



# ITR CANADA

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## **A Study on Time Differences for Activities Between Animal Care Systems Ventilated Racks and Conventional Suspended Shoe Box Bins**

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### **Introduction:**

Our facility wanted to transition from open top shoe box rodent cages to ventilated caging. A study was undertaken to #1: determine the time difference of performing typical study-related activities when rodents (rats and mice) are housed in a ventilated rack from Animal Care Systems (ACS) versus when housed in regular open-top shoe box bins and #2: determine whether corticosteroid levels (stress level indicator) and in-life parameters differ between the two different caging systems. The study was conducted in accordance with ITR's Standard Operating Procedures (SOPs). The study trials were conducted in January 2018, one after the other.

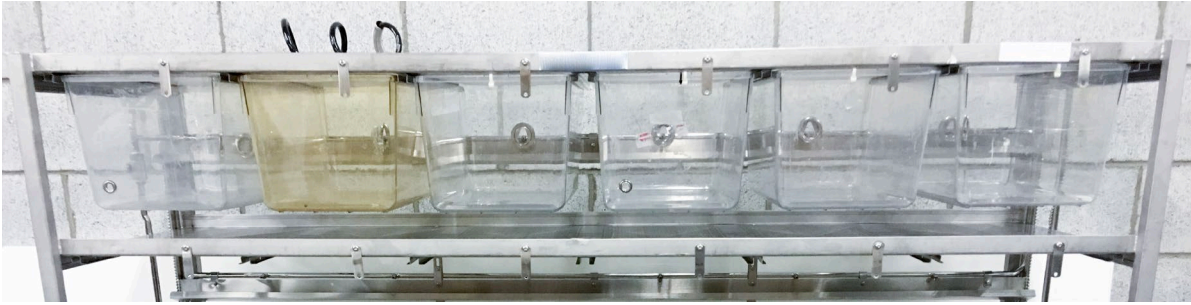
### **Materials and Methods:**

The experimental design consisted of 48 Sprague-Dawley rats and 36 CD1 or BALB/c mice. The study duration was 7 days per rodent species.

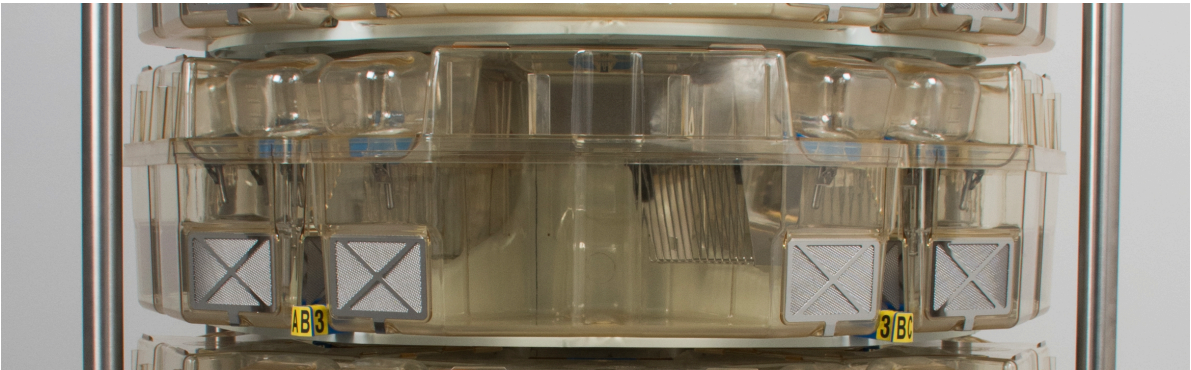
Group Numbers	Group Designation	No. of Rats		No. of Mice	
		Male	Female	Male	Female
1	Shoe Box - Rat	12	12	-	-
2	Ventilated Rack - Rat	12	12	-	-
3	Shoe Box - Mouse	-	-	0	18*
4	Ventilated Rack - Mouse	-	-	6	12

\* Due to unavailability of male mice in the spare colony, 6 female mice were added in order to keep the total number of animals consistent in Groups 3 and 4.

In Group 1 (shoe box; **Figure 1**), rats were housed in groups of 2 (males) or 3 (females). In Group 2 (Optirat Plus ventilated rack; **Figure 2**), rats were housed in groups of 3 (males) or 5 (females). In both Groups 3 (shoe box) and 4 (Optirat Plus ventilated rack), mice were housed in groups of 3 for males or 6 for females.



**Figure 1:** Shoe box style bin



**Figure 2:** Optirat Plus ventilated rack

Throughout the 7- day period (per trial), the following tasks were performed daily, bi-weekly or weekly and timed with a chronometer: Detailed Clinical Examination (DCE), Body Weight (BW), Clinical Signs (CS), Mock Dosing, Treats, Food Consumption (FC), Mock Bleeds (Pre-Rx, 24hr Post-Rx), Corticosterone Day 7 Bleed, Bin (cage) Change (BC). To minimize variability, any activity was conducted by the same technician for all compared groups (Group 1 and 2 or Group 3 and 4) on a given day. Body weight was measured at days 1, 4 and 7 and food consumption was measured on days 1-3 and 3-6.

**Blood Collection for Corticosterone:** To assess levels of stress in rodents, a blood sample of 0.5 mL (rats) or 0.1 mL (mice) on Day 7 was collected from animals, using the jugular vein for the analysis of corticosterone. The samples were analyzed by the immunology department under qualified method MD 232.

## **Results:**

### **Species: Rats**

Timed Activities: Overall, mean time differences were minimal or non-existent for most activities in the rat study between groups. There were no clear differences for the following activities: DCE, BW, CS, mock dosing, treats, FC and mock bleeds. Time differences noted in the other activities were minor and inconclusive due to lack of a clear trend.



Body Weight and Food Consumption

	Avg Body Weight Gain from Day 1 to 7 (grams)		Avg Mean Food Consumption from Day 3-6 (grams)	
	Group 1	Group 2	Group 1	Group 2
Males	20	23	101	104
Females	5	6	72	64

Negligible differences were noted in mean body weight gain throughout the 7-day trial and in mean food consumption from Days 3 to 6.

Corticosterone Levels

	Corticosteroid Levels (pg/mL)	
	Group 1	Group 2
Males	66 592	83 513
Females	438 635	227 355

Results indicate no difference in corticosterone levels between male rats. However, corticosterone levels were observed to be lower in female rats housed in the ventilated rack system, without overlap from  $\pm$  standard deviation values.

**Species: Mice**

Timed Activities: Overall, time differences were minimal or non-existent for most activities in the mouse study, except for the single corticosterone bleeding occasion which was performed in less time in Group 4 animals in the ventilated rack (15 min in group 3 (shoe box) vs. 7 min in group 4 (ventilated)).

Differences in Body Weight

	Avg Body Weight Gain from Day 1 to 7 (grams)	
	Group 3	Group 4
Females	-0.1	0.4

Negligible differences were noted in mean body weight gain in females. BW in male mice could not be compared since none were assigned to Group 3, however normal growth levels were observed for Group 4 male mice.



### Corticosterone Levels

	Corticosteroid Levels (pg/mL)	
	Group 3	Group 4
Females	150 981	142 412

There was no difference in mean corticosterone levels between Group 3 and Group 4 female mice, Group 4 male mice could not be compared since no males were assigned to Group 3. Group 4 male mice on average measured 26 955 pg/mL, and when compared to the expected normal range values provided by ALPCO Rodent ELISA kit protocol, collected at approximately the same time of day (early afternoon), corticosterone levels were lower than the range provided (47 to 159 ng/mL).

Clinical Observations: No abnormal clinical signs could be related to housing differences during the study for both species. Male mice did not exhibit aggression or dominance resulting in injury in the ventilated rack.

### **Conclusions:**

Overall, there were no appreciable differences in the time taken to perform typical husbandry or study-related procedures from rodents housed in the two different types of caging. Single occasion corticosterone blood collection in both species was completed in a slightly shorter time in ventilated cages. Markedly reduced corticosterone levels in female rats in ventilated cages vs standard bin housing and in male mice (compared to normal range values) may suggest lower stress levels when housed in the ventilated rack system.