Burrowing

Apparatus: 20 cm long grey plastic 68 mm diameter grey cylinder, the open end of the tube being raised 3 cm by bolting two 50 mm machine screws to it, 1 cm in from end, spaced just less than a quadrant of the tube apart, protruding like the undercarriage of an aircraft. The lower end of the tube is closed with a wooden plug.

Method: Fill cylinder with 200g food pellets (ordinary laboratory chow) and place in a clean cage with a thin layer of bedding, against the long wall of the cage. The closed end of the cylinder should be against the back wall of the cage. No food is necessary in the hopper, and indeed it may distract their attention from the burrow, so this is an important detail of standardization. Put a single (non food-deprived) mouse in and after 2 h measure the amount of food displaced from the tube (defined as being on the floor of the cage rather than in the tube). (For all practical purposes this is 200g weight left in tube). The test is optimally run approximately 2 h before the start of the dark cycle. Continue the test overnight, supplying a water bottle. The two-hour measurement is generally more sensitive than the overnight one, the latter often suffering from a ceiling effect as almost all the food is displaced, but with sensitivity also comes variability, particularly if this is the first time mice are exposed to the test.

The mice seldom carry the pellets in their mouths (presumably due to their size) but actively push them out of the tubes with their feet. The topology of the behaviour frequently resembles burrowing, with the mouse facing away from the open end of the tube, pulling pellets under or around its body with the front feet, then pushing them out with the back ones. The result is a heap of pellets around the front of the tube; most remain here without further displacement. Non-hoarding mice, (for example, scrapie-infected) can be seen to enter the tubes at least as frequently as controls but most pellets on the cage floor have been accidentally displaced during the course of locomotion, not purposefully pushed out. The cylinders do not appear to be aversive; the arousal produced by being placed in a new cage stimulates exploration of both cage and cylinder.

Mice burrow spontaneously, but their performance generally increases with practise. A practise run in addition to a baseline test can improve and standardise burrowing ability, especially if mice are housed in groups. Simply put a full burrow into the home cage; with group housed mice social facilitation will further help develop the burrowing behaviour.

Individual differences also occur, so if possible run a baseline test to ensure the groups are equal before you give the experimental treatment. (For example, in Cunningham et al. 2003 the groups started with innate differences, which tended to obscure the scrapie-induced reduction of burrowing). The practise at burrowing, especially if (as advised) they are allowed all night for this baseline run, will also ensure higher levels of burrowing later.

Non-edible items will also be burrowed (e.g. clay balls, sawdust bedding). Thus clay ball burrowing can be run conjointly with food restriction during an appetitively motivated experiment.

It is possible that “burrowing” may be related to the “burrow cleaning” behaviour described by Schmid-Holmes et al.

References


Cunningham C, Deacon R, Wells H, Boche D, Waters S, Picanco Diniz C, Scott H, Rawlins JNP,