Zagazig University
Faculty of Pharmacy
Dept. of Pharmacology

Ethics of Animal Handling

Dr Waleed Barakat

http://www.facebook.com/PharmacolgyPharmacyZagazig2012
http://www.wbarakat.name.eg
waled055@yahoo.com

Ethical Committee for Animal Handling at Zagazig University- ECAHZU

ECAHZU has been established to provide the guidelines and information about the basic requirements for the proper handling of experimental animals for research purposes during all steps of research activity including:

- transport,
- feeding,
- handling,
- sample collection,
- body disposal
- housing,
- breeding,
- observation,
- euthanasia and

Applying such standard procedures during all the aforementioned steps will ensure the reproducibility and accuracy of scientific observations and conclusions and the welfare of animals.

The ECAHZU will adopt and apply the suitable measures described in the European Convention for the Protection of Vertebrate Animals used for Experimental and Other Scientific Purposes

(http://conventions.coe.int/treaty/Commun/QueVoulezVous.asp?NT=123&CM=0&CL=ENG).

European Convention for the Protection of Vertebrate Animals used for Experimental and Other Scientific Purposes

Strasbourg, 18.III.1986, 2005, 2009

Preamble

Man has a moral obligation to respect all animals and to have consideration for their capacity for suffering & memory.

Nevertheless man in his quest for knowledge, health and safety has a need to use animals where there is a reasonable expectation that the result will be to extend knowledge or be to the overall benefit of man or animal, just as he uses them for food, clothing and as beasts of burden;

In order to protect animals (pain, suffering, distress or lasting harm), the following has been agreed:

Part I – General principles

Article 1

1. This Convention applies to any animal used or intended for use in any experimental or other scientific procedure where that procedure may cause pain, suffering, distress or lasting harm.

2. In this Convention:

a "***animal***", means any live non-human vertebrate, including free-living and/or reproducing larval forms, but excluding other foetal or embryonic forms;

b "***intended for use***" means bred or kept for the purpose of sale, disposal or use in any experimental or other scientific procedure;

c "***procedure***" means any experimental or other scientific use of an animal which may cause it pain, suffering, distress or lasting harm, excluding the least painful methods accepted in modern practice (that is "humane" methods) of killing or marking an animal.

d "***competent person***" means any person who is considered by a Party to be competent in its territory to perform the relevant function described in this Convention;

e "***responsible authority***" means, in the territory of a given Party, any authority, body or person designated for the relevant purpose;

f "***establishment***" means any stable or mobile facility, any building, group of buildings or other premises, including a place which is not wholly enclosed or covered;

g "***breeding establishment***" means any establishment where animals are bred with a view to their use in procedures;

h "***supplying establishment***" means any establishment, other than a breeding establishment, from which animals are supplied with a view to their use in procedures;

i "***user establishment***" means any establishment where animals are used in procedures;

j "***humane method of killing***" means the killing of an animal with a minimum of physical and mental suffering appropriate to the species.

Article 2

A procedure may be performed for:

a i avoidance or prevention of disease, ill-health or other abnormality, or their effects, in man, vertebrate or invertebrate animals or plants, including the production and the quality, efficacy and safety testing of drugs, substances or products;

ii diagnosis or treatment of disease, ill-health or other abnormality, or their effects, in man, vertebrate or invertebrate animals or plants;

b detection, assessment, regulation or modification of physiological conditions in man, vertebrate and invertebrate animals or plants;

c protection of the environment;

d scientific research;

e education and training;

f forensic inquiries.

Article 3

Each Party undertakes to take all the necessary steps to give effect to the provisions of this Convention and to ensure an effective system of control and supervision as soon as possible and in any case within a period of five years from the date of entry into force of the present Convention in respect of that Party.

Article 4

No provision in this Convention shall affect the liberty of the Parties to adopt stricter measures for the protection of animals used in procedures or for the control and restriction of the use of animals in procedures.

Part II – General care and accommodation

Article 5

1. Any animal used or intended for use in a procedure shall be provided with accommodation, an environment, at least a minimum degree of freedom of movement, food, water and care, appropriate to its health and well-being.

Any restriction on the extent to which an animal can satisfy its physiological and ethological needs shall be limited as far as practicable.

2. The environmental conditions in which animals are bred, kept or used shall be checked daily.

3. The well-being and state of health of animals shall be observed sufficiently closely and frequently to prevent pain or avoidable suffering, distress or lasting harm.

4. Each Party shall determine arrangements to ensure that any defect or suffering discovered is corrected as quickly as possible.

Part III – Conduct of procedure

Article 6

1. A procedure shall not be performed for any of the purposes referred to in Article 2, if another scientifically satisfactory method, not entailing the use of an animal, is reasonably and practicably available.

2. Each Party should encourage scientific research into the development of methods which could provide the same information as that obtained in procedures.

Article 7

When a procedure has to be performed, the choice of species shall be carefully considered and, where required, be explained to the responsible authority;

in a choice between procedures, those should be selected which use the minimum number of animals, cause the least pain, suffering, distress or lasting harm and which are most likely to provide satisfactory results.

Article 8

A procedure shall be performed under general or local anaesthesia or analgesia or by other methods designed to eliminate as far as practicable pain, suffering, distress or lasting harm applied throughout the procedure unless:

a the pain caused by the procedure is less than the impairmnt of the animal's well-being caused by the use of anaesthesia or analgesia, or

b the use of anaesthesia or analgesia is incompatible with the aim of the procedure. In such cases, appropriate legislative and/or administrative measures shall be taken to ensure that no such procedure is carried out unnecessarily.

Article 9

1. Where it is planned to subject an animal to a procedure in which it will or may experience severe pain which is likely to endure, that procedure must be specifically declared and justified to, or specifically authorised by, the responsible authority.

2. Appropriate legislative and/or administrative measures shall be taken to ensure that no such procedure is carried out unnecessarily. Such measures shall include:

– specific authorisation by the responsible authority;

– specific declaration of such procedure to the responsible authority and judicial or administrative action by that authority if it is not satisfied that the procedure is of sufficient importance for meeting the essential needs of man or animal, including the solution of scientific problems.

Article 10

During a procedure, an animal used shall remain subject to the provisions of Article 5 except where those provisions are incompatible with the objective of the procedure.

Article 11

1. At the end of the procedure it shall be decided whether the animal shall be kept alive or killed by a humane method. An animal shall not be kept alive if, even though it has been restored to normal health in all other respects, it is likely to remain in lasting pain or distress.

2. The decision referred to in paragraph 1 of this article shall be taken by a competent person, in particular a veterinarian, or the person who, in accordance with Article 13, is responsible for, or has performed, the procedure.

3. Where, at the end of the procedure:

a an animal is to be kept alive, it shall receive the care appropriate to its state of health, be placed under the supervision of a veterinarian or other competent person and kept under conditions conforming to the requirements of Article 5.

b an animal is not to be kept alive or cannot benefit from the provisions of Article 5 for its well-being, it shall be killed by a humane method as soon as possible.

4. No animal which has been used in a procedure entailing severe or enduring pain or suffering, irrespective of whether anaesthesia or analgesia was employed, shall be used in a further procedure unless it has returned to good health and well-being and either:

a the further procedure is one in which the animal is subject throughout to general anaesthesia which is to be maintained until the animal is killed; or
b the further procedure will involve minor interventions only.

Article 12

The responsible authority may allow the animal concerned to be set free provided that it is satisfied that the maximum practicable care has been taken to safeguard the animal's well-being.

Part IV – Authorisation

Article 13

A procedure for the purposes referred to in Article 2 may be carried out by persons authorised, or under the direct responsibility of a person authorised.

Part V – Breeding or supplying establishments

Article 14

Breeding and supplying establishments shall be registered with the responsible authority. Such registered establishments shall comply with the requirements of Article 5.

Article 15

The registration shall specify the person in charge of the establishment, who shall be competent to administer or arrange for suitable care for animals.

Article 16

1. Arrangements shall be made at registered breeding establishments to record, in respect of the animals bred there, the number and species of such animals leaving, the dates they leave and the name and address of the recipient.

2. Arrangements shall be made at registered supplying establishments to record the number and species of such animals entering and leaving, the dates of these movements, from whom the animals concerned were acquired and the name and address of the recipient.

3. The responsible authority shall prescribe the records which are to be kept and made available to it by the person in charge of the establishments. Such records shall be kept for a minimum of three years from the date of the last entry.

Article 17

1. Each dog and cat in an establishment shall be individually and permanently marked in the least painful manner possible before it is weaned.

2. Where an unmarked dog or cat is taken into an establishment for the first time after it has been weaned, it shall be marked as soon as possible.

3. Where a dog or cat is transferred from one establishment to another before it is weaned and it is not practical to mark it beforehand, a full documentary record, specifying in particular its mother, shall be kept until it can be marked.

4. Particulars of the identity and origin of each dog or cat shall be entered in the records of the establishment.

Part VI – User establishments

Article 18

User establishments shall be registered with or otherwise approved by the responsible authority and shall comply with the conditions laid down in Article 5.

Article 19

Provisions shall be made at user establishments for installations and equipment appropriate for the species of animals used and the performance of the procedures conducted there.

The design, construction and functioning of such installations and equipment shall be such as to ensure that the procedures are performed as effectively as possible, with the object of obtaining consistent results with the minimum number of animals and the minimum degree of pain, suffering, distress or lasting harm.

Article 20

In user establishments:

a the person or persons who are administratively responsible for the care of the animals and the functioning of the equipment shall be identified;

b sufficient trained staff shall be provided;

c adequate arrangements shall be made for the provision of veterinary advice and treatment;

d a veterinarian or other competent person should be charged with advisory duties in relation to the well-being of the animals.

Article 21

Animals of the species listed below which are for use in procedures shall be acquired directly from or originate from registered breeding establishments, unless a general or special exemption has been obtained under arrangements to be determined by the Party:

Mouse *Mus musculus*
Rat *Rattus norvegicus*
Guinea Pig *Cavia porcellus*
Golden hamster *Mesocricetus auratus*
Rabbit *Oryctolagus cuniculus*
Dog *Canis familiaris*
Cat *Felis catus*
Quail *Coturnix coturnix*

Article 22

In user establishments, only animals supplied from registered breeding or supplying establishments shall be used, unless a general or special exemption has been obtained under arrangements to be determined by the Party.

Article 23

Procedures may, where authorised by the responsible authority, be conducted outside user establishments.

Article 24

Arrangements shall be made to maintain records and make them available as required by the responsible authority. In particular, these records should show the number and species of all animals acquired, from whom they were acquired and their date of arrival.

Part VII – Education and training

Article 25

1. Procedures carried out for the purpose of education, training or further training for professions or other occupations, including the care of animals being used or intended for use in procedures, must be notified to the responsible authority and shall be carried out by or under the supervision of a competent person, who will be resposible for ensuring that the procedures comply with national legislation under the terms of this Convention.

2. Procedures within the scope of education, training, or further training for purposes other than those referred to in paragraph 1 above shall not be permitted.

3. Procedures referred to in paragraph 1 of this article shall be restricted to those absolutely necessary for the purpose of the education or training concerned and be permitted only if their objective cannot be achieved by comparably effective audio-visual or any other suitable methods.

Article 26

Persons who carry out procedures, or take part in procedures, or take care of animals used in procedures, including supervision, shall have had appropriate education and training.

Guidelines for accommodation & care of animals

The member states of the Council of Europe have decided that it is their aim to protect live animals used for experimental and other scientific purposes to ensure that any possible pain, suffering, distress or lasting harm inflicted as a consequence of procedures being conducted upon them, shall be kept at a minimum.

1. The physical facilities

1.1. Functions and general design

1.1.1. All facilities should be so constructed as to provide a suitable environment for the species to be kept, taking into account their physiological and ethological needs.

Facilities should also be designed and managed to prevent access by unauthorized persons and the ingress or escape of animals.

1.2. Holding rooms

1.2.1. All necessary measures should be taken to ensure regular and efficient cleaning of the rooms and the maintenance of satisfactory hygienic standards.

Ceilings and walls should be damage-resistant with a smooth, impervious and easily washable surface. Floors should be smooth, impervious and have a non-slippery, easily washable surface, which can carry the weight of racks and other heavy equipment without being damaged.

1.2.4. Holding rooms should, where appropriate, be provided with facilities for carrying out minor procedures and manipulations.

1.3. General and special purpose procedure rooms

1.3.3. Facilities should be provided to enable newly-acquired animals to be isolated until their health status can be determined, and the potential health risk to established animals assessed and minimized.

1.3.6. There should be accommodation for separate housing of sick or injured animals, where necessary.

1.4. Service rooms

1.4.1. Storerooms should be designed, used and maintained to safeguard the quality of food and bedding. These rooms should be vermin and insect-proof. Other materials, which may be contaminated or present a hazard to animals or staff, should be stored separately.

1.4.2. Separate storerooms for clean cages, instruments and equipment should be provided.

1.4.3. The cleaning and washing areas should be large enough to accommodate the installations necessary to decontaminate and clean used equipment. Walls and floors should be covered with a suitably durable surface material and the ventilation system should have ample capacity to carry away the excess heat and humidity.

1.4.4. Provision should be made for the hygienic storage and disposal of carcasses and animal waste. Special precautions should be taken with toxic, radioactive or infectious waste.

2. The environment and its control

2.1. Ventilation

2.1.1. Adequate ventilation should be provided in the holding room and the animal enclosures to satisfy the requirements of the animals housed.

The purpose of the ventilation system is to provide sufficient fresh air of an appropriate quality and to keep down the levels and spread of odours, noxious gases, dust and infectious agents of any kind. It also provides for the removal of excess heat and humidity.

2.1.2. The air in the room should be renewed at frequent intervals. A ventilation rate of fifteen to twenty air changes per hour is normally adequate.

However, in some circumstances, for example where stocking density is low, eight to ten air changes per hour may suffice. In some cases, natural ventilation may suffice and mechanical ventilation may not even be needed.

2.1.4. Smoking in rooms where there are animals should be forbidden.

2.2. Temperature

2.2.1. New-born, young, hairless, newly-operated, sick or injured animals will often require a much higher temperature level. Temperature in the holding rooms should be measured and logged on a daily basis.

2.2.2. It may be necessary to provide a ventilation system having the capacity both to heat and cool the air supplied.

2.2.3. In user establishments a precise temperature control in the holding rooms may be required, because the temperature of the environment is a physical factor which has a profound effect on the metabolism and behaviour of all animals, and therefore affects the validity of certain scientific outcomes.

2.3. Humidity

For some species, such as rats and gerbils, the relative humidity may need to be controlled within a fairly narrow range to minimise the possibility of health or welfare problems, whereas other species, such as dogs, tolerate well wide fluctuations in humidity levels.

2.4. Lighting

Where natural light does not provide an appropriate light/dark cycle, it is necessary to provide controlled lighting both to satisfy the biological requirements of the animals and to provide a satisfactory working environment.

Consideration should be given to the inclusion of windows in holding rooms, since they are a source of natural light and can provide environmental enrichment for some species, especially non-human primates, dogs, cats, some farm animals and other large mammals.

2.5. Noise

Noise can be a disturbing factor for animals. High noise levels and sudden noises can cause stress which, in addition to the welfare consequences for the animal, may influence experimental data.

2.6. Alarm systems

A technologically dependent animal facility is a vulnerable entity. It is strongly recommended that such facilities are appropriately protected to detect hazards such as fires, the intrusion of unauthorized persons, and the breakdown of essential equipment, such as ventilation fans, air heaters or coolers and humidifiers.

3. Education and training

All persons involved in caring for, or otherwise involved with, animals being bred, held or used for experimental or other scientific purposes should be appropriately educated and trained

4. Care

4.1. Health

4.1.1. Animals within an animal facility are totally dependent on humans for their health and well-being. The physical and psychological state of the animals will be influenced by their local environment, food, water and the care and attention provided by the animal care staff.

A strategy should be in place in all establishments to ensure that an appropriate health status is maintained, which safeguards animal welfare and meets scientific requirements.

4.1.2. The person responsible for the establishment should ensure regular inspection of the animals and supervision of the accommodation and care by a veterinarian or other competent person.

4.1.3. Because of the potential risk of contamination of animals and staff presented by the handling of animals, particular attention should be paid to the institution of hygiene procedures and supervision of staff health.

4.3. Transport of animals

4.3.1. For animals, transportation is a stressful experience which should be mitigated as far as possible. The following principles should apply to all animal movements, from short journeys by vehicle within scientific establishments to international transportation.

4.3.3. Animals that are sick or injured shall not be considered fit for transport, except for slightly injured or sick animals whose transport would not cause additional suffering, or where the transport is under veterinary supervision for, or following, veterinary treatment.

4.3.8. On arrival at their destination the animals should be removed from their transport containers and examined by a competent person with the least possible delay.

Animals, which are sick, injured or otherwise out of condition, should be kept under close observation and housed separately from other animals. These animals should be provided with veterinary treatment as appropriate or, if deemed necessary, promptly killed by a humane method.

4.4. Quarantine, acclimatisation and isolation

The objectives of quarantine and isolation periods are:

a. to protect other animals in the establishment;

b. to protect man against zoonotic infection; and

c. together with an acclimatisation period, to foster good scientific practice.

4.4.1. Quarantine

Quarantine is defined as a period of housing newly introduced or reintroduced animals separate from existing animals in the establishment to establish the state of health of the animals and to prevent the introduction of disease. Such a period is recommended when the health status of the animal is not known.

4.4.2. Acclimatisation

A period of acclimatisation is needed to allow animals to recover from transport stress, to become accustomed to a new environment and to husbandry and care practices.

4.4.3. Isolation

A period of isolation is intended to reduce the risk of infection to other animals or humans. Any animal suspected of posing such a risk should be housed in a separate facility.

4.5. Housing and enrichment

4.5.1. Introduction

All animals should be allowed adequate space to express a wide behavioural repertoire. Restricted environments can lead to behavioural and physiological abnormalities and affect the validity of scientific data.

4.5.2. Housing

Animals, except those which are naturally solitary, should be socially housed in stable groups of compatible individuals. Single housing should only occur if there is justification on veterinary or welfare grounds.

4.5.4. Animal enclosures

Animal enclosures should not be made out of materials detrimental to the health of the animals. Their design and construction should be such that no injury to the animals is caused. Unless they are disposable, they should be made from materials that will withstand cleaning and decontamination techniques.

4.6. Feeding

4.6.1. The form, content and presentation of the diet should meet the nutritional and behavioural needs of the animal.

4.6.2. The animals' diet should be palatable and non-contaminated. In the selection of raw materials, production, preparation and presentation of feed, precautions should be taken to minimise chemical, physical and microbiological contamination.

The feed should be packed in bags that provide clear information on the identity of the product and its date of production.

An expiry date should be clearly defined by the manufacturer and adhered to.

Packing, transport and storage should also be such as to avoid contamination, deterioration or destruction. Storerooms should be cool, dark, dry and vermin and insect-proof.

4.6.3. Each animal should be able to access the food, with sufficient feeding space provided to limit competition. In some circumstances, food intake may need to be controlled to avoid obesity.

4.7. Watering

4.7.1. Uncontaminated drinking water should always be available to all animals.

4.8. Flooring, substrate, litter, bedding and nesting material

4.8.1. Appropriate bedding materials or sleeping structures should always be provided for animals, as well as appropriate nesting materials or structures for breeding animals.

Various materials are commonly placed into the animal enclosure to serve the following functions:
- to absorb urine and faeces, and thus facilitate cleaning;
- to allow the animal to perform certain species-specific behaviour, such as foraging, digging or burrowing;
- to provide a comfortable, yielding surface or secure area for sleeping;
- to allow the animal to build a nest for breeding purposes.

Certain materials may not serve all of these needs, and it is therefore important to provide sufficient and appropriate materials. Any such materials should be dry, absorbent, dust-free, non-toxic and free from infectious agents or vermin and other forms of contamination.

4.9. Cleaning

4.9.1. The standard of a facility, including good husbandry, depends very much on good hygiene. A very high standard of cleanliness and order should also be maintained in holding, washing and storage rooms.

Adequate routines for the cleaning, washing, decontamination and, when necessary, sterilisation of enclosures and accessories, bottles and other equipment should be established and carried out.

4.9.2. These cleaning and disinfection regimes should not be detrimental to animal health or welfare.

4.9.3. There should be regular cleaning and, where appropriate, renewal of the materials forming the ground surface in animal enclosures to avoid them becoming a source of infection and parasite infestation.

4.10. Handling

The quality of care animals are given in the laboratory may influence not only breeding success, growth rate and welfare, but also the quality and outcome of experimental procedures.

4.11. Humane killing

4.11.1. All humane methods of killing animals require expertise, which can only be attained by appropriate training.

4.11.2. A deeply unconscious animal can be exsanguinated, but drugs which paralyze muscles before unconsciousness occurs, drugs with curariform effects and electrocution without passage of current through the brain, should not be used without prior anaesthesia.

Disposal should not be allowed until death has been confirmed.

4.12. Records

Records of source, use and final disposal of all animals bred, kept for breeding, or for subsequent supply for use in scientific procedures should be used not only for statistical purposes but, in conjunction with health and breeding records, as indicators of animal welfare and for husbandry and planning purposes.

4.13. Identification

In some instances, it is necessary for animals to be individually identified, for example, when being used for breeding purposes or scientific procedures, to enable accurate records to be kept.

Species-specific section

A. Species-specific provisions for rodents

1. Introduction

Mice

The laboratory mouse is derived from the wild house mouse *(Mus musculus)* a largely nocturnal burrowing and climbing animal which builds nests for regulation of the microenvironment, shelter and reproduction.

Mice are good climbers. Mice do not readily cross open spaces, preferring to remain close to walls or other structures.

A wide range of social organizations has been observed depending on population density and intense territoriality may be seen in reproductively active males. Pregnant and lactating females may prove aggressive in nest defense.

As mice, particularly albino strains, have poor sight they rely heavily on their sense of smell and create patterns of urine markings in their environment. Mice also have very acute hearing and are sensitive to ultrasound.
There are considerable differences in the expression and intensity of behaviour depending on the strain.

Rats

The laboratory rat is derived from the wild brown rat *(Rattus norvegicus)* and is a highly social animal.
Rats avoid open spaces, and use urine to mark territory.

Their sense of smell and hearing are highly developed, and rats are particularly sensitive to ultrasound. Daylight vision is poor, but dim-light vision is effective in some pigmented strains. Activity is greater during hours of darkness. Young animals are very exploratory and often engage in social play.

2. The environment and its control

2.1. Ventilation

2.2. Temperature

Rodents should be maintained within a temperature range of 20°C to 24°C. Local temperatures among groups of rodents in solid-floored enclosures will often be higher than room temperatures.

2.3. Humidity

The relative humidity in rodent facilities should be kept at 45 to 65%.

2.4. Lighting

Light levels within the enclosure should be low. All racks should have shaded tops to reduce the risk of retinal degeneration. This is of particular importance for albino animals.

2.5. Noise

As rodents are very sensitive to ultrasound, and use it for communication, it is important that this extraneous noise is minimized.

Ultrasonic noise (over 20 kHz) produced by many common laboratory fittings, including dripping taps, trolley wheels and computer monitors, can cause abnormal behaviour and breeding cycles.

4. Housing, enrichment and care

4.1. Housing

Gregarious species should be group-housed as long as the groups are stable and harmonious.

4.2. Enrichment

The enclosures and their enrichment should allow the animals to manifest normal behaviours

Wood sticks for chewing and gnawing may be considered for enrichment for all rodent species.

Many rodent species attempt to divide up their own enclosures into areas for feeding, resting, urination and food storage. These divisions may be based on odour marks rather than physical division but partial barriers may be beneficial to allow the animals to initiate or avoid contact with other group members.

To increase environmental complexity the addition of some form of enclosure enrichment is strongly recommended. Tubes, boxes and climbing racks are examples of devices which have been used successfully for rodents, and these can have the added benefit of increasing utilizable floor area.

4.3. Enclosures – dimensions and flooring

The enclosures should be made of easy-to-clean materials and their design should allow proper inspection of the animals without causing disturbance to them.

4.3.1. Dimensions

Table A.1. Mice: Minimum enclosure dimensions and space allowances

	Body weight (g)	Minimum enclosure size (cm^2)	Floor area per animal (cm^2)	Minimum enclosure height (cm)
In stock and during procedures	up to 20 over 20 to 25 over 25 to 30 over 30	330 330 330 330	60 70 80 100	12 12 12 12
Breeding		330 For a monogamous pair (outbred/inbred) or a trio (inbred). For each additional female plus litter 180 cm^2 should be added.		12
Stock at breeders* Enclosure size 950 cm^2	less than 20	950	40	12
Enclosure size 1500 cm^2	less than 20	1500	30	12

Table A.2. Rats: Minimum enclosure dimensions and space allowances

	Body weight (g)	Minimum enclosure size (cm^2)	Floor area per animal (cm^2)	Minimum enclosure height (cm)
In stock and during procedures*	up to 200 over 200 to 300 over 300 to 400 over 400 to 600 over 600	800 800 800 800 1 500	200 250 350 450 600	18 18 18 18 18
Breeding		800 Mother and litter. For each additional adult animal permanently added to the enclosure add 400 cm^2		18
Stock at breeders** Enclosure size 1500 cm^2	up to 50 over 50 to 100 over 100 to 150 over 150 to 200	1500 1500 1500 1500	100 125 150 175	18 18 18 18
Stock at breeders** Enclosure size 2500 cm^2	up to 100 over 100 to 150 over 150 to 200	2500 2500 2500	100 125 150	18 18 18

4.3.2. Flooring

Solid floors with bedding or perforated floors are preferable to grid or wire mesh floors.

As mesh floors can lead to serious injuries, the floors should be closely inspected and maintained to ensure that there are no loose or sharp projections.

During late pregnancy, parturition and lactation, breeding females should only be kept on solid floors with bedding.

4.7. Cleaning

Although high hygiene standards should be maintained, it may be advisable to maintain some odour cues left by animals. Too frequent changing of enclosures should be avoided, particularly where pregnant animals and females with litters are concerned, as such disturbances can result in mis-mothering or cannibalism.

Decisions on frequency of cleaning should therefore be based on the type of the enclosure, type of animal, stocking densities, and the ability of ventilation systems to maintain suitable air quality.

4.8. Handling

When handling, care needs to be taken to minimize disturbance of the animals or their enclosure environment.

Thank You

Good Luck