Subject: Food/Water Restriction or Regulation

BACKGROUND

This guideline describes the recommendations for protocols that include the regulation or restriction of an animal’s food and/or water. The *Guide for the Care and Use of Laboratory Animals* (the Guide, NRC 2011) states: “The objective when these studies are being planned and executed should be to use the least restriction necessary to achieve the scientific objective while maintaining animal well-being.” (p. 31) The restriction or regulation of food/water must be described in detail in the protocol application and approved by the IACUC.

Definitions

*Regulation* of food/water is defined as the scheduled access to food or water sources so an animal consumes as much as desired at regular intervals. For example, rats may have regulated access to food where the food is withheld for several hours in order for them to work for food as a reward in a behavioral test. In the case of this conditioned-response research protocols, the use of a highly preferred food or fluid as positive reinforcement, instead of regulation, is recommended.

*Restriction* of food/water is where the total volume consumed is strictly monitored and controlled (NRC 2003).

*Fasting* is the removal of food (but not water) for a certain period of time prior to an experimental manipulation such as surgery, glucose tolerance testing, etc.

IACUC Policy

Protocols that use restriction or regulation should do so using the least restriction necessary to achieve the scientific objective while maintaining animal well-being. Protocol applications must address the necessary level of regulation/restriction, the methods for assessing the health and well-being of the animals, the potential adverse consequences of regulation/restriction, and the steps to be taken to address the adverse health effects.

Animals must always have access to water unless justified and approved in the IACUC protocol.

Food regulation and restriction requires assessment of minimum caloric requirements for the animal to maintain health.

Animals should be acclimated to food regulation/restriction over a period of time, not less than 1 week, in order to reduce stress unless approved by the IACUC.

Animals experiencing adverse effects due to food/water regulation/restriction must be evaluated by a veterinarian.

Special considerations

- Life stage (young, growing, pregnant, and lactating) and health status may affect the maintenance caloric requirement for animals. When determining restriction or regulation protocols these situations should be considered and appropriate monitoring implemented (e.g. weight assessment, comparison with expected growth curve).
IACUC Guidelines

Restriction/Fasting

- Pre-surgical fasting is the veterinary standard for larger species (cats, dogs, pigs) and does not need to be detailed in the IACUC protocol. Small research animals are not typically fasted before surgery. Therefore, pre-surgical fasting of rodents and rabbits must be justified in the IACUC protocol.

- Fasting may be necessary in preparation of a non-surgical experimental manipulation.
  - The length of time fasting must be specifically defined in the IACUC protocol.
  - Experiments on rodents should be planned so that the fasting starts in the morning, and the experimental manipulation occurs in the afternoon. This is because removing food “overnight” can have adverse effects as often rodents eat during the dark phase of the light cycle.
    - If food does need to be removed prior to leaving the lab for the evening, a small portion of food that will be consumed over the next few hours (e.g. a few pellets) may be left on the cage floor.

Regulation of food/water

The following parameters should be measured to ensure that the nutritional needs of the animals are met. Animals should be assessed daily and written records should be maintained for each animal to document these parameters.

- Animals must be weighed before experiments begin to establish a baseline weight. Weights must be recorded weekly during the periods of food/water regulation and must be specified in the IACUC approved protocol.
  - If weight loss is expected this will need to be outlined in the IACUC approved protocol. In addition to appropriately determine percentage weight loss, weight should be compared to age matched controls fed ad libitum or based on age matched growth data from the vendor.

- Body condition score can be used to assess health status (appendix 1)
  - Ideal score is 3/5; scores of 2/5 or less is considered under-conditioned to emaciated.
  - Scores lower than 2/5 must be justified in IACUC protocol

- The amount of food and/or water consumed should be measured.

- Skin turgor should be evaluated to assess the animal’s hydration status.

- Solid and liquid waste should be evaluated to assess the animal’s hydration status and physiologic compensation for fluid regulation if applicable.

- General appearance and demeanor should be observed. Rough hair coat and sunken eyes are indicators of dehydration.
### Appendix 1

#### Table 1. Rodent Body Condition Score

| BC 1 | Mouse is emaciated.  
|      | - Skeletal structure extremely prominent;  
|      | - little or no flesh cover.  
|      | - Vertebrae distinctly segmented.  |
| BC 2 | Mouse is underconditioned.  
|      | - Segmentation of vertebral column evident.  
|      | - Dorsal pelvic bones are readily palpable.  |
| BC 3 | Mouse is well-conditioned.  
|      | - Vertebrae and dorsal pelvis not prominent;  
|      | - palpable with slight pressure.  |
| BC 4 | Mouse is overconditioned.  
|      | - Spine is a continuous column.  
|      | - Vertebrae palpable only with firm pressure.  |
| BC 5 | Mouse is obese.  
|      | - Mouse is smooth and bulky.  
|      | - Bone structure disappears under flesh and subcutaneous fat.  |


### References
