

Innorack® 3.0 Intracage Ammonia (NH₃) Concentration Report

I. INTRODUCTION

A primary goal of individually ventilated cage (IVC) housing systems is to provide animals with higher quality living conditions than that of the traditional static containment cages. The Innorack® 3.0 ventilation system employs transversal airflow that provides efficient evacuation of moisture and gases from the Innocage®, resulting in a cleaner environment for the mice and more time in between cage change-outs¹. This study was performed to evaluate daily intracage ammonia (NH₃) levels produced by mice housed in the Innorack® 3.0 IVC system.

II. MATERIALS AND METHODS

Test Location

This test was performed at Explora Biolabs in San Diego, CA in a temperature and humidity controlled vivarium. Average temperature was 74°F and average humidity was 45% .



FIGURE 1. AMMONIA TEST CAGE

Equipment

A single-sided, 77-cage position Innorack® 3.0 served as the test IVC rack. The rack was fully populated with cages. Rack airflow was set to 60 ACH @ POS differential pressure. Test cages were modified to include a sampling port located 3.4 inches from the front surface of the cage and 1 inch from the bottom (see **FIGURE 1** above). NH₃ measurements were taken with a Sperian Biosystems PHD6™ Gas detector with a PID sensor.

Study Design

Adult CD-1 male and female mice were housed separately at 1 animal per cage, 3 animals per cage, and 5 animals per cage. Average weight of mice ranged from 36g to 40g. Mice were housed in 40 cages: 10 cages contained 1 animal; 10 cages contained 3 animals; and 20 cages contained 5 animals - placed randomly in the middle of the rack. Each test cage contained 450mL of corn cob bedding, 270g of Harlan Teklad® 18% Protein Rodent Diet, and 275mL of acidified water in polyethylene terephthalate water bottles.

The test was administered for 14 days. Measurements were taken each day between 8:00 AM and 9:00 AM. Prior to collecting data, the PHD6 device underwent a self-test and fresh air calibration. Measurements were then taken by inserting tube of the PHD6 over the test probe of the cage and waiting 30-90 seconds for the NH₃ reading to stabilize. NH₃ recordings were immediately logged after the reading stabilized. During the study, food trays were topped off and water bottles were filled as needed while cage bottoms remained undisturbed. Anytime a cage lid was removed, it was noted on the testing sheet.

III. RESULTS

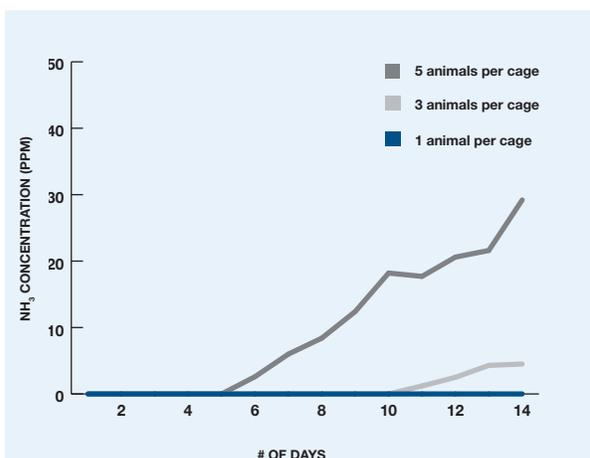


FIGURE 2. MEAN NH₃ LEVELS
The figure shows mean levels of intracage ammonia concentration during a 14-day cage change cycle.

IV. DISCUSSION

Mean ammonia levels for 14-day cage change cycle are shown in **FIGURE 2** (above). Under all test conditions, low or undetectable levels of NH₃ were present. Even with the highest density measured, average NH₃ levels were less than 30 PPM. These results indicate a 14-day change out, and in most cases, even a longer period is suitable for all the tested configurations.

REFERENCES

1. Silverman J, Bays DW, Cooper SF, Baker SP. 2008. *Ammonia and Carbon Dioxide Concentrations in Disposable and Reusable Mouse Cages.*