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Supplementary Methods: fecal progestogen assays.

Progesterone standards and ^{125}I-Progesterone were purchased from MP Biomedicals (Costa Mesa, CA). Normal mouse serum was purchased from Sigma-Aldrich Corp. (St. Louis, MO) and the Goat Anti-Mouse IgG from Equitech bio Inc. (Kerville, TX). The monoclonal progesterone antibody was diluted at 1/12000 in a Phosphate Buffered Saline (PBS) containing 0.1% Bovine Serum Albumin and 0.1% Tween 80, pH 7.5. The Normal Mouse Serum and the Goat Anti Mouse IgG were both diluted at 1/100 in a 5 % PEG (Polyethylene Glycol 8000)/PBS buffer. 50 µl of standards or diluted fecal samples were incubated overnight at room temperature with 100 µl of the CL425 monoclonal antibody d 1/12000 and 200 µl of ^{125}I-Progesterone.

The progesterone-antibody complexes were separated from the free progesterone by adding 100 µl normal mouse serum d 1/100 and 1 ml of Goat Anti Mouse IgG d 1/100, and incubating it for 1hr at room temperature. The tubes were then centrifuged at room temperature for 20 min at 3,100 rpm, and the supernatant containing the unbound progesterone was aspirated, and the precipitate counted on a gamma counter.

We validated the use of the Progesterone CL425 antibody with our population by assessing parallelism, accuracy, and precision of the assay using a fecal pool of wild baboon feces. The slope of a serial dilution of the fecal pool showed great parallelism with the slope of the standard curve ($F=0.001$, $p=0.998$, $N=7$; see Fig. S1). The assay accuracy, assessed by spiking each standard with an aliquot of the fecal pool, is 113% ± 7 (Mean± SD, N=7). The intra-assay coefficients of variation (CV) was 3.83% (N=10) for a 300 ng/g fecal pool. The inter-assay CVs were 10.4%, 8.7%, 6.0 and 8.9% respectively for a 150, 300, 600 and 750 ng/g fecal pool (N=14).

We also assessed if fP concentrations reflected biological variations, determined with the CL425 antibody, by comparing fP concentrations during the different phases of the menstrual cycle and found as expected that fP concentrations were two times higher during the luteal phase of the cycle than during the follicular phase ($fP_{Follicular}$= 468 ng/g feces±11 (Mean±SE), N=635; fP_{Luteal}= 969 ng/g feces±132, N=314; Mann-Whitney test: $Z=-15.488$, $p<0.001$, see fP profile across cycle in Fig. S1).

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Table S1. Results of the LMMs showing the factors affecting the duration of the IBI and its component phases transformed. (A) Models with age as a linear term, (B) Models with age as a quadratic term. *

A.

Duration of	Log IBI		PPA		Sqrt Cycling		Sqrt RS Pregnancy	
	b	Sig.	*b*	Sig.	*b*	Sig.	*b*	Sig.
Dominance rank	0.003	<0.001	3.273	<0.001	0.013	0.663	0.004	0.596
Primiparity (Yes/No)	-0.041	<0.001	-22.514	0.016	-1.680	<0.001	-0.129	0.180
Age	-0.001	0.339	1.155	0.284	-0.101	0.041	-0.001	0.948
Female density		0.001		0.003		0.180		0.831
(intermediate vs. small)	0.025	0.003	28.964	0.001	0.237	0.548	-0.048	0.589
(large vs. small)	0.034	<0.001	26.482	0.008	0.760	0.077	-0.053	0.585
Rainfall	-0.024	0.019	-30.327	<0.001	0.091	0.486	0.152	<0.001
Habitat quality (higher vs. lower)	-0.029	0.017	-33.075	0.015	-0.574	0.271	-0.306	0.013

B.

Duration of	Log IBI		PPA		Sqrt Cycling		Sqrt RS Pregnancy	
	b	Sig.	*b*	Sig.	*b*	Sig.	*b*	Sig.
Dominance rank	0.003	<0.001	3.336	<0.001	0.020	0.506	0.006	0.417
Primiparity (Yes/No)	-0.020	0.074	-13.252	0.256	-0.664	0.224	0.122	0.304
Age	-0.020	0.001	-6.859	0.271	-0.996	0.001	-0.221	0.001
Age^2	0.001	0.002	0.327	0.192	0.036	0.002	0.009	0.001
Female density		0.001		0.004		0.178		0.777
(intermediate vs. small)	0.023	0.004	28.331	0.001	0.221	0.572	-0.054	0.540
(large vs. small)	0.033	<0.001	25.732	0.010	0.755	0.078	-0.063	0.513
Rainfall	-0.026	0.012	-30.854	<0.001	0.096	0.456	0.153	<0.001
Habitat quality (higher vs. lower)	-0.029	0.018	-33.200	0.015	-0.587	0.264	-0.309	0.012

*Cells with gray shading indicate statistically significant effects; the yellow shaded cell indicates the sole difference in results when we use transformed versus untransformed variables.

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Table S2. Results of the LMM showing the factors affecting duration of the number of cycles to conception (on untransformed variables); compare to similar results in Table 2B.

Duration of	Number cycles to conception	
	B	Sig.
Dominance rank	0.017	0.360
Primiparity (Yes/No)	-0.393	0.229
Age	-0.566	0.001
Age^2	0.020	0.004
Female density		0.351
(intermediate vs. small)	0.028	0.906
(large vs. small)	0.320	0.217
Rainfall	0.119	0.121
Habitat quality (higher vs. lower)	-0.257	0.427

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Supplementary Fig. S1. Validation of progesterone measured in the baboon fecal pool (fP) using the Quidel CL425 antibody. (A) Demonstrates parallelism with standard, (B) demonstrates biological validation.