PROVISION OF FEED AND WATER

PERFORMANCE STANDARD: All animals will receive the necessary quantities of feed and water to sustain life, promote health, and assure well-being, except as scientifically exempted by the IACUC for specific and defined purposes and for specific and defined periods.

BACKGROUND: The Duke animal care program includes a variety of research, testing, and teaching activities. The Duke IACUC recognizes that ethical use of animals requires animals receive adequate feed / water to assure adequate physiology and a stable biological platform. Occasionally, research or testing activities will require reduced quantity or quality of water or feed. IACUC approval is required for water / feed provisions below the standards for the species or breed. Monitoring for health risks and clear milestones for animal well-being is also necessary.

ROLES: The Duke Principal Investigator is responsible for all approved activities involving animals. The Duke Principal Investigator must also assure feed / water is provided according to the Duke DLAR SOP for feed / water or an alternate plan for feed/ water as approved by the Duke IACUC.

POLICY: The IACUC defines the following terms and conditions for provisions of feed / water:

1. **The Duke Standard**: The Duke Division of Laboratory Animal Resources (DLAR) establishes standard care parameters for all animals used in Duke-sponsored research, testing, and teaching. For example: Required provision for standard rabbit water and feeding is listed in DLAR-HUS-2.04; required provisions for guinea pigs are found in DLAR-HUS-3.04; etc. This policy begins with the basis that water / feed standards are determined by DLAR. Reduced schedules are covered in this policy.

2. **Ad libitum or free access**: A situation where animals have unfettered access to feed or water. Ad libitum feeding is occasionally harmful to the well-being of animals (e.g., rabbits). In these cases, limit feeding shall be used to provide sufficient quantities and quality for normal growth and maintenance; water may be provided ad libitum.

3. **Reduced Water / Feed**: Defined as any provision of water or feed which is less frequent or in less quantity than listed in the Duke standards (DLAR SOPs). Restriction and deprivation are two forms of reducing water / feed. Animals placed on a reduced water / feed schedule carry the following stipulations:

   a. **Water / Feed Minimums**:

      i. **Minimum Frequency of Provision**: Considering the regulatory expectations for minimum frequencies of feed or water provision, the Duke IACUC expects:

         1. **Water**: Available continually or no less than twice a day for at least 1 hour each time. Any other schedule requires IACUC approval as part of the protocol. Small or younger animals generally require more frequent access to water than do older or larger animals.
2. **Feed:**
   a. **Mice, rats:** A sufficient quantity of a nutritional ration is offered to these species at least once every 12 hours for a minimum duration of 1 hour.
   b. **All other species:** A sufficient quantity of a nutritional ration is offered to these species at least once every 24 hours for a minimum duration of 1 hour or until all food is consumed.

ii. **Minimum Quantity of Water / Feed:** The minimum quantity is defined by DLAR SOP according to the specific needs of the species. SOPs that describe ad libitum feeding require ad libitum feeding for the time period indicated in section A.2.

b. **Monitoring While on Reduced Water / Feed:** One cannot always predict which, if any, animals on a reduced schedule of water / feed will develop problems. At a minimum, animals on a reduced intake (either quantity or frequency) of water or feed should be monitored for:
   i. **Body Weight** (at least every other day for juvenile animals, every third day for smaller sized adult animals and weekly for larger sized adult animals). More frequent recording may be required by the IACUC or veterinary staff.
   ii. **Body Condition** (based upon a condition score for the species)
   iii. **Hydration Status**
   iv. **Behavioral Changes**

   **NOTE:** Monitoring plasma osmolality, electrolyte levels, and/or urine specific gravity may also be valuable measures of compromised physiology.

c. **Precautions When Reducing Water / Feed:** When restricting intake or volume of food or water, certain precautions are required, including:
   i. **Daily recording of food / water intake.** Sufficient intake of nutritional compounds must be assured (restricted water / feed). IACUC approval as a Category ‘E’ activity is required for water / feed intake at a deprived level.
   ii. In the case of conditioned-response experiments, use of a highly preferred food or fluid as a positive reinforcement is recommended.
   iii. Animals which hibernate / estivate may have reduced supply of water / feed based upon normal species behaviors and needs. These animals also require a monitoring plan which must be described in the approved protocol.

4. **Restricted Water / Feed:** A situation where access to water / feed is controlled and measured and is less than the ‘standards’ described in the DLAR SOPs for species. Restricted water / feed does not cause significant negative impact upon animal well-being (defined as measures of physiology, activity, and general body condition). Restricted intake does not mean ‘no’ intake, but rather provision of a lesser volume than the animal would consume during ad lib conditions. Restriction is not a category ‘E’ activity. There are three general methods of restricting water / feed; only one method requires IACUC approval:

a. **Restriction as a management activity:** Feed restriction is a necessary husbandry process to prevent over-eating which may result in dysbiosis and / or obesity (e.g. rabbits), either of which is potentially fatal to the unrestricted animal. Metering of food for purposes of animal well-being does not require IACUC approval. DLAR veterinary clinical opinion is sufficient
b. **Restriction as a clinical activity:** Feed restriction is a necessary clinical care activity to prevent aspiration or asphyxiation (e.g., restricted water / feed intake is necessary to facilitate safe anesthesia induction and safe recovery from anesthesia). Restriction may also be employed for several other clinical veterinary reasons. Restricted feed / fluid intake based upon veterinary clinical requirements does not require IACUC approval. DLAR veterinary clinical opinion is sufficient.

c. **Restriction as a research activity:** Feed restriction is a necessary component to certain types of research (e.g. restriction may be necessary to motivate the animals toward a desired behavioral goal; restriction may be used as a tool for assessing the effectiveness of research outcomes). IACUC approval is required. DLAR veterinary opinion is not sufficient for authorizing this style of restriction. The justification for a restricted water / feed plan is not required to be as rigorous as the justification for deprived water / feed schedules. To obtain approval for restricted water / feed provisions, the IACUC requires:
   i. The scientific justification for restriction of water / feed;
   ii. A program to monitor physiologic or behavioral parameters;
   iii. Criteria for removal of the animal from the study if specific endpoints have been reached (e.g., weight loss, hydration state, behavior change, etc.);
   iv. Urine specific gravity measurements on a frequently sufficient basis to track increasing levels of dehydration (including endpoints for removal from study), if appropriate;
   v. Hematocrit measurements on a basis sufficient to track increasing levels of dehydration (including endpoints for removal from study), if appropriate; and
   vi. A recovery plan for rehydration (based upon a clinically appropriate rehydration plan).

5. **Deprivation of Water / Feed:** Deprived intake generally means no intake of water / feed for extended periods of time which has the potential for a demonstrable impact upon animal well-being. Deprivation of water / feed for research or clinical purposes may be necessary in certain circumstances, but requires IACUC approval. When experimental situations require water / feed deprivation, consideration must be given for minimum quantities of food and fluid required to sustain reasonably normal physiology within the restricted time period. Deprivation is defined as follows:
   a. **Water Deprivation:** Defined as no intake for more than:
      i. 8 hours: Lagomorphs
      ii. 18 hours: Primate (old world) species
      iii. 23 hours: Other species (including rodents)
      iv. 28 hours: Ruminants

      Note: Provision of 1 hour ad lib water every 12 hours is neither deprivation nor restriction.

   b. **Food Deprivation:** Defined as no intake for more than:
      i. 36 hours: Simple stomach animals
      ii. 72 hours: Ruminants

6. **IACUC Approval of Deprivation:** Deprivation of water / feed is a Category ‘E’ activity. The ‘threshold’ for IACUC approval of deprivation is high, and requires:
a. An assessment of ethical cost/scientific benefit
b. Clear scientific justification requiring a deprived animal for the research outcomes;
c. PI agreement to notify the DLAR veterinary staff prior to initiating the period of deprivation;
d. A program to monitor physiologic or behavioral parameters. For example:
   i. Urine specific gravity measurements on a frequently sufficient basis to track increasing levels of dehydration;
   ii. Hematocrit measurements on a basis sufficient to track increasing levels of dehydration; and

e. Criteria for removal of the animal from the study if specific endpoints have been reached (e.g., weight loss, hydration state, urine specific gravity, hematocrit, behavior change, etc.)
f. A recovery plan for rehydration (based upon the humane endpoints).

7. NOTES ON RESTRICTION / DEPRIVATION:
   a. Certain hibernating / estivating species do not consume water / feed for periods which would qualify as deprivation, but is in fact ‘normal’ for the species while hibernating / estivating. The IACUC defines hibernating / estivating animals as ‘NORMAL.’ Thus, these instances are neither deprived nor restricted. Hibernating / estivating protocols will be reviewed by the IACUC on a case-by-case basis.

   b. For some species, especially rodents, restriction of water will concurrently cause the animal to eat less (and vice versa).

REFERENCES:
1. United States Department of Agriculture, 9 CFR Parts 1, 2, and 3.
2. PHS Policy on the Care and Use of Laboratory Animals, OPRR, 1996.
3. OLAW Web Site: http://grants.nih.gov/grants/olaw/
4. AAALAC Accreditation Guidelines: http://www.aaalac.org
5. 8th Edition: The Guide for the Care & Use of Laboratory Animals
7. Duke Division of Laboratory Animal Resources Standard Operating Procedures