

Nesting Enrichment and Shredding Prevention for Mice

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ABSTRACT

In our facility, we have one mouse colony (CD-1 mice) that has historically exhibited significant levels of shredding of their pelleted feed. Our program uses Nestlets™ as the standard nesting material in each cage, and we hypothesized that a variation and/or mixture of different types of nesting material would prevent the amount of pelleted feed being shredded on a weekly basis. To test our hypothesis, we rotated 6 different types of nesting material between 36 cages over 6 weeks. The nesting material types included 1) 8 g 2"x2" Nestlets™, 2) 8 g 1"x1" Nestlets™, 3) 8 g of Enrich-n'Nest®, 4) 8 g of brown crinkled paper (BCP), 5) BCP with one 2"x2" Nestlet™ to equal 8 g, or 6) 4 g BCP with 4 g Enrich-n'Nest®. Each cage was given the nesting material for one week, and at the end of the week, a photo was taken to score the nest building and amount of shredding. Observations of fighting, health reports, flooding events, and extra cage changes were also recorded throughout the 6 week period. There were no health reports, and no fighting was observed over the 6 weeks. Extra cage changes were not necessary; however some of the shredding was significant by the end of the 7 days. Nesting scores were significantly higher for mice given BCP or any combination including BCP, while shredding scores were significantly lower for mice given BCP alone. In conclusion, we would recommend that strains prone to shredding be given brown crinkled paper as a nesting material with or without other nesting materials. The decreased shredding maintains a cleaner cage environment and may lead to a decrease in cage changing frequency, a less stressful experience for the mice, and better research results.



INTRODUCTION

Shredding of feed ("food grinding" or "food wasting") is a common behavior among certain strains of mice⁽¹⁾. This behavior leads to wasting of feed, dirtier cages, and more frequent cage changing intervals (which is extra labor/resources and more stressful for the mice). Food grinding is seen in both captive and wild rodents, and whether or not it is normal and simply amplified in the cage setting or indicative of an obsessive compulsive behavior is still under debate. One previous study attempted to determine if various enrichment items would decrease this behavior, however they only used one Nestlet™ as the nesting material (offered for only one day) and most of the enrichment items studied included shelters and/or chew toys⁽¹⁾. Since the inclusion of more naturalistic nesting material has been proven to be critical to its use by the animals⁽²⁾, we wanted to test whether or not other nesting materials might be better at decreasing the shredding behavior we were witnessing in one of our in-house colonies.

MATERIALS & METHODS

Experimental Design.

Thirty-six cages of CD-1 mice (3-5 mice per cage) were randomly chosen for inclusion in this study. All mice were housed in Optimice® caging (Animal Care Systems, Inc) on corncob bedding (Bed-o-Cobs ¼", The Andersons Lab Bedding) with *ad libitum* access to automatic reverse osmosis water and rodent chow (LabDiet PicoLab® Rodent Diet 20, 5053). Cages were randomly assigned to one of six groups each week, attempting to have each cage exposed to each nesting material only once. Each group was given a total of 8 g of their assigned nesting material: 1) 2"x2" Nestlets™ (n=38, Ancare), 2) 1"x1" Nestlets™ (n=37, Ancare), 3) Enrich-n'Nest® (n=35, The Andersons Lab Bedding), 4) brown crinkled paper (BCP) taken from an EnviroPAK (WF Fischer and Son, Inc) (n=35), 5) BCP with one 2"x2" Nestlet™ (n=44), and 6) 4 g BCP with 4 g Enrich-n'Nest® (n=27). Due to a shortage of our Enrich-n'Nest® supply one week, extra cages were assigned to Group 5 for that week alone.

The specific nesting material assigned to each cage was maintained in that cage for 7 days. At the end of the week, a picture was taken of the cage to score the nest and the amount of shredding. Nest scores were assigned according to a previous publication⁽²⁾, and shredding scores were assigned as designated below (see figures 1-3 for examples).

- 0 - no visible shredding
- 1 - some large chunks of food on the floor or one small sport of shredded feed
- 2 - some visible shredded feed on the floor of the cage (with or without larger pieces)
- 3 - moderate shredded feed on the floor
- 4 - significant shredded feed on the floor requiring cage change

Statistics.

GraphPad Prism 7 was used for all statistical analysis. A Welch's t test was performed to look for differences between each group. Statistical significance was set at a p < 0.05.

RESULTS

There were no health reports or early cage changes required for any cage included in this study. Nest and shredding scores for each nesting material can be seen in figures 4 and 5.

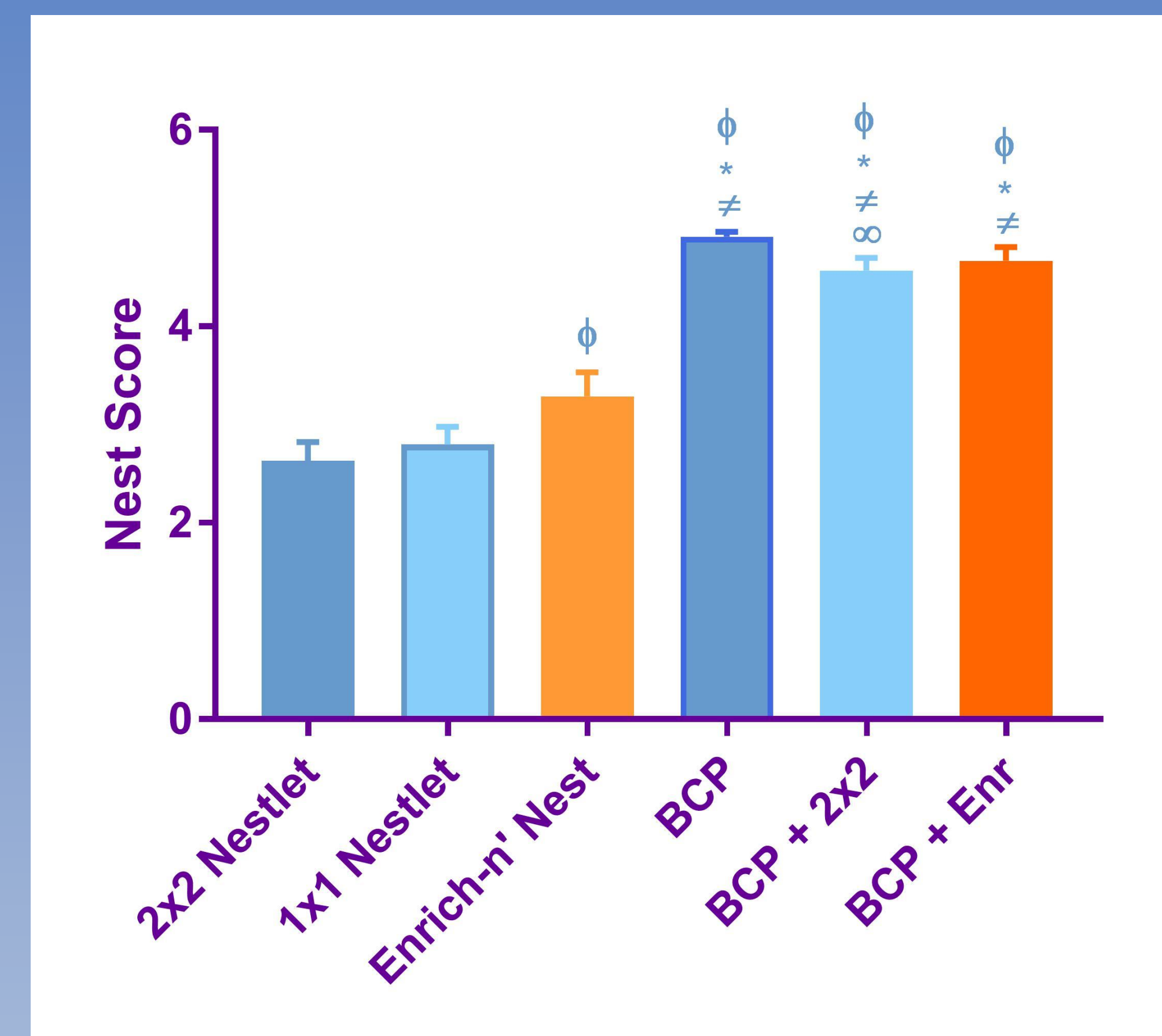


Figure 4. Nest Score by Enrichment Type

The nest score was highest for groups given BCP with or without another substrate. ϕ indicates a significant difference from 2x2 Nestlets™. * indicates a significant difference from 1x1 Nestlets™. \neq indicates a significant difference from Enrich-n'Nest®. ∞ indicates a significant difference from BCP alone.

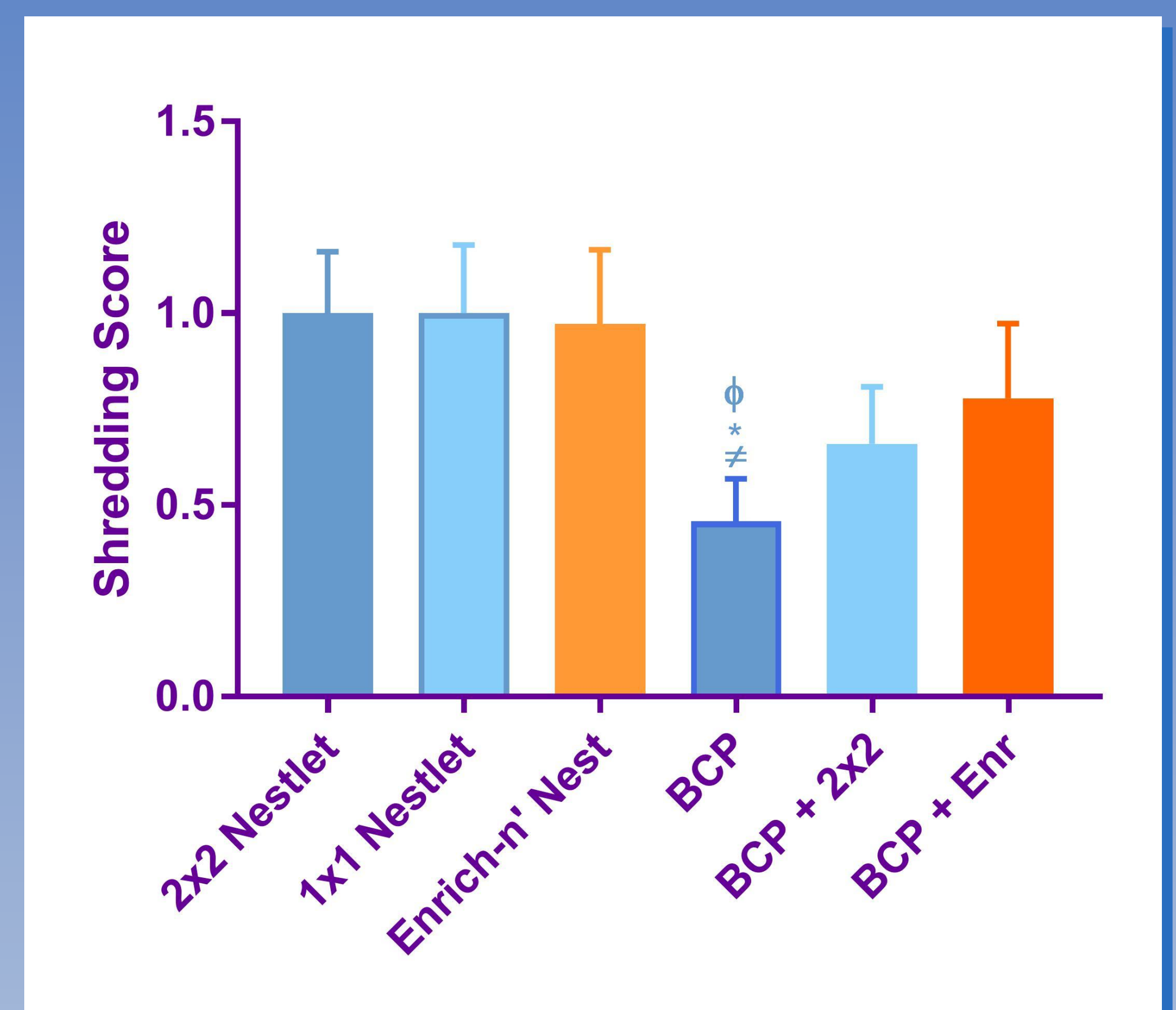


Figure 5. Shredding Score by Enrichment Type

There was significantly lower shredding in cages given BCP when compared to the Nestlet™ groups and the Enrich-n'Nest group. ϕ indicates a significant difference from 2x2 Nestlets™. * indicates a significant difference from 1x1 Nestlets™. \neq indicates a significant difference from Enrich-n'Nest®.



Figure 1. An example of a nest score of 5 and a shredding score of 0.

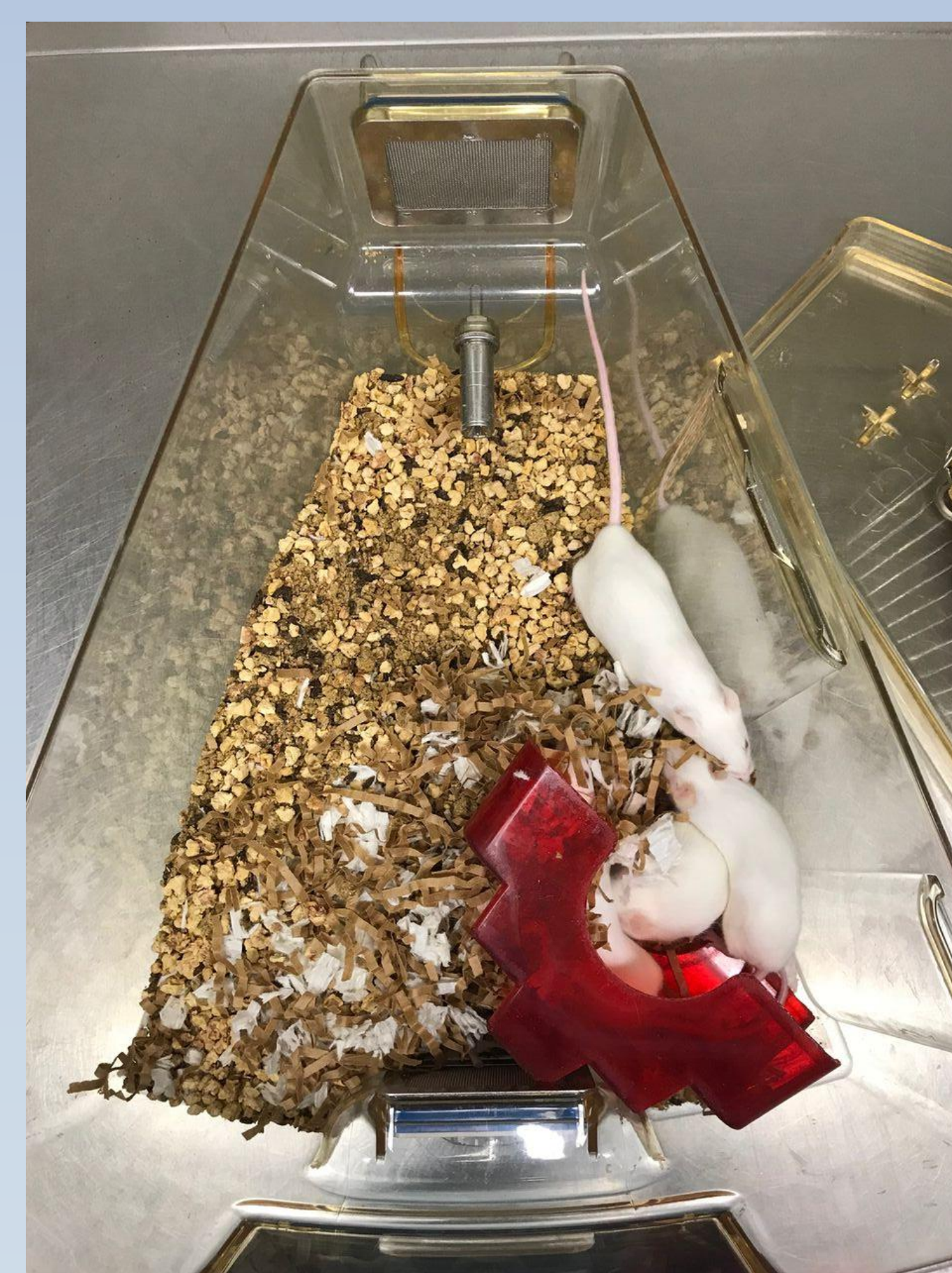


Figure 2. An example of a nest score of 4 and a shredding score of 3.



Figure 3. An example of a nest score of 1 and a shredding score of 4.

CONCLUSIONS/DISCUSSION

Our data indicate that BCP with or without a Nestlet™ or Enrich-n'Nest® allows CD-1 mice to build more complex nests. BCP alone also resulted in a significant decrease in shredding of the 5053 LabDiet used in this study. While future studies should be conducted to confirm these results in other strains and with other types of rodent chow, these findings are promising and may give facilities an easy way to decrease food wasting in strains prone to that behavior. Pritchett-Corning and coauthors⁽³⁾ have also shown that sunflower seeds can significantly decrease food wasting, so a combination of BCP and sunflower seeds (or other substrate that allows for gnawing and foraging behavior) would be worthwhile to examine as well.

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