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| Policy: | SC-35-900 |
| Date: | 6/9/2025 |
| Enabled by: | IACUC/AV/ ILAR |
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Title: Husbandry Care of Cephalopods

I. Purpose:

The purpose of this policy is to outline the minimum standards of care for cephalopods (octopus, squid, cuttlefish, etc.) as currently understood. It is important to recognize there are no established standards for quickly assessing welfare for laboratory cephalopods and evidence based operational welfare is scarce.

II. Policy:

All units providing animal care for cephalopods must meet or exceed these minimum requirements based on the ILAR Guide for the Care and Use of Laboratory Animals (Guide), and the Public Health Service Policy (PHS). Deviations or exceptions must be approved by the Attending Veterinarian and the IACUC. Anyone housing cephalopods is encouraged to consult with the authors listed in the references below, as they are considered subject matter experts for cephalopod husbandry "best practices" that will be in addition to these minimum standards.

III. Procedure:

Daily (365 days a year without exception):

- Observe each animal and check for health concerns (*Guide* pg. 112).
- Ensure adequate feed is available, though depending on the species and life stage this may be done less frequently (*Guide* pg. 65-68).
- Record sick and dead animals and report them to Campus Veterinary Services (CVS) or designated clinical veterinarian per standard operating procedure for reporting sick or dead animals.
- Record minimum and maximum water temperatures.
 - Temperature range varies by species. Ranges can vary widely with species and salinity. However, temperatures must be appropriate for the species. (*Guide* pg. 78).
 - It is recommended to record each individual tank water temperature daily, but for large subsets of tanks minimally 10% of the tanks must be recorded.
- For closed systems (recirculating), record water quality (*Guide* pg. 78):
 - dissolved oxygen
 - ammonia
 - nitrite

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- nitrates
 - pH (species dependent)
 - salinity (29-36 ppt).
- Water flow (current) should allow the cephalopods to maintain normal locomotion and behavior relative to the species.
- Clean any excessively soiled tanks (Guide pg. 70). Ensure adequate water quality if compounds such as ink is released from the species. Ink should be removed as soon as possible once found.
- Clean and organize room, anterooms, and surrounding premises (Guide pg. 72).
- Record daily completion of tasks, initial, and date log sheet.

Weekly (not to exceed every 7 days):

- For flow through systems, record water quality (Guide pg. 78):
 - dissolved oxygen
 - ammonia
 - nitrite
 - nitrates
 - pH (species dependent)
 - salinity (29-36 ppt).
- Skimmers should be checked and filters cleaned.
- Since water quality is constantly changing in flow-through systems more frequent evaluation may not be necessary. If high mortality or other clinical concerns are recognized, water quality intervals may be increased.

Biweekly (not to exceed every 14 days):

- Replace at least 25% of the tank water volume using conditioned water in recirculating systems.
- For filtration system and pumps, clean all filters per manufacturer's instruction.

Monthly (not to exceed every 30 days):

- Disinfect nets, shelves, racks, tank cleaning utensils, scrub brushes, and enrichment devices.
 - The use of certain disinfectants may be contraindicated for some aquatic species, as residues may be highly deleterious (Guide pg. 71).

As needed:

- Disinfect the animal room including walls, floors, and ceilings (if possible) (Guide pg. 72).
- Remove and replace worn or damaged equipment from primary enclosures and surrounding facility (Guide pg. 72).
- Commercial feed must be discarded after 6 months of the milling date unless manufacturer guidelines recommend a shorter or longer expiration (Guide pg. 66).
- Clean and sanitize feed storage containers (Guide pg. 67). Live feed must adhere to the standards of care for that species.

Environmental Enrichment:

- Refer to the Environmental Enrichment policy.
- Cephalopods should be provided the opportunity to demonstrate species typical behavior. (*Guide* pg. 83) Dens and shelters for octopuses are not considered enrichment. Additional manipulanda must be provided in addition to shelter and appropriate for the species.
- Devices must be checked regularly for wear and discarded when safety hazards are observed. Avoid anything that has sharp or pointy protrusions.

Facilities:

- Temperature alarms must be installed in all rooms housing cephalopods (*Guide* pg. 143).
- Adequate ventilation must be provided for the health and comfort of the animal at all times, governed by thermal and moisture loads (*Guide* pg. 81).
- Floors shall be moisture-resistant, non-absorbent, impact-resistant, and relatively smooth (*Guide* pg. 137). Refer to Physical Plant and Facilities Maintenance policy.

Housing:

- Caging/Enclosures must be in good condition, free of any damage that may cause injury and escape proof.
- Whenever possible and depending on the species, fish should be socially housed in compatible groups (*Guide* pg. 51). Most octopuses are solitary and should be kept in isolation. (1)
- Space requirements will vary by species and life stage (*Guide* pg. 83).

When housing this species, please also refer to the Animal Care Program's Standards of Care Policy on Pest Control, Identification and Labeling of Cages, Environmental Enrichment, Food Storage, House-Keeping in Facilities Housing Biomedical Research Animals, Physical Plant Facilities Maintenance, as well as the IACUC's Policy on Social Housing of Social Species.

Reference:

1. Fiorito, G, etc. "Guidelines for the Care and Welfare of Cephalopods in Research- A consensus based on an initiative by CephRes, FELASA and the Boyd Group", Vol 49, no. S2, 2015, pp 1-90. Laboratory Animals, Sage Publications.
2. Crook, R.J. 2021 "Behavioral and neurophysical evidence suggests effective pain experience in octopus." (Science)
3. Giancola-Detmering, S.E. and Crook, R.J. 2024 *Stress produces negative judgement bias in cuttlefish*. Biology Letters
4. PRIM&R November 2024 conference *Session A12: Welfare considerations for Cephalopods*. Dr. Robyn Crook and Dr. Raphael Malbrue