

Light variability between a library-style mice rack and an Optimice® carousel rack

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Introduction

Light can affect the physiology, morphology 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 intensity¹. For most pigmented strains, this is below 60 lux and for albino strains it is below 25 lux^{2,3}. Retinal damage due to increased light exposure has frequently been reported especially in albino rodents because they lack the normal pigmentation of the eyes⁴. 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 and for animal comfort. Thus, the following study assessed light levels in two types of mice cage racks, where intra-rack variability in light exposure was compared between a library-style rack and an Optimice carousel. Both racks were additionally compared at two locations in the room, at the very center and in the dimmest corner of the room.

Study Design

A library-style mouse rack and an Optimice carousel rack were tested in a room and placed in the same location relative to a fixed lighting source. Two different locations were used, the center and the dimmest corner of the room. Light intensity was measured within individual cages in three planes: front and rear (depth); left-most, center, and right-most positions (horizontal); and at the top, middle and bottom rows (vertical). Light measured 1 foot above the floor at the center of the room was 448 lux.

Results

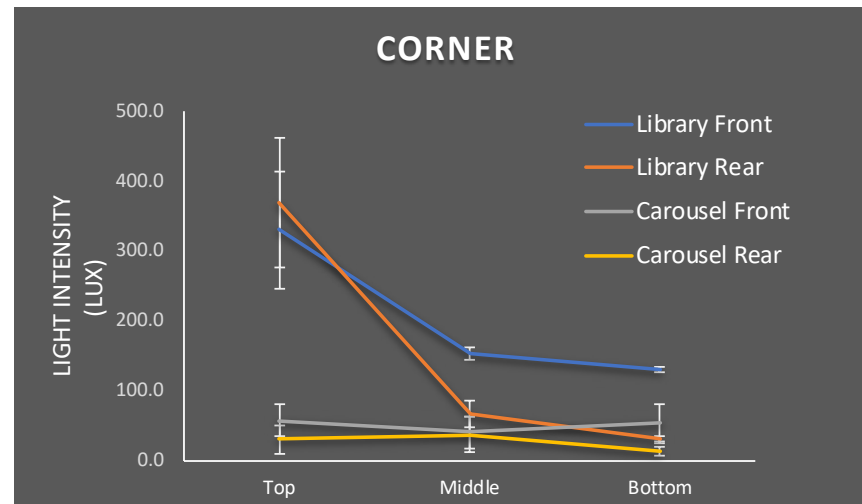
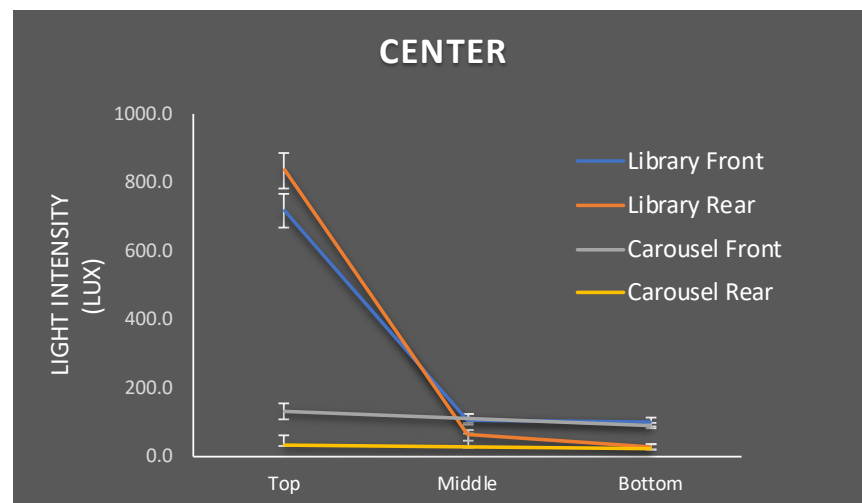


Figure 1: Mean (\pm SEM) light intensity levels (lux) determined in the front and rear of individual cages in the top, middle and bottom rows of racks positioned in either the brightest center (previous column) or dimmest corner (above) of the room. Under both conditions, there was considerably less light discrepancy between rows in the Optimice carousel compared to the library-style rack.

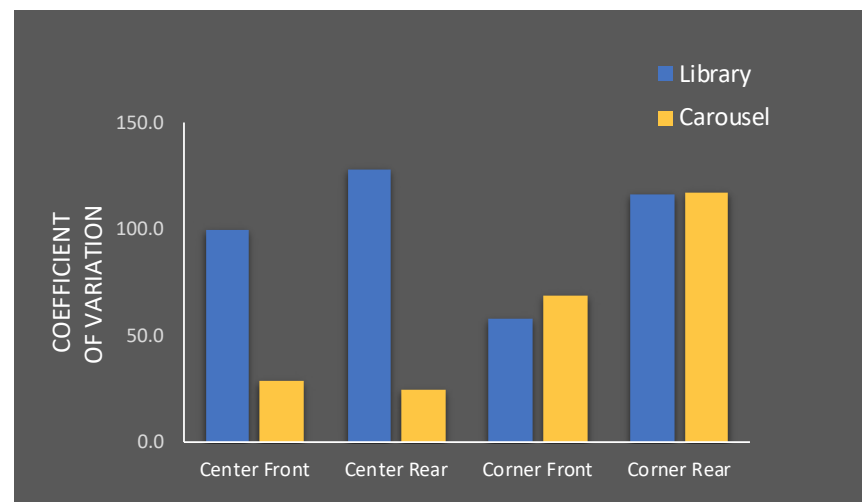


Figure 2: Coefficients of variation, expressed as a % ratio of the standard deviation to the mean, to illustrate the extent of lux variability in Optimice carousel and library-style racks. Variability was comparable in racks located in the corner of the room. When located in the center of the room, however, lux variability was significantly smaller in Optimice carousel than in library-style racks.

Conclusion

Compared to the library-style rack, there was less variability in light exposure between cages in the Optimice carousel rack when located in the center, brightest part of the room. Regardless of rack location, light intensity levels were overall lower in Optimice carousel than in library-style cages. Moreover, light exposure within individual Optimice cages approached or surpassed standards suggested for pigmented and non-pigmented rodents. Providing a stable and less intense lighting environment for animals is highly recommended⁴; and the Optimice carousel rack effectively meets both of these conditions.

Acknowledgments

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References

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