Seasonal changes in the time budget of degus, 
Octodon degus

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Summary
The activity budget of an individual is the allocation of time to all its activities, and is expected to vary in response to both internal and environmental factors that influence its energy acquisition, breeding success, and survival. We recorded seasonal variation in individual and social behaviour of a natural population of degus (Octodon degus), a diurnal, semi-subterranean and social rodent from central Chile. We related changes in degu activity to differences in sex, seasonality (breeding activity, abundance of high quality food), and abundance of degu predators. On average, degus allocated most of their time while active above ground to foraging (46%) and alertness (32%); activities such as resting (8%), locomotor activity (7%), self-grooming (3%), burrow digging (0.2%), dust-bathing (1%), and social interactions (3%) occupied a relatively small percentage of degus’ time budget. Time spent in foraging and total vigilance did not vary seasonally, but they were inversely related, reflecting a trade-off. Degus adjusted bipedal vigilance and locomotor activity partially to the presence of predators. Sex interacted with seasonality to influence degu behaviour. Male degus dust-bathed more and were more aggressive toward conspecifics than females during breeding time. We hypothesize that breeding activity is a more important predictor than abundance of high quality food to account for these interactions.

Keywords: activity, foraging, vigilance, predation risk, degu breeding, seasonality.

Introduction
The allocation of time to different kinds of activity, or activity budget, is one major aspect of the temporal behaviour of animals (Halle & Stenseth, 1) Corresponding author; e-mail address: lebenspe@bio.puc.cl
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Given that organisms must perform their activities within constraints imposed by daily or seasonal cycles (Bartness & Albers, 2000), time is limited to them. As a consequence, how an animal allocates its time budget to different activities usually is influenced by conflicting demands. Thus, time must be assigned to activities that increase nutritional and breeding objectives, but also to activities that minimize costs and risks imposed by environmental conditions (Alkon & Saltz, 1988; Armitage et al., 1996; Halle, 2000; Weiner, 2000).

Among animals, activity of model organisms such as rodents is influenced by several individual (energy requirements, sex-specific breeding activity) and environmental (weather, predators, food abundance) factors, some of which interact and result in activity trade-offs to individuals. Thus, foraging-related activities are typically traded off against those that decrease the risk of predation (Kotler et al., 1991; Abramsky et al., 1996; Vásquez, 1996; Hendrie et al., 1998), or the risk of hyperthermia (Melcher et al., 1990; Cotton & Parker, 2000; Kenagy et al., 2002). On the other hand, breeding-related activities may force individuals to expand their daily activity to gather enough food (Corp et al., 1997), and sex-linked differences or similarities in activity tend to be related to sex differences or similarities in breeding strategies (Behrends et al., 1986; Loughry, 1993; Armitage et al., 1996; Sharpe & Rosell, 2003). Sex-specific parental duties and breeding-related activities may interact with predation risk to modulate overall activity (Daly et al., 1990; Sommer, 2000). Other factors such as food availability may cause changes in overall activity and re-allocation of time to different activities (Lacki et al., 1984; Kenagy et al., 1989).

The allocation of time to different, and often conflicting, activities might be of special concern to rodents that breed once per year in seasonal environments. Herein, we used observational data to examine how male and female degus, *Octodon degus* (Rodentia; Octodontidae), adjust their activity time throughout seasonal changes in their annual life cycle and environmental conditions. In particular, our objective was to examine how degus allocate time seasonally among essential activities such as foraging, vigilance, and social behaviour.

Several aspects of degu biology and ecology predict that these rodents should adjust their seasonal activity in response to sex-linked changes in breeding activity, food abundance, and predator abundance. First, degus are small to medium sized (ca. 180 g), diurnal, social, and semi-subterranean