Policy on Wire-Bottom Caging for Rodents

Policy:

- Solid-bottom caging and bedding must be used for rodents unless adequate scientific justification for use of wire-bottom caging is provided in the animal use protocol.
- Use of wire-bottom caging for nutrition and metabolism experiments of short duration (no longer than three weeks), in which coprophagy or consumption of bedding would interfere with experimental objectives or add variation sufficient to increase animal numbers, are scientifically justified. Protocols with these experiments do not require review at a convened meeting of the Institutional Animal Care and Use Committee (IACUC) unless requested by a committee member.
- Wire-bottom caging may be used as temporary housing for up to three weeks, at the discretion of the Attending Veterinarian for Laboratory Animals, if more appropriate housing is unavailable because of unforeseen circumstances and does not require review at a convened IACUC meeting.
- Use of wire-bottom caging must include monitoring procedures that will ensure the animal's welfare and compliance with the approved protocol.

Exceptions: Exceptions to this policy must be reviewed by the Division of Animal Resources (DAR) veterinary staff and referred to the IACUC for committee review and action as appropriate. The IACUC, or any individual member, has the option to call any protocol for full committee review at a convened IACUC meeting.

Background: Acceptable primary enclosures for animals must, among other things, allow for the normal physiologic and behavioral needs of the animals, including urination and defecation, maintenance of body temperature, normal movement and postural adjustments, and, where indicated, reproduction (1).

Solid-bottom caging with bedding is preferred by rodents, especially for periods of rest (1, 2). Clinical abnormalities associated with housing rodents on wire-bottom caging have been documented. There is evidence contributing to T*he Guide* recommendation (1) that solid-bottom caging with bedding be used for rodents over prolonged periods of housing as wire-bottom caging may cause stress-associated lesions of foot and limbs of guinea pigs and rats (3, 4). Lesions associated with housing animals on wire-bottom caging have included ulceration and nodular swellings, pressure neuropathies of the hind foot, peripheral nerve abnormalities, and urologic syndrome (2). Some of these clinical abnormalities may also occur in animals housed in solid-bottom caging or may not occur until animals have been housed on wire-bottom caging for over a year.

There are also occasions when rodents may be more appropriately housed on wire if there is adequate scientific justification. For example, for metabolism studies where urine and/or feces collections are needed, wire-bottom cages are usually necessary. Other studies needing wire-bottomed cages include those where exact food intake information is needed for nutrition studies in order to evaluate food efficiency (grams weight gain/grams consumed), the bioavailability of

component of the feed must be calculated (for example, the percentage of a consumed nutrient that reaches the liver), or when the relative absorption of a diet component or an orally or injected drug is administered (amount consumed or injected/amount in the feces and/or urine). These types of studies cannot be completed accurately with solid-bottomed caging as it is not possible to accurately assess food intake, spillage, or to collect urine or feces due to bedding and dander in the cage bottom. In such experiments, wire-bottom cages will minimize animal use and is consistent with U.S. government principles.

Additional concerns with bedding in solid-bottom caging include: a) rodents frequently practice coprophagy, and b) rodents frequently consume bedding material (5). Coprophagy and consumption of bedding is more difficult for the rodent when placed in wire-bottomed caging. Consumption of feces adds unacceptable complexity (second chance for nutrient absorption and/or alteration in chemical structure due to fecal flora) and error to most nutrition trials. Consumption of bedding also adds complexity and may add unknown chemical components to dietary intake, again increasing error and animal number requirements for most nutrition trials. In such experiments, wire-bottom cages will minimize animal use.

Role of the Investigator: If principal investigators desire to house rodents in wire-bottom caging, they must submit in writing an acceptable scientific rationale in their IACUC protocol for using wire-bottom instead of solid-bottom caging with bedding.

Role of the Animal Care Unit: Daily observations of rodents used in research are performed by DAR animal care staff. If any abnormality is noted, the DAR veterinary staff is contacted to assess the animal. The DAR veterinary staff, in consultation with the researcher, will determine the proper course of treatment.

References:

1. Guide for the Care and Use of Laboratory Animals (*The Guide*), NRC, (1996).
2. The Laboratory Rat 2nd edition, Suckow, Weisbroth, Franklin, Eds. Academic Press, (2006).
3. Grover-Johnson N, Spencer PS. (1981) Peripheral nerve abnormalities in aging rats. *J Neuropathol Exp Neurol.* 40(2):155-165.
4. Ortman JA, Sahenk Z, Mendell JR. (1983) The experimental production of Renaut bodies. *J Neurol Sci.* 62(1-3):233-241.
5. Weisbbroth, SH. (1979) Chemical contamination of lab animal beddings: problems and recommendations. *Lab Anim.* (8):24-34.

Approved 5/4/2010