

WellBeing International

WBI Studies Repository

2000

A Framework for Assessing the Suitability of Different Species as Companion Animals

C. A. Schuppli

University of British Columbia

D. Fraser

University of British Columbia

Follow this and additional works at: <https://www.wellbeingintludiesrepository.org/wileapet>



Part of the [Animal Studies Commons](#), [Other Anthropology Commons](#), and the [Other Business Commons](#)

Recommended Citation

Schuppli, C. A., & Fraser, D. (2000). A framework for assessing the suitability of different species as companion animals. *Animal Welfare*, 9, 359-372.

This material is brought to you for free and open access by WellBeing International. It has been accepted for inclusion by an authorized administrator of the WBI Studies Repository. For more information, please contact wbisr-info@wellbeingintl.org.



A Framework for Assessing the Suitability of Different Species as Companion Animals

C.A. Schuppli and D. Fraser

University of British Columbia

KEYWORDS

animal welfare, companion animals, ethics, exotic animals, pet animals, pet ownership

ABSTRACT

Municipal regulations and humane movement policies often restrict or discourage the use of 'exotic' species as companion animals. However, confusion arises because the term 'exotic' is used in various ways, and because classifying species as exotic or non-exotic does not satisfactorily distinguish suitable from unsuitable companion animals. Even among commonly kept species, some appear to be much more suitable than others. Instead, decisions about suitable companion animal species need to be based on a number of relevant issues. As ethical criteria, we considered that keeping a companion animal should not jeopardize - and ideally should enhance - its welfare, as well as that of its owner; and that keeping a companion animal should not incur any appreciable harm or risk of harm to the community or the environment. These criteria then served as the basis for identifying and organizing the various concerns that may arise over keeping a species for companionship. Concerns include how the animals are procured and transported, how well their needs can be met in captivity, whether the animal poses any danger to others, and whether the animal might cause environmental damage. These concerns were organized into a checklist of questions that form a basis for assigning species to five proposed categories reflecting their suitability as companion animals. This assessment framework could be used in creating policy or regulations, and to create educational and decision-making tools for pet retailers, animal adoption workers, and potential owners, to help prevent animals from being placed in unsuitable circumstances.

Introduction

In 1992, the Toronto city government was considering whether to allow miniature pigs as domestic pets within the city boundaries. The week before the final vote was a busy one for pig biologists. Proponents of pet pigs wanted expert testimony that pigs are highly intelligent and make engaging companion animals. Opponents were seeking scientific data on the size and strength of pigs and their ability to damage dwellings and public property. City officials wanted to know whether pigs carry diseases that could be transmitted to humans or other domestic animals. The three groups, although addressing the same issue, saw very different criteria as relevant to the decision.

The Toronto pig debate was one small example of the ongoing confusion over the use of non-traditional species as companion animals¹. In many cases, the concerns have been expressed simply as a call to

avoid 'exotic' or 'wild' species² for purposes of companionship. Some municipalities have enacted regulations concerning the keeping of exotic animals, and many animal welfare organizations have policies discouraging trade in wild and exotic species (eg British Columbia Society for the Prevention of Cruelty to Animals [1982]; American Veterinary Medical Association [1990]; Metropolitan Toronto Zoo [1994]; American Humane Association [1995]; The Humane Society of the United States, see Farinato & Lamb [1995]; Canadian Federation of Humane Societies [1997]; Royal Society for the Prevention of Cruelty to Animals [1997]; People for the Ethical Treatment of Animals [1998]; Zoocheck Canada [1998]).

Unfortunately, these policies and regulations often give rise to conflicting interpretations. Confusion arises partly because the term 'exotic', which most correctly refers to animals that are not native to the local area, has sometimes been used to mean merely non-traditional or faddish companion animals. In fact, none of these meanings is necessarily related to the ethical issues that arise over keeping companion animals. For example, gerbils, *Meriones* spp., which appear to be satisfactory pets for young children, are a North African and Central Asian species which have been captive-bred only since the 1960s (Huddart & Naherniak 1995), and hence would be considered exotic by some definitions. Furthermore, even among species that are commonly kept as companion animals, some appear to be much more suitable than others, as evidenced by the numbers given up to animal shelters or for euthanasia. Hence, simply designating species as exotic or non-exotic does not satisfactorily distinguish suitable from unsuitable companion animals. In addition, suitability is also influenced by the owner's awareness and ability to care for the animal. Therefore, a more systematic analysis is needed to evaluate the suitability of different species as companion animals, based on the wide range of issues relevant to this assessment.

The purpose of this paper is to identify the various issues that affect the suitability of different species as companion animals, and to bring these issues together in the form of a systematic assessment framework which could be used in creating policy or regulations, and for educational purposes.

Ethical criteria for keeping animals as companions

Companion animals are often kept for the purpose of enhancing the welfare of the owner by providing companionship, protection, assistance or stimulation. Ethical objections to keeping a companion animal could arise if such benefits to the owner were achieved to the detriment of the animal. However, animals of many species seem capable of leading very satisfactory lives as companion animals, with at least some elements of their welfare (eg freedom from hunger, fear and disease) enhanced as a result of their being kept for companionship. In fact, companion animals are sometimes kept specifically as a service to the animals themselves, as sometimes occurs in the adoption of unwanted animals.

There is a risk, however, that we may fail to recognize a threat to the animal's welfare, especially when dealing with unfamiliar species. For example, keeping a particular species might lead to suffering if the animals are prevented from carrying out an important element of their natural behaviour such as migration, or if the animals are procured in an inhumane manner. In such cases, use of the species could raise legitimate ethical concerns. To prevent such concerns, we would want to ensure that keeping the animals would enhance, or at least not jeopardize, the welfare of the animal.

Ethical issues may also arise over any benefits or harms caused to other parties. Undesirable effects on other people (eg injury) or to the environment (eg ecological damage) could be grounds for refusing to allow owners to keep certain animals, however positive the relationship might be for the owners and the animals themselves.

Our criteria for assessing the suitability of species as companion animals were, therefore, that keeping a companion animal: i) should not jeopardize - and ideally should enhance - the welfare of the animal, as

well as of the owner; and ii) should not incur any appreciable harm or risk of harm to the community, including other wild and domestic animals, or to the environment. We then used these criteria as the basis for organizing the various concerns that arise over keeping animals for purposes of companionship.

Concerns that arise over using species as companion animals

Welfare of the animal

The welfare of animals is affected by a range of factors, many of which have been captured in the 'five freedoms' of the Farm Animal Welfare Council (1992). We consider these in turn.

First, freedom from hunger, thirst and malnutrition requires both that the nutritional requirements of the species are adequately known and that suitable foods are available to the owner. Among herbivorous and omnivorous reptiles such as the green iguana, *Iguana iguana*, metabolic bone disease is a common problem when owners with insufficient knowledge of the animals' nutritional requirements provide a diet of poor-quality vegetables and fruits (Jacobson 1987).

Second, freedom from disease and injury requires that adequate veterinary knowledge of the species exists, and that the expertise is available to the owner. For some exotic animals, little is known about basic care and diseases. For other species, considerable information may exist, but veterinarians and other individuals with this knowledge may not be readily available (eg Jacobson [1987]; Barten [1993]). In either case, animals may suffer because of inappropriate treatment. For example, ivermectin is commonly used as an ecto- and endo-parasiticide in reptiles but can harm turtles and tortoises if used on those species (Clyde 1996).

Third, freedom from physical and thermal discomfort requires that the housing and environmental needs of the species are known and can be met by the owner. Many species require very specialized housing. Ectothermic ('cold-blooded') reptiles and amphibians require a variety of temperature and moisture regimes within their enclosures (Barten 1993). Many tropical species, such as the African pygmy hedgehog, *Erinaceus albiventris*, and the sugar glider, *Petaurus breviceps*, require year-round warm temperatures of 22-27 °C (Polachic 1997; Pet Industry Joint Advisory Council of Canada 2000). Supplying these complex conditions can be difficult within the household environment.

Fourth, for animals to be free from fear, distress and other negative psychological states, they must not be unduly upset by captivity and close human proximity. This requires an ability to recognize negative psychological states in the given species (Flecknell & Molony 1997; Mench & Mason 1997), and an ability to house and handle the animals accordingly.

Fifth, for animals to be free to carry out most normal forms of behaviour, knowledge of their natural behaviour is needed, and important features of their natural environment need to be provided. Some species require high levels of exercise or key stimuli in the environment in order to live normal lives. For example, gerbils in the wild dig burrows, but in captivity, when they cannot dig a burrow, they often carry out a stereotypical behaviour of scrabbling in the corners of their cages. Wiedenmayer (1997) found that captive gerbils stopped corner-scrabbling when provided with tunnels. Other species are extremely social, and their normal behaviour requires ample interaction with conspecifics unless humans can make appropriate substitutes. For certain highly social species such as primates, the demands for interaction can be very great. For example, Rhesus monkeys, *Macaca mulatta*, establish strong and complex social-emotional bonds in captivity, without which behavioural problems can develop (Mitchell *et al* 1979). For many exotic species, little is known about the environmental features necessary to allow natural behaviour.

Animal welfare may also be jeopardized if the owner loses interest in, or commitment to, the animal. In some instances, long-term commitment may be reduced if the animal grows too large and becomes difficult to house or costly to keep. For example, the so-called 'miniature' pot-bellied domestic pig, *Sus scrofa*, can grow to more than 50kg; these animals became fashionable pets in North America during the 1990s, but because of their large size, many of them were given up to animal shelters where they were likely to be euthanized because facilities were inadequate to accommodate them (Farinato & Lamb 1995). A similar problem occurs when small fish outgrow their aquaria (Tetra undated), as public aquaria cannot accommodate the influx of these unwanted fish. Consistent care may also be jeopardized if animals are very long lived. For example, parrots in captivity can live 30-80 years (Forshaw 1973), as do many primates. Such pets may outlive their owners, or the owners may lose the interest or ability to provide care, with the result that the animal is put into a shelter or is passed through a series of owners.

Small body size may also affect the welfare of companion animals. Some species, such as the sugar glider, are so small and fragile that they can be easily crushed by improper handling (Humane Society of Tucson 1998).

As well as these general aspects of animal welfare, additional considerations arise for species that are collected directly from their native habitat. Some methods of wild capture inflict considerable harm to animals; for example, some wild birds remain stuck to unattended glue sticks or die from inadequate care after capture (Bowles *et al* 1992). Animals that survive capture may then travel long distances, sometimes in crowded and unhygienic conditions (Bowles *et al* 1992). Based on studies in Senegal (a major bird exporter) and several bird-importing countries, the total average mortality of birds from capture, export and quarantine has been estimated at 70 per cent (Carter & Currey 1987).

Welfare of others

Some animals create a risk of injury to humans (either owners or community members) and to other animals. Venomous snakes, pythons, crocodylians, primates, wolves, wolf-hybrids and large cat species are generally considered unsuitable as companion animals for this reason (Diesch 1981; Jacobson 1993; Payne 1998; People for the Ethical Treatment of Animals 1998). The Canadian Veterinary Medical Association (1993) cautions owners about pet ferrets, *Mustela putorius Jura*, because they are known to bite people unpredictably, especially children (Paisley & Lauer 1988). In extreme cases, people have died from bites by exotic companion animals (Diesch 1981; 1982). However, safety concerns are by no means limited to exotic species: in the United States, there are 2-3 million bites by domestic dogs annually (Cornwell 1997), which account for 0.3 per cent to 1.1 per cent of all emergency department visits (Sokal & Houser 1971; Avner & Baker 1991; Weiss *et al* 1998) and cause as many as 18 human deaths per year (Sacks *et al* 1996).

Companion animals may also expose humans to disease. For example, pet racoons, *Procyon lotor*, and skunks, *Mephitis mephitis*, have sometimes been found to test positive for rabies (Diesch 1981), yet there is no licensed rabies vaccine for these species in the United States (National Association of State Public Health Veterinarians Inc 1998). Health Canada (1997) has documented human salmonellosis, attributed to *Salmonella tilene*, transmitted from African pygmy hedgehogs and sugar gliders. Turtles are also known carriers of *Salmonella* (D'Aoust *et al* 1990). Hence, there has been a ban on the importation of pet turtles for commercial purposes in Canada (D'Aoust & Lior 1978) and on the commercial sale and distribution of pet turtles in the United States (Lecos 1988). Common pet species are a problem as well as exotic species, in that a number of human illnesses can be acquired from traditional pets such as dogs and cats (Elliot *et al* 1985; Folkenberg 1990).

Zoonoses transmitted to wild or domesticated animals are also a concern. According to Fowler (1978), Newcastle Disease, transmitted from imported parrots destined for the pet trade, required the euthanasia of 12 million chickens and the destruction of hundreds of nondomestic birds in California in 1971. Bacteria, viruses and parasites are common in many shipments of imported aquarium fish (Trust & Bartlett 1974; Shotts & Gratzek 1984), and many parasites are transferred to native fish from shipments of exotics (Hoffman & Schubert 1984).

Species may be ill-suited as companion animals simply because they have qualities that may detract from, or fail to enhance, the welfare of the owner. In such cases, the animal's standard of care may also suffer because of reduced owner commitment. Suitability in this respect depends greatly on the owner. For example, fish may be boring for young children but suitable for owners seeking quiet, undemanding companion animals. Companionship is one of the most important reasons for owning an animal (Mugford 1980; Serpell 1986; Endenburg 1991). Hence, if an animal is solitary, inactive or nocturnal, the owner may find it unsatisfactory; for example, hedgehogs are nocturnal and roll into a ball when handled inappropriately (Pet Industry Joint Advisory Council 2000). Offensive qualities of animals (noise, odour, unruly or destructive behaviour) may also be undesirable to owners – and possibly to other members of the community.

Risks to the environment

When wild species are used in the companion animal trade, a major concern is the impact that wild captures have on the native populations and ecosystems from which the animals are taken. In some areas, nestlings of cavity-nesting birds are captured by destroying nest trees; this may pose a threat to local populations if the availability of nesting sites is reduced (Beissinger & Bucher 1991). In the fish trade, tropical reef fish are often collected by stunning with cyanide (Rubec 1986). In addition to causing delayed mortality in targeted fish, cyanide also kills non-target fish and shellfish, along with eggs and larvae, and poses a health hazard for the fishers (Rubec 1986; McAllister *et al* 1998). Fish dealers can certify that their fish were caught with nets or other less objectionable methods (Tetra undated).

In some cases, species can become endangered partly by capture for the pet trade (Smart & Bride 1993). As many as 18 out of the 140 New World parrot species may be considered at risk of extinction through a combination of capture for the pet trade and habitat destruction (Collar & Juniper 1991). Attempts to prohibit trade in endangered species include legislation such as the 1992 *Wild Bird Conservation Act* in the United States (Department of the Interior 1992), and international agreements such as the *Convention on International Trade in Endangered Species of Wild Fauna and Flora* (CITES [CITES Secretariat 1973]) and the *Convention on the Conservation of European Wildlife and Natural Habitats* (Council of Europe 1982). However, for species in which trade is allowed, the scientific data needed to monitor sustainable harvesting levels are often lacking (Beissinger & Bucher 1991). This, combined with the poor regulatory capabilities of many exporting and importing countries, raises major concerns about the continued acquisition of companion animals caught from the wild.

Concerns also arise over non-native species being introduced into new habitats. When owners tire of companion animals, they sometimes release them into the wild. For example, many exotic fish species have been released deliberately or accidentally into the continental United States from the aquarium fish trade (Courtenay *et al* 1984). The risk of a species colonizing and damaging an ecosystem will depend on both the biology of the species and the physical and biological properties of the environment (Pimm 1987; Vitousek 1990; Smallwood & Salmon 1992). Introduced species can affect ecosystems by altering the food chain and structure of the biological community, or even by driving native species to extinction (Pimm 1987). Agricultural damage is often caused by introduced species (Smallwood & Salmon 1992). During the early 1940s, the house finch, *Carpodacus mexicanus*, became established in eastern North

America from the release of caged birds in the pet trade (Elliott & Arbib 1953). The house finch is responsible for damaging many fruit crops in California, and as the population spreads it will probably become a nuisance to crops in new areas (Long 1981).

Table 1. Checklist of questions to assess the suitability of species as companion animals.

<i>Welfare of the animal</i>	
1	Is there adequate knowledge of the species with respect to: 1.1 nutritional requirements? 1.2 health care? 1.3 environmental requirements for physical and thermal comfort? 1.4 recognizing and preventing negative states such as fear, pain and distress? 1.5 requirements for exercise, social interaction, and natural behaviour? If there is adequate knowledge of the species' requirements, might the owner still have practical difficulty in providing: 1.6 suitable food? 1.7 veterinary services? 1.8 an environment that meets the animal's needs regarding comfort, psychological welfare, exercise, social interaction, and natural behaviour?
2	Is the animal's size: 2.1 so large when mature that the owners may be unable to accommodate it? 2.2 so small that the animal might easily be injured?
3	Is the animal's life expectancy so great that the owner may lose the commitment or ability to provide care throughout its life?
4	Is there any appreciable risk of suffering, injury, illness, or death arising from: 4.1 procurement? 4.2 transportation
<i>Welfare of others</i>	
5	Is the animal poisonous or venomous?
6	Is there any appreciable risk of the animal attacking or injuring: 6.1 humans? 6.2 other animals? If a risk of injury exists, can it be made acceptably low by selecting safe individuals or by proper management?
7	Is there any appreciable risk of the animal transmitting disease to: 7.1 humans? 7.2 wild or domestic animals? If a risk of disease transmission exists, can it be made acceptably low by finding individuals free from the disease(s) or by proper management?
8	Does the animal have objectionable characteristics (eg noise, odour, uncleanliness, unruliness, destructive behaviour) that may prove unacceptable to: 8.1 the owner? 8.2 the community?
9	Does the animal have other characteristics (eg solitary, sedentary or nocturnal nature) that may cause the owner to lose interest and commitment?
<i>Risks to the environment</i>	
10	Is there any appreciable risk of the animal causing ecological damage if it escapes or is released?
11	For species that exist in the wild, are trade and transportation subject to adequate regulation and enforcement?
12	If there is ongoing wild capture, is there any appreciable risk that capture might have undesirable effects on native populations and ecosystems? If a risk exists, can it be avoided by use of captive-breeding that does not depend on continued wild capture?

Table 2. Categories of animal species classified according to their degree of suitability as companion animals.

Category A	Species whose use for companionship is generally positive for the animal and the owner, whose needs are easily met, whose procurement and transportation raise no appreciable problems, and whose use involves no apparent risks to the community or the environment.
Category B	Species that require significant commitment of time and/or resources in order that their use be positive for the animal and the owner, but where ownership is unproblematic with regard to procurement, transportation and effects on the community and the environment. Substantial owner education may be needed for such species.
Category C	Species that have complex or demanding requirements needing skilful and knowledgeable owners who are prepared to commit significant time and/or resources to animal ownership, but where ownership is unproblematic with regard to procurement, transportation and effects on the community and the environment. Control of ownership (eg ownership only by qualified persons) may be appropriate for such species.
Category D	Species where there is insufficient knowledge (eg regarding procurement, transportation, environmental impact or the animal's needs) to allow a confident assessment of its suitability as a companion animal. Use of these species might be acceptable in the future if knowledge becomes adequate and any necessary safeguards are in place.
Category E	Species that are unsuitable as companion animals because of undue harm or risk of harm to one or more of: the animal, the owner, the community, or the environment.

An assessment framework

As a guide for assessing the suitability of different species as companion animals, we attempted to capture the above issues in the form of a checklist of questions (Table 1).

Three features of the checklist require comment to clarify its use. First, use of the checklist requires substantial knowledge of the species. Thus, while the questions provide a uniform process whereby a knowledgeable person can assess a species in a systematic way, the questions do not reduce or eliminate the need for such knowledge. Second, some of the questions inherently require ethical or value-related judgements, for example, to decide whether enforcement of trade regulations is 'adequate', or whether risk of injury is 'acceptably' low. Whether to use a particular animal for purposes of companionship is inherently an ethical issue. The checklist helps to structure the empirical knowledge and normative judgements that are needed to arrive at a decision, but cannot turn the decision into a purely empirical or objective one. For example, some individuals may attach particular importance to certain concerns; some users, for instance, may consider that the risk of ecological damage or inhumane procurement is sufficiently high to rule out all use of wild-caught species. Finally, the suitability of a species depends partly on the owner and circumstances as well as on the characteristics of the species; hence, the assessment process often does not lead to a universal 'yes or no' decision. Rather, we suggest that the assessment leads most logically to classifying species into one of five possible descriptions (Table 2), reflecting in part the degree of owner commitment and expertise required.

The following examples illustrate how we see the framework being used, but these are not intended as final evaluations of the species in question.

Domestic mice, *Mus musculus*, and golden hamsters, *Mesocricetus auratus*, are examples of animals that might be assigned to category A. These animals are readily procured (by captive breeding) and transported without risk to themselves or the environment; there is substantial experience of and research into their care, nutrition and behaviour (Baumans 1999; Whittaker 1999); and their welfare needs appear

to be met easily and cheaply within a human home by an enriched cage environment coupled with regular handling. The few undesirable traits can generally be dealt with by simple management. The occasional tendency of hamsters to nip can usually be overcome by regular, gentle handling (Whittaker 1999); objectionable odours from mice can be managed successfully by regular cleaning and the use of simple 'latrines' in the cage (Boyd 1988). Small body size may lead to a risk of injury, but this can be minimized by owner education. The nocturnal habits of these rodents, while undesirable for some owners, may actually correspond well to normal playtime for children attending school, and night-time noise is usually not a problem outside the room where the animals are kept. The solitary nature of hamsters makes them suitable for rearing individually (Whittaker 1999); the more social nature of mice can be accommodated by housing two same-sex litter mates together (Baumans 1999).

Many popular dog and cat breeds are likely to be classified in category B as long as they are procured from known and responsible sources. The animals' health, nutrition, and behaviour have been studied extensively (MacArthur Clark 1999), and expertise is widely available. Food and care products are easily accessible, and the animals' requirements for comfort, exercise, and most forms of normal behaviour can generally be met with sufficient owner commitment. Numerous potential problems exist for the owner and community. These include noise, odour, hygiene, disease transmission, injury, and destructiveness (MacArthur Clark 1999); however, the problems can generally be overcome with a reasonable level of owner commitment. Consequently, the animals can be expected to thrive when kept as companions, and they may greatly enhance human welfare. However, certain dog breeds may merit category C or E because they have been bred for extreme traits that seriously jeopardize their welfare (Steiger 1998); or, in the case of breeds predisposed to aggression, because of a danger to others and the high requirement for animal training and owner skill.

Among common exotic pet species, the green iguana may be an example of category C. Green iguanas can be maintained reasonably well in the home, but require a specialized, temperature- and humidity-controlled environment in some climates (Barten 1993). Although much is known about their care, housing, and health needs (Barten 1993), this expertise may not be readily accessible to a given owner. The animals' specialized needs, potential to transmit disease, large adult size, and long lifespan (Barten 1993) require an owner with unusual knowledge and commitment.

Category D is included to acknowledge that in some cases we may not have sufficient knowledge to be assured that keeping a species for companionship is acceptable. This category could be applied if the methods of procuring or transporting the animal are not well known, if the ecological effects of their capture from the wild are uncertain, if their escape into a new environment could have unpredictable consequences, or if the animal's needs are not well enough known to be met reliably.

Category E consists of species that are judged unsuitable as companion animals for any of a variety of reasons. Animals judged to fall into this category may include: i) dangerous species such as venomous snakes and large cat species; ii) exotic species that could cause ecological damage if they escaped; iii) wild species whose capture or transportation raises humane or environmental concerns; iv) long-lived species whose lifespan is likely to exceed an owner's ability to provide care; and v) species whose requirements (eg for normal social behaviour) cannot reasonably be met in captivity.

Uses for the framework

The keeping of animals for companionship is influenced by decisions and actions made by municipal governments, national and sub-national (eg state or provincial) governments, international organizations, pet distributors, animal adoption organizations and individual animal owners. The framework described above could help to guide decisions at any of these levels.

Some municipal governments regulate the keeping of companion animals, most often to prevent unwanted impacts of animals on the community. Typical examples are regulations for controlling noisy or stray dogs (eg City of Vancouver [2000]). Where exotic species are considered, regulations are often designed mainly to control dangerous pets such as large cats (eg Cincinnati [1995]; Portland [1997]). However, some municipalities have also created ordinances to prohibit the keeping of exotic or wild animals as pets. Some prohibit all species except the most traditional pets (eg Spotsylvania County [1993]). Others prohibit specific species or families such as members of the bear family, weasel family (including ferrets), non-human primates, porcupines, racoons, alligators, crocodiles, large cats, and wolves (Erie County 1983; King County 1994). Often, birds, fish, reptiles, amphibians or unusual species are not considered, unless they are poisonous (Erie County 1983; King County 1994). The framework described above could provide a more systematic process and rationale for deciding which species to permit in a given municipality or how animal ownership should be regulated. For example, a municipality might choose to permit only species judged to fall into categories A and B, or it might require licensing for species judged to fall into category C.

Many national or sub-national governments control the importation of animals, often to prevent the introduction of disease. In Canada, the Canadian Food Inspection Agency enforces the *Health of Animals Act* (Department of Justice 1997) which monitors imported and exported live animals to protect livestock and poultry from serious diseases. The framework developed above suggests broader criteria that governments might consider as grounds for refusing to accept importation. For example, a country might refuse to accept certain species destined for the pet trade if these species have a history of injury or death through procurement or transportation. National and sub-national governments could also regulate companion animal species in other ways. For example, Diesch (1981) suggested that unacceptable ownership of exotic animals might be prevented by a regulatory system modelled after the one used for falconry in the United States. This system restricts the practice of falconry to qualified individuals by requiring an examination, inspection of facilities and equipment, and other requirements (Diesch 1981). A similar system could be created for species assigned to category C, with potential owners screened in some manner, perhaps with a requirement for membership of an appropriate organization such as a herpetological society.

International treaties regulate trade in certain animal species. Most notably, countries that are members of CITES act by banning commercial international trade in an agreed list of endangered species and by regulating and monitoring trade in certain others (CITES Secretariat 1973). This process helps to curtail the use of some species as companion animals. In Canada, for example, permits are seldom approved for parrots of endangered species purchased as pets (Environment Canada 1997). Although CITES was designed specifically for threatened and endangered species, it provides a model that could be extended to regulate international trade in species that are deemed unsuitable as companion animals.

Apart from policy and regulatory questions, pet retailers, animal adoption workers and potential animal owners are often confronted with the issue of whether particular animals, including those of common pet species, are suitable for particular circumstances. The matching of individual animals and owners raises many of the same questions that enter into policy issues over appropriate species. For example, animal adoption workers may need to assess whether a potential owner can provide adequately for an animal's needs, accommodate its mature size, care for it throughout its expected lifespan, and tolerate any negative aspects such as odour and noise. In such cases, the checklist of questions may also be useful as a decision-making tool to help ensure that animals are placed in appropriate circumstances, and as an educational tool to guide potential owners through a rational decision about whether a particular animal is suitable for them.

Animal welfare implications

The welfare of animals can be jeopardized if unsuitable species are used as companion animals. The assessment framework we propose incorporates the wide range of factors that affect the suitability of species for companion animal use. The framework could be used by the humane movement and by different levels of government in developing policy and regulations regarding appropriate companion animal species. It may also be useful for pet retailers, animal adoption workers, and potential owners to make well-considered decisions about appropriate companion animals for particular circumstances.

¹ We are using 'companion animal' as interchangeable with 'pet animal', as defined by the *European Convention for the Protection of Pet Animals* (Council of Europe 1987) as: 'animals sharing man's companionship and in particular living in his household'.

² Diesch (1981) uses the term 'wild' to refer to native species that are not domesticated but occasionally kept as pets, and 'exotic' for foreign species, generally ones that are not domesticated, but occasionally kept as pets. For simplicity, we will use 'exotic' to encompass both groups of companion animals.

Acknowledgements

We are grateful to Drs Michael Burgess, Michael McDonald, Dan Weary and John Wooldridge for valuable discussion; and to many veterinarians, animal care workers, and others who generously shared their expertise on the issues. Funds for the research were kindly provided by the University of British Columbia Centre for Applied Ethics.

References

American Humane Association 1995 Wild and exotic animals as pets. In: *American Humane Association Policies*. American Humane Association: Englewood, USA

American Veterinary Medical Association 1990 AVMA *Position on Wild Animals as Pets*. Available from: <http://www.avma.org/policy/polwild.html>. American Veterinary Medical Association, Schaumburg, Illinois, USA

Avner J R and Baker M D 1991 Dog bites in urban children. *Pediatrics* 88: 55-57

Barten S L 1993 The medical care of iguanas and other common pet lizards. *Veterinary Clinics of North America: Small Animal Practice* 23: 1213-1249

Baumans V 1999 The laboratory mouse. In: Poole T (ed) *UFAW Handbook on the Care and Management of Laboratory Animals, 7th edition. Volume 1* pp 282-312. Blackwell Science Ltd: Oxford, UK

Beissinger S R and Bucher E H 1991 Sustainable harvesting of parrots for conservation. In: Beissinger S R and Snyder N F R (eds) *New World Parrots in Crisis: Solutions from Conservation Biology* pp 73-115. Smithsonian Institution Press: Washington, USA

Bowles D, Currey D, Knights P and Michels A 1992 The trail. In: Bowles D, Currey D and Knights P (eds) *Flight to Extinction. The Wild-caught Bird Trade* pp 6-11. The Animal Welfare Institute and the Environmental Investigation Agency: Washington, USA

Boyd J 1988 Enrichment surprises with mice. *Humane Innovations and Alternatives in Animal Experimentation* 2: 49-50

British Columbia Society for the Prevention of Cruelty of Animals 1982 Policy statement: exotic birds and animals as pets. In: *British Columbia Society for the Prevention of Cruelty to Animals Policy Statements* p 2. British Columbia Society for the Prevention of Cruelty to Animals: Vancouver, Canada

Canadian Federation of Humane Societies 1997 *Policy Statement on Exotic Pets*. Canadian Federation of Humane Societies: Ottawa, Canada

Canadian Veterinary Medical Association 1993 *Animal Welfare Position Statement on Non-domesticated Wild Caught Animals as Pets*. Available from: <http://www.cvma-acmv.org/doc18.htm>. Canadian Veterinary Medical Association Animal Welfare Advocacy, Ottawa, Canada

Carter N and Currey D 1987 Research into the conditions of capture, transportation and export of wild-caught birds from Senegal. In: Thornton A (ed) *The Trade in Live Wildlife. Mortality and Transport Conditions* pp 10-18. The Environmental Investigation Agency: London, UK

Cincinnati 1995 General regulations on possession or sale of wild or potentially dangerous animals. In: *Cincinnati Municipal Code Regulation No 701-43, Ordinance No 188-1995*. City of Cincinnati: Cincinnati, USA

CITES Secretariat 1973 *Convention on International Trade in Endangered Species of Wild Fauna and Flora*. International Environment House: Geneva, Switzerland

City of Vancouver 2000 *Special Noise By-law 6555 Sec 4(C)*. City of Vancouver: Vancouver, Canada

Clyde V L 1996 Practical treatment and control of common ectoparasites in exotic pets. *Veterinary Medicine* 91: 632-636

Collar N J and Juniper A T 1991 Dimensions and causes of the parrot conservation crisis. In: Beissinger S R and Snyder N F R (eds) *New World Parrots in Crisis: Solutions from Conservation Biology* pp 1-24. Smithsonian Institution Press: Washington, USA

Council of Europe 1982 *Convention on the Conservation of European Wildlife and Natural Habitats*. (European Treaty Series No 104). Council of Europe, Publications and Documents Division: Strasbourg, France

Council of Europe 1987 *European Convention for the Protection of Pet Animals. Explanatory Report on the European Convention for the Protection of Pet Animals. Substantive Provisions. General Provisions Article 1*. (European Treaty Series No 125). Council of Europe, Publications and Documents Division: Strasbourg, France

Cornwell J M 1997 Dog bite prevention: responsible pet ownership and animal safety. *Journal of the American Veterinary Medical Association* 210: 1147-1148

Courtenay W R Jr, Hensley D A, Taylor J N and McCann J A 1984 Distribution of exotic fishes in the continental United States. In: Courtenay W R Jr and Stauffer J R (eds) *Distribution, Biology, and Management of Exotic Fishes* pp 41-77. The Johns Hopkins University Press: Baltimore, USA

D'Aoust J Y, Crozier E D M and Sewell A M 1990 Pet turtles: a continuing international threat to public health. *American Journal of Epidemiology* 132: 233-238

D'Aoust J Y and Lior H 1978 Pet turtle regulations and abatement of human salmonellosis. *Canadian Journal of Public Health* 69: 107-108

Department of the Interior 1992 *Wild Bird Conservation Act*. United States Code of Federal Regulations: US Government Printing Office, USA

Department of Justice 1997 *Health of Animals Act*. Department of Justice of Canada: Ottawa, Canada

Diesch S L 1981 Should wild-exotic animals be banned as pets? *California Veterinarian* 35: 13-18

Diesch S L 1982 Reported human injuries or health threats attributed to wild or exotic animals kept as pets (1971-1981). *Journal of the American Medical Association* 180: 382-383

Elliot D L, Tolle S W, Goldberg L and Miller J B 1985 Pet-associated illness. *New England Journal of Medicine* 313: 985-995

Elliott J J and Arbib R S Jr 1953 Origin and status of the house finch in the eastern United States. *Auk* 70: 31-37

Endenburg N 1991 *Animals as Companions. Demographic, Motivational and Ethical Aspects of Companion Animal Ownership*. Published PhD thesis, University of Utrecht, Utrecht, The Netherlands

Environment Canada 1997 *Permit Requirements - Parrots*. Available from: http://www.ec.gc.ca/cwssc/cites/note10_e.html. Canadian Wildlife Service, Environment Canada, Quebec, Canada

Erie County 1983 Wild animals. In: *Erie County Property Maintenance Code Section PM-803.0. Ordinance No 46-1983*. Erie County: Erie, USA

Farinato R and Lamb R 1995 Fad news is bad news. The sad story of wild and exotic pets. *Humane Society of the United States News (Fall)*: 18-21

Farm Animal Welfare Council 1992 FAWC updates the five freedoms. *Veterinary Record* 131: 357

Flecknell P A and Molony V 1997 Pain and injury. In: Appleby M C and Hughes B O (eds) *Animal Welfare* pp 63-73. CAB International: Wallingford, UK

Folkenberg J 1990 Pet ownership. Risky business? *The Food and Drug Administration Consumer* 24(3): 28-31

Forshaw J M 1973 *Parrots of the World*. Doubleday: New York, USA

Fowler M E 1978 Infectious and zoonotic diseases. In: Fowler ME (ed) *Zoo and Wild Animal Medicine* pp 367-374. W B Saunders: Philadelphia, USA

Health Canada 1997 African pygmy hedgehog-associated *Salmonella tilene* in Canada. *Canada Communicable Disease Report* 23(17): 1-3

Hoffman GL and Schubert G 1984 Some parasites of exotic fishes. In: Courtenay W R Jr and Stauffer J R (eds) *Distribution, Biology, and Management of Exotic Fishes* pp 233-261. The Johns Hopkins University Press: Baltimore, USA

Huddart Sand Naherniak C 1995 Shifting paradigms: a new look at animals in classrooms. *Green Teacher* 44: 12-16

Humane Society of Tucson 1998 *The New Fad Pet: Sugar Gliders*. Available from: <http://www.azstarnet.com/~polson/sgliders.htm>. The Humane Society of Tucson, Arizona, USA

Jacobson E R 1987 Reptiles. *Veterinary Clinics of North America: Small Animal Practice* 17: 1203-1225

Jacobson E R 1993 Snakes. *Veterinary Clinics of North America: Small Animal Practice* 23: 1179-1212

King County 1994 Prohibiting the private ownership of exotic animals as pets, establishing licensing and other requirements for those currently possessing such animals. In: *King County Council Ordinance No. 11340*. King County: King County, USA

Leeds C W 1988 Risky shell game: pet turtles can infect kids. *The Food and Drug Administration Consumer* 21(10): 19-21

Long J L 1981 *Introduced Birds of the World. The Worldwide History, Distribution and Influence of Birds Introduced to New Environments*. Universe Books: New York, USA

MacArthur Clark J 1999 *The Dog*. In: Poole T (ed) *UFAW Handbook on the Care and Management of Laboratory Animals, 7th edition. Volume 1* pp 423-444. Blackwell Science Ltd: Oxford, UK

McAllister D, Baquero J, Rodriguez K and Tongson E 1998 *Non-toxic Aquarium Fish-catching*. Available from: http://www.idrc.calnayudammalaquarium_28e.html. International Development Research Centre Nayudarma, Ottawa, Canada

Mench J A and Mason G J 1997 Behaviour. In: Appleby M C and Hughes B O (eds) *Animal Welfare* pp 127-141. CAB International: Wallingford, UK

Metropolitan Toronto Zoo 1994 Private ownership of wildlife. In: *Metropolitan Toronto Zoo Official Policy A & P-008*. City of Toronto: Toronto, Canada

Mitchell G, Maple T L and Erwin J 1979 Development of social attachment potential in captive rhesus monkeys. In: Erwin J, Maple T L and Mitchell G (eds) *Captivity and Behavior. Primates in Breeding Colonies, Laboratories and Zoos* pp 59-111. Van Nostrand Reinhold: New York, USA

Mugford R A 1980 The social significance of pet ownership. In: Corson S A and O'Leary Corson E (eds) *Ethology and Nonverbal Communication in Mental Health* pp 111-122. Pergamon Press: Oxford, UK

National Association of State Public Health Veterinarians Inc 1998 *Compendium of Animal Rabies Control* 1998. Available at: <http://www.cdc.gov/epo/mmwr/preview/rr4604.html#TOC>. American Veterinary Medical Association, Richmond, Virginia, USA

Paisley J Wand Lauer B A 1988 Severe facial injuries to infants due to unprovoked attacks by pet ferrets. *Journal of the American Medical Association* 259: 2005-2006

Payne D 1998 *Keeping a Snake as a Pet*. Available from: <http://www.zoo.org/conserv.htm>. Woodland Park Zoo, Seattle, Washington, USA

People for the Ethical Treatment of Animals 1998 *Companion Animal Factsheet No 4. Exotic Animals: Born Free, Sold Out*. Available from: <http://www.peta-online.org/facts/comifsc04.htm>. People for the Ethical Treatment of Animals, Norfolk, Virginia, USA

Pet Industry Joint Advisory Council of Canada 2000 *Introducing the Hedgehog*. Available from: <http://www.pijaccanada.com/hedgehog.html>. The Pet Industry Joint Advisory Council of Canada, Pointe-Claire, Quebec, Canada

Pimm S L 1987 Determining the effects of introduced species. *Trends in Evolution and Ecology* 2: 106-108

Polachic D 1997 Sugar gliders: perfect pet or fad? *Pets Quarterly Magazine (Spring)*: 18-19

Portland 1997. Keeping of large cats within the city's boundaries. In: *The Portland City Code Ordinance No 171742*. City of Portland: Portland, USA

Royal Society for the Prevention of Cruelty to Animals 1997 *Policies on Animal Welfare, Revised 1997*. Royal Society for the Prevention of Cruelty to Animals: Horsham, UK

Rubec P J 1986 The effects of sodium cyanide on coral reefs and marine fish in the Philippines. In: Maclean J L, Dizon L Band Hosillos L V (eds) *The First Asian Fisheries Forum*. The Asian Fisheries Society: Manila, Philippines

Sacks J J, Lockwood R, Hornreich J and Sattin R W 1996 Fatal dog attacks, 1989-1994. *Pediatrics* 97: 891-895

Serpell J A 1986 *In the Company of Animals: A History of Human-animal Relationships*. Basil Blackwell: Oxford, UK

Shotts E B Jr and Gratzek J B 1984 Bacteria, parasites and viruses of aquarium fish and their shipping waters. In: Courtenay W R Jr and Stauffer J R (eds) *Distribution, Biology, and Management of Exotic Fishes* pp 215-232. The Johns Hopkins University Press: Baltimore, USA

Smallwood K S and Salmon T P 1992 A rating system for potential exotic bird and mammal pests. *Biological Conservation* 62: 149-159

Smart A C and Bride I G 1993. *The UK Trade in Live Reptiles and Amphibians: A Report to the RSPCA on the Nature and Status of the Reptile and Amphibian Pet Trade Between 1980 and 1992*. The Durrell Institute of Conservation and Ecology: Canterbury, UK

Sokal A B and Houser R G 1971 Dog bites: prevention and treatment. *Clinical Pediatrics* 10: 336-338

Spotsylvania County 1993 Wild or exotic animals. Keeping as a pet. In: *Spotsylvania County Code Article VI, Sec 4-81*. Spotsylvania County: Spotsylvania, USA

Steiger A 1998 Problems with animal welfare, disease and behavioural abnormalities of extreme breed types in pet animals. In Veissier I and Boissy A (eds) *Proceedings of the Congress of the International Society for Applied Ethology* p 91. International Society for Applied Ethology: Clermont, France

Tetra undated *If There's a Fish in Your Future ... is There a Future for Your Fish? A Joint Conservation Program of Tetra Second Nature, New York Zoological Society and the Wildlife Conservation Society*. Tetra Second Nature: Blacksburg, USA

Trust T J and Bartlett K H 1974 Occurrence of potential pathogens in water containing ornamental fishes. *Applied Microbiology* 28: 35-40

Vitousek P M 1990 Biological invasions and ecosystem processes: towards an integration of population biology and ecosystem studies. *Oikos* 57: 7-13

Weiss H B, Friedman D I and Coben J H 1998 Incidence of dog bite injuries treated in emergency departments. *Journal of the American Medical Association* 279: 51-53

Whittaker D 1999 Hamsters. In: Poole T (ed) *UFA W Handbook on the Care and Management of Laboratory Animals, 7th edition. Volume 1* pp 356-366. Blackwell Science Ltd: Oxford, UK

Wiedenmayer C 1997 Causation of the ontogenetic development of stereotypic digging in gerbils *Animal Behaviour* 53: 461-470

Zoocheck Canada 1998 *The Issues and Legislation*. Available from: <http://www.zoocheck.com/about/>.

Zoocheck Canada, Toronto, Ontario, Canada.