick- feeding:sexM	0.40	1.04	0.39	0.70
glm(AvLysis2~Loc ation+breedingStatu s+sex+Location:bree dingStatus+Locati on:sex+ plasma sample age, binomial)	(Intercept)	4.13	1.06	3.88	< 0.001
	LocationNK	-2.22	1.25	-1.78	0.08
	LocationSK	-2.98	1.31	-2.27	0.02
	breedingStatusChick- feeding	-1.31	0.68	-1.93	0.05
	sexM	-0.40	0.69	-0.57	0.57
	sample_age	-0.005	0.001	-4.85	< 0.001
	LocationNK:breedingStatus Chick-feeding	2.68	1.23	2.17	0.03
	LocationSK:breedingStatus Chick-feeding	4.26	1.38	3.10	< 0.001
(model after elimination of interaction breedingStatus:sex)	LocationNK:sexM	0.41	1.12	0.37	0.71
	LocationSK:sexM	1.28	1.08	1.18	0.24
glm(AvLysis~Locat ion+breedingStatus +sex+Location:bree	(Intercept)	3.90	1.03	3.78	< 0.001
	LocationNK	-2.07	1.00	-2.08	0.04
	LocationSK	-2.36	1.18	-1.99	0.05

dingStatus+ plasma	breedingStatusChick-				
sample age,	feeding	-1.26	0.67	-1.87	0.06
binomial)	sexM	0.10	0.45	0.22	0.82
	sample_age	-0.005	0.001	-4.83	< 0.001
(Final model: model	LocationNK:breedingStatus				
after elimination of	Chick-feeding	2.66	1.20	2.21	0.03
interaction	LocationSK:breedingStatus				
Location:sex)	Chick-feeding	4.16	1.35	3.07	< 0.001

Mass: male and female

	(Intercept)	23.43	0.34	69.43	< 0.001
	LocationNK	2.97	0.68	4.33	< 0.001
lm(mass~Location+	LocationSK	2.49	0.76	3.30	< 0.001
breedingStatus+sex	breedingStatusChick-				
+Location:breeding	feeding	0.37	0.48	0.77	0.44
Status+Location:sex	sexM	0.25	0.47	0.54	0.59
+breedingStatus:sex	LocationNK:breedingStatus				
)	Chick-feeding	-1.88	0.72	-2.61	0.01
(starting model	LocationSK:breedingStatus				
before elimination	Chick-feeding	-1.31	0.80	-1.64	0.10
of interaction	LocationNK:sexM	-0.71	0.72	-0.99	0.32
Location:sex)	LocationSK:sexM	-0.42	0.77	-0.54	0.59
	breedingStatusChick-				
	feeding:sexM	0.90	0.60	1.51	0.13
	(Intercept)	23.52	0.32	72.71	< 0.001
lm(mass~Location+	LocationNK	2.54	0.52	4.85	< 0.001
breedingStatus+sex	LocationSK	2.28	0.63	3.61	< 0.001
+Location:breeding	breedingStatusChick-				
Status+breedingStat	feeding	0.42	0.47	0.88	0.38
us:sex)	sexM	0.05	0.42	0.13	0.90
	LocationNK:breedingStatus				
(model after	Chick-feeding	-1.75	0.70	-2.49	0.01
elimination of	LocationSK:breedingStatus				
interaction	Chick-feeding	-1.29	0.80	-1.62	0.11
Location:sex)	breedingStatusChick-				
	feeding:sexM	0.79	0.58	1.35	0.18
	(Intercept)	23.33	0.29	79.85	< 0.001
lm(mass~Location+	LocationNK	2.45	0.52	4.71	< 0.001
breedingStatus+sex	LocationSK	2.24	0.63	3.54	< 0.001
+Location:breeding	breedingStatusChick-				
Status+)	feeding	0.77	0.39	1.95	0.05
(Final model: model	sexM	0.47	0.29	1.63	0.11
after elimination of	LocationNK:breedingStatus				
interaction	Chick-feeding	-1.67	0.70	-2.38	0.02
breedingStatus:sex)	LocationSK:breedingStatus				
	Chick-feeding	-1.23	0.80	-1.54	0.13

ii)

Haptoglobin: females only					
Model	Explanatory variables	Estimate	SE	t	P
lm(log10(hp)~Location+breedingStatus+Location:breedingStatus) (starting model before elimination of interaction Location:breedingStatus)	(Intercept)	-0.24	0.10	-2.48	0.01
	LocationNK	-0.51	0.21	-2.39	0.02
	LocationSK	0.05	0.23	0.20	0.85
	breedingStatusBincubating	0.05	0.14	0.38	0.71
	breedingStatusChick-feeding	0.06	0.15	0.40	0.69
	LocationNK:breedingStatusBincubating	0.08	0.27	0.28	0.78
	LocationSK:breedingStatusBincubating	-0.04	0.29	-0.14	0.89
	LocationNK:breedingStatusChick-feeding	0.36	0.27	1.33	0.19
	LocationSK:breedingStatusChick-feeding	-0.21	0.29	-0.73	0.47
lm(log10(hp)~Location+breedingStatus) (Final model: model after elimination of interaction Location:breedingStatus)	(Intercept)	-0.26	0.09	-3.02	0.003
	LocationNK	-0.33	0.10	-3.21	0.002
	LocationSK	-0.07	0.11	-0.65	0.52
	breedingStatusBincubating	0.06	0.11	0.54	0.59
	breedingStatusChick-feeding	0.11	0.11	0.97	0.33
Nitric oxide: females only					
lm(log10(Nox)~Location+breedingStatus+Location:breedingStatus) (starting and final model: interaction Location:breedingStatus significant)	(Intercept)	-2.05	0.08	25.61	< 0.001
	LocationNK	-0.06	0.17	-0.36	0.72
	LocationSK	-0.76	0.21	-3.59	0.001
	breedingStatusBincubating	-0.07	0.11	-0.59	0.55
	breedingStatusChick-feeding	-0.16	0.11	-1.41	0.16
	LocationNK:breedingStatusBincubating	0.04	0.22	0.17	0.87
	LocationSK:breedingStatusBincubating	0.75	0.25	2.99	0.003
	LocationNK:breedingStatusChick-feeding	0.29	0.21	1.37	0.17
	LocationSK:breedingStatusChick-feeding	0.52	0.25	2.08	0.04

Agglutination: females only

lm(AvAgglut~Location*breedingStatus + plasma sample age, data=AggF)	(Intercept)	8.03	1.20	6.70	<0.001
	LocationNK	1.76	1.56	1.13	0.26
	LocationSK	1.62	1.57	1.04	0.30
	breedingStatusBincubating	1.33	1.03	1.28	0.20
	breedingStatusChick-feeding	0.67	0.88	0.76	0.45
	sample_age	-0.003	0.001	-2.91	0.005
	LocationNK:breedingStatusBincubating	-3.70	2.00	-1.85	0.07
	LocationSK:breedingStatusBincubating	-2.02	2.28	-0.88	0.38
	LocationNK:breedingStatusChick-feeding	-3.68	1.90	-1.94	0.06
	LocationSK:breedingStatusChick-feeding	-3.56	1.88	-1.90	0.06
lm(AvAgglut~Location+breedingStatus +plasma sample age, data=AggF)	(Intercept)	8.45	1.19	7.10	<0.001
	LocationNK	-1.07	0.73	-1.46	0.15
	LocationSK	-0.64	0.78	-0.82	0.42
	breedingStatusBincubating	0.34	0.81	0.42	0.67
	breedingStatusChick-feeding	-0.59	0.71	-0.83	0.41
	sample_age	-0.003	0.001	-2.64	0.01

Lysis: females only

glm(AvLysis2~Location+breedingStatus+Location:breedingStatus+plasma sample age, binomial, data=FLysis)	(Intercept)	3.93	1.34	2.94	0.003
	LocationNK	0.79	1.32	0.60	0.55
	LocationSK	-2.22	1.64	-1.35	0.18
	breedingStatusBincubating	-1.03	0.98	-1.05	0.29
	breedingStatusChick-feeding	-0.50	0.82	-0.62	0.54
	sample_age	-0.005	0.001	-3.82	<0.001
	LocationNK:breedingStatusBincubating	-0.56	1.72	-0.33	0.74
	LocationSK:breedingStatusBincubating	5.19	2.20	2.36	0.02
	LocationNK:breedingStatusChick-feeding	-1.47	1.66	-0.89	0.37
	LocationSK:breedingStatusChick-feeding	2.99	1.82	1.65	0.10
glm(AvLysis2~Location+breedingStatus+plasma sample	(Intercept)	3.05	1.08	2.81	0.005
	LocationNK	-0.15	0.61	-0.24	0.81
	LocationSK	0.91	0.62	1.48	0.14

age, binomial, data=FLysis)	breedingStatusBincubating	-0.28	0.68	-0.42	0.68
	breedingStatusChick- feeding	-0.44	0.63	-0.70	0.49
(Final model: model after elimination of interaction Location:breedingSt atus)	sample_age	-0.004	0.001	-3.87	< 0.001

Mass: females only

	(Intercept)	23.42	0.30	77.44	< 0.001
lm(mass~Location+	LocationNK	2.68	0.73	3.69	< 0.001
breedingStatus+Loc	LocationSK	2.96	0.80	3.70	< 0.001
ation:breedingStatu	breedingStatusBincubating	0.75	0.44	1.69	0.09
s)	breedingStatusChick-feeding	0.40	0.45	0.88	0.38
(starting model before elimination of interaction Location:breedingSt atus)	LocationNK:breedingStatusB incubating	-0.89	0.90	-0.99	0.32
	LocationSK:breedingStatusBi ncubating	-1.31	0.97	-1.35	0.18
	LocationNK:breedingStatusC hick-feeding	-1.53	0.90	-1.71	0.09
	LocationSK:breedingStatusC hick-feeding	-1.87	0.98	-1.91	0.06
lm(mass~Location+	(Intercept)	23.71	0.27	87.69	< 0.001
breedingStatus)	LocationNK	1.76	0.33	5.35	< 0.001
	LocationSK	1.73	0.35	4.88	< 0.001
(Final model: model after elimination of interaction Location:breedingSt atus)	breedingStatusBincubating	0.45	0.35	1.29	0.20
	breedingStatusChick-feeding	-0.24	0.35	-0.69	0.49

ESM Table 3(b). Coefficient estimates, standard error, t and P values for models with environmental variables (rainfall (mm), average maximum temperature ($T_{\max}$, °C) and average minimum temperature ($T_{\min}$, °C)) as dependent variables and the different sampling time points when we took measurements for two datasets. i) In the case of sexes-combined dataset, we had sampling time points for non-breeding and chick-feeding birds, location, sex and their interaction. ii) In the case of the female-only dataset, we had sampling time points for non-breeding, incubating and chick-feeding birds, location and their interaction. We used these two datasets to test for the potential of these environmental variables as confounding factors in our investigation of the effect of reproduction on immune function that we carried out from January 2011 to March 2014 in three climatically-distinct location: cool and wet South Kinangop (SK), cool and dry North Kinangop (NK) and warm and dry Kedong (KE). Significant P values are in bold

i)

Rainfall: females and males					
Model	Explanatory variables	Estimate	SE	t	P
lm(rain~breedingStatus+Location+sex+breedingStatus:Location+breedingStatus:sex+Location:sex) (starting model before elimination of interaction breedingStatus:sex)	(Intercept)	20.05	8.42	2.38	0.02
	breedingStatusChick-feeding	21.63	11.75	1.84	0.07
	LocationNK	47.19	17.05	2.77	0.01
	LocationSK	67.86	18.69	3.63	< 0.001
	sexM	-10.02	11.52	-0.87	0.39
	breedingStatusChick-feeding:LocationNK	-45.73	17.86	-2.56	0.01
	breedingStatusChick-feeding:LocationSK	-4.21	19.58	-0.22	0.83
	breedingStatusChick-feeding:sexM	-0.13	14.69	-0.01	0.99
	LocationNK:sexM	5.22	17.73	0.30	0.77
	LocationSK:sexM	-6.14	18.54	-0.33	0.74
lm(rain~breedingStatus+Location+sex+breedingStatus:Location+Location:sex)	(Intercept)	20.08	7.82	2.57	0.01
	breedingStatusChick-feeding	21.57	9.59	2.25	0.03
	LocationNK	47.21	16.74	2.82	0.01

(model after elimination of interaction breedingStatus:sex)	LocationSK	67.89	18.42	3.69	< 0.001
	sexM	-10.08	9.54	-1.06	0.29
	breedingStatusChick- feeding:LocationNK	-45.75	17.72	-2.58	0.01
	breedingStatusChick- feeding:LocationSK	-4.22	19.47	-0.22	0.83
	LocationNK:sexM	5.20	17.48	0.30	0.77
	LocationSK:sexM	-6.18	18.00	-0.34	0.73

lm(rain~breedingSt atus+Location+sex+ breedingStatus:Loc ation)	(Intercept)	20.14	7.15	2.82	0.01
	breedingStatusChick- feeding	21.57	9.53	2.26	0.03
	LocationNK	50.70	12.80	3.96	< 0.001
	LocationSK	64.46	15.61	4.13	< 0.001
(Final model: model after elimination of interaction Location:sex)	sexM	-10.19	7.04	-1.45	0.15
	breedingStatusChick- feeding:LocationNK	-47.11	17.28	-2.73	0.01
	breedingStatusChick- feeding:LocationSK	-4.01	19.34	-0.21	0.84

Average maximum temperature ($T_{\max}$ °C): females and males

lm($T_{\max}$ ~breeding Status+Location+se x+breedingStatus:L ocation+breedingSt atus:sex+Location:s ex)	(Intercept)	27.14	0.41	66.70	< 0.001
	breedingStatusChick- feeding	1.86	0.57	3.29	0.001
	LocationNK	-3.10	0.82	-3.76	< 0.001
	LocationSK	-2.76	0.90	-3.06	< 0.001
	sexM	0.79	0.56	1.42	0.16
	breedingStatusChick- feeding:LocationNK	1.51	0.86	1.76	0.08
(starting model before elimination of interaction Location:sex)	breedingStatusChick- feeding:LocationSK	-1.11	0.95	-1.17	0.24
	breedingStatusChick- feeding:sexM	-0.49	0.71	-0.69	0.49
	LocationNK:sexM	-0.18	0.86	-0.21	0.83
	LocationSK:sexM	-0.57	0.90	-0.64	0.53

lm($T_{\max}$ ~breeding Status+Location+se x+breedingStatus:L ocation+breedingSt atus:sex)	(Intercept)	27.19	0.39	69.86	< 0.001
	breedingStatusChick- feeding	1.91	0.56	3.40	< 0.001
	LocationNK	-3.20	0.62	-5.13	< 0.001
	LocationSK	-3.07	0.76	-4.05	< 0.001
	sexM	0.68	0.50	1.35	0.18
(model after elimination of interaction Location:sex)	breedingStatusChick- feeding:LocationNK	1.53	0.84	1.82	0.07
	breedingStatusChick- feeding:LocationSK	-1.08	0.94	-1.15	0.25
	breedingStatusChick- feeding:sexM	-0.60	0.68	-0.87	0.39

lm(Tmax~breedingStatus+Location+sex+breedingStatus:Location)	(Intercept)	27.35	0.35	78.91	< 0.001
	breedingStatusChick-feeding	1.63	0.46	3.53	< 0.001
	LocationNK	-3.14	0.62	-5.07	< 0.001
	LocationSK	-3.04	0.76	-4.02	< 0.001
(Final model: model after elimination of interaction breedingStatus:sex)	sexM	0.36	0.34	1.05	0.30
	breedingStatusChick-feeding:LocationNK	1.48	0.84	1.77	0.08
	breedingStatusChick-feeding:LocationSK	-1.13	0.94	-1.20	0.23

Average minimum temperature ($T_{\min}$ °C): females and males

	(Intercept)	10.94	0.34	32.06	< 0.001
lm(Tmin~breedingStatus+Location+sex+breedingStatus:Location+breedingStatus:sex+Location:sex)	breedingStatusChick-feeding	-0.37	0.48	-0.77	0.44
	LocationNK	-1.54	0.69	-2.23	0.03
	LocationSK	-5.87	0.76	-7.75	< 0.001
	sexM	0.66	0.47	1.41	0.16
	breedingStatusChick-feeding:LocationNK	-1.05	0.72	-1.46	0.15
(starting model before elimination of interaction Location:sex)	breedingStatusChick-feeding:LocationSK	1.16	0.79	1.47	0.14
	breedingStatusChick-feeding:sexM	-0.58	0.60	-0.98	0.33
	LocationNK:sexM	-0.87	0.72	-1.21	0.23
	LocationSK:sexM	-0.57	0.75	-0.77	0.45

lm(Tmin~breedingStatus+Location+sex+breedingStatus:Location+breedingStatus:sex)	(Intercept)	11.06	0.33	33.72	< 0.001
	breedingStatusChick-feeding	-0.31	0.47	-0.65	0.52
	LocationNK	-2.07	0.53	-3.94	< 0.001
	LocationSK	-6.17	0.64	-9.66	< 0.001
	sexM	0.41	0.42	0.98	0.33
(model after elimination of interaction Location:sex)	breedingStatusChick-feeding:LocationNK	-0.89	0.71	-1.26	0.21
	breedingStatusChick-feeding:LocationSK	1.20	0.79	1.51	0.13
	breedingStatusChick-feeding:sexM	-0.73	0.58	-1.27	0.21

lm(Tmin~breedingStatus+Location+sex+breedingStatus:Location)	(Intercept)	11.25	0.29	38.41	< 0.001
	breedingStatusChick-feeding	-0.65	0.39	-1.66	0.10
	LocationNK	-2.00	0.52	-3.82	< 0.001
	LocationSK	-6.14	0.64	-9.60	< 0.001
	sexM	0.02	0.29	0.06	0.95

(model after elimination of interaction breedingStatus:sex)	breedingStatusChick- feeding:LocationNK	-0.95	0.71	-1.35	0.18
	breedingStatusChick- feeding:LocationSK	1.14	0.79	1.44	0.15
lm(Tmin~breedingS tatus+Location+sex)	(Intercept)	11.24	0.28	40.60	< 0.001
	breedingStatusChick- feeding	-0.67	0.30	-2.26	0.03
	LocationNK	-2.56	0.35	-7.23	< 0.001
Final model: model after elimination of interaction breedingStatus:Loc ation)	LocationSK	-5.31	0.38	14.00	< 0.001
	sexM	0.07	0.29	0.23	0.82

ii)

Rainfall: females only

Model	Explanatory variables	Estimate	SE	t	P
	(Intercept)	22.00	10.00	2.20	0.03
lm(rain~breedingSt atus+Location+bree dingStatus:Location)	breedingStatusBincubating	0.16	14.63	0.01	0.99
	breedingStatusChick-feeding	17.34	14.83	1.17	0.24
	LocationNK	45.46	24.07	1.89	0.06
	LocationSK	53.92	26.45	2.04	0.04
(starting model before elimination of interaction breedingStatus:Loc ation)	breedingStatusBincubating:L ocationNK	-0.69	29.64	-0.02	0.98
	breedingStatusChick- feeding:LocationNK	-37.86	29.51	-1.28	0.20
	breedingStatusBincubating:L ocationSK	-22.91	31.84	-0.72	0.47
	breedingStatusChick- feeding:LocationSK	8.42	31.93	0.26	0.79
lm(rain~breedingSt atus+Location)	(Intercept)	25.01	8.98	2.79	0.01
	breedingStatusBincubating	-3.23	11.57	-0.28	0.78
	breedingStatusChick-feeding	11.14	11.62	0.96	0.34
(Final model: model after elimination of interaction breedingStatus:Loc ation)	LocationNK	29.70	10.93	2.72	0.01
	LocationSK	48.82	11.44	4.27	< 0.001

Average maximum temperature ($T_{\max}$ °C): females only

lm(Tmax~breeding Status+Location+br	(Intercept)	26.96	0.47	57.54	< 0.001
	breedingStatusBincubating	5.88	0.69	8.57	< 0.001

feedingStatus:Location) (starting model and also final model. Interaction breedingStatus:Location is significant)	breedingStatusChick-feeding	2.26	0.70	3.25	0.00
	LocationNK	-2.32	1.13	-2.06	0.04
	LocationSK	-2.26	1.24	-1.83	0.07
	breedingStatusBincubating:LocationNK	-3.59	1.39	-2.59	0.01
	breedingStatusChick-feeding:LocationNK	0.22	1.38	0.16	0.88
	breedingStatusBincubating:LocationSK	-4.08	1.49	-2.74	0.01
	breedingStatusChick-feeding:LocationSK	-1.75	1.50	-1.17	0.24

Average minimum temperature ($T_{\min}$ °C): females only

lm($T_{\min}$ ~breedingStatus+Location+breedingStatus:Location) (starting model and also final model. Interaction breedingStatus:Location is significant)	(Intercept)	10.88	0.43	25.34	< 0.001
	breedingStatusBincubating	-3.01	0.63	-4.80	< 0.001
	breedingStatusChick-feeding	-0.23	0.64	-0.36	0.72
	LocationNK	-1.14	1.03	-1.10	0.27
	LocationSK	-5.85	1.14	-5.15	< 0.001
	breedingStatusBincubating:LocationNK	1.71	1.27	1.35	0.18
	breedingStatusChick-feeding:LocationNK	-1.46	1.27	-1.15	0.25
	breedingStatusBincubating:LocationSK	2.89	1.37	2.11	0.04
	breedingStatusChick-feeding:LocationSK	0.96	1.37	0.70	0.49
