proceedings

Abstract

Chunky Reproduces Better? Small Rodent Fertility and Fitness in Commercial Orchards †

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† Presented at the 1st International Electronic Conference on Animals—Global Sustainability and Animals: Science, Ethics and Policy, 5–20 December 2020; Available online: https://ieca2020.sciforum.net/.

Abstract: Rodents are an important part of agricultural ecosystems, including within commercial orchards. In 2018–2020, we studied small mammals in commercial orchards in Lithuania (northern Europe), snap-trapping them twice a year (in June–July and September–October, 1450 individuals, 11 species) at 18 sites across central, northern, eastern, southern and western parts of the country. Sites were located in apple and plum orchards, as well as currant, raspberry and highbush blueberry plantations, with each site also having a control habitat (meadow or forest) adjacent. We present results of our analysis of body condition, based on body weight and body length in relation to the habitat type and the intensity of agricultural activities, and reproduction parameters (litter size, pregnancy disruption) in common, bank, short-tailed and root voles as well as yellow-necked and striped field mice, accounting for over 96% of trapped rodents. The average body condition index of *Apodemus flavicollis* was C = 3.39, that of *Apodemus agrarius* was C = 3.38, and those of *Microtus agrestis*, *Microtus arvalis*, *Clethrionomys glareolus* and *Microtus oeconomus* were C = 3.29, 3.25, 3.23 and 3.01, respectively. Body condition of rodents was significantly dependent on species ($p < 0.0001$), age ($p < 0.005$) and gender ($p < 0.05$) of the individual, season ($p < 0.0001$) and habitat ($p < 0.05$); the influence of crop age ($p = 0.07$) and intensity of agricultural practices ($p = 0.12$) was much weaker or insignificant. We found observed litter size decreasing in autumn in all rodents; that in *M. arvalis* and *A. flavicollis* was significant, and there was a tendency for it to decrease in *M. oeconomus*. A decrease in the observed litter size in areas with a higher intensity of agricultural practices was registered for *M. arvalis* and *M. oeconomus*, the trend in *M. glareolus* was not significant. In *A. flavicollis*, litter size was similar irrespective of the intensity of agricultural practices. In spring, litter size was significantly correlated with the female body mass in *M. oeconomus* ($r = 0.67$, $p < 0.05$, body mass explained 45% of variation of the litter size) and *A. flavicollis* ($r = 0.53$, $p < 0.005$, 27% of litter size variation explained). In autumn, litter size and female body mass were positively correlated in all rodent species. Female body condition index and litter size correlations were weak. Therefore, old orchards with a low intensity of agricultural practices are important habitats, maintaining sustainable rodent populations and diversity of animals in the agrolandscape.

Keywords: rodents; litter size; pregnancy disruption; body condition; agrolandscape; Lithuania

Citation: Balčiauskas, L.; Stirkė, V.; Balčiauskienė, L. Chunky Reproduces Better? Small Rodent Fertility and Fitness in Commercial Orchards. *Proceedings* **2021**, *73*, 1. https://doi.org/10.3390/IECA2020-08541

Published: 24 November 2020

Institutional Review Board Statement: The study was conducted in accordance with Lithuanian (the Republic of Lithuania Law on the Welfare and Protection of Animals No. XI-2271) and European legislation (Directive 2010/63/EU) on the protection of animals. Study was post-hoc approved by the Animal Welfare Committee of the Nature Research Centre (protocol code No GGY-7, 27 January 2021).