



The Safe Harbor Mouse Retreat™ is an innovative enrichment shelter that saves mice and money

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Environmental enrichment can be defined as altering the living environment of captive animals in order to provide them with opportunities to express their natural behavioral repertoire¹. As important as offering an enriched environment is assuring lab animals are housed in the safest conditions possible. Cage flooding events are an unfortunate reality; however, technology is advancing to minimize these events. Bio-Serv, in collaboration with Allentown, Inc., has developed an innovative and economical shelter called the Safe Harbor Mouse Retreat (**Fig. 1**). This shelter offers a life-saving refuge for mice during these occasional, but devastating cage-flooding accidents. Mice will not be lost due to chilling or drowning caused by water exposure. Breeding mice can save their litters by moving their pups to the second level, and all mice can escape to the higher level where they can remain warm and dry until they are rescued. This clever shelter is not only life-saving for mice but offers several other significant benefits as well.

Mice are a nocturnal prey species and therefore have a strong innate need to seek shelter. Mice are social animals and form kin groups; however, when mice are crowded, they may establish a dominance hierarchy, leading to fighting, especially in males¹. Because levels of aggression can vary widely among different strains and because introduction of enrichment items like shelters may increase aggression in some cases, the type of shelter introduced to group-housed mice should be considered very carefully. Dominant mice may become territorial because a shelter is a highly valued enrichment. This situation can be alleviated with the Safe Harbor Mouse Retreat because it has a novel bi-level design providing a hiding spot and resting area with many escape holes so that submissive mice can shelter away from dominant mice (**Fig. 2**). Also, as a result of the complexity of the shelter offering many escape routes, fighting injuries among mice will be minimized with use of the Safe Harbor Mouse Retreat as compared with other shelters that trap a mouse inside.

In a poster presented by Charles River Laboratories, researchers evaluated a hanging shelf as form of enrichment for adult female mice². The results showed that the presence of the shelf was not associated with increased wounding (used as an indicator of aggression), and two mouse strains showed a decrease in wounding. Mice were observed using the shelf as both a shelter (mouse located under shelf) and a perch (mouse located on shelf). In daylight, the shelf was used as a perch in 20–50% of observations, and in darkness, the mice perched during 67–100% of observations. It was also observed that the shelf added structural complexity and



FIGURE 1 | Bio-Serv in collaboration with Allentown, Inc. developed an innovative and economical shelter called the Safe Harbor Mouse Retreat™.

increased vertical utilization of the cage space, effectively increasing the amount of usable space in the cage². Similarly, the Safe Harbor Mouse Retreat has a shelf for the mice to perch upon and adds cage complexity along with additional cage space. These benefits are endorsed by the Association for Assessment and Accreditation of Laboratory Animal Care International (AAALAC International).

The Safe Harbor Mouse Retreat enhances both breeding and enrichment programs by providing privacy, security and warmth. Mice have touch-sensitive body hairs and are thigmotaxic, which means that they prefer to stay in close contact with walls or objects³. Even in a safe environment, they will hug walls as they move about.

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FIGURE 2 | The novel bi-level design offers a hiding spot and resting area with many escape holes.

Their fur can feel the presence of surfaces against the body, and their whiskers are highly sensitive with the ability to detect the slightest tactile changes. Providing them a complex shelter like the Safe Harbor Mouse Retreat encourages them to move about the microenvironment of the cage instead of just following the walls of the cage. Mice also have an aversion to drafts and cold and will seek shelter to secure warmth. The *Guide for the Care and Use of Laboratory Animals*⁴ dictates that for rodents, the ambient temperature should be maintained in the range of 68–79 °F. Mice become thermally stressed at temperatures of 64–68 °F and will huddle when they are chilled³. Providing mice a sheltering opportunity allows for better thermoregulation and reduces stress as a research variable.

The Safe Harbor Mouse Retreat can provide life-saving intervention for weanling and juvenile mice. Many strains of transgenic and knock-out mice are phenotypically small in stature and cannot reach the cage lid, where food is typically located. Of course, access to nutrition is imperative for their well-being. The second level of the Safe Harbor Mouse Retreat enables undersized weanlings to move up to the food source on the cage lid and access their diet.

The size and shape of the Safe Harbor Mouse Retreat was engineered so that it fits into all of Allentown's shoebox cage designs, and its low profile accommodates most other shoebox caging as well. It is made of durable, high-temperature polycarbonate so it will withstand routine cage-washing and autoclaving procedures. The open design allows for easy cleaning and convenient stackability, minimizing the need for storage space. The polycarbonate material provides good visibility for daily cage exams and the shelter is

certified (contaminant screened) for use in Good Laboratory Practice (GLP) or toxicology studies.

Bio-Serv is constantly striving to develop cutting-edge, scientifically based enrichment options, which promote good animal welfare at a reasonable cost. The Safe Harbor Mouse Retreat is a keen example of our collaborative innovation. It is an economical life-saving sheltering option for mice, and the value will be realized immediately when one mouse is saved from a cage-flooding event.

Company profile

For over 40 years, Bio-Serv has helped customers improve animal welfare by offering an extensive line of innovative quality products. Our well-trained professional staff is available to help you select the appropriate products for your research animals. For more information please visit our website at bio-serv.com or call us at 800-996-9908.

1. Hutchinson, E., Avery, A. & VandeWoude, S. Environmental enrichment for laboratory rodents. *ILAR J.* **46**, 148–161 (2005).
2. Winnicker, C. *et al.* Assessment of a hanging shelf enrichment in mouse stock caging. 2012 Triborough Symposium, Atlantic City, NJ (11–13 June 2012).
3. Moberg, G.P. Biological response to stress: implications for animal welfare. in *The Biology of Animal Stress: Basic Principles and Implications for Animal Welfare* (eds. Moberg, G.P. & Mench, J.A.) 1–22 (CAB International, Wallingford, UK, 2000).
4. Institute for Laboratory Animal Research. *Guide for the Care and Use of Laboratory Animals* (National Academies Press, Washington, DC, 1996).

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