

## STANDARD OPERATING PROCEDURE

### ENVIRONMENTAL ENRICHMENT FOR CATTLE USED IN RESEARCH AND TEACHING

#### 1.0 PURPOSE:

- 1.1 This standard operating procedure (SOP) describes the methods for environmental enrichment of bovine (*Bovinae*) used for research and teaching purposes.
- 1.2 These methods are intended to improve the well-being of these animals by increasing species-specific behaviors and reducing maladaptive behaviors.
- 1.3 This SOP is part of the UGA Environmental Enrichment Program that fully complies with the requirements of the National Research Council, *Guide for the Care and Use of Laboratory Animal*, ed8 available at <http://grants.nih.gov/grants/olaw/Guide-for-the-Care-and-Use-of-Laboratory-Animals.pdf> and the Animal Welfare Act and Regulations: Public Law 99-198 – The Improved Standards for Laboratory Animal Act available at <http://www.nal.usda.gov/awic/legislat/awa.htm> .

#### 2.0 STANDARDS:

##### 2.1 Natural Behavior:

*Bovinae* is a family of ungulates that includes domestic cattle, bison, African buffalo, water buffalo, yaks and spiral-horned antelopes. In the laboratory environment, the term bovine generally refers to domestic cattle (*Bos primigenius*). Cattle were originally identified as three separate species, *Bos taurus*, *Bos indicus* and *Bos primigenius*. Now they have all been grouped under the later species. (ICZN, 2003) Cattle were originally domesticated about 10,500 years ago in Mesopotamia. (Bollongino et al., 2012) Domestic cattle are commonly grouped based upon their use, as dairy cattle or beef cattle. Domestic cattle are ruminants, having a four compartment stomach. As ruminants, they are proficient at digestion of plant cellulose due to their ability to regurgitate their food, chew their “cud” and then re-swallow for specialized microbial digestion in the rumen compartment of their stomach. For this reason, domestic cattle can thrive on grasses and many other forms of vegetation. They naturally spend most of their day grazing, chewing their cud and grooming. They typically only sleep about 4 hours per day. (Holland, 2011) Cattle can subsist in an array of housing systems, from extensive grazing to confined feedlot pens or intensive laboratory environments. Dairy cows do require a dry area for lying down. Cattle are social animals, thriving within the herd and stressed when separated. Most are placid and easy to work with, though bulls and cows defending their calves can be aggressive. By virtue of their size and disposition, bull cattle may be considered as one of the most dangerous of domestic animals. Cattle communicate primarily through body language, vocalization and olfactory scents. They may turn “broad-side” to show aggression or even paw and charge. However, like most prey animals, they usually run from threats. (NVCC, 2013)

##### 2.2 Environmental enrichment must be evaluated by taking into account the following:

- 2.2.1 The Natural Behavior and needs of bovines (see above)
- 2.2.2 Social Enrichment – Housing of compatible co specific offers a high level of enrichment. Every effort will be made socially house social species. If social housing is not possible, animals should be housed in a manner that allows for as much tactile, auditory, visual or olfactory contact as possible. Social housing is a recognized and important part of the Environment Enrichment Program but

should not be viewed as the sole means of meeting the enrichment needs of animals.

2.2.3 Physical Enrichment (devices, toys, etc) – Physical enrichment can be an important part of the Environmental Enrichment Program. However the selection of physical enrichment should take into account the safety of the device, its ability to stimulate and maintain the animal’s interest and its impact on the research being conducted. Physical enrichment should be carefully monitored to assess its impact of the goals of increasing natural behaviors.

2.2.4 Activity/Food Enrichment – Activity/food enrichment can be an important part of the Environmental Enrichment Program. However, the selection of activity/food enrichment should take into account the health of the animal, the limitations of its confines and its impact on the research being conducted. Any activity/food enrichment should be planned in consultation with the Attending Veterinarian (AV) and the Principal Investigator (PI).

2.3 The enrichment program is carried out by University Research Animal Resources (URAR). Specific needs and requirements should be communicated to the Assistant Director of the Animal Resources (AR) Unit.

2.4 Unless specifically justified by the PI in the Animal Use Proposal (AUP), all animals will receive enrichment. It is recognized that animal enrichment can be a research variable. In caring for the psychological well-being of animals, it is important to recognize limitations and use a balanced approach in providing the best possible care and allowing for the expression of species-typical behavior within a functioning research environment.

2.5 Abnormal Behaviors:

The Environmental Enrichment Program is a dynamic process. Ongoing evaluation is a necessary component to meeting the goal of more species-specific natural behaviors. University Research Animal Resources (URAR) will regularly monitor all enrichment, in part, by looking for stereotypical behaviors that might indicate animal stress or maladaptation to the laboratory environment.

Abnormal behaviors in bovines include:

- Aggression
- Tongue rolling (especially in veal calves)
- Anorexia
- Unusual vocalization, particularly ‘hoots’ or ‘roars’
- Apathy

When these behaviors are observed, URAR will evaluate the need for additional environmental enrichment. All changes to enrichment will be approved by the AV and the PI. Enrichment changes will be made for all animals on study, in order to minimize research variability, even if all of the animals are not showing the stereotypical behavior.

### **3.0 PROCEDURES:**

3.1 Social Enrichment – As a social species, bovine social housing will be considered the default method of housing unless otherwise justified based on social incompatibility resulting from inappropriate behavior, veterinary-related concerns regarding animal well-being, or scientific requirements approved by the UGA Institutional Animal Care and Use

Committee. If equines cannot be housed together, every attempt will be made for defined group interactions. Positive human interaction will be provided by Animal Care Staff on a regular basis. Also, the addition of a companion animal from another species will also be considered.

3.2 Physical Enrichment - in order of preference

- 3.2.1 Exercise (especially for tied dairy cattle) – at least 1hr/day
- 3.2.2 Dry area to lie down (especially for milking dairy cows)
- 3.2.3 Scratch post (Wilson et al., 2002)

3.3 Activity/Food Enrichment - in order of preference

- 3.3.1 Pasture access

**4.0 RECORDS:**

The Animal Care Staff will log provision of enrichment daily according to their facility specific documentation records.

**5.0 DEFINITIONS AND REFERENCES:**

5.1 Definitions:

- 5.1.1 Animal Use Proposal (AUP): a detailed written description of the procedures involving the use of animals in a research or instructional project.
- 5.1.2 Attending Veterinarian (AV): the veterinarian responsible for the health and well-being of all laboratory animals used at the institution
- 5.1.3 Enrichment: a method of providing animals with the opportunity to behave as they do in the wild, playing, foraging, grooming, and interacting in other ways with one another.
- 5.1.4 Principal Investigator (PI): the scientist who plans and coordinates all phases of the research or instructional work and the protocol.
- 5.1.5 Standard Operating Procedure (SOP): a set of standardized instructions for dealing with routine laboratory procedures

5.2 References:

- Animal Welfare Act and Regulations: Public Law 99-198 – The Improved Standards for Laboratory Animal Act (<http://www.nal.usda.gov/awic/legislat/awa.htm>)
- Bollongino, R. et al. (2012) *Modern Taurine Cattle descended from small number of Near-Eastern founders*. Molecular Biology and Evolution
- Federation of Animal Science Societies, Guide for the Care and Use of Agricultural Animals in Research and Teaching, ed. 3 available at [www.fass.org/docs/agguide3rd/Ag\\_Guide\\_3rd\\_ed.pdf](http://www.fass.org/docs/agguide3rd/Ag_Guide_3rd_ed.pdf)
- Holland, J.S. (2011) *40 Winks?* National Geographic
- International Commission on Zoological Nomenclature (2003) *Opinions. Bulletin of Zoological Nomenclature*
- Merck Manual at <http://www.merckmanuals.com/vet/behavior.html>
- National Research Council, *Guide for the Care and Use of Laboratory Animals*, ed 8 available at <http://grants.nih.gov/grants/olaw/Guide-for-the-Care-and-Use-of-Laboratory-Animals.pdf>

North Virginia Community College (2013) *Cattle and Reproduction*:  
<http://loudoun.nvcc.edu/vetonline/vet116/Cattle/cowbehavior.htm>

Wilson, et. al., (2002) *An assessment of several potential enrichment devices for feedlot cattle*. Applied Animal Behavior Science