Local sex ratio affects the cost of reproduction

Nicolaus, Marion; Michler, Stephanie P. M.; Ubels, Richard; van der Velde, Marco; Bouwman, Karen M.; Both, C; Tinbergen, Joost

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Appendices

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Marion Nicolaus, Stephanie P. M. Michler, Richard Ubels, Marco van der Velde, Karen M. Bouwman, Christiaan Both and Joost M. Tinbergen

Appendix S1. Collection of provisioning data

In 2006, additional provisioning data of parents were collected on 94 broods using a Radio Frequency Identification system (RFID). At day 5, an antenna was placed around the nest-box entrance to let the parents habituate to the presence of a new device. At day 10, the antenna was connected to a reader (Trovan, Ltd., Douglas, UK) and the number of visits of PIT tagged parents was automatically recorded for 24 hours (for details on the PIT tags used see Nicolaus *et al.* 2008). At day 11 (± 25 hours later), data were collected and the RFID device removed. We defined a visit as being a reading recorded with a minimum time interval of 3 seconds from the previous reading. Because parental visits to the nest were recorded when going in and out the next-box, we divided the total number of visits per individual by two. Video data collected simultaneously outside the nest-boxes revealed that the number of visits observed and automatically recorded were highly significantly and positively correlated ($r=0.98$, $p<0.01$ for males, $r=0.99$, $p<0.01$ for females, $n=20$ individuals of each sex).

Literature cited

Nicolaus M., K. M. Bouwman, & N. J. Dingemanse. 2008. Effect of PIT tags on the survival and recruitment of Great Tits *Parus major*. Ardea, 96:286-292.

Appendix S2. Overview of the plot manipulations and breeding parameters of the Lauwersmeer great tit population in the Netherlands. A density ('decreased'/'increased') and a sex ratio ('female/balanced/male') treatment were assigned to each of the 12 plots. The mean plot density (total number of nestlings per plot) and mean plot sex ratio (proportion of male nestlings in a plot) are presented before and after manipulation at day 6 (n=number of plots). Mean brood size, sex ratio, probability of producing a second clutch and adult survival are presented with their standard deviation (SD) and their sample size for the three study years 2005, 2006 and 2007 (n=number of nests or individuals).

36 Table Appendix S2

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	2005			2006			2007		
parameters	**mean**	**SD**	**n**	**mean**	**SD**	**n**	**mean**	**SD**	**n**
plot traits									
decreased before	156.83	28.27	6	134.33	48.73	6	166.83	19.57	6
decreased after	137.83	26.35	6	119.67	48.90	6	143.00	22.02	6
increased before	161.50	16.28	6	118.00	27.62	6	144.83	34.50	6
increased after	181.17	17.33	6	132.67	32.67	6	168.67	42.97	6
female before	0.48	0.02	4	0.47	0.06	4	0.46	0.01	4
female after	0.24	0.00	4	0.24	0.02	4	0.25	0.02	4
balanced before	0.47	0.02	4	0.50	0.02	4	0.51	0.04	4
balanced after	0.49	0.01	4	0.49	0.01	4	0.50	0.03	4
male before	0.50	0.03	4	0.49	0.04	4	0.52	0.06	4
male after	0.74	0.02	4	0.79	0.03	4	0.76	0.02	4
brood traits									
brood size	7.67	1.72	201	8.96	1.27	107	7.35	1.58	198
brood sex ratio	0.49	0.18	201	0.48	0.17	107	0.49	0.18	198
p(second brood)	0.09	0.29	201	0.32	0.47	107	0.12	0.32	198
adult survival									
female survival	0.15	0.36	201	0.39	0.49	107	0.33	0.47	198
male survival	0.15	0.36	189	0.26	0.44	115	0.34	0.47	203

Appendix S3. Annual variation in the probability of producing a second clutch

Model summary of hierarchical models examining the probability of producing a second clutch in relation to the plot social environment (density, 'D' and sex ratio, 'SR') and date in a great tit population in the Netherlands for three study years (2005, 2006 and 2007). In these models, density treatment ('decreased/increased') was fitted as a factor with 'decreased' chosen as reference category. Date (in April days), natural density and natural plot sex ratio centred around population mean, were fitted as fixed effects. Nests and plots were fitted as nested random effects.

Parameters	**level**	**β**	**s.e. (β)**	**χ^2**	**df**	**P**
2005 (n=224 broods)						
intercept		-2.623	0.617			
date	*nest*	-0.228	0.067	11.56	1	<0.001
2006 (n=158 broods)						
intercept		-0.82	0.192			
natural D	*plot*	-0.016	0.005	10.21	1	0.001
natural plot SR	*plot*	12.855	5.485	5.49	2	0.019
date	*nest*	-0.273	0.07	15.02	1	<0.001
2007 (n=242 broods)						
intercept		-1.602	0.269			
natural D	*plot*	-0.032	0.009	12.09	1	<0.001
D	*plot*	-1.575	0.536	8.64	1	0.003
natural plot SR	*plot*	11.043	4.861	5.16	1	0.023
date	*nest*	-0.105	0.05	4.3	1	0.038