MMMPP
Melbourne Mouse Metabolic Phenotyping Platform

THE UNIVERSITY OF MELBOURNE

Oxygen bomb calorimeter

1. Experiment

Use the CAL3K-U oxygen bomb calorimeter to determine caloric content in a sample

2. Aim

To measure caloric content of a specialist diet or faeces sample

3. Equipment

The CAL3K-U oxygen bomb calorimeter uses oxygen to burn a sample within a chamber to measure the caloric content of that sample. The most common application is to detect the caloric content of faeces or of a specialty diet. The ignition and burning process is contained within a chamber called a 'bayonet vessel' so that energy released can be measured in the form of heat. Benzoic acid standards are used for ignition of the samples/spiking. The vessel is filled with oxygen at the oxygen filling station, then the prepared vessel is placed in the calorimeter. Once run, the vessel is placed in the air cooler for 8 minutes to bring the temperature back down in preparation for the next sample.

4. Training requirements

At this stage the oxygen bomb calorimeter is only available as a 'Platform-operated' service so no training is required.

5. Experiment design considerations

1. Collect faeces over a 24 or 48 h period: Move mouse to a clean box with minimal bedding (to soak up urine). At 24 or 48 h move mouse to a new box and use forceps to collect all the faeces onto an absorbent lint-free wipe (eg. a kim wipe). Place the faeces with the wipe into a labelled 50 ml falcon tube.
2. Allow faeces to dry completely for 48 hours (may need to exchange kim wipes as moisture is absorbed), then measure and record the total faecal dry mass in g/24 h. This will allow the kcal per day to be calculated after oxygen bomb analysis.
3. (An additional measurement that may be useful is the faecal wet mass. To obtain this, collect a fresh mouse faecal pellet (straight from the source), weigh it immediately ('wet mass'), then allow it to fully dry and weigh it again ('dry mass'). Dividing wet by dry will calculate a ratio of wet to dry mass, which can then be applied to the total mass of 24 or 48 h samples collected.)
4. Triplicate samples are recommended for bomb calorimetery. Each sample must be > 0.200 g (approx. 12 dry mouse faecal pellets).
5. Samples are weighed immediately prior to oxygen bomb calorimeter analysis. Results are given in KJ/g.
6. Daily faecal caloric content is calculated from total faecal mass.

6. Monitoring

N/A

7. References

https://www.ddscalorimeters.com/cal3k-u-calorimeter/