

The Canine Obesity Model

Canines are becoming the preferred animal model for obesity research, because humans and canines have similar nutritive requirements, obesity-induced disorders (diabetes), consumption patterns (small number of large meals), and metabolic characteristics. (Rodents are dissimilar to humans in all these categories.) Furthermore, in most obesity research an animal's food intake and body weight are the only endpoints measured, but in the canine model additional functional endpoints are available.

The specific model offered by NDI includes a set of techniques new to obesity research. Body fat, bone density and total body mass are assessed using non-invasive techniques (specifically with the use of dual absorption x-ray spectrometry [DEXA]). In addition specific cognitive models have been developed for the canine to assess feeding patterns, in order to test efficacy of appetite suppressing compounds or satiating effects of treatments, without relying solely on measuring food consumption or body weight.

Satiety Assessment

This protocol examines a canine's cognitive performance in relation to satiety, i.e. the animal's performance declines as it becomes satiated, with a positive correlation between the difficulty of the task and the rate of decline. The test was developed for the purpose of establishing the effectiveness of a treatment, such as a specific type of food or a pharmaceutical, in producing satiety (and hence limiting caloric intake). The task starts with presentation of a sample stimulus (a red plastic block) covering one of the three food wells on a sliding stimulus tray. After a 3-s inspection interval, the sliding tray is moved closer to the dog, which can now retrieve the food reward by removing the red block. The tray is then withdrawn for a variable time delay, after which the tray is presented with two identical red blocks, one placed at the original position and the other in a novel position. The dog is rewarded only if it removes the red block over the novel position. Satiety reduces motivation to respond quickly and accurately on this food-reinforced task. This protocol has been validated using overfeeding, treatment with amphetamine (anorexic agent) and consumption of a high fiber diet (Prog Neuropsychopharmacol Biol Psychiatry. 2005;29(3):481-488).



Palatability Assessment

This protocol evaluates palatability by presenting dogs with different objects that have been associated with different foods, and allowing the dogs to choose only one object. The number of choices for each object determines food preference; “palatability” is the animal’s preference *relative* to the other objects. This test offers several advantages over the widely used two-pan test protocol (amount of different foods consumed in 10 minutes). This “preference/palatability” protocol provides a reliable measure of food preference that requires few test subjects, while the 2-pan test reveals similar preferences but with variability in data that requires larger numbers of subjects and is susceptible to effects from prior exposure and feeding of the test foods to the subjects (neither of which affect this palatability assessment protocol).

Araujo, J., Chow., A., & Milgram, N.W. (2004). A novel palatability assessment protocol. *Journal of Animal Science* 82, 2200-6.

Araujo, J., Studzinski, CM, Larson, BT, & Milgram, NW. (2004). Palatability of Two Similar Foods: A Comparison of the Cognitive Palatability Assessment Protocol CPAP) and the Two-Pan Test. *American Journal of Veterinary Research.*, 65, 1490-1496.

Endpoint Measures

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| 1. Food intake and body weight. |
| 2. Body condition score. This is the standard a scoring system widely used in the animal field (pet food companies and animal pharmaceuticals). |
| 3. Body fat, bone density, total body mass. These are assessed with dual absorption x-ray spectrometry (DEXA). |
| 4. Palatability. (See above) |
| 5. Satiety. (Optional, depending on experimental question; see above). |