The behaviour and ecology of long-tailed bats (*Chalinolobus tuberculatus* Gray) in the central North Island.

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Abstract

The morphology, breeding season, juvenile development, activity and roosting behaviour of a North Island forest population of long-tailed bats (*Chalinolobus tuberculatus* Gray) was investigated intensively over spring and summer 1994 - 95. The diet of a cave dwelling population was studied by analysing guano collected regularly over a one year period.

Most body measurements taken were consistent with reported individuals caught at similar latitudes in other studies, while discrepancies in tail length, body length and wingspan may be the result in differences in measuring techniques. Females were significantly larger than males in forearm length, body length, left hind-limb length and wingspan. A higher proportion of adult females caught may reflect the higher activity and energy demands during pregnancy and lactation, but the higher proportion of juvenile males caught cannot be explained.

Most females gave birth in mid-November. Weight gain amongst females was more consistent up to than after parturition. Parturition was earlier than in closely related Australian species at similar latitudes in Australia. The onset of nipple enlargement coincided with parturition and did not reduce in size until volant juveniles were captured in early January. This suggests that lactation lasted approximately eight weeks, longer than in Australian *Chalinolobus* species. Most females captured during breeding (87.8%) showed signs of pregnancy or lactation. Cartilage bands and the lack of bulging in the metacarpal-pharangeal joint, body size and colour were all used to indicate bat age. Juvenile bats became volant from early January onwards. The age when juveniles are capable of sustained flight is probably greater than in closely related species in Australia.

Bat echolocation was recorded with an automatic bat detector and compared with weather, light intensity and potential insect prey abundance. Combinations of environmental variables best explained variation in bat activity. The number of passes during the night, the number of passes per hour and the number of passes in the first hour after sunset were all highest during pregnancy with reduced activity during lactation. The time of the first pass relative to sunset was earliest during September and February. Insect abundance was highest during lactation and when juveniles were volant. Diurnal bat activity generally followed a bimodal pattern with more activity in the first and last hour of darkness, however there were seasonal differences in this pattern.

Bats were tracked to roost sites using small transmitters (1.7 g) and directional receivers. Female bats used communal roosts only during lactation, but used combinations of communal and solitary roosts during pregnancy and when juveniles became independent. Communally roosting bats preferred mature trees or limbs of trees that were recently dead. These trees provided cavities with small entrances (6 - 7 cm) that were situated from 5 to 30 m above the ground. The number of bats observed emerging from communal roosts ranged from 5 to 208 (mean = 86). It is unlikely the same group of bats remained together every night. Individual bats changed roosts every one to three days therefore they probably transported juvenile bats with them.

Insect prey taxa were identified from long-tailed bat guano collected from a limestone cave roost over one year. It was concluded that bats feed mainly on Diptera, Lepidoptera and Coleoptera, while other orders are taken in smaller numbers. Quantitative data could not be used as an indication of seasonal changes in prey taken. There was no evidence of terrestrial insects in the faeces as reported for Australian *Chalinolobus* species. Estimated sizes of ingested prey items were smaller than the size range of available prey insects. Larger insects may be culled of identifiable body parts before ingestion.

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