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Benefits Of Providing Nesting Material As A Form Of Environmental Enrichment For Mice

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Husbandry conditions in a laboratory environment can be barren and monotonous. Improving those conditions by providing opportunities for laboratory mice to engage in species-specific behavior can improve their mental and physical well-being[1]. Giving the animals choices and control over their environment is key to reducing stress[2]. Nesting is a normal behavior of mice, and giving mice nesting opportunities allows them to choose how and where to create their nest and provides them a means of thermoregulation in their microenvironment.

Mice are a prey species and build nests for protection and shelter. They also use nests as a means of protecting themselves from thermal stress. The thermoneutral zone for mice is 79–93 °F, and mice become thermally distressed and huddle together at temperatures of 68 °F and below[3]. The newest edition of the Guide for the Care and Use of Laboratory Animals has raised the recommended lower limit for environmental temperature from 64 °F to 68 °F (ref. 4). This temperature is still very chilly for mice; therefore, affording them protection in their microenvironment is essential for decreasing thermal stress. In the lab environment, there is a wide variety of housing and husbandry systems that create wide temperature and humidity fluctuations. These extremes may result in behavioral, physiological and morphological changes that can negatively impact research outcomes. Mice are extremely sensitive to wind turbulence, and studies have demonstrated that the inability to retreat from air turbulence is a chronic stressor and severely alters immune function[5]. Mice avoid cages with high intracage ventilation rates. Providing nesting material counteracts this avoidance[6]. Consider how mice are able to survive long winters or live in a box refrigerator. Studies have found the center of a complex nest can be as warm as 90 °F (ref. 7). A nest will allow mice to address their thermal needs as dictated by their environment.

Mice in the wild build dome-shaped, intricate, multilayered nests[2]. Nest building has several complex steps, including digging and hollowing the material, heating the material with their bodies, burrowing, sorting the materials, expanding the nest and finally weaving the material to create a nest that requires a person to use two hands to pick up[8,9]. A nest built in a laboratory environment cannot be picked up with one hand without falling apart. Studies have demonstrated that lab mice have not lost their ability to nest, but the quality and complexity of the nests they build are dependent on the quality of the materials provided[2]. Nest-building is not only for breeding females, who construct nests for their offspring, but also for non-breeding rodents, including males. Nesting material allows the mice to alter their surroundings to suit their needs and offers them some control over their environment, two key objectives in reducing stress.

A paper substrate is an excellent material that allows mice to build a complex nest, preferable to cotton squares or rolls. Mice can shred the paper sheets and carry out the required tasks needed to form a complex nest. Paper is also a safer substrate than cotton, because cotton fibers can entangle digits and tails, and cotton lint can cause severe ocular damage to nude mice.

Figure 1
Rodent Nesting Sheets and Dispenser offer an economical and safe way to encourage natural nesting behavior.

Bio-Serv offers Nesting Sheets (Fig. 1) that are made of virgin pulp paper and are certified (contaminant-screened). There is no lint to cause ocular damage or accumulate on cage filters. Economically, the sheets are very inexpensive, costing $0.01 per sheet, a fraction of the cost of the smallest cotton squares. Nesting Sheets are packaged in a case of four sleeves containing 1,400 sheets per sleeve. One sleeve conveniently fits into Bio-Serv's Nesting Sheet Dispenser, so that the sheets can be pulled out one at a time, similar to facial tissues. If sterile Nesting Sheets are required, they can be custom gamma-irradiated, or they can simply be taken out of the plastic sleeve, placed into an autoclave bag and be autoclaved into the barrier.

The appropriate number of Nesting Sheets per cage depends on the number of mice in the cage, but a good starting point is two sheets per cage. Nesting Sheets can be used as a tool for daily health checks by placing a sheet on the cage lid. Healthy mice will work diligently to pull the paper into the cage and start creating a nest. If the sheet has not been pulled completely into the cage within a relatively small amount of time, there may be a health concern that warrants more attention. A labor-friendly method for putting the sheets into a cage is to locate them in the cage-washing area and place clean Nesting Sheets into each cage after the bedding has been dispensed. Nesting Sheets will not damage or clog bedding disposal systems.

For more information on Bio-Serv Nesting Sheets or the Nesting Sheet Dispenser, please feel free to contact us at 800-996-9908 (US and Canada) or visit our website at http://www.bio-serv.com/product/RNSND.html.

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