Title: Late breeding in two common dormouse *(Muscardinus avellanarius)* populations, *Mammalian Biology, 2003*

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Background to study
The reproductive activity of dormice is restricted to a few months in the northern parts of its range and second litter juveniles and lactating females are at risk to overwinter mortality due to having limited time to increase fat reserves for hibernation. Despite this risk, records of late litters are frequent and can be as late as October. The reasons why dormice produce such late litters and the impact of these on populations are discussed.

Method
- Capture-mark-recapture study of dormice in two isolated forests in Lithuania. Study sites A & B were 60 ha and 85 ha which covered 22% and 17% of total area of forest occupied by dormice.
- 262 and 341 nestboxes were placed at 50 m intervals in a grid and were checked monthly from April to October and twice monthly in May and September. Data from study periods 1984-1989 and 1997-2002 at Site A and 1984-1992 at Site B were used.
- Encountered individuals were weighed, sexed, uniquely marked and classed as adults if survived hibernation. Independent juveniles were recorded depending on weight and fur and females were considered breeding if with litter present or were encountered pregnant or with nipples.
- Juvenile overwinter survival was determined as those captured the following active season.

Key results
- 37 out of 479 records of breeding were recorded as 'late' across both study sites and years and 8.3% of all litters with known birth dates were born in September.
- Late born litters were not recorded each year and the proportion of years with records varied between sites, Site A encountered late litters in 4 out of 9 years and almost every year at Site B which had a lower average population density. Late breeding was statistically related to low spring densities and low summer density of adult females.
- In one particular year, September litters accounted for 36.1% of all litters at Site B, however density did not increase but decreased the following year.
- No significant relationship between late litters and temperature and rainfall was found. However high survival of late born juveniles in 2000 at Site A correlated with favourable environmental conditions and good crops of berries and nuts in autumn.
- Survival of late born juveniles (September) was lower than those born in early August and survival of females bearing late litters did not differ significantly with those that did not.

Key messages to landowners and managers derived from these results
- The survival of late born juveniles is reliant on abundant food resources during autumn, as such late crop producing species such as buckthorn, bramble, hazel and oak are important components to maintain in dormouse habitat.
- Successive years of bad weather may reduce the availability of resources for dormice and despite compensating by increasing number of litters; common dormice are likely to be highly threatened by climate change across their range.

Key words/phrases
Common dormouse; *Muscardinus avellanarius*; Lithuania; breeding; late litters; survival; nest boxes; climate