Is reproduction of the Australian house mouse (*Mus domesticus*) constrained by food? A large-scale field experiment

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Abstract
Food quantity and especially food quality are thought to be key factors driving reproductive changes in the house mouse, *Mus domesticus*, leading to outbreaks of house mouse populations in the Australian grain-growing region. Characteristic changes during an incipient mouse plague are an early start of breeding, a high proportion of females breeding at a young age and a prolonged breeding season. We conducted a large-scale food manipulation during an incipient mouse plague, which started with early breeding and relatively high spring numbers of mice. We measured background food availability in four farms throughout the study and conducted a food manipulation experiment from November to March in two of them. After harvest in December 100-200 kg/ha spilled grain remained in the stubble. This was depleted by March. In two treatment farms we added high-protein food pellets on a weekly basis between November and March and two farms served as controls. We measured changes in mouse numbers by capture-mark-recapture trappings and changes in reproduction by scoring embryos and recent placental scars at necropsy. Mouse numbers did not differ between treatments and controls. There were no differences in the litter size or the proportion of females breeding between treatments and controls. We observed the normal pattern of high litter size in spring and decreasing litter size towards the end of summer in treatments and controls. In all farms reproduction stopped in March. Mouse numbers were high but not at plague densities. Contrary to our prediction we did not observe food constraint affecting the reproduction of female mice. Our field experiment seems to rule out food quality as the driving factor for improved reproduction and formation of an outbreak of mice. We suggest that physiological mechanisms in mice might not enable them to take advantage of food with a high protein content in arid summers in southeastern Australian grain fields because of the lack of free-standing water.

Keywords House mouse plague · Reproduction · Food constraint · Water · Supplemental food