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**Dogs**

**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)**

6<sup>th</sup> meeting  
Strasbourg, 25-27 March 2003

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**Species specific provisions for dogs**

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

**PART B**

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## Species-specific sections – Dogs

### **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 dog (*Canis familiaris*) is an inquisitive and highly social animal which actively seeks information about its surroundings, reflecting the behaviour of its ancestors in the wolf family. Although much of the day is spent resting, the dog requires a complex physical and social environment during the active phase.

Bitches seek solitude in a quiet area for parturition and rearing of young.

As aggression is a significant risk, care is needed to maintain dogs in socially harmonious groups.

The recommendations are provided for the beagle, the most commonly used breed. Account should be taken of individual breed characteristics if other breeds are used.

## 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°C should be maintained when precise control is required for dogs under procedure. In all other circumstances, dogs may be maintained within a wider temperature range provided that welfare is not compromised.

Puppies have limited thermoregulatory control in the first 10 days or so of life and additional local heating should be provided within the whelping enclosure.

**Background: The range of temperatures given in the European (15-21°C), UK (15-24) and US (18-29) 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 the most stringent range but within the largest range would impact on the welfare of the dogs.**

**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 dogs undergoing procedures. In addition, young puppies will need higher temperatures to take account of their limited thermoregulatory control.**

**In some cases, dogs 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 dogs should also have access to an area that enables them to exercise some control over their living environment.**

**Consideration of the above factors resulted in the Working Party agreeing the above proposal.**

### 2.3. Humidity

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

**Background: The ranges in European and UK guidelines (both 45-65% with extremes 30-70) and US (30-70%) are near identical. However, there is no evidence that a relative humidity exceeding these ranges would impact the welfare of dogs. 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 dogs 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 dogs 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 dogs. 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 on a regular basis and allow for routine husbandry practices.**

**During the dark period, total darkness should be avoided. In nature, total darkness does not exist. Furthermore, minimal night lighting is necessary to avoid a startle reflex.**

**Some lighting systems have been shown to be aversive to some animals.**

#### 2.5. Noise

Noise in dog kennels can reach high levels which are known to cause damage to humans, and which could have effects on dogs' health or physiology. For these reasons it is important to consider methods of reducing noise in dog facilities. Much of the noise is generated by the dogs' own vocalisations, but may also be generated by husbandry operations within the facility and also ingress from outside sources. Any source of noise that may stimulate further dog barking should therefore be limited as far as possible. Ingress of noise can be controlled by appropriate siting of the facility and by appropriate architectural design. Noise generated within the facility can be controlled by noise absorbent materials or structures. By addressing the dogs' behavioural needs in the facility design, the level of vocalisation may be decreased. Expert advice should be taken when designing or modifying dog accommodation.

**Background: The hearing range of dogs is 0.04-46 kHz, with peak sensitivity of 0.5-16 kHz.**

**All existing guidelines mention that noise can be a disturbing factor or even be damaging. The hearing range above indicates the frequencies involved. In dog kennels, it is known that most noise is created by the animals themselves and that the noise levels can be high for a substantial proportion of the day (Hubrecht et al. 1997, Sales et al. 1997). Sound-absorbing materials should therefore be used. Socialisation and habituation of the dogs to the presence of humans will reduce the barking behaviour.**

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 have been used as a common reference to determine the health status of animals. A minimum quarantine period of two weeks is**

***suggested 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**

***Background: As with other sections, proposals are based on research data where available, and otherwise on good practice. The over-riding principle with dogs is the need to encourage and motivate social housing. Dogs should be held in socially-harmonious groups with a minimum of two, i.e. a pair. Long-term single housing and social isolation are associated with a range of behavioural disturbances (Hetts et al, 1992).***

##### **4.1. Housing**

Dogs should be housed in socially harmonious groups within the animal enclosure, unless the scientific procedures or welfare requirements make this impossible. Special care is needed when regrouping dogs or introducing an unfamiliar dog to a group. In all cases, groups should be monitored for social compatibility on an ongoing basis.

Single housing of dogs for even short periods can be a significant stress factor. Therefore, dogs should not be single housed for more than 4 hours without justification on welfare or veterinary grounds. Single housing for more than 4 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.

In such circumstances, additional resources should be targeted to the welfare and care of these dogs. Additional human socialisation time, and visual, auditory and, where possible, tactile contact with other dogs should be provided for all single-housed animals on a daily basis.

Unless contra-indicated on scientific grounds, single-housed dogs should be allowed to exercise in a separate area with, if possible, other dogs, and with staff supervision and interaction, on a daily basis.

Stud dogs should, wherever possible, be housed in socially harmonious pairs or groups or with bitches.

Peri-parturient bitches should only be moved to the whelping enclosure between one and two weeks of expected parturition. While in the whelping enclosure they should have additional daily human contact.

##### **Early Socialisation with Conspecifics and Humans**

Social behaviour in dogs develops between 4 and 20 weeks of age. During this period it is particularly important that the dog has social contacts with both littermates and adult dogs (e.g. the bitch) and with humans and is familiarised with 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 dog and it has been shown that a short period of handling even from the first day after birth on is of importance as the young animals are already able to respond to scent and tactile stimulation.

***Background: Dogs are social animals and it is therefore not surprising that single housing is associated with an increased incidence of behavioural abnormalities (Hetts et al. 1992). Hetts argues that social isolation is even more damaging than spatial restriction. There is abundant literature on dogs kept as companion animals to show that they frequently suffer***

*from separation anxiety when left on their own (e.g. review in Serpell & Jagoe, 1995). From 3 weeks of age, puppies become increasingly distressed if placed alone in a strange environment (Elliott & Scott, 1961). There are no clear data to indicate what an optimum group size might be, but pair housing would seem to be a reasonable minimum as dogs in pairs spend a similar proportion of their time socialising to those in larger groups (Hubrecht, 1993). Aggression in group housing can be a serious problem, in some cases leading to the death of animals, so it is important to ensure that there is an adequate husbandry routine to monitor the dogs and forestall potential problems.*

*The Expert Group considered that, with the exception of the provision for temporary separation of up to 4 hours for pair- or group-housed dogs (see Section 4.3), special justification and approval from the Responsible Authority should be required if dogs are to be single-housed for scientific purposes. The Expert Group also considered that, as single housing for even short periods can be a stress factor, any period in excess of 24 hours should be considered as severely compromising the welfare of the animals and therefore taken fully into account when considering the justification for the procedures.*

*With regard to early socialisation with conspecifics and humans, socially restricted rearing conditions lead to the development of behavioural abnormalities and crippled behavioural repertoires (Thompson et al, 1956; Fuller, 1967). The early development of the dog can be divided into four stages: (1) the neonatal stage when the puppy is comparatively helpless; (2) the transition period at about 13 days when the eyes first open, and lasting for about 1 week; (3) the socialisation period between 4 and 20 weeks; and (4) the juvenile period. It has long been accepted that the socialisation period is critical in determining the dog's social behaviour (Scott & Fuller, 1965; Scott et al, 1974; Wright, 1983). All dogs should therefore have experienced adequate socialisation during the 'socialisation period', and should receive gentle and sympathetic handling thereafter. The earlier periods are also important. Short periods of daily handling or other stimuli can have a marked influence on development. For example, early handling can result in a more rapid maturation of the brain (Fox & Stelzner, 1966), more rapid weight gain and earlier opening of the eyes. Puppies can learn associations between smell and suckling at one day of age (Fox, 1971), and Fox (1978) showed that puppies exposed to varied stimulation between birth and 5 weeks of age were later more confident and exploratory in a strange environment. The easiest way to minimise stress in the dog is to ensure that he/she reacts well to handling.*

#### 4.2. Enrichment

The design of indoor and outdoor enclosures should allow some privacy for the dogs and enable them to exercise some control over their social interactions.

Separate areas for different activities should be provided. This can be achieved by, for example, inclusion of raised platforms and pen sub-divisions.

Dog treats and toys afford welfare benefits to the animals, providing these are used sensibly and adequately monitored. As chewing is an important behaviour, items should be provided which meet this need.

The primary advantages of exercise are to allow additional opportunities for dogs to experience a complex and varied environment and to increase interactions with other dogs and humans. These will be particularly important where these needs cannot be fully met within the space provided by the animal enclosure. Therefore, unless contra-indicated on scientific or veterinary grounds, dogs should be removed to a separate area and allowed to exercise, with other dogs where possible, and with staff supervision and interaction, ideally on a daily basis.

**Background: There are two basic methods of enriching a caged environment: (1) by social enrichment, and (2) by physical enrichment. These can be sub-divided as follows:**

- *By providing more, or more varied, opportunities for social interactions with (a) humans or (b) dogs*
- *By allowing dogs a greater choice of activity through the provision of physical items within the pen*
- *By allowing dogs a greater choice of location of micro-environment within the pen*

*As discussed under (4.1) above, housing dogs in pairs is considered an effective strategy for conspecific socialisation. It is also common practice in many dog facilities to allow dogs to run together while the pens are being cleaned, for example by making use of corridor areas. The dogs appear to enjoy this activity although there have been no specific studies on its effectiveness for enrichment. Given that puppies have been properly socialised with humans during the socialisation period, they will be motivated to socialise with humans (Scott & Fuller, 1965).*

*Studies on the provision of physical enrichment items indicate that dogs will make extensive use of items, particularly if they are food-flavoured (DeLuca & Kranda, 1992; Hubrecht, 1993; Hubrecht, 1995). Proper presentation, for example by suspending chews a few centimetres from the floor of the pen on a spring, can help to minimise cleaning and possessive aggression problems whilst also allowing the animals to chew in a species-specific manner (Hubrecht, 1993).*

*Social and environmental enrichment can be combined into an integrated programme (Loveridge, 1994).*

*Kennels or open pen designs should not overtly restrict the dogs' ability to obtain information about the surroundings. High walls or partitions between pens result in the dogs being unable to see to the end of their rooms. This can lead to them spending a relatively high proportion of time on their hind-legs (Hubrecht et al, 1992) or in apparently repetitive, possibly stereotypical, jumping behaviour. Obvious ways around this problem include reducing solid partition height between pens for at least a portion of their length, or providing platforms within pens. Hubrecht (1993) has shown that platforms are extensively used by dogs to play and rest on. These structures have the benefit that they increase the complexity of pens, thus allowing the dogs more choices within their environment, and that, if they are properly designed so they have sufficient height, they do not block the existing floor area. They also provide a greater floor area within a given space, as they make use of the otherwise inaccessible third dimension within a pen.*

*Dog housing should be designed so that the dogs can retreat to an area that provides them with a sense of security. This need not cause a problem of visibility for the animal carer as it can simply be an area with a few barriers shielding the animal from view on some sides. It is particularly important to provide such structures when dogs are housed in large social groups, to allow the dogs more control over their social interactions.*

### *Exercise*

*One obvious effect of confinement is to restrict locomotory behaviour. Small enclosures not only discourage exercise, but also restrict the type of locomotion that is possible. Clark et al (1991) have shown that increasing pen dimensions beyond the minimum acceptable in the US (USDA Code of Federal Regulations) does not seem to make much difference to the dog in terms of physical fitness, nor does this seem to make much difference to the frequency of aggression or play (Bebak & Beck, 1993). However, a further study (Hubrecht et al, 1992) of the behaviour of mixed breeds housed in pens with spacious outdoor runs (744 square metres) showed that both the activity of the dogs and the range of locomotory behaviours were greater than that of dogs in pens of less than 7 square metres.*

#### 4.3. Animal enclosures – dimensions and flooring

Animal enclosures, including the divisions between enclosures, should provide a robust and easily cleaned environment for the dogs. In their design and construction they should seek to provide an open and light facility giving the dogs comprehensive sight of other dogs and staff, outside of their immediate 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 dog's time utilisation, thereby playing a role in minimising the risk of developing stereotypies. Careful consideration must therefore be given to providing an appropriate balance between solid walls and metal bars or mesh. Reinforced plate glass has also been used for pen dividers in order to allow visual contact but at the same time maintaining separation, e.g. of dosing groups in toxicology studies. The design of enclosures should provide an enclosed area out of view of other dogs while at the same time allowing for visual, auditory and, where possible, tactile contact between dogs. This design can at the same time allow easy inspection by staff.***

##### Outside runs

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

Dogs should never be forced to spend their entire lives outside and should at all times have access to an internal enclosure that meets the standards for construction and environmental control detailed in these guidelines. The internal enclosure should represent not less than 50% of the minimum space to be made available to the dogs, as detailed in table 1 below.

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 dogs.

##### Dimensions

These guidelines are intended to encourage the social housing of dogs and to permit adequate enrichment of the environment. It should be noted that within this concept and strategy every encouragement is given to holding dogs in larger and socially-harmonious groups both to extend the available floor space even further and to enhance the socialisation opportunities.

The space allowances detailed below are based on the requirements of beagles, but it should be noted that allowances significantly in excess may be required for giant breeds such as the St Bernard or Irish Wolfhounds. In the cases of breeds other than the laboratory beagle, space allowances should be decided in consultation with veterinary staff and the responsible authority.

Table 1. Minimum space allowances

Weight of dog kg	Minimum floor area For one or two dogs m <sup>2</sup>	For each additional dog add a minimum of m <sup>2</sup>	Minimum height m
= 20	4	2	2
> 20	8	4	2

Dogs that are pair or group housed may each be constrained to half the total space provided (2 m<sup>2</sup> for a dog under 20 kg, 4 m<sup>2</sup> for a dog over 20 kg) while they are undergoing procedures as defined in the Convention, if this separation is essential for scientific purposes. The period for which a dog should be so constrained should be minimised and should not in any event exceed 4 hours. This

provision is made to encourage pair housing (particularly in toxicology studies) while at the same time allowing for the need to monitor feed intake and post-dosing observations.

Any further social or physical constraint, such as in a metabolism cage or physical restraint in a sling, may severely compromise the welfare of the animals. Constraint in a metabolism cage or any similar type of housing for scientific purposes should be 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, lie down and turn around.

Nursing bitches and litters, and puppies up to 7.5 kg

The normal weaning age for puppies is 6-9 weeks.

The following recommendations are based on good practice and address the situation in dog breeding establishments.

A nursing bitch and litter should have the same space allowance as a single bitch of equivalent weight. The whelping pen should be designed such that the bitch can move to an additional compartment or raised area away from the puppies.

Table 2. Minimum post weaned stock space allowances

Weight of dog kg	Minimum floor area/animal m <sup>2</sup>	Minimum height m
= 2	0.5	2
= 5	1.0	2
= 10	1.5	2
= 15	2	2
= 20	4	2

The table above indicates the minimum floor space which should be continuously available to each dog of the weight indicated.

The minimum pen size for any animal is 4m<sup>2</sup>.

**Background: Confining dogs in small pens prevents them from retreating when alarmed and restricts their ability to perform species-specific behaviour. For example, in a pen too small a dog will not be able to run in a 'dog-specific' manner (Hubrecht, 1997). Small enclosures are also associated with a higher incidence of circling and other stereotypies, compared to larger enclosures (Hubrecht et al, 1992). Dogs given larger enclosures choose to keep significantly more distance between themselves (Bebak & Beck, 1993). Adequate space is required for social interactions (but also to enable an individual to control its social interactions), and to permit play with enrichment devices such as toys. Regarding good practice, the UK Home Office recommends that no dog is kept in less than 4.5 square metres (Home Office, 1995). The Home Office has also identified appropriate space allowances for post-weaned stock.**

**Therefore, in order to encourage housing in pairs (at least), and taking account of many existing pen sizes, the minimum floor area recommended for one dog is the same as that for two dogs, i.e. 4 square metres for dogs weighing under 20 kg. Each additional dog above two and weighing up to 20 kg will require an additional 2 square metres.**

**Dogs weighing 20 kg or more should be given a minimum floor space of 8 square metres, i.e. two standard pens interlinked. Again, two dogs may be kept in this space, but each additional dog above two and weighing more than 20 kg will require additional floor space of 4 square metres. These requirements may be met by linking two or more adjacent pens.**

**Dogs which are normally pair- or group-housed may each be constrained to half the space provided (e.g. 2 square metres for a dog under 20 kg) while they are undergoing scientific procedures if this separation is essential to the purpose of the study, but with a maximum of 4 hours separation. This space provision is to encourage pair- or group-housing particularly in toxicology studies. The Expert Group considered that any period of isolation may cause some stress and so compromise welfare; however a permissible period of separation of 4 hours was established in discussion with the Working Party as a reasonable period to allow adequate time for dosing, feeding and making individual observations of animals. The dogs should therefore be returned to pair- or group-housing as soon as possible, and certainly by the end of the working day. The Expert Group also considered that any period of separation exceeding 4 hours should require the authorisation of the Responsible Authority. This above is consistent with good practice in toxicology. For example, a survey of husbandry practices in toxicology studies in the UK found that 7 out of 8 respondents housed their dogs two or more to a pen, separating them for feeding; and six respondents provided pen floor areas of 4.5 square metres or more (Hubrecht, 1994). One establishment had pens of 6.8 square metres floor space. It was also noted that separation for dosing was not always considered necessary and depends on the compound under study.**

**Any further constraint such as in a metabolism cage or physical restraint in a sling may severely compromise the welfare of dogs. The Expert Group considered this should be specifically authorised by the Responsible Authority. The optimum size of metabolism cage which balances welfare and scientific objectives is yet to be determined, but these or any other type of similar confinement should provide a dog with a space as close as possible to the minimum standards for normal housing and at the very minimum should allow the dog to stretch fully, lie down and turn around.**

## Flooring

The preferred flooring for dog accommodation is a solid continuous floor with a smooth non-slip finish. All dogs should be provided with a comfortable solid resting area, for example by the use of enclosure furniture such as raised beds or platforms.

Open flooring systems such as grids or mesh should not be used for dogs. Where there is a justification for open flooring, the highest level of attention should be given to their design and construction in order to avoid pain, injury or disease and allow the animals to express normal behaviours. If any welfare problems do arise related to the flooring, veterinary advice should be sought and, if necessary, dogs relocated onto solid flooring.

Pre-weaned puppies and peri-parturient and suckling bitches should not be held on an open floor system.

***Background: The question of whether dog accommodation should have solid or grid floors was considered at length at the Berlin Workshop (1993). Most experts recommended solid or at least only partly gridded floors and agreed that dogs preferred solid flooring. In considering this issue, the Expert Group aimed to satisfy the concept of the 5 Freedoms (FAWC, 1993), comprising freedom: from thirst, hunger and malnutrition; from discomfort; from pain, injury and disease; to express normal behaviour; and from fear or distress. In relation to the relevant Freedoms, the floor of a dog enclosure needs to be comfortable (physical and thermal), non-injurious, easily cleanable and of a design suited to the anatomy of the canine limb. There are arguments to support both strategies of flooring (open vs solid), but no firm evidence that open flooring systems do actually equal poor welfare for the dogs. However, the positive benefits of an open flooring system tend to accrue primarily to the provider in respect of comparative capital cost and efficient husbandry practices with respect to cleaning, rather than in positive benefits to animal welfare. Indeed, there can be significant negative effects if open flooring systems are poorly designed, although this comment can be applied to any type of floor to some extent. The above recommendations therefore recognise the desirability of providing the animal with an element of choice, whatever the flooring system, and, specifically, with a comfortable resting place. A solid area, of sufficient size for an animal to lie down in comfort, should be provided in any system, whether solid or open. In certain situations, open flooring should never be used, such as for heavily pregnant or suckling bitches, and very young animals.***

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

When dogs are held on solid floors, some litter or substrate material facilitates cleaning and minimises the necessity to wash/hose down regularly.

Peri-parturient and suckling bitches should be provided with a bed and bedding material to support whelping and the nursing of puppies. Puppies also benefit from the provision of bedding materials, as may certain breeds such as the greyhound.

***Background: In general dogs are housed on sawdust or wood chips, perhaps more for historical reasons than to meet dogs' needs. It is common for concrete or similar flooring to be used for dogs, but provision of a warm dry place to sleep is paramount. Under-floor heating may be used but should not be instead of bedding materials as dogs could then be lying in direct contact with urine and faeces. Raised bed boards are popular and also allow visualisation of the environment. The beds may be wood-based but must then be metal-edged to reduce chewing (MacArthur, 1987). Nesting boxes for whelping bitches that are insulated and raise pups from the floor have been in use for some time.***

**The idea of having a bedding material is to soak up urine and faecal water content, reducing the need for cleaning and also the amount of free water in the enclosure. In puppies there is also the need for an insulating layer on the floor as young animals regulate their body temperatures less effectively.**

**Any bedding material used must clearly be non-toxic, produce little ammonia, be absorbent, non-allergenic and atraumatic (Voipio et al, 1986; Potgieter & Wilke, 1996). Soft wood bedding has been found to induce liver enzymes in mice (Vessell, 1973) and so hard wood is the material of choice, also being more absorbent (Voipio et al, 1986). A study between pine wood, eucalyptus pulp and vermiculite showed that the dust content of vermiculite and pine was higher than eucalyptus, and both had lower water absorbency. However, the vermiculite produced the least ammonia and pine the highest (Potgieter & Wilke, 1996). There have however been reports of vermiculite inducing neoplastic changes in the lungs of mice (Jager et al, 1997) and cedar has been implicated in inducing tumours in rats (Sabine, 1975), whereas other workers have found that sawdust gave a similar incidence of neoplasia as control groups (Tennekes et al, 1981). It therefore appears that, although vermiculite may be best avoided, compelling evidence not to use a particular type of wood bedding, due to carcinogenicity, is lacking.**

**Dogs have been bedded on straw or hay. However, they may not be a good choice due to the lack of quality control of these products and their ability to induce atopic skin disease. There are many cases of atopy, but pollens, fungi and moulds are frequently incriminated.**

**Paper has been used in domestic situations but newspaper print will make animals dirty and there is insufficient evidence concerning the toxicity of shredded paper when ingested. Recycled, non-toxic and sterile paper products may be acceptable.**

**Fabric type bedding materials are popular in whelping units. There are several types that are hypoallergenic, non-toxic, durable and easily washed, but they can be expensive and care must be taken to clean them regularly.**

#### 4.7. Cleaning

Each occupied enclosure should be cleaned at least daily. All excreta and soiled materials should be removed from all areas used by dogs at least daily and more frequently if necessary.

Wet cleaning by hosing down of enclosures should be carried out as necessary but should not result in dogs becoming wet. When enclosures are hosed down, the dogs 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 dog facilities. It is emphasised by the Expert Group that persistent daily hosing down of enclosures with the dogs present can lead to them being almost constantly wet and this was also addressed during the Berlin Workshop discussions (1993). This situation is undesirable in relation to health and welfare. It should also 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 dogs.**

4.8. Handling (See item 4.1 above and item 4.10 of the General section of Appendix A)

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 - DOGS

### References

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