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Foraging decisions in the bushveld gerbil (gerbilliscus leucogaster) using cost/benefit scenarios

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Abstract

Foraging is an essential part of an animal's everyday life, during which it has to balance out many costs and rewards while making decisions on where, what, when and how to forage. The aim of my study was to investigate how different cost/benefit foraging scenarios affect foraging decisions in captive Bushveld gerbils. The foraging behaviour of Bushveld gerbils was studied in four experiments to establish the effect of cost/benefit scenarios on their foraging behaviour, specifically I tested i) how much gerbils will work for seeds of different quality; ii) how seed presentation (piled/scattered) influences foraging behaviour; and iii) the effect of potential predation risk on foraging decisions. Initial seed preference studies for five commercially available seeds (sunflower, sorghum, oats, maize and wild rice) indicated that the gerbils displayed individual seed preferences, and this information was then used to tailor the experiments to the preferences of individual gerbils. The experimental apparatus consisted of 2 joined tanks, one of which, the experimental tank, was designed to impose a cost (weighted door) to access reward (food). The weight of the door was altered to create a low cost door (light door) or a high cost door (heavy door) that was individually tailored to the gerbils by using their individual body weights to create a heavy door approximately the same weight as the gerbil. Most and least preferred seeds were used to create a high reward and a low reward, respectively. Using the door in combination with the preferred seeds, 4 treatments were created, namely, low cost low reward, low cost high reward, high cost low reward, and high cost high reward. These treatments were run in 4 different experiments that were designed to assess the decisions Bushveld gerbils made during foraging. My results indicated that the gerbils employed foraging strategies which, firstly, favoured a reduced cost, possibly linked to reduced energy expenditure, and secondly, gaining the highest rewards. The gerbils consumed less in high cost and low reward treatments, and consumed more in low cost and high reward treatments. The data also revealed that the presentation of the seeds influenced foraging decisions, where seed consumption and exploratory behaviour differed when seeds were piled rather than scattered, depending on the cost/reward structure. Under potential predation risk, the gerbils employed predator avoidance strategies by using cover more and reducing foraging, indicating they were trading-off foraging against predation risk. Demand curves generated to assess decision-making indicated that the gerbils made consistent decisions except under particular circumstances, such

as when there was a large difference in food value and cost. Ultimately, my study showed that Bushveld gerbils change their foraging decisions in a predictable way to exploit low cost and high reward situations. Their decision-making was largely inelastic, indicating that foraging decisions were similar under different circumstances, except when there is a large discrepancy between the qualities of seeds presented.