

The biology of prolonged lactation in wild *Macaca sinica*: Interbirth intervals, maternal depletion, infant mortality

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A sample of 442 female toque macaques distributed among 39 independent social groups were briefly captured, sedated, and released (within one day) during 13 different years in the period 1986-2002 at the natural forest site of Polonnaruwa, Sri Lanka, where long-term sociobiological research has been conducted (1968 to 2023). All macaques were individually identified and had known life-histories. Lactation was determined by testing females for the presence or absence of milk by manually massaging the mammary tissue. Female reproduction in this wild population was depicted from different perspectives. Firstly, lactation and weaning were linked to offspring age, as well as to female reproductive status (cycling, gestation, and quiescence). A second data set examines interbirth intervals in relation to lactation duration, diet, and somatic growth or parity. Differences in diet quality were also related to menarche. A third data set examined female body condition (using skinfold thickness as a measure of % body fat) to diet quality and differences in the expenditure of foraging time between lactating and non-lactating females. A fourth data set considered the relation between infant mortality during peak lactation and the depletion of female metabolic energy balance as indexed by early weaning (cessation of lactation) and a shift to female reproductive quiescence. In the publication some of these data were integrated with mother-infant behavioral relationships as cited from an independent study of the same population. A final data set indicates the names of participants who contributed to both the long-term demographic records, milk collections and estimates human effort for different phases of this research.

Notes

Microsoft 365 EXCEL for spreadsheet entries. (Microsoft corporation)

SigmaPlot 14.5 for statistical analysis and graphic figures. (SYSTAT software Inc.)

Microsoft 365 WORD for document format. (Microsoft Corporation)

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Methods

Individual animal identification: The methods involve hand-written notes of field observation of individually identified macaques in their natural habitat at Polonnaruwa, Sri Lanka, according to established protocols as described in earlier publications. National Research Council (1981). Techniques for aging and sexing primates. In: Techniques for the Study of Primate Population Ecology. pp 81-134. Washington, DC, National Academy Press. Also: Dittus, WPJ (1990). Manual for the Identification of Individual Toque Macaque, unpublished training manual, Smithsonian Primate Biology Program. All research staff are trained in these methods.


Vital statistics: (dates of birth and death, age, survival, death, sex, reproductive condition) are based on monthly census of all macaque groups by trained field staff. During the birth season females were observed more frequently in order to pinpoint dates of birth.


Milk sampling: Temporary capture and sedation of macaques was used for purposes of milk tests. Methods were published in: Milligan LA, Rapoport S, Cranfield MR, Dittus WPJ, Glander KE, Oftedal OT,... Bazinet RP. (2008). Faty acid composition of wild anthropoid primate milks. Comparative Biochemistry and Physiology, part B 149: 74-82. doi: 10.1016/j.cbpb.2007.08.006. Mammary tissue was manually massaged, or nipple stippled, to check for the presence or absence of milk.

Intergation of data sets: Information from different data logs were entered into EXCEL spreadsheets for examination of relationships among different variables: infant age, milk presence, lactation, weaning, infant and maternal death, interbirth intervals, female reproductive states, female body condition, foraging duration, diet quality. Reproductive states were defined in the 3rd wordsheet (tab) of the first data set as well as in the publication. Column headings (variables) were defined in the second tab of the first data set.


Definitions: All dataset files and variables were defined in the README_DITTUS_Lactation_interbirth_intervals_female_reproduction_maternal_depletion.txt

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