The Effects of different Rack Systems on the Breeding Performance of DBA/2 Mice

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Aim:
The housing systems for laboratory animals were developed over a long time. For reducing cross contamination between cages, microenvironmental systems such as a positive, individually ventilated caging systems and a forced-air-ventilated systems are increasingly used by many researchers.

The impact of these systems on the health of animals, the light intensity, the relative humidity and temperature of cages, the concentration of ammonia, and CO2 in the cages etc. were investigated by many researchers.

The aim of this present study was to compare the effects of different rack systems and to understand the influence of environmental enrichment on the breeding performance.

Material & Method:
60 DBA/2 breeding pairs, originated from Charles River, were used for this experiment.

Following 4 weeks of adaptation, at 10 weeks of age animals were marked and separated randomly to three rack systems, a ventilated cabinet (Scanbur), a normal open rack and an individually ventilated cage rack (VR-IVC, Charles River), in the same animal room.

Every rack system contained 10 enriched and 10 non-enriched cages. Both cages were type II long Makrolon cages, only the enriched cages contained a nest box, a wood bar for climbing and nest material.

After regrouping to breeding pairs, reproduction performance, such as litter size, the number of puppies weaned and the body weights at weaning time, and the nest position of every cage were recorded for 8 month.

Health monitoring was done in the end of the experiment.

Results:
In general no significant difference was found between three rack systems on both housing conditions and a significant housing difference was only found for the time distance between litters in the open rack, but IVC groups often showed a higher coefficient of variation (CV, mean/SD).

The time distance between litters in enriched groups was increased in comparison to non-enriched groups, leading to a decrease of the total number of litters, the number of puppies born and puppies weaned in all rack systems, especially in the IVC rack. Enriched groups also showed higher abortion in comparison to non-enriched groups.

IVC rack showed higher abortion in comparison to other racks. All enriched groups had an increase in abortion, especially in the open and IVC rack.

According to the development of breeding performance on different stages, animals might be able to adapt themselves to an IVC rack, but animals need more time to adapt to the IVC rack than to the Scantainer and open rack.

Enrichment seems to have a positive influence on raising puppies in the first breeding stage, but not consistent in the second and third stage.

Conclusion:
In total all three rack systems have a similar breeding index in non-enriched groups during this long term breeding experiment, but the IVC rack showed a higher variation.