

UBC ANIMAL CARE COMMITTEE

POLICY 011

Policy and Procedures: Restricted/Deficient Diets For or Fasting of Animals

Date Approved: December 15, 2014

Date Revised: March 27, 2015

Purpose: Food and/or fluid restriction may be required in order to achieve a variety of research and/or husbandry objectives. These objectives may include: conditioning a response in order to train animals to perform a task, nutrition studies that may require altering the levels of specific nutrients below nutrient requirements, or pre-surgical fasting. The investigator must provide scientific justification for restricted diets. This could involve considering alternatives to food restriction and assuming the least restriction to achieve the scientific objectives

Policy:

1. All animals should have access to standard laboratory diets and water at all times unless prior approval has been given by the Animal Care Committee for the feeding of special diets and/or water, restricting diets or fasting animals. The investigator must provide scientific justification for feeding restricted diets, including an explanation of why alternatives were rejected. The restriction must be the least amount required to achieve the scientific objectives.
2. A feeding log must be present and maintained in each room where animals are being fed special or intermittent diets or for animals that are fed in daily feeding (ex. pigs, etc.). The log must clearly designate the start and end dates of this special procedure, the animal or cage number, the type and amount of food being fed and the person(s) responsible for the feeding. Each cage of animals must be clearly marked, and correspond to the feeding log.
3. If animals are being fasted, a cage card indicating the start date and time of the fast must be placed on each cage of fasting animals. The person responsible for removing the food should be listed on the card with their contact information. Research staff responsible for monitoring animals on food regulation studies must be trained and competent to evaluate the animal's condition.
4. Animals on deficient diets/restricted diets should be monitored more rigorously than animals on regular diets. As per Animal Care Committee guidelines, all animals must be checked daily including weekends. Special attention should be paid to the amount of food or the feeding log to ensure that animals do not go without food. The investigator is responsible for assuring that specially formulated diets are nutritionally adequate and palatable.
5. Animals should be maintained at a percentage of their baseline weight or that of aged matched controls. The goal is to maintain greater than 80% body weight of an age and sex-matched ad lib fed control unless scientifically justified in the protocol. Rodents on food restriction studies must be weighed 3X/week during the acclimation period; then at least weekly unless the animal's condition warrants more frequent body weight monitoring. The weights should be compared to the baseline weight, age matched controls or established growth curves, and the food and water restriction should be adjusted accordingly. Chronic fluid deficiencies often result in a loss of body weight due to the reduced food consumption

therefore fluid restricted animals must also be weighed weekly. Rodents may need increased monitoring due to their small size and increased metabolism.

6. Endpoints for food restriction should be specified in advance. Examples of specific endpoints include:
 - a) Failure of growing animals to gain weight.
 - b) Loss of greater than 15% of the body weight of a mature animal and/or
 - c) Body condition score of 2 – Animal is underconditioned (a) segmentation of vertebral column is present (b) dorsal pelvic bone is readily palpable.
 - d) No fecal output for > 24 hours or there are few or no fecal pellets.
 - e) Animal shows other clinical signs of starvation or dehydration including listlessness and inactivity.

Procedures for Specific Types of Food Restriction/Fasting

Pre-anesthetic Fasting or Surgical Fasting

For non-rodent/rabbit species, food may be withheld for up to 18 hours prior to an anesthetic procedure (i.e. overnight fasting). Water should be available during the overnight fast but may be removed in the morning on the day of surgery. In most cases, pre-anesthetic fasting is not required for rodents. However, specific surgical procedures may require an overnight fast and should be approved by the Animal Care Committee.

Conditioned Response Research Protocols

- a. The amount of food/fluid restriction should be the minimum required to achieve the objective.
- b. If food/fluid restriction is to be used in an experimental protocol, the method of restriction and scientific justification for its use should be clearly explained in the ACC Research Protocol.
- c. Restriction must be based on a measurable parameter such as percentage of ad libitum intake, percentage of body weight compared to a control animal (paired; ad libitum intake), or length of time access of food/fluid is allowed per 24 hours.
- d. Consideration must be given to alternative methods and/or modifications to food and/or fluid restriction.
- e. In order to make a knowledgeable determination of an appropriate level of food/fluid restriction, it is necessary to know what normal quantities of food or fluid are required for maintenance of the species. Life stage (growth, pregnancy, lactation, geriatric) and state of health must also be taken into consideration in determining maintenance requirements.
- f. Unless scientifically justified, food and/or water restriction should be introduced incrementally to allow for physiological and psychological adaptation.
- g. For example: Feeding the animal a percentage (50 – 70%) of ad lib consumption daily to reach a body weight of no less than 80% of ad lib fed controls is a standard method of food restriction. As a guideline the average 25 g mouse will consume about 15 g/100 BW/day of a nutritionally balanced diet. Thus a 25 g mouse would eat 3.75 g/day. Restricting the diet slowly starting with 70% of the free feeding diet would require the mouse to be fed 2.6 g of food daily. (see rat example below)
- h. If young growing animals (rats or mice <14 weeks of age) are to be restricted, the investigator must ensure adequate nutrient intake to avoid malnutrition. The use of non-feed restricted

littermates for comparison is optimal, but otherwise vendor growth chart comparisons for the appropriate strain can be used.

Nutrition Studies

- a. The principal investigator is responsible for assuring the proper formulation and nutritional adequacy of these diets.
- b. Specific arrangements for feeding and diet storage should be provided in the ACC Proposal Application and arranged with the Animal Resource Program.
- c. These rations frequently vary in form and in palatability. The animals should be closely monitored to insure that an adequate diet is consumed.

Limit Feeding to Control Obesity

- a. The quantity fed should be appropriate for maintaining the weight of mature adult animals.
- b. As a program of limit feeding is established, more frequent monitoring of animal weights will be required to determine an appropriate volume of feed.
- c. Once the program is established, less frequent monitoring (monthly) is acceptable.

Dietary Restriction for Other Reasons:

- a. An explanation of the need for dietary restriction should be provided in the ACC Application along with a description of the nature of the restriction.
- b. Consideration must be given to alternative methods and/or modifications to food and/or fluid restriction.

References:

1. Guidelines for the Care and Use of Mammals in Neuroscience and Behavioral Research. ILAR. NRC. 2002. Food and Fluid Regulation. PP. 49-61.
2. Toth, Linda A. and Gardiner, Thomas W. Food and Water Restriction Protocols: Physiological and Behavioral Considerations. *Contemp. Topics* 39(6), Nov. 2000
3. Rowland, Neil E. Food or Fluid Restriction in Common Laboratory Animals: Balancing Welfare Considerations with Scientific Inquiry. *Comparative Medicine*, 57(2), April 2007. (Highly recommended)
4. National Institute of Aging: Guidelines for Caloric Restriction in Rodents