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Cats

**WORKING PARTY FOR THE PREPARATION OF THE FOURTH MULTILATERAL
CONSULTATION OF PARTIES TO THE EUROPEAN CONVENTION FOR THE
PROTECTION OF VERTEBRATE ANIMALS USED FOR EXPERIMENTAL
AND OTHER SCIENTIFIC PURPOSES (ETS 123)**

6th meeting
Strasbourg, 25-27 March 2003

Species specific provisions for cats

**Background information for the proposals
presented by the Group of Experts on dogs and cats**

PART B

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Species-specific sections – Cats

Preamble

In 1997, the Council of Europe (CoE) established four Expert Groups in order to advise the CoE Working Party on revisions to Appendix A of the Convention ETS123 (European Convention for the Protection of Vertebrate Animals used for Experimental and other Scientific Purposes, 1986). One of these Expert Groups was established to consider proposals for dogs and cats; its remit was later extended to include ferrets when the CoE Working Party decided that other species covered by ETS123 should be included in the revision. Organisations represented both on the Group and at its meetings were:

Federation of European Laboratory Animal Science Associations (FELASA) – Coordinator of Group
Eurogroup for Animal Welfare
European Federation of Pharmaceutical Industries and Associations (EFPIA)
Federation of Veterinarians in Europe (FVE)
Federation of European Laboratory Animal Breeders Associations (FELABA)
International Society for Applied Ethology (ISAE)

The members of the Expert Group on dogs, cats and ferrets met on several occasions and also exchanged information by e-mail. The Coordinator of the Expert Group, accompanied by one or more other members, attended all meetings of the Working Party in Strasbourg, in order to present the Group's proposals, discuss their content and answer questions, and refer matters back to the Group where appropriate.

The CoE Expert Group on Dogs, Cats and Ferrets has provided three separate reports, covering each of these species. Each report comes in two parts. Part A details the proposals for amendments to Appendix A, as agreed by the Working Party and including amendments to the Expert Group's original proposals as required by the Working Party. Part B provides background information for these proposals. Where possible, recommendations have been based upon scientific evidence; where this is not available, they take account of established good practice, based both on the experience of the members of the Expert Group and also on further consultations with other experts. Additional comments have been received from members of the Working Party and from a range of non-governmental organisations and individuals. These have been considered by the Expert Group and incorporated in the proposals where appropriate.

The proposals and their rationale are therefore the outcome of extensive and detailed discussions within the Group and should be regarded as expert recommendations, reflecting the scientific evidence and information on good practice available at the time. Their intention is to increase the welfare of animals used in research, taking into account the purposes for which such animals are used, which may place some constraints upon their housing and husbandry.

The Expert Group considered that, although the provisions of Appendix A formally are guidelines, its finalised proposals should be regarded as minimum requirements. Knowledge gained by further research and scientific evidence, as well as changing views on what is current 'good practice', may mean that the accommodation and care provided for animals in research in the future may vary from these proposals such that future revision of Appendix A is necessary.

1. Introduction

The domestic cat is derived from the solitary African wild cat (*Felis silvestris libyca*), but has a strong tendency to learn social behaviour. With appropriate socialisation provided at an early age, such behaviour can be expressed both to conspecifics and man.

Good social interactions with humans encourage suitable temperament for subsequent studies. However, as cats lack dominance hierarchies and appear to lack mechanisms for reconciliation post-conflict, forming social relationships may be stressful. Visible signs that cats are stressed are not as straightforward to interpret as are those in dogs.

As cats are territorial and will become attached to particular locations they are likely to be stressed by relocation. Cats are excellent climbers and utilise raised structures (e.g. shelves) extensively, both as vantage points and, when group housed, to maintain distance from other cats.

2. The environment and its control

2.1. Ventilation (See item 2.1. of the General section of Appendix A)

Background: The number of air changes per hour in the European (15-20), UK (10-12) and US (10-15) guidelines differ to some extent, although no evidence is offered to support the specific ranges. All guidelines allow for lower ventilation rates if stocking density is low. These factors were taken into account in drafting the General Section of Appendix A.

2.2. Temperature

A temperature range of 15 to 21° should be maintained when precise control is required for cats under procedure. In all other circumstances, cats may be maintained within a wider temperature range provided that their welfare is not compromised.

As kittens have limited thermoregulatory control for around the first ten days of life, additional local heating should be provided during this period.

Background: The range of temperatures given in the European (15-21°C), UK (15-24) and US (18-29) guidelines differ. Narrow ranges aim to avoid wide fluctuations of the ambient temperature so as to reduce experimental variation, although there is no evidence that a temperature outside of the least stringent range would impact on the welfare of the cats.

It is more important that there are no abrupt changes, which would affect e.g. the respiratory system, or too wide a fluctuation, which could affect physiological parameters and interfere with certain procedures.

In view of the above, there would seem no reason to recommend a specific temperature range, except for cats undergoing procedures. Young kittens will need higher temperatures to take account of their limited thermoregulatory control (Olmstead et al, 1979).

In some cases, cats will have access to an outside run at ambient temperatures. As this could mean extremes of temperature being encountered with potential impact on welfare, the cats should also have access to an indoor area that allow them to exercise some control over their living environment.

Consideration of the above factors led to the Working Party agreeing the above proposal.

2.3. Humidity

It is considered unnecessary to control relative humidity, as cats can be exposed to wide fluctuations of ambient relative humidity without adverse effects.

Background: The ranges in European and UK (both 45-65% with extremes 30-70) and US (30-70%) guidelines are near identical. However, there is no evidence that a relative humidity exceeding these ranges would impact the welfare of the cats. The Working Party therefore agreed the above proposal.

N.B. The Expert Group considered there could be benefits in recording and logging Relative Humidity on a regular basis, in order to help identify any potential problems at an early stage.

2.4. Lighting

Holding of cats under the natural 24 hours light-dark cycle is acceptable. Where the light part of the photoperiod is provided by artificial lighting, this should be within a range of 10 to 12 hours daily.

If natural light is totally excluded, low level night lighting (5-10 lux) should be provided to allow cats to retain some vision and to take account of their startle reflex.

Background: Prolonged periods in excess of the natural dark period can stress the cats. A minimum light period should therefore be provided daily, not less than the extreme within the natural light-dark cycle throughout the seasons. In addition, sufficient lighting is essential to examine the clinical condition of the animals and allow for routine husbandry practices.

During the dark period, total darkness should be avoided. In nature total darkness does not exist and, contrary to folklore, cats cannot 'see in the dark' if there is a complete absence of any light. Furthermore, minimal night lighting is necessary to avoid a startle reflex.

Some lighting systems have been shown to be aversive to some animals, possibly because the cat's Critical Fusion Frequency is higher than humans' (Berkley, 1976), and so they may perceive light sources as flickering whereas we do not.

2.5. Noise (See item 2.5. of the General section of Appendix A)

Background: The hearing range of cats is 0.07-91 kHz, with peak sensitivity 1-40 kHz.

All existing guidelines mention that noise can be a disturbing factor or even be damaging. Unpredictable noises cause stress (Carlstead et al, 1993). The hearing range of cats is included in these recommendations to give an indication of the audio-frequencies involved. Sound-absorbing materials will help reduce the disturbance caused by husbandry-generated noise.

2.6. Alarm systems (See item 2.6. of the General section of Appendix A)

3. Health (See items 4.1 and 4.4 of the General Section of Appendix A)

Background: The FELASA recommendations are used as a common reference to determine the health status of animals. A minimum quarantine period of two weeks is proposed as the incubation periods of most diseases are less than two weeks and this duration also allows for additional sampling and analysis if required.

In relation to acclimatisation, a period of two weeks is common practice.

This recommendation from the Expert Group should be considered in conjunction with the information provided in the General Section.

4. Housing and enrichment

4.1. Housing

Female cats and neutered cats of both sexes are generally sociable and are commonly held in groups of up to 12. However, the establishment of groups of two or more such cats requires careful monitoring of the compatibility of all individuals in the group. Special care is needed when regrouping cats, introducing an unfamiliar cat to a group, housing unneutered males in group or maintaining cats in larger groups.

Where cats are normally group-housed, single housing may be a significant stress factor. Therefore, cats should not be single housed for more than 24 hours without justification on veterinary or welfare grounds. Single housing for more than 24 hours on experimental grounds should be determined in consultation with the animal technician and with the competent person charged with advisory duties in relation to the well-being of the animals.

Cats which are repeatedly aggressive towards other cats should be housed singly only if a compatible companion cannot be found. Social stress in all pair- or group-housed individuals should be monitored at least weekly using an established behavioural and/or physiological stress scoring system. This is especially important for unneutered males.

Females with kittens under four weeks of age or in the last two weeks of pregnancy may be housed singly. During this time, consideration should also be given to allowing females which are normally group-housed to have access to their group e.g. by connecting nesting enclosures to the group housing animal enclosures.

Early Socialisation with conspecifics and humans

The development of social behaviour in cats is profoundly affected by social experience between two and eight weeks of age. During this period it is particularly important that the cat has social contacts with other cats (e.g. litter mates) and with humans and is familiarised with environmental conditions likely to be encountered during subsequent use. Daily handling during this sensitive stage of development is a prerequisite for the social behaviour of the adult cat and it has been shown that a short period of handling even on the first day after birth is of importance as the young animals are already able to respond to scent and tactile stimulation.

All cats should have a period of play and general social interactions with humans on a daily basis, plus additional time for regular grooming. Particular attention should be paid to the social enrichment for single-housed cats by providing additional human contact.

Background: The domestic cat has evolved from an essentially solitary species, the African wildcat *Felis sylvestris libyca* and its capacity to live in groups is consequently limited compared to, for example, that of the domestic dog. For example, groups of cats lack distinct dominance hierarchies, and mechanisms for reconciliation post-conflict appear to be absent (van den Bos & de Cock Buning, 1994a; van den Bos, 1998). Naturally-occurring social groups generally consist of related females, and males of breeding age are essentially asocial (Kerby & Macdonald, 1988). Castrated males may form permanent amicable associations with groups of females (Bradshaw & Brown, 1996), and neutered pet cats of both sexes can co-exist amicably at densities up to at least 1 per 10 square metres (Bernstein & Strack, 1996). The criteria which determine whether one cat is likely to behave sociably towards another are not fully understood, but cats which have lived together since both were kittens (e.g. littermates) are more likely to be friendly towards one another than cats which first meet when one or both are adult (Bradshaw & Hall, 1999). Enforced proximity to unfamiliar conspecifics is a significant source of stress for many cats (Smith et al, 1994; Kessler & Turner, 1999). This will be obvious if it leads to fighting, but long-term it is more likely to lead to the most stressed individuals reducing their activity and retreating to locations which provide security, e.g. high shelves (van den Bos & de Cock Buning, 1994b). This may not be noticed by caretakers unless formal assessment of stress is

conducted. In the absence of clear guidelines for predicting which of a candidate group of cats are likely to be socially incompatible, the welfare of group-housed cats can be protected most effectively by careful monitoring of social behaviour using a standard method (Kessler & Turner, 1997) and removing the most chronically-stressed individuals. This should ensure social harmony in groups consisting of females, young cats and/or neutered males; groups containing more than one reproductively entire male of breeding age are more difficult to monitor in this way, and are not recommended at the current state of knowledge.

Cats that are not socialised to people become highly stressed when approached by caretakers and other personnel, and this is likely to be most acute during handling (McCune, 1992; McCune, 1995a). This stress may be minimised, and possibly replaced, by positive feelings on the part of the cat, if kittens are correctly socialised to people during the primary socialisation period, which is between two and approximately eight weeks of age (McCune et al, 1995). Optimum socialisation is achieved if handling is increased from a few minutes each day to a minimum of 40 minutes per day by six weeks old, and it is most effective if performed in the presence of the mother and littermates (McCune et al, 1995).

It is generally believed that the same period is critical for socialisation to other cats, but since the litter is normally not divided or separated from the mother until towards or after the end of this time, few kittens fail to achieve minimal experience of members of their own species. However, it is known that separation from the mother at two weeks of age is detrimental to the development of social behaviour, and that hand-raised kittens are very likely to react fearfully to other cats, and to develop attachment-related behavioural disorders (Baerends-van Roon & Baerends, 1979).

The time of onset of the socialisation period is not known precisely, but may begin as soon as the appropriate senses have developed. Thus kittens begin to learn about the visual and auditory characteristics of their surroundings from about their third week of life, as their senses of vision and hearing mature (Bradshaw, 1992). Since their senses of touch and smell are already functional at birth, and are used in associative learning from the second or third day of life (Rosenblatt, 1972), it is likely that gentle handling from this age onwards is beneficial in priming socialisation, although the reaction of the mother should also be taken into account.

4.2. Enrichment

Raised, part-enclosed structures should be provided (e.g. a bed with three walls and a roof on a shelf approximately 1 metre off the floor) to give the cats a view of their surroundings and, if pair- or group-housed, the opportunity to maintain a comfortable distance from other cat(s). There should be a sufficient number of these structures to minimise competition. Structures should be distributed within the enclosure so that animals can fully use the space available.

There should also be provision for the cats to seek refuge and privacy within their own enclosure and, in particular, away from the sight of cats in other enclosures. Vertical wooden surfaces should be provided to allow claw-sharpening and scent-marking.

Pseudo-predatory and play behaviour should be encouraged. A selection of toys should be available and these should be changed on a regular basis in order to ensure ongoing stimulation and avoid familiarity, which decreases the motivation to play.

Background: The ancestral species of the domestic cat is a solitary predator, and modern cats retain both the species-typical repertoire of hunting behaviour patterns, and the motivational system which controls their expression. This is not closely controlled by appetite (Adamec, 1976), and therefore even well-fed cats, which spend much of their time sleeping, have a need to express predatory behaviour, in the form of play with prey-like objects (Hall, 1998). In the wild, cats forage for small food items, such as insects, in addition to larger prey (Fitzgerald, 1988), and it is beneficial to provide opportunities for

simulating this type of predatory behaviour also. Pseudo-predatory behaviour should be encouraged by the provision of toys simulating mouse-sized prey (which can be included in social interactions with humans) and by feeders which require manipulation by the cat to dispense food (e.g. a clean plastic bottle containing 20-30 pieces of dry cat food, with 2-3 holes of sufficient diameter to allow the food to fall out a piece at a time when the bottle is rolled).

A further enrichment for some cats may be provided in the form of trays of growing grass, which are replaced as the grass is eaten. However, certain cats may be observed not to eat grass.

Healthy free-roaming cats never defecate in locations where food is available (Bateson & Turner, 1988), and have to overcome this natural aversion when confined. Cats which are given no option but to feed close to a litter box (e.g. when boarded in catteries) may continue to show this disinhibition after returning home, expressed as a loss of house-training (Overall, 1997). Areas for feeding and for litter trays should therefore not be less 0.5 metres apart and should not be interchanged.

Cats have a much more sensitive sense of smell than humans (Bradshaw, 1992). The olfactory environment therefore has a significance to them which people cannot directly experience. Scent-marking behaviour (e.g. object-rubbing, claw-sharpening) is an important element of social behaviour (Bradshaw & Cameron-Beaumont, in press). Sites where scent signals can be deposited and remain undisturbed, such as by cleaning procedures, for extended periods may therefore make an important contribution to social harmony in group-housed cats, although knowledge of this is currently incomplete.

A cat which is group-housed reduces its opportunities for conflict by maintaining distance from the other cats (Leyhausen, 1979), and monitoring both their location and behaviour (Smith et al, 1994). This is made easier if elevated structures are available, since these enable both spacing in three dimensions, and vantage points: such structures are used more than the floor of the enclosure (Podberscek et al, 1991; Rochlitz et al, 1998).

Well-socialised cats actively seek to engage in social interaction with people. During this they perform species-typical behaviour (e.g. tail up, rubbing, purring) indicating both that the interactions are amicable (Bradshaw & Cameron-Beaumont, in press) and that this may also be an adequate substitute for interactions with other cats.

4.3. Animal enclosures – dimensions and flooring

Enclosures, including the divisions between enclosures, should provide a robust and easily cleaned environment for the cats. Their design and construction should seek to provide an open and light facility giving the cats comprehensive sight outside of their animal enclosure.

Background: Freedom to express a range of normal behaviours will place some demands on the structure of enclosures. Those which allow extensive visibility of the immediate surroundings will promote normal behaviours and encourage animals to take an interest in their surroundings. The ability to watch other animals and staff may also provide a useful function in the cat's time utilisation. Careful consideration must therefore be given to providing an appropriate balance between solid walls and metal bars or mesh. Glass can be used beneficially in cat enclosures so as to provide visual contact but at the same time maintain separation. The design of enclosures should also provide an enclosed area out of view of other cats, while at the same time allowing for easy inspection of animals by staff.

Dimensions

Table 1. Minimum space allowances

	Floor* m ²	Shelves m ²	Height m
Minimum for one adult cat	1.5	0.5	2
For each additional cat add	0.75	0.25	-

Note: * Floor area excluding shelves.

The minimum space in which a queen and litter (to weaning) may be held is the space for a single cat, which should be gradually increased so that by 4 months of age litters have been re-housed to conform with the above space requirements for adults. The normal age for weaning is 7-9 weeks.

Areas for feeding and for litter trays should be not less than 0.5 metres apart and should not be interchanged.

Constraint in a space below the minimum requirement detailed above, such as in a metabolism cage or any similar type of housing for scientific purposes, may severely compromise the welfare of the animals. Such constraint should be for the minimum time and within a space that is as close as possible to that defined above and no less than that required for the animal to stretch fully horizontally and vertically, to lie down and turn around.

Background: Cats are descended from a territorial species and, while they show considerable flexibility in how much space they require in the wild, there is evidence that the smaller the space a cat is confined in, the more likely it is to develop behavioural abnormalities indicative of chronic stress (McCune, 1995b). Further research is required to establish the precise minimum space needed, but it is likely that increasing the quality of space may provide more benefit than floor area per se (McCune, 1995b). The recommendation for single-housed cats is therefore based on providing sufficient space for the enrichments in (4) to be implemented effectively and safely by animal caretakers. Unlike dogs, there is no evidence that cats benefit from periods of 'exercise' outside their primary enclosure. Enriched single housing for cats is illustrated in Loveridge et al (1995).

For pair- and group-housed cats, behavioural indicators of stress increase at densities greater than one cat per two square metres (Kessler & Turner, 1999; Rochlitz, 2000); the recommendations are based on the assumption that this density can be increased slightly if the cats can make use of the full height of the enclosure, and that the other enrichment in (4) is also implemented. Enriched group-housing for cats is illustrated in Loveridge (1994).

Outside runs

Outside runs provide an environmental enrichment opportunity for cats in both breeding and user establishments and should be provided where possible.

Cats should never be forced to spend their entire lives outside and should always have access to an internal enclosure that meets all standards including minimum dimensions detailed in these guidelines.

The quality and finish of the floor of an outside run need not be to the standard of the inside enclosure, providing it is easily cleanable and not physically injurious to the cats.

Flooring

The preferred flooring for cat enclosures is a solid continuous floor with a smooth non-slip finish. Additional enclosure furniture should provide all cats with a comfortable resting place.

Open flooring systems such as grids or mesh should not be used for cats. Where there is justification for open flooring, the highest level of attention should be given to their design and construction in order to avoid pain, injury and diseases and allow the animals to express normal behaviours. Practical experience shows that metabolism cages are not always necessary as cat's urine and faeces can be collected direct from litter trays.

Background: The question of whether cat accommodation should have solid or open flooring was considered at the Berlin Workshop (1993). Cats are considered by the Expert Group to require a solid floor and should not be kept on open flooring at any time, except for specific scientific purposes, when such use should be authorised by the Responsible Authority. The provision of a comfortable resting place is considered particularly important for this species.

4. 4. Feeding (See item 4.6.of the General section of Appendix A)

4.5. Watering (See item 4.7. of the General section of Appendix A)

4.6. Substrate, litter, bedding and nesting material

At least one litter tray of minimum dimension 300 x 400 mm should be provided for every 2 cats and should contain a suitable absorbent and non-toxic litter or substrate material that is acceptable to and used by the cats. If urine and faeces are regularly deposited outside the trays, additional trays containing alternative substrates should be provided. If this is ineffective in pair- or group-housed cats, social incompatibility is indicated and cats should be removed from the group one at a time until the problem is resolved.

Sufficient beds should be provided for all cats and should be made of a suitable easily cleanable material. These beds should contain bedding material such as polyester fleece or similar bedding material.

Background: Cats can be naturally trained to use litter trays and so absorbent substrate on the floor of the pen is not necessary. The litter material should be non-toxic, absorbent, dust-free and produce little ammonia; dust-free wood chips have been shown to be acceptable. The dust content of older 'chalky granules' has been considered to be too high (Saigeman, 1998). Cats require sleeping areas that are quiet and warm and, if kept in groups, should have the choice to sleep on their own. Cats also, when allowed to exhibit natural instincts (Rochlitz, 2000) will often sleep at a height, so sleeping boxes may be hung on walls (Hurni & Rossbach, 1987) or at different heights especially in the corners of rooms where they cannot be approached from behind (Roy, 1992). Generally non-toxic, durable and easily washable bedding material is used with cats. Man-made material is popular as cats prefer those materials that maintain a constant temperature, though shredded paper or wood shavings have been shown to be acceptable (Roy, 1992). As cats are more fastidious eaters than dogs, the possibility of them poisoning themselves by ingesting bedding material or causing intestinal foreign bodies is much reduced.

4.7. Cleaning

Each occupied enclosure should be cleaned at least daily. Litter trays should be emptied daily and litter material replaced.

Cleaning of enclosures should not result in cats becoming wet. When enclosures are hosed down, the cats should be removed from the enclosure to a dry place and returned only when it is reasonably dry.

Background: Maintenance of good cleaning regimes is an obvious requirement to meet within cat facilities. It is particularly important with this species that animals do not become wet, as this is generally intensively disliked and is also undesirable in relation to health and welfare. It should be noted that cleaning is a task which should bring staff into close contact with animals. Consideration should be given to exploiting this opportunity to develop 'social contacts' between carers and cats.

4.8. Handling (See item 4.10. of the General section of Appendix A)

For cats, close contact with the persons caring for the animals is crucial, especially for single housed cats.

4.9. Humane killing (See item 4.11. of the General section of Appendix A)

4.10. Records (See item 4.12. of the General section of Appendix A)

4.11. Identification (See item 4.13. of the General section of Appendix A)

PART B - CATS

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