Programme Description
Animal Care and Use Programme

The Department of Experimental Medicine

University of Copenhagen
Faculty of Health and Medical Sciences and
Copenhagen University Hospital

The Panum Institute
Blegdamsvej 3B
DK-2200 Copenhagen N
Denmark

For

Date of Submission August 1st 2015
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Programme Description

Link to Instrucions for Completing and Submitting the Programme Description for the Institutional Animal Care and Use Programme

Section 1. Introduction

A. State the name of the programme unit and, if applicable, its parent organisation. List all organisations (schools, centres, etc.) included within the programme unit.

<table>
<thead>
<tr>
<th>Official name of the animal facility at the University of Copenhagen and the Copenhagen University Hospital is the Department of Experimental Medicine.</th>
</tr>
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</table>

The Department is located at 6 separate sites: The Panum Building (hereafter abbreviated to Panum), Copenhagen University Hospital (also known as Rigshospitalet and hereafter abbreviated to RH), the Biocenter, the August Krogh Building (hereafter abbreviated to AKB), the Frederiksberg facility and the Taastrup facility. The Department is responsible for the animal care and use programme at the University, termed Campusstalden. Campusstalden includes, on a management level, representatives from the University of Copenhagen (the Faculty of Health and Medical Sciences, the Faculty of Science and Biotech Research and Innovation Centre (BRIC)) and The Capital Region of Denmark (Region Hovedstaden) – see more about this administrative unit here (unfortunately only available in Danish): http://campusstalden.ku.dk/.

**Official name and address of the animal facility:**
University of Copenhagen & Copenhagen University Hospitals
Faculty of Health and Medical Sciences
Department of Experimental Medicine (abbreviated as AEM)
The Panum Building
Blegdamsvej 3B
DK-2200 Copenhagen N
Denmark
Tel: +45 35 32 73 73
Fax: +45 35 32 73 99
E-mail: emed-adm@sund.k.dk
Web: http://emed.ku.dk/

**Official addresses of the 6 sites are as follows:**

*Panum Building – Main site*
Department of Experimental Medicine
The Panum Building
Blegdamsvej 3B
DK-2200 Copenhagen N
Tel: +45 35 32 73 73

*Copenhagen University Hospital*
Department of Experimental Medicine
Righospitalet, Afsn. 5703
Henrik Harpestrengsvej 4
DK-2100 Copenhagen Ø
Denmark
Tel: +45 35 45 63 06

Biocenter
Department of Experimental Medicine
The Biocenter
Ole Maaløes Vej 5
DK-2200 Copenhagen N
Denmark
Tel: +45 35 32 46 24

August Krogh Building
Department of Experimental Medicine
August Krogh Building
Universitetsparken 13
DK-2100 Copenhagen Ø
Denmark
Tel: +45 35 32 46 24

Frederiksberg Facility
Department of Experimental Medicine
Dyrlægevej 68
1870 Frederiksberg C
Denmark
Tel: +45 25 11 25 46

Taastrup Facility
Department of Experimental Medicine
Snubbekorsvej 3
2630 Taastrup
Denmark
Tel: +45 25 11 25 48

Parent Organisation:
Faculty of Health and Medical Sciences
University of Copenhagen
Blegdamsvej 3B
DK-2200 Copenhagen N
Denmark
Tel: +45 35 32 79 00
E-mail: email@sund.ku.dk
Web: http://healthsciences.ku.dk/
The layout of the facility:
The main site at the Panum Building consists of 9 animal units, the administration of the
Department, the central laboratory (both in building 16.1), the main service area (01) and
the surgical unit (16.3). The site encompasses animal units in buildings 16, 18 and 10.
The five remaining sites operate as single units. These are The Copenhagen University
Hospital (RH); August Krogh Building (AKB) the Biocenter (Bio), Frederiksberg
facility and Taastrup facility.

Included within the programme unit are six core facilities:
The Core Facility for Transgenic Mice
The Core Facility for Molecular Imaging
The Radiation Treatment Unit for Small Animals (Gammacell)
The Pathology and diagnostic services unit
The Perinatal Core Facility
The Rodent Metabolic Phenotyping Center.
The Rodent Isolator Unit at Frederiksberg
The Metabolism and Calorimetry Centre in Taastrup

B. Give a brief overview of the institution, its purpose and how the animal care and use
programme relates to the mission of the institution.

Mission and Scope
The primary function of the Department is to assist researchers at the University of
Copenhagen in planning and carrying out animal experiments in accordance with the
highest scientific, humane and ethical principles. The Department acts as an advisory
body, and provides veterinary care, housing and husbandry of laboratory animals, as
well as assistance with experimental procedures.
The Department has developed and maintains a comprehensive, high quality animal care
program, which is in full compliance with National (https://www.retsinformation.dk/Forms/R0710.aspx?id=2862) and European legislation.
The revised Appendix A guidelines of the European Convention ETS 123 are fully
implemented throughout the programme. (http://conventions.coe.int/Treaty/en/Treaties/html/123.htm). The Department is in full
compliance with the European Union Directive 2010/63/EU on the protection of animals

The University of Copenhagen is committed to the humane care and use of live animals
used in research, teaching and testing at the University. The study of live vertebrates is
essential to the University’s fulfilment of its research and teaching mission. The use of
live vertebrates for these purposes is a privilege, and carries with it the responsibility to
follow applicable laws, policies, guidelines and procedures developed by the Danish
Government, the EU, AAALAC and the University of Copenhagen.

In order to fulfil the mission as related above, the Department offers the following
services and facilities:
Services
• Routine and specialized husbandry and breeding of all common laboratory animal species
• Comprehensive veterinary care and expertise
• Assistance with experimental procedures
• Diagnostic pathology
• Rodent health surveillance program in accordance with FELASA guidelines
• Access to specialized Core Facilities and laboratories
• Access to advanced surgical facilities and specialized equipment
• Assistance with policies and forms
• Compliance assurance with national and international legislation and guidelines
• Import and export of research animals
• Teaching programs and courses for investigators, PhD-students, undergraduate students and staff

Facilities
• Fully staffed experimental surgical facilities with state-of-the-art anaesthesia and monitoring equipment.
• Specialized Core Facilities: The Core Facility for Transgenic Mice, the Core Facility for Molecular Imaging, the Radiation Treatment Unit for Small Animals Core facility, the Pathology and diagnostic services unit, the Perinatal Core Facility, the Rodent Metabolic Phenotyping Center, the Rodent Isolator Unit at Frederiksberg and the Metabolism and Calorimetry Center in Taastrup. Read more on the Department’s website regarding the mentioned core facilities: http://emed.ku.dk/forskerservice/corefaciliteter-og-speciallaboratorier/ or the Faculty’s website: http://healthsciences.ku.dk/research/corefacilities/. (See complete list of the Department’s relevant facilities: http://emed.ku.dk/forskerservice/forsøgssvyrsfaciliteter_og_corefaciliteter/)
• Six fully staffed animal research sites, in total roughly 70,000 m²: at Panum, RH, AKB, Bio, Frederiksberg and Taastrup.

C. Note that AAALAC International’s three primary standards are the European Convention for the Protection of Vertebrate Animals Used for Experimental and Other Scientific Purposes, Council of Europe (ETS 123); the Guide for the Care and Use of Laboratory Animals (Guide), NRC, 2011; and the Guide for the Care and Use of Agricultural Animals in Research and Teaching (Ag Guide), FASS 2010. Other regulations and guidelines used (e.g., Directive 2010/63, national legislation, GLP, etc) may also apply. Describe which of the three primary standards and other regulations and guidelines are used as standards for the institutional animal care and use programme and how they are applied.

The Department is in full compliance with the European Convention for the Protection of Vertebrate Animals Used for Experimental and Other Scientific Purposes, Council of Europe (ETS 123), as mentioned above. The Department is also in full compliance with the European Union Directive (Directive 2010/63/EU on the protection of animals used
for experimental and other scientific purposes), as well as Bekendtgørelse af lov om dyreforsøg, which is Danish legislation governing the use of animals in research. The Guide for the Care and Use of Laboratory Animals (Guide), NRC, 2011, is used in all facilities where applicable and The Guide for the Care and Use of Agricultural Animals in Research and Teaching (Ag Guide), FASS 2010 is also used for the Department’s research facilities for agricultural animals (Frederiksberg and Taastrup facilities) where applicable. The Department is also in compliance with standards and classifications set by various authorities including the Danish Working Environment Authority, the Danish Environmental Protection Agency and the National Institute of Radiation Protection.

D. Describe the organisation and include an organisational chart or charts (as an Appendix/Appendices) detailing the lines of authority from the Institutional Official (e.g., Responsible Person at the Institution, Certificate Holder) to the Designated Veterinarian, the Institutional Animal Care and Use Committee/Oversight Body (IACUC/OB), and the personnel providing animal care. Please include the title, name (Note: For individuals whose information is publically available, provide the titles and names; for individuals whose information is not publically available, you may provide titles only.), and degree (if applicable) of each individual at the level of supervisor or above. Names of animal care staff below the title of supervisor need not be included, but the titles and number of animal care personnel under each supervisor should be included. If animal care responsibility is administratively decentralized, the organisational chart or charts must include all animal care programmes, indicating the relationship between each administrative unit and personnel, the Designated Veterinarian, and the Institutional Official.

**Organisation**

The administrative structure of the centralized, university-wide program is shown in the organizational charts provided as appendix 1. The Department of Experimental Medicine at the Faculty of Health and Medical Sciences at the University of Copenhagen consists of eight main divisions. All eight divisions support the laboratory animal care and animal facility services, which includes husbandry, animal procurement, veterinary services (veterinary clinical services) etc.

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<tr>
<td>Quality assurance.</td>
<td>Professor Jann Hau, MD</td>
</tr>
<tr>
<td>Purchasing, finances and administration</td>
<td>Anette Skovgaard Jensen, MSc</td>
</tr>
<tr>
<td>Facility management and staff supervision of animal technicians.</td>
<td>Janne Koch, DVM (small animals) Karin Kold, MSc (large animals)</td>
</tr>
<tr>
<td>Veterinary service including researcher contact, working environment, occupational health and safety as well as contact with relevant authorities.</td>
<td>Senior Veterinarian Cathrine Juel Bundgaard, DVM</td>
</tr>
<tr>
<td>Research, teaching and training, which encompasses veterinary teaching assistance.</td>
<td>Associate Professor Klas Abelson, PhD</td>
</tr>
<tr>
<td>The core Facility for Pathology.</td>
<td>Senior Veterinarian Cathrine Juel Bundgaard, DVM</td>
</tr>
<tr>
<td>Equipment maintenance, service contracts etc.</td>
<td>Janne Koch, DVM Karin Kold, MSc</td>
</tr>
<tr>
<td>Projects and communication.</td>
<td>Niels Christian Kampmann, MSc</td>
</tr>
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</table>

The Veterinary Services division consists of seven full-time veterinarians and one part time veterinarian:
Senior Veterinarian Cathrine Juel Bundgaard, DVM, MSc
Grete Østergaard, PhD, DVM, MSc
Stefania Embla Arnórsdóttir, DVM (currently on maternity leave),
Karsten Pharao Hammelev, DVM
Anne Charlotte Teilmann, DVM
Maria Mathilde Haugaard, DVM, PhD
Janne Koch, PhD, DVM, small animal facility manager, also supports the Veterinary Services division on an as needed basis.

The staff currently consists of (as at June 2015):
- 1 Professor
- 1 Honorary Professor
- 1 Associate professor
- 1 Assistant professor
- 1 Adjunct professor
- 4 PhD students
- 1 post-doctoral fellow
- 7 Veterinarians
- 2 Facility Managers
- 4 Maintenance/engineering staff
- 56 Animal technicians
- 15 Animal technician students
- 2 Laboratory technicians
- 3 Service area workers
- 2 Quality assurance team members
- 1 Course coordinator
- 4 full time and 1 part time Office and financial administrators
- 1 Human resources specialist
• 2 Projects and communications staff members
• 1 student office administrator

Members of the Animal Welfare Committee (IACUC):
• Head of Department Jann Hau, Professor, MD
• Facility Manager Janne Koch, PhD, DVM
• Facility Manager Karin Kold MSc
• Grete Østergaard, PhD, DVM, MSc
• Cathrine Juel Bundgaard, DVM, MSc
• Stine Hansen Animal Technician
• Bettina Ditlevsen Animal Technician
• Jes G. Westergaard, Professor, MD (independent member)
• Thomas Thymann, Associate Professor
• Lisbeth Knudsen, Professor at the Institute of Public Health (expert in alternatives to laboratory animals)
• Allan Randrup Thomsen Professor in Experimental Virology, Institute of International Health, Immunology and Microbiology and Head of the user group at the Department’s Panum-facilities).

E. Identify the key institutional representatives (including, but not limited to, the Institutional Official; IACUC/OB Chairperson; Designated Veterinarian; animal programme manager; individual(s) providing biosafety, chemical hazard, and radiation safety oversight; etc.); other person(s) responsible for overseeing the welfare and care of the animals; and individuals anticipated to participate in the site visit.

The following persons will be present at the accreditation visit:
• Institutional Official, Head of Department Jann Hau, Professor, MD
• Head of Projects and Communications and responsible for AAALAC Christian Kampmann, MSc
• Senior Veterinarian Cathrine Juel Bundgaard, DVM, MSc
• Veterinarian and Working Environment Coordinator Grete Østergaard, PhD, DVM, MSc
• Veterinarian and Facility Manager Janne Koch, PhD, DVM
• Facility Manager Karin Kold, MSc
• Technical engineer Torben Nielsen
• Technical engineer Jens Erik Flescher
• Technical engineer Karen Marie Brøgger
• QA auditor Helga Petersen, BSc
• QA auditor Nicola Kofoed, BSc.
• Chief Administrator Anette Skovgaard, MSc
• Research, teaching and training Manager Klas Abelson, Associate Professor, PhD

Researchers from each experimental unit will be available (as much as possible) during the inspection, however this list will be confirmed once an inspection date has been confirmed. Animal technicians will also of course be available during the site visit, however a list of those available will be confirmed once an inspection date has been confirmed.
F. Briefly describe the major types of research, testing, and teaching programmes involving animals and note the approximate number of principal investigators and protocols involving the use of animals. As mentioned in the instructions, please complete one of the animal use forms included with this outline or provide the information requested in a similar format as an appendix.

The Department’s own research
The Department concentrates its own research on animal welfare, behaviour and refinement methods. There are two principal investigators within the Department’s own staff.

Mentioned below are some of the department’s main areas of research:
• Objective assessment of stress and animal well-being
• Permanent catheterization and automatic blood sampling in mice
• Refinement of blood sampling techniques
• Characterisation of the immune response of hens following immunization/vaccination
• Refinement and optimization of animal models of human disease
• Research in effective analgesic methods in rats and mice
• Development of efficient non-invasive immunisation methods, and optimisation of purification methods for polyclonal antibodies from egg yolk

Other research groups
As detailed in appendix 2, the research conducted at the Department of Experimental Medicine by University affiliated researchers as well as external researchers is extremely varying. At any one time we have up to 800 active project plans with roughly 178 principal investigators (with some principal investigators having more than one protocol active at any one time). Agricultural, metabolic, perinatal, infectious diseases and surgical techniques research (among other projects) are carried out at the Frederiksberg and Taastrup facilities. Research at the other facilities encompasses a wide variety of biomedical research, which can be more easily comprehended via appendix 2.

Teaching programs
It is the responsibility of the Department to ensure that all personnel involved in animal care and use are appropriately qualified to conduct the proposed activities in accordance with EU legislation, national law, international guidelines and institutional regulations.

All external personnel (investigators, assistants, laboratory technicians etc.) involved in animal care and use must, at a minimum have attended a course in laboratory animal science (FELASA B/EU Function AD or above) to ensure the humane care and use of laboratory animals, the safety of all personnel, and compliance with above mentioned standards. See Danish legislation on the subject: (“Bekendtgørelse om kvalifikationskrav til personer der beskæftiger sig med dyreforsøg, BEK nr 1016 af 12/12/2001: https://www.retsinformation.dk/Forms/R0710.aspx?id=1138&exp=1”).

Courses offered by the Department (http://emed.ku.dk/kurser/)
• Course in laboratory animal science (FELASA C/EU Function ABD) – available only in English
• Course in laboratory animal science (FELASA B/EU Function AD) – available in English
• Course in laboratory animal science (FELASA B/EU Function AD) – available in Danish

**Advanced courses offered by the Department**
• Course in experimental surgery (post graduates, PhD students and technicians) – available only in Danish
• Course in microsurgery and advanced techniques in experimental animals (post graduates and PhD students)
• Course in toxicology (post graduates and PhD students)
• Animal Biology and behaviour (post graduates, PhD students and technicians)
• Phenotyping of genetically engineered mouse models (post graduates, PhD students and technicians)
• Other courses in collaboration with the veterinary departments

**Internal courses**
• Working with SOPs
• Breeding course
• Instrument handling and care
• Surgery and invasive procedures
• Anaesthesia, analgesia and pain management
• Pathology, animal welfare and disease monitoring

**G.** Note the source(s) of research funding (grants, contracts, etc.) involving the use of animals.

The EU and the Danish Government, including research councils and private foundations, are the principal funding sources for research (including research with laboratory animals) at the University of Copenhagen. Some investigators’ research at the Department is partly funded by Commercial companies, semi-public and/or other sources of public funding.

**H.** List other units (divisions, institutes, areas, departments, colleges, etc.) of your organisation that house and use animals that are not included in this Description. If any of these are contiguous, physically or operationally (e.g., same IACUC/OB, same animal care staff), with the applicant unit, describe the association. Explain why such units are not part of this programme application.

There are 34 laboratories outside the Department (external laboratories) within the University of Copenhagen, which are classified for work with genetically modified animals and 2 external laboratories for work with non-genetically modified animals, where animals may be taken for terminal procedures only. Transport of animals and goods from AEM facilities is well described in the Department’s standard operating procedures. Animals may only spend a maximum of one working day in external laboratories before they must be euthanized (that is, permanent housing of animals outside of AEMs facilities is not permitted). Live animals, euthanized animals and tissue may not re-enter AEM’s facilities once they have been moved to external laboratories. A
list of external laboratories sometimes used for terminal procedures is provided in appendix 14. While the animals moved to these laboratories are under the jurisdiction of the Departments animal welfare committee, they are not included as part of the programme application as they are external to the Departments own laboratories and the animals are not housed there.

I. Contract Facilities: If the institution contracts for animal care facilities or services for animals owned by the institution, the contractor and its AAALAC International accreditation status must be identified. If a contractor's animal care and use programme is not accredited by AAALAC International, a brief description, following this Programme Description outline, of the relevant contractor's programmes and facilities must be provided. In addition, the species and approximate average number of animals housed in the contract facilities and the approximate distance between the institution's animal facility and the contract facility must be noted. Incorporation of the contractor programme into the site visit schedule will be discussed with institutional representatives. If the institution does not contract for animal care facilities or services, so note.

| Not applicable |

J. Note other relevant background that will assist reviewers of this report.

| Not applicable |
Section 2. Description

I. Animal Care and Use Programme

A. Programme Management


   a. The Institutional Official (e.g., Administrative Responsible Person, Certificate Holder) [Guide p. 13-14]
   Describe how programme needs are clearly and regularly communicated to the Institutional Official by the Designated Veterinarian, IACUC/OB, and others associated with the programme.

   The Institutional Official and Head of Department is Professor Jann Hau, MD. The Institutional Official is a member of the Department’s IACUC as well as the Department’s management group and is therefore present for meetings of both groups, where needs for the programme are discussed and decisions made. The Department’s IACUC meets quarterly and the Management group meets weekly. Meeting minutes for the two most recent IACUC meetings for the Department are provided, as appendix 8 and meeting minutes for the Department’s management group are available upon request.


   i. Describe the institutional arrangement for providing adequate veterinary care. For each veterinarian associated with the programme (including private practitioners), provide the veterinarian's name(s), list responsibilities, and how the veterinarian is involved in monitoring the care and use of laboratory animals. If employed full-time by the institution, note the percentage of time devoted to supporting the animal care and use programme of the institution. If employed part-time or as a consultant, note the frequency and duration of visits.

   Department Veterinarians perform rounds of all the animal units once every two months. Any tasks to be completed as a result of these rounds are delegated between the Veterinarians. In addition to this, veterinarians are available at all times during normal operating hours, and in weekends and holidays, between 8am and 3pm, when animal technicians or researchers require their expertise regarding animal health and wellbeing. Outside these hours, a researcher or animal technician can also procure extra Veterinarian expertise, by requesting it 5 days in advance.

Table 2. List of designated veterinarians
### ii. List others (e.g., person(s) responsible for overseeing the welfare and care of the animals (if different), Principal Investigators, veterinarians serving as Principal Investigators, veterinary faculty/staff, technical staff, farm managers) who have a direct role in the provision of veterinary care and describe their responsibilities. An organisational chart depicting the reporting relationship between these individuals and the Designated Veterinarian should be included as an appendix.

<table>
<thead>
<tr>
<th>Name of veterinarian(s)</th>
<th>Responsibilities</th>
<th>Time dedicated to animal care and use program</th>
<th>Time dedicated to teaching</th>
<th>If part time/consultant, indicate frequency and duration of visits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cathrine Juel Bundgaard, MSc, DVM</td>
<td>Head veterinarian Pathology and health surveillance programme.</td>
<td>60-70%</td>
<td>30-40%</td>
<td>N/A</td>
</tr>
<tr>
<td>Grete Østergaard, PhD, DVM</td>
<td>Working environment coordinator. Approval of project plans. Initial contact and guidance for new researchers regarding new projects.</td>
<td>60-70%</td>
<td>30-40%</td>
<td>N/A</td>
</tr>
<tr>
<td>Maria Mathilde Haugaard, PhD, DVM</td>
<td>Approval of project plans. Initial contact and guidance for new researchers regarding new projects.</td>
<td>60-70%</td>
<td>30-40%</td>
<td>N/A</td>
</tr>
<tr>
<td>Stefania Embla Arnorsdottir, DVM</td>
<td>Animal imports and exports. Responsible for zebrafish and frogs specifically.</td>
<td>60-70%</td>
<td>30-40%</td>
<td>N/A</td>
</tr>
<tr>
<td>Karsten Pharao Hammelv, DVM</td>
<td>Responsibility for large animals at Frediksberg and Taastrup</td>
<td>80-90%</td>
<td>10-20%</td>
<td>N/A</td>
</tr>
<tr>
<td>Anne Charlotte Teilmann, DVM</td>
<td>Pathology and health surveillance programme.</td>
<td>60-70%</td>
<td>30-40%</td>
<td>N/A</td>
</tr>
<tr>
<td>Janne Koch, PhD, DVM</td>
<td>Facility Manager</td>
<td>80-90%</td>
<td>10-20%</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Please see appendix 1 for an organizational chart depicting the reporting relationship between the below individuals and the Designated Veterinarians.

Table 3. Others responsible for overseeing animal welfare and care at AEM
c. **Collaborations** [Guide, p. 15]

Describe processes for assigning animal care and use responsibility, animal ownership and IACUC/OB oversight responsibilities at off-site locations (i.e., collaborations).

<table>
<thead>
<tr>
<th>Position/Title</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal Technician</td>
<td>Administer veterinary care according to veterinarian’s instructions. Daily monitoring of the well-being of the animals, daily care, biotechnical/veterinary procedures etc.</td>
</tr>
<tr>
<td>Investigators</td>
<td>Administer veterinary care according to veterinarian’s instructions.</td>
</tr>
<tr>
<td>Facility Manager Karin Lene Kold</td>
<td>Facility management to animal technicians and general operations at the Frederiksberg and Tåstrup facilities as well as the surgical unit at Panum.</td>
</tr>
</tbody>
</table>

Not applicable

2. **Personnel Management**

a. **Training and Education**

Describe how the IACUC/OB provides oversight and evaluates the effectiveness of training programmes. Describe how training is documented.

The Department’s IACUC evaluates training according to current requirements in EU and Danish legislation. According to both EU and Danish legislation (listed below), persons who carry out, or take part in procedures involving research animals, and/or care of the animals, must be adequately educated and trained.

- Danish Ministry of Justice: Executive Order no. 88 regarding Experimental Animals, Chapter 14: Qualifications for persons participating in animal experimentation (in Danish): (“Bekendtgørelse om dyreforsøg, kapitel 14: Kvalifikationskrav for personer der beskæftiger sig med forsøgsdyr, BEK nr 88 af 13/01/2013: [https://www.retsinformation.dk/Forms/R0710.aspx?id=145248#Kap14](https://www.retsinformation.dk/Forms/R0710.aspx?id=145248#Kap14)

The Danish legislation is elaborate and a summary of the principal contents is found in the following text.

The licence-holder must have a relevant university degree in medicine, veterinary medicine or science and one or more educational courses relevant for the experimental activity. In practice, this corresponds to FELASA category C. The licence-holder is responsible for the qualifications of other persons participating in the experiment.

Persons performing experimental procedures must:
1) Have completed the animal caretaker education with the optional special subjects keeping of experimental animals and laboratory animal technique, cf. the Ministry of Education’s Order regarding education within animals-plants-nature, and can document knowledge about the species used in the procedures concerned,

2) Be in the process of completing the animal caretaker education with the optional special subjects keeping of experimental animals and laboratory animal technique, and has passed level 1 and the first 6 months of level 2, and can document knowledge about the species used in the procedures concerned,

3) Have completed the former agriculturist education with specialization as animal assistant and with the special subject laboratory animals, and can document knowledge about the species used in the procedures concerned,

4) Have other relevant education and has completed a theoretical and practical course in the conduct of animal experiments, including the species used in the procedures concerned.

In practice, this corresponds to FELASA category B/EU Function AD.

In addition to providing a copy of the licence described above, the principal investigator must provide a project plan to Department veterinarians, which must be approved before work can begin. The project plan forms have fields where the principal investigator must record the training level of the researchers involved.

For procedures related to day-to-day animal husbandry carried out by Animal Technicians, the Department has its own set of standard operating procedures (SOP’s). These SOP’s include technical procedures as well as general husbandry and are reviewed every three years at a minimum. Competency in technical procedures (such as taking a blood sample etc) is recorded for each Technician on a “driver’s license”. A new quality assurance system was set up at the Department at the beginning of 2015, which will include regular procedure audits on various procedures carried out at AEM.

i. Veterinary and Other Professional Staff [ETS 123, Article 26; Guide, pp. 15-16]
Provide name and credentials of veterinary and other professional staff, including the veterinary personnel listed above and other person(s) responsible for overseeing the welfare and care of the animals, and describe their qualifications, training, and continuing education. Please do not provide curriculum vitae of personnel.

Table 4. Credentials of key staff
### Name /Credentials | Describe qualifications, training, continuing education
--- | ---
Cathrine Juel Bundgaard, MSc, DVM | DVM<br>Master of Laboratory Animal Science<br>½ year animal research (microbiology)<br>12 years laboratory animal veterinarian
Grete Østergaard, PhD, DVM | PhD, DVM<br>Master of Laboratory Animal Science<br>1.5 years clinical experience (general and surgical private practice, small and large animals)<br>15 years animal research<br>12 years laboratory animal veterinarian
Maria Mathilde Haugaard, PhD, DVM | PhD, DVM<br>Course in laboratory animal science<br>1 year clinical experience (general and surgical private practice, large animals)
Stefania Embla Arnorsdottir, DVM | DVM<br>6 years laboratory animal veterinarian<br>Course in laboratory animal science
Karsten Pharao Hammellev, DVM | DVM<br>6 years laboratory animal veterinarian<br>Course in laboratory animal science
Anne Charlotte Teilmann, DVM | DVM, PhD student<br>5 years experience in laboratory animal science
Janne Koch, PhD, DVM | PhD, DVM<br>6 years laboratory animal veterinarian<br>Course in laboratory animal science
Karin Lene Kold | MSc, Agronomy<br>FELASA B Course<br>15 years management experience in research animal science
Jann Hau | MD, Professor<br>Over 28 years of experience as a professor in the laboratory animal science field.<br>AAALAC council member and member of several international working groups and boards on various aspects of laboratory animal science, primatology, and veterinary care.<br>Co-author of the CRC Handbook of Laboratory Animal Science<br>Editor-in-chief of the Scandinavian Journal of Laboratory Animal Science and editor of the laboratory animals' section of the UFAW journal Animal Welfare and member of the editorial board of several journals including the journal In Vivo. Former president of the Scandinavian Society of Laboratory Animal Science (ScandLAS) and the Federation of European Laboratory Animal Science Associations (FELASA). Former chairman of the FELASA Accreditation Board for European laboratory animal science courses.<br>Please see the following link for further information: [http://www.zoominfo.com/p/Jann-Hau/337540715](http://www.zoominfo.com/p/Jann-Hau/337540715)

### ii. Animal Care Personnel [ETS 123, Article 26; Guide, p. 16]
Indicate the number of animal care personnel. **56**

Summarize their training, certification level and type, experience, and continuing education opportunities provided.

**Staff training**

All personnel responsible for the daily care of animals must be either 1) a trained animal technician 2) a trained agricultural technician specializing in animal husbandry 3) a trained agriculturist with an emphasis on animal
care with practical training and experience in an animal facility 4) a trained veterinary technician or 5) in other ways have obtained qualifications similar to 1-4. In practice, this corresponds to a FELASA category A person (EU Function C). The majority of animal care staff at the Department are laboratory animal technicians educated at the Technical College of Kolding:
(http://www.hansenberg.dk/uddannelser/erhvervsuddannelser/dyrepasser/)
or at the Technical College of Roskilde:
(http://www.rts.dk/dyrepasser).

Employees are taught basic procedures, involving the care of animals and other procedures relevant to the Department. SOPs exist on most procedures and relevant SOPs must be read and understood by the employee carrying out those procedures. Each animal technician has a personal document detailing the procedures undertaken at the Department and their skill level regarding each procedure. An example of this document (called a “drivers licence”) is available upon request.

Below is a list of some of the procedures carried out at the Department:

**Common procedures**
- Quarantine rules and procedures
- Feeding and watering of animals
- Health monitoring
- Waste handling
- Handling and restraint of species at the facility
- Subcutaneous injection in species at the facility (presently; mouse, rat, hamster, guinea pig, chicken, rabbit, pig, mini pig, cat, reptiles, amphibians, cattle, sheep, goat, ferret, fox)
- Intramuscular injection in species at the facility
- Intradermal injection in species at the facility
- Intraperitoneal injection in species at the facility
- Intravenous injection in species at the facility
- Oral administration (gavage) in species at the facility
- Blood sampling in chickens (V. jugularis and V. axillaries)
- Blood sampling from the periorbital vein plexus (Rodents)
- Blood sampling from tail, saphenous, sublingual and mandibular vein (Rodents)
- Blood sampling from central tail artery (Rodents)
- Blood sampling from pig, sheep, goat, ferret, fox, cattle and minipig (V. jugularis)
- Exsanguination of rodents, hamsters, guinea pigs, chickens, rabbits, pigs, mini pigs.
- Euthanasia by cervical dislocation/decapitation (Rodents and poultry)
- Euthanasia by injection with pentobarbital
- Euthanasia of pig, mini pig, sheep, goat and cattle by injection or by captive bolt pistol
- Euthanasia of birds, fish, reptiles and amphibians by injection or decapitation
- Tail biopsy (Rodents)
- Ear marking of different species
- Marking by tattooing
- Embryo transfer and caesarean section on rodents
- Suturing
- Knowledge of common anaesthetics
- Knowledge of common analgesics
- Knowledge of surgical procedures
- Operation of the Department’s IVC-systems
- Operation of automated cage handling systems
- Operation of autoclaves
- Operation of farm machines at the facility
- Knowledge of biosafety (BSL and GMO classified areas)
- Knowledge of health and safety in the workplace
- Knowledge about the health monitoring procedures and system in rodents
- Filling in cage cards

**Administrative procedures**
- MS Office, intranet, internet etc.
- Filling out request forms
- Ordering animals and other items

**Special procedures**
- Castration
- Vasectomy (sterilization of male animals (rodents))
- Hysterectomy
- Removal of ovary
- Removal of kidney
- Removal of spleen
- Removal of pancreas
- Insertion of intravascular catheters
- Insertion of identification chips
- Maintenance of rumen fistula in cattle
- Temperature control in pigs and mini pigs
- Administration of inhalation anaesthetics
- Anaesthetization of pigs, sheep, goats and ferrets
- Knowledge of rodent breeding
- Pig breeding, natural and artificial insemination
- Embryo transfer
- Instruction at courses
- Specialised procedures performed at the Department’s surgical unit

**Continuing education**
The Department also provides further training to staff, as described below:

- Internal courses such as experimental surgery, anaesthesia, microsurgery, breeding etc.
- Other courses/training in anaesthesia, surgical techniques, mouse phenotyping, animal behaviour etc.
- Labour market training courses (AMU courses)
- Seminars
- Symposia
- Exchange programs/visits (USA, Sweden, Indonesia, Mauritius etc.)
- Attendance at international conferences (Scand-LAS, FELASA, AALAS)

It is the Department’s expectation that all animal technicians become familiar with all relevant common procedures and continually seek to improve their skills and knowledge through further education.

iii. The Research Team [ETS 123, Article 26; Guide, pp. 16-17; 115-116; 122; 124]

1) Describe the general mechanisms, by which the institution or IACUC/OB ensures that research personnel have the necessary knowledge and expertise in the animal procedures proposed and the species used.

According to Danish legislation (Bekendtgørelse om dyreforsøg §57), the license holder is responsible for conducting the experiments described in their license. The license holder may only allow other persons to carry out the experiments if they have a relevant and applicable education, including a theoretical and practical course in animal experimentation, concerning the species used. The Department offers several such courses. In practice, the minimum requirement is the “FELASA B/EU function AD” course.

In the Department, to start an experiment, a scientist must send a proposed project plan to the Department’s veterinarians. In this plan, the scientist must provide the names and educational qualifications of all staff members involved. If the veterinarians discover unqualified staff, they will take corrective action.

a) Briefly describe the content of any required training.

The FELASA B/EU function AD course provides basic knowledge and skills in conducting animal experiments and contains theoretical and practical considerations for legislative, ethical and animal welfare aspects concerning care and use of animals for scientific purposes. The course includes experimental animal biology and health, care, use, handling and breeding of animals for scientific purposes, general laboratory animal science, including pain and stress related behaviour, as well as anaesthesia and analgesia. Knowledge about the particular species used in planned procedures can be obtained through training at the institution or establishment. The license-holder must supervise staff members until they are proved sufficiently competent.
b) Describe the timing of training requirements relative to the commencement of work.

Persons may not participate in animal experiments without, at a minimum, the FELASA B/ function AD course, or an equivalent course. In exceptional cases the Danish Animal Experiments Inspectorate may allow an exemption or temporary exemption from the education requirement.

c) Describe continuing education opportunities offered.

For scientists, the Department offers the following courses:
• Course in laboratory animal science (FELASA C/EU Function ABD) – available only in English
• Course in laboratory animal science (FELASA B/EU Function AD) – available in English and Danish

Advanced courses offered by the Department
• Course in experimental surgery (post graduates, PhD students and technicians) – available only in Danish
• Course in microsurgery and advanced techniques in experimental animals (post graduates and PhD students)
• Course in toxicology (post graduates and PhD students)
• Animal biology and behaviour (post graduates, PhD students and technicians)
• Phenotyping of genetically engineered mouse models
• Other courses in collaboration with the Faculty of Science

2) Describe the process(es) to ensure surgical and related procedures are performed by qualified and trained personnel. Who determines that personnel are qualified and trained for surgical procedures? What role does the Designated Veterinarian and IACUC/OB have in this determination? [Guide, pp. 115-116]

The license-holder (researcher) determines whether research personnel are qualified and trained for surgical procedures in experiments (they must of course hold the minimum legal requirement for work with research animals as described in previous questions). The Department’s veterinarians may, as part of the project plan approval procedure, question and advise researchers regarding surgical procedures.

3) Describe the training and experience required to perform anaesthesia. [Guide, p. 122]
For large animals (pigs, sheep, goats, dogs and cows) the Department’s veterinarians and animal technicians either directly perform the anaesthesia themselves or train the researchers in the correct techniques. For small animals, the theoretical and practical training provided by the FELASA B/EU function AD course is regarded as sufficient.

4) Describe how the proficiency of personnel conducting euthanasia is ensured (especially physical methods of euthanasia). [Guide, p. 124]

Only persons with minimum the FELASA B/EU function AD course may euthanize experimental animals. For small animals, the theoretical and practical training provided by the FELASA B/EU function AD course is regarded as sufficient. For large animals, animal caretakers are trained in physical euthanasia at the Department. Euthanasia is typically performed by researchers when animals are anaesthetized and following training provided by the Department’s staff.

Describe the institutional entities that are involved in the planning, oversight, and operation of the institutional occupational health and safety programme.

There are four levels to the institutional occupational health and safety programme.
1. University of Copenhagen Occupational Health and Safety Committee (“AMKU”). This is the top level which ensures promotion and harmonization of principles for occupational health initiatives at the university. The members include representatives from every faculty.
2. Faculty of Health and Medical Sciences Occupational Health and Safety Committee. (“FAMU Sund”). This level ensures a harmonized implementation of common practices for all employees at the faculty.
3. Department of Experimental Medicine Occupational Health and Safety Committee (“AEM LAMU”). This is the forum where the Department Head and representatives appointed by the Department Head together with elected employee representatives coordinate occupational health initiatives in the Department.
4. Working environment groups consisting of 2 members (1 elected employee and 1 manager) are active in the daily detection and solution of problems.

The member list of AEM LAMU includes:
Jann Hau (Department Head)
Karin Kold (appointed by the Department Head)
Janne Koch (appointed by the Department Head)
Klas Abelson (appointed by the Department Head)
Nicola Jane Kofoed (appointed by the Department Head)
Grete Østergaard (appointed by the Department Head)
Anne-Mette Freising Dupont (Elected employee representative for the period 2015-2018)
Gerda Majgaard Jensen (Elected employee representative for the period 2015-2018)
Gina Louise Gravel (Elected employee representative for the period 2015-2018)
Lena Tina Larsen (Elected employee representative for the period 2015-2018)
Morten Bjerg (Elected employee representative for the period 2015-2018)
Preben Buur Lund (Elected employee representative for the period 2015-2018)

The local working environment groups are:
Janne Koch - Lena Tina Larsen: covers workplaces in animal units at Panum
Janne Koch - Anne-Mette Freising Dupont and Lena Tina Larsen: covers workplaces in animal units at Panum
Janne Koch - Gina Louise Gravel: covers workplaces in animal units in breeding barriers
Janne Koch - Morten Bjerg: covers workplaces in the washing area at Panum
Karin Kold – Preben Buur Lund: covers workplaces in animal units at Frederiksberg and Taastrup
Klas Abelson – Gerda Majgaard Jensen: covers workplaces in offices, laboratories, and veterinarians

The Department’s Occupational Health and Safety Program includes:
- Quarterly meetings of the LAMU group
- A yearly status discussion of the LAMU’s accomplishments and future plans.
- A yearly inspection of the entire facility by the local working environment group
- Every 3 years an employee survey of physical and psychological well-being (“APV”, workplace assessment) is undertaken
- A yearly employee survey of psychological well-being (“trivselsundersøgelse”) is undertaken

The LAMU identifies hazards, assesses risks, and plans risk management. A responsible person is assigned to each item. A description and course of action for each issue is entered into a log (“LAMU log”) which is reviewed at the quarterly LAMU meetings.

i. Hazard Identification and Risk Assessment [Guide, pp. 18-19; See also Chapters 2 and 3 in Occupational Health and Safety in the Care and Use of Research Animals, NRC 1997]

1) Describe the process used to identify, evaluate and control experimental and other potential hazards (such as ionizing and non-ionizing radiation, chemical cleaning agents, animal bites, allergens, zoonoses, and venomous species) inherent or intrinsic to the use of
animals by the institution. Describe how risks of these hazards are assessed and how procedures are developed to manage the risks.

Experimental hazards in individual experiments are assessed and managed in the following way: Before a scientist can start an animal experiment, he or she must submit a project plan for review by the Department’s veterinarians. The scientist must provide details about potential hazards in the experiment and the veterinarian decides upon appropriate precautions to be taken, with input from the scientist and other sources. For substances that pose an unknown, potential hazard, a thorough assessment must be completed.

Dr Grete Østergaard, who is one of the Department’s veterinarians, has a PhD degree in Toxicology and is the author of a textbook in toxicology. Additional expertise is present at the Faculty, which has a number of working environment consultants who assist with expert advice on biological agents, GMO’s, chemicals, and radioactivity. The Department has procedure rooms and animal holding rooms which are officially classified for GMO (animals or microorganisms class 1 or 2) or approved for work with radionuclides or X-rays. The safety precautions are written into the project plan. The animal caretakers are instructed in the precautions and for particular experiments a meeting with scientists, animal caretakers, and a veterinarian may be arranged to ensure that all involved are instructed correctly. A relevant animal technician will call for a start-up meeting with a Department veterinarian (and in some cases the Facility Manager) where the following is discussed: what the project is about, how and where procedures are safely performed, handling of waste, time plan etc. In case of a particularly dangerous hazard the facility manager or a veterinarian may directly oversee the work.

Hazards identified in standard procedures (which may pertain to many different projects, for example the risk of animal bites when performing an injection) are described in detail in the Department’s standard operating procedures, as are the appropriate precautions to be taken. Other hazards, which are not specific to particular projects, are described below:

Chemical disinfectants are evaluated for efficacy and safety by the veterinarians prior to introduction. Introduction of new disinfectants is also a topic discussed by LAMU.

Cleaning agents, shampoo, soap etc for staff and scientists, are evaluated prior to purchase according to a LAMU policy. The policy states that the items should be selected on the basis of efficacy, compatibility with equipment, employee safety, and price. Scented items may not be purchased if there is a suitable non-scented alternative. In the evaluation the Department relies on official labelling data for cleaning agents and cosmetics.
Allergens: Within the Department, efforts to reduce allergen levels include the use of IVC caging systems in most rodent units. Coveralls, shoe covers and hairnets are put on upon entry into an animal unit and removed upon exit. Staff and scientists are encouraged to handle animals only with gloves. The Department promotes a Faculty policy that experimental animals should be kept within well-defined designated zones, and that animal allergens should not be present outside these zones. Animals should preferably not leave the animal facility however, it is sometimes necessary for scientists to take animals to their external labs. Prominent signs are posted on all doors leading to an allergen zone. The Department provides advice and guidelines to owners of external labs on safe intra-university transportation measures to reduce allergen levels and to prevent release of allergens from the lab to surrounding rooms.

Zoonoses: The Department veterinarians are responsible for knowing the microbiological status of experimental animals. Where a zoonotic hazard is identified, LAMU is notified, and a plan for management is developed.

Danish legislation and guidelines for assessing particular hazards are described in detail below:

Manual handling
Lifting, pulling and pushing must be included in the written evaluation of occupational safety and health at the workplace, as required by “Bekendtgærelse om arbejdets udførelse; Arbejdstilsynets bekendtgørelse nr. 559 af 17. juni 2004: https://www.retsinformation.dk/Forms/R0710.aspx?id=30092&exp=1#K2” Chapter 2a. Guidance is provided in “At-vejledning D.3.1: http://arbejdstilsynet.dk/da/regler/at-vejledninger/l/d-3-1-loft-traek-og-skub.aspx” Work must be planned to ensure that it can be performed safely. Details on safe practices are provided in the guidance legislation, as are descriptions of work practices and situations that are to be avoided. It is stated that the maximum weight that may be pushed on a cart is 200 kg, pushing heavier weights may be detrimental to health. Weight exceeding 500 kg is not recommended as it can almost certainly lead to health risks. The employer is responsible for providing theoretical and practical work instructions, and employees are responsible for following these.

Carcinogens
Work with carcinogens is regulated via “Bekendtgørelse om foranstaltninger til forebyggelse af kræfrisikoen ved arbejde med stoffer og materialer” Further guidance is given in ”At-vejledning C.2.1” ”Bekendtgørelse om foranstaltninger til forebyggelse af kræfrisikoen ved arbejde med stoffer og materialer” (Appendix 1), contains a list of
all substances regarded as potential carcinogens. The list also includes all substances classified as, or fulfilling the criteria for classification, as mutagens or carcinogens by the Danish Environmental Protection Agency. For some of the carcinogens on the list, special provisions apply.

In general, the employer (in collaboration with the researcher) is obliged to try to substitute the carcinogen with another, less dangerous substance. Working procedures that minimize the exposure must be used. Manual handling should be avoided as far as possible. The employer must provide a written workplace instruction for handling of the carcinogen, specifically stating the carcinogenic risk and the name of the carcinogen. Exhaust air may not be re-circulated. Personal protective equipment must be used if other measures are insufficient to reduce the exposure.

**Biological agents**

Work with biological agents is regulated via the Executive Order regarding Biological Agents and Working Environment (BEK nr 864 af 10/11/1993: Bekendtgørelse om biologiske agenser og arbejdsmiljø”). Biological agents are classified into four risk groups according to risk posed to humans. A list of organisms and their classification (2-4) is provided in Appendix 8 in the Executive Order. If the agent in question is not included in the list, the employer must classify the agent according to classification criteria provided in Appendix 7. Risk group 1 agents include those organisms, which are unlikely to cause an infection in humans. Risk group 2 agents are organisms which may be infectious and pathogenic in humans but are not highly infectious, and for which prophylactic or curative measures exist. Risk group 3 agents are infectious and pathogenic organisms that could potentially infect the general population, for which prophylactic or curative measures exist. Risk group 4 agents include highly infectious and pathogenic organisms, for which no prophylactic or curative measures exist.

The written evaluation of occupational safety and health at the workplace demanded in “Bekendtgørelse om arbejdets udførelse” must contain a risk assessment for the use of biological agents. The evaluation must be based on the classification of organisms as described above.

The employer must register employees working with risk group 3 and 4 agents. Employees who are exposed to dangerous biological agents must be given the option of having an occupational health examination.

Laboratories, including animal rooms, where work with risk group 2-4 agents takes place, must conform to the rules given in Appendix 5 of the Executive order. At least 30 days before an institution starts
working with agents in risk group 2-4, the local district labour inspectorate (Arbejdstilsynskreds) must be advised. For animal management, it is specifically mentioned that procedures must be developed for decontamination, disinfection, waste handling, and monitoring that ensure the safety and protection of health for workers.

**Gene technology projects (genetically modified microorganisms, animals, and plants)**

Work with genetically modified organisms is regulated via ”Bekendtgørelse om genteknologi og arbejdsmiljø”. There are rules for individual projects and rules for the institution in general.

Individual projects with genetically modified organisms

According to “Bekendtgørelse om genteknologi og arbejdsmiljø” (§ 6) and the guidance paper “At-vejledning C.0.5” the researcher must make a written risk assessment for projects involving GMOs. The risk assessment must consider human and animal health and safety and the safety of the environment. The guidance paper At-vejledning C.0.5 is only concerned with genetically modified microorganisms, but several of the regulations also apply for genetically modified animals and plants. If the proposed project includes genetically modified microorganisms, the work will be classified into one of four classes. Class 1 is used for work, which results in no, or insignificant risk to humans or the environment, class 2 is low risk, class 3 is moderate risk, and class 4 is high risk.

**General rules for the facility where genetically modified organisms are kept**

Before a facility can receive and house genetically modified organisms, the rooms (laboratories and animal holding rooms) must be approved and classified for this purpose by the National Working Environment Authority (Arbejdstilsynet) (“Bekendtgørelse om genteknologi og arbejdsmiljø”). More guidance is given in “At-vejledning C.0.4”. For work with genetically modified animals and plants, an approval is sufficient. For work with microorganisms, the facility must be classified according to four classes, taking into account the work that will be performed as well as the facility itself. Work processes may be undertaken in a room with the same classification. Work of a lower classification may occur in a room with a higher classification, on the condition that the work procedures conform to the room classification.

Currently the Department has three GMO class classification levels: GM animals, GMO class 1 + animal and GMO class 2 + animal.

**Chemical agents**

Work processes with chemicals may only be undertaken where it is possible to do so in a safe manner (“Lov om arbejdsmiljø”).
Unnecessary exposure to chemicals in the workplace should be avoided ("Bekendtgørelse om arbejdets udførelse"). Work with chemicals is regulated via "Bekendtgørelse om arbejde med stoffer og materialer". The work must be planned so that it can be performed safely. If potentially dangerous chemical substances are used, the written evaluation of occupational safety and health at the workplace demanded in “Bekendtgørelse om arbejdets udførelse” must contain a risk assessment for the use of these substances. The employer is responsible for keeping a list of dangerous chemicals at the workplace (§ 6a). For each dangerous chemical, instructions for use must be made available (§ 21). Exposure to dangerous chemicals should be minimized through exclusion, substitution, change of work procedures etc. If it is not possible to completely avoid exposure, a number of protective measures (e.g. confinement in closed process, ventilation) must be used. Control measurements of the concentration of the chemical in the air at the workplace may be demanded. Personal protective equipment is the last resort. Employees who are exposed to dangerous chemicals must be given the option of having an occupational health examination (Chapter 7). Special rules for work with lead, chromate, epoxy resin and isocyanates, and asphalt are given in the appendices of the Executive order.

**Radiation (X-rays, radio nuclides)**

Unnecessary exposure to radiation at the workplace should be avoided "Bekendtgørelse om arbejdets udførelse”. The Ministry of Health (Sundheds- og Ældreministeriet) regulates radiation protection via the National Board of Health (Sundhedsstyrelsen). Workers may not be exposed to doses exceeding the limits given in “Bekendtgørelse om dosisgrænser for ioniserende stråling”. The use of personal dosimeters is mandatory for a number of workers, described in Appendix 4 of “Bekendtgørelse om dosisgrænser for ioniserende stråling”.

**X-rays**

The use of x-ray equipment is regulated via "Bekendtgørelse om brugen af røntgenanlæg m.v". X-ray installations must be approved by the National Board of Health. A nominated individual at the facility must be responsible for the proper operation of the x-ray installation.

**Radio nuclides**

The use of radioactive materials is regulated in “Lov om brug m.v. af radioaktive stoffer. Synthesis, possession and use of radioactive materials require permission from the National Board of Health. The guidance paper “Vejledning om strålebeskyttelse ved arbejde med åbne radioactive kilder” gives detailed information on the procedures that must be followed. Work with radio nuclides may only take place in approved laboratories; however, the board may provide an exemption from this requirement under certain circumstances. A
laboratory can be approved in connection with the permission to synthesize, possess and use radioactive materials.

Noise
Unnecessary noise at the workplace should be avoided ("Bekendtgørelse om arbejdets udførelse"). Noise in the working environment is regulated via "Beskyttelse mod udsættelse for støj i forbindelse med arbejdet". Workers may not be exposed to noise above 85 dB during work. The noise level, including infra- and ultrasound, should be kept as low as possible. The employer should lower the noise level as far as possible using technical and administrative tools. Personal protective equipment (hearing protection) should only be used if it is not possible to reach a sufficiently low noise level by technical and administrative means. Personal protective equipment must be used for noise levels at or above is 80-85 dB. Further guidance on the use of ear protection is given in Vejledning om brug af høreværn”.

Allergens
If a person working with research animals develops asthma from inhalation of dust or vapour from animals or animal products, the employee will be compensated according to a list of recognized occupational diseases, i.e. where the possibility for compensation exists (Vejledning om behandling af anerkendelsesspørgsmålet ved anmeldelser af astma og kronisk bronchitis efter arbejdsskadesikringsloven: https://www.retsinformation.dk/Forms/R0710.aspx?id=18853).

2) Describe procedures for reporting and evaluating exposure to hazards, workplace injuries, etc.

Accidents and injuries must be reported formally to the University of Copenhagen. The injured person, together with his or her manager, must fill in a form which is signed and sent to the University’s secretary for occupational health (“AMOS”), which is responsible for reporting injuries and accidents to the National Board of Industrial Injuries and/or the Danish Working Environment Authority. AMOS processes the form and makes sure that proper procedures are followed, e.g. in case of compensation. All accidents and injuries are discussed at the following LAMU meeting and an assessment is made as to how these accidents could be prevented or avoided in future.


1) Describe how hazardous agents are contained within the study environment and in the animal housing area.
Scientists are encouraged to avoid the storage of hazardous agents inside the animal units. Where storage of dangerous chemicals is necessary, the chemicals are stored in a designated refrigerator or in a designated locked chemical cabinet. The Department requires proper labelling of vials and containers left by scientists inside the animal units. Labels are provided in a plastic folder on the refrigerator door in laboratories.

Pharmaceutical preparations are centrally stored in the Department’s surgical unit, either under refrigeration or in a locked cabinet. Pharmaceuticals for daily use are stored locally in the different animal units in lock boxes in unit refrigerators or in locked cabinets. Other hazardous agents are stored in the units’ storage rooms.

In the main laboratory at 16.1, chemicals are stored in a locked ventilated cabinet, specifically designed for chemical storage. An inventory record is kept (please see appendix 15), which includes information about the type of chemical, chemical formula, concentration, amount, H and P phrases and other relevant safety information. The Department is required by the University to use a centralized record-keeping system called Kemibrug: www.kemibrug.dk. All chemical substances are registered here. The following information, at a minimum, is registered:

- CAS registry numbers
- Name of substance (concentration)
- Amount (volume/amount)
- Storage location (place, building, floor, room and location)
- H and P phrases

The system can generate user manuals (in some cases also in English), links to supplier’s user manuals, generate labels, classify substances etc.

Hazardous substances created within the lab must be labelled according to the CLP classification system.

All hazardous substances and materials must be transported and contained in a way that ensures no spillage or leakage in the environment. The manufacturer must provide information about correct handling, transportation and adequate storage of the agent. There must be adequate signposting in and around the storage area, according to the instructions from the Ministry of Environment and Food for toxic substances and materials. Guidelines regarding substances and materials that are inflammable and/or present an explosion hazard are covered by the Danish Emergency Management Agency.

Chemical substances and products must be classified and labeled according to the Ministry of the Environment’s departmental order: “BEK nr 329 af 16/05/2002 - Gældende Bekendtgørelse om klassificering, emballering, mærkning, salg og opbevaring af kemiske
The Executive Order on Hazardous Agents: “BEK nr 923 af 28/09/2005 – Gældende, Bekendtgørelse om listen over farlige stoffer, Miljøministeriet:
https://www.retsinformation.dk/Forms/R0710.aspx?id=12861” maintains a list containing all known hazardous agents, including the appellation, classification, labelling, Chemical Abstract Service number (CAS-nr.), EC number (EF-nr.), index and remarks of the substance.

Work with radiation, biological agents and genetically modified organisms may only take place in approved and appropriately classified laboratories.

2) Describe facilities that use hazardous agents. Note square feet/metres, number of animal rooms, and support spaces. In addition, describe design features, construction features, and special equipment, especially as they relate to hazard containment. Note if, and how, exhaust air is treated. If special facilities are not available and animals exposed to hazardous agents are housed within conventional animal rooms, so note.

<table>
<thead>
<tr>
<th>Facility Description</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit 16-2M in the Panum Building is GMO class 2 classified. This includes rooms 16-2-31A and 16-2-33A (animal room/procedure room), 16-2-31B (corridor), 16-2-35C (staff entrance) and 16-2-29B (chemical lock). These areas total 44.83m²</td>
<td></td>
</tr>
<tr>
<td>Room 16-2-8 (15.97m²) is classified as GMO class 2 in the quarantine facility at Panum.</td>
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</tr>
<tr>
<td>Room 10-3-31 (15.66m²) at Panum is also classified as GMO class 2.</td>
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<tr>
<td>Room 16-4-36 (9.15m²) at Panum is also classified as GMO class 1 (with special conditions).</td>
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</tr>
<tr>
<td>Rooms 2-01-16 (21.34m²) and 2-01-14A (8.82m²) at the Biocenter are also classified as GMO class 1 (and is in the process of being classified as GMO class 2).</td>
<td></td>
</tr>
<tr>
<td>In unit 16-3 experiments involving radioactivity may be carried out in rooms 16-3-15a (15.82m²), 16-3-25a (34.5m²) and 16-3-29a</td>
<td></td>
</tr>
</tbody>
</table>
(17.42m²). The same is applicable for room 10-3-8 (15.68m²) and 10-3-38 (16.45m²) at unit 10-3.

• Room N93 at the Frederiksberg facility can be classified as GMO class 2 on an as needed basis depending on the research project.

The Department has a permit for specific radionuclides and activity levels from the National Board of Health, which corresponds to a 1/10 S1 permission for the purchase, storage and use of open radioactive sources.

All information regarding the classification and necessary measures, such as working procedures, etc. are described in the directions from the Danish Working Environment Authority’s (“Klassifikation af laboratorier til genteknologisk arbejde, At-vejledning C.0.4: http://arbejdstilsynet.dk/da/regler/at-vejledninger/k/c-0-4-klassifikation-af-laboratorier.aspx”). The faculty’s webpage has detailed information on the subject: http://arbejdsmiljo.ku.dk/bioarbmiljo/gmo/.

Locations designed for the purpose of housing GM animals must meet certain design criteria. The purpose of a classification is to ensure that there can be no adverse health impact on humans or on the external environment as a result of work with GMOs. Basically this means undertaking measures to ensure that animals cannot escape from the unit or during transportation between units and/or classified laboratories. The rooms are designed with lock functions and potential hiding places or escape routes for animals are blocked. Rodents are housed mainly in IVC cages, which further ensure that the animals cannot escape. In the case of an escape during handling, the animal will remain in the room, and involved personnel remain in the room until the animal is caught. Transport between classified areas takes place in accordance with specific guidelines (applicable for animals, biological materials, etc.). Disposable materials are disposed of, preferably as clinical waste according to specific guidelines. Wastes and/or reusable materials are decontaminated according to specific procedures. Special guidelines and rules apply for classified areas, which are all described in SOPs (Admission Policies including dress requirements, Waste management and decontamination, Autoclaving equipment, Disinfection with Virkon S, Hazard symbols, Internal transportation of animals and microorganisms, Quarantine Rules for researchers and visitors, Quarantine Rules for employees, MSDS and information about Kemibrug, how to behave in animal and procedure rooms, cleaning classified areas, safety instructions and cleaning requirements). This information is all available upon request.

All units, with the exception of AKB, have laboratories equipped with ventilated benches or fume hoods for work with hazardous substances. In cases where animals are being treated with hazardous
substances as part of an experimental plan, they are housed in appropriately classified facilities. In cases where larger animals are used in experiments involving hazardous substances, containment facilities are used and animal technicians are protected with personal protective equipment as necessary.

**Exhaust air**
Exhaust air from laminar air flow (LAF) cabinets, fume hoods, and cabinets for chemicals (termed process ventilation) is not re-circulated but filtered through the central ventilation exhaust system.

3) Describe the oversight process and husbandry practices in place to ensure personnel safety, including any personal protective equipment provided when work assignment involves hazardous agents.

For individual experiments, the appropriate use of personal protective equipment and procedures will be described in the project plan by the veterinarian who approves the plan. General policies on protective measures will be reviewed, discussed, and decided by LAMU. The Department management as well as LAMU ensures that all procedures are in agreement with regulations, the Department’s policies and SOPs, and that the appropriate protective equipment is available and used properly. Husbandry procedures, such as restraining animals in particular ways to avoid harm to the technician as well as the animal, are also described in the SOPs. It is the duty of daily management to make sure that personal protective equipment is used properly. Employees are obliged to use personal protective equipment during the whole procedure involving a potential hazard. Personal protective equipment can include, but is not limited to gloves, protective eyewear, masks and respirators, coveralls, shoe covers, protective work shoes and hairnets. A combination of these elements can be used depending on the hazards involved.


4) Describe any facilities that may also be used for human-based research or patient areas, including the policies and procedures for human patient protection, facility decontamination, animal transport through common corridors or elevators, and other personnel protection procedures.
Pigs are transported through underground corridors to the University Hospital where scanning is possible. The scanners are also used for human patients. The hospital has procedures in place for decontamination. These procedures include: Single-use materials for equipment which comes into direct contact with pigs, removal of all items that are not needed for the procedure, and cover for all remaining items. The pig is covered with drapes before entering the scanner. Staff members wear single-use clothing and gloves. Following a pig experiment, the entire room is subject to a special disinfection procedure.

5) Describe any other circumstances in which animals or caging equipment are transported in common use corridors or elevators (e.g., have the potential to come in contact with individuals not associated with the animal care and use programme), and measures taken to mitigate risks associated with such use.

In some cases, animal procedures cannot be performed in the designated procedure rooms within a unit. In these cases animals must be moved to suitable laboratories of the same health status and classification. Cages of animals can be transported from units to laboratories using common corridors and elevators. In these cases cages are packaged with a filter top lid and are sealed within at least one plastic bag (for a maximum time of one hour). GMO class 1 and GMO class 2 animals may only be transported between areas of the same classification and the outer plastic bag must be treated with Virkon S disinfectant before leaving the classified area. GMO class 1 and 2 cages must also bear a sticker showing the classification of the contents on the outer plastic bag layer. The cages must be transported on a trolley to ensure greater comfort for the animals.

6) If motorized vehicles are used for animal transport, describe how the driver is protected from exposure to hazards such as allergens or zoonoses.

As described above, all cages transported out of a unit have a filter top lid and at least one layer of plastic bag. These two barriers effectively protect the driver from any potential exposure to hazards such as allergens and zoonoses. Furthermore, whilst in transit, the cages are placed in a sealed trailer which further protects the driver.


1) Describe educational programme(s) to inform personnel about zoonoses, personal hygiene, allergies, and other considerations regarding occupational health and safety.
All new employees receive a staff handbook when they begin at the Department, which details general occupational health and safety aspects of the job. All persons involved in the care of research animals at the Department, as part of their required qualifications, receive education about zoonoses, personal hygiene, allergies etc. More specific information about potential hazards in relation to particular projects is conveyed during project plan meetings. These meetings take place before a project begins and all safety aspects regarding potential zoonoses, hygiene, allergies etc. are explained in full to all parties involved.

2) Describe special qualifications and training of staff involved with the use of hazardous agents in animals.

As described in the question above, all persons involved in the care of research animals at the Department, as part of their required qualifications, receive education about zoonoses, personal hygiene, allergies etc. Any further required education for particular projects is conveyed during project plan meetings.

iv. Personal Hygiene [Guide, p. 20; Ag Guide pp. 4-5]

1) List routine personal protective equipment and work clothing provided for animal care personnel, technical staff, farm employees, etc. Describe arrangements for laundering work clothing.

Personnel can be exposed to biological, chemical, and other health hazards when working with animals. Described below is the minimum personal protective equipment to be used in the different units at the facility.

The Department ensures that employees are provided with clean work clothes and use personal protective equipment, appropriate for use in the animal facility. In cases where hazardous substances, materials or procedures are used, adequate protective equipment is used. Employees must wear protective clothing (e.g., clean work clothes (disposable or reusable), coveralls, hair nets, gloves, shoe covers, shoes, rubber boots etc.) and must also follow other personal hygiene procedures when inside the facility. When leaving the facility, employees must remove their outer protective clothing. A shower before leaving the facility is recommended for everyone working within the pig facilities.

Work clothes
Clean work clothes and shoes are provided for all staff members, and are to be worn inside the units at all times. Different provisions apply for different units.

Coveralls
Clean, reusable or disposable, long-sleeved, one-piece coverall suits are used in some units and for some work situations.

**Lab coats or aprons**
Lab coats can be used as extra protection over coveralls, depending on the procedure to be performed.

**Gloves**
Standard disposable latex or nitrile rubber gloves are used in all units.

**Eye protection**
If the procedure requires it, different types of safety goggles are used.

**Respiratory protection**
Different masks, such as surgical masks, dust masks and respirators may be used depending on the procedure performed.

**Safety footwear**
Protective footwear is recommended and provided for all personnel working with large animals and/or heavy items.

At the Panum building, AKB and RH, work clothing is sent out to be laundered by a laundering company for all units except for SPF units (10-2 and 10-4), where work clothing is laundered in washing machines within the units to prevent barrier breaches. The laundry contractor has been informed about the presence of animal allergens on the clothing.

The Biocenter, the Frederiksberg facility and the Taastrup facility all launder work clothing onsite using washing machines and dryers.

2) Describe provisions for washing hands, showering, and changing clothes, including instances where work clothes may be worn outside the animal facility.

Personal hygiene is essential and the animal facilities are equipped with appropriate washing and showering facilities. Furthermore, some sub-units within the central units, which require additional hygiene procedures, have separate showering facilities. Laboratories, procedure rooms, animal rooms and service spaces are all equipped with hand washing facilities.

It is essential to complete relevant hygiene procedures before entering and leaving a unit. All units have rooms where clothes change and other hygiene procedures can be performed, and where all necessary equipment (such as protective suits, hair covers, shoe covers, face masks, hand wash, alcohol disinfectant etc.) is available. Special procedures apply for each unit. The general rule at the rodent facilities, when entering, is to wash hands with soap and use alcohol disinfectant, change into laboratory coat or, in most cases, a coverall, hair cover, put on shoe covers and use gloves when handling animals. No personal belongings such as overcoats and/or bags are allowed to enter the unit. Entry procedures and quarantine rules are described in the facility’s SOPs for each unit.
At the large animal facilities frequent hand washing and a shower before leaving the facility is recommended. Signage at the entrance to all animal units also describes requirements for entering the unit.

3) Describe policies regarding eating, drinking, and smoking in animal facilities.

Smoking is prohibited in all areas of the University of Copenhagen and Copenhagen University Hospitals. Eating is only permitted in the staff lunchroom and in the cafeterias where the sites are located. Staff members are not allowed to eat meals inside the animal units. Coffee, tea and water as well as some snacks (heat treated) are available within the units, provided they are taken in the staff office room or break room.


1) Describe briefly institutional policies governing experimentation with hazardous biological, chemical, and physical agents, including the oversight process for the use of hazardous agents. Note: Written policies and standard operating procedures (SOPs) governing experimentation with hazardous biological, chemical, and physical agents should be available during the AAALAC site visit. If such policies and procedures are not available, please explain.

Procedures

Procedures involving experimentation with hazardous substances and/or materials are subject to strict national regulation as well as institutional regulations. The University of Copenhagen has, in compliance with legislation, its own institutional policies regarding chemicals, GMO, biological, irradiation and radionuclides, which are published on the University’s intranet. These policies encompass the legal and practical issues (among other things) involved with the acquisition, transport, classification, workplace risk assessment, labeling, storage, use and disposal of the hazardous substances mentioned above. It is the purpose of these policies to create a healthy, safe working environment that is always in keeping with technical and social developments in society and to disseminate knowledge of good practice and work for a uniformly high level of health and safety throughout the organization.

The Department requires that all researchers fill out a project plan, which must be approved by the Department’s veterinary staff, stating any use of substances and/or materials that are potentially dangerous. Compulsory information in the project plans include general safe
handling, precautionary measures against accidents and, in case of an injury or accident, treatment options. On the Department’s website, detailed information on work with chemical substances, radio nuclides, GMO and biological agents is available. The staff management ensures that all personnel, including cage cleaning staff understand the potential exposure risks to hazardous substances and/or materials, biological agents and radio isotopes in animal project plans, is provided with exposure control methods as needed, receive training on hazardous substances and/or materials, biological agents and radio isotopes used in specific plans, receive training on exposure control methods, and receive notification about relevant standard operating procedures (SOPs) on the subject.

**Work with particularly hazardous agents**
The work should preferably be contained. This could mean that dosing of animals and cage changing occur inside a safety cabinet. The animal technicians may not mix, dilute, weigh or in any other way prepare particularly hazardous substances. The researcher must provide the substance ready for use. For example, in a syringe ready to be injected, or as drinking water ready to be poured into bottles. Where containment is not possible, e.g. for experiments with large animals, other work procedures will have to be decided.

While working with particularly hazardous substances, animal technicians must use disposable nitrile gloves, a respirator which is applicable and suitable for the purpose intended, safety eyewear, and a disposable protective coveralls.

A warning label must be posted on the cage.

In addition, a label with precautions must be posted on the cage.
Details such as the name of the substance used and the date must be included on the cage card information, and the cage must be handled according to a valid working description. For animals kept in IVCs, a disposable cage is placed inside the IVC cage. Single use IVC cage systems are also available for special circumstances.

- After the work is completed, the working area is cleaned with an appropriate detergent and water.
- All disposable materials used together with the hazardous agent will be treated as hazardous waste by personnel. All non-disposable materials used will be handled according to directions applicable to the agent in question. The materials may be washed before leaving the unit and/or autoclaved or, in some cases, sent to the service area without prior treatment. In the latter case, the material must be packed in designated plastic bags, sealed and marked appropriately.

2) Describe aspects of the health and safety programme specifically for personnel potentially exposed to hazardous agents.

The following procedures apply for work with any hazardous substances and/or materials:

- Plan, organize and carry out the work as securely as possible
- Avoid unnecessary contact with hazardous substances and/or materials
- Reduce possibility of contact
- Make sure limit values are not exceeded

When using particularly hazardous substances and/or materials a more detailed workplace risk assessment (arbejdspladsvurdering – APV) must be completed, evaluating the risk of working with the proposed substance(s). The evaluation is the basis for further evaluation on how the work should be performed. Detailed guidelines apply from the Danish Working Environment Authority: “Arbejde med stoffer og materialer At-vejledning C.1.3: http://http://arbejdstilsynet.dk/da/regler/at-vejledninger/a/c-1-3-arbejde-med-stoffer-og-materialer.aspx”. This is completed in collaboration with the consultants for the Working Environment Unit (Arbejdsmiljøenhenden). The Department maintains SOPs for research procedures concerning hazardous substances including chemicals, biological agents and/or radioactive materials or will develop SOPs based on the risk assessment, if necessary. Otherwise,
particular aspects of research procedures involving hazardous substances are described in individual project plans. All aspects are covered including cage change procedures, handling of animals, cleaning equipment, filter change etc.

3) Describe safety procedures for using volatile anaesthetics and how waste anaesthetic gases are scavenged.

Anaesthetic procedures involving anaesthetic gases are only performed by trained staff and only at the Department’s experimental surgical unit and procedure rooms with the necessary and appropriate equipment.

Work with anaesthetic gases is performed under exhaust ventilation, designed specifically for this purpose. Furthermore, the operating rooms and the entire surgical unit are equipped with ventilation systems that circulate and replenish the air.

Anaesthesia machines, breathing circuits, and waste-gas scavenging systems are properly maintained and serviced in order to minimize the risk of anaesthetic gases escaping into operating rooms.

Staff and others using the surgical facilities at the experimental surgical unit are trained in hazard awareness, prevention, and control of exposure to waste anaesthetic gases. The LAMU has discussed and approved an emergency plan for accidents with isoflurane (isoflurane kemisk APV_0610) and detailed SOPs regarding its use are available. According to Departmental policy (as advised by LAMU), pregnant women may not work with isoflurane. The following departmental order applies for gasses for medical purposes: "BEK nr 1318 af 27/11/2007 – Gældende, Bekendtgørelse om gasser til medicinsk brug, Indenrigs- og Sundhedsministeriet: https://www.retsinformation.dk/Forms/R0710.aspx?id=113514”.

4) List, according to each of the categories noted below, hazardous or potentially hazardous agents currently approved to be used in animals that are or will be maintained for more than a few hours following exposure. If the hazardous agent cannot be listed by name for security/proprietary reasons, identify it by the general category of agent and level of hazard. Note: This information may be provided as an Appendix.

a) Biological agents, noting hazard level (Directive 93/88 EEC, CDC Biohazard Level, etc.).

Due to the lengthy nature of the list, please refer to appendix 15 for a list of potentially hazardous substances used at the Department.
b) Chemical agents, noting general category of hazard (toxicant, toxin, irritant, carcinogen, etc.).

Due to the lengthy nature of the list, please refer to appendix 15 for a list of potentially hazardous substances used at the Department.

c) Physical agents (radiation, UV light, magnetic fields, lasers, noise, etc.).

Due to the lengthy nature of the list, please refer to appendix 15 for a list of potentially hazardous substances used at the Department.

5) Describe the programme for housing and caring for animals exposed experimentally to the hazardous agents noted above, with emphasis on management and safety practices for containment of each class of agent. Indicate how levels of personnel exposure are assessed.

Well-defined housekeeping procedures are essential in reducing the risks associated with working with, for example, pathogenic agents, hazardous chemicals and radioactive material. The Department requires the development of a project plan that adequately describes procedures to contain and handle the agent in a way that minimizes exposure to animal care unit personnel and the environment. These procedures are communicated to animal care staff during project plan meetings and are kept on record for future reference within the animal unit.

In addition to project plan, the Department keeps track of all hazardous substances used in connection with research performed at the facility.

Where possible animals exposed to hazardous substances are contained in specialised caging (for example disposable IVC cages) and daily husbandry is undertaken using equipment such as biosafety cabinets. Where this is not possible (such as with large animals), steps are taken to minimise the exposure of other animals and technicians with personal protective equipment and husbandry procedures.

In some cases levels of exposure to hazardous substances can be assessed via special measuring equipment (for example, a meter to measure ppm of hydrogen peroxide in the air). In other cases the exposure is calculated before the experiment begins. In all cases, exposure must not exceed the levels accepted in current legislation.

**General management and safety practices for all agent classes:**
vi. **Personal Protection** [Guide, pp. 21-22]

1) Describe training, equipment and procedures employed to reduce potential for physical injury, inherent to animal facilities (e.g., noisy areas, large quantities of chemicals such as disinfectants, ergonomics) or species used (e.g., nonhuman primates, agricultural animals).

In general, risks and procedures on how to reduce potential injuries are described in SOPs and other manuals in connection with the description on how to perform a procedure or operate equipment. This includes information concerning potential risks, how to avoid accidents and how to react in case of an emergency.

In general, the following must be taken into account during risk assessment:
- The cause of the risk
- Persons exposed
- Consequences to health
- Risk level assessment
- Preventive measures
- Implementation and evaluation

Advanced equipment must only be operated by personnel who have received thorough training from the equipment supplier or other qualified instructors. Only qualified personnel may use equipment where there is a risk of physical injury. Operation manuals, signs, and in some cases SOPs, are available for all equipment at the animal facility.
Procedures involving a potential risk for physical injury are either described in SOPs or in the project plan. It is the responsibility of the person in charge of the procedure to inform and instruct personnel involved. Hazardous procedures are only to be performed after receiving comprehensive instruction from a qualified person, and in some cases only under the supervision of the qualified person. Equipment used to reduce the potential for injury include: personal protective equipment such as eye protection, respiratory protection, gloves, work clothes and shoes/boots with safety protection, hearing protection, lift tables, fork lifts, all-terrain vehicles, pallet lifts, tractors, fume hoods and laminar air flow containment hoods. First aid kits, eyewashes, fire extinguishing equipment, sprinklers (in some places), and fire blankets (in some units) can be found in each unit as well as in the service areas.

Staff management is primarily responsible for overseeing safety training and for general supervision of personnel. On the University’s website information about evacuation, injury etc. is available.

2) Describe the procedures for the maintenance of protective equipment and how its function is periodically validated.

The Department’s own local, Working Environment Committee group (LAMU) checks all protective equipment during their annual rounds. Any problems are noted and dealt with as soon as possible. It is also the responsibility of staff management to ensure that appropriate personal protective equipment is available and in good working order.

3) Describe situations where respiratory protective equipment is available or required, such as cage washing facilities, feedmills, etc. Describe how such equipment is selected and how respirator fit testing and training in the proper use and maintenance of the respirator is provided.

At the main cage waste facility, at Panum, robots handle the emptying and beddng filling of cages. When this is done manually it is done using appropriate PPE (e.g. P2 mask) and under process ventilation. At all other sites the washing facilities are either manual or semi-automatic. Here too PPE (e.g. P2 mask) is used and all emptying is done under process ventilation.

Respiratory equipment is also available in the event of a volatile liquid spill (such as isoflurane). All technicians have been instructed in the correct way to fit the masks and filters and the LAMU checks all respiratory equipment during annual rounds.

4) Describe programme policies to ensure personnel safety when working with rack/cage washers, other sanitation/sterilization equipment, and other heavy equipment such as scrapers, tractors, and
farm machinery. Describe the training programme that supports these policies.

Work with heavy equipment including rack/cage washers, autoclaves, trucks and other heavy equipment is included in the written evaluation of occupational safety and health at the workplace, as required by “Bekendtgørelse om arbejdets udførelse; Arbejdstilsynets bekendtgørelse nr. 559 af 17. juni 2004: http://arbejdstilsynet.dk/da/regler/bekendtgorelser/a/sam-arbejdets-udforesp-559.aspx”. Guidance is provided in “At-vejledning D.3.1: https://arbejdstilsynet.dk/da/regler/at-vejledninger/l/d-3-1-loft-traek-og-skub.aspx”. The work must be planned so that it can be performed safely. Details on safe practices are provided in the guidance paper, as are descriptions of work practices and situations that are to be avoided. The employer is responsible for providing theoretical and practical work instructions, and the employees are responsible for following these instructions. SOP’s are available on the safe operation of the cage/rack washer, heavy machinery, sanitation/sterilization equipment and farm machines and employees are also provided with onsite training.


1) Identify the individual(s) and/or office responsible for developing and monitoring the medical evaluation and preventive medicine programme.

It is the employer’s responsibility, supported by expert advice to assess the necessity for preventive medicine. The workplace assessment takes in to consideration aspects to ensure that work processes are safe and pose little or no risk to the employee or other people working in the Department’s facilities. Management, together with the working environment organisation, coordinates issues related to programs for monitoring employees and administering preventive medicine. The Department may rely on advice, with regards to specific issues related to occupational health, from the Clinic of Occupational Medicine at Bispebjerg Hospital (https://www.bispebjerghospital.dk/afdelinger-og-klinikker/arbejds-og-miljoemedicinsk-afdeling/for-sundhedsfaglige/Sider/henvisning-til-arbejdsmedicinsk-afdeling.aspx).

The Clinic works with issues related to:
- Examination of persons with possible occupational and environmental related diseases
- Prevention of occupational and environmental illnesses
- Advice and information on occupational and environmental medical issues including poisoning
- Research and teaching in occupational and environmental medicine
If preventive medical evaluation is relevant it will be discussed on a management level. One of these measures may be to offer vaccinations to employees. However, risks must – according to The Working Environment Authority – be reduced primarily by occupational hygiene measures including instruction of employees and only where this is not feasible or adequate, should vaccination be offered.

2) Describe the categories of personnel (research staff, visiting scientists, animal care staff, students, support staff, etc.) included in the programme.

All individuals with permission to enter the animal facility are included in the programme. The main categories are of course employees at the Department and researchers performing research at the Department’s facilities. Visitors may only enter with special permission after thorough instructions and in some cases only when accompanied by a Department staff member to ensure that safety procedures are followed.

3) Describe general features of the medical evaluation and preventive medicine programmes, including pre-employment/pre-assignment health evaluation, periodic medical evaluations, immunization programmes, and procedures for communicating health related issues.

Measures are in place in order to ensure occupational health and safety. The project plan, institutional guidelines, the license from the Animal Experiments Inspectorate and various granted permissions from government authorities including the necessary risk assessments are all measures which ensure that correct procedures are followed and that staff working with these hazardous agents receive the proper instruction (and training if required), protection and education for cases of injury/exposure including preventive medicine, pre- and post-health evaluations, monitoring programs etc. There is no general standard institutional pre-employment evaluation or continuing periodic medical evaluations, rather, evaluations are made on an as needed basis depending on the circumstances.

Personnel working with animals and in laboratories are advised to be vaccinated against tetanus with their general practitioner. All new employees are also advised to receive the immunization. The Department covers the expenses in connection with this. Procedures are in place for medical care in case of animal bites and scratches, needle sticks and cuts. In case of the involvement of hazardous substances, a risk assessment must take preventive medical precautions into consideration.

Working with biological agents and other work involving the potential exposure to biological agents, are covered by Executive Order on Biological Agents and working environment. In some cases,
immunizations or tests are required. For example, those working with risk group 2 agents i.e. yellow fever virus or humane influenza virus. Work with radioactive material also requires special preventive and monitoring measures.

Requirements for the employer in relation to hazardous chemicals are to provide instructions that are appropriate for the situation. Working Environment Agency guidelines are available for work with hazardous Substances.

4) Describe special precautions or procedures for personnel exposed to potentially hazardous species (nonhuman primates, sheep, etc.) or agents (infectious agents, human origin tissues, chemicals/toxins, etc.).

The Department has procedures in place to ensure that tissues of human origin (such as human cell lines) are adequately tested for human pathogens before use within the facility. Special procedures involving increased hygiene and the opportunity to test for exposure have been put in place for work with particular species such as pigs (where MRSA can be a potential hazard). Work with infectious agents, as previously mentioned, is tightly regulated and specific regulations and requirements are closely followed by the Department.

Exposure to hazardous substances and materials is avoided or reduced by implementing the following general measures:

1. Eliminate exposure by:
   - Removal of hazardous substances or materials where possible
   - Replacement with a non-hazardous or less hazardous substitute
   - Use a hazardous substance or material in a safer form, or
   - If a harmful product is created, change the process, so that the hazardous substance is not formed.

2. Limit exposure by:
   - Provide physical barriers in procedure rooms (ie. fume hoods)
   - Enclose the hazardous substance or the process
   - Using a suitable and safe working procedure
   - Limit the amount used
   - Establish exhaust ventilation if made by air pollution (gases, vapours, fumes or dust) or
   - Limit the number of exposed staff or duration of exposure

3. Protect against exposure by:
   - Use personal protective equipment

4. Handling potentially hazardous species:
   - Provide suitable procedures and training with experienced personnel
   - Never work alone
   - Provide physical barriers in procedure rooms
Describe institutional methods for reporting and investigating animal welfare concerns.

The IACUC (the animal welfare committee at the Department) has developed a mechanism for reporting animal welfare concerns (as decided at the 18th meeting, June 6, 2012). Animal caretakers and researchers are encouraged, via signage in animal units and on the Department’s website (http://emed.ku.dk/om/dyrevelfaerdskomite/), to report concerns about animal welfare in experiments or animal care to the Head of Department, to the Department veterinarians, to an IACUC member who is not employed by the department or anonymously via a mailbox outside the Department’s administration office. This mailbox is emptied by an IACUC member who is not directly employed by the Department. The persons who receive the report are obliged to take appropriate action and advise the IACUC and the person who reports the concern of any and all action taken. The actions are documented in the minutes from IACUC meetings and in the veterinary records in cases where veterinary action has also been taken. In serious cases it is also necessary to report animal welfare concerns to higher authorities (AAALAC and the Animal Experiments Inspectorate).

B. Programme Oversight
Programmatic oversight of all aspects of the animal care and use programme must be described. Irrespective of whether the programmatic oversight is carried out by just one body or is delegated to several bodies (e.g., protocol review to an Ethics Committee, an Institutional Animal Care and Use Committee, the Competent Authority; oversight of animal care and welfare to an Animal Welfare Body; occupational health and safety to the Occupational Health Unit, etc.), it must be described how the comprehensive programmatic oversight, and the responsibility and authority of the body/bodies, are ensured.

The Ministry of the Environment and Food
Denmark is a member of the European Union and is in full compliance with European legislation and relevant guidelines. In Denmark, the administration of animal experiments is centralized. The Ministry of the Environment and Food is responsible for legal issues relating to animal welfare and animal experimentation. Legal instruments are also in place to ensure ethical oversight of animal experimentation. Within the Ministry, animal experimentation is the responsibility of the Council for Animal Experimentation (Rådet for Dyreforsøg): http://www.foedevarestyrelsen.dk/fvst_ansvar_opgaver/Sider/Dyreforsoegstilsynet.aspx

Council for Animal Experimentation
The Council consists of a president (who must also hold the role of a court judge), and 10 other members. The Ministry of the Environment and Food appoints the president and all members; the appointment period is 4 years. The members are appointed on the basis of recommendations from various state agencies and interest groups. Four members are recommended by animal protection organizations. The minister of the Environment and Food ensures that some of the members have the
necessary professional insight in the subject. (Law on Animal Experimentation, consolidated Act number 253, 8th of marts 2013).

The Council gives directions to its administrative body, the Animal Experiments Inspectorate (Dyreforsøgstilsynet: http://www.foedevarestyrelsen.dk/fvst_ansvar_opgaver/Sider/Dyreforsoegstilsynet.aspx. Members of the Council for Animal Experimentation are listed along with their qualifications in appendix 6.

**Animal Experiments Inspectorate**

The Inspectorate is mentioned in the Executive Order on the Rules of Procedure for the Council for Animal Experimentation (see link above – in Danish only); where it is stated that the Inspectorate includes a veterinary secretary. Apart from this, there are no requirements for the composition of the Inspectorate. At present (2015), the Inspectorate consists of one secretariat director, one scientific coordinator, one veterinarian, one office clerk and a student. The Inspectorate is responsible for carrying out the practical actions decided by the Council, including the inspection of facilities, as well as daily administration. Members of the Animal Experiments Inspectorate are listed along with their qualifications in appendix 6.

**Licence**

The main instrument for controlling animal experiments is the licensing system. No animal experiment may be performed without a licence (Law on Animal Experimentation “§1: LBK nr 253 af 8/03/2013 – Gældende, Bekendtgørelse af lov om dyreforsøg, the Ministry of the Environment and Food - https://www.retsinformation.dk/Forms/R0710.aspx?id=162938#Kap3”). A researcher can obtain a licence by electronically sending an application to the Animal Experiments Inspectorate. The application is considered and either approved or rejected at one of the monthly meetings of the Council. The council may also request further information about an application before it is approved. The President may make decisions without involving the Council. Any applications considered by the Council are defined in §3 in the Executive Order on the Rules of Procedure for the Council for Animal Experimentation. The Council may specify how an experiment is to be conducted as they see fit. Decisions of the Council may not be appealed (Law on Animal Experimentation).

A licence legally allows the applicant to perform certain procedures on a defined number of animals of a defined species within a certain time frame, which is usually five years, but may be shorter.

The licence-holder must pay an initial fee, followed by a yearly fee to uphold the licence (Executive Order Regarding Payment of Fee for Licence for animal Experimentation).

The Council/Inspectorate makes announced and unannounced inspections, and persons participating in an experiment are required to provide assistance to the Council during these visits (Law on Animal Experimentation, §11).

Experimental procedures may only be carried out in the institution/company specified in the licence (Law on Animal Experimentation, §3). If a licence-holder
wishes to perform the experiments in a different facility, permission must first be sought and given by the Animal Experiments Inspectorate.

**Department project plans**

When the Council approves a license application, the Department receives a copy of the license from the Inspectorate. The Department veterinarian reads all the received licenses. If any licences raise concerns, the veterinarian presents the license to the IACUC (the Departments animal welfare committee) for consideration. Before animals are ordered, and/or an experiment can commence at the facility, researchers must complete a project plan. The Department’s Veterinarians review and approve the plan to ensure that the experiment described in the project plan is in compliance with the conditions specified in the licence. A project plan must be written for each individual study forming part of the licensed project. (Please see appendices 7a, 7b and 7c for further information regarding project plan review). Relevant information in connection with project plans at the facility is available at the department’s website: [http://emed.ku.dk/forskerservice/projektplaner-for-forsøg-og-avl-med-dyr/](http://emed.ku.dk/forskerservice/projektplaner-for-forsøg-og-avl-med-dyr/)

The project plan ensures that relevant experimental information is made available for personnel overseeing and/or participating in the research. Special emphasis is made on informing the Department’s animal care staff about any precautionary measures. The project plan includes:

- Detailed information on test substances and chemicals (hazardous materials)
- License number
- Contact information for the license holder, responsible person(s) and other personnel participating in the research
- Account number
- If GMOs and other hazardous substances are used a special license is required from the Working Environment Authority (when applying to work with known carcinogens or gene technology).
- Information about use of biological materials
- Description of the research procedures (e.g. symptoms and side effects that can be expected in the animals) and time schedule.
- Severity level (terminal, light, moderate or severe)
- Humane endpoints
- Which actions should be taken in the event of clinical symptoms.
- How to handle euthanized animals
- The use of anaesthetics and analgesia

**IACUC**

In the beginning of 2007 the Department of Experimental Medicine formally established an Animal Welfare Committee (IACUC):

[http://emed.ku.dk/om/dyrevelfaerdskomite/](http://emed.ku.dk/om/dyrevelfaerdskomite/)

Since January 2013, each license-holder, breeder or supplier is obliged to set up an animal-welfare body or be affiliated with an animal-welfare body. This animal-welfare body is a local institutional board (IACUC), but The Council for Animal Experimentation still has supreme authority while the local IACUC may only outline recommendations and guidelines. The tasks for the IACUC are outlined in Executive Order on Animal Experimentation -

[https://www.retsinformation.dk/Forms/R0710.aspx?id=145248#Kap19](https://www.retsinformation.dk/Forms/R0710.aspx?id=145248#Kap19)
The members of the committee are appointed by the Head of Department for the Department of Experimental Medicine. The committee’s responsibility is to review and supervise the animal care and use program, review procedures at the facility and to ensure that they comply with current legislation and policies at the Department. Committee members must observe confidentiality with respect to individuals and research projects.

1. The Role of the IACUC/Oversight Body [ETS 123, Articles 6-13; Guide, pp. 24-40]

   a. IACUC/OB Composition and Function [Guide, pp. 17; 24-25]

      The next questions apply to all IACUC/OB including equivalents external to the institution (e.g., governmental, etc.). For external equivalents to the IACUC/OB, provide a brief summary of the system in place.

      Please provide a IACUC/OB roster, indicating names, degrees, membership role, and affiliation (e.g., Department/Division) as an appendix.

      i. Describe IACUC/OB membership appointment procedures.

      The members of the Department’s IACUC are appointed by the Head of Department of the Department of Experimental Medicine.

      Members of the Council for Animal Experiments are appointed by The Ministry of the Environment and Food and the appointment period is 4 years. Members are appointed on the basis of recommendations from various state agencies and interest groups.

      Members of the Animal Experiments Inspectorate must include a veterinarian.

      ii. Describe frequency of IACUC/OB meetings.

      The Department IACUC meets quarterly.  
The council for Animal Experiments meets monthly.

      iii. Describe the orientation, training, and continuing education opportunities for IACUC/OB members. [Guide, p. 17]

      Members of the IACUC at the Department of Experimental Medicine all have working experience and expertise in the field of veterinary science, animal facility management, animal research, alternative methods in research etc. One member is a lay person not employed by the University. Members are encouraged to attend workshops in managing an IACUC, with guest speakers from, among others, AAALAC.
The Council
The members of the Council for Animal Experimentation do not receive formal training, but are appointed with due consideration to educational background, experience and previous knowledge in the field of animal experimentation.

A blank copy of your institution’s protocol/project review form should be provided as an appendix. Also include forms used for periodic renewal, modifications, amendments, etc., as applicable.

i. Describe the process for reviewing and approving animal study protocols/projects, including research and teaching proposals. Include a description of how animal study protocols/projects that do not involve a formal grant proposal are reviewed and approved (i.e., pilot studies or internally funded studies). Include a description of how the IACUC/OB weighs the potential adverse effects of the study against the potential benefits that may result from the research. Describe how protocols/projects that have the potential to cause pain or distress to animals are reviewed, alternative methodologies reviewed, veterinary input solicited, and studies controlled or overseen. Specify how animals and experimental group sizes are justified.

Licence
The Ministry of the Environment and Food’s Council for Animal Experimentation performs the overall animal study plan review and approval via the Animal Experiments Inspectorate. Researchers can only apply if they have passed an EU function ABD course (previously FELASA C-course), ensuring a formal education in working with research animals. Applications for a license are made online, however guidelines outlining the information required in an application is provided to applicants and has been attached as appendix 16. Decisions on applications are made based on relevant Danish and European legislation. Any plans involving pain and/or distress in animals must be scientifically justified and it must be justified that alternative methodologies cannot be used. Experimental group sizes are determined and justified on the basis of statistical significance. Projects not involving a formal grant proposal are treated in the same manner as all other projects.

Project plan
Individual studies, described in the individual project plans, are reviewed and approved by the Department’s Veterinarians, who ensure that the study conforms to the conditions approved in the license, and the local standards. A blank copy of the Department’s project plan documents are provided in appendix 7a (project plan for small animals), 7b (project plan for large animals) and 7c (project plan for breeding animals).

The process is as follows:
1. The investigator submits a project plan to the Veterinarian.
2. The Veterinarian checks whether the proposed procedures are covered by the licence and whether other permits from authorities are required and have been obtained.
3. Furthermore the Veterinarian confirms whether any hazardous substances are to be used in connection with the proposed research procedures. Well documented health and safety procedures must be available, and if needed the veterinary staff will take further action to obtain all relevant documentation.
4. The Veterinarian considers the project description regarding:
   - Necessary and correct anaesthesia and analgesia
   - Clear and relevant humane endpoints for the project
   - Method(s) of euthanasia
5. If the project plan is considered to be covered by the licence and the above mentioned points are fulfilled, the Veterinarian will assign a project number to the study and a contact Department technician will be allocated to the individual project.
6. If the project or the people involved are new to the Department, the Veterinarian and representatives from the unit where the research procedures will take place, meet with the investigator(s) prior to the commencement of the research study.
7. By presenting the assigned project number to the Department’s animal technicians, the investigator can then order animals for the study and liaise with the technicians for the practical execution of the project.

Any unexpected or adverse outcomes during experiments are noted during daily animal husbandry by either the animal care technicians or research staff and are communicated to Department Veterinarians, who then investigate. If deemed necessary, the Animal Experiments Inspectorate is informed and the research can be halted while a solution is found.

ii. Describe process for reviewing and approving amendments, modifications, and revised protocols/projects. If applicable, include a description of “major” vs. “minor” amendments.

Amendments to animal use plans are submitted and treated in the same manner as original projects as described in the question above.

A project plan is – unless any changes are required – valid the year it has been approved and the following year. This means that researchers are required to renew the project plan if the research project is to be continued. Project plans resubmitted for approval to the Veterinarians receive the same review process as newly submitted project plans. Every year the researchers are reminded that their previous project plans will become invalid. If a project plan is not renewed, the researcher will be notified by either the animal technicians and/or a Veterinarian. The year that the project is approved is included in the project plan number. Every cage card is supplied with a project plan number, so it is easy to identify
and inform the researcher in question. The following illustrates the renewal system implemented at the department: From January 1, 2015 only project plans starting with P 14-xxx or P 15-xxx will be valid. All project plans starting with P 13-xxx (or lower) are now invalid. The Department recommends that project plans, which start with P 13-xxx are renewed if the researcher would like to continue the project in 2015.

c. Special Considerations for IACUC/OB Review [Guide, pp. 5; 27-33]

i. Experimental and Humane Endpoints [Guide, pp. 27-28]
Describe how criteria for determining alternatives to experimental (humane) endpoints are developed, approved, and applied. Include a description of monitoring systems in place for studies for which information on alternative endpoints are not available.

The Department encourages the use of humane endpoints, wherever possible. The animal must be euthanized, or in other ways removed from the experiment, when the described criteria are met. The use of humane endpoints is always discussed with the scientist during the Veterinarian’s consideration of the project plan. For animals that are not yet allocated to a research project, daily monitoring as part of normal animal husbandry is carried out. If deemed necessary, more frequent monitoring may be specified in the project plan, depending on the nature of the experiment (especially in cases where information on alternative endpoints is not available). This will be carried out either by researchers or by arrangement with animal technicians.

ii. Unexpected Outcomes that Affect Animal Well-being [Guide, pp. 28-29]
Describe how unexpected outcomes of experimental procedures (e.g., unanticipated phenotypes in Genetically Modified Animals) are identified, interpreted, and reported to the IACUC/OB.

Unexpected outcomes from experimental procedures are typically first observed by animal technicians during daily checks or by researchers themselves during experimental work. If these unanticipated outcomes are perceived to be detrimental to animal welfare then they are reported to Department Veterinarians. Department Veterinarians then investigate and work in collaboration with the researchers to come to an appropriate decision regarding the plan (whether that be discontinuing the project or making changes to avoid further animal welfare concerns). If the problem cannot be solved, the Department veterinarian or the animal technician will report the problem to the IACUC and/or the Animal Experiments Inspectorate, where it will be discussed and appropriate action taken.

Note: This section is to include only those protocols that require prolonged restraint. Brief restraint for the purpose of performing routine clinical or experimental procedures need not be described.

1) Briefly describe the policies for the use of physical restraint procedures or devices.

The approval of restraint procedures rests with the Council for Animal Experimentation / the Animal Experiments Inspectorate.

2) Describe animal restraint devices that are used or have been used within the last three years. For each device, briefly describe the duration of confinement, acclimation procedures, monitoring procedures, criteria for removing animals that do not adapt or acclimate, and provision of veterinary care for animals with adverse clinical consequences.

Procedures are described case-by-case, in the individual license, and the Department’s Veterinarians and technicians monitor the use of physical restraint methods. At present there are no cases in which it is necessary to acclimatize animals to a restraint device.

Table 5. Restraint devices

<table>
<thead>
<tr>
<th>Method of Restraint</th>
<th>Species</th>
<th>Approved Duration of Restraint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chair</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Tether</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Stanchion</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Sling</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Other: Wire mesh</td>
<td>Rat</td>
<td>6 h</td>
</tr>
<tr>
<td>whole body restrainer</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Tying up in individual stalls: Cattle.
Only used where there is a scientific need as part of a research protocol. The maximum duration depends on the research protocol. Animals are used to finding their own stalls and standing to be tied. An animal is observed hourly during working hours of the first day, and if the animal seems docile it is watched daily. If the animal has serious problems adapting, e.g. repeatedly and violently trying to break free, throwing itself to the floor etc. it is released for some hours. Tying up is then re-attempted. Any injuries are reported to the veterinarians and treated.

Tying up in individual stalls with floor grating: Cattle.
Only used where there is a scientific need as part of a research protocol. The maximum duration is 1 hour. Animals are not acclimatized because it is estimated to be unnecessary. An animal is watched during the entire restraining period. Any injuries are reported to the veterinarians and treated.

Metabolic cages: Sheep and pigs. Only used where there is a scientific need as part of a research protocol. The maximum duration is 121 hours. Animals are not acclimatised to the cage itself because it is estimated that the acclimatisation will be just as aversive as the restraint itself. However, they are acclimatised from field housing to indoor housing in a limited space for 1 week. In the metabolic cage, an animal is monitored hourly during working hours of the first day. If the animal has serious problems adapting, e.g. repeatedly and violently trying to break free, throwing itself to the floor etc. it is released. Any injuries are reported to the veterinarians and treated. We have noted depression (refusal to eat, unnatural immobility) in animals in metabolism cages and have discussed ways to improve the conditions for the animals in the IACUC. A plan for refinement has been developed and is available upon request.

Farrowing crates: Sows. Used in relation to farrowing to reduce the number of piglets which are accidentally laid or stepped on by the sow. Used for occupational safety reasons in relation to experiments where pregnant sows are housed prior to caesarean section. The maximum duration is 5 days (3 days before farrowing or caesarean section and 2 days following farrowing). Animals are not acclimatised to the crates. The pregnant sows we receive are normally already habituated to the device on the farm they have been acquired from. During the restraint period, the sow is released for 20 minutes once per day to allow exercise.


Note: One survival surgical procedure followed by a non-recovery procedure is not included in this category.

1) Describe the institutional policy(ies) regarding multiple survival surgery (major or minor) on a single animal.

Multiple Survival Surgery is described as the following: An animal recovers from initial surgery (major or minor) and is subsequently re-anesthetized for one or more survival surgical procedures (major and/or minor) related to the proposed study. No animal may be used in more than one major surgical procedure from which it is allowed to recover, unless justified for scientific reason and included in the researcher's experimental license. The re-use of animals for procedures, which would lead to strong pain or other kind of intense suffering in the unanaesthetised state is not permitted.
Multiple survival surgical procedures are covered by Danish legislation. According to the Legal Order on Care and Housing of Laboratory Animals, and the Use of Threatened or Wild Animals for Experimentation (BEK nr 88 af 30/01/2013. “Bekendtgørelse om dyreforsøg. Ministry of the Environment and Food: https://www.retsinformation.dk/Forms/R0710.aspx?id=145248 §12, animals may only be re-used when the actual severity of the previous procedures was mild or moderate, the animal’s general state of health and well-being has been fully restored and the procedure is mild, moderate or non-recovery. In practice, the Council for Animal Experimentation makes case-by-case evaluations.

2) Describe the procedure for approving multiple survival surgery (major or minor) and the criteria used to determine the potential impact on the animals’ well-being.

As described above, the practice of performing multiple survival surgeries on a single animal is regulated by the authorities.

3) Summarize the protocols currently approved that involve multiple major survival surgical procedures and the time allowed between procedures on the same animal. Describe the method of institutional monitoring.

Multiple major surgical procedures are not performed in the Department.


1) Describe experimental situations that require food and/or fluid regulation. Note: This does not include pre-surgical fast. List title of the experiment(s), justification, species involved, and length and type of food/fluid regulation.

<table>
<thead>
<tr>
<th>Experiment type</th>
<th>Species</th>
<th>Justification</th>
<th>Length of restriction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavioural Studies</td>
<td>Rat and mouse</td>
<td>Necessary to render the animal motivated to work for a food reward</td>
<td>No limit. Daily food is provided in limited amounts. Fluid is not restricted</td>
</tr>
<tr>
<td>Glucose tolerance test</td>
<td>Rat and mouse</td>
<td>Necessary for the glucose tolerance measurements</td>
<td>6-18 hours</td>
</tr>
</tbody>
</table>

2) Describe animal health monitoring procedures and frequency (e.g., body weight, blood urea nitrogen, urine/fecal output, food/fluid consumed).
According to the Council for Animal Experimentation, the percentage of body weight lost due to experimental protocols involving food or fluid restrictions may not exceed 20% of normal body weight. In accordance with this rule, body weight is monitored regularly throughout the restriction period. In addition, the general appearance of the animal is monitored on a daily basis.

3) Describe methods of ensuring adequate nutrition and hydration during the regulated period.

Specific methods are included in the license held by the researcher. Weight is monitored and measured frequently as specified in the project plan and general appearance monitoring includes monitoring signs like skin fold recoil and activity level.

vi. Use of Non-Pharmaceutical-Grade Drugs and Other Substances
[Guide, p. 31]
Describe the rationale and consideration given by the IACUC/OB for use of non-pharmaceutical grade drugs or other substances, if applicable.

Non-pharmaceutical grade drugs may only be used in experimental cases where new investigational drugs are to be tested and no pharmaceutical grade equivalent is available.

Describe special considerations used by the IACUC/OB when reviewing field investigations of animals (non-domesticated vertebrate species), if applicable.

Not applicable

Describe considerations given and guiding documents used by the IACUC/OB when reviewing “biomedical” and “agricultural” research projects involving agricultural species as study animals, if applicable.

All vertebrates intended for, or used in, experiments must be housed and taken care of according to specifications given in the LBK 88 of 30/01/2013 and LBK 918 of 14/08/2014. [links to relevant documents]
The Guide for the Care and Use of Agricultural Animals in Research and Teaching (Ag Guide), FASS 2010 is also used for the Department’s research facilities for agricultural animals (Frederiksberg and Taastrup facilities). Animals bred on an agricultural farm will only be covered by the Danish regulations when the experiment begins on the farm, or when they are
moved to the place where the experiment takes place. The Department is obliged to provide adequate housing, feeding, and care. Animals must be accommodated according to physiological, behavioural and health requirements specific to their species. The Department must ensure reasonable freedom of movement, provide daily checks on physical surroundings, ensure that personnel are adequately trained and that the animals are treated humanely and must ensure that resources are adequate to ensure sufficient time for human-animal contact. Detailed guidance is given in the regulations with respect to general premises, rooms, caging, environmental enrichment, transportation, sacrifice, care, veterinary care, and staff.

ix. Animal Reuse [ETS 123, Article 11; Guide, p. 5]
Describe institutional policies and/or oversight of animal reuse (i.e., on multiple teaching or research protocols). Summarize the protocols currently approved that involve the reuse of individual animals.

Not applicable


a. Describe mechanisms for IACUC/OB review of ongoing studies and periodic reviews.

Department Veterinarians are responsible for checking project plans against awarded licenses to ensure that all aspects of the proposed research are covered by the license. The Department Veterinarians make inspections of every unit every second month and all members of the IACUC have access to written reports from these inspections. During announced and unannounced visits by The Animal Experiments Inspectorate, procedures under certain licenses are selected for inspection and are reviewed. Both the Inspectorate and the Department Veterinarian can demand to be present the first time a specific procedure is done and may monitor the animal in the following days, before issuing the final license or approving the project plan. All persons performing procedures on animals are obliged to keep a journal that refers to the license from the Animal Experiments Inspectorate. This journal must be accessible by the Animal Experiments Inspectorate and must be submitted upon request. The journal must include information about the following: Number of animals used and the severity level experienced of the individual animal. Furthermore the number of animals of each species that have been generated by cloning or genetic modification and how many cloned and genetically modified animals that have been used in procedures and collection of tissue must be registered. Any major deviations or unexpected outcomes from research, which affect animal welfare, must be reported to The Animal Experiments Inspectorate.

b. Describe the process and frequency with which the IACUC/OB reviews the animal care and use programme and conducts facility and laboratory
inspections. Detail any criteria used for exempting or varying the frequency of reviewing satellite holding facilities and animal use areas. If contract facilities or contractor-provided personnel are used, describe procedures used by the IACUC/OB to review such programmes and facilities. Note: A copy of the last report of these reviews should be included as an appendix.

**The Council**
The Council for Animal Experimentation/the Animal Experimentation Inspectorate does not perform regular overall reviews of the entire facility. They do, however, perform periodic announced and unannounced visits, which includes inspection of individual licenses and the general state of the Department’s animal units.

These site visits, along with veterinary rounds, project plan approval and renewal, quality assurance audits and yearly working environment group facility reviews are regarded as sufficient review of the animal care and use programme. As these documents are only available in Danish, they have not been supplied as an appendix, however, they will of course be made available during the site visit with a suitable translator.

<table>
<thead>
<tr>
<th>Date</th>
<th>Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.07.2013</td>
<td>General inspection (16.2)</td>
</tr>
<tr>
<td>29.07.2013</td>
<td>General inspection (10.3)</td>
</tr>
<tr>
<td>24.10.2013</td>
<td>General inspection (16.3)</td>
</tr>
<tr>
<td>22-25.10.2013</td>
<td>Individual license (10.3)</td>
</tr>
<tr>
<td>22.05.2014</td>
<td>General inspection Panum</td>
</tr>
<tr>
<td>11.06.2014</td>
<td>Individual license (AKB)</td>
</tr>
<tr>
<td>13.11.2014</td>
<td>Individual license (16.4)</td>
</tr>
<tr>
<td>17.12.2014</td>
<td>Individual license (16.4)</td>
</tr>
<tr>
<td>17.02.2015</td>
<td>General inspection Taastrup</td>
</tr>
<tr>
<td>29.04.2015</td>
<td>Individual License (16.4)</td>
</tr>
</tbody>
</table>

c. Describe institutional responses to deficiencies noted on regulatory inspection reports (e.g., government, regulatory agencies). Note: Copies of all such inspection reports for the past three years (if available) should be available for review by the site visitors.

Any deficiencies noted on regulatory inspections are handled as soon as possible and within the time frame specified by the regulatory body.

d. Describe other monitoring mechanisms or procedures used to facilitate ongoing protocol assessment and regulatory compliance.
II. Animal Environment, Housing and Management

Note: Complete each section including where applicable, procedures performed in farm settings, field studies, aquatic environments, etc.

A. Animal Environment

1. Temperature and Humidity [ETS 123, Article 5 and Appendix A, p. 10; Guide, pp. 43-45]

   a. Describe briefly the heating and air conditioning system performance. Provide method and frequency for assessing, monitoring, and documenting animal room or housing area temperature and humidity that is appropriate for each species. Note current (measured within the last 12 months), detailed (by room) performance data are to be provided as indicated on the enclosed Heating, Ventilation, and Air Conditioning (HVAC) System Summary appendix. If outdoor housing areas are used, so note.

   Current room temperature and humidity are observed and documented either at room level on individual logging devices, or on air handling units (AHUs) where IVC-cages are used (rack level). Parameters are checked and documented on individual room task sheets (“opgaveskema”) by the animal technicians. In case of deviations, animal technicians notify the Department’s maintenance engineers.

   All data is furthermore collected in either the WDM system (Wireless Data Management) (Tecniplast, Buguggiate, Italy) or on the loggers (TFA, Wertheim, Germany). Data can be accessed online from the WDM system and collected from room logger base stations. Room/AHU ventilation data is provided in appendix 10B: Temperature and Humidity.

   The central University maintenance departments at the Faculties are responsible for operating and servicing the HVAC systems and making sure they are calibrated. Physical plant personnel continually monitor sites at Panum, RH, Biocenter, AKB and Frederiksberg as these units are equipped with HVAC systems managed centrally through Building Management Systems (BMS). If temperature and humidity vary outside defined ranges alarms are activated and personnel react according to defined time intervals. At the Taastrup site in building 9-11 there is an alarm system connected to the ventilation system, which notifies the responsible AEM engineer, the staff on call, and the Facility manager when parameters are out of range. Central maintenance can then be contacted, if necessary.
AHUs are serviced by an external contractor (Scanbur, Karlslunde, Denmark). Alarm settings are available for both the WDM system and on the logging devices. Animal technicians also monitor the environment by checking either the AHUs or room loggers daily. Thus, assessment is constantly performed and ensured by monitoring on a local as well as on a central level.

b. If temperature set points and/or environmental conditions are outside the thermoneutral zone for the species, describe the process for ensuring behavioural thermoregulation (e.g., nesting material, shelter, etc.) and/or IACUC/OB approved exception.

Animals thrive best at ambient temperatures below their thermoneutral zone since normal physical activity generates body heat. Social housing combined with bedding and nesting material allow most of the Department’s animals to behaviourally thermoregulate.

Measures have been taken at the sites for large animals (Frederiksberg and Taastrup) to ensure behavioural thermoregulation. These are: installing heating lamps to increase the temperature locally for guinea pigs housed in pens, showering systems for cooling pigs, mobile air conditioning units where HVAC systems are not equipped with a cooling function and straw huts for creating shelter and a heating barrier. Increased amounts of bedding material are also used.


a. Briefly describe the performance aspects of the ventilation system. Provide method and frequency for assessing, monitoring, and documenting the animal room ventilation rates and pressure gradients (with adjacent areas). Note: current (measured within the last 12 months) detailed (by room) information is to be provided as indicated on the enclosed Heating, Ventilation, and Air Conditioning (HVAC) System Summary appendix.

The systems at Panum, Biocenter, RH, AKB and Frederiksberg (1-39) supply the rooms with clean (100% fresh), filtered and heated/cooled air. Units are individually supplied with air and some caging systems have individual filter possibilities, e.g. IVC (HEPA and G3 filter). Exhaust air is not re-circulated. The HVAC systems are equipped with electrical heating and humidity can be adjusted to some extent.

Animal holding rooms, procedure rooms and service areas are ventilated to maintain a defined number of air changes per hour (ACH). Differential air pressure is balanced for each unit as either positive, to exclude pathogens, or as negative to prevent the possible spread of pathogens, allergens or to limit or prevent exposure to hazardous substances. The pressure gradient can be individually adjusted for IVC systems on AHU level. The facility management
can upon request have the ventilation rates and/or pressure gradients adjusted, but these are usually fixed.

The central maintenance departments Campus Service Sund (CSS) and Science Campus Service (SCS) are responsible for servicing the HVAC systems and an external contractor (Scanbur, Karlslunde, Denmark) services the Departments AHUs on a yearly basis. Central systems have recently been balanced at the AKB site and the Panum Building. Balancing reports are available on request. Furthermore, each valve is marked with the latest adjustment value, the name of the technician and the date. The site at the Biocenter is currently undergoing balancing. AEM engineers annually perform spot checks on the ACH and document this. This is next planned for autumn 2015.

The systems in Frederiksberg 1-36 (Vestskellet) and 1-73 (Large stable and surgery) have only heating ventilation. If necessary, mobile air conditioning units are used. At the Taastrup site, ventilation systems are production stable systems. One system (9-11) is relatively modern and the system performs according to the stock settings. The two other systems are simple systems operated manually with a fan in the ceiling of the building and dampers which open and close to regulate the flow. Heating is available.

b. Describe ventilation aspects of any special primary enclosures using forced ventilation.

The vast majority of the Department’s rodents (mice and rats) are housed in individually ventilated cage racks. IVCs are from Tecniplast (Tecniplast, Buguggiate, Italy). Various types of AHU are used such as Slimline and Smartflow. Blueline and Greenline cage systems are used. Performance parameters can be set individually for each AHU. Sensors monitor the temperature and relative humidity at the supply and exhaust.

The caging systems are provided with HEPA-filtered supply air and are ventilated directly into the building exhaust. Cages are mainly operated in positive pressure with cages in BSL1 and BSL2 areas operated at negative pressure. Service for the systems is provided by the external contractor.

IVC systems from Innovive (Innovive Inc, San Diego, USA) are also used at the Department. The same features apply as for the Tecniplast systems.

c. If any supply air used in a room or primary enclosure is recycled, describe the percent and source of the air and how gaseous and particulate contaminants are removed.

No supply air used in a room or primary enclosure is recycled within the Department’s facilities.
3. **Life Support Systems for Aquatic Species** [ETS 123, Appendix A, pp. 93-109; Guide, pp. 84-87]

Provide a general description of institutional requirements for enclosures using water as the primary environmental medium for a species (e.g., aquatics). Describe overall system design, housing densities, and water treatment, maintenance, and quality assurance that are used to ensure species appropriateness. Please note that facility-specific tank design and parameter monitoring frequencies should be summarized in the Aquatic Systems Summary appendix.

Aquatic species at the Department are housed in accordance with the guidelines detailed in ETS 123, Appendix A and are housed in two separate locations:

- Rana frogs, zebrafish and terrapins at the AKB facility
- Zebrafish and xenopus at the Panum aquatic facility

Water for the aquatic facilities at the AKB facility (for rana frogs and terrapins only) is supplied by public water utilities. Water quality is monitored twice a year by the municipal water works. The most recent chemical, microbial and trace element analysis of water supplies from the municipal water works as appendices 17a, 17b and 17c respectively. On the website of the waterworks, information about the water quality ([http://www.hofor.dk/vand/vandkvalitet/](http://www.hofor.dk/vand/vandkvalitet/)) and composition ([http://www.hofor.dk/wp-content/uploads/2014/12/regionale_14.pdf](http://www.hofor.dk/wp-content/uploads/2014/12/regionale_14.pdf)) is available. The utilities supplying AKB are food standard ISO 22.000 certified. Temperature is monitored daily for terrapins and frogs (including when frogs are in hibernation in refrigerators) by Department technicians. Water for terrapins is also further treated by filtration via a sponge and gravel system.

Water at the AKB facility for zebrafish is also provided by public water utilities but is further treated via reverse osmosis (RO) so that the water in the tanks and all water used in cleaning and care of the fish is RO water. The pH, temperature, oxygen, salinity and dissolved oxygen are constantly monitored by the housing system and are checked and recorded once daily by animal technicians. Water is further filtered once within the tank system via mechanical (filter pads and cartridges), chemical (carbon filter) and biological (Kaldnes media) filtration methods and is disinfected with UV radiation before being pumped into tanks.

**Zebrafish**

Zebrafish are housed in specially designed tanks, where all relevant parameters are automatically registered and can be set within specific limits. Chloride, nitrogen dioxide, nitrate and ammonia levels in the water are monitored manually on a weekly basis. Zebrafish are fed three times daily on weekdays and twice daily on weekends. One feeding each day is with live artemia and the other feedings are with dry feed (feed from Special Diet Services is used: ZM100 for juveniles, granulated feed for adults and ZM000 for fish younger than juveniles). There are two types of tank systems used at AEM, one is the Z-Hab system by aquatic Systems where tanks come in 1.5L, 3L and 10L capacities. The other system is the Tecniplast ZebTec Active Blue system where tanks come in 1.1L, 3.5L and 8L
capacities. Zebrafish are graded according to size and housed with like sized tank mates according to the following caging density table.

Table 8. Housing densities for zebrafish***

<table>
<thead>
<tr>
<th>Tank size (liter)</th>
<th>Embryos</th>
<th>Larvae</th>
<th>Max number of adult zebrafish</th>
<th>Max number of adult breeding zebrafish</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>220</td>
<td>55</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>1.5</td>
<td>300</td>
<td>75</td>
<td>7</td>
<td>2 (over night only)</td>
</tr>
<tr>
<td>3.0</td>
<td>600</td>
<td>150</td>
<td>15</td>
<td>6</td>
</tr>
<tr>
<td>3.5</td>
<td>700</td>
<td>175</td>
<td>17</td>
<td>8</td>
</tr>
<tr>
<td>8.0</td>
<td>1600</td>
<td>400</td>
<td>40</td>
<td>19</td>
</tr>
<tr>
<td>10.0</td>
<td>2000</td>
<td>500</td>
<td>50</td>
<td>24</td>
</tr>
</tbody>
</table>

Xenopus

Adult, juvenile and tadpole Xenopus are housed in the aquatic facility at Panum. They are housed in various tanks according to their size. Previously, xenopus were housed at the AKB facility where tadpoles and juveniles were housed in tanks measuring 50cm x 40cm x 30cm (LxBxH) and adult xenopus were housed in large tanks measuring either 60cm x 250cm x 40cm or 160cm x 70cm x 30cm. As described below, a new housing system is currently being introduced. Xenopus are graded according to size and housed with like sized tank mates.

Tanks are cleaned (scrubbed without soap) and water drained and replaced twice a week. A thorough sanitization using detergent (after the removal of animals to temporary holding tanks) is completed once a month. Tank water is 20 degrees, as monitored by thermometers placed in the water during re-filling. All animals are fed twice weekly with the following feed:
- Tadpoles = Yeast
- Juveniles = crushed trout pellets and goldfish feed
- Adult Xenopus = shrimp and trout pellets

Animals are provided with shelters in the form of stainless steel or red plastic “houses” in which they can retreat.

The light/dark cycle is 12/12.

In the future, Xenopus will be housed in specially designed Aqua Schwarz tank systems (AQUA SCHWARZ GmbH, Göttingen, Germany) at the Aquatic facility at Panum. Tanks will be of 15L and 25L capacity, for which the below housing densities still apply. Xenopus will be graded by size and housed with like sized tank mates. These systems will allow for greater control over environmental variables such as water quality and temperature. Tank cleaning frequencies have yet to be established.

Table 9. Housing densities for Xenopus*.
Rana frogs
Housing for adult frogs is currently being moved from the Frederiksberg facility to the AKB facility.
At Frederiksberg frogs were housed either temporarily in a vivarium to acclimate themselves to the new surroundings, or in small cages in a refrigerator when they were in hibernation. The vivarium is a large metal-sided, open air cage, which contains a heat lamp where frogs can bask, two swimming pools, which were provided with a constant flow of fresh water and various forms of foliage and black plastic half pipes in which to hide themselves.
The vivarium was cleaned twice weekly (scrubbed without soap) with clean water and foliage is replaced as necessary.

Adult frogs will in future be housed at AKB, in purpose built rooms. Each room contains a heat lamp where frogs can bask, swimming pools on either side of a central walkway, which are provided with a constant flow of fresh water and hides consisting of plastic pipes.
The rooms and hides are cleaned twice a week (scrubbed without soap) and are sanitized once a month using appropriate detergents (after the removal of all animals into temporary holding tanks). Housing densities are calculated according to table 9a below. Frogs are checked on a daily basis and fed daily with mealworms. The light/dark cycle is 12/12.

Frogs in hibernation have their cages cleaned and filled with fresh water twice a week until they no longer produce feces, after which their cages are cleaned once a week. The temperature in the refrigerator is kept between 2 to 5 degrees celcius. Frogs in hibernation are not fed.

Housing densities are calculated according to table 10 below. Frogs are checked on a daily basis and fed daily with mealworms and small grasshoppers. The light/dark cycle is 12/12, except for frogs in hibernation where there is 24 hours darkness.

Table 10. Housing densities for Rana frogs*.
Terrapins
Terrapins are housed in room 1-0-08 at the AKB unit. The tanks are equipped with heat lamps which are located above metal resting boards where terrapins may bask. They are fed twice a week with terrapin feed called Aquatic no.4. Tanks are cleaned (scrubbed without soap) and water drained and replaced twice a week. Tanks are 162cm x 250cm x 78cm (BxLxH) in size. Tank water is 20 degrees, as monitored by thermometers placed in the piped water system and is filtered using a gravel and sponge filtration system. Water is re-circulated through the filtration system. A suction device is used daily to remove any water contaminants and the water is completely changed twice a week. The filter system is cleaned and rinsed once a week.
A thorough sanitization using detergent and disinfectant (after the removal of animals to temporary holding tanks) is completed once a month or between batches of animals.

Table 11. Housing densities for terrapins*.

<table>
<thead>
<tr>
<th>Body length** (cm)</th>
<th>Minimum water surface area (cm²)</th>
<th>Minimum water surface area for each additional animal in group-holding (cm²)</th>
<th>Minimum water depth (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 5</td>
<td>60</td>
<td>100</td>
<td>10</td>
</tr>
<tr>
<td>Above 5 to 10</td>
<td>160</td>
<td>300</td>
<td>15</td>
</tr>
<tr>
<td>Above 10 to 15</td>
<td>350</td>
<td>600</td>
<td>20</td>
</tr>
<tr>
<td>Above 15 to 20</td>
<td>600</td>
<td>1200</td>
<td>30</td>
</tr>
<tr>
<td>Above 20 to 30</td>
<td>1000</td>
<td>2000</td>
<td>35</td>
</tr>
<tr>
<td>Above 30</td>
<td>2000</td>
<td>5000</td>
<td>40</td>
</tr>
</tbody>
</table>

*Housing densities as calculated according to the tables above for terrapins, frogs and xenopus are taken from ETS 123, Appendix A.

**Body length is measured from the snout to the rear of the body for Rana frogs and xenopus and from the front of the shell to the rear for terrapins.

*** Housing densities as calculated according to the tables above for terrapins, frogs and xenopus are taken from: Matthews M, Trevarrow B, Matthews J. 2002. ‘A virtual tour of the guide for zebrafish users.’ Lab Animal vol. 31, pp. 34-40.

Describe facility design features and other methods used to control, reduce, or prevent excessive noise and vibration in the animal facility.
The animal facilities are designed to reduce excessive noise and other disturbances via physical means such as insulation. Work processes are also organized to reduce potential noise and vibration. Animals are kept in relatively small rooms, with doors that for the most part can be closed in order to avoid unnecessary disturbance. Where possible, units are equipped with separate procedure rooms, so that procedures on animals can be performed in a secluded area, reducing disturbance to the other animals as well as the animals undergoing procedures. Service rooms, offices and restrooms are, where possible, placed on the opposite side of the corridor to animal rooms and at one end of the unit to limit any noise created by staff and researchers. Animals that naturally produce a lot of noise, such as pigs and hens, are housed in the basement at the Panum building (units 02 and 01) to ensure that their noise will not affect other animals.

IVC ventilation systems are equipped with air supply units. However, these units are standalone and are not in direct contact with the cage racks, in order to minimize the transfer of noise and vibrations.

**Music and radio policy at the Department**

Unexpected sounds are to be avoided where possible. This includes the sound from radios and other music-sources. The Departmental policy is that each unit may choose to either have a radio playing at a low level (low enough for a normal conversation to be had beside the device) for the whole working day, or there must be no radio noise at all. Radios may not be turned on and off during the day to reduce the occurrence of sudden noise. The sound-sources must not be moved, i.e. transportable systems emitting sound to the surroundings must not be moved between rooms, but remain stationary in the room(s) chosen by staff.

### B. Animal Housing (All terrestrial, flighted, and aquatic species)

#### 1. Primary Enclosures

Provide a description of primary enclosures used (e.g., cages (conventional, individually-ventilated cage systems (IVCS), etc.), pens, stalls, pastures, aviaries, tanks) in appendix.

a. Describe considerations, performance criteria and guiding documents (e.g. ETS 123, Guide, Ag Guide and/or other applicable standards) used by the IACUC/OB to verify adequacy of space provided for all research animals, including traditional laboratory animal species, agricultural animals, aquatic species, and wildlife when reviewing biomedical, field and agricultural research studies.

Danish and EU legislation provides detailed information on care and use of animals for research purposes. The Declaration on care and use of animals used for research provides information on, among many other things, space provisions for different species of research animals. For detailed information please see: Bekendtgørelse om dyreforsøg BEK nr 88 af 30/01/2013

The revised Appendix A of the European Convention ETS 123 is also used as a standard to assess space provisions: http://conventions.coe.int/Treaty/EN/Treaties/PDF/123-Arev.pdf. The Department is in full compliance with the National and EU legislation. Regarding minimum enclosure size, the Department has in some cases internal rules, with fewer animals per cage or enclosure than the maximum number allowed by National and European legislation. This is to ensure that the animals can continue to live in their social groups throughout an experiment.

b. Describe space exceptions to the guiding documents (ETS 123, Guide, Ag Guide, and/or applicable standards), indicating the references, considerations and performance criteria used (e.g., by the IACUC/OB) to verify adequacy of space provided for all animal species covered by the programme. [ETS 123, Appendix A, pp. 14, 18-109; Guide, pp. 55-63]

Space provisions at the Department are in accordance with both EU (the revised Appendix A of the European Convention ETS 123) and national legislation. The IACUC at the Department has made internal guidelines that generally assign more space per animal than EU and national regulations (these are the only space exceptions), this is to ensure that animals may stay in social groupings for the entirety of an experiment in order to reduce stress. These guidelines are detailed in appendix 12 on Primary Enclosures and Animal Space Provisions. Specific legislation from the EU and Denmark is listed below:

EU

Denmark
Bekendtgørelse om dyreforsøg BEK nr 88 af 30/01/2013
https://www.retsinformation.dk/Forms/R0710.aspx?id=145248


a. Enrichment

i. Describe the structural elements of the environment of primary enclosures that may enhance the well-being of animals housed (e.g., resting boards, privacy areas, shelves/perches, swings, hammocks, etc.).

Table 12. Structural elements of primary enclosures
<table>
<thead>
<tr>
<th>Species</th>
<th>Structural enrichment features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cat</td>
<td>Shelves to jump up on</td>
</tr>
<tr>
<td>Pig</td>
<td>Holes or windows for contact with animals in neighbouring pens</td>
</tr>
<tr>
<td>Rodent</td>
<td>Double decker rat cages</td>
</tr>
<tr>
<td>Rabbit</td>
<td>Solid shelters</td>
</tr>
<tr>
<td>Guinea pig</td>
<td>Large area for foraging and exercise and built in shelters.</td>
</tr>
<tr>
<td>Chicken</td>
<td>Dust baths, perches, swings, nesting boxes</td>
</tr>
<tr>
<td>Terrapins</td>
<td>Rest platforms with heat lamps</td>
</tr>
<tr>
<td>Cows</td>
<td>Outdoor grazing</td>
</tr>
<tr>
<td>Ferrets</td>
<td>Shelters</td>
</tr>
<tr>
<td>Foxes</td>
<td>Resting box to hide in</td>
</tr>
<tr>
<td>Dogs</td>
<td>Ramps and shelves to climb up</td>
</tr>
<tr>
<td>Sheep</td>
<td>Outdoor grazing</td>
</tr>
<tr>
<td>Goats</td>
<td>Outdoor grazing</td>
</tr>
<tr>
<td>Zebrafish</td>
<td>Plastic water plants</td>
</tr>
<tr>
<td>Frogs (Rana</td>
<td>Heat lamps, swimming areas</td>
</tr>
<tr>
<td>esculenta)</td>
<td></td>
</tr>
</tbody>
</table>

**ii.** Describe nonstructural provisions to encourage animals to exhibit species-typical activity patterns (e.g., exercise, gnawing, access to pens, opportunity for exploration, control over environment, foraging, access to a den or refuge, burrowing, nesting materials, toys/manipulanda, browsing, grazing, rooting, climbing).

Table 13. Nonstructural enrichment provisions
<table>
<thead>
<tr>
<th>Species</th>
<th>Non-structural enrichment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cat</td>
<td>Various toys, soft rug material provided on shelves, scratching boards and play with humans.</td>
</tr>
<tr>
<td>Pig</td>
<td>Straw, balls, empty paper bags, chains, straw for rooting in, feed strewn on the floor, vegetables, rings, various toys with food in them for manipulation, varied diet where possible.</td>
</tr>
<tr>
<td>Rodent</td>
<td>Paper wool or nestlets, gnawing sticks, plastic shelters and cardboard tubes.</td>
</tr>
<tr>
<td>Rabbit</td>
<td>Straw, vegetables placed in hay, gnawing sticks.</td>
</tr>
<tr>
<td>Guinea pig</td>
<td>Hay for burrowing, straw, hay, vegetables.</td>
</tr>
<tr>
<td>Chicken</td>
<td>Vegetables hung up to provide interest, straw, various types of feed scattered in bedding. Mealworms in a plastic bottle that require manipulation to access</td>
</tr>
<tr>
<td>Frog (rana esculenta)</td>
<td>Moss/foliage to burrow in, Scattered mealworms and grasshoppers to forage, plastic shelters and pipes</td>
</tr>
<tr>
<td>Terrapins</td>
<td>Stainless steel “houses”</td>
</tr>
<tr>
<td>Cows</td>
<td>Exploration possibilities</td>
</tr>
<tr>
<td>Ferrets</td>
<td>Various toys</td>
</tr>
<tr>
<td>Foxes</td>
<td>Various toys</td>
</tr>
<tr>
<td>Dogs</td>
<td>Toys, play with humans</td>
</tr>
<tr>
<td>Sheep</td>
<td>Exploration possibilities</td>
</tr>
<tr>
<td>Goats</td>
<td>Exploration possibilities</td>
</tr>
<tr>
<td>Xenopus</td>
<td>Plastic shelters and pipes</td>
</tr>
<tr>
<td>Zebrafish</td>
<td>Marbles to spawn in</td>
</tr>
</tbody>
</table>


i. Describe institutional policy or strategy for social housing of social species.

Where possible, animals are given various forms of enrichment in order to encourage species specific behaviours, reduce stress and boredom and enhance animal wellbeing. Social species are always kept in pairs or small groups (a legal requirement) according to species specific requirements. Single housing not used unless deemed necessary for experimental or health and wellbeing considerations. Occasionally sexually mature male mice or male and female rabbits are single-housed because of aggression. Hens are normally housed with a rooster to reduce aggression among females.
ii. If social animals are not socially housed, provide justification, as approved by the IACUC/OB.

Animals are not to be housed individually, unless for veterinary or scientific reasons. Breeding is one such case, where a pregnant female may be housed singly. Some research studies have permission to use individual caging and/or metabolic cages and/or the use of behavioural equipment. Newly operated animals, animals with catheters etc. may also be housed individually to prevent cage mates from harming the wound. Any circumstances in which social animals are to be isolated must be approved by the Council for Animal Experimentation and through the internal project plan review process.

iii. Describe steps taken with isolated or individually housed animals to compensate for the absence of other animals (e.g., interaction with humans, environmental enrichment, etc.).

Single housed animals are always placed in rooms where other animals of the same species are present and where possible viewing windows or bars and/or areas where the animals can touch are provided.

c. Procedural Habituation and Training of Animals [ETS 123, Appendix A, p. 17; Guide, pp. 64-65]

Describe how animals are habituated to routine husbandry or experimental procedures, when possible, to assist animals to better cope with their environment by reducing stress associated with novel procedures or people.

It is department policy that new animals (ordered from other premises) are allowed at least one week to habituate to their environment before any experimental procedures are undertaken. Mice, rats, rabbits and guinea pigs are habituated to handling by weekly cage change. Hens and dogs are habituated by daily human company and handling. Pigs are sedated for most experimental procedures and are habituated to being sedated in trolley cages by encouraging them to enter the trolley of their own accord. All pigs at the Taastrup facility are trained to walk onto scales of their own accord and to move in and out of the pens when they are to spend time basking out doors in the summer. Most large pigs are also trained to follow animal technicians (holding an apple), in order to move them to different pens (where necessary). Cows are trained to move to and from fields and to find their own stalls when they are tied up for experimental procedures. Pigs at the Frederiksberg facility are trained to move onto the scales by themselves as well as to daily insulin dosing, basic clicker training and socialising with technicians in order to insert ear catheters etc. Cats are routinely handled and played with as part of their everyday care.
d. Enrichment, Social and Behavioural Management Programme Review

[Guide, pp. 58, 69]

Describe how enrichment programmes and exceptions to social housing of social species are regularly reviewed to ensure that they are beneficial to animal well-being and consistent with the goals of animal use.

The Department is in accordance with all current Danish and EU legislation regarding the use of enrichment for specific species. Any new rules and guidelines suggested by regulatory bodies are readily complied with. The Department also reviews current procedures via review of SOP’s which happens at least every three years. The Department’s IACUC and management team also reviews current procedures and programs as necessary. Animal technicians are also encouraged to contribute with new ideas for the improvement of animal enrichment through their daily experiences with the animals. There are enrichment charts available for large animals which are available to view upon request.

e. Sheltered or Outdoor Housing [Guide, pp. 54-55]

i. Describe the environment (e.g., barn, corral, pasture, field enclosure, flight cage, pond, or island).

At the Taastrup facility there are several grass fields where cows, sheep and goats are housed as well as concrete floored outdoor pens for pigs to bask in the sun.

ii. Describe methods used to protect animals from weather extremes, predators, and escape (e.g., windbreaks, shelters, shaded areas, areas with forced ventilation, heat radiating structures, access to conditioned spaces, etc.).

All animals at the Taastrup facility have access to indoor pens and are moved inside during weather extremes. Grass fields where cows, sheep and goats are housed are securely fenced in order to prevent escape or entry by large animals. Basking areas for pigs are fenced with movable metal bars in order to prevent escape. The area is also partially shaded by the building to allow shelter from the sun if the animal so desires. The pigs are moved to pens inside at night time so there is no danger of predation.

iii. Describe protective or escape mechanisms for submissive animals, how access to food and water is assured, provisions for enrichment, and efforts to group compatible animals.

Animals in outdoor fields are checked every day to ensure their health and wellbeing, according to national law requirements. Water and feed are also checked each day to ensure that all animals have access to clean fresh water and feed.
Fields and outdoor basking areas are large to allow escape mechanisms for submissive animals. Social animals are always housed in groups, unless the project plan dictates otherwise. In these cases animals are housed, wherever possible, in such a manner that they are able to hear, see and touch each other through pen walls or fences.


i. Describe types of naturalistic environments (forests, islands) and how animals are monitored for animal well-being.

| Not applicable |

ii. Describe how food, water, and shelter are provided.

| Not applicable |

iii. Describe how animals are captured.

| Not applicable |

C. Animal Facility Management

1. Husbandry


i. List type and source of food stuffs.

<p>| Table 14. Type and source of animal feed |</p>
<table>
<thead>
<tr>
<th>Species</th>
<th>Product Description</th>
<th>Supplier</th>
<th>Producer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mice and rats</td>
<td>Altromin 1314 F</td>
<td>Brogaarden</td>
<td>Altromin GmbH &amp; Co. KG</td>
</tr>
<tr>
<td>Rabbits</td>
<td>Chudleys Rabbit Royale Vegetables</td>
<td>Islip Kettering</td>
<td>Islip Kettering</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grongtrosisten</td>
<td>Grongtrosisten</td>
</tr>
<tr>
<td>Mice and rats</td>
<td>Altromin 1324 Mod.</td>
<td>Brogaarden</td>
<td>Altromin GmbH &amp; Co. KG</td>
</tr>
<tr>
<td>Mice and rats</td>
<td>Altromin C-1042</td>
<td>Brogaarden</td>
<td>Altromin GmbH &amp; Co. KG</td>
</tr>
<tr>
<td>Pigs Panum</td>
<td>Svinefoder nr. 5</td>
<td>Nordsjællands Andel Grovvare,</td>
<td>Nordsjællands Andel Grovvare,</td>
</tr>
<tr>
<td>Pigs Frederiksberg and Taastrup</td>
<td>Various feed types</td>
<td>Nordsjællands Andel Grovvare, Brogaarden, DLG</td>
<td>Nordsjællands Andel Grovvare, Brogaarden, DLG</td>
</tr>
<tr>
<td>Mini pigs Frederiksberg and Taastrup</td>
<td>Expanded diet for mini pigs formulated for Ellegaard Göttingen Minipigs Altromin 9023</td>
<td>Special Diets Services Brogaarden</td>
<td>Special Diets Services Altromin Spezialfutter</td>
</tr>
<tr>
<td>Guinea pigs Panum</td>
<td>Pellets</td>
<td>Brogaarden</td>
<td>N/A</td>
</tr>
<tr>
<td>Guinea pigs Frederiksberg</td>
<td>Pellets</td>
<td>Brogaarden</td>
<td>N/A</td>
</tr>
<tr>
<td>Cats</td>
<td>HILL's Prescription Diet Feline c/d</td>
<td>Kruuse, Denmark/ Brogaarden</td>
<td>Hill's</td>
</tr>
<tr>
<td>Chickens</td>
<td>Pellets</td>
<td>Brogaarden</td>
<td>N/A</td>
</tr>
<tr>
<td>Chickens Taastrup</td>
<td>Pellets, maize, wheat (whole grain), shells and stones</td>
<td>Brogaarden, DLG</td>
<td>Brogaarden, DLG</td>
</tr>
<tr>
<td>Terrapins</td>
<td>Aquatic Diets no. 4</td>
<td>Mazuri Zoo Foods</td>
<td>Mazuri Zoo Foods</td>
</tr>
<tr>
<td>Xenopus</td>
<td>Shrimp Trout pellets</td>
<td>ABC Catering Brogaarden</td>
<td>ABC Catering Brogaarden</td>
</tr>
<tr>
<td>Rana frogs</td>
<td>Shrimp Trout pellets</td>
<td>ABC Catering Brogaarden</td>
<td>ABC Catering Brogaarden</td>
</tr>
<tr>
<td>Zebrafish</td>
<td>Artemia Zebra fish feed</td>
<td>ABC Catering Special Diets Services</td>
<td>ABC Catering Special Diets Services</td>
</tr>
<tr>
<td>Cows</td>
<td>Silage, hay and straw. Mineral and vitamin supplements</td>
<td>Martin Hansen Grovvare, Brogaarden, DLG</td>
<td>Martin Hansen Nordsjællands Andel Grovvare, Brogaarden, DLG</td>
</tr>
<tr>
<td>Foxes</td>
<td>Regular dog feed</td>
<td>Brogaarden</td>
<td>N/A</td>
</tr>
<tr>
<td>Ferrets</td>
<td>Chudleys ferret feed</td>
<td>Brogaarden</td>
<td>Chudleys</td>
</tr>
<tr>
<td>Dogs</td>
<td>Regular dog feed</td>
<td>Brogaarden</td>
<td>N/A</td>
</tr>
<tr>
<td>Sheep</td>
<td>Silage, hay and straw. Mineral and vitamin supplements</td>
<td>Martin Hansen Grovvare, Brogaarden, DLG</td>
<td>Martin Hansen Nordsjællands Andel Grovvare, Brogaarden, DLG</td>
</tr>
<tr>
<td>Goats</td>
<td>Silage, hay and straw. Mineral and vitamin supplements</td>
<td>Martin Hansen Grovvare, Brogaarden, DLG</td>
<td>Martin Hansen Nordsjællands Andel Grovvare, Brogaarden, DLG</td>
</tr>
</tbody>
</table>

**ii.** Describe storage facilities of vendors, noting temperature and vermin control measures. If more than one source, describe each.

**Storage facilities of our suppliers comply with recommended guidelines. As AEM uses so many different vendors, storage facility details for each are supplied as appendix 23.**

**iii.** Describe bulk food storage facilities, if applicable, noting temperature and vermin control measures. Note food storage areas within the specific animal facilities are described below in Section IV.B.4.a. Physical Plant.
There is a central food storage space at the main site at the Panum Building (room no. 04-01-21). From here, food is distributed to AKB, RH and Biocenter. The storage room is designed specifically for storing animal feed. The room is dark and ventilated by an air conditioning system. The temperature is checked daily and the relative humidity is set between 65-75% as recommended in the vendors storage directions. This is monitored by a local mobile logger connected to the local alarm system. Best before dates for feed are controlled by the service area staff. Food is stored in its original packaging on shelves or off the floor on pallets. The vendor’s storage directions are followed.

The storage area has vermin control in form of limited access, rodent traps and insect control solutions. The storage room door opens into the main service area. Outside the main service area, rodent traps with rodenticide are placed and monitored by an external contractor (Absolut Skadedyrsbekæmpelse, Herlev, Denmark http://www.absolut-skakedyr.dk/).

In the feed storage room at the Frederiksberg facility feed is stored in original packaging off the floor on pallets. Hay and straw at the Taastrup facility are kept in a large barn. Other feed at the Taastrup facility is stored more locally in animal rooms as described below. Both facilities are supplied with rodent traps, which are monitored by an external contractor called Anticimex, Roskilde, Denmark. (http://www.anticimex.com/da/dk/Virksomheder/Skadedyr1/).

iv. Describe food storage in animal rooms.

**Panum, Biocenter, AKB and RH**

Feed is stored in limited amounts, for one week’s use, in a secluded storage room within each unit. Food is stored in original packaging and placed on shelves off the floor. Each unit uses UV insect control solutions as vermin control. Every week each unit receives fresh feed.

Food to be distributed, it is placed in a cart. If any feed is left in the cart after distribution, it is discarded before new feed is added, in order to prevent mixing between old and new feed. The cart is cleaned once a month with mild detergent followed by rinsing with water. They can also be cleaned in a rack washer where these facilities are available.

**Taastrup**

Opened feed sacks and enrichment feed options are stored in vermin proof containers within each respective animal room. Pig feed is stored in an open feed wagon when being distributed.

**Frederiksberg**
Feed is taken from storage areas and distributed in feed wagons daily. Feed is not stored locally in animal rooms.

v. Describe food preparation areas.

Ready-to-use food is purchased for most species and normally no preparation is needed. However, fresh vegetables, for those animals receiving it, are prepared in the animal rooms. Shrimps for Xenopus and Artemia for Zebrafish is also prepared within their animal room.

vi. Describe how food is provided to various species (*ad libitum*, limited amounts, types of feeders).

Food is provided according to what is specified in the Department’s SOPs. Please refer to the table below for further details.

Rodents are fed ad libitum. Extruded or pelleted feed is placed in the food hopper in the cage wire lids, for easy access for the animals and to avoid contamination by urine and/or moisture.

If for some experimental reason the animal is unable to reach the feed hopper, diet is made available in stainless steel cups or diet gels are placed on the bedding for easy access. In these cases animals are monitored more frequently.

All animals are checked every day and feed is also checked at this time.

Table 15. Feed amounts and methods for all species
<table>
<thead>
<tr>
<th>Species and cage/room</th>
<th>Feeding frequency</th>
<th>Type of feeder</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mice</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type II long</td>
<td>Ad libitum, but not above the wire. Full feed once a week and top up at the end of the week.</td>
<td>Overhead wire hopper</td>
</tr>
<tr>
<td>Type III/ Type III high</td>
<td>Ad libitum, but not above the wire. Full feed once a week and top up at the end of the week.</td>
<td>Overhead wire hopper</td>
</tr>
<tr>
<td>Type II long IVC</td>
<td>Ad libitum, but not above the wire. Full feed once a week and top up at the end of the week.</td>
<td>Overhead wire hopper</td>
</tr>
<tr>
<td>Type III/ Type III high IVC</td>
<td>Ad libitum, but not above the wire. Full feed once a week and top up at the end of the week.</td>
<td>Overhead wire hopper</td>
</tr>
<tr>
<td><strong>Rats</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type III high</td>
<td>Ad libitum, but not above the wire. Full feed once a week and top up at the end of the week.</td>
<td>Overhead wire hopper</td>
</tr>
<tr>
<td>1500 U Type IV S</td>
<td>Ad libitum, but not above the wire. Full feed once a week and top up at the end of the week.</td>
<td>Overhead wire hopper</td>
</tr>
<tr>
<td>1500 U Type IV S IVC</td>
<td>Ad libitum, but not above the wire. Full feed once a week and top up at the end of the week.</td>
<td>Overhead wire hopper</td>
</tr>
<tr>
<td><strong>Rabbits</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Small metal troughs and scattered feed in straw</td>
<td></td>
</tr>
<tr>
<td><strong>Pigs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Feed is scattered in the pen. For young animals, feed is placed in a trough.</td>
<td></td>
</tr>
<tr>
<td><strong>Cats</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Metal bowls</td>
<td></td>
</tr>
<tr>
<td><strong>Guinea Pigs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Small metal troughs and scattered feed in straw</td>
<td></td>
</tr>
<tr>
<td><strong>Hens</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Feeding trough or feeding towers</td>
<td></td>
</tr>
<tr>
<td><strong>Terrapins</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Scattered in water</td>
<td></td>
</tr>
<tr>
<td><strong>Rana frogs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Scattered in enclosure</td>
<td></td>
</tr>
<tr>
<td><strong>Xenopus</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Scattered in water</td>
<td></td>
</tr>
<tr>
<td><strong>Cows</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pasture</td>
<td></td>
</tr>
<tr>
<td><strong>Ferrets</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Troughs</td>
<td></td>
</tr>
<tr>
<td><strong>Dogs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strewn on the floor</td>
<td></td>
</tr>
<tr>
<td><strong>Foxes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Feed trough</td>
<td></td>
</tr>
<tr>
<td><strong>Zebrafish</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sprinkled/squirted into the tank water</td>
<td></td>
</tr>
<tr>
<td><strong>Sheep</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pasture</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Feed in troughs. feeders or strewn on the floor (depending on the type).</td>
<td></td>
</tr>
<tr>
<td><strong>Goats</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pasture</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Feed in troughs, feeders or strewn on the floor (depending on the feed type).</td>
<td></td>
</tr>
</tbody>
</table>
vii. Describe special food quality control procedures including procedures for rotating stock, monitoring milling dates, nutritional quality, bio-load, chemical contaminants, etc.

Each batch of packaged diet is analysed for nutrients and contaminants by the manufacturer. A quality analysis data sheet is delivered together with each batch and can be checked on the website www.batchanalyser.dk (username: batchanalyser, password: burger 2820). The vendor (Brogaarden, Gentofte, Denmark) controls the quality assurance for each food delivery.

Most standard rodent diets are autoclaved using a program specially designed for diet. Irradiated diets are available for special purposes. Special diets are used if requested by researchers.

Any fresh produce items (vegetables for rabbits and guinea pigs and meat for terrapins and Xenopus) are inspected and washed to remove any potential chemical contaminants upon arrival. Hay and silage for large animals is inspected upon arrival to ensure its quality.

Feed is never used after the expiration date, animal care staff ensures that feed is cycled so that the oldest feed is used first.

b. Drinking Water [ETS 123, Appendix A, p. 16; Guide, pp. 67-68]

i. Describe the water source, treatment or purification process, and how it is provided to the animals (e.g., bowls, bottles with sipper tubes, automatic watering, troughs, ponds, streams, etc.).

Source
Water for all units is supplied by public water utilities. Water quality is monitored daily by the municipal water works HOFOR. On the website of the waterworks, information about the water quality (http://www.hofor.dk/vand/vandkvalitet/) and composition (http://www.hofor.dk/wp-content/uploads/2014/12/regionale_14.pdf) is available. The utilities supplying AKB and Frederiksberg are food standard ISO 22.000 certified.

Water in some rodent units at the Panum building, RH and AKB are further treated with citric acid to help prevent biological contaminants from building up in water bottles. Acid is added to water bottles either by an automatic dosing system, (which is verified by animal technicians according to Departmental SOPs) or manually after bottle filling (again according to a Departmental SOP), to a pH between 2.5 and 3.

Further to the descriptions in the table below, some animals in single use caging receive pre-packaged distilled water.
Water is provided ad libitum to all species (unless the project plan dictates otherwise), mainly in water bottles with stainless steel sippers.

Table 16. Water sources and methods of provision.

<table>
<thead>
<tr>
<th>Species and cage/room</th>
<th>Watering Source and treatment</th>
<th>How water is provided</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mice</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type II long</td>
<td>- Public water utilities treated with citric acid to pH 3 in some units to discourage microorganism growth. Fresh water is provided once a week or as needed</td>
<td>Plastic bottle with sipper tube</td>
</tr>
<tr>
<td>Type III/Type III high</td>
<td>- Public water utilities treated with citric acid to pH 3 in some units to discourage microorganism growth. Fresh water is provided once a week or as needed</td>
<td>Plastic bottle with sipper tube</td>
</tr>
<tr>
<td>Type II long IVC</td>
<td>- Public water utilities treated with citric acid to pH 3 in some units to discourage microorganism growth. Fresh water is provided once a week or as needed</td>
<td>Plastic bottle with sipper tube</td>
</tr>
<tr>
<td>Type III/Type III high IVC</td>
<td>- Public water utilities treated with citric acid to pH 3 in some units to discourage microorganism growth. Fresh water is provided once a week or as needed</td>
<td>Plastic bottle with sipper tube</td>
</tr>
<tr>
<td><strong>Rats</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type III high</td>
<td>- Public water utilities treated with citric acid to pH 3 in some units to discourage microorganism growth. Fresh water is provided once a week or as needed</td>
<td>Plastic bottle with sipper tube</td>
</tr>
<tr>
<td>1500 U Type IV S</td>
<td>- Public water utilities treated with citric acid to pH 3 in some units to discourage microorganism growth. Fresh water is provided once a week or as needed</td>
<td>Plastic bottle with sipper tube</td>
</tr>
<tr>
<td>1500 U Type IV S IVC</td>
<td>- Public water utilities treated with citric acid to pH 3 in some units to discourage microorganism growth. Fresh water is provided once a week or as needed</td>
<td>Plastic bottle with sipper tube</td>
</tr>
<tr>
<td><strong>Rabbits</strong></td>
<td>- Public water utilities</td>
<td>Plastic bottle with sipper tube</td>
</tr>
<tr>
<td><strong>Pigs</strong></td>
<td>-- Public water utilities</td>
<td>Automatic watering system with drinking nipples or water cups or water bowls/troughs</td>
</tr>
<tr>
<td><strong>Cats</strong></td>
<td>- Public water utilities</td>
<td>Metal bowls</td>
</tr>
<tr>
<td><strong>Guinea Pigs</strong></td>
<td>- Public water utilities</td>
<td>Plastic bottle with sipper tube</td>
</tr>
<tr>
<td><strong>Hens</strong></td>
<td>- Public water utilities</td>
<td>Water trough or water tower</td>
</tr>
<tr>
<td><strong>Terrapins</strong></td>
<td>- Public water utilities and gravel filtration system</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Rana frogs</strong></td>
<td>- Public water utilities</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Xenopus</strong></td>
<td>- Public water utilities, treated by biological and physical filters</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Cows</strong></td>
<td>- Public water utilities</td>
<td>Automatic watering system with a trough</td>
</tr>
<tr>
<td><strong>Ferrets</strong></td>
<td>- Public water utilities</td>
<td>Troughs or bowls</td>
</tr>
<tr>
<td><strong>Dogs</strong></td>
<td>- Public water utilities</td>
<td>Metal bowls</td>
</tr>
<tr>
<td><strong>Foxes</strong></td>
<td>- Public water utilities</td>
<td>Water buckets</td>
</tr>
<tr>
<td><strong>Zebrafish</strong></td>
<td>- Public water utilities, treated by reverse osmosis then further treated with chemical, biological and physical filters</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Dogs</strong></td>
<td>- Public water utilities</td>
<td>Metal bowls</td>
</tr>
<tr>
<td><strong>Sheep</strong></td>
<td>- Public water utilities</td>
<td>Troughs</td>
</tr>
<tr>
<td><strong>Goats</strong></td>
<td>- Public water utilities</td>
<td>Troughs</td>
</tr>
</tbody>
</table>
ii. Describe methods of quality control, including monitoring for contaminants.

**Quality**

Water quality is monitored daily by the municipal water works HOFOR who are food standard ISO 22.000 certified. Local acceptable water quality parameters (including chemical, microbiological and hazardous agent analysis) are attached as appendix 18. The most recent water quality results produced by the water works are provided as appendices 17a, 17b and 17c.

External control is also performed by external contractors for each facility. Eurofins Miljø (Glostrup, Denmark) performs external controls at the Taastrup facility and Panum (the latest report is provided as appendix 19). Frederiksberg Forsyning (Frederiksberg, Denmark) performs external water quality controls at the Frederiksberg facility (the latest report is provided as appendix 20). In brief, parameters such as iron, smell, taste, appearance, colour, total bacterial count and the type of bacteria detected are monitored.

There is no control of the water quality at the National University Hospital, Biocenter or AKB other than the monitoring supplied by the water works.

iii. If automatic water delivery systems are used, describe how they are maintained and sanitised.

As described in table 16 above, automatic watering systems are used for pigs and cows. The systems for pigs are cleaned when the pens are cleaned down (or more often if they appear dirty). The system is scrubbed with steel wool or a high pressure hose is used and the system is then flushed thoroughly with clean water. Depending on the research project, it can be necessary to clean the system with a disinfecting agent also. The automatic watering system for cows is cleaned every second day by scrubbing and rinsing with clean water.

c. **Bedding and Nesting Materials** [ETS 123, Appendix A, p. 16; Guide, pp. 68-69]

i. Describe type(s) and how used for various species.

All rodents are supplied with aspen chip bedding (Tapvei, Kortteinen, Finland) in cages. Nesting material for rodents is provided in the form of Happi Mats supplied by Scanbur. These mats are small squares of non-woven organically grown hemp fibres, which are especially suited to the nesting behaviour of rodents. Red transparent plastic shelters are also provided in all rodent cages in order to more easily check the animals without unnecessarily disturbing them. All bedding and nesting material is autoclaved into some units.
Plastic shelters are autoclaved into the units, and within the units they are cleaned separately in washing machines or bottle wash machines. Quality certificates for bedding and nesting materials for rodents are supplied by the vendors.

Hay and straw from local vendors, strewn on the floor of pens is used for pigs, mini pigs, sheep, goats, cows (when not out to pasture), foxes, guinea pigs and rabbits. Saw dust sprinkled on the floor is used for ferrets and hens (as well as straw in nesting boxes for hens). Dogs are provided with fabric blankets.

ii. Describe bulk bedding storage facilities, if applicable, including vermin control measures. Note bedding storage areas within the specific animal facilities are described below in Section IV.B.4.a.

Rodent bedding material is mainly supplied in “big-bags”. Some bedding is supplied in vacuum packed bags. All bedding material remains in its original packaging (big-bags or vacuum packed bags) until it is used. The big-bags are stored adjacent to the suction system that pumps the material into a silo for use with the automated cage cleaning system. Other bedding material is stored together with the animal feed in room 04-01-21. No bedding material is stored inside individual rodent units other than in clean cages at rodent facilities.

At large animal facilities hay, straw and sawdust are stored inside the stables, as well as at a central storage area. Hay and straw are delivered in big bales, with or without a plastic cover. Bedding material packaging for the site at the Biocenter is disinfected with H₂O₂ gassing before entering the animal unit. Vermin control consists of UV insect control solutions, which are placed around the main service area and inside the stables. At the large animal facilities rodent control is carried out by an external contractor. Poison boxes for rodents are placed inside and outside the building and are checked regularly to replenish the poison.

iii. Describe quality control procedures, including monitoring for contaminants.

Contact bedding for units 10-2, 10-4 and 16-4 at Panum is autoclaved in the main service area. Bedding packaging for Biocenter is disinfected with H₂O₂ prior to entry. At the site at the Copenhagen University Hospital, AKB, Frederiksberg and Taastrup site the bedding is not autoclaved, but is checked upon arrival. Quality certificates for aspen chip bedding are made available by the supplier.
d. Miscellaneous Animal Care and Use Equipment

i. Describe motorized vehicles and other equipment (e.g., trailers) used for transporting animals, noting the type and how the cargo compartment is environmentally controlled, if applicable.

Rodents are transported in either static cages with a filter top lid, IVC cages or single use cages wrapped in at least one plastic bag and sealed with a knot. Cages may only be kept inside the plastic bags for a maximum of one hour.

Anaesthetised pigs are transported using lifts from the Likorall family, equipped with Octostretch and Liftsheet Octo. Standardized procedures have been developed and implemented to allow movement to- and from the operating theatre without any manual lifting by staff, while ensuring safe and gentle transportation of the animal.

The Department uses external contractors for transporting animals between sites. These are Prime Service Transport (Brønshøjgård, Lyng, Denmark) and Harald Hansens Eftf. I/S v/Peter Gregers Jensen (Fabriksvangen, Slangerup, Denmark), both of whom are certified to transport live animals.

ii. Describe other animal care related equipment used in the animal care programme (e.g., specialized equipment for exercise or enrichment, high pressure sprayers, vacuum cleaners, tractors, trailers, spreaders, etc.).

Cage cleaning equipment is installed at all sites. The following equipment is installed at AEM’s various sites:

Panum Building
- Automated robotic cage cleaning and handling system (Kjærgaard, Løsning, Denmark and Apollo, Brabde, Denmark)
- Waste management system (Dustcontrol, Norsborg, Sweden)
- The main service area is equipped with a stationary central vacuum cleaning system (Dustcontrol, Norsborg, Sweden)
- Cabinet cage and rack washer-dryer (Getinge, Getinge, Sweden)
- 3 large steam sterilizers (1 for biocontaminants) (Getinge, Getinge, Sweden)
- 1 autoclave at unit 16.3 (Getinge, Getinge, Sweden)
- Some units (Barrier units 10.2 and 10.4, 16.2IVC, 16.2M/B, 16.4, and MGU) are equipped with disinfection chambers (chemical locks) for bringing in and taking out steel containers. Inside these chambers Virkon S is used as a disinfectant.
- 5 Pass-through bottle-wash-and-fill-systems (inside the units, 4 Ken (Broby, Denmark) and 1 IWT, Tecniplast S.p.A., Buguggiate, Italy). At the MGU, another Ken system is currently being installed.
- High pressure cleaners
• Stainless steel containers which are used to sterilize and to transport cages including bedding, feed, enrichment, clothes etc. to the different units.

National University Hospital
• Cage washer (IWT)
• Separate bottle washer

Biocenter
• Cabinet cage washer-dryer (IWT)
• Pass-through bottle-wash-and-fill-system (IWT)
• 1 autoclave (Getinge)
• 1 disinfection chambers (lock). \( \text{H}_2\text{O}_2 \) is used as disinfectant.
• The big bag storage room likewise uses \( \text{H}_2\text{O}_2 \) as disinfectant.

AKB
• Cage washer (Jeros, ringe, Denmark)
• Bottle washer (Ken 412)

Taastrup
• Plant for removing manure, SWEA
• Machines for high pressure cleaning (mobile and stationary), Nilfisk Alto (Nilfisk, Brøndby, Denmark)
• 1 Schaeff tractor
• 1 Honda all-terrain vehicle
• 1 Norcar 760 forklift

Frederiksberg
• Machines for high pressure cleaning (mobile and stationary), Nilfisk Alto (Nilfisk, Brøndby, Denmark)
• Floor cleaner, Nilfisk SC400 (Nilfisk, Brøndby, Denmark)
• Linde E15 truck for lifting materials and feed etc
• Linde E10 truck for lifting anaesthetised animals
• Linde Aislemaster for removing manure

Hydrogen peroxide gas disinfection machines can be moved around to all units as needed.

e. **Sanitation** [ETS 123, Appendix A, pp. 16-17; Guide, pp. 69-73]

i. **Bedding/Substrate Change**

1) Describe frequency of contact and non-contact bedding change for each species and enclosure type (solid-bottom or suspended) or pen.

Cages are always cleaned in connection with bedding changes.
*Mice and rats in IVC cages receive clean cages every two weeks, since the ammonia levels are lower in these cages compared to conventional cages.

Table 17. Bedding change frequency for animals at AEM
<table>
<thead>
<tr>
<th>Species and cage/room</th>
<th>Change Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mice</strong></td>
<td></td>
</tr>
<tr>
<td>Type II long</td>
<td>- Once a week.</td>
</tr>
<tr>
<td></td>
<td>- If there are 4 or more animals in the cage then twice a week.</td>
</tr>
<tr>
<td>Type III/Type III high</td>
<td>- Once a week.</td>
</tr>
<tr>
<td></td>
<td>- If there are 6 or more animals in the cage then twice a week.</td>
</tr>
<tr>
<td>Type II long IVC</td>
<td>- Once every two weeks</td>
</tr>
<tr>
<td>Type III/Type III high IVC</td>
<td>- Once every two weeks</td>
</tr>
<tr>
<td><strong>Rats</strong></td>
<td></td>
</tr>
<tr>
<td>Type III high</td>
<td>- Twice a week (if there is more than one rat).</td>
</tr>
<tr>
<td>1500 U Type IV S</td>
<td>- Twice a week (if there is more than one rat).</td>
</tr>
<tr>
<td>1500 U Type IV S IVC</td>
<td>- Once a week.</td>
</tr>
<tr>
<td></td>
<td>- If there is more than one rat then twice a week.</td>
</tr>
<tr>
<td><strong>Rabbits</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- All cages are changed once a week</td>
</tr>
<tr>
<td></td>
<td>- Dirt trays are changed twice a week.</td>
</tr>
<tr>
<td><strong>Pigs</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Mucked out weekly.</td>
</tr>
<tr>
<td></td>
<td>- Spot cleaned every day</td>
</tr>
<tr>
<td><strong>Cats</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Dirt trays are changed daily.</td>
</tr>
<tr>
<td></td>
<td>- Room is cleaned 3 times a week.</td>
</tr>
<tr>
<td><strong>Guinea Pigs</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Once a week.</td>
</tr>
<tr>
<td><strong>Hens</strong></td>
<td></td>
</tr>
<tr>
<td>Cage</td>
<td>- Once a week.</td>
</tr>
<tr>
<td>Room/enclosure</td>
<td>- Once a week if there are many.</td>
</tr>
<tr>
<td></td>
<td>- Once every 3 weeks if there are fewer than 10 and spot cleaned as necessary.</td>
</tr>
<tr>
<td><strong>Terrapins</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Vacuumed daily and water is fully changed at least twice a week and the filter is rinsed as needed</td>
</tr>
<tr>
<td></td>
<td>- Once a month the tank is scrubbed with soap and water and the tank is always sanitised between batches of animals.</td>
</tr>
<tr>
<td><strong>Rana frogs</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Enclosures are cleaned twice a week and are daily spot checked for contaminants (uneaten food etc).</td>
</tr>
<tr>
<td><strong>Xenopus</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Stationary tanks have the water changed twice a week.</td>
</tr>
<tr>
<td></td>
<td>- Aqua Schwarz cages have a constant flow of fresh water, but are manually cleaned when fish are euthanized, the project finishes or every two weeks if a build-up of contaminants is observed.</td>
</tr>
<tr>
<td><strong>Ferrets</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Enclosures are cleaned out once a week.</td>
</tr>
<tr>
<td><strong>Cows</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Mucked out weekly (unless they are out to pasture).</td>
</tr>
<tr>
<td><strong>Foxes</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Cages are cleaned twice a week and faeces are removed daily.</td>
</tr>
<tr>
<td><strong>Zebrafish</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Cages have a constant flow of fresh water, but are manually cleaned when fish are euthanized, the project finishes or every two weeks if a build-up of contaminants is observed.</td>
</tr>
<tr>
<td><strong>Dogs</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Cages are cleaned twice a week and faeces are removed daily.</td>
</tr>
<tr>
<td><strong>Sheep</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Mucked out weekly (unless they are out to pasture).</td>
</tr>
<tr>
<td><strong>Goats</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Mucked out weekly (unless they are out to pasture).</td>
</tr>
</tbody>
</table>
2) Describe any IACUC/OB-approved exceptions to frequencies recommended in the Guide or applicable regulations and the criteria used to justify those exceptions.

All units at the facility follow the above-mentioned frequencies. Exceptions are:

- Animals transferred into barrier units by ET/caesarean section (bedding change is postponed approximately 2 weeks in order not to stress the animals)
- For other breeding purposes (evaluation on an individual basis).

The Departments veterinary staff consider each research project (including details such as bedding change frequencies) during the project plan review and hereby oversees this.

3) Note the location where soiled bedding is removed from the cages/enclosures and where clean bedding is placed into the cages/enclosures.

Rodents are transferred from the soiled cage, into a clean cage with new bedding in their animal rooms or pens in all facilities.

**Panum Building**
Mouse and Rat cages containing soiled bedding are placed inside stainless steel containers or transport trolleys and are transported to the service area, located on level 01. The removal of soiled bedding is done in the service area, rather than inside the units (with the exception of the GMO class 2 facilities).

Cages here are, for the most part, handled by an automated robotic tunnel cage cleaning system. The bedding is removed and the cages are washed. The automated system fills the clean cages with new bedding.

Some of the cages are cleaned in the cage and rack cabinet washer-dryer. The bedding is removed under ventilation and refilled either semi-automatic or manually.

In some cases (for example to avoid contamination etc.), the stainless steel containers containing soiled cages with bedding are autoclaved before the bedding is removed and the cages properly cleaned.

Rabbit, hen, sheep, pig, mini pig and guinea pig cages have their bedding removed and replaced within the animal room.

**Biocenter**
The bedding is removed manually from cages, under ventilation in the service area. Cages are cleaned in the cabinet cage/rack washer and refilled with clean bedding using a semi-automated process.

**RH**  
The bedding is removed manually from the cages under ventilation in the service area. Cages are cleaned in the cage washer-dryer and refilled with new bedding manually.

**AKB**  
The bedding is removed manually from the cages under ventilation in service area. Cages are cleaned in the cage washer-dryer and refilled with new bedding manually.

**Taastrup**  
Pens are mucked out and filled with new bedding material at the site of the pen as these are generally built in to the building. Animals can be moved to neighbouring empty pens, an outdoor area (fenced off) or a fenced off area just outside the pen (indoors) whilst the process takes place or are otherwise acclimated to the procedure.

**Frederiksberg**  
Pens are mucked out and filled with new bedding material at the site of the pen as these are generally built in to the building. Animals can be moved to neighbouring empty pens or a fenced off area just outside the pen whilst the process takes place or are otherwise acclimated to the procedure.

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ii. **Cleaning and Disinfection of the Micro- and Macro-Environments**

Describe the washing/sanitising frequency, and methods used in the Appendix, “Cleaning and Disinfection of the Micro- and Macro-Environment.”

1) Describe any IACUC/OB-approved *exceptions* to the Guide (or applicable regulations) recommended sanitisation intervals.

   The sanitation intervals can be adjusted in connection with specific research projects if approved by the Department veterinarians.

2) Assessing the Effectiveness of Sanitisation and Mechanical Washer Function

   a) Describe how the effectiveness of sanitisation procedures is monitored (e.g., water temperature monitoring, microbiological monitoring, visual inspections, etc.).
The main sanitation systems (including the cabinet washer and autoclaves) are serviced regularly by the supplier (Getinge A/S, Lyngby, Denmark). Others are serviced by Scanbur A/S (Karlslunde, Denmark) or other suppliers. Most systems are modern, computerized systems, which have built-in monitoring and logging systems.

At Panum the automatic washing process is supervised by staff. Cleaning efficiency is monitored visually. The cages are inspected during and after the washing process, before they leave the service area.

Microbiological monitoring and disinfection control is carried out once a year by the staff at the Department, as a control measure for all washing machines, chemical locks, bottle wash machines and autoclaves. Contact slides are used to test for microbiological contamination and for disinfection in chemical locks and cage wash machines (contact slides are from Merck KGaA, Darmstadt, Germany).

Bottle wash equipment is also tested via test media contact plates, with the variation that sterile water is used to pick up any contaminants within the recently cleaned bottles and is poured over the contact plates, rather than direct contact of the plate to the bottle surface.

Sterikon Bio indicators (Merck KGaA, Darmstadt, Germany) are used to test all autoclave cycles. A simple colour change of the test media is used to ascertain the effectiveness of the cycle.

Hydrogen peroxide vapouriser machines are validated with independent bio indicator cards during each cycle to ensure that different batches of hydrogen peroxide are effective.

Chemical and heat treatment as a means of sanitising animal rooms are used at the Department but are not validated.

b) Describe preventive maintenance programmes for mechanical washers.

Describe the handling, storage, method and frequency of disposal, and final disposal location for each of the following:

i. Soiled bedding and refuse

Rodents:
Handling: Dirty cages containing soiled bedding and refuse are emptied under process ventilation or single-use, disposable cages are used.

In general all species:
Handling: Infectious material is disposed of in yellow “Biological Hazardous Waste” bags and GMO waste is sterilized at a minimum temperature of 121°C in an autoclave prior to handling. Waste (whether heat treated or regular waste) is then placed in large sealed bins according to their designation (biological hazardous waste, regular waste etc.).

Storage: The waste is kept in the large bins until collected for disposal.

Disposal: A professional waste collecting company (Henrik Tofteng A/S, Brøndby, Denmark) is contracted to collect and dispose of waste by methods certified by the Danish Environment Control Authority.

Pigs in Taastrup:
Handling and storage: The waste is collected and stored directly in a locally placed environmental recycling unit.

Disposal: The fermented waste is spread on local fields as manure.

ii. Animal carcasses

Handling: Animal carcasses are transported in plastic bags to storage or to laboratories for pathological examination. If animals pose a contamination risk, they are handled as hazardous waste (in hazardous waste yellow bags and for GMO animal carcasses, autoclaving).

Storage: Animal carcasses are either kept in a special farm container, are refrigerated or are frozen at -18°C until they are collected for disposal.

Disposal: carcasses are either incinerated by the disposal company DAKA (Løsning, Denmark), for some large animals or collected for “hazardous waste treatment” by a professional company certified by the Danish Environment Control Authority

iii. Hazardous wastes - infectious, toxic, radioactive, sharps and glass

Infectious waste:
Handling: Infectious waste is put into yellow “Biological Hazardous Waste” bags or containers. In case of GMO-organisms/animals, bags are also then autoclaved by AEM.

Storage: All infectious waste is kept in yellow “Biological Hazardous Waste” containers clad with inner plastic layer.

Disposal: A professional garbage collecting firm (Henrik Tofteng A/S) is hired to collect and dispose biological hazardous waste by methods (incineration) certified by the Danish Environment Control Authority.

**Chemical waste:**
Handling: Chemical waste stays within the original container for transportation to a central storage facility. The waste is sorted and labelled into different chemical categories for disposal.

Storage: Chemical waste is stored in approved containers in a central storage facility at the Faculty Service Centre of Logistics.

Disposal: Chemical waste is collected and handled by NORD (formerly Kommunekemi, Nyborg, Denmark). NORD is a specialist within sustainable Total Hazardous Waste Management and is one of Europe’s leading incineration facilities.

**Radioactive material:**
Handling: the waste is divided into three categories in the laboratory: “non-active waste” (below 0,01 MBq pr. kg waste), “waste that can be discarded for incineration or drainage” (below 0,1 MBq) or “waste that needs treatment” (above 0,1 MBq). Exposure to radiation is assessed by the project licence holder and must remain below maximum acceptable levels (approved by the National Board of Health). Written instructions and SOP’s on how to discard radioactive waste are available.

Storage and disposal:
Below 0,01 MBq pr. Kg, waste is stored in sealed plastic bags and disposed as biological hazardous waste.
Below 0,1 MBq, waste is incinerated by a company approved to handle radioactive materials.
Above 0,1 MBq, waste is stored and disposed by Risø DTU National Laboratory for Sustainable Energy, Roskilde, Denmark.

**Sharps and glass:**
Handling: Sharps and glass are collected in approved containers with a yellow lid and are handled as Biological Hazardous Waste.

Storage and disposal: please see Biological Hazardous Waste above.
i. Describe the programme for controlling pests (insects, rodents, predators, etc.) noting the control agent(s) used, where applied, and who oversees the programme and applies the agent(s). Include a description of natural predators (e.g., barn cats) or guard animals (e.g., dogs, donkeys) used for pest and predator control, if applicable.

Outside the animal facilities:
Rodent traps with rodenticide are used. This pest control is handled by Faculty Service Centre and an external contractor provided by the city municipality (Absolut Skadedyrsbekæmpelse). The Frederiksberg and Taastrup facilities are serviced by the pest control company Anticimex. Two barn cats also live at the Taastrup site.

Wild predators are kept to a minimum by local hunters at Taastrup site.

Inside the facility:
Insect control is achieved by UV/electric lamps. Large animal sites (Taastrup, Frederiksberg and Panum-02) also use spray insecticides and tape impregnated with insecticide (Trinol, Turbo-Jet, Norresundby, Denmark). During summer period Panum-02 uses biological pest control in the form of robber flies (Mortalin, Copenhagen, Denmark).

Rodents are caught by electrical rodent trap (Mortalin, Copenhagen, Denmark). Traps are monitored daily by staff.

The pest control programme is supervised by site managers (Janne Koch and Karin Kold) and veterinarians. Pest control agents are applied by animal technicians.

ii. Note how animal users are informed of pesticide use and how animal users may opt out of such use in specific areas.

Animal users are informed of the use of Pesticide during research project start-up meetings with site managers (Janne Koch and Karin Kold), veterinarians and/or animal technicians.

h. Emergency, Weekend and Holiday Care [ETS 123, Article 5 and Appendix A, p. 12; Guide, pp. 74-75]

i. Describe procedures for providing weekend and holiday care. Indicate who (e.g., regular animal care staff, students, part-time staff, etc.) provides and oversees care and what procedures are performed. Indicate qualifications of weekend/holiday staff if not regular staff.
At present, only animal care personnel employed at the Department may carry out weekend and holiday care. Students may also accompany fully trained staff on weekend and holiday work but may not tend to the animals alone. Procedures performed during the weekends include checking, refilling food and water for the animals and, in some cases, research related procedures such as administering medication.

ii. Describe procedures for contacting responsible animal care and/or veterinary personnel in case of an emergency.

During normal working hours, at least one member of the veterinary staff as well as a management staff member is available to contact. Each unit has at least one mobile phone which is manned at all times during working hours (including weekend working hours and holidays). Similarly, the clinical veterinarians have a common on-call mobile phone which is manned by the on call vet during normal working hours (8-15 on weekdays, weekends and holidays). For activities outside normal working hours, researchers and animal technicians can arrange for a veterinarian to be on call. The Head of Department may always be contacted in case of emergency.

2. Population Management [ETS 123, Article 17 and Appendix A, p. 17; Guide, pp. 75-77]

a. Identification

Describe animal identification methods for each species (e.g., microchips, cage/tank cards, collars, leg bands, tattoo, ear tags, brands, etc.).

A variety of identification methods are used to distinguish individual animals throughout the facility. In general, animal technicians are responsible for applying identification methods but in some cases researchers mark their own animals. Ear notching is the most commonly used method for rodents, especially for mice. Marking with felt pens is also frequently used for rodents in research projects. As mentioned in the question below, cage cards for each species can contain information about individual animals within the cage/pen (for example the number of the ear notch on a rodent would be written on its cage card). Individual identification methods for different species are outlined below:

**Mice and Rats**
- Ear notching
- Tattooing
- Ear clips
- Markings on the tail
- Microchip

**Guinea pigs**
- Tattooing or microchip
Hamster
• Ear notching
Rabbits
• Tattooing
• Colour coding on the fur
Cats
• Tattooing (ear)
• Microchip
Pigs, sheep, goats and cattle
• Ear clips (regulated by law)
Hens
• Leg bands
Frogs (amphibians)
• Rana Esclenta are not identified individually, xenopus are microchipped by the supplier, but we don’t currently have a scanner that is able to read them.
Terrapins
• Marking on shell
Ferrets
• Microchip
Foxes
• The foxes are not micro-chipped, as the Department only has two.

b. Record Keeping
Describe procedure(s) for maintaining individual records on animals. Identify the species for which individual records are maintained, individuals (titles, not necessarily names) responsible for maintaining the records, and where they are maintained and how veterinary and IACUC/OB access is assured.

In general, cage cards are used as primary identification for animals at the facility. Individual record keeping is used for some animal species. An overview of record keeping requirements for all species is provided as appendix 21.

For large animals, we have several types of individual records.

1. There is a legal requirement (from the Animal Experiments Inspectorate) to keep individual animal records for cats, dogs, and nonhuman primates. In recent years, the Department has only housed dogs, while nonhuman primates and cats have not been used for some years. The dog records are kept by the facility manager.

2. There is a legal requirement (Veterinary and Food Administration) to keep animal records for agricultural animals (relevant species include cattle, sheep and pigs) in the national CHR register (central husbandry register). This is an electronic database where animals are registered according to legal requirements upon arrival or birth. There is also a Departmental SOP describing registration for these animals.
3. To oversee our surgical activities with pigs, we keep individual electronic records via a spreadsheet system, which is maintained by animal technicians. These records include information about animal id number, weight, premedication, anaesthetics, comments, surgical procedures and treatment. Records are kept on the Department’s shared drive, ensuring access for relevant parties (such as veterinarians etc). O:\Operation\Grisejournal\Grisejournaler

4. Medical records for sick animals of any species are maintained as an excel sheet which is maintained by the veterinarians and accessible to the IACUC. O:\16-1\Dyrlæger\3 Veterinær journaler

Cage cards for rodents
Cage cards are used as identification for rodents. Information on the cage card includes; license number, license holder’s name, project number, animal owner, animal strain, generation, earmark number (of the mating pair) where relevant, mating date, sex, arrival date/date of birth, comments etc. Some information is relevant for animals in breeding and other information is used for animals in research projects.

c. Breeding, Genetics and Nomenclature

i. Describe the programme for advising investigators on the selection of animals based on genetic characteristics.

One of the Department’s services is to provide advice to researchers on which specific mouse or rat strain is suitable for a research project. However, the researcher concerned makes the final decision on which animal/genotype is needed for their research. A researcher may ask for advice on which animal models to use, or for clarification or further explanation of genetics of appropriate models for specific purposes etc. Typically, the veterinary staff will handle such inquiries with support from either main suppliers or other researchers that the Department collaborates with.

ii. Describe the programme for advising investigators on using standardized nomenclature to ensure proper reporting of the identification of the research animals with regard to both the strain and substrain or the genetic background of all animals used in a study.

The Department encourages researchers to use standardized nomenclature. However, researchers often use shorter names for practical reasons. The veterinary staff is available to provide help concerning matters of nomenclature, both to the animal care personnel and to researchers. The Standardized Genetic Nomenclature for Mice and Rats is used: MGI-Guidelines for Nomenclature of Mouse and Rat Strains.
iii. For newly generated genotypes, describe how new phenotypes that negatively impact well-being will be monitored, managed and reported to the IACUC/OB in a manner to ensure the animals’ health and well-being.

All animals housed at the Department are checked each day. Therefore animal technicians monitor the pups (the Department only generates new genotypes for rodents) of any new strains daily to ensure health and well-being. For new strains where the phenotype is suspected to negatively impact well-being, this is usually described in the breeding project so that animal care staff can be especially aware. Phenotypic scoring criteria are sometimes used as supplied by the researcher. Any concerns are communicated to Department Veterinarians and any researchers involved, who then investigate the matter.

III. Veterinary Care [Guide, pp. 105-132]
Note: Complete each section, including, where applicable, procedures performed in farm settings, field studies, aquatic environments, etc.

A. Animal Procurement and Transportation [ETS 123, Article 22 and Appendix A, pp. 12-13; Guide, pp. 106-109; Ag Guide, pp. 8; 45; 51-57]

1. Animal Procurement
Describe the method for evaluating the quality of animals supplied to the institution (e.g., from commercial vendors, other institutions, etc.).

All animals are acquired according to the law LBK nr 88 af 30/01/2013 § 10 and Bilag 1, which list the animals that must be purpose-bred. Animals can only be ordered by the animal technicians in the Department if there is an associated approved project plan. The Department veterinarians have responsibility for the procurement of animals. It is the responsibility of the facility manager to ensure that there are sufficient facilities and experienced personnel to house and manage the different animals ordered. Department veterinarians will not approve a project plan using a new species of animals, before the Facility manager has agreed that they can be housed and cared for. The Department Veterinarian will visit new vendors, if it is considered necessary, before approving them as vendors.

Rodents
The Department only accepts animals from approved commercial breeders to enter directly into our clean units (excluding SPF units). The most recent animal health reports must also be inspected before shipment may take place. Approved breeders are: Charles River (Sulzfeld, Germany), Harlan (Horst, The Netherlands), Jackson Laboratories (Bar Harbor, Maine, USA), Taconic (Lille Skensved, Denmark) and Janvier Labs (Le Genest-Saint-isle, France). Animals from all other institutions may only enter unit 16-2 for animals of unknown health status, provided they can also supply AEM with relevant health certificates (where possible). Animals that arrive without a health certificate will be observed by the animal technicians for general health. All rodents are closely inspected upon arrival.

Other species
During an acclimatization period, animals are observed by the animal technicians for general health (appearance, eating, drinking, behaviour etc.). For agricultural animals, the Department uses few vendors, where access to the Veterinarian livestock reports is possible. When new vendors are to be used, it is the Department veterinarian’s responsibility to approve the vendor.

2. **Transportation of Animals**

Describe how animals are transported between outside sources and the institution and within the institution, including loading, unloading, level of biosecurity, immune status and specific pathogen status (consider all species, including aquatic and semi-aquatic species).

Animals may only arrive during working hours when there are animal technicians available to receive them. Researchers may not order and receive animals themselves, this process must go through the Department to ensure the quality of the animals and to maintain the health status at each unit. Upon arrival all animals, regardless of species are received by an animal technician and the order is checked against the delivery to ensure the correct animals have arrived. The animals are then taken directly to their respective units where they are inspected and transferred to their new housing as soon as possible.

The relevant authority is the Danish Veterinary and Food Administration. Transportation within Denmark for distances less than 50 km is covered by “Executive order regarding transportation of animals” (“Bekendtgørelse om transport af dyr”).

**Transport regulations**

The Department is in full compliance with national and EU regulations. Transportation, including transit, in Denmark and between Denmark and another EU country, and importation from non-EU countries is covered by “Executive order regarding protection of animals during transportation” (“BEK nr 1729 af 21/12/2006 - Gældende Bekendtgørelse om beskyttelse af dyr under transport: Bekendtgørelse om beskyttelse af dyr under transport - retsinformation.dk”)

In the executive order, there are specific rules for transportation of bovine animals, swine, equidae, sheep and goats (Chapter 2), for poultry, birds and rabbits (Chapter 3), for dogs and cats (Chapter 4), for other mammals and birds (Chapter 5), and for other vertebrates and cold-blooded animals (Chapter 6).

Flight transportation of threatened species must conform to IATA rules (§ 35 and 43).

Import, transit and transportation from non-EU countries are only permitted when the importer or exporter has provided a written statement declaring that they will fulfill the legislative transportation requirements (§ 45).

**Rodents**

From breeders (outside sources), rodents are transported in solid cardboard or plastic cages, which are designed to prevent contamination during transportation.
Only approved animal couriers may transport the animals. All export of animals is undertaken according to Danish and international legislation.

As mentioned in the previous question, animals of known health status from Department approved vendors may directly enter clean animal units in the facility (excluding the Department’s SPF breeding units). Other animals of unknown health status must enter the Department’s 16-2 IVC unit.

Between units, or between units and external laboratories, rodents are transported either in single-use transport cages or standard animal cages fitted with filter-top lids and a plastic bag. These are either carried, transported on roller tables or transported by an approved animal courier between units that are not in the same building.

**Other species**

All other species; pigs, sheep, goats, cattle, ferrets, hens, cats, rabbits, terrapins, xenopus and rana frogs, are purchased from reputable commercial vendors. Quarantine is not required for any of these species, they may immediately enter their respective units. Animals of the same species, purchased in different batches, are kept separated after arrival as required. All animals are transported with approved animal couriers and according to current Danish and European legislation.

Xenopus are transported in polystyrene boxes with dampened sponges to keep the environment damp. Rana frogs are transported in wooden crates with a dampened sponge to keep the environment damp. Transport within the facility occurs in small holding tanks (40 x 50 x 28cm) when required (which is very occasionally). These tanks are also used as holding tanks during sanitization of primary tanks.

Pigs are transported in barred trolleys from the pens to the surgical units. Other species are transported in suitable containers (however this is a rare occurrence as most species other than rats, mice and pigs remain within their units for the duration of their stay). Most transportation occurs through elevators within the facility.

### B. Preventive Medicine

   a. Describe methods used to monitor for known or unknown infectious agents.

   All animals are checked at least daily and any signs of disease are monitored and reported to Department veterinarians. If a specific disease is suspected, steps are taken to test for the disease. Periodic testing for known infectious agents (the frequency of which depends on the agent) is undertaken for mice and rats only. Blood samples, feces samples, fur swabs and environmental swabs are tested for a battery of different known pathogens and infectious agents. AEM follows the FELASA guidelines for health monitoring of rats and mice. Depending on the health
status of a unit and the agent being tested, the frequency for this can range from weekly to quarterly. The Department has a Core Facility for Pathogenic Services, which is involved in relation to the above.

b. Describe methods used to control, contain, or eliminate infectious agents.

Each unit has a specific health status in relation to the other units belonging to the Department. Some units are grouped together, meaning that their health status is the same and no quarantine period is needed between visiting these units. Between other units there is a specific quarantine period to prevent contamination between units. The Quarantine rules for the Department are supplied as appendices 22a and 22b.

If an infectious agent is detected during routine testing, or during an investigation after evidence has been presented in the form of symptoms, the Department Veterinarian will, in collaboration with the researchers and Facility Manager, decide which precautions must be taken. Often the unit in question is isolated and a seven-day quarantine period is placed on the unit (before visitation to another unit is allowed). All equipment coming out of the unit is sterilized until the infectious agent has been eliminated.

2. Quarantine and Stabilization [ETS 123, Appendix A, pp. 9, 13-14; Guide, pp. 110-111]

a. Describe the initial animal evaluation procedures for each species.

All animals must be ordered by the Department. The Department has full control of all arrivals. No animal arrives without prior agreement and assessment of health status. All animals are inspected upon arrival by trained animal technician staff. In case of health or welfare problems, the technicians will contact the veterinarians for further action. This procedure is the same for all species housed at the Department.

b. Describe quarantine procedures for each species that are purpose bred.

According to Danish legislation, the following species must be purpose-bred: Mouse, rat, guinea pig, golden hamster, Chinese hamster, gerbil, rabbit, non-human primate, dog, cat, frogs (Xenopus and Rana) and zebrafish.

**Rodents**
The Department audits breeders and allows rodents from certain commercial vendors to enter experimental units directly. The list of vendors includes Taconic, Harlan, Charles River, Janvier and Jackson lab. Animals from the Jackson sites can however only enter experimental units directly if accompanied by clean health certificates. For rodents originating from other institutions, the Department offers housing in a specialised isolation unit (16.2) with IVC caging and work procedures designed to avoid cross-contamination among batches of animals. These animals can never enter a clean experimental unit,
but the strains can be established in other departmental units through rederivation via IVF, embryo transfer or caesarean section.

From all units at the Department, animals can enter the SPF breeding units only by IVF, embryo transfer or caesarean section.

**Rabbits**
The Department has a single supplier of rabbits, HB Lidköpings Kaninfarm (Lidköping, Sweden). There is no quarantine period required for rabbits from this vendor.

**Cats**
Cats are obtained from various suppliers. Cats are kept in separate rooms for each batch. No quarantine for entering the Department is required.

**Goats, cattle and sheep**
Goats, sheep and cattle are obtained from various suppliers, which must be registered with the Danish farm registration system (CHR). There is no quarantine period required for sheep, goats and cattle. Cattle are only housed at Taastrup, where there are both outdoor and indoor housing facilities.

**Ferrets**
The Department has a single supplier of ferrets, Euroferret, owned by Jonas Sander. There is no quarantine period required for ferrets from this vendor.

**Guinea pigs**
The Department has several suppliers of Guinea pigs, (Harlan and Charles River). There is no quarantine period required for guinea pigs from these vendors.

**Foxes**
The Department has a single supplier of foxes, Farmer Ole Olsen. There is no quarantine period required for foxes from this vendor.

**Dogs**
The Department has a single supplier of dogs, Harlan A/S. There is no quarantine period required for dogs from this vendor.

**Poultry**
The Department has various suppliers, [http://bangs.dk/](http://bangs.dk/), [http://www.hoejtoftegaard.dk/start.htm](http://www.hoejtoftegaard.dk/start.htm), [http://www.triova.dk/](http://www.triova.dk/), [http://www.danhatch.dk/danhatch-a-s](http://www.danhatch.dk/danhatch-a-s). There is no quarantine period required for poultry from these vendors.

**Pigs**
Pigs are obtained from various suppliers, with SPF status. There is no quarantine period required for pigs. Mini pigs are similarly obtained from a single supplier, Ellegaard Gottingen Mini Pigs ApS (Dalmose, Denmark), without quarantine. Minipigs and other pigs are housed separately in the
Panum building, but not necessarily in separate rooms in Frederiksberg or Taastrup.

**Terrapins**
Terrapins are obtained from various vendors and are kept as batch groups in separate aquariums. No quarantine is required.

**Rana frogs and Xenopus**
Rana frogs and xenopus are obtained from NASCO and are kept as batch groups in separate aquariums. No quarantine is required.

**Zebrafish**
At present we only house zebrafish that have been brought in by scientists from other scientific institutions. In case we need to buy zebrafish, they would be obtained from NASCO. We have a quarantine facility at AKB where Zebrafish can enter. Only embryos that have been decontaminated by bleaching can enter the aquatic facility in the Panum building.

c. Describe the quarantine facilities. In your description explain any special measures used for quarantine/conditioning of each random source (not bred and raised specifically for research) species used.

As explained above, the Department does not require a quarantine period for any incoming animals. The Department uses isolation unit 16-2 to house animals of unknown health status. Animals in this unit are subject to normal husbandry procedures such as regular cage change, feeding, watering, and health checks.
Unit 16-2 contains IVC caging and ventilated hoods for handling animals. Forceps are used to transfer animals during cage change and gloves are changed between cages if the animals need to be handled, to prevent cross contamination. All material exiting the unit is sterilized and a strict staff and researcher quarantine period is enforced.

d. Describe the required/recommended stabilization period for each species.

As a general rule, the Department requires a one-week stabilization period for all species to habituate and acclimatize to the new environment. In special cases, such as terminal experiments, a shorter period is allowed, on the understanding that the researcher agrees to the possible negative effect on research data.

e. Describe the programme for the separation of animals by species, source, and health status. If the animals in different status are not maintained separately, describe circumstances in which mixing occurs and explain the rationale for mixing.
The Department has an extensive program for separation of animal species and batches of animals with varying health status. Animals of different species can be housed in the same holding room, if they can be separated completely by housing them in IVCs.

In the Taastrup, Frederiksberg and Panum 02 facilities, different farm animals can be housed in the same holding room, but in separate pens. Species that can cause anxiety and physiological and/or behavioural changes when housed together, due to interspecies conflict, are not housed in the same holding room.

The Department is sectioned into a number of separate, isolated housing units, in order to maintain a high health status while simultaneously allowing a large number of users to enter the experimental units. Different units therefore have differing health status / rules for entry. In addition, some units are adapted to accommodate specific animal species. The units are separated from one another by quarantine rules, please see appendices 22a and 22b.

The Department comprises of the following units:
- SPF 10.2 and 10.4: Breeding barriers for rodents, no entry for researchers
- Unit 10.3, Biocenter and 16.4: Experimental units for rodents
- Unit 16.2 isolation unit: Experimental unit for rodents of unknown/undesirable health status
- MGU 01: SPF unit for mice with researcher access.
- Unit 01: Experimental unit for non-rodents (separate rooms for pigs, cats, chickens and rabbits)
- AKB animal unit: Experimental unit for amphibians and rodents
- Unit RH: Experimental unit for rodents.
- Frederiksberg Unit: Experimental unit for farm animals and other large animals.
- Taastrup Unit: Experimental Unit for farm animals and other large animals

3. **Separation by Health Status and Species** [ETS 123, Appendix A, pp. 8-9; Guide, pp. 111-112]

   a. Describe isolation procedures and related facilities for animals.

   All animals of similar health status are housed in the same unit or group of units. If an animal is suspected of having a disease or tests positive for a particular infectious agent then the unit or IVC rack or cage that the animal in question originates from is isolated by a seven day quarantine period from all other units/IVC racks/cages (including units of the same health status). All animals are inspected by a veterinarian, who decides what measures to take, such as treatment, or euthanasia. The veterinarian will decide whether it is necessary to isolate the animal in a separate cage, pen or room. Extra cages/pens are available for all species.

   b. Describe situations where multiple species may be housed in the same room, area, or enclosure.
Rats and mice are housed in the same room if they can be completely separated in IVC cages. Farm animals (cows, pigs, sheep and goats) can sometimes be housed in the same holding room. Different species may not be housed in the same enclosure.

4. Surveillance, Diagnosis, Treatment and Control of Disease [ETS 123, Article 5 and Appendix A, pp. 11-12; Guide, pp. 112-113]

a. Describe 1) the procedure(s) for daily observation of animals for illness or abnormal behaviour, 2) the observer’s training for this responsibility, and 3) method for reporting observations (written or verbal). Include a description of the method for ensuring that reported cases are appropriately managed in a timely manner.

According to Danish law, animals must be inspected daily including ring weekends. The animal technicians are instructed to report observations out of the normal to the researcher in charge of the animals in question and to a Department veterinarian. Researchers are also obliged to report observations out of the normal to either an animal technician or one of the Department veterinarians.

Animal technicians and researchers working with animals must have qualifications corresponding to at least FELASA category B or C (EU function AD) which provides adequate training for observing illness in animals. Observations are communicated via telephone or in person. If the initial contact person cannot be reached, the on duty Department veterinarian can be reached during work hours and between 8am and 3pm on holidays and weekends. This ensures that any health issues are dealt with in a timely manner.

b. Describe the methods of communication between the animal care staff/veterinarians and the researcher(s).

For the most part communication is conducted via telephone or in person with regards to any concerns about animal wellbeing. The veterinarians keep a record (a journal) where all reported sick animals and any treatment recommended or undertaken, is registered. E-mail correspondence or minutes from a conversation/meeting are used as documentation. For more general concerns such as organizing an appointment for animal technicians to provide assistance to researchers or to schedule a unit inspection, e-mail is used.

c. Describe the procedure for providing veterinary medical care to ill animals and note who is contacted and the method of communicating (written or verbal) information to the veterinarian regarding sick animals.

Animal technicians report observations of illness to a veterinarian or the researcher in charge. This can be a written or verbal communication. The veterinarian examines the ill animal as soon as possible and decides whether treatment or euthanasia is necessary, relevant or possible. In case of treatment...
or euthanasia, the veterinarian performs this herself/himself, or instructs the technicians or researcher in the treatment. In case of euthanasia, the scientist may also perform this. Any observations and treatment of ill animals are recorded in a journal by Department veterinarians.

d. Describe the preventive medicine and health management/monitoring programmes (e.g., physical examination, TB testing, vaccination, hoof/nail trimming, teeth cleaning/ floating, vendor surveillance, use of sentinel animals, etc.) for each species.

**Rodents**
The Department follows FELASA’s suggestions for routine health monitoring of mice and rats. In accordance with this, the Department only allows rodents from certain commercial vendors to enter experimental units directly. These vendors perform health monitoring of rodents based on the list of rodent pathogens provided by FELASA, and are trusted by the Department to maintain safe barrier facilities.

**Rabbits, and guinea pigs**
Rabbits and guinea pigs are not under routine health surveillance apart from daily checks.

**Pigs**
The pigs are Danish farm pigs and are, when they arrive, free from the following diseases: African swine fever, brucellosis, European/classical swine fever, anthrax, foot and mouth disease, swine vesicular disease, and vesicular stomatitis, which do not occur in Denmark. In addition, they are from a specific pathogen-free farm, which excludes the following organisms and diseases: Actinobacillus pleuropneumoniae, Mycoplasma hyopneumoniae, Brachyspira hyodysenteriae, Toxin-producing Pasteurella multocida, PRRS (Porcine Reproductive and Respiratory Syndrome), Scabies, and Lice. The farms where the department buys the pigs undertake routine health monitoring. The pigs are also monitored for the presence of MRSA. No other routine health surveillance is conducted at the Department apart from daily checks. Newborns are given an iron supplement, and adult pigs that are housed for several months are vaccinated against erysipelas. Pig’s hooves are trimmed on a regular basis, according to natural wear.

**Mini-pigs**
Mini-pigs are obtained from Ellegaard Göttingen Minipigs, an AAALAC-accredited vendor, who conforms to the FELASA guidelines with respect to health monitoring. No routine health surveillance is conducted at the Department apart from daily health checks.

**Chickens**
Chickens are Danish farm chickens. No routine health surveillance is conducted at the Department other than daily health checks.

**Frogs, Terrapins**
No routine health surveillance is conducted at the Department apart from daily health checks.

Cattle
The cows are Danish farm cows. No routine health surveillance is conducted at the Department apart from daily health checks. Hooves are trimmed twice a year.

Goats
The goats are Danish farm goats and are, when they arrive, free of Blue Tongue and Maedi Visna. No routine health surveillance is conducted at the Department apart from daily health checks. Hooves are trimmed 4 to 5 times a year.

Sheep
The sheep are Danish farm sheep and are free of Blue Tongue and Maedi Visna. No routine health surveillance is conducted at the Department apart from daily health checks. Hooves are trimmed 4 to 5 times a year.

Ferrets
The ferrets are from a vendor which delivers ferrets tested negative to plasmacytosis and influenza virus. No routine health surveillance is conducted at the Department apart from daily health checks

Foxes
The foxes are Danish farm foxes and are, when they arrive, free of plasmacytosis. No routine health surveillance is conducted at the Department apart from daily health checks.

Dogs
The dogs are from Harlan Laboratories, delivered with individual documentation regarding DOB, ancestry, vaccination program etc. No routine health surveillance is conducted at the Department apart from daily health checks.

Cats
No routine health surveillance is conducted at the Department apart from daily health checks

In all rodent units, except 16.2 (unit for animals with unknown health status, or with known infection), a sentinel system is in operation. The sentinels (mice and/or rats) are used in compliance with the FELASA guidelines, with respect to the number and frequency of sampling, and the organisms tested for. In addition to the routine 3-month or yearly FELASA sampling, more frequent sampling is undertaken for MHV (mouse hepatitis virus). Department veterinarians perform necropsies and further diagnostic testing of animals, which exhibit signs of unwanted infection. Health monitoring results are available upon request.
C. Clinical Care and Management [Guide, pp. 113-115]


a. Describe the procedures to ensure that emergency care is continuously available for animals during and outside of regular work hours.

During normal working hours (8-15 on weekdays), at least one member of the veterinary staff as well as a management staff member is available at the Department. In weekends a veterinarian will be on call during normal working hours (8-15). For activities outside normal working hours, researchers and animal technicians can arrange for a veterinarian to be on call. When procedures on large animals are performed outside normal working hours the research group must include veterinary expertise. The Head of Department may always be contacted in case of emergency.

b. Describe the authority of the Designated Veterinarian or his/her designee relative to the emergency treatment of animals in the programme.

Department veterinarians are empowered to make decisions about appropriate treatment plans for research animals at all times, although the License holders have the ultimate legal responsibility. This means that if a research group cannot be contacted and emergency treatment is required, the veterinarian will decide the course of action. Similarly, if disagreement arises between researchers and animal care staff over the wellbeing of an animal, the veterinarian can make the decision to euthanize the animal, for example, without the permission of the license holder.


Describe the procedure for maintaining medical records and documenting treatment of ill animals including: clinical laboratory findings, diagnoses, treatments, medical progress records, etc. Identify individual(s) (titles, not necessarily names) responsible for maintaining such records and identify where the records are maintained and who has access to the records. Describe the role of the Designated Veterinarian in record keeping.

Medical records for sick animals of any species are maintained as an excel sheet which is maintained by the veterinarians and accessible to the IACUC. O:\16-1\Dyr læger\3 Veterinær journaler.
This journal includes information on people involved, the project number, animal id, medical history, treatment, laboratory findings, communication with researcher and euthanasia. Any concerning information (for example trends in a certain strain etc) are investigated.
If treatment is provided by a Veterinarian or technician, it is reported to the researcher either verbally or via e-mail.
3. **Diagnostic Resources.** Describe available diagnostic methods used in the programme including:

a. **In-house diagnostic laboratory capabilities.**

The Department’s Pathology and diagnostic services unit has a well-equipped necropsy room allowing examination of animals independent of their health status. The following is offered: Complete necropsies followed by a histopathological workup of genetically modified mice as well as animals developing unforeseen symptoms during experiments or developing spontaneous disease. Professor Björn Rozell at the Department has extensive experience with mouse pathology and collaborates with researchers at the Faculty and other faculties as well as the pharmaceutical industry. Of the Department’s veterinarians, DVM Anne Charlotte Theilman Frey is associated with this core facility.

b. **Commercially provided diagnostic laboratory services.**

The Department uses IDEXX for diagnostic procedures in most of our animals.

c. **Necropsy facilities and histopathology capabilities.**

The Department has a room for necropsy (04.01.29). The Department uses the pathology service of the Pathology and diagnostic services unit. For large animals, each unit can undertake necropsies at the unit. For more complex necropsies, the department collaborates with Professor Henrik Elvang Jensen at the Department for Veterinary Disease Biology.

d. **Radiology and other imaging capabilities.**

The Department has a mobile C-arm X-ray system (Siemens Siremobil Compact L. power 1,4 KW mobile C-arm X-ray system for radiography and continuous fluoroscopy) and two IVIS machines placed in unit 16.2 and the Biocenter.

The Department has a core facility for Molecular Imaging, which contains a SPECT-scanner for small animals, a PET/CT scanner for small animals, a MR scanner for small animals and equipment for optical imaging. For further information visit: http://sund.ku.dk/forskning/corefaciliteter/molecular_imaging/.

4. **Drug Storage and Control**

a. Describe the purchase and storage of controlled and non-controlled drugs.

Drugs are stored in compliance with Danish legal requirements. All medicines, including prescription drugs and controlled substances are stored in dedicated medicine cabinets, or in a dedicated refrigerator at the main surgical unit at Panum. At Frederiksberg and Taastrup, cabinets are locked outside of normal
working hours. Controlled substances are kept in a separate, locked cabinet. Small amounts of drugs may be kept locally at the different units, provided they are kept in locked cabinets with limited access. No medication is used beyond the expiration date. Medicines and drugs specific to particular projects are purchased by the research groups. Drugs must be purchased through a MD or a veterinarian in the case of veterinary drugs. If there is not a MD or veterinarian within the research group, then drugs may be purchased through the Department veterinarians.

b. Describe record keeping procedures for controlled substances.

In the case of controlled substances, at Panum, a record is kept in unit 16.3, with information about consumption, usage, preparation, inventory, amount purchased, supplier, order number, date, signed by etc.

For controlled substances, the following legislation applies: ”LBK nr 748 af 01/07/2008 – Gældende, Bekendtgørelse af lov om euforiserende stoffer: https://www.retsinformation.dk/Forms/R0710.aspx?id=120356” and ”BEK nr 749 af 01/07/2008 - Gældende Bekendtgørelse om euforiserende stoffer: https://www.retsinformation.dk/Forms/R0710.aspx?id=120497”.

D. Surgery [Guide, pp. 115-123]


Describe the process(es) used to ensure adequate pre-surgical planning, including: identifying personnel; locating equipment, supplies, veterinary involvement for selecting analgesic and anaesthetic agents and facilities; planning; and pre- and postoperative care.

The Department veterinarian thoroughly reviews each project plan involving surgery. Then the veterinarian and animal technicians hold a start-up meeting with the researcher involved. Here the veterinarian gives advice regarding proper pre-surgical techniques such as: Use of appropriate anaesthesia and analgesia is discussed including; dose, route, frequency, duration, syringe, needle sizes and volume to be injected. Criteria for administration of postoperative analgesics must also be considered. If neuromuscular blocking agents are to be used, the drug, dose, volume injected and route of administration should be considered. Equipment (such as heat blankets etc.), analgesia and monitoring procedures required for post-surgical care should also be considered. Furthermore the veterinarians advise the researchers in undertaking an animal health assessment with a visual examination (alert, normal, lethargic, secretions, chest wall movement to determine respiratory rate, etc.). Giving a period of animal stabilization to a new environment before undergoing surgical procedures is also required. (E.g. place the animal in the surgery room for at least 20-30 minutes before the procedure). Pre-
surgical fasting of a specified duration if indicated for the procedure or species to be used (it needs to be justified if it is more than 12 hours). A description of preoperative medications or antibiotics (dose, frequency, route) is required as needed.

The Department provides individual assistance to researchers seeking advice regarding surgery. The veterinarians can demand that they be present during the procedures, to give advice and to ensure that appropriate procedures are used. For practical assistance with surgery in larger animals, the Department employs a veterinary technician and a veterinarian competent in anaesthesia and preparatory surgery such as catheterization.

In addition, the Department offers courses in surgical techniques, with emphasis on anaesthesia, analgesia, aseptic technique, gentle handling of tissues, minimal damage of tissue, appropriate use of instruments, effective haemostasis, suturing techniques, and supportive peri- and postoperative measures.

   
   a. List building name(s) and room number(s) or other locations (coded, if confidential) where surgical procedures are performed. Include areas where surgical procedures are conducted in agricultural species. Indicate the type of species, nature of procedure (major/minor/emergency; survival and non-survival, etc.). Indicate for each surgical area if the use is heavy (daily), moderate (weekly), or light.

   Major survival surgeries on non-rodent species may only be performed in surgical unit 16.3 and Frederiksberg’s surgical unit. Minor survival surgery and all procedures done on rodents may be performed in standard procedure rooms, and do not require separate dedicated facilities. However, aseptic technique must be used. Surgical facilities should be sufficiently separate from other areas to minimize unnecessary traffic and decrease the potential for contamination.

   The non-rodent surgical area includes rooms 15, 25, 27, 29 and 31 in unit 16.3 at Panum. These rooms are mostly used for pigs. They are used for all types of procedures, both non-survival and survival procedures. The area is used on a daily basis.

   Furthermore rooms G196 and C196 in building 1-73 at the Frederiksberg facility are used for major survival surgery. These rooms are used for all agricultural species and all types of procedures, both non-survival and survival procedures. The area is used moderately.

   In Taastrup room 9-11(L6). This room is used for all agricultural species. It is lightly used for minor and emergency procedures, for both survival and non-survival procedures.

   Procedure rooms throughout the rest of the Department include:
b. List the major surgical support equipment available at each location where survival or nonsurvival surgery is performed (e.g., gas anaesthesia machines, respirators, etc.).

Surgical unit 16.3 contains the following surgical support equipment:
- ABL (1)
- Gas anesthesia apparatus (3 new and 3 older)
- Autoclave (1)
- Automatic infusion pumps
- Mobile C-arm X-ray system (1)
- Diathermia equipment (6)
- Electrocautery
- Camera and monitor (1)
- Suction
- Surgical Instruments (6 complete sets)
- Laparoscopy apparatus (2)
- Lights: Surgical and ergonomic lights (in all rooms)
- Operating tables (3 new and 3 older)
- Respirators
- Dishwasher for the decontamination of instruments (1)
- Various utensils and consumables such as sutures, sterile equipment etc.

The surgical unit at Frederiksberg contains the following surgical support equipment:
- ABL (1)
- Gas anesthesia apparatus (3)
- Autoclave (1)
- Automatic infusion pumps
- Mobile C-arm X-ray system (1)
- Diathermia equipment (1)
- Camera and monitor (1)
• Suction
• Surgical Instruments (not in sets)
• Laparoscopy apparatus
• Lights: Surgical and ergonomic lights
• Operating tables (4)
• Respirators (3)
• Dishwasher for the decontamination of instruments (1)
• Various utensils and consumables such as sutures, sterile equipment etc.

The surgical room at Taastrup contains the following surgical support equipment:
• Gas anesthesia apparatus (2)
• Surgical Instruments
• Standard operating light
• Operating tables (2)
• Respirators (2)
• Various utensils and consumable such as sutures, sterile equipment etc.

The rodent experimental units (Panum; 10.3, 16.2, 16.4, Copenhagen University Hospital, Biocenter and AKB) all possess gas anaesthesia machines.

c. Describe any specialized considerations for designation of surgical areas (e.g., rodents, aquatics, farm animals, etc.).

Not applicable


a. Describe the criteria used to differentiate major from minor survival surgery, including classification for certain procedures (e.g., laparoscopic technique, etc.).

The Department considers major surgery to include exposure of body cavities or major tissue damage/loss or substantial impairment of functions. Other surgeries are considered to be minor.

Surgery is performed on rodents, rabbits, cats, dogs, sheep, cows, goats and pigs and can include a number of procedures, such as catheterisation, nephrectomy, enterotomy, eye and heart surgery etc.

b. How is a non-recovery surgical procedure defined?

A non-survival procedure is a procedure where the animal is euthanized while still anaesthetised.
a. Describe procedures, equipment, and protective clothing used for aseptic surgery. Include patient and surgeon preparation.

**Description of the use of aseptic techniques**
- Animal hair removal and disinfection of the operative site (E.g. use of clippers and appropriate skin disinfectant to prepare the region for surgery)
- Use of hand-wash, sterile gloves, mask, cap, surgical scrubs
- Use of draping, sterilized instruments, sutures, supplies etc.
- Operative techniques to reduce the likelihood of infection.

The Department has a comprehensive SOP describing these procedures.

b. Describe methods used to sterilize instruments and protective clothing. Indicate how effectiveness of sterilization is monitored and, if applicable, any approved alternate methods for instrument re-sterilization between serial surgeries. If used, include a description of approved liquid sterilants and instrument exposure time(s) required for each.

The Department uses an autoclave to sterilize packaged surgical instruments and other materials used in surgery. Sterile single-use materials are used when convenient or appropriate. Instruments used in serial surgery of rodents may also be sterilized with a hot bead sterilizer (instrument handles can be cleaned using ethanol). Autoclave efficiency is checked by the use of sterilization indicator adhesive tapes. Only disposable, single-use protective clothing is used.

c. Describe surgical support functions provided by the programme to investigators.

The Department is generally not directly involved in surgery performed by researchers who use the Department’s services. The researchers carry out the surgery themselves and are responsible to the Council for Animal Experimentation. The Department participates indirectly in surgical activities by providing guidance and advice. In certain instances, veterinary staff or a vet nurse can be available to provide assistance during surgical procedures, particularly with monitoring anaesthetic levels, vital organ function and inserting catheters etc.

5. **Intraoperative Monitoring** [Guide, p. 119]

Describe monitoring and recording requirements for each species, including the type of record(s) maintained. Also note monitoring of anaesthesia during non-recovery procedures.

**Proper intra-operative monitoring techniques include:**
- Monitoring anaesthetic level and vital organ functions (e.g. adequate level of anaesthesia) will be maintained by monitoring arterial blood pressure, respiration rate (chest wall movement), corneal reflex, and/or hindlimb withdrawal to toe pinch
• Providing vital organ support such as parenteral fluid administration, oxygen and maintenance of body temperature.

For large animals undergoing survival surgery, written records of surgery listing the procedure, are kept by the veterinary technicians running the surgical facility at unit 16.3 and the surgical unit at Frederiksberg. These records are kept electronically. For rodents and rabbits written records are not kept by the Department.

Describe the postoperative care programme, including who is responsible for overseeing and providing the care, types of records maintained (e.g., perioperative), where the records are maintained, etc.

The researcher is ultimately responsible for overseeing and providing care following surgery (according to Danish law). The animal technicians may assume this responsibility, provided the researcher has given instructions. For rodents and rabbits, written records are not kept by the Department. For pigs undergoing survival surgery, written records of surgery, listing the procedure, are kept by the veterinary technicians running the surgical facility at unit 16.3 and surgical unit Frederiksberg. These records are placed in the anteroom of the pig stable.

Proper postoperative techniques
• Monitoring temperature, cardiovascular and respiratory function
• Monitoring of the surgical incision (e.g. Check for signs of infection, improper wound closure, the use of antimicrobial agents like betadine at the incision site)
• Thermal support to avoid hypothermia (e.g. use of a heating pad for a period of time after surgery)
• Administration of analgesia for postoperative pain (e.g. Buprenorphine)
• Administration of prophylactic antibiotics and other drugs
• Suture or clips removal (usually 8-10 days postoperatively)
• Recovery area. Recovering rodents should be housed individually to prevent injury by cage-mates. Although constant monitoring may not be possible, the animals should be frequently observed until recovered from anaesthesia and adequately stabilized before being returned to their home cages.
• Monitor mobility and behaviour of the animal
• During major operative procedures on multiple rodents, care must be taken to avoid cross contamination.

E. Pain and Distress [Guide, pp. 120-121]

1. Describe how and by whom pain and distress are assessed and categorized.

The researcher is ultimately responsible for assessing pain and distress (according to Danish law). Animal technicians may assume this responsibility provided the researcher has given appropriate instructions. If there is any uncertainty, Department veterinarians may be contacted.
2. Describe how the IACUC/OB ensures that unnecessary pain and distress are avoided (e.g., pilot studies, monitoring by veterinary staff, animal use protocols, humane endpoints, other refinements, etc.).

The Danish law on animal experimentation states that strong pain, suffering or fear is unacceptable at all times. The responsibility rests with the license-holder. The Animal Experiments Inspectorate includes the following phrase in a number of licenses: “The animals must be sacrificed as soon as the goal of the experiment has been reached. In case of seriously affected general condition, or complications leading to suffering, the animals must be euthanized immediately”. For experiments, where curative measures are available, this may be stressed by the phrase “In case of seriously affected general condition, or complications leading to suffering, the condition must immediately be alleviated or the animals must be euthanized”.

Furthermore the researchers must state in their license what humane endpoints they will use, which ensures early indicators for future suffering are used. The animal is to be euthanized, or in other ways removed from the experiment, when it reaches the criteria described. This is always discussed with the researcher during the Veterinarian’s scrutiny of the project plan.

In addition, the Animal Experiments Inspectorate publishes guidance notes on limits on tumour sizes, limits on arthritic changes etc. that the Department adheres to.

All personnel at the Department of Experimental Medicine are focused on animal welfare. Both the animal technicians and the veterinary staff are very aware of the wellbeing of the research animals housed in the facility. It is also the central issue in the Department’s IACUC, known as the Animal Welfare Committee. The IACUC outlines general guidelines on this topic, which are enforced by all staff and particularly through the project plan reviewed by the veterinary staff.

F. Anaesthesia and Analgesia [Guide, pp. 121-123]

1. List the agents used for each species. Dosages, routes of administration and drug combination should be included in guidelines and available at the time of the site visit. Describe also any non-pharmacologic means used to diminish pain and distress.

The Department recommends opioids for strong pain and NSAIDs for more moderate pain. The two types of analgesics can be combined for synergistic effect. The Department encourages the researcher to treat rats post operatively with oral buprenorphine. The animals are fed 0.1 – 0.25mg/kg buprenorphine (Temgesic®, Reckitt Benckiser, Berkshire, UK) sublingual mixed in sweetened hazelnut chocolate spread known as Nutella (Ferrero SpA, Alba, Italy), 2-3 times daily.

Table 18. Opiod analgesics (mg/kg body weight) for various species of laboratory animals
Butorphanol
Morphine
Pethidine
Buprenorphine

Mouse
1-5 SC
2.5-5 SC
10-20 SC, IM
0.05-0.1 SC

Rat
2 SC
2.5 SC
10-20 SC, IM
0.01-0.05 SC, IV

Guinea pig
- 2 SC, IM
- 2 SC, IM
0.05 SC

Rabbit
0.1-0.5 IV
- 10 SC, IM
0.01-0.05 SC, IV

Cat
0.4-0.8 SC
0.1-0.2 SC
4-10 SC, IM
0.001-0.005 SC, IV

Dog
0.2-0.6 SC, IM
0.5-5 SC, IM
10 IM
0.005-0.02 SC, IM, IV

Ruminant
0.5 IM, SC
0.2-0.5 IM
2-4 IM, IV
0.005-0.01 IM, IV

Pig
1-0.3 IM
0.2-1 IM
1-10 SC, IM
0.05-0.1 IM, IV

Frequency of administration
6 x daily
6 x daily
8 x daily
4 x daily

Table 19. NSAID analgesics (mg/kg body weight) for various species of laboratory animals

<table>
<thead>
<tr>
<th>Species</th>
<th>Acetyl Salicylic Acid</th>
<th>Carprofen</th>
<th>Flunixin</th>
<th>Ketoprofen</th>
<th>Paracetamol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mouse</td>
<td>120 PO</td>
<td>5 SC</td>
<td>2.5 SC, IM</td>
<td>-</td>
<td>200 PO</td>
</tr>
<tr>
<td>Rat</td>
<td>100 PO</td>
<td>5 SC</td>
<td>2.5 SC, IM</td>
<td>5 IM</td>
<td>200 PO</td>
</tr>
<tr>
<td>Guinea pig</td>
<td>87 PO</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Rabbit</td>
<td>100 PO</td>
<td>1.5-4 PO</td>
<td>1.1 SC, IM</td>
<td>3 IM</td>
<td>-</td>
</tr>
<tr>
<td>Cat</td>
<td>10-25 PO</td>
<td>4 IV, SC</td>
<td>1 SC</td>
<td>1-2 SC</td>
<td>contraindicated</td>
</tr>
<tr>
<td>Dog</td>
<td>10-25 PO</td>
<td>4 IV, SC</td>
<td>1 IV, IM</td>
<td>2 SC, IM, IV</td>
<td>15 PO</td>
</tr>
<tr>
<td>Ruminant</td>
<td>50-100 PO</td>
<td>-</td>
<td>1-2 IV, SC</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Pig</td>
<td>10 PO</td>
<td>2-4 IV, SC</td>
<td>1-2 SC, IV</td>
<td>3 IM</td>
<td>-</td>
</tr>
<tr>
<td>Frequency of Administration</td>
<td>3 x daily*</td>
<td>1 x daily</td>
<td>2 x daily</td>
<td>1 x daily</td>
<td></td>
</tr>
</tbody>
</table>

*: Cats: ASA: 1 x 48 hours, Flunixin: 1 x daily.
PO: perorally  IV: intravenously SC: subcutaneously IM: intramuscularly

Non-pharmacologic means to alleviate pain include: Reduction of fear and excitement e.g. by removal from cage mates, quiet surroundings, dim light, prevention of dehydration by parenteral or enteral liquid supplementation, prevention of hypothermia by provision of heat source. In addition gentling through handling and training is encouraged.

2. Describe how the veterinarian(s) provides guidance and advice to researchers concerning choice and use of anaesthetics, analgesics or other pain moderating methods.

The veterinarians provide individual verbal and written guidance for investigators when requested or if a problem is noticed or foreseen (for example when the veterinarian reviews a project plan). The obligatory EU function “ABD” or “AD” courses in laboratory animal science include theory and practical classes in anaesthesia and analgesia.

3. Describe the monitoring of the effectiveness of anaesthetics and analgesics, including who does the monitoring.

The use and monitoring of anaesthetics and analgesics is normally the responsibility of the researcher. The researcher may give directions to animal
technicians to monitor and administer post-operative analgesia. Analgesics and anaesthetics are never used when out of date. The following monitoring measures are used to ensure the effectiveness of the drugs used; monitoring arterial blood pressure, respiration rate (chest wall movement), corneal reflex, and/or hindlimb withdrawal to toe pinch. There is no legal or institutional demand for routine records. Licenses may contain requirements for anaesthesia/analgesia in specific projects.

4. Describe how the veterinarian(s) and the IACUC/OB evaluate the proposed use of neuromuscular blocking agent to ensure the well-being of the animal.

The use of neuromuscular blocking agents must be scientifically justified and are only ever used in conjunction with suitable anaesthetics and appropriate means of mechanical ventilation, as recommended by Department veterinarians.

5. Describe policies and practices for maintaining and ensuring function of equipment used for anaesthesia.

Equipment is checked before each use and the level of anaesthesia is monitored during surgery to ensure the efficacy of the equipment. Equipment is serviced yearly by a company called Thuesen teknik (Vallensbæk, Denmark) [www.thuesen-teknik.dk](http://www.thuesen-teknik.dk).


1. Describe approved methods of euthanasia, including humane slaughter. Include consideration of species, age, condition (e.g., gestational period, or neonatal) and location(s) for the conduct of the procedure.

Laboratory animals are euthanized in a humane and non-stressful way. The procedures are carried out according to Danish legislation (BEK nr 88 af 30/01/2013 “Bekendtgørelse om dyreforsøg” appendix 3. [https://www.retsinformation.dk/Forms/R0710.aspx?id=145248](https://www.retsinformation.dk/Forms/R0710.aspx?id=145248). See the list below for species details.

**Euthanasia in rats:**
- Blow to the head followed by:
  - Decapitation,
  - Cervical dislocation on rats under 250g
  - Lethal injection of pentobarbital.
- CO₂ asphyxiation in purpose built chambers with gradual filling with CO₂
- Anaesthesia followed by:
  - I.v., i.p. or i.c. injection of pentobarbital
  - Cardiac puncture
  - Exsanguination by severing the carotid artery

**Euthanasia in mice:**
- Cervical dislocation
• CO2 asphyxiation in purpose built chambers with gradual filling with CO₂
• Anaesthesia followed by:
  a) I.v., i.p. or i.c. injection of pentobarbital
  b) Heart puncture
  c) Bleeding by cutting the main vessels in the neck or axilla

Euthanasia in rabbits and guinea pigs:
• Blow to the head followed by:
  a) Cervical dislocation
Anaesthesia followed by:
  b) I.v., i.p. or i.c. injection of pentobarbital
  c) Heart puncture
  d) Bleeding by cutting the main vessels in the neck
  e) Cervical dislocation on animals less than 1 kg.

Euthanasia in pigs:
• Shooting with a bolt gun followed by exsanguination.
• Anaesthesia followed by:
  a) Exsanguination
  b) Intracardial or intravenous injection of pentobarbital

Euthanasia in hens:
• Blow to the head followed by:
  a) Decapitation on birds under 5 kg. Birds under 250g can be decapitated without sedation.
  b) Cervical dislocation on birds under 1 kg.
• Anaesthesia followed by:
  a) Exsanguination
  b) Intracardial or intravenous injection of pentobarbital

Euthanasia in large animals (cow, sheep, goat):
• Shooting with a bolt gun followed by exsanguination.
• Anaesthesia followed by:
  a) Exsanguination
  b) Intracardial or intravenous injection of pentobarbital

Euthanasia in terrapins:
• Sedation followed by injection of pentobarbital into the arterial sinus under the shell, followed by decapitation.

Euthanasia in cats, dogs, ferrets and foxes:
• Anaesthesia followed by intravenous injection of pentobarbital

Euthanasia in Rana frogs and Xenopus:
• Anesthesia followed by injection of pentobarbital.
  • Concussion and decapitation

Euthanasia in Fish:
2. Describe policies and practices for maintaining and ensuring function of equipment used for euthanasia.

All equipment is kept in good working order via surveillance from animal technicians and those who use the equipment. Any equipment used is sanitised as appropriate after each use. Equipment is also serviced yearly by Thuesen Teknik.

3. Describe the methods used to confirm death of an animal.

Methods used to confirm death of an animal are as follows:
• Check for the absence of a heart beat
• Check the colour of mucous membranes, which should be pale
• If using cervical dislocation, check that the neck is broken by feeling with fingers

IV. Physical Plant [ETS 123, Article 19 and Appendix A, pp. 8-9; Guide, pp. 133-151]
Repeat this section for each animal housing area, including agricultural settings, temporary holding areas for field studies, aquatic environments, and each IACUC/OB approved satellite housing facility. Include as an appendix the floor plans of each (if applicable) on 8.5" x 11" or A4 paper.

A. Location and Construction Guidelines

1. Note the location (building, floor, wing, etc.) of the animal facility(ies). Describe the management structure and programme oversight for each of the areas listed in this section.

The Department of Experimental Medicine operates in six separate geographical locations (Panum, Biocenter, RH, AKB, Taastrup and Frederiksberg). The Panum site extends over four buildings (4, 10, 16 and 18) and six floors within the Panum building. The Biocenter site is located in the lower ground floor of the Biocenter building. The AKB site is located on the ground level of the AKB building. The RH site is located in the ground floor of building 5703. The Panum, RH, Biocenter and AKB sites are all within walking distance of each other within the central city of Copenhagen and RH, Biocenter and Panum are connected by an underground walkway. The Frederiksberg site is located 4km from the Panum building and consists of the ground floor of two main buildings located on Dyrlægevej. The Taastrup unit is located 20km from the Panum building, out of the city and consists of three main buildings plus fields and various storage constructions.

Floor plans (architectural drawings) and room allocation information are attached for all of the above described buildings. These include detailed information on total area of the facilities, sites, and units, and information regarding area space allocated for animal rooms, procedure rooms (including laboratories), and service space areas.
The management structure and programme oversight is the same for all of the separate areas of the Department.

2. Describe the physical relationship of the animal facilities to the research laboratories where animals may be used.

In general
Most procedures are carried out within the units, using the laboratories and procedure rooms available. Laboratories and procedure rooms are usually located on the opposite side of the corridor to animal housing rooms and where possible, at the other end of the corridor.

Researchers are allowed to bring and use special equipment inside the unit, provided that it can be sanitised and does not pose any risk of infection. However, researchers do in some cases take the animals out of some units and into their own research labs, if special equipment is needed. Researchers are informed of rules and regulations in these cases and must ensure that the external laboratory is classified with at least the same status as the unit the animals were taken from. In case of contamination of a unit, researchers are requested to clean and gas-sterilize their laboratories so that the unit is not re-infected. In this case, the Department provides the researcher with both advice on the subject and decontamination equipment. Each laboratory outside the Department, in which animal experimentation takes place, is considered an allergen zone and transport of animals between the Department and outside laboratories takes place in sealed containers.

Panum, Biocenter and AKB
The units at these sites have a traditional arrangement. In all units where animals are housed, the animal rooms are located on one side of the corridor, and the laboratories are located on the other side, so the animals do not have to leave the unit. Exceptions are floor 01 and 02 at the Panum site where animals are housed in pens. These animals are generally used in procedures in building 16, floor 3. The main laboratory is located in building 16, floor 1.

RH
At the Copenhagen University Hospital, the animal rooms are located in a separate section on the same floor as the laboratories. Animals are transferred via a corridor to the research laboratories, which are located adjacent to the animal room section. The laboratories are considered part of the unit.

Frederiksberg and Taastrup
There are surgical suites at both the Frederiksberg and Taastrup facilities, located in the same building as some of the animal housing rooms, although in separate rooms. Some standard procedures for large animals are carried out within the animal holding room in order to avoid stressing the animals by moving them. There are facilities within each animal room to allow this (benches and washing facilities). Otherwise procedures are carried out within the designated surgical suites.

3. Describe the general arrangement of the animal facilities (e.g., conventional, clean/dirty corridor, etc.). For animals that are maintained in a laboratory in order
to satisfy the scientific aims of a protocol, describe the housing and care provided and the maximum period of stay required.

Animals may be moved to external laboratories in order to use equipment not available at units. In these cases the animals may not be kept overnight and must be afforded the same care facilities as found in the Departments units.

Table 20. General arrangement of animal facilities

<table>
<thead>
<tr>
<th>Site</th>
<th>Unit</th>
<th>Building</th>
<th>Floor</th>
<th>Cage</th>
<th>Unit type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panum</td>
<td>01</td>
<td>Service</td>
<td>02, 04</td>
<td>01</td>
<td>No animals housed (sometimes animals are kept for up to (\frac{1}{2}) a day in a Scantainer in the Service area)</td>
</tr>
<tr>
<td>Panum</td>
<td>01</td>
<td></td>
<td>10, 16</td>
<td>01</td>
<td>Conventional and Pen</td>
</tr>
<tr>
<td>Panum</td>
<td>02</td>
<td></td>
<td>16</td>
<td>02</td>
<td>Pen</td>
</tr>
<tr>
<td>Panum</td>
<td>10.2</td>
<td></td>
<td>10</td>
<td>2</td>
<td>IVC</td>
</tr>
<tr>
<td>Panum</td>
<td>10.3</td>
<td></td>
<td>10</td>
<td>3</td>
<td>IVC</td>
</tr>
<tr>
<td>Panum</td>
<td>10.4</td>
<td></td>
<td>10</td>
<td>4</td>
<td>IVC</td>
</tr>
<tr>
<td>Panum</td>
<td>16.1</td>
<td>Office</td>
<td>16</td>
<td>1</td>
<td>No animals housed</td>
</tr>
<tr>
<td>Panum</td>
<td>16.2</td>
<td></td>
<td>16</td>
<td>2</td>
<td>IVC</td>
</tr>
<tr>
<td>Panum</td>
<td>16.3</td>
<td></td>
<td>16</td>
<td>3</td>
<td>No animals housed</td>
</tr>
<tr>
<td>Panum</td>
<td>16.4</td>
<td></td>
<td>16</td>
<td>4</td>
<td>IVC</td>
</tr>
<tr>
<td>RH</td>
<td>RH</td>
<td></td>
<td>5703</td>
<td>00</td>
<td>Conventional</td>
</tr>
<tr>
<td>RH</td>
<td></td>
<td></td>
<td>9392</td>
<td>K</td>
<td>Conventional</td>
</tr>
<tr>
<td>Biocenter</td>
<td>Biocenter</td>
<td></td>
<td>02</td>
<td>IVC</td>
<td>Experimental unit</td>
</tr>
<tr>
<td>AKB</td>
<td>AKB</td>
<td></td>
<td>02</td>
<td>Conventional</td>
<td>Experimental unit</td>
</tr>
<tr>
<td>Frederiksberg</td>
<td>-</td>
<td>1-73</td>
<td>1</td>
<td>Pens</td>
<td>Experimental unit</td>
</tr>
<tr>
<td>Frederiksberg</td>
<td>-</td>
<td>1-36</td>
<td>1</td>
<td>Pens</td>
<td>Experimental unit</td>
</tr>
<tr>
<td>Frederiksberg</td>
<td>-</td>
<td>1-39</td>
<td>1</td>
<td>Pens</td>
<td>Experimental unit</td>
</tr>
<tr>
<td>Taastrup</td>
<td></td>
<td>9-11</td>
<td>1</td>
<td>Pens</td>
<td>Experimental unit</td>
</tr>
<tr>
<td>Taastrup</td>
<td></td>
<td>9-05</td>
<td>1</td>
<td>Pens</td>
<td>Experimental unit</td>
</tr>
<tr>
<td>Taastrup</td>
<td></td>
<td>9-02</td>
<td>1</td>
<td>Pens</td>
<td>Experimental unit</td>
</tr>
<tr>
<td>Taastrup</td>
<td></td>
<td>9-04</td>
<td>1</td>
<td>Pens</td>
<td>Experimental unit</td>
</tr>
<tr>
<td>Taastrup</td>
<td></td>
<td>9-03</td>
<td>1</td>
<td>Pens</td>
<td>Experimental unit</td>
</tr>
<tr>
<td>Taastrup</td>
<td></td>
<td>32-0 øst</td>
<td>1</td>
<td>Field</td>
<td>Experimental unit</td>
</tr>
</tbody>
</table>

Table 20. General arrangement of animal facilities

Animals may be moved to external laboratories in order to use equipment not available at units. In these cases the animals may not be kept overnight and must be afforded the same care facilities as found in the Departments units.
4. Describe finishes throughout the animal facility(ies) for floors, walls, ceilings, doors, alleyways, and gates. Note any areas that are not easily sanitised and describe how these areas are maintained.

Corridors in animals units and service areas are wide, so equipment can be moved around easily. The walls are typically concrete covered with either vinyl, painted with plastic paint or laminated. Floors in corridors are covered with vinyl in most animal units, whereas in the main service area at the Panum site, floors are coated with epoxy or special paint in all service areas.

Floors
Floors are covered with vinyl, except at the Copenhagen University Hospital and AKB, where the walls are covered with ceramic tiles. All seams and gaps are joined with either silicone or welded seam vinyl. In the work area at the main service area at the Panum site, floors are either epoxy covered or specially painted concrete. In areas at the other sites, floors are covered by ceramic tiles, epoxy coated concrete or plain concrete.

Doors
Doors for entering the units are typically steel, with viewing windows. The same applies for doors into the animal rooms (10.2, 10.3, 10.4, 16.2 IVC, 16.2 M/B, 16.4 at the Panum site and the Biocenter). At the RH and AKB doors are wooden and sealed with paint except for the door leading to the animal room section, which is made of steel and glass. Doors at both Frederiksberg and Taastrup facilities are typically painted wood or steel.

Walls
Walls in animal rooms are mainly seam vinyl sheeting, except for ceramic tiles at RH and AKB. Walls at the Frederiksberg facility are either painted concrete or wood and floors are concrete. Walls at the Taastrup facility facilities are either painted concrete or whitewash and floors are concrete, in some cases sealed with textured epoxy. Whitewash is in itself a type of sanitation and is re-coated once a year. Pens within these rooms are constructed away from walls so that animal debris does not come in contact with walls and the pens themselves can be easily sanitised. Walls in other rooms and service areas are either concrete, covered with vinyl, laminate or ceramic tiles or painted with plastic paint.

Ceilings
Ceilings are either painted with plastic coating or other water-resistant paint in animal units/rooms. Ceilings at the Frederiksberg and Taastrup facilities are made of wood or fibrous material. Various ceiling materials are used outside animal units. At the Biocenter, lowered ceilings are used. The main support area at the Panum site has either lowered ceilings covering installations or open ceilings exposing installations.

Windows
Animal rooms at Panum, RH, Biocenter and AKB do not have windows, however some of the steel doors, leading to the corridor, have a window. All offices and
some procedure rooms have windows with an outdoor view. Some animal housing rooms at Frederiksberg and Taastrup have glass windows with wooden or metal frames.

5. If exterior windows are present within the animal housing or procedure areas, describe IACUC/OB consideration regarding temperature and photoperiod control, as well as potential security risks.

Some procedure rooms at the Panum and RH sites have exterior windows. In these cases there is limited access to the outside of these facilities, ensuring security. The rooms have central heating and cooling systems as with other rooms in the units. There is no form of photo period control, however animals may not be kept in these procedure rooms over night, they must be returned to the animal holding rooms.

At the Frederiksberg and Taastrup facilities, animal housing rooms, for the most part, have heating and ventilation systems to control temperature. There is photoperiod control in all animal rooms in building 1-39 and room 51 in building 1-36 at the Frederiksberg facility and building 9-04 and room L5 in building 9-11 in the Taastrup facility.

The Taastrup facility is an isolated facility set in a rural area, therefore security issues due to foot traffic are not a great concern. Windows to animal rooms in the Frederiksberg facility are generally placed high on the wall and would therefore be difficult to access from the outside. Campus security also patrols the area outside of working hours.

B. Functional Areas and Operations

1. Heating, Ventilation, and Air-Conditioning (HVAC) [ETS 123, Appendix A, pp. 9-10; Guide, pp. 139-140, 143]

a. Describe the mechanical systems used to provide temperature, humidity and air pressure control. Include details such as the use of variable air volume (VAV) systems, and additional key features of HVAC systems affecting performance.

Most central systems are relatively modern and/or are continuously being upgraded. Electronically Controlled Ventilation systems (ECV) are commonly used and ensure efficient, silent and economical ventilation throughout the Department at Panum, Biocenter, AKB, RH and Frederiksberg (1-36). All these systems supply the rooms with clean (100% fresh), filtered and heated/cooled air. Units are individually equipped with air filters. The HVAC systems are equipped with electrical heating, and humidity can be adjusted.

Panum
There are two main ventilation systems at the Panum site: Siemens (Unigyr-Visonik Insight) and Honeywell (Enterprise Buildings Integrator). A Rough-grade and a fine-grade (class 7 and class 9 filters) are installed at the supply. Each animal unit is divided into four zones that are ventilated individually. The only exceptions are unit 04.01 (MGU), which has only one ventilation zone.
(ventilation system 3118/19/20), controlled and monitored by the Siemens system, and unit 16.4, which is divided into three ventilated zones.

**Biocenter**
At the Biocenter site a Siemens Building Automation system provides ventilation. The ventilation system has a general heating and humidity supply as well as individual heating and humidity supplies in each individual animal room.

**RH**
The animal rooms at the RH site are situated in a secluded section with admittance control and limited access. The unit is designed with one corridor leading to the four animal rooms and the service room. The unit is operated by an individual HVAC system (system number 3211). Furthermore, heating can be supplied locally via heaters that are controlled via a thermostat.

**AKB**
The site at the August Krogh Building has undergone refurbishment and modernization, which includes a replacement of the current ventilation system.

**Frederiksberg**
At this site there are 3 systems. Building 1-39 is equipped with a relatively new system from the year 2000. This is a barrier facility for infection studies and all parameters can be controlled; ACH, heating, cooling, pressure etc. Both the intake and exhausts are fitted with filters, in accordance with the requirements of individual experiments.

Older systems are in place in buildings 1-73 and 1-36. Here systems supply the rooms with fresh air and heating, but no cooling is available. Mobile air conditioning units are used in rare cases.

**Taastrup**
Systems here are not laboratory standard HVAC systems, but production stable systems. The newest system in building 9-11 is from 2001. Ventilation is set according to the requirements of the species and number of animals in the room. The rooms of the animals are supplied with fresh air and heating as well.

Systems in buildings 9-05 and 9-04 are simple, manually operated systems. A central fan is switched on/off, but the heating is centrally controlled and monitored by the central maintenance staff.

Please see appendix 10: Environmental parameters for lab animals at AEM/HVAC system summary for details regarding environmental parameters, settings, ranges, ACH, photo period and reaction times. Pressure settings are also indicated in the above appendix.
b. Describe construction features that minimize the potential for adverse consequences to animal well-being, such as re-heat coils that fail closed or that are equipped with high-temperature cut-off systems.

Building Management Systems (BMS) monitor all facilities equipped with HVAC systems, which are used to control and regulate the heating and ventilation systems so they function optimally within set ranges. The BMS is also a tool to identify troubleshooting using the built-in or attached analysis systems. The system constantly adjusts according to set parameters and an alarm will go off if the system is out of the defined range and cannot self-adjust. Maintenance staff will react to deviations and are on call outside working hours in case a critical deviation is detected.

Second level monitoring is done by the animal technicians, who in their daily routine monitor environmental parameters on either AHUs or room loggers. Furthermore, the AEM engineers have access to an online system – WDM – that monitors every AHU used for IVCs and which sends alarms according to defined values.

One system (9-11 in Taastrup) notifies the responsible AEM engineer directly. If the person isn’t available, the message is redirected to the animal technicians on call and finally to the Facility Manager.

c. Describe how critical air pressures, ventilation, and temperature are monitored and maintained in the event of a system or component failure.

Supervision of the system
The central surveillance/maintenance departments (CSS, SCS and RH) at the buildings where the sites are located supervise the HVAC systems. They react in case of deviations, failures or breakdown and the Department is notified, if necessary. At all sites, the ventilation systems supplying the animal rooms have high priority. Furthermore, the Department monitors environmental parameters locally through the readings on the AHU/ the WDM-system and local loggers.

Panum
In case of power failure, or other utility failures, the systems are emergency powered by diesel generators, and electrical heating can also be supplied.

RH
In case of an alarm, the system is inspected and the failure corrected.
• Temperature alarm: if the failure cannot be fixed, the closed doors will manually be opened to stand ajar.
• If the standard cooling system fails, the water-cooling system is used as backup.
• Humidity alarm: will be fixed the next weekday.
• System failure: the system is switched over to manual operation.
• Documentation: alarms are registered daily in a log.
• Communication: in case of severe or long lasting failures, the Department is contacted.

**Biocenter**
In case of power failure, or other utility failures, the systems are emergency powered by diesel generators, and electrical heating can also be supplied.

**AKB**
In case of power failure, or other utility failures, the systems are emergency powered by diesel generators, and electrical heating can also be supplied.

**Frederiksberg**
The system in building 1-39 is a barrier facility. The HVAC is fully monitored and in case of failure, maintenance staff reacts and the responsible AEM engineer is notified. Emergency power can be supplied by mobile generator.

Systems in buildings 1-73 and 1-36 are also BMS monitored, but in case of emergency, either mobile heating or cooling devices can be installed and opening of windows/doors can help to sustain acceptable environmental parameters.

**Taastrup**
Only the system in building 9-11 is fully monitored. In 9-05 and 9-04 only the heating is monitored by the central maintenance staff. The same precautionary measures are available here as at the Frederiksberg site.

d. Describe procedures for monitoring animal facility mechanical systems and notifying appropriate personnel in the event of a significant failure that occurs outside regular work hours.

Temperature, humidity and other deviations outside the defined ranges for the various units, species etc. are to be solved according to defined time intervals. Please see appendix 10: Environmental parameters for lab animals at AEM/HVAC system summary. In all cases the Department’s engineers and Facility Mangers are notified in case of serious deviations or breakdown.

**Panum**
The systems are monitored according to the set values on the intake and the exhaust on all systems in each unit. Deviations are constantly monitored, and are adjusted automatically by the computerized HVAC-system. Should parameters deviate from the set limits, an alarm goes off and maintenance staff will be notified and will investigate as required. The systems are under 24-hour surveillance by either maintenance staff or security personnel. The Department’s engineers and Facility Manager are notified in case of serious deviations or breakdown. In case of power failure, or other utility failures, an emergency system in the form of diesel generators, and electrical heating can also be supplied.
Biocenter
The surveillance staff monitor the system. Temperature and humidity readings are taken from the exhaust air. Deviations are constantly observed, and are adjusted automatically by the HVAC-system. Should parameters deviate from the set limits, an alarm goes off and maintenance staff will be notified to resolve the problem. During working hours the maintenance staff at the Biocenter are alerted. Outside working hours the alarm is redirected to Panum (in which case the same procedures apply as for the Panum Building in terms of backup power systems and notifying the Department’s engineers and Facility Manager).

RH
The University Hospital’s central surveillance department continuously monitors the ventilation system. Both temperature and humidity are monitored. The humidity is regulated according to the set parameters, which are measured via the exhaust. The temperature is measured at room-level via a thermostat in each animal room. Note that the adjustment and monitoring of the heater thermostats are not centrally monitored.

The maintenance department at the University Hospital supervises alarm settings connected to the central control system. The maintenance staff reacts to alarms according to what has been agreed with the Department:

Procedures in case of an alarm for RH:
In case of an alarm, the system must be inspected and the failure corrected.
• Temperature alarm: if the failure cannot be fixed, the closed doors will manually be opened to stand ajar.
• If the standard cooling system fails, the water-cooling system is used as a backup.
• Humidity alarm: will be fixed the next weekday.
• System failure: the system is switched over to manual operation.
• Documentation: alarms are registered daily in a log.
• Communication: in case of severe or long lasting failures, the Department is contacted.

AKB
The maintenance staff monitor the system during work hours. Outside work hours the SCS hotline can be called. Local room loggers measure environmental parameters.

Frederiksberg
Systems are under 24 hour surveillance by central maintenance staff. Local room loggers measure environmental parameters. Maintenance staff is on call 24/7.

Taastrup
Systems are partially under 24 hour surveillance. One system (building 9-11) has an alarm system which notifies the responsible AEM engineer. Only the
heating is centrally monitored. Local room loggers measure environmental parameters. Maintenance staff is on call 24/7.


   a. Note if emergency power is provided for the animal facility and if so, what electrical services and equipment are maintained in the event the primary power source fails.

      Diesel generators supply emergency power in case of failure to the Panum site, Biocenter, AKB and RH. This mainly supports the HVAC systems in the animal units and lighting for escape paths in the different buildings as well as other essential equipment i.e. fume hoods, certain refrigerators etc. IVC AHUs are also connected to the emergency power. There is no backup for lighting in the animal rooms. However, lighting equipment can be hooked up individually to emergency power if required.

      **Frederiksberg and Taastrup**
      At these sites no systems are automatically powered in case of emergency. In case of breakdown, AEM’s engineers will evaluate if any critical functions will need emergency power and ensure these are powered by mobile generators.

   b. Give history of power failures for the animal facility. Note frequency and duration. If emergency power was not available during a power failure, describe steps taken to ensure the comfort and well-being of the animals and the temperature extremes reached in the animal rooms during the failure.

      Only pre-announced power failures have occurred, and these last for only a few minutes. These forced power failures are for maintenance reasons and to test the backup systems.

      As mentioned, the HVAC system is backed-up by an emergency power supply, and therefore the temperature, humidity and ventilation are not affected by power failure.

      No unannounced power failures have been recorded the last three years.

   c. Describe lighting system(s) for the animal housing facility(ies). For each species or holding room type, list light intensity, photoperiod (Light:Dark), construction features (e.g., water resistance), and control (e.g., automatic versus manual, phasing). For systems automatically controlling photoperiod, describe override mechanisms.

      In animal rooms at Panum, Biocenter, RH and AKB, the lighting is automated and normally set at 12h/12h photoperiod. There is also a twilight period of a ¼
to ½ an hour. See the table below for variations of the light cycle.

Conventional fluorescent lighting is used and the light fittings are waterproof.
Animal rooms are illuminated according to guiding principles set by the Guide.
According to Danish legislation the animal rooms should be equipped with adequate lighting in order carry out a full inspection of every animal. “BEK nr 687 af 25/07/2003 – Gældende Bekendtgørelse om forsøgsdyrs pasning og opstaldning og om anvendelse af udryddelsestruede og vildtlevende dyr til forsøg mv.: https://www.retsinformation.dk/Forms/R0710.aspx?id=1614#K4”.

There are no windows with direct access to outside light in any of the animal rooms throughout the facility except at the sites at Frederiksberg and Taastrup.

The automatic lighting systems in almost all units have a manual override in each room in the form of light switches. The Biocenter does not have a manual override system.

**Frederiksberg and Taastrup**

1-39 has an advanced lighting system and can be programmed according to individual species needs. 1-36 and 1-73 have natural light and a manual on/off lighting. 9-11 has natural light and a manual on/off lighting except L5 which has a lighting control system. 9-04 has a light control system. 9-05 has natural light and a manual on/off.

Table 21. Lighting specifications
<table>
<thead>
<tr>
<th>Species</th>
<th>Light Intensity (lux)</th>
<th>Photoperiod (L/D)</th>
<th>Water-resistant light fixtures (yes/no)</th>
<th>Automatic control (yes/no)</th>
<th>Windows (yes/no)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mice, rats, rabbits, guinea pig</td>
<td>Panum: 450 RH: 450 Biocenter: 650 AKB: 400</td>
<td>12h/12h (L: from 06:00am – 6:00pm)</td>
<td>Yes, all electrical circuits in animal rooms are water resistant.</td>
<td>Yes</td>
<td>Not in animal rooms</td>
</tr>
<tr>
<td>Rabbits, guinea pig</td>
<td>Rabbits: 450 Guinea pig: 450</td>
<td>12h/12h (L: from 06:00am – 6:00pm)</td>
<td>Yes, all electrical circuits in animal rooms are water resistant.</td>
<td>Yes / No</td>
<td>Not in animal rooms except in Frederiksberg and Taastrup (where there is manual light control)</td>
</tr>
<tr>
<td>Pigs</td>
<td>350</td>
<td>14h/10h (L: from 06:30am – 7:30pm)</td>
<td>Yes, all electrical circuits in animal rooms are water resistant.</td>
<td>Yes / No</td>
<td>Not in animal rooms except in Frederiksberg and Taastrup (where there is manual light control)</td>
</tr>
<tr>
<td>Chicken</td>
<td>500</td>
<td>12h/12h (L: from 06:00am – 6:00pm)</td>
<td>Yes, all electrical circuits in animal rooms are water resistant.</td>
<td>Yes</td>
<td>Not in animal rooms</td>
</tr>
<tr>
<td>Cats</td>
<td>500</td>
<td>12h/12h (L: from 06:00am – 6:00pm)</td>
<td>Yes, all electrical circuits in animal rooms are water resistant.</td>
<td>Yes</td>
<td>Not in animal rooms</td>
</tr>
<tr>
<td>Amphibians</td>
<td>Panum/AKB: 300</td>
<td>12h/12h (L: from 06:00am – 6:00pm)</td>
<td>Yes, all electrical circuits in animal rooms are water resistant.</td>
<td>Yes</td>
<td>Not in animal rooms</td>
</tr>
<tr>
<td>Reptiles</td>
<td>350</td>
<td>12h/12h (L: from 06:00am – 6:00pm)</td>
<td>Yes, all electrical circuits in animal rooms are water resistant.</td>
<td>Yes</td>
<td>Not in animal rooms</td>
</tr>
</tbody>
</table>

3. **System Malfunctions.** If not previously reported, describe animal losses or health problems resulting from power, HVAC, or other life support system (e.g., individually ventilated cages) failures, and mechanisms for reporting such incidences.  **AAALAC International Rules of Accreditation (Section 2.f)**

No animal losses or animal problems resulting from system failures have occurred.

4. **Storage Areas** [ETS 123, Appendix A, p. 9; Guide, pp. 141-142]

   a. Describe storage areas for feed and bedding, including temperature and vermin control.
Storage facilities are located at every site. The main feed storage room is located at the Panum Building, which is temperature- and humidity controlled. The Biocenter site is also equipped with a temperature- and humidity controlled room for feed.

In other sites, diet is stored unopened at room temperature. At the Frederiksberg site, feed is stored in building 1-39 at room temperature. Diets which need cooling are stored in refrigerators/freezers in the same room. The room temperature is logged electronically. At Taastrup, feed is stored in containers. Temperature is logged in the room where the containers are placed.

Vermin control is accomplished through exclusion barriers, immediate sanitation of any spilled product, daily observation for any signs of infestation and the use of baited spring traps or electronic traps, which are checked on a daily basis.

**Bedding, etc.**
Bedding, nesting material and other enrichment is stored in the main storage rooms available. Bedding for the automated cage cleaning and handling system is stored in big bags or a silo.

Some short-term storage occurs inside the different units in dedicated areas. Additionally, at the other sites; the Biocenter, RH and AKB, bedding, nesting material, enrichment and limited amounts of diets are stored in the service areas of these sites.

At Frederiksberg, bedding, hay, straw, etc. is stored in 1-10 where there is vermin control. At Taastrup, these are stored in a barn. Materials are visually inspected regularly.

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b. Describe storage areas for cages, equipment, supplies, etc.

Cages and supplies are stored in designated areas within the units. Main storage facilities are used for large equipment and long-term storage of equipment. As mentioned above, the main storage rooms are located at the Panum site.

**Panum site**
Clean, filled cages are stored in stainless steel containers in the large service corridor on level 01 and are taken up to the various units each day. Cages are constantly cycled and there is a limited reservoir of cages. Each unit has a storage room, generally opposite animal rooms, which contain equipment and supplies such as extra gloves and cleaning chemicals. These storage rooms are equipped with shelves, refrigerators and freezers as required to store equipment.

Three large storage rooms on level 02 in the Panum site house miscellaneous equipment such as cage carts, animal technician uniforms, gloves etc. This is
the main reservoir for such items and other units and satellite units take supplies from this area. Some short-term storage occurs inside the different units in dedicated areas.

**Biocenter, RH and AKB**
At the other rodent sites, cages and supplies i.e. gloves, experimental equipment, cleaning equipment etc. are stored in the service areas of these sites.

**Frederiksberg**
In 1-10 equipment is stored as well as in 1-36-45. Local storage areas and rooms are used as well.

**Taastrup**
Rooms 9-03, 9-12 and 9-11 are used for storage.

c. Describe storage areas for flammable or hazardous agents and materials (e.g., disinfectants, pesticides, fuel).

Flammable or hazardous chemicals are stored in locked, ventilated cabinets specifically designed for chemical storage. These cabinets are located at the different sites, where available (Panum, RH, Biocenter, Frederiksberg and Taastrup).

At the central lab in 16-1 at Panum, an inventory record is kept including information about type of chemical, chemical formula, concentration, amount, H- and P-phrases and other relevant safety information. Secondary containers can also be used for storing specific hazards.

Petrol and diesel is stored in Taastrup on a spill tray a sufficient distance from any animal related facilities, to ensure safety.

Describe for each cage sanitation area its location, the traffic flow pattern (soiled to clean, or in and out) within the facility, and kinds of equipment (tunnel washer, bottle washer, rack washer, etc. and other related equipment such as bedding dispensing units).

Cage sanitation is handled in the service areas at the different sites. Cages are emptied (bedding is automatically or manually discarded, always under ventilation), washed in either tunnel washer or cabinet washers, refilled (automatically, semi- automatically or manually) and sterilized (for certain units) by autoclavation. Autoclavation is available at the Panum site, Biocenter and Frederiksberg. At the other sites, no autoclavation can be performed locally. At the main service area at the Panum site, three large autoclaves handle most of the sterilization. The Biocenter site has a smaller autoclave.
Water bottles are washed and refilled using pass-through bottle-wash-and-fill-systems inside the units.

The surgical suite, unit 16.3, has at its disposal a dishwasher for small instruments and an autoclave for cleaning and sterilizing instruments. The main laboratory has a laboratory dishwasher. At the surgical facilities at Frederiksberg an autoclave is available for sterilizing instruments.

**Flow**
The flow at the cleanest units and the units where hazardous biological agents or chemical substances are used, takes into consideration that materials are transported safely. This also ensures that the risk of cross contamination is minimized.

**Panum**
Materials are transported in steel containers and are taken in and out of the units through chemical locks. Containers containing waste and/or dirty material are opened in the unclean part of the central washing area (some are autoclaved prior to opening). Material is washed and processed to the clean side. Materials may either be autoclaved or transported in containers to their destination unit.

**Biocenter**
The unit is designed with clean/un-clean corridors and separation of dirty and clean material in the main cleaning area.

**Frederiksberg and Taastrup**
Both Frederiksberg and Taastrup have washing equipment for miscellaneous animal related equipment. Central and mobile high-pressure cleaning equipment is available at Taastrup and Frederiksberg.

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C. **Special Facilities** [ETS 123, Appendix A, pp. 8-9; Guide, pp. 144-146, 150]

1. **Specialized Types of Animal Housing**
   Note specialized types of available animal housing spaces such as barrier, hazard containment (infectious, radioactive, chemical), "animal cubicles" (also known as "Illinois Cubicles", "Horsfal Cubicles," and "animal modules"), or facilities designed specifically for housing certain species such as aquatic or agricultural animals (e.g., barns, feedlots). [Guide, pp. 160-161]

a. Describe facilities for aseptic surgery, surgical support, animal preparation, surgeon’s scrub, operating room, and postoperative recovery.

<table>
<thead>
<tr>
<th>Special animal housing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IVC</td>
<td>This caging system is designed to minimize cross-contamination and to protect staff and researchers from animal allergens.</td>
</tr>
<tr>
<td>Isolators</td>
<td>The isolators are flexible film trolleys, designed to provide a sterile positive pressure or contaminated negative pressure environment for housing small rodents in a variety of cage types. All isolators are classified as GMO class II animals (GMO klasse 2 dyr).</td>
</tr>
<tr>
<td>Pens for pigs</td>
<td>Designed especially for housing pigs, with prescribed dimensions and features such as under floor heating.</td>
</tr>
<tr>
<td>Pens for cats, poultry etc.</td>
<td>The pens are flexible, and the environment can be altered according to the species to be housed.</td>
</tr>
<tr>
<td>Animal Room 08-01-48</td>
<td>Animal room approved for the use of radio nuclides.</td>
</tr>
<tr>
<td>Innovive</td>
<td>Single-use, disposable IVC caging system.</td>
</tr>
<tr>
<td>Different caging systems/solutions</td>
<td>Suitable for work with hazardous chemicals or infectious material. Single use systems.</td>
</tr>
<tr>
<td>Zebrafish tanks</td>
<td>Automated tank system specifically designed for Zebrafish.</td>
</tr>
<tr>
<td>Frederiksberg isolator</td>
<td>A suite of rooms specifically designed to house large animals in GMO class I and II studies.</td>
</tr>
<tr>
<td>Panum room 16.2.8</td>
<td>A room specifically designed to house animals in GMO class II studies.</td>
</tr>
<tr>
<td>Panum room 16.2M</td>
<td>A room specifically designed to house animals in GMO class II studies.</td>
</tr>
<tr>
<td>Metabolism cages</td>
<td>Designed for specific species in metabolism studies.</td>
</tr>
</tbody>
</table>

Major survival surgeries on non-rodents are performed in surgical units 16.3 at the Panum facility, A1 in building 9-11 at Taastrup and C196 and G196 in building 1-73 at Frederiksberg. Minor survival surgery and all procedures done on rodents may be performed in standard procedure rooms, and do not require separate dedicated facilities. However, aseptic techniques must be used. Surgical facilities are sufficiently separate from other areas to minimize unnecessary traffic and decrease the potential for contamination.

There is a preparation room at the Panum, Taastrup and Frederiksberg facilities where animals can be prepared and anaesthetized before being transported into the surgery suite. Large animals at the Frederiksberg and Taastrup facilities are usually weighed in the animal rooms or pens prior to being transferred to the surgical suites. Preparation rooms can also be used as recovery rooms for survival surgeries. Disposable sterile scrubs are provided for surgeons and support staff as well as facilities for showering and preparing for surgery.
In rodent experimental units (Panum; 10.3, 16.2, 16.4, Copenhagen University Hospital, Biocenter and AKB) generally no major surgical support equipment is available apart from gas anaesthesia machines.

b. Describe construction features of the operating room(s), including interior surfaces, ventilation, lighting, and fixed equipment used to support surgical procedures and enhance contamination control.

The surgical suite in unit 16.3 is equipped with the following fixed equipment:
• Autoclave (1)
• Lights: Surgical and ergonomic lights (in all rooms)
• Operating tables (3 new and 3 older)
• Dishwasher for the decontamination of instruments (1)
• Anaesthesia equipment
• Medical monitoring equipment

The surgical suite at Frederiksberg is equipped with the following fixed equipment:
• Lights: Surgical and ergonomic lights
• An operating table
• Anaesthesia equipment
• Medical monitoring equipment
• Mechanical lifting equipment
• A laparoscopy column
• An anaesthesia gas column

The surgical suite at Taastrup is equipped with the following fixed equipment:
• Lights: Surgical and ergonomic lights
• An operating table
• Anaesthesia equipment
• Medical monitoring equipment
• Mechanical lifting equipment

Floors and walls for all surgery suites are clad with vinyl or treated with paint for wet rooms, which can be easily cleaned and all surfaces (for example benches) are sealed to allow for sanitisation. As described above, surgical and ergonomic lighting is provided to assist in surgery. Ventilation is 100% fresh air with 16 air changes per hour (which is adjustable).

Describe other facilities such as imaging, irradiation, and core behavioural laboratories or rooms. Include a description of decontamination and methods for preventing cross-contamination in multi-species facilities.

The Department has a number of core facilities including the Core Facility for Transgenic Mice, the Core Facility for Molecular Imaging, the Radiation Treatment Unit for Small Animals (Gammacell), the Pathology and diagnostic services unit,
the Perinatal Core Facility, the Rodent Metabolic Phenotyping Center. These facilities are generally each connected to a particular animal unit and certain rules apply with regard to prevention of cross contamination as described below.

The Radiation Treatment Unit for Small Animals
• Animals from all units may be taken to this core facility for treatment and then returned to their unit. Animals are placed in individual containers which are disinfected before and after the procedure and therefore retain their original health status.

The Core Facility for Molecular Imaging
• This core facility is connected to unit 10-3.
• Only animals from unit 10-3 may enter, and animals may return to 10-3 if necessary. As all animals come from one unit and are regarded as having the same health status, decontamination is unnecessary.

The Rodent Metabolic Phenotyping Center
• This core facility is connected to unit 16-4.
• Only animals from unit 16-4 may enter, and animals may return to 16-4. As all animals come from one unit and are regarded as having the same health status, decontamination is unnecessary.

The Core Facility for Transgenic Mice
• This core facility is connected to unit 16-4.
• Only animals from unit 16-4 may enter, and animals may return to 16-4. As all animals come from one unit and are regarded as having the same health status, decontamination is unnecessary.

The Pathology and diagnostic services unit
• Animals and/or tissue from all units can be taken to this unit, however due to the nature of the services provided here (diagnosing potentially infectious agents), animals or tissue may not return to the original animal unit.
• This service is provided by Department veterinarians.

The Perinatal Core Facility
• This core facility is primarily for work with pigs at the Frederiksberg facility.

Rodent and isolator unit at Frederiksberg
• This core facility is primarily for microbiological research, where animals are housed in isolators.
• Animals are not moved from this unit to other units.

Metabolism and calorimetry center in Taastrup
• This core facility is for housing large animals for metabolism studies.

4. Other Animal Support Facilities
Describe other facilities providing animal care and use support, such as food preparation areas, feedmills, abattoirs, etc.

Not applicable

Describe such features as control of entry, perimeter fences, gates, entryways, cameras, guards.

All main entrances at Panum, RH, AKB and Biocenter are under surveillance by camera, and security personnel patrol the perimeters. At the Panum site, the entrance/reception is staffed by security personnel. Entry to the facility’s main buildings is, outside office hours, only possible with a valid admission card.

Entrance to individual units at Panum, RH, AKB, Biocenter and the Frederiksberg facility is controlled with admission card locks, pin codes and alarms or with key access. The Department’s administration, together with the Faculty’s security department, approves and issues entry rights to the units.

Facilities at the Frederiksberg and Taastrup units are locked outside of working hours. Only those researchers granted keys may enter the facilities after working hours. Within working hours these facilities are staffed by Departmental personnel.