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Modular Microstructural Feeding Analysis System for Rodents



A modular system for rats or mice capable of a wide range of sensitivity in recording weight of food consumed and timed feeding bouts.

For research of feeding disorders and ethological measures of behaviour.

Available through our agents worldwide.

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General Description:

The Campden Microstructural Feeding System is modular in two respects. Firstly, it can be tailored to be sensitive to the feeding of different rodents and secondly its modularity extends to how the hardware is configured.

The feeding station, consisting of the feed hopper, load cell and associated electronics can be fitted to any of our rodent chambers of appropriate size. Load cells of a range of sensitivities are available to whatever accuracy of weight is desired, it should also be remembered however that the more sensitive the load cell is the less total load it is able to sustain. Thus for prolonged experiments at high sensitivities it may be necessary to refill the food hopper either manually or by a mechanical system.

The aperture into which the animal inserts its head to gain access to the powdered diet can be varied by a slide to account for different sizes of animal and cannulated animals. A separate catch tray extends 25mm into the cage, under the grid floor in order to catch any spillage when the animal withdraws from the feeding hole.

The presence of the animal at the feeding station is detected by infra red beams and measurements are then taken immediately before and after a feed.

The software, a menu driven Windows™ –based package allows the user to define the minimum size of a ‘meal’ and the minimum time between meals at the outset. Animal activity is reported concurrently and presented onto an Excel spreadsheet. Up to 16 chambers can be run from one Interface Box and one Acquisition Card. For 17 to 32 chambers two Interface boxes and two Acquisition cards are required.

PC requirements are IBM compatible PC with the following features:

- Minimum Pentium processor.
- One free ISA slot
- 150MB free hard disk space for the application and minimum 16MB RAM
- Standard Windows™95 keyboard and serial port mouse.

The modular components of the Model 80350 Microstructural Feeding Analysis System are described as follows:

80350FS: Feeding Station

80350IBC: Interface Box and PC Acquisition Card

80350S16: Software for 1-16 chambers

80350S32: Software for 1-32 chambers

80350SC: Small chamber

80350LC: Large Chamber

Component Model 80350FS The Feeding Station.



The picture above shows the Feeding Station fitted to the rear wall of animal chamber, with the associated electronics. The rear wall is removable from the rest of the chamber for cleaning purposes.

The slide to accommodate head size can be seen above the feed tray, with the water bottle holder to the top left. The food hopper itself has been removed so as not to obscure the other features and is placed in front by the coiled lead, which plugs into the Interface Box.

Component Model 80350IBC the Interface Box and Acquisition Card



The Interface Box connects to the Data Acquisition Card (not shown) by the digital and analogue cables seen above. The Interface Box can accommodate up to 16 Feeding Stations. Two Interface Boxes fitting to two Data Acquisition cards can accommodate 32 Feeding Stations.

The Animal Chambers Models 80350SC and 80350LC



The large chamber, on the right, has the rear wall, with Feeding Station, removed and placed centrally in the photograph. An example small chamber is shown on the left.

The large chamber is constructed to UK Government requirements to accommodate large rodents up to 1Kg in weight; its features are as follows:

- Dimensions are 430mm (front to back) x 235 (width) x 400mm (height from grid floor) with clear Polycarbonate top lid and front, other walls and base being anodised aluminium.
- Top lid is removable (not hinged but secured to prevent animal escape) as the means of placing and removing the animal.
- Floor is a grid of 2mm diameter bars with a 7mm gap (5mm pitch) (across the width) with cross supports of 35mm pitch (along the length).
- Tray under floor is removable for cleaning from the front. E.g. filling with sawdust for removal of animal's excrement.
- Chamber is well ventilated to allow air circulation for the animal and prevent condensation, which would inhibit observation by person or video camera.
- Back wall with food hopper and water bottle is free standing on the bench.
- Feeding hole in rear wall incorporates a vertical sliding panel by which the hole can be elongated to accommodate cannulated animals.
- Remainder of the chamber is detachable for cleaning with a pressure washer.
- Separate catch tray extends 25mm into the cage, under the grid floor in order to catch any spillage when the animal withdraws from the feeding hole.
- The small chamber dimensions are 285 (front to back) x 210 (width) x 200mm (height from grid floor) and otherwise has common features with the larger cage.
- Alternatively if you require different dimensions of chamber and grid floor we will be pleased to accommodate your requirements.

Feeding Analysis Software, Models 80350S16 and 80350S32



Software Features:

Chambers can be started individually in sequence from 1 onwards as the animal is placed into each one and will then run concurrently until each chamber has completed its allotted time period.

Animal activity is reported concurrently and presented onto an Excel spreadsheet.

A 'meal' is defined and entered by the user beforehand. This will be defined by a minimum weight (x grams to 1 d.p.) followed by a minimum time (y minutes to 2 d.p.'s) during which feeding does not occur.

The local eating rate can be calculated as the meal intake per eating episode (grams per time of eating).

The time of the experimental period can be set between 1 and 24 hours (to 1 d.p.).

Weight measurements are not taken when the animal is feeding.

Measurements are as follows:

- Latency to eating i.e. time from being placed into the chamber to commencing first meal. (minutes)
- The number of meals (as an integer).
- The meal size, being the amount of food taken in each meal (grams).
- Total food intake over the experimental period (grams).
- The total time spent eating (minutes).
- The duration of each meal (minutes).
- The duration of intervals between meals (minutes).
- All experimental data files are stored in a spreadsheet compatible CSV format.

Use of colour and symbols is so as not to be corruptible by the red light if the PC is inside the experimental area. All panels are designed to be simple to use and self-explanatory as to their function.

The Top-level menu is visible whenever the program is launched and allows the user to select any of the sub-menus Run experiment and View results.

To define the experiment the operator can to perform the following functions:

- Open an existing database
- Save a current database (with a new name if required)
- Edit a currently open database
- Move backwards and forwards through the entries in an open database in single steps
- Move to entry (n) in the currently open database.

Each chamber is allocated it's own database filename for ease of use.

Exiting a sub-menu will return the operator to the top level.

On-screen help is available via a 'help' button.

Information is saved in Excel database types.

Running the Experiment

The run experiment sub-menu is used to define the parameters for individual experiments and control the system during experiment.

Three buttons are provided on-screen to control an experiment:

START Begin an experiment (All data must be entered first)

STOP Stop an experiment before it has completed. Results to date will be saved.

TIMER Setting of hours from 1 to 24.

Upon completion (or manual termination with the stop button) all results will be saved to an Excel file type.

An on-screen help button provides useful information on the various options when operated.