## **EXPERIMENTAL ORGANISMS**

## Don't overlook enrichment, says a systematic look

Bailoo, J.D. et al. Front Behav Neurosci 12, 232 (2018).

For the past 5 years, Hanno Würbel and his lab at the University of Bern in Switzerland have been systematically studying the standards that guide the housing and care of laboratory mice. In particular, they want to understand how those standards, which vary from country to country, contribute to both animal welfare and to the reproducibility of experimental results. "This is not to say that poor animal welfare and poor reproducibility go hand-in-hand," says Jeremy Bailoo, a former post-doc with Würbel who is now setting up his own lab at Texas Tech Health Science Center. "We're trying to understand whether or not there is a link and if so, to what extent this exists."

Last January, Bailoo, Würbel and colleagues published on cage and group sizes (*Sci. Rep.* **8**, 713; 2018); in October, their attention turned to cage enrichment. Varying an animal's environment with enrichment options, like nesting material or shelters, raises particular concerns among researchers who worry it might increase variation in experimental results. In their current study, they compared a variety of measures in two strains of female mice-one inbred and one outbred-across four enrichment conditions. Three were in standard laboratory cages: unenriched cages with just bedding; cages with nesting material; and cages with different structural elements. The fourth condition was 'super-enriched' and semi-naturalistic: a standard mouse cage attached to a larger pet cage outfitted with a wide variety of climbing structures, shelters, and materials intended to let mice be mice and encourage natural behavior. Primary outcomes measured were stereotypies, like biting at the cage bars, and behavioral tests of anxiety. Secondary measures included home cage behavior, growth, endocrine stress responses, brain function, and emotional state. They hypothesized that as enrichment increased, welfare would as well.

That wasn't quite the case—only mice in the super-enriched cages showed significant changes in welfare-related measures. Namely, stereotypies were almost entirely eliminated. But in terms of experimental outcomes, enrichment didn't systematically matter. "There is no evidence that enriched conditions will increase variation and thereby reduce the precision of studies," says Würbel. Why the super-enriched environment was so beneficial isn't clear, but Würbel plans to look more closely at whether there are particularly essential enrichment forms or if the effect is related to the sheer variety of options provided.

Making general recommendations remains tricky, but enrichment shouldn't be overlooked. "There probably isn't one condition that will fit all," says Würbel "but scientists need to think about what type of housing condition, what type of enrichment, is appropriate for their particular studies."

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