SUPPLEMENTARY MATERIALS TO:

Conservation of avian diet specialists: lessons from brood provisioning ecology of the endangered vermivore, the Fairy Pitta (*Pitta nympha*)

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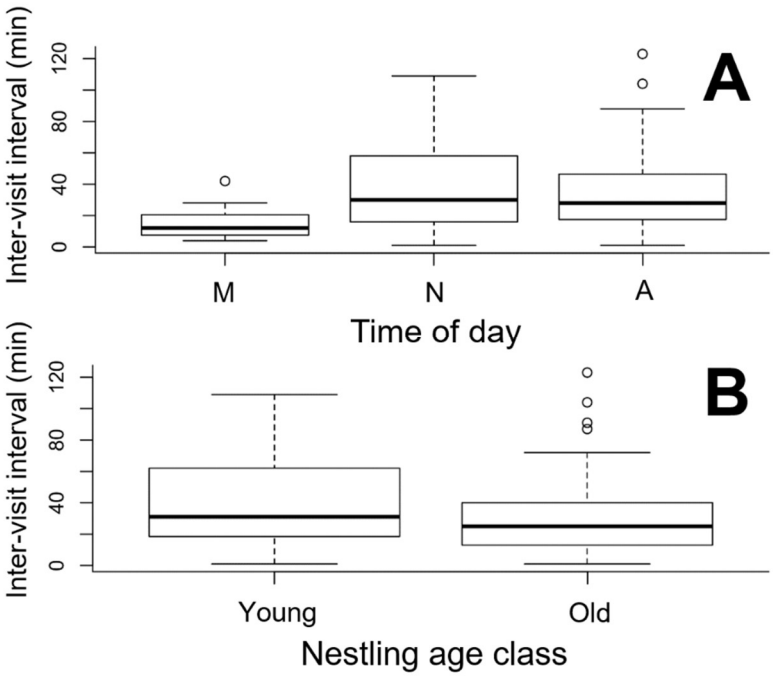
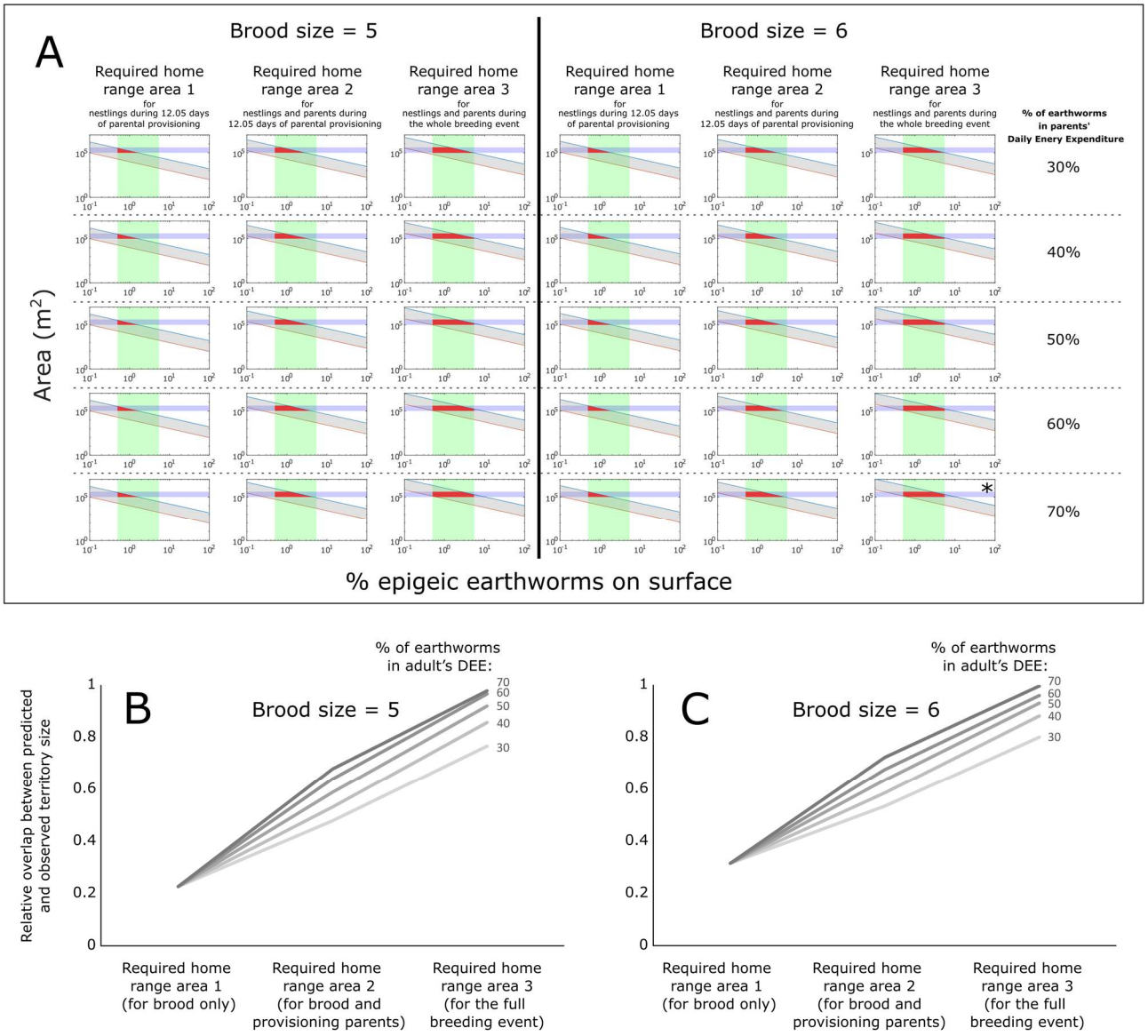
Part 1. Supplementary figures



Supplementary Figure S1. Factors affecting the **inter-visit interval**. (A) – the effect of the **time of day** on the **inter-visit interval**. (B) – the effect of the **nestling age class** on the **inter-visit interval**. A horizontal thick line indicates the median, the box indicates the 1st (lower) and 3rd (upper) quartiles, the error bars indicate the 1.5 interquartile range, and the extra data points are outliers defined as data points that are located outside the 1.5 × the interquartile range. Details of statistical analyses are shown in Supplementary Table S9.



Supplementary Figure S2. Connections between earthworm densities and pitta's territory size. (A) – In each small panel, the gray band represents the estimated range of the habitat area (vertical axis; m^2) that provides a sufficient number of earthworms for the Fairy Pitta breeding event as a function of the proportion (horizontal axis; %) of local earthworm density that is available to pittas on the ground surface. The lower (orange) and upper (blue) edge of the gray band in each panel correspond to the **Low_Required home range area** and the **High_Required home range area** estimates (see Methods part *6*) calculated respectively for the lowest and highest values of densities of epigeic earthworm species in the Fairy pitta habitats taken from the literature[21,23] (see Methods parts *7* and *9*). Panels are grouped in two blocks according to the brood sizes (5 and 6). In each block, the panels are grouped in three columns representing the three categories of the estimates (see Methods part *6*): **Required home range area1** (considering needs of nestlings only), **Required home range area 2** (considering needs of nestlings and parents during brood provisioning period), and **Required home range area 3** (considering needs of nestlings and parents during one full breeding event). The five rows represent different proportions of earthworms in the adult's DEE. In each small panel, the vertical semitransparent green band indicates the range of values (0.5-5%) on the horizontal axis that is likely to occur in nature based on Duriez et al.[24] (see more explanations in the Methods part *6*). The horizontal semitransparent purple band indicates the empirically estimated range of breeding territory size of the Fairy Pitta (10-30 ha). The two axes are in the logarithmic scale for the convenience of graphical presentation. See the Methods for the full explanations of assumptions and formulas. The panel marked with an asterisk is also presented in Fig 3A. In each panel, the surface area (marked with red-shaded polygon) of the overlap between the gray, blue, and green bands indicates the degree of match between the range of theoretically predicted home range areas and the range of observed territory sizes in the Fairy Pitta (see Methods part *7*). (B, C) –

comparisons of the degree of overlap between predicted and observed territory areas for the three types of estimates: **Required home range area1** (considering needs of nestlings only), **Required home range area 2** (considering needs of nestlings and parents during brood provisioning period), and **Required home range area 3** (considering needs of nestlings and parents during one full breeding event). The Y-axis indicates the degree of overlap, and the relative values are shown by setting the theoretical maximum overlap value to 1.

Part 2. Supplementary Tables

Supplementary Table S1. Information on hatching and fledging date, number of eggs, number of hatchling nestlings, number of fledging nestlings for each of the four broods under observation.

Nest ID	Total duration of video recordings (hours)	Nest location description	Hatching date	Fledging date	Nr of eggs	Nr of hatchling nestlings	Nr of fledging nestlings	Nr of days with video		
								Very young nestlings (1-4 days old)	Intermediate age nestlings (5-8 days old)	Old age nestlings (9-12 days old)
Nest 1	26.1	on rock	2012.06.30	.	6	6	6	2	2	2
Nest 2	19.9	on slope	2012.07.06	2012.07.17	6	5	5	1	2	2
Nest 3	76.9	on rock	2013.06.24	2013.07.06	5	5	5	4	4	4
Nest 4	25.3	on slope	2017.06.24	2017.07.06	6	6	6	3	4	2

Supplementary Table S2. Diet composition of nestlings at four nests. Some arthropods could not be identified because of the angle and light condition of the recorded video. The data are summarized in Fig 1C.

Prey type	Number of prey items					% of total prey number				
	Nest 1	Nest 2	Nest 3	Nest 4	All four nests	Nest 1	Nest 2	Nest 3	Nest 4	All four nests
Earthworms	117	40	252	138	547	88.0	81.6	81.5	88.5	84.5
Centipedes (Chilopoda)	3	6	18	7	34	2.3	12.2	5.8	4.5	5.3
Unidentified arthropods	5	1	3	1	10	3.8	2.0	1.0	0.6	1.5
Beetles (Coleoptera)	2	1	3	3	9	1.5	2.0	1.0	1.9	1.4
Planarians: *Bipalium* (Tricladia)			7	1	8	0.0	0.0	2.3	0.6	1.2
Caterpillars (Lepidoptera larvae)	2		2	3	7	1.5	0.0	0.6	1.9	1.1
Grasshoppers (Orthoptera)	1		6		7	0.8	0.0	1.9	0.0	1.1
Insect pupae	1		2	1	4	0.8	0.0	0.6	0.6	0.6
Mole crickets (Orthoptera)	1		3		4	0.8	0.0	1.0	0.0	0.6
Dragonfly (Odonata)		1			1	0.0	2.0	0.0	0.0	0.2
Moth (Lepidoptera adults)				1	1	0.0	0.0	0.0	0.6	0.2
Snake (Serpentes, Reptilia)				1	1	0.0	0.0	0.0	0.6	0.2
Stick insect (Phasmatodea)	1				1	0.8	0.0	0.0	0.0	0.2
Unidentified preys (not earthworm)			13		13	0.0	0.0	4.3	0.0	2.0
Total	133	49	309	156	647	100.0	100.0	100.0	100.0	100.0

Supplementary Table S3. The effect of **nestling age class** on **earthworm proportion** in each nest. The *p*-values are obtained in the one-tailed Fisher's exact test for the research hypothesis: "Young > Old" in each nest. Fisher's combined probability test was performed using these one-tailed *p*-values.

Nest ID	Prey type	Nestling age class		Fisher's exact test *p*-value
		Young (1 to 7 days)	Old (8 to 13 days)	
Nest 1	Earthworms	75	42	< 0.0001
	Others	0	16	
	% of earthworms	100.0	72.4	
Nest 2	Earthworms	24	16	0.313
	Others	4	5	
	% of earthworms	85.7	76.2	
Nest 3	Earthworms	158	94	0.155
	Others	31	26	
	% of earthworms	83.6	78.3	
Nest 4	Earthworms	81	57	0.324
	Others	9	9	
	% of earthworms	90.0	86.4	
Total	Earthworms	350	210	Fisher combined chi-square = 37.533,
	Others	32	55	
	% of earthworms	91.6	79.2	$df = 8$, $p < 0.0001$

Supplementary Table S4. The list of the three models that best explain variation in the **average prey length** (square-root-transformed) per feeding visit for "Only Earthworms present (OE)" visits. The initial model included the **number of earthworms**, **nestling age class**, **time of day**, and **inter-visit interval** as independent variables. **Nest ID** was used as a random variable. The values show the effect estimate for the variables, standard error in parentheses (± SE), (t-value), *p*-value. Blank cells in the table indicate that the variable was not included in the model. Significant effects are shown in bold (except for intercept). The best model in the alternative analysis with **nest ID** as independent variable resulted in very similar effect estimates and the same conclusions. The table concerns the results presented in Fig. 2B.

Model type	Model ID	Intercept	Number of earthworms	Nestling age class; estimate for "young"	Time of day; estimate for "morning" and noon"	Inter-visit interval	Nest ID; estimate for "2 (left)", "3 (middle)", "4 (right)"			*df*	logLik	AICc	ΔAICc
LMER	m1	2.841 ± 0.080, (35.480), < 2E-16	**-0.091** ± 0.028, (-3.224), 0.001							4	-64.734	137.8	0
	m2	2.605 ± 0.037, (69.02), < 3.17E-05								3	-67.109	140.4	2.62
	m3	2.808 ± 0.088, (31.613), < 2E-16	**-0.094** ± 0.028, (-3.304), 0.001	0.061 ± 0.073, (0.845), 0.399						5	-66.075	142.6	4.85
LM	m1	2.768 ± 0.099, (27.819), < 2E-16	**-0.092** ± 0.029, (-3.186), 0.001				0.029 ± 0.136, (0.216), 0.829	0.112 ± 0.084, (1.336), 0.184	0.108 ± 0.115, (0.944), 0.347	3	-59.625	125.4	0
	m2	2.735 ± 0.107, (25.433), < 2E-16	**-0.096** ± 0.029, (-3.268), 0.001	0.061 ± 0.074, (0.823), 0.412			0.043 ± 0.137, (0.319), 0.750	0.112 ± 0.084, (1.336), 0.183	0.114 ± 0.115, (0.993), 0.322	4	-59.260	126.8	1.40
	m3	2.762 ± 0.104, (26.354), < 2E-16	**-0.093** ± 0.029, (-3.176), 0.001			0.0002 ± 0.001, (0.184), 0.854	0.025 ± 0.138, (0.184), 0.854	0.110 ± 0.085, (1.292), 0.198	0.106 ± 0.116, (0.912), 0.363	4	-59.564	127.5	2.10

Supplementary Table S5. The lists of the three models that best explain variation in the types of feeding visits in two analyses: one including **feeding visit type1** and the second replacing it with **feeding visit type2** as a response variable. The initial models included **nestling age class** and **inter-visit interval** as independent variables. Since the number of NoE (**feeding visit type1**) in the morning (**time of day**) was extremely rare, the **time of day** was only included in an initial model that explains the variation of **feeding visit type2**. **Nest ID** was used as a random variable. As the response variable is binary (either EI = 0 and NoE = 1, or OE = 0 and MIX = 1), we used Binomial distribution and the models estimate the effect of independent variables on the probability of NoE (**feeding visit type1**) or MIX (**feeding visit type2**). The values show the effect estimates for the variables, standard error in parentheses (± SE), (Z-value), *p*-value. Blank cells in the table indicate that the variable was not included in the model. Significant effects are shown in bold (except for intercept). The best models in the alternative analysis with **nest ID** as independent variable resulted in very similar effect estimates and the same conclusions. The table concerns the results presented in Fig. 2C, D.

Response variable	Model type	Model ID	Intercept	Nestling age class; estimate for "young"	Inter-visit interval	Time of day; estimate for "morning (left)" and noon (right)"		Nest ID; estimate for "2 (left)", "3 (middle)", "4 (right)"			*df*	logLik	AICc	ΔAICc
Feeding visit type1	GLMER	m1	-2.410 ± 0.394, (-6.110), 9.96E-10	**-2.325** ± 1.079, (-2.155), 0.031							3	-29.921	66.0	0
		m2	-2.520 ± 0.604, (-4.172), 3.02E-05	**-2.359** ± 1.088, (-2.167), 0.030	0.003 ± 0.014, (0.247), 0.804						4	-29.892	68.0	2.02
		m3	-3.160 ± 0.422, (-7.480), 7.45E-14								2	-33.496	71.1	5.09
	GLM	m1	-2.410 ± 0.394, (-6.110), 9.96E-10	**-2.325** ± 1.079, (-2.155), 0.031							2	-29.921	63.9	0
		m2	-2.520 ± 0.605, (-4.172), 3.02E-05	**-2.359** ± 1.088, (-2.167), 0.030	0.003 ± 0.014, (0.247), 0.804						3	-29.892	65.9	2.00
		m3	-1.745 ± 0.553, (-3.152), 0.001	**-2.160** ± 1.087, (-1.987), 0.046				-0.149 ± 1.194, (-0.125), 0.900	-1.376 ± 0.900, (-1.528), 0.126	-1.038, ± 1.159, (-0.896), 0.370	5	-28.495	67.3	3.40
Feeding visit type2	GLMER	m1	-0.510 ± 0.458, (-1.112), 0.266	**-0.889** ± 0.327, (-2.719), 0.006							3	-118.015	242.2	0
		m2	-0.765 ± 0.512, (-1.494), 0.135	**-0.983** ± 0.338, (-2.904), 0.003	0.008 ± 0.006, (1.293), 0.196						4	-117.181	242.6	0.42
		m3	-0.455 ± 0.478, (-0.952), 0.341	**-0.900** ± 0.329, (-2.728), 0.006		0.417 ± 0.829, (0.504), 0.614	-0.112 ± 0.329, (-0.342), 0.732				5	-117.785	245.9	3.74
	GLM	m1	-0.728 ± 0.392, (-1.856), 0.063	**-0.941** ± 0.392, (-1.856), 0.004				-16.444 ± 1152.282, (-0.014), 0.988	**0.848** ± 0.427, (1.982), 0.047	0.828 ± 0.523, (1.583), 0.113	5	-111.687	233.7	0
		m2	-0.951 ± 0.429, (-2.216), 0.026	**-1.039** ± 0.340, (-3.057), 0.002	0.008 ± 0.006, (1.352), 0.176			-16.540 ± 1153.000 (-0.014), 0.988	0.824 ± 0.432, (1.907), 0.056	0.779 ± 0.526, (1.480), 0.138	6	-110.773	234.0	0.30
		m3	-0.654 ± 0.417, (-1.567), 0.117	**-0.948** ± 0.331, (-2.862), 0.004		0.348 ± 0.825, (0.422), 0.672	-0.153 ± 0.332, (-0.460), 0.645	-16.450 ± 1148.345, (-0.014), 0.988	0.829 ± 0.431, (1.922), 0.054	0.858 ± 0.528, (1.625), 0.104	7	-111.443	237.5	3.80

Supplementary Table S6. The effect of **nestling age class** on the **feeding visit type**: differences between nestlings' age classes in the number and proportion (%) of visits with only earthworms per nest. The *p*-values are obtained in Fisher's exact one-sided test for the research hypothesis: "Young > Old" in each nest. Fisher's combined probability test was performed using these one-tailed *p*-values.

Nest ID	Feeding visit type	Nestling age class		Fisher's exact test
		1 to 7 days	8 to 13 days	*p*-value
Nest 1	Only earthworms (OE)	24	13	< 0.0001
	No Earthworms or mixed (NoE, MIX)	0	14	
	% visits with earthworms only (OE/[OE+NoE+MIX])	100.0	48.1	
Nest 2	Only earthworms (OE)	6	8	0.794
	No Earthworms or mixed (NoE, MIX)	2	2	
	% visits with earthworms only (OE/[OE+NoE+MIX])	75.0	80.0	
Nest 3	Only earthworms (OE)	27	20	0.898
	No Earthworms or mixed (NoE, MIX)	51	25	
	% visits with earthworms only (OE/[OE+NoE+MIX])	34.6	44.4	
Nest 4	Only earthworms (OE)	16	9	0.286
	No Earthworms or mixed (NoE, MIX)	8	8	
	% visits with earthworms only (OE/[OE+NoE+MIX])	66.7	52.9	
Total	Only earthworms (OE)	73	50	Fisher combined chi-square = 25.324, *df* = 8, *p* = 0.001
	No Earthworms or mixed (NoE, MIX)	61	49	
	% visits with earthworms only (OE/[OE+NoE+MIX])	54.5	50.1	

Supplementary Table S7. The lists of the three models that best explain variation in the **number of prey items** for two analyses: one including **feeding visit type1** and the second replacing it with **feeding visit type2**. The initial models also included **inter-visit interval**, **nestling age class**, and **time of day** as independent variables. **Nest ID** was used as a random variable. As the response variable is count, we used Poisson distribution. The values show the effect estimate for the variables, standard error in parentheses (± SE), (Z-value), *p*-value. Blank cells in the table indicate that the variable was not included in the model. Significant effects are shown in bold (except for intercept). The best models in the alternative analysis with **nest ID** as independent variable resulted in very similar effect estimates and the same conclusions. The table concerns the results presented in Fig. 2E, F.

Feeding visit type variable used in model	Model type	Model ID	Intercept	Feeding visit type1; estimate for "NoE"	Feeding visit type2; estimate for "MIX"	Inter-visit interval	Nestling age class; estimate for "young"	Time of day	Nest ID; estimate for "2 (left)", "3 (middle)", "4 (right)"			*df*	logLik	AICc	ΔAICc
Feeding visit type1	GLMER	m1	1.062 ± 0.083, (12.682), < 2E-16	**-1.033** ± 0.357, (-2.895), 0.004								3	-333.406	672.9	0
		m2	1.041 ± 0.102, (10.174), < 2E-16	**-1.033** ± 0.357, (-2.909), 0.004		0.001 ± 0.001, (0.351), 0.725						4	-333.345	674.9	1.96
		m3	1.070 ± 0.097, (11.064), < 2E-16	**-1.039** ± 0.359, (-2.896), 0.004			-0.014 ± 0.087, (-0.162), 0.871					4	-333.393	675.0	2.06
	GLM	m1	0.955 ± 0.094, (10.080), < 2E-16	**-1.017** ± 0.357, (-2.844), 0.004					-0.018 ± 0.208, (-0.090), 0.928	0.031 ± 0.111, (0.278), 0.780	**0.379** ± 0.130, (2.906), 0.003	5	-329.236	668.8	0
		m2	0.940 ± 0.106, (8.794), < 2E-16	**-1.016** ± 0.357, (-2.841), 0.004		0.0005 ± 0.001, (0.305), 0.760			-0.026 ± 0.209, (-0.125), 0.900	0.027 ± 0.111, (0.250), 0.802	**0.375** ± 0.131, (2.857), 0.004	6	-329.190	670.8	2.03
		m3	0.962 ± 0.104, (9.171), < 2E-16	**-1.022** ± 0.359, (-2.846), 0.004			-0.013 ± 0.087, (-0.155), 0.877		-0.019 ± 0.208, (-0.095), 0.924	0.032 ± 0.111, (0.293), 0.769	**0.379** ± 0.130, (2.908), 0.003	6	-329.224	670.9	2.10
Feeding visit type2	GLMER	m1	0.970 ± 0.084, (11.490), < 2E-16		**0.279** ± 0.088, (3.154), 0.001							3	-320.495	647.1	0
		m2	0.942 ± 0.102, (9.238), < 2E-16		**0.288** ± 0.090, (3.188), 0.001		0.044 ± 0.089, (0.495), 0.620					4	-320.372	649.0	1.84
		m3	0.958 ± 0.102, (9.365), < 2E-16		**0.278** ± 0.088, (3.141), 0.001	0.001 ± 0.001, (0.201), 0.840						4	-320.475	649.2	2.05
	GLM	m1	0.882 ± 0.099, (8.892), < 2E-16		**0.269** ± 0.089, (2.997), 0.002				0.051 ± 0.213, (0.242), 0.808	-0.007 ± 0.113, (-0.070), 0.944	**0.337** ± 0.132, (2.540), 0.011	5	-316.748	643.8	0
		m2	0.856 ± 0.111, (7.682), 1.57E-14		**0.280** ± 0.092, (3.037), 0.002		0.047 ± 0.090, (0.528), 0.597		0.056 ± 0.213, (0.264), 0.792	-0.017 ± 0.114, (-0.151), 0.879	**0.334** ± 0.133, (2.511), 0.012	6	-316.609	645.7	1.85
		m3	0.876 ± 0.110, (7.921), 2.35E-15		**0.268** ± 0.089, (2.985), 0.002	0.0002 ± 0.001, (0.136), 0.891			0.048 ± 0.214, (0.227), 0.820	-0.009 ± 0.113, (-0.081), 0.935	**0.335** ± 0.133, (2.515), 0.011	6	-316.739	645.9	2.11

Supplementary Table S8. The lists of the three models that best explain variation in the **number of earthworms**, the **biomass of a single earthworm** (Box-Cox transformation; exponent value of 0.1), and **biomass of earthworms per visit** (square-root-transformed). The initial models included **weather category**, **inter-visit interval**, and **nestling age class** as independent variables. **Nest ID** was used as random variable, **visit ID** nested within **nest ID** was also used as random variable where the **biomass of a single earthworm** was used as a response variable. The values show the effect estimate for the variables, standard error in parentheses (± SE), (Z-value or t-value), *p*-value. Blank cells in the table indicate that the variable was not included in the model. Significant effects are shown in bold (except for intercept). The best models in the alternative analysis with **nest ID** as independent variable resulted in very similar effect estimates and the same conclusions. The table concerns the results presented in Fig. 2G, H, I.

Response variable	Model type	Model ID	Intercept	Weather category; estimate for "light rain"	Inter-visit interval	Nestling age class; estimate for "young"	Nest ID; estimate for "2", "3", "4"	*df*	logLik	AICc	ΔAICc
Number of earthworms	GLMER	m1	0.659 ± 0.131, (5.021), 5.15E-07	**0.354** ± 0.144, (2.447), 0.014				3	-207.842	421.9	0
		m2	0.617 ± 0.146, (4.212), 2.53E-05	**0.343** ± 0.145, (2.358), 0.018	0.001 ± 0.002, (0.652), 0.514			4	-207.631	423.6	1.71
		m3	0.662 ± 0.134, (4.908), 9.19E-07	**0.360** ± 0.162, (2.222), 0.026		-0.012 ± 0.133, (-0.090), 0.927		4	-207.838	424.0	2.12
	GLM	m1	0.659 ± 0.131, (5.021), 5.15E-07	**0.354** ± 0.144, (2.447), 0.014				2	-207.842	419.8	0
		m2	0.617 ± 0.146, (4.212), 2.53E-05	**0.343** ± 0.145, (2.358), 0.018	0.001 ± 0.002, (0.652), 0.514			3	-207.631	421.5	1.68
		m3	0.662 ± 0.134, (4.908), 9.19E-07	**0.360** ± 0.162, (2.222), 0.026		-0.012 ± 0.133, (-0.090), 0.927		3	-207.838	421.9	2.09
Biomass of a single earthworm	LMER (Nest ID /Visit ID)	m1	0.076 ± 0.006, (122.7), < 2E-16					4	298.070	-588.0	0
		m2	0.791 ± 0.013, (59.264), < 2E-16	**-0.043** ± 0.014, (-2.919), 0.004				5	298.934	-587.7	0.33
		m3	0.769 ± 0.010, (71.590), < 2E-16			-0.019 ± 0.013, (-1.518), 0.132		5	295.805	-581.4	6.59
	LMER (Visit ID)	m1	0.756 ± 0.006, (122.7), < 2E-16					3	298.070	-590.1	0
		m2	0.791 ± 0.013, (59.254), < 2E-16	**-0.043** ± 0.014, (-2.919), 0.004				4	298.934	-589.7	0.32
		m3	0.769 ± 0.010 (71.590), < 2E-16			-0.019 ± 0.013, (-1.518), 0.132		4	295.805	-583.5	6.58
Biomass of earthworms per visit	LMER	m1	0.544 ± 0.021, (25.79), < 2E-16					3	-0.712	7.6	0
		m2	0.500 ± 0.035, (13.976), < 2E-16			0.066 ± 0.044, (1.509), 0.134		4	-1.776	11.9	4.26
		m3	0.548 ± 0.043, (12.535), < 2E-16	0.005 ± 0.050, (-0.111), 0.912				4	-2.784	13.9	6.28
	LM	m1	0.500 ± 0.035, (13.976), < 2E-16			0.066 ± 0.044, (1.509), 0.134		3	3.377	-0.6	0
		m2	0.527 ± 0.044, (11.725), < 2E-16	-0.055 ± 0.056, (-0.983), 0.327		0.091 ± 0.050, (1.797), 0.07		4	3.869	0.6	1.15
		m3	0.505 ± 0.043, (11.598), < 2E-16		-0.0001 ± 0.0008, (-0.218), 0.827	0.068 ± 0.045, (1.519), 0.131		4	3.401	1.5	2.08

Supplementary Table S9. The list of the three models that best explain variation in the **inter-visit interval** (square-root-transformed). The initial model included **nestling age class**, **time of day**, **feeding visit type2** (OE or MIX), **weather category**, and the **number of prey items** as independent variables. **Nest ID** was used as a random variable. The values show the effect estimate for the variables, standard error in parentheses (± SE), (t-value), *p*-value. Blank cells in the table indicate that the variable was not included in the model. Significant effects are shown in bold (except for intercept). The best model in the alternative analysis with **nest ID** as independent variable resulted in very similar effect estimates and the same conclusions. The table concerns the results presented in Supplementary Fig. S1.

Model type	Model ID	Intercept	Nestling age class; estimate for "young"	Time of day; estimate for "morning (left)" and noon (right)"		Feeding visit type2; estimate for "MIX"	Weather category; estimate for "light rain"	Number of prey items	Nest ID; estimate for "2", "3", "4"	*df*	logLik	AICc	ΔAICc
LMER	m1	5.107 ± 0.326, (15.663), 8.35E-07	**0.901** ± 0.325, (2.766), 0.006	**-2.149** ± 0.871, (-2.466), 0.014	-0.119 ± 0.324, (-0.369), 0.712					6	-442.204	856.9	0
	m2	4.849 ± 0.377, (12.850), 1.07E-08	**0.683** ± 0.363, (1.881), 0.061	**-2.255** ± 0.873, (-2.582), 0.010	-0.120 ± 0.323, (-0.372), 0.710		0.532 ± 0.395, (1.346), 0.179			7	-421.308	857.2	0.36
	m3	4.928 ± 0.352, (13.964), 1.44E-07	**0.977** ± 0.331, (2.946), 0.003	**-2.192** ± 0.871, (-2.516), 0.012	-0.111 ± 0.324, (-0.343), 0.731	0.408 ± 0.343, (1.188), 0.236				7	-421.649	857.9	1.04
LM	m1	5.081 ± 0.294, (17.267), < 2E-16	**0.908** ± 0.326, (2.788), 0.005	**-2.104** ± 0.871, (-2.418), 0.016	-0.106 ± 0.325, (-0.327), 0.744					5	-421.703	853.7	0
	m2	4.832 ± 0.347, (13.892), < 2E-16	0.696 ± 0.362, (1.920), 0.056	**-2.200** ± 0.871, (-2.525), 0.012	-0.107 ± 0.324, (-0.330), 0.741		0.526 ± 0.395, (1.920), 0.184			6	-420.798	854.1	0.32
	m3	4.895 ± 0.330, (14.820), < 2E-16	**0.983** ± 0.331, (2.970), 0.003	**-2.163** ± 0.870, (-2.486), 0.013	-0.100 ± 0.324, (-0.309), 0.757	0.420 ± 0.342, (1.228), 0.221				6	-420.932	854.3	0.59

Supplementary Table S10. Estimated number and biomass of earthworms required for nestlings of the Fairy Pitta from the moment of hatching to fledging based on our empirical data. See Methods part 5 for details of calculations. * - as data for nest 2 were based on the smallest amount of data we consider the average from the three nests sampled through video recording of 25 hours or more per nest as the better estimate of the needs of a typical brood of the Fairy Pitta. & - the estimated number of earthworms required for the pair of adults and their brood (Supplementary Table S11) is calculated based on this number.

Conditions considered in estimation of the number and biomass of earthworms (in bold font); Nest ID, nr of hours and days of video recording (in normal font)	Estimated number of earthworms per day	Estimated number of earthworms per nestling during 12.05 days of parental provisioning	Estimated biomass of earthworms per nestling during 12.05 days of parental provisioning	Estimated number and biomass of earthworms needed for breeding		
				Number	Ash-free dry mass (g)	Estimated fresh mass (g)
NESTLINGS in Nest 1 (26.1 video-hours during 6 days, including 3 days for nestlings < 7 days old)	81	163	29.0	976	174.3	1009.2
NESTLINGS in Nest 2 (19.9 video-hours during 5 days, including 1 day for nestlings < 7 days old)	41	83	12.2	495	73.1	423.5
NESTLINGS in Nest 3 (76.9 video-hours during 12 days, including 6 days for nestlings < 7 days old)	51	124	13.7	619	68.7	397.6
NESTLINGS in Nest 4 (25.3 video-hours during 9 days, including 5 days for nestlings < 7 days old)	113	227	19.9	1359	119.2	690.2
NESTLINGS: (Average from nests 1, 2, 3, 4)	71.6	148.9	18.7	862.4	108.8	630.1
NESTLINGS: (Average from nests 1, 3, 4) *	81.7	**171.0** &	20.9	984.9	120.7	699.0

Supplementary Table S11. Estimated number of earthworms required for breeding event. See Methods part *5* for details of calculations of the three estimates: **Number of earthworms estimate_1**, **Number of earthworms estimate_2**, **Number of earthworms estimate_3** (see Methods part *5* for details). These estimates are used to calculate (see Methods part *6* for details) the estimates of the home range surface area (presented in Supplementary Fig. S2A) needed to provide the estimated number of earthworms to the breeding pittas.

* - This particular estimate of number of earthworms are used in calculations of the home range surface area (as a function of % of earthworms on the ground surface) in Fig. 3A, and it is also marked with an asterisk (*) in Supplementary Fig. S2A.

Brood size	% of earthworms in parents' daily energy expenditure	Category of the estimate of the number of earthworms needed for a breeding event	**Number of earthworms required**
5	30	Nestlings during 12.05 days of parental provisioning [Nr of earthworms estimate 1]	855
		Nestlings and parents during 12.05 days of parental provisioning [Nr of earthworms estimate 2]	1520
		Nestlings and parents during a full breeding event [Nr of earthworms estimate 3]	2844
	40	Nestlings during 12.05 days of parental provisioning [Nr of earthworms estimate 1]	855
		Nestlings and parents during 12.05 days of parental provisioning [Nr of earthworms estimate 2]	1742
		Nestlings and parents during a full breeding event [Nr of earthworms estimate 3]	3508
	50	Nestlings during 12.05 days of parental provisioning [Nr of earthworms estimate 1]	855
		Nestlings and parents during 12.05 days of parental provisioning [Nr of earthworms estimate 2]	1963
		Nestlings and parents during a full breeding event [Nr of earthworms estimate 3]	4171
	60	Nestlings during 12.05 days of parental provisioning [Nr of earthworms estimate 1]	855
		Nestlings and parents during 12.05 days of parental provisioning [Nr of earthworms estimate 2]	2185
		Nestlings and parents during a full breeding event [Nr of earthworms estimate 3]	4834
	70	Nestlings during 12.05 days of parental provisioning [Nr of earthworms estimate 1]	855
		Nestlings and parents during 12.05 days of parental provisioning [Nr of earthworms estimate 2]	2407
		Nestlings and parents during a full breeding event [Nr of earthworms estimate 3]	5497
6	30	Nestlings during 12.05 days of parental provisioning [Nr of earthworms estimate 1]	1026
		Nestlings and parents during 12.05 days of parental provisioning [Nr of earthworms estimate 2]	1691
		Nestlings and parents during a full breeding event [Nr of earthworms estimate 3]	3015
	40	Nestlings during 12.05 days of parental provisioning [Nr of earthworms estimate 1]	1026
		Nestlings and parents during 12.05 days of parental provisioning [Nr of earthworms estimate 2]	1913
		Nestlings and parents during a full breeding event [Nr of earthworms estimate 3]	3679
	50	Nestlings during 12.05 days of parental provisioning [Nr of earthworms estimate 1]	1026
		Nestlings and parents during 12.05 days of parental provisioning [Nr of earthworms estimate 2]	2134
		Nestlings and parents during a full breeding event [Nr of earthworms estimate 3]	4342
	60	Nestlings during 12.05 days of parental provisioning [Nr of earthworms estimate 1]	1026
		Nestlings and parents during 12.05 days of parental provisioning [Nr of earthworms estimate 2]	2356
		Nestlings and parents during a full breeding event [Nr of earthworms estimate 3]	5005
	70	Nestlings during 12.05 days of parental provisioning [Nr of earthworms estimate 1]	1026
		Nestlings and parents during 12.05 days of parental provisioning [Nr of earthworms estimate 2]	2578
		Nestlings and parents during a full breeding event [Nr of earthworms estimate 3]	**5668** *

Part 3. Papers cited in BirdLife International 2001; Kim 2010; Kim 2014

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