

The use of sodium lamps to brightly illuminate mouse houses during their dark phases

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Summary

The human and murine diurnal rhythms are out of phase. Consequently in conventionally-lit mouse houses the mice's deep sleep is often disrupted, the daily welfare monitoring of the mice is limited by their inactivity, and scientific data obtained from the mice model the sleeping rather than awake human. Sodium light is bichromatic, with both wavelengths being in the human visual field but at the margin of murine vision. We report here that sodium lamps can be used to light mouse houses to a level that is comfortable for humans, but still sufficiently dull to permit nocturnal behaviour in mice. The response of mice to sodium light was initially monitored by recording the locomotory activity of BALB/c mice. The movement of mice in their cages greatly increased at the start of the nocturnal phase. Alterations in the white light cycle caused an acute change in the onset of nocturnal behaviour. In contrast, sodium light did not suppress the onset of nocturnal locomotory behaviour, even though the lighting was sufficiently bright for humans to read without light adaptation. The sodium lighting was then used to observe the nocturnal behaviour of over 150 mice of various strains, for over 1.5 years. Mice were invariably awake and alert during the nocturnal/sodium light phase. All exhibited high locomotory activity, except for nursing mothers. Some tasks, such as cage cleaning and minor surgery, were more easily done under white than sodium lighting. We therefore adjusted the timing of the light cycles to provide white light in the morning and sodium light (nocturnal phase) in the afternoon. This provided for easy operation of the mouse house, while yielding both animal welfare and scientific advantages.

Keywords Nocturnal; circadian; behaviour; welfare monitoring