

## Targeted Approaches for Enrichment: Nutrition Offers Many Benefits for Laboratory Animals

The field of laboratory animal enrichment is continually evolving. New enrichment products, methodologies, and protocols are being developed, revised and updated daily, and for good reason: enrichment is a critical component to improving and maintaining the health and well-being of laboratory animals. With research budgets tightening, there is increasing emphasis on streamlining operational efficiencies and standardizing best practices. Organizations are being asked to do more with less. Faced with these fiscal constraints, the research community is rising to the challenge, demonstrating creative and innovative ways to maximize enrichment, implementing and adopting new enrichment programs, and leading the way as models of efficiency. With limited resources, it's important that the enrichment tools that animals do receive are of high quality and nutritional value and can be used in multiple ways. Nutritional enrichment is one area that can accomplish those needs in a cost effective format.

Nutritional enrichment or nutri-enrichment is the act of using nutrition, such as dietary supplements, to enrich an animal's environment and improve its well-being. Nutri-enrichment can be a powerful and effective



tool to reduce stress, prevent boredom, improve colony performance and provide additional nutritional support for animals. It overlaps well with other enrichment areas and can be used as a launching point to evaluate how enrichment methods can be combined and used in an effective and efficient manner.

Foraging is one example of how nutri-enrichment can be used in such a way. In the wild, rodents spend most of their time foraging for food. Foraging takes a physical toll on the animal, and their reward is the fruit, seed or other energy source that gives them adequate nutritional support for survival. The animal's physiology and behavior has adapted to these nutritional sources over time. In contrast, laboratory animals are usually provided food ad libitum, requiring very little physical expenditure to obtain their required daily energy requirements.

It has been shown that using an inadequate source of nutrition for foraging has an adverse impact on the reproductive performance

of female mice. Further, lactating rats can eat up to three times more at peak lactation compared to non-lactating rodents. Therefore, choose nutri-enrichment sources wisely. Ensure that there is enough foraging reward (energy).

Sunflower seeds are recommended for female mice and, in many cases, improve breeding performance. Using nutritionally devoid enrichment treats puts unnecessary stress on the animal and may impact overall breeding performance and experimental results.

Facilities can employ simple enrichment techniques that will provide natural foraging conditions and opportunities for the animals. These techniques promote species-specific behaviors and improve the physical, psychological and social conditions of the animal. There are many examples of nutritional sources that can act as enrichment and offer a high nutritional value. By scattering sunflower seeds, apple and orange pieces and other approved nutritional foraging mixes in the bedding, animals such as mice, rats, guinea pigs and chinchillas will forage as they would in their natural environment. Fruit and vegetables, either fresh or frozen and used in creative ways, work very well for NHPs. Timothy hay

in different forms such as cubed, pelleted or bails are ideal for rabbits, guinea pigs and chinchillas. Institutions that are developing enrichment programs or making improvements to existing ones, should consider the many nutritional enrichment options and products available for laboratory animals.

Selecting the type of nutritional foraging reward must be carefully considered. There are clear distinctions between providing “treats” such as yogurt drops versus carefully selected nutri-enrichment sources that are nutritionally balanced. Treats, which are usually comprised of processed ingredients and have high sugar content, are recommended in very limited amounts and should be used sparingly. A balanced approach, which weighs the specific nutritional needs of the animal with the type of application, is preferred. Gel based products, such as DietGel 31M and Criticare are alternatively good sources of nutrition that have the added benefits of embedded sunflower seeds to promote foraging for rodents and timothy hay for rabbits and guinea pigs. With a proper balance of vitamins, minerals, fats, carbohydrates and protein, gel-based products offer a powerful nutritional and enrichment option for animals. Further, since they combine both nutrition and enrichment, they are ideal for those institutions looking for an efficient way to implement an enrichment program.

Before implementing nutrition and enrichment products, take some time and effort to better understand how the products are made, and to ensure that their ingredients are acceptable for the animal species. In other words, know what the animals are eating and why they are eating it. Study design and nutritional implications must be reviewed prior to the start of the experiment and factored into study scope and aim. It’s recommended that researchers be given enrichment questionnaires before the study to ensure that they understand the benefits of nutri-enrichment and its study implications.

It’s equally important that facilities develop enrichment guidelines that are clearly communicated and adopted by all staff members and then are harmonized throughout the institution. Once implemented, it’s critical to assess outcomes to ensure that the enrichment implementation is effectively meeting the intended goals. Observations of animal behavior, health, performance characteristics and use of the enrichments are important components of such an assessment. These efforts should be continuous and revisited on a regular basis.

Researchers and staff must also monitor the reactions of the animals to the enrichment sources compared with baseline behavior. This is especially true as the introduction of nutritional variables could impact study results and animal health. Physiological variables can be monitored to assess responses to changes in

laboratory environments, e.g., body-weight, heart rate, hormonal levels, immune status and reproductive function. Guinea pigs, for example, are used as a model of human cholesterol and lipoprotein metabolism. Using improper nutri-enrichment sources for guinea pigs could alter blood cholesterol levels and lipid profiles and may not represent accurate data.

### **Conclusion**

Having a well-thought-out enrichment strategy, factoring in study design and enrichment methods, is critical for successful study outcomes. Unbalanced nutritional rewards (e.g., products with high sugar and salt content) may produce unwanted health consequences and experimental results. It is always recommended to use products that are nutritionally well-defined, have purified ingredients (if possible) and are nutritionally balanced.

Implemented properly and in combination with other enrichment areas, nutri-enrichment is a powerful tool that offers the laboratory animal community many opportunities to improve enrichment programs, achieve cost-efficiencies and support institutional animal health initiatives.

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