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**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 ferrets

**Background information for the proposals
presented by the Group of Experts on Dogs, Cats and Ferrets**

PART B

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Species-specific section - Ferrets

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

Ferrets are small carnivores, weighing up to 2.5kg in the case of adult males, and are thought to be a domesticated form of the wild polecat. There is a pigmented and an albino form of the ferret, the former being genetically dominant, having a brown or ginger and black coat and being known as the polecat ferret. The fur in albino males may become very yellow owing to the secretions of the sebaceous glands.

Under natural conditions they feed on small mammals, birds, fish and invertebrates. They do not digest vegetable material well, hence the need for a high animal protein level in the diet. They tend to hoard food, but will not eat decayed matter.

They have a complex hunting behaviour and have therefore been used for hunting small animals such as rabbits. This is linked to their living habits, normally in burrows, and it is therefore important to provide in their living environment enrichments such as tubes and boxes, in which they can crawl, sleep and play games.

Studies of feral ferrets indicate that they are normally solitary animals, with a single male occupying a large territory with several females. However, in captivity they seem to benefit greatly from social housing in groups and spend a considerable amount of time in play behaviour.

Ferrets usually breed once a year, mating in the spring. During the breeding season, male animals are hostile to and will fight vigorously with unfamiliar males, which can result in serious injuries and even to death. As a consequence, at this time single housing of males is advisable.

The ferret is an intelligent, inquisitive, playful and agile animal and is often kept as a pet. It can be taught to come in response to a voice command and also to work on leads or lines. It will investigate all areas of its enclosure and will exploit any opportunity for escape. This should be taken into account in the design of the accommodation and a complex, escape-proof enclosure is required which also provides opportunities to the ferret to exhibit a wide behavioural repertoire.

Research uses of the ferret include studies associated with emesis, as it has a strong vomiting reflex, and viral diseases such as human influenza, owing to its susceptibility. It is highly susceptible to canine distemper virus, with high mortality, and vaccination of stock is advised. The vaccine must be indicated by the manufacturers for use in ferrets, as some distemper vaccines contain live virus produced in ferrets, which could produce clinical infection post-vaccination.

2. The environment and its control

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

Background: The air in ferret enclosures should be renewed 10 to 15 times per hour but without draughts. It is important both to attenuate the musk odour while minimising the risk of viral respiratory diseases, to which the ferret is very sensitive. Tiered racks of cages are likely to require higher rates than floor pens (Home Office, 2002). Lower stocking densities will require fewer air changes.

2.2. Temperature

Ferrets should be maintained in the temperature range 15 to 24°C.

Ferrets do not have well-developed sweat glands and heat exhaustion may occur if they are exposed to high temperatures

Background: The ferret does not have well-developed sweat glands, and is prone to heat exhaustion when exposed to high temperatures (Plant, 1999). Adult ferrets can tolerate well temperatures as low as 4oC, however young unweaned ferrets should not be maintained below 15oC. Heating or cooling may therefore be required in cold winters or hot summers to ensure a comfortable environment is maintained. Particular care must be taken during transport to avoid the animals being exposed to high temperatures (Home Office, 2002).

2.3. Humidity

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

Background: There are no specific adverse effects reported as a result of ferrets being exposed to wide fluctuations of ambient relative humidity. However, high humidity levels should be avoided, especially if the temperature is low, to minimise the occurrence of viral respiratory disease.

2.4. Lighting

The light source and type should not be aversive to the animals and particular care should be taken with ferrets, especially if albino, in the top tier of tiered racking systems.

Holding of ferrets 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 for a minimum of 8 hours daily and should generally not exceed 16 hours daily.

However, it should be noted that the duration of light-dark cycles is important for the manipulation of the reproductive cycle in the ferret and the light period may be reduced to 6 hours under these circumstances. This will need to be increased to 14-15 hours when it is required to stimulate oestrus in the female.

If natural light is totally excluded, low level night lighting should be provided to allow animals to retain some vision and to take account of their startle reflex.

Background: Lighting levels and durations must not only allow for easy and regular inspection of the ferrets but also allow for necessary manipulation of the reproductive cycle. The natural light cycle is normally acceptable; where artificial lighting is provided, a minimum light period of 8 hours is considered adequate. This can be reduced to 6 hours and then increased to a longer day period (up to 15 hours of light) to stimulate the occurrence of oestrus (Plant, 1999). It should be noted that the male is light negative and requires the opposite light cycles to the female to stimulate their season; this should commence several months before required so as to ensure sperm maturity. In tiered racking systems, and particularly with albino ferrets, it is important to avoid the exposure of animals to high intensity lighting, although no specific levels are referenced.

2.5. Noise

Lack of sound or auditory stimulation can be detrimental and make ferrets nervous. However, loud unfamiliar noise and vibration have been reported to cause stress-

related disorders in ferrets and should be avoided. It is important to consider methods of reducing sudden or unfamiliar noise in ferret facilities, including that generated by husbandry operations within the facility and also by ingress from outside sources. 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. Expert advice should be taken when designing or modifying accommodation.

Background: No data are available on the hearing range of the ferret, however the evoked auditory response range is 1-6 kHz up to 32 days of age, 4-15 kHz for adults, but up to 100 kHz for pregnant females (Plant, personal communication). It is necessary to avoid sharp, loud or otherwise unfamiliar noises and vibration, as these are considered to cause stress-related disorders in ferrets. The most important factor is familiar noise, and the lack of sound or auditory stimulation can be detrimental, making animals jumpy and nervous. A soft and varied background noise may stimulate the sensory and social development of the young ferret.

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 ferret is particularly sensitive to certain virus conditions, such as Aleutian disease and canine distemper. Human influenza virus may cause clinical disease in ferrets and appropriate preventive measures should therefore be taken in consultation with the attending veterinary surgeon. It should be noted that humans may also be infected by ferrets suffering from influenza.

Pregnancy toxæmia and Oestrus-induced anaemia are not uncommonly encountered in jills. Pregnancy toxæmia results from feeding an inadequate diet during pregnancy, particularly in jills carrying large litters. Oestrus-induced anaemia occurs in jills kept in the absence of a male during the breeding season. As the ferret is an induced ovulator, such jills may remain in oestrus for several months. The vulva may become very swollen and susceptible to trauma, also haematopoiesis is suppressed and a severe anaemia may develop. This may be managed by mating with a vasectomised male or by use of hormonal preparations, on the advice of the attending veterinary surgeon.

Breeding males should be housed singly during the breeding season as they are highly aggressive during this time and severe injuries can result from fighting. During mating, females may suffer neck injuries.

4. Housing and enrichment

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

Background: The domestic ferret is thought to descend from the European polecat. Porter & Brown (1993) describe the natural behaviour of the polecat as follows. The wild polecat uses underground burrows, often with more than one entrance. Side chambers are used for sleeping areas and to store food. The sleeping chamber is lined with dry nesting material by the polecat, which keeps its nest clean and may even air its bedding. The polecat defaecates and urinates away from its burrow and

uses vertical surfaces to scent mark. Nesting jills dig out a chamber usually near the end of the burrow, far away from the entrance. Feral ferrets when established behave in a similar way to the polecat. The ferret in captivity therefore requires a dry warm sleeping chamber, discrete eating and food storage areas, and a vertical surface for scent-marking well away from the sleeping and eating areas (Porter & Brown, 1993; Plant, 1999). Enclosures can be made from various materials such as wood, plastic, fibreglass or metal but care should be taken when using galvanised metal as zinc toxicity has been noted (Fox, 1998). Soiled litter should be removed daily and it may be useful to provide a soil tray in a corner of the enclosure.

4. 1. Housing

Although in the wild the ferret is generally a solitary animal, there would seem to be welfare benefits by providing more opportunities for enrichment by housing them in socially harmonious groups within the animal enclosure, unless there are scientific or welfare justifications for single housing.

During the breeding season, adult males may need to be maintained singly to avoid fighting and injury. However, males can be maintained successfully in groups at other times.

Pregnant females should be housed singly only during late pregnancy, no more than 2 weeks prior to parturition.

Separation of animals that are normally group housed can be a significant stress factor. Where this is for a period of more than 24 hours, it should be regarded as severely compromising the welfare of the animals. If for scientific purposes, this should be taken fully into account when considering the justification for the procedures.

Where animals are single-housed, whether for scientific or welfare reasons, additional resources should be targeted to the welfare and care of these animals. Additional human socialisation time, and visual, auditory and, where possible, tactile contact with other ferrets should be provided for all single-housed animals on a daily basis.

Background: Male polecats occupy large territories which include those of females but are thought to be relatively solitary (Plant, 1999). Experience shows, however, that ferrets are sociable animals and should normally be housed socially as social interactions are a major environmental enrichment for them (Wolfensohn & Lloyd, 1998; Plant, 1999). Care should always be taken when grouping animals, or introducing new animals to a group, to ensure that they are compatible. It has been found that gradual introduction, first by vision and smell, may be beneficial. However, group housing is not always advisable for males in the breeding season and females with litters, mated or in oestrus (Plant, 1999). Where animals are normally group-housed, the Expert Group considered that any isolation could be a stress factor and should therefore be avoided. Where this was for a period in excess of one day, it was considered this potentially could have a significant impact on the animal's welfare and should therefore be specifically justified to, and approved by, the Responsible Authority. Practical experience has shown that singly-caged ferrets show reduced exploratory movements during routine maintenance of litter material and generally are less active. They put on weight more quickly and are in poorer bodily condition than group-housed animals, which may be associated with their lower activity levels as well as the prompting of behaviours by other members of the social group in group-housing situations.

Socialisation

The ferret is an inquisitive, intelligent, playful and agile animal and this should be taken into account by providing regular interactions with other ferrets by group housing and by regular handling. In general, ferrets seem to benefit from such regular and confident handling and this should be encouraged. It will result in a better quality and more sociable animal.

Social behaviour in ferrets develops at an early age and it is important that the young ferret has social contacts with other ferrets (e.g. litter mates) and with humans (e.g. animal caretakers). Daily handling during this sensitive stage of development is a prerequisite for the social behaviour of the adult ferret. It is reported that the more frequent the interactions, the more placid the animal will become, and these interactions should be continued through into adult life.

A major form of environmental enrichment for ferrets is the provision of group housing. Where this is not possible, additional resources should be targeted.

4.2. Enrichment

The design of animal enclosures should meet the animals' species- and breed-specific needs. It should be adaptable so that innovations based on new understanding may be incorporated.

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

Separate areas for different activities, such as by raised platforms and pen subdivisions, should be provided in addition to the minimum floor space detailed below. Where nesting boxes are provided, these should be designed to contain the young ferrets within the nest.

Provision of containers and tubes, of cardboard or rigid plastic, and paper bags stimulates both investigative and play behaviour. Water baths/bowls have been reported to have been used extensively by ferrets.

Background: It is generally accepted that the ferret is an inquisitive and active animal and requires an interesting and complex environment (Porter & Brown, 1993; Wolfensohn & Lloyd, 1998; Plant, 1999). Ferrets in all situations may show stereotypies, such as running movements repeated over a short distance, and enrichment should be aimed at reducing their incidence. Social enrichment should be provided by housing socially as described. Physical enrichment of enclosures to stimulate investigation and play can be provided through the use of tubes, either plastic or cardboard, containers of various materials, and paper bags. Boxes are a form of enrichment that will not only help meet the species-specific needs but will also provide privacy for the ferrets. Deep litter for group-housed animals is also beneficial as an enrichment (Plant, 1999). An example of the type of enrichment device that can be provided in a ferret enclosure is shown in the photograph:



Photograph courtesy of GlaxoSmithKline R&D

4.3. Animal enclosures – dimensions and flooring

Animal enclosures, including the divisions between enclosures, should provide an easily cleaned and robust environment for the ferrets. In their design and construction they should seek to provide an open and light facility giving the ferrets comprehensive sight of other ferrets and staff, outside of their immediate animal enclosure. There should also be provision for the ferrets to seek refuge and privacy within their own enclosure and, in particular, away from the sight of ferrets in other enclosures.

It should be noted that ferrets are inquisitive and agile animals with a remarkable ability to escape. The design of the enclosure should be such that the animal is unable to escape and also unable to injure itself should any attempt be made.

The recommended minimum height of the enclosure should be 50 cm. The ferret is an inquisitive animal that enjoys climbing and this height allows for some vertical enrichment. The floor space should provide an adequate area for movement and to allow the animal the opportunity to select sleeping, eating and urination/defecation areas. In order to provide enough space for environmental complexity, no animal enclosure should be less than 4500 cm². Minimum space requirements for each ferret are therefore as follows:

Single housing	4500 cm ²
Group housing	
up to 600g	1500 cm ² per animal
over 600g	3000 cm ² per animal
Adult male	6000 cm ² per animal
Jill + litter	5400 cm ²

It is recommended that animal enclosures should be of a rectangular shape rather than square, to facilitate locomotor activities.

Constraint in less than the above space requirements for scientific purposes, such as in a metabolism cage, may severely compromise the welfare of the animals

Background: Housing should provide adequate area for movement and ample height to allow the animal to stand on its hind legs. It should also provide sufficient space to meet the requirements described under (4) above. Most recommended dimensions refer to the breeding and keeping of ferrets as working animals or pets (e.g. Porter & Brown, 1993). Recommended enclosure dimensions for ferrets have been developed by a UK expert group and have been adopted by the Home Office as a supplement to their code of practice for breeders and suppliers. This expert group finalised its recommendations after examining excellent ferret accommodation created by modifying disused dog pens. These housed ferrets in an area of 4.5 square metres with ample room for enrichment. Some breeders and users have provided complex wooden sleeping boxes complete with tunnels within these pens. A further set of recommendations produced by the UK Animal Procedures Committee advocated more spacious accommodation. In preparing the above space dimensions, the Council of Europe Expert Group considered both of these sets of recommendations, but formulated its proposals after further discussions with those with considerable practical experience in the housing of ferrets both for breeding and research purposes. The basic criterion used was the need to accommodate the minimum environmental enrichment that it was considered should be provided, in the form of tubes, tunnels, boxes, ladders etc, while also meeting the physiological needs of the ferrets for separate areas of their accommodation for feeding, sleeping and urination/defaecation. The above figures are therefore those that it is considered are the minimum required to allow animals to express a basic behavioural repertoire.

Flooring

The flooring for ferret accommodation should be a solid continuous floor with a smooth non-slip finish. Additional enclosure furnishment such as beds or platforms should provide all ferrets with a warm and comfortable resting place.

Open flooring systems such as grids or mesh should not be used for ferrets.

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

Background: The ferret is a carnivore. The diet should provide high levels of animal protein and fat. High carbohydrate levels can lead to protein deficiency because the animals will eat to meet their calorie requirements. Dietary fibre is not a particular requirement. These requirements are met by ferret diets available from commercial manufacturers. The nutritional requirements of the pregnant or lactating jill require particular attention, as poor or inappropriate diets can lead to poor reproductive performance, including poor conception rates, small litter numbers and pregnancy toxæmia. Plant (1999) notes that feeding of raw fish and eggs should be avoided as they contain an excess of thiaminase and may predispose to thiamine deficiency. Also, raw fish may have high levels of nitrates.

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

4.6. Substrate, litter, bedding and nesting material

Bedding material is required for all ferrets. In addition, nesting materials such as hay, straw or paper should be provided. Deep litter systems are considered to provide additional enrichment.

It is good practice to use some litter or substrate material at least to facilitate cleaning and minimise the necessity to wash/hose down regularly.

4.7. Cleaning

Wet cleaning by hosing down of animal enclosures should not result in ferrets becoming wet. When animal enclosures are hosed down, the ferrets should be removed from the enclosure to a dry place and returned only when it is reasonably dry.

Ferrets tend to defecate in one area of the enclosure against a vertical surface. Provision of a litter tray may be beneficial and reduce the frequency of cleaning required for the remainder of the enclosure.

Each occupied enclosure should be cleaned at least daily. All excreta and soiled materials should be emptied from litter trays and/or removed from all other areas used by ferrets at least daily and more frequently if necessary.

Background: An appropriate cleaning regime is a pre-requisite of good husbandry and health for ferrets. This regime needs to take account of the normal behaviours of the ferret, in particular the use of a vertical surface for urination, defaecation and scent-marking. However, ferrets may use litter trays and this will reduce the frequency of cleaning for the rest of the enclosure. The zoning of the enclosure into eating, sleeping and urination/defaecation areas should be respected when replacing litter trays. Ferrets do not normally like becoming wet and should be removed when the enclosure is being hosed down.

4.8 Handling (See item 4.11. of the General section of Appendix A)

Background: Handling of ferrets from an early age is particularly important and will lead to a more placid animal that is less stressed by handling when adult. Frequency of handling is more important than the duration of the interaction. Particular care should be taken when handling nursing mothers and sick animals, as these can be aggressive. It is essential that handlers are experienced and confident.

4.9. Humane killing (See item 4.12. of the General section of Appendix A)

4.10. Records (See item 4.13. of the General section of Appendix A)

4.11. Identification (See item 4.14. of the General section of Appendix A)

Background: Use of collars, as for cats, may be a suitable method of identification for temporary purposes, as may the use of coat dyes for albino animals. However, the preferred method of permanent identification is by microchipping. Ear tattooing and ear tags are not suitable as the ferret ear is small and comparatively delicate.

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