GV-SOLAS
Gesellschaft für Versuchstierkunde
Society for Laboratory Animal Science

Statement

From the Committee for the Humane Laboratory Animal Housing

Options for Short-Term and Temporary Energy-Saving Measures for Housing and Breeding of Laboratory Animals

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Rapidly rising energy costs are becoming an increasing problem for the housing and breeding of laboratory animals in scientific institutions. The GV SOLAS Committee for the Humane Care of Laboratory Animals ("Ausschuss für Tiergerechte Labortierhaltung") has therefore compiled the aspects outlined below to present laboratory animal facilities with potential measures that could be implemented for short periods - for example, in the event of an acute energy shortage - in order to maintain operations following a risk assessment, without significantly compromising animal welfare or ongoing experiments.

The welfare-compliant housing of valuable laboratory animal populations and the conduct of scientific experiments require considerable resources to meet the legally mandated conditions pursuant to Section 11 of the German Animal Welfare Act (TierSchG) as well as the European species-specific minimum requirements for laboratory animal husbandry as defined in Annex III of Directive 2010/63/EU and in Appendix A of ETS 123.

It should be explicitly noted that any implementation of the measures listed below requires timely coordination, i.e., in this case, preventive consultation - with the holders of Section 11 licenses, institutional management, the responsible veterinary authorities, in-house technical services, and the scientists conducting animal experiments within the facility. Unilateral action may negatively affect those being responsible for the animals under Section 11 TierSchG and must be strictly avoided.

It should also be emphasized that the currently valid legally prescribed and/or professionally recommended housing conditions have been taken into account in this document. Any energy-saving measures and their effects on housing conditions and on the results of animal experiments must be closely monitored and documented. Relevant changes to housing conditions should, in case of doubt, only be implemented temporarily and regarded as exceptional situations.

For resource conservation in the operation of laboratory animal facilities, the following aspects are particularly relevant:

1. Reduction of housing capacities
2. Climate control of housing rooms
3. Processing of husbandry materials
4. Hygienic barriers

1. Reduction of Housing Capacities

For the measures listed below, it must generally be assessed whether they are scientifically acceptable and effective in terms of the energy savings achieved. When selecting appropriate measures, it should also be considered whether they are intended to address a medium- to long-term shortage or a short-term and temporary need for energy conservation.

1.1. Reduction of breeding activities to the minimal required numbers for maintaining the lines/strains required for experimental use, if necessary, by consolidating breeding activities in central areas and closing unused rooms/sections. In certain cases, a general breeding stop should also be considered.

1.2. Review of the necessity of imports and the establishment of new breeding lines.

1.3. Temporary suspension of hygienic rederivation of lines, provided there is no urgent need for their use.

1.4. Intensification of cryopreservation measures. However, this is only suitable as a long-term energy-saving measure, since prior to cryopreservation an increase in animal numbers of the respective line (especially breeding females and some males) is required to obtain sufficient numbers of embryos. If only sperm cryopreservation is intended, shorter-term implementation without additional breeding effort may be possible.

1.5. Consolidation and optimization of underutilized housing rooms. This can be implemented relatively easily in individually ventilated cage (IVC) systems. In open housing systems, this is only feasible if hygienic standards are reduced or harmonized.

2. Climate Control of Housing Rooms

In general, previously tightly defined environmental parameters could be adjusted or their tolerance ranges relaxed in order to minimize energy-intensive adjustments. This applies to room temperature and relative humidity. Nota bene: Any changes to housing conditions approved under Section 11 of the German Animal Welfare Act (TierSchG) must be coordinated with the responsible authorities prior to implementation. This applies equally to animal welfare and genetic supervisory authorities.

2.1. Air Exchange Rates

2.1.1. For rodent housing in IVC systems: reduction, for example, to 8 air changes per hour per room (a 50–70-fold air exchange per hour within the cage remains unaffected; exhaust air from IVC systems should be connected to the building exhaust system).

2.1.2. For rodent housing in open cage systems: reduction, for example, to 10–12 air changes per hour or lower, provided that stocking density, number of personnel in the room, and operation of equipment allow this with respect to pollutant gas loads (ammonia and CO_2), particularly within the cage. In doing so, protection both animals and staff by removal of harmful gases (cf. workplace regulations) must be maintained.

2.1.3. Adjustment of air exchange rates in aquatic housing systems. It must be taken care to ensure that potentially increased humidity and condensation do not lead to higher microbial loads, for example through mold formation (if necessary, room and water temperatures should be adjusted accordingly).

2.2. Temperature

2.2.1. A reduction of room temperature below 20°C is not acceptable for rodents and conflicts with legal requirements, as physiological parameters are significantly affected at temperatures below this threshold. Higher temperatures are generally better tolerated by rodents. However, relaxing the controlled temperature range from 22°C ± 1°C to 22°C ± 2°C is likely feasible without causing animal welfare concerns. Relaxing the control range may reduce the energy demand for air conditioning. Providing additional suitable nesting material may support thermoregulation of the housed animals.

2.2.2. Changes in room temperature in aquatic housing systems can be implemented relatively easily from an animal welfare perspective, as housing water is typically maintained above 24°C. Aligning room temperature with water temperature is one option, as is reducing aquarium temperature. Breeding of fish lines can be carried out within recirculating housing systems.

2.3. Humidification

Relative humidity is a key factor for animal welfare and health, and thus also for experimental outcomes. Changes should be introduced gradually (stepwise) and should not exceed or fall below certain limits (maximum tolerance range 30–70%) to allow physiological adaptation.

2.3.1. A general reduction in relative humidity is usually not effective, as it may require additional energy-intensive dehumidification. Instead, it may be beneficial to relax the tolerated range of relative humidity from 55% ± 10% (GV-SOLAS recommendation) to, for example, 55% ± 15%. This would reduce the frequency of energy-intensive humidification and dehumidification.

2.3.2. Instead of central steam-based humidification, decentralized electrically operated humidifiers can be used, provided they are more energy-efficient overall and the necessary infrastructure (e.g., water supply and drainage) is available. Hygienic requirements in animal facilities and the personnel effort required for maintenance must also be considered. In this context, the use of ventilated cabinets may also be advantageous, as the volume requiring climate control, and thus energy consumption, is significantly lower than for entire rooms.

3. Processing of Husbandry Materials

3.1. Cage Change Intervals

Cage change intervals may be extended depending on stocking density and other relevant factors. In aquatic systems, priority may be given to cleaning aquaria that exhibit excessive biofilm and/or algal growth. This can significantly reduce the number of cages and husbandry materials requiring processing, as well as the associated autoclaving cycles. Investments in structural measures or innovative approaches, such as software-assisted, demand-driven cage changing based on automated detection of bedding contamination may also be considered.

3.2. Cage Cleaning

In smaller animal facilities, cage cleaning may be reduced by manually replacing bedding and wiping cages instead of performing full cleaning cycles under certain conditions and provided that this is acceptable from a hygienic, logistic, and occupational safety (dust exposure) perspective. It must be ensured, however, that each cage is reused for the same individuals.

3.3. Cleaning Systems

3.3.1. Reducing water temperature during washing processes is generally not advisable, as this may compromise the effectiveness of cleaning agents. However, temperatures may be adjusted to the lower limit of the effective operating range.

3.3.2. Energy-intensive drying sections can probably be deactivated if materials can be air-dried. The additional space and lab requirements must be taken into account. The use of rinse aids to promote faster drying may also be considered. Nota bene: In aquatic systems, rinse aids are generally avoided; however, air drying is unproblematic. If aquaria are reused immediately after cleaning, complete drying is not required.

3.4. Autoclaving and Sterilization

Autoclaves are highly energy-intensive systems. Alternative sterilization methods, such as hydrogen peroxide, peracetic acid, or surface treatment with suitable disinfectants, may be considered for certain materials. The material properties of items to be sterilized must be carefully evaluated to avoid safety-related issues (e.g., off-gassing of hydrogen peroxide from cage components). Sterilization of materials such as chow or bedding using these alternative sterilization methods is generally not compatible with animal welfare requirements.

3.4.1. For efficiency reasons, autoclaves should be used as centrally as possible, allowing smaller, less efficient units to be excluded. Transport of sterilized materials can be carried out using closed autoclave carts, which must be surface sterilized before entering hygienically sensitive areas.

3.4.2. Water bottles and bottle caps may be autoclaved empty using short solid-load cycles, with bottles subsequently filled within housing areas at taps equipped with sterile filters. Background: Liquid cycles need much longer time and require more energy than solid-load cycles. However, increased space and personnel requirements for hygienically compliant bottle filling must be taken into account.

3.4.3. Waiving the autoclaving of feed may be considered. It should be noted that feed is often fortified with heat-labile nutrients to compensate for degradation during autoclaving. If autoclaving is omitted, feed composition must be adjusted accordingly, or the use of irradiated feed or hygienically comparable products (e.g., hybrid pellets) should be considered. (Caveat: Limited capacities and potentially long delivery times at commercial irradiation facilities, as well as increased material and lab requirements [e.g., additional plastic packaging, disinfectants], must be taken into account when introducing such feed products).

4. Hygienic Barriers

4.1. Energy-intensive hygienic barrier systems may, wherever reasonable and acceptable, be consolidated. Infection control must, of course, remain the primary consideration. Nota bene: Air exchange rates and pressure differentials in existing facilities often cannot be easily modified and may require complex recalibration and detailed coordination among responsible personnel.

In summary, energy consumption in laboratory animal facilities can, if necessary, be adjusted through a range of short-term and temporary measures across multiple operational parameters.

Planned measures should be closely coordinated with institutional management, regulatory authorities, and the involved scientists, as depending on the extent of the required savings they may affect experimental outcomes.

In cases of severe energy shortages, operators of laboratory animal facilities can be compelled to reduce hygienic standards.

Selected Relevant Sources:

European regulations:

European Convention for the Protection of Vertebrate Animals Used for Experimental and Other Scientific Purposes (ETS No. 123), Appendix A; with declaration of acceptance dated 15 June 2006, Federal Law Gazette 2007, Part II, p. 37, Bonn, 26 November 2007 https://eur-lex.europa.eu/legal-content/DE/TXT/?uri=OJ:L:1999:222:TOC

Directive 2010/63/EU of the European Parliament and of the Council of 22 September 2010 on the protection of animals used for scientific purposes http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:276:0033:0079:de:PDF

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