

## WVU IACUC Policy: Biomedical Research Involving Changes to Food or Fluid

### Purpose

This document outlines the procedures to be used when food or fluid regulation is required for a biomedical research study. This document does not apply to animals used for food or fiber research (Agricultural).

### Background and Rationale

Some research studies may require food and/or water regulation or restriction. The Guide for the Care and Use of Animals (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)

Studies which require changes from the standard food provisions for that species **must** provide a description and justification in the animal use protocol. This policy does not apply to routine pre-procedure fasting for large animal species.

### Definitions

- *Regulation*: Scheduled access to food or fluid sources so an animal consumes as much as desired at regular intervals, for researcher experimental purposes. (e.g., Animals have ad lib access to food/water for 2 hours daily. Timed food access based on behavioral work.)
- *Restriction*: When the total volume of food or fluid consumed is strictly monitored and controlled, for researcher experimental purposes. (e.g., Animals only receive a certain percent of their daily ration based on metabolic needs. Maintaining animals at 90% BW for aging study.)
- *Deprivation*: The removal of food or fluid for a designated period prior to an experimental manipulation. (e.g., Animals have food removed for a period leading up to an experimental manipulation, after which feeding resumes as normal. Fasting animal prior to blood glucose collection).
- *Ad libitum*: The animal normally has free access to food and/or water in the home environment.
- *Food/water manipulation*: A change in the standard diet or fluid consumption. This includes addition of experimental compounds, medications, or adjusting nutrient levels. (e.g., high fat diet, medicated diet)

### Policy

1. Studies which use food/fluid regulation or restriction should implement the least restriction necessary to achieve their study goals and maintain animal well-being.
2. Animal use protocols **must** address the following:
  - a. Necessary level of regulation/restriction
  - b. Potential adverse consequences of regulation/restriction

- c. Steps that will be implemented **to** assess animal health and adverse outcomes, **including** procedures for temporary or permanent removal from study
3. Animals **must** have *ad libitum* access to water on a regular basis, unless stated and justified in the protocol.
4. When designing experiments with food regulation or restriction, the Principal Investigator (PI) should determine the minimum caloric need for the animal considering the following factors:
  - a. Species, stock, strain, breed
  - b. Age (young, growing, aged)
  - c. Sex
  - d. Thermoregulatory demand (environmental temperature)
  - e. Time of feeding
  - f. Experimental manipulation and health status (e.g., surgery, illness)
  - g. Reproductive status (e.g., pregnant, lactating)
5. The nutritive value of the diet is important when determining the appropriate volume to feed an animal during the study.
6. Studies which use food regulation/restriction as a motivation for behavioral performance **must** consider difficulty of the task, motivation required to complete the task, effectiveness of animal training for the task and alternative training paradigms (e.g., positive reinforcement, highly palatable treats)

#### **Food/Fluid Manipulations**

- a. Deviations from the standard diet **must** be described in the animal use protocol.
- b. Changes to the food or fluid may change palatability; animal food and water intake may need to be monitored to ensure normal consumption.
- c. Cages **must** be appropriately labeled when non-standard food/fluid is provided, and appropriate disposal ensured. (see “Communication Procedures” below)
- d. Animals should be acclimated to new diet if possible.

#### **Deprivation**

- a. Protocols which require deprivation **must** describe:
  - Length of time food will be withheld
  - Time of day which fast will occur (fasting is more significant overnight for rodents)
  - Total number of times deprivation will occur
  - Length of time between deprivation occurrences
- b. Animals without access to food for more than 24 hours (monogastric) or 48 hours (ruminants) or water for longer than 24 hours ***will be listed in category E.***

### **Regulation/Restriction**

- a. Animals should be acclimated to the regulation/restriction paradigm slowly over time. If weight loss is expected, it should occur gradually (no more than 10% in a week).
- b. The method and duration **must** be described in the animal use protocol (complete restriction over set period, percent of daily ration, frequency of restriction/regulation).
- c. If animals receive their daily ration during their behavioral testing, describe how animals will be fed/watered on non-experimental days.
- d. Water regulation:
  - It is important that an animal's daily water needs are met to avoid adverse clinical consequences.
  - Animals often drink to satiation in approximately 30 minutes of free access to fluids.
  - Food consumption often is decreased when water availability is limited; food should be provided concurrently during free access to fluids.

### **Monitoring and Records**

- a. Records **must** be maintained during periods of food/water regulation/restriction and be available for review by veterinary or IACUC staff upon request. The records **must** include animal weights (recorded at least weekly), hydration status and information about the amount and timing of the food and/or fluids provided to the animal. A sample monitoring form, attached to the end of this document, illustrates the kinds of measures that might be recorded. Depending on the circumstances of the research, different measures may be appropriate. It is the Principal Investigator's responsibility to decide what measures are appropriate and describe them in the IACUC protocol.
- b. Body Weight:
  - An initial body weight **must** be obtained prior to initiation of study.
  - Body weights **must** be recorded at least weekly throughout the study. It is recommended to record body weights at the same time each day.
  - For regulation studies, an animal's body weight should not decrease by more than 20% from initial body weight.
  - *Growing animals*: body weight should be compared to a growth curve or age/strain/breed matched control animals rather than the starting weight.
  - *Obese animals*: weight loss calculation should be based on optimum body weight for the animal.
- c. Daily food or fluid intake **should** be measured and recorded for each study animal
- d. Animal output:
  - Fecal and urine output **should** be monitored.
  - If animals have NO output in 24 hours, veterinary staff should be contacted.
- e. Clinical signs that **should** be considered for monitoring.:
  - Body condition score
  - Hydration status:
    - Skin turgor can be used to assess hydration status. Skin should return to normal position rapidly after being pinched; a delay is an indication of dehydration.

- Dry mucous membranes can be an indicator of dehydration in large animals.
- Small dry fecal pellets and concentrated urine are signs of dehydration.
- Clinical condition (e.g., activity level, coat appearance/grooming, skin color)
- Changes in response to behavioral studies

**Communication Procedures in OLAR-managed Vivaria**

- a. Feeding/watering for regulation/restriction is the responsibility of the research staff.
- b. Any abnormalities **must** be reported to the Office of Laboratory Animal Resources (OLAR) immediately. Examples of abnormalities may be a change in expected performance on behavioral tests, significant weight loss, signs of dehydration, etc.
- c. OLAR monitors animals daily.
- d. Special care cards (see Figure 1) and special care forms **must** be completed and submitted by the research staff and detail the period when animals are on a food/fluid regulation study with start and stop dates. Visit the OLAR website for more information: <https://hsc.wvu.edu/olar/forms/> Cards are available in the OLAR animal room card boxes or from OLAR staff.
- e. Any animal that does not have a special care card will be fed/watered by OLAR.
- f. When an animal is changed to free feeding, the special care card needs to be removed and OLAR **must** be notified.

**Figure 1**

## Special Care

PI: \_\_\_\_\_

Protocol: \_\_\_\_\_

- Food
- Water
- Bedding
- Extended weaning
- Change schedule
- Enrichment
- Other and/or Notes

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## References

1. [Guide for the Care and Use of Laboratory Animals](#), National Research Council, 2011.
2. [Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching](#), Federation of Animal Science Societies, 2010.
3. Dixon DP, Ackert AM, Eckel LA. 2003. Development of, and recovery from, activity-based anorexia in female animals. *Physiol Behav* 80:273-279.
4. Hart RW, Neumann DA, Robertson DTE. 1995. Dietary Restriction: Implications for the Design and Interpretation of Toxicity and Carcinogenicity Studies. ILSI Press, Washington.
5. Heiderstadt, K.M., McLaughlin, R.M., Wright, D.C., Walker, S.E., Gomea-Sanchez, C.E. 2000. The effect of chronic food and water restriction on open-field behavior and serum corticosterone levels in rats. *Lab Animals* 34:20-28.
6. National Institutes of Health: [http://oacu.od.nih.gov/ARAC/documents/Diet\\_Control.pdf](http://oacu.od.nih.gov/ARAC/documents/Diet_Control.pdf)
7. National Research Council. 2011. *Guide for the Care and Use of Laboratory Animals*. 8<sup>th</sup> Edition. National Academies Press, Washington.
8. Toates FM, Rowland NEE. 1987. *Feeding and Drinking*. Elsevier, Amsterdam.

**Food/Fluid Regulation Monitoring Form for Rodents**

IACUC Protocol Number:

Cage ID (if applicable):

Principal Investigator:

Procedure Date:

Responsible Personnel Name:

Species: Mice  Rats

Lab Phone:

Procedure: Fluid Restriction

Lab Email:

Food Restriction

After Hours Contact Number:

Animal ID:

Date	Time	Animal ID	Body Condition: BCS	Body Condition: B.Wt. (g)	Hydration: Urine/Feces	Hydration: Skin Turgor	Food Regulation: Food Given	Food Regulation: Food Eaten	Food Regulation: Fluids Given (mL) & time	Fluid Regulation: Fluids Drank (mL)	Initials


Body Condition Score (BCS): 1=emaciated, 5=obese

Skin Turgor: N=normal, A=abnormal

This form is provided as an example. PIs may use either this form or their own form to monitor their animals on Food/Fluid regulation, as long as the documentation of monitoring is available upon request. This form can be used to monitor more than one animal. After all the rodents listed on this sheet are no longer on study, this sheet should be kept on file in the lab. Frequency of monitoring must be done according to the approved IACUC protocol dealing with the experimental condition under study.