SUPPLEMENTARY Information FOR
Daily rhythms of female self-maintenance correlate with predation risk and male nest attendance in a biparental wader

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Table S1| Daily pattern of female sleeping (absolute time within hour)

Response	Effect type	Effect	Estimate	95% CI Lower	Upper
Female sleeping time	Fixed	Intercept	**0.095**	**0.056**	**0.134**
		M incubation	**0.401**	**0.154**	**0.638**
		Sin (12 hours)	-0.005	-0.049	0.037
		Cos (12 hours)	**-0.057**	**-0.098**	**-0.014**
		M incubation : Sin (12 hours)	**0.298**	**0.034**	**0.567**
		M incubation : Cos (12 hours)	**-0.297**	**-0.561**	**-0.038**
	Random (variance)	Nest (Intercept)	13		
		Sin (12 hours)	14		
		Cos (12 hours)	12		
		Residual	61		

The posterior estimates (medians) of the effect sizes with the 95% credible intervals (CI) from a posterior distribution of 5,000 simulated values generated by the 'sim' function in R (Gelman et al. 2016). Variance components were estimated by the 'lmer' function(Bates et al. 2015). Response variable was proportion of sleeping during particular hour of day. Time was taken as "hour of day" transformed to radians (2*hour * π/period of interest – 12h) and fitted as sine and cosine of radians. Model was weighted by square root of female incubation time during the hour. Estimates whose 95% credible intervals don't contain 0 are highlighted in bold.

Table S2 | Model outputs after control for potentially confounding effects

a) Daily pattern of female sleep

				95% CI	
Response	Effects type	Effect	Estimate	Lower	Upper
Female sleep	Fixed	**Intercept**	**0.215**	**0.188**	**0.242**
		M incubation	**0.05**	**0.024**	**0.077**
		Sin (12 hours)	**0.036**	**0.005**	**0.067**
		Cos (12 hours)	**-0.087**	**-0.115**	**-0.058**
		Night (yes)	**-0.086**	**-0.112**	**-0.061**
		Temperature	-0.016	-0.044	0.011
		Precipitation	-0.011	-0.031	0.010
		Start of incubation	0.005	-0.020	0.030
		Day of incubation	-0.006	-0.031	0.021
		M incubation : Sin (12 hours)	**0.036**	**0.007**	**0.067**
		M incubation : Cos (12 hours)	**-0.045**	**-0.071**	**-0.02**
	Random (variance)	Nest (Intercept)	12%		
		Sin (12 hours)	15%		
		Cos (12 hours)	10%		
		Residual	63%		

b) Daily pattern in the length of female sleeping bouts

				95% CI	
Response	Effects type	Effect	Estimate	Lower	Upper
Length of sleeping bouts (minutes)	Fixed	**Intercept**	**3.956**	**3.447**	**4.458**
		M incubation	**0.439**	**-0.053**	**0.916**
		Sin (12 hours)	**0.958**	**0.697**	**1.208**
		Cos (12 hours)	**1.655**	**1.23**	**2.083**
		Night (yes)	**1.064**	**0.369**	**1.763**
		Temperature	-0.297	-0.84	0.245
		Precipitation	0.068	-0.338	0.466
		Start of incubation	0.182	-0.379	0.737
		Day of incubation	**-0.624**	**-1.093**	**-0.141**
		M incubation : Sin (12 hours)	**0.129**	**-0.099**	**0.353**
		M incubation : Cos (12 hours)	**-0.072**	**-0.413**	**0.266**
	Random (variance)	Nest (Intercept)	12%		
		Residual	88%		

c) Daily pattern of female preening

				95% CI	
Response	Effects type	Effect	Estimate	Lower	Upper
Female preening	Fixed	**Intercept**	**0.196**	**0.138**	**0.253**
		M incubation	**-0.316**	**-0.480**	**-0.148**
		Sin (12 hours)	**-0.002**	**-0.023**	**0.020**
		Cos (12 hours)	**-0.115**	**-0.145**	**-0.084**
		Night (yes)	**-0.045**	**-0.068**	**-0.023**
		Temperature	-0.000	-0.005	0.004
		Precipitation	-0.003	-0.015	0.009
		Start of incubation	0.002	-0.011	0.016
		Day of incubation	0.012	-0.002	0.026
		M incubation : Sin (12 hours)	**-0.024**	**-0.145**	**0.099**
		M incubation : Cos (12 hours)	**0.327**	**0.169**	**0.480**
	Random (variance)	Nest (Intercept)	23%		
		Sin (24 hours)	9%		
		Cos (24 hours)	17%		
		Residual	51%		

The posterior estimates (medians) of the effect sizes with the 95% credible intervals (CI) from a posterior distribution of 5,000 simulated values generated by the 'sim' function in R (Gelman et al. 2016). Variance components were estimated by the 'lmer' function (Bates et al. 2015). Time was taken as "hour of day" transformed to radians (2*hour * π/period of interest – 12/24h) and was fitted as the sine and cosine of the radians. All continuous predictors (except of time of day) were z-transformed (mean-centered and divided by SD). Models were controlled for potentially confounding effects, which were as follows: "Start of incubation"- the day when the breeding attempt has started (number within the year); "Day of incubation" - day within the incubation period, for which the recordings have been analyzed; "Temperature" – the daily mean temperature; "Precipitation" – the daily sum of precipitation. For temperature and precipitation we used weather measurements from meteorological station České Budějovice (Czech hydrometeorological institute, pers. comm.). Estimates whose 95% credible intervals don't contain 0 are highlighted in bold. Response variables were as follows: a) the relative proportion of sleep within the female incubation time and during the particular hour of the day; b) the length of sleeping bout in minutes, and c) the relative proportion 30s intervals within the female incubation time when female preened. Models were weighted by the square root of the female incubation time during the hour. Note, that model for the length of sleeping bouts did not converge, when contained also random slopes for the time of day.

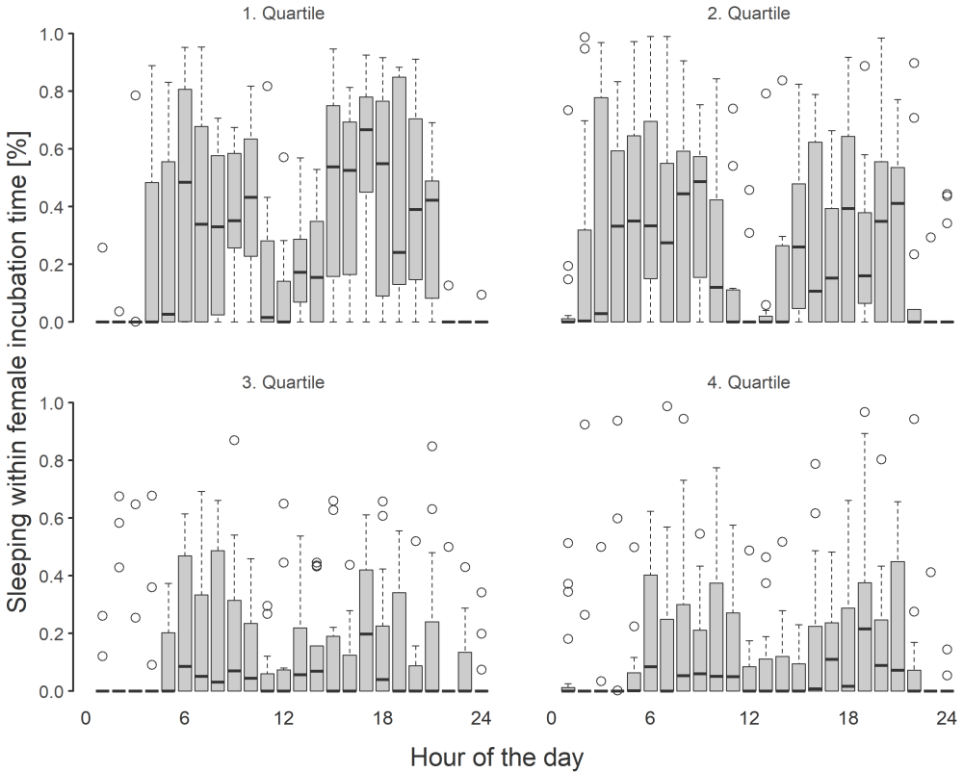

Figure S1. The proportion of female incubation time female spent with sleep in relation to the time of day and male contribution to incubation. The boxplots represent the real proportions in our dataset and are separated by the quartiles of male contribution to incubation (Q1: 0 – 4.7 %; Q: 4.8 – 12.5 %; Q3: 12.6 – 20.9 %; Q4: 21 – 36.6 %). Boxes depict median (horizontal line inside the box), 25–75th percentiles (box), 25th and 75th percentiles minus or plus 1.5× interquartile range, respectively, or the minimum and maximum value, whichever is smaller (whiskers) and outliers (circles).

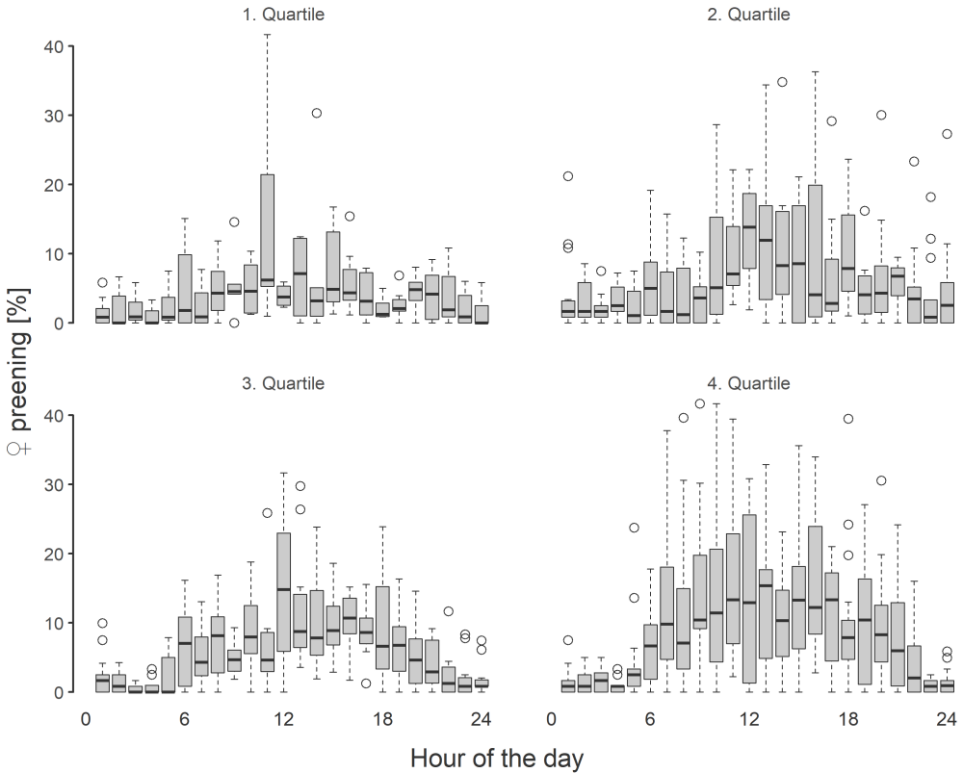

Figure S2. Female preening behavior during incubation in relation to the time of day and male contribution to incubation. Presented data represent the real frequencies in our dataset and are separated by the quartiles of male contribution to incubation (Q1: 0 – 4.7 %; Q: 4.8 – 12.5 %; Q3: 12.6 – 20.9 %; Q4: 21 – 36.6 %). Boxes depict median (horizontal line inside the box), 25–75th percentiles (box), 25th and 75th percentiles minus or plus 1.5× interquartile range, respectively, or the minimum and maximum value, whichever is smaller (whiskers) and outliers (circles).

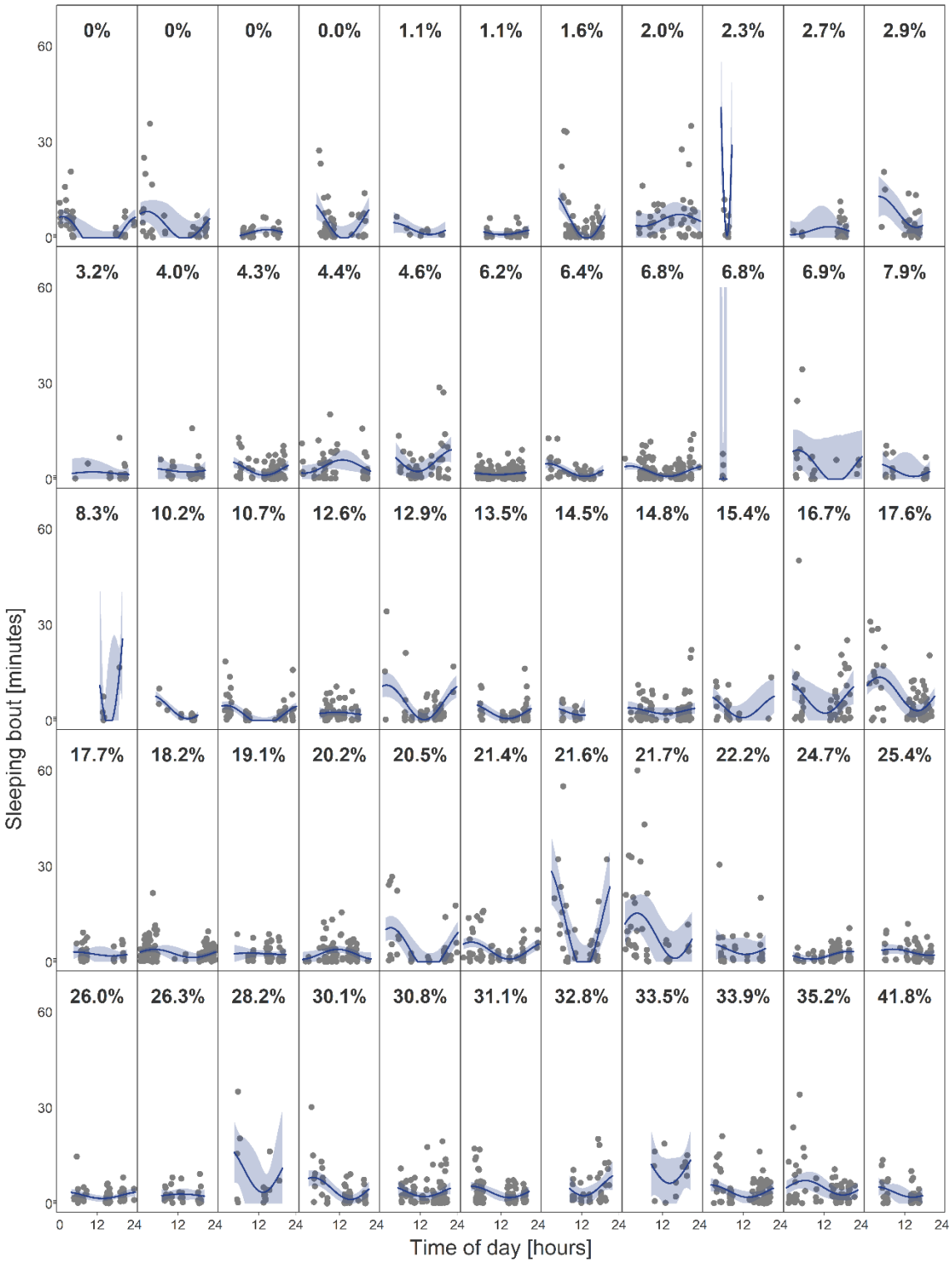

Figure S3. Individual variation in relationship between the time of day and the length of female sleeping bouts. The panels represent individual nests sorted by the male contribution to incubation (the number in the upper part of each panel); points represent the length of sleeping bouts in minutes. Data are fitted by the model ('lm' function), with time when the bout started transformed to radians (2*hour * π/period of interest – 24h) and fitted as the sine and cosine of the radians. Curve with shaded areas indicate the model prediction with 95% credible intervals based on the joint posterior distribution of 5,000 simulated values based on the model output (Table 1) and generated by the 'sim' function in R (Gelman & Hill 2007). Lines and curves are visualized only for the time range for which the bout lengths are present in our dataset.

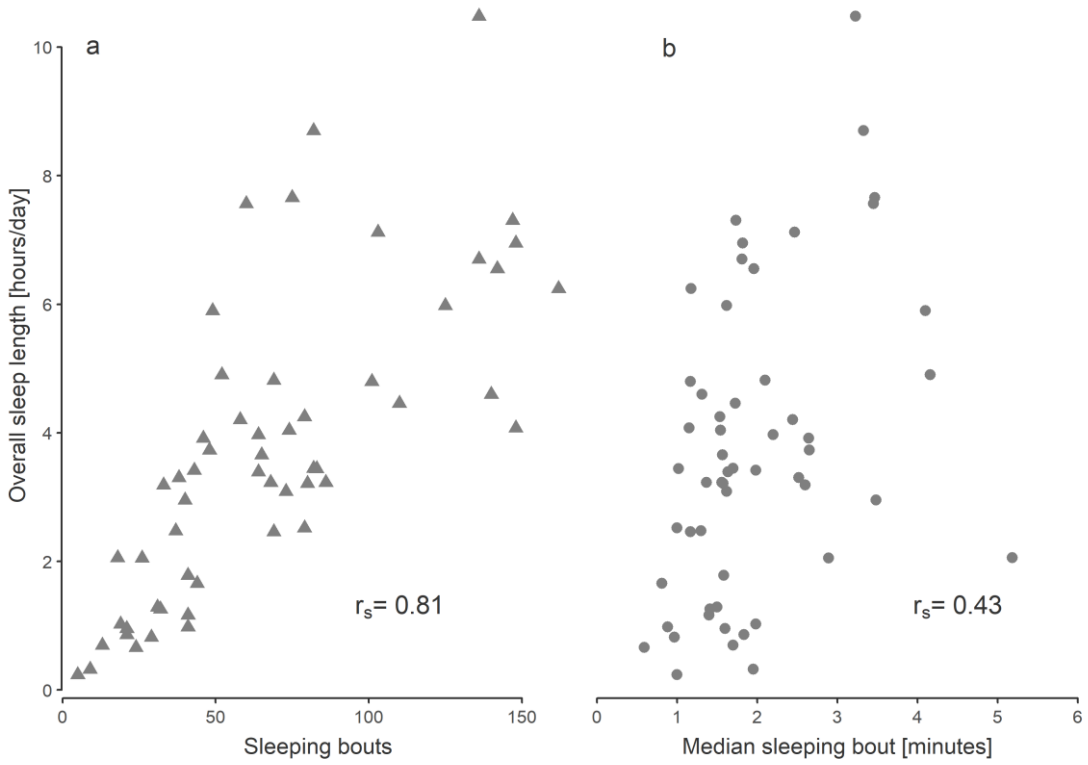

Figure S4. a) Relationship between daily sleep length and number of sleeping bouts. b) Relationship between daily sleep length and median length of sleeping bout. Spearman's rank correlation coefficients are presented.

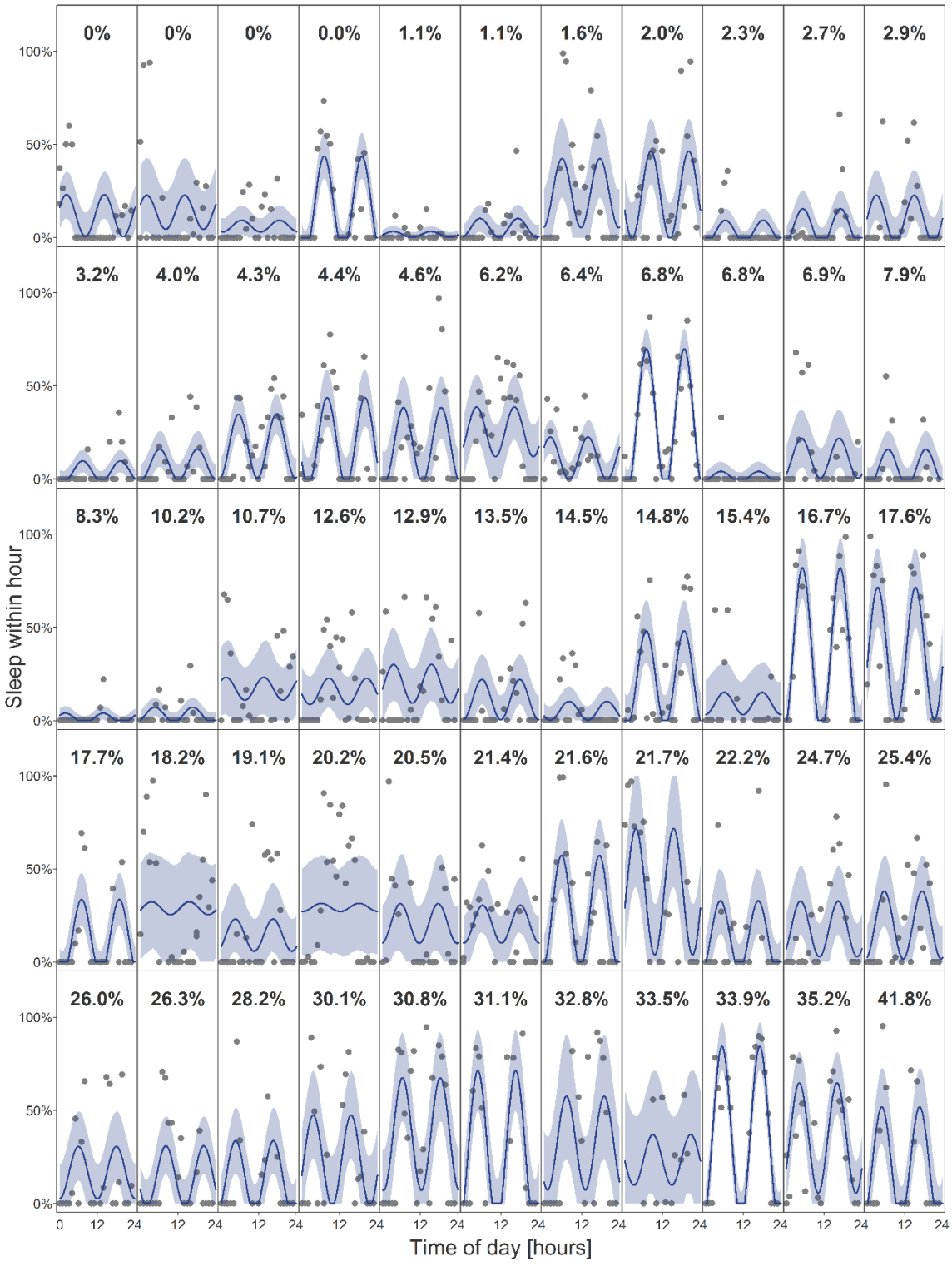

Figure S5. Individual variation in relationship between the time of day and female sleep. The panels represent individual nests sorted by the male contribution to incubation (the number in the upper part of each panel); points represent the relative proportion of sleep within female incubation time. Data are fitted by the model ('lm' function), with time ("hour of day") transformed to radians (2*hour * π/period of interest – 12h) and fitted as the sine and cosine of the radians. Curve with shaded areas indicate the model prediction with 95% credible intervals based on the joint posterior distribution of 5,000 simulated values based on the model output (Table 1) and generated by the 'sim' function in R (Gelman & Hill 2007).

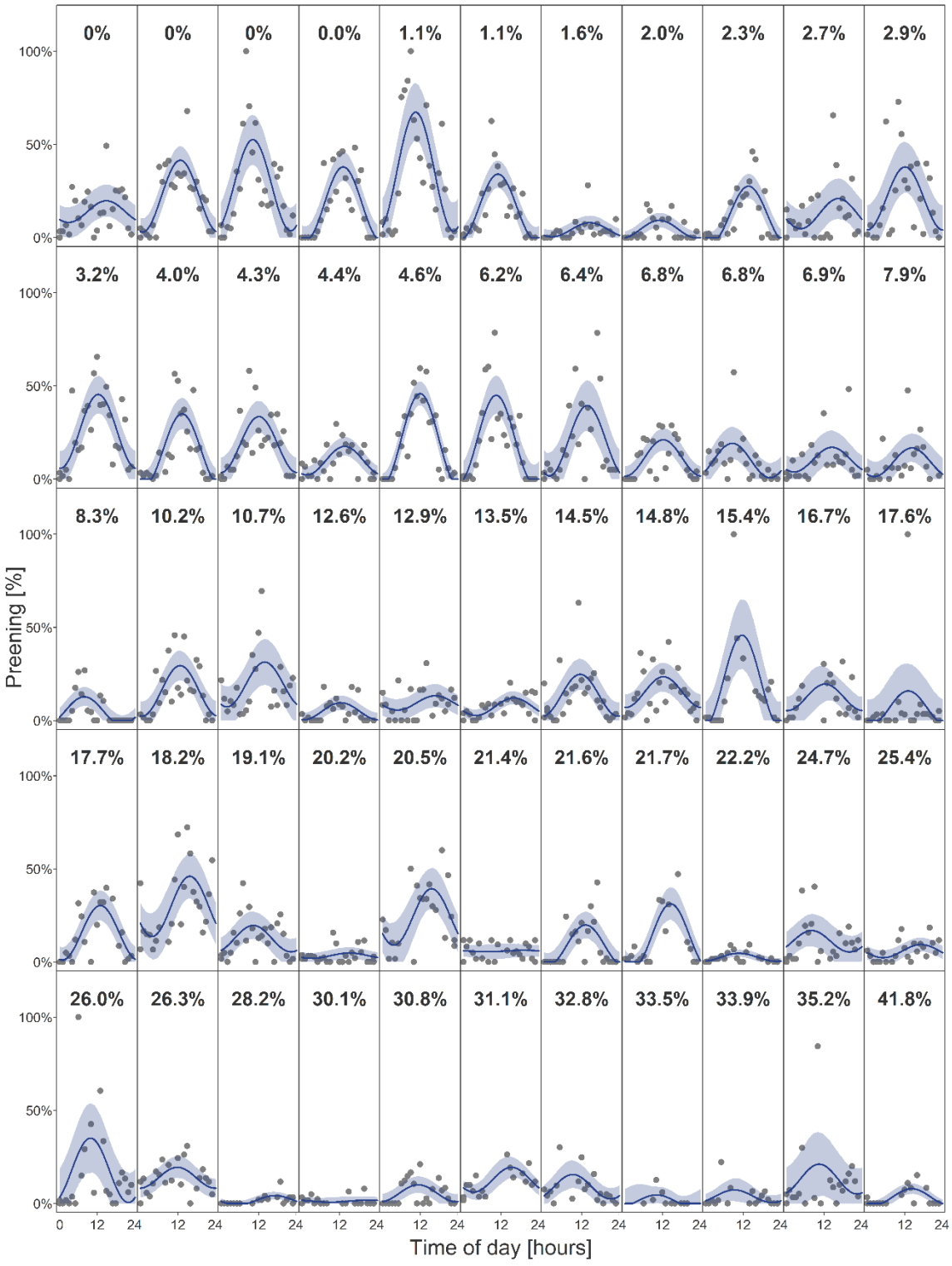

Figure S6. Individual variation in relationship between the time of day and female preening. The panels represent individual nests sorted by the male contribution to incubation (the number in the upper part of each panel); points represent the relative proportion of preening time within female incubation time. Data are fitted by the model ('lm' function), with time ("hour of day") transformed to radians (2*hour * π/period of interest – 24h) and fitted as the sine and cosine of the radians. Curve with shaded areas indicate the model prediction with 95% credible intervals based on the joint posterior distribution of 5,000 simulated values based on the model output (Table 1) and generated by the 'sim' function in R (Gelman & Hill 2007).