



AN EXPLORATIVE STUDY OF LEMUR FITNESS IN RELATION TO LITTER SIZE, OR “A LACK THEREOF”

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Background:

Lack’s ideal clutch hypothesis states that the ideal clutch size in bird species is somewhere between the number that maximizes lifetime fitness of the parent and of the offspring. This study aimed to examine this model as a predictor of fitness and ideal litter size in social primates.

Methods:

690 captive-bred lemurs from the Duke Lemur Center were recruited for this study. Data on weight, litter size, and life history were to determine ideal litter size in relation to fitness—measured as the litter size most likely to produce individuals that survive to reproductive age—for 14 lemur species via Pearson’s r correlation followed by two-tailed t tests.

Calculations:

$$r = \frac{n\sum x_i y_i - (\sum x_i)(\sum y_i)}{\sqrt{n\sum x_i^2 - (\sum x_i)^2} \sqrt{n\sum y_i^2 - (\sum y_i)^2}}, \text{ where } t = \frac{r - \mu_r}{\text{est. } \sigma_r}, \text{ where est. } \sigma_r = \sqrt{\frac{1-r^2}{N-2}}$$

Results:

The analysis did not support Lack’s hypothesis as a reliable measure of fitness or predictor of litter size in social lemur species. Next, life history data pertaining to male-to-female birth, infant mortality, and survival was examined for each species with the same correlations. In all species, the mean litter size was found to be more favorable to female offspring’s fitness vs male’s— as measured by survival to reproductive age.

Highest fitness below mean litter size:

- Increasing female survival was positively correlated to increasing male-to female infant mortality, $p=0.0139$

- Male survival increased with increasing litter size, $p=0.0116$

- Highest fitness at mean litter size:

- Increasing male-to-female birth ratios was positively correlated with male-to-female infant mortality, $p=0.0317$

- Increasing male-to-female infant mortality was negatively correlated with male survival, $p=0.0475$

- Highest fitness above mean litter size:

- Increasing male infant mortality was positively correlated with increasing litter size, $p=0.0116$

Discussion:

Fitness differences by sex and litter sizes may be due intrabrood conflict between males and females, maternal preference for female offspring, or the female-dominant structure and lack of sexual dimorphism in lemur species. Future studies in wild populations should take care to account for population structure to examine similarities to captive populations.

