Light variability between a library-style rat rack and an Optirat Plus carousel rack

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Introduction

Light can affect the physiology, development, and behavior of rodents and should be controlled in scientific studies. The "Guide for the Care and Use of Laboratory Animals" states that rats and mice generally prefer cages with low light intensity[1]. For most pigmented strains, this is below 60 lux, and for albino strains it is below 25 lux[2, 3]. Light intensity varies with distance; hence cage illumination can change as a function of rack style, its position relative to the light source, and within-rack differences in cage location. It is important to keep lighting intensity and duration constant to minimize experimental variability. Thus, the following study assessed light levels in two types of rat caging material, where intra-rack variability in light exposure was compared between a library-style rack and an Optirat Plus carousel.

Study Design

Both the library-style rack and Optirat Plus carousel were tested in a standard rodent room and placed in the same location relative to a fixed lighting source. Light intensity was measured within individual cages in three planes: front and rear (depth); left-most, center, and right-most positions (horizontal); and Rows 1, 4, and 6 (vertical). Light measured in the room 3 feet above the floor at the rack location was 174 lux.

Results

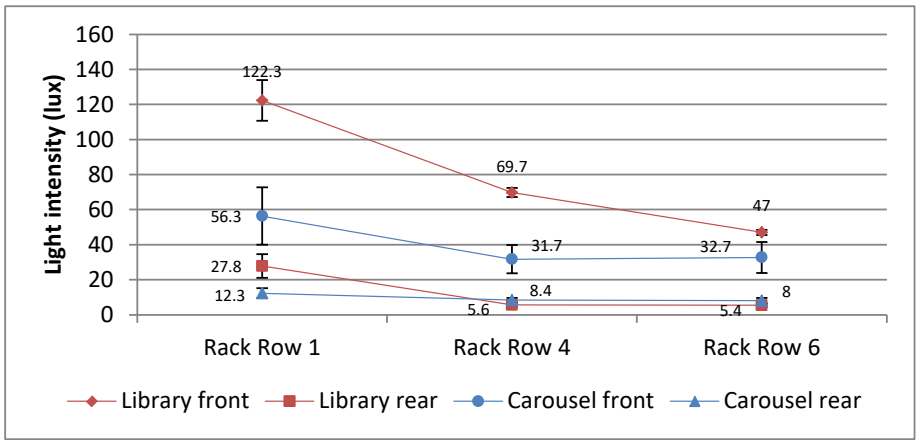

Figure 1: Average light intensity levels (lux) (± SEM) determined in the front and rear of individual cages situated in Rows 1, 4, and 6. Both between and within rows, there was considerably less light discrepancy in the Optirat Plus carousel compared to the library-style rack.

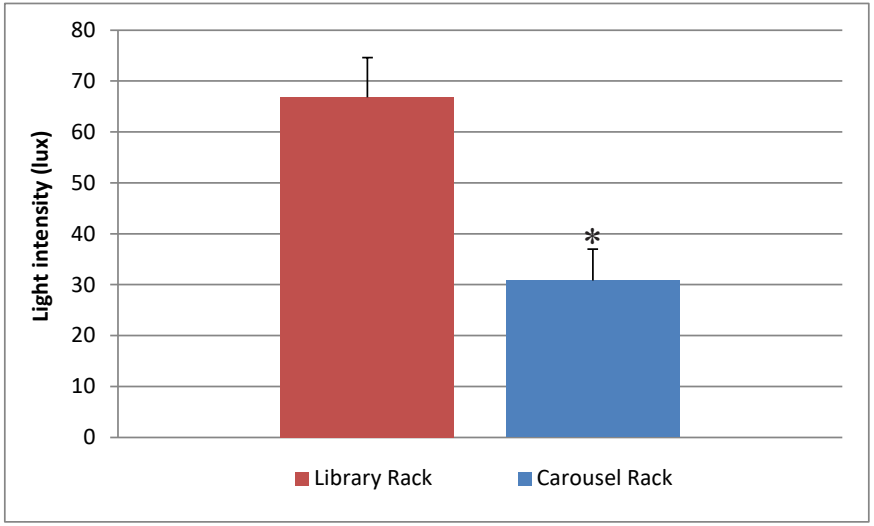

Figure 2: Average intensity levels (lux) collapsed across rows to illustrate differences in light exposure between cage fronts and rears. Note the lower variance in lux values in the Optirat Plus carousel compared to the library-style rack; 30.8 vs. 66.8, respectively; *: value differs significantly (P = 0.002, t-test).

Conclusion

Compared to the library-style rack, there was less variability in light exposure both within and between cages in the Optirat Plus carousel rack. Moreover, the average amount of light per cage within individual Optirat Plus cages approached or surpassed standards suggested for pigmented and non-pigmented rodent exposure preferences, respectively.

Acknowledgments

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References

[1]Institute for Laboratory Animal Research. Guide for the Care and Use of Laboratory Animals 8th ed., 2011.

[2]Animal Welfare Unit, NSW Department of Primary Industries. ARRP Guideline 22: Guidelines for the Housing of Mice in Scientific Institutions.

[3]Animal Welfare Unit, NSW Department of Primary Industries. ARRP Guideline 20: Guidelines for the Housing of Rats in Scientific Institutions.