

Assigning Degrees of Ease or Difficulty for Pet Animal Maintenance: The EMODE System Concept

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Abstract Pet animal management is subject to varied husbandry practices and the resulting consequences often impact negatively on animal welfare. The perceptions held by someone who proposes to keep an animal regarding the ease or difficulty with which its biological needs can be provided for in captivity are key factors in whether that animal is acquired and how well or poorly it does. We propose a system to ‘score’ animals and assign them to categories indicating the ease or difficulty with which they can be kept as pets in accordance with welfare and public health and safety considerations. The ‘EMODE’ (‘Easy’, ‘Moderate’, ‘Difficult’, ‘Extreme’) system has two fundamental components: animal welfare—which considers the ‘five freedoms’ principles; and public health and safety—which considers management associated with risks from disease or injury to the keeper and to others. EMODE incorporates two tiers of assessment and guidance, and may offer a reasonable guide for the majority of relevant animals. EMODE Tier 1 provides a primary and general assessment of animals by class or group, and EMODE Tier 2 provides a secondary refined assessment of animals by species or breed. EMODE offers a user-friendly and versatile foundation concept for the future development of guidance for the layperson who may be considering acquiring a pet or for certain personnel when considering assigning species to restrictive lists of suitable animals,

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for example, ‘positive lists’ as used by governments to control animals in trade and keeping.

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Introduction

Pet animal management is subject to highly varied husbandry demands and outcomes. A study of domesticated dogs in the UK indicated an average lifespan of over 11 years (Mitchell 1999), whereas a study of reptiles (turtles, tortoises, lizards and snakes) in the UK indicated a premature mortality rate of 75 % in their first year in the home (Toland et al. 2012). Whilst the two published studies used different approaches (average longevity versus premature mortality) it is hard to avoid the conclusion that most pet dogs achieve natural longevity whereas most pet reptiles do not. This difference probably relates to three key factors: the more challenging biological needs of reptiles compared with dogs; the relatively poor adaptability of reptiles to captivity compared with dogs; and the availability and degree of competent, independent guidance.

Veterinarians are notably familiar with domestic animals (e.g. dogs, cats and rabbits), thus they can provide highly competent advice and guidance on keeping and caring for these animals. By contrast for non-domesticated, ‘exotic’ species (including fishes, amphibians, reptiles, birds, and unusual mammals) it is difficult to obtain competent advice because veterinarians that specialise in these species are still relatively few in number. Whilst there are many Internet hobbyist websites and unqualified persons who offer advice to potential or actual buyers, the quality of this guidance can be questionable, thus here we regard such sources as unreliable.

There is debate among veterinarians about the suitability of different animals as pets (Figuerola-Diaz 2011). Differing biological needs among animals of individual species, and their adaptability to captivity, are fundamental factors determining their success or failure to thrive (Brown and Nye 2006; Mason 2010; Serpell et al. 2006; Warwick 1995; Warwick et al. 2013). Domesticated species are, by definition, adapted to living in close proximity to humans, but many exotic species face particular challenges of adjustment to artificial conditions (Morgan and Tromberg 2007; Warwick 2004). These challenges are exacerbated by the fact that not only are exotic species placed into the generally unnatural surroundings of private dwellings, but also they are commonly confined to vivariums and other cages, further restricting their lifestyle.

The perceptions held by someone who proposes to keep an animal regarding the ease or difficulty with which its biological and behavioural needs can be provided for in captivity are undoubtedly key factors in deciding whether that animal is acquired, and how well or poorly it does in captivity. According to The World Conservation Union there are the following number of species for each animal class: invertebrates >1,300,000; fishes >31,000; amphibians >6,400; reptiles >9,000; birds >9,900; mammals >5,400 (WCU 2010). The great diversity in exotic species

offered in the pet trade is reflected in the variability in ease and difficulty experienced in keeping them in captivity. The diversity of ornamental fish species is considerable and care ranges from minimal to specialised. For example, in the UK approximately 50 % of kept fish occupy outdoor ponds (PFMA 2011), which may result in required care being minimal. Longer-lived animals (we have used 10 years or greater to indicate this) have more time in which to manifest management challenges—requiring enduring responsibility of commitment time and expense, which can be an important consideration.

An animal that might seem ‘easy’ or ‘moderate’ to specialised zoo personnel and others may be difficult or extremely difficult for the layperson, and even to many who regard themselves to be experts. EMODE is not directly aimed at verifiably specialised animal keepers, rather it is most relevant to the novice and other non-specialists. Given the likely importance of perception among prospective and actual animal keepers regarding both acquisition and fate of captive animals, we propose a system to ‘score’ animals and assign them to categories indicating the ease or difficulty with which they can be ‘kept’ as pets in accordance with animal welfare and public health and safety considerations. We have termed this approach the ‘EMODE’ (‘Easy’, ‘Moderate’, ‘Difficult’, ‘Extreme’) system.

Categorising Animals and the EMODE System

Schuppli and Frazer (2000) presented a detailed framework for assessing the suitability of different animals as ‘companions’. Whilst innovative and important within the scientific community, this material may be overly sophisticated or inaccessible to the layperson and to others. Additionally, although Schuppli and Fraser included animal welfare and public health and safety in their framework, they also considered species suitability based on broader ranging issues involving the harmful effects of sourcing animals (including methods of wildlife collection and transportation) and potential environmental impact (such as where incidental or deliberate releases may lead to non-indigenous animals becoming invasive alien species). These issues of sourcing animals and ecological impacts are important ones and do require very careful consideration. Koene (2012) has also developed a model decision tree for the assessment of species suitability as pets that uses an evidence-based algorithm. This is an important approach for the professional community but may be relatively inaccessible to the layperson and non-biological personnel because the system is designed to enable biologically qualified users to research and apply carefully selected scientific information on a species-by-species basis. EMODE focuses on those aspects that directly affect an animal’s suitability or otherwise in the home, and is designed to be highly accessible to the layperson, which offers a proportionate advantage over alternative frameworks.

The EMODE system we propose borrows some elements from the work both of Schuppli and Fraser, and of Koene while maintaining a more fundamental and user-friendly approach targeted at the layperson who might purchase an animal, and decision-makers who develop formative policies. EMODE incorporates two

tiers of assessment and guidance that may be regarded as primary considerations of animal husbandry which can, if needed, lead to the application of the systems of Schuppli and Fraser, and of Koene and thus to the greater specificity that those methods offer.

There are two major components to the EMODE system: animal welfare using the ‘five freedoms’ principles; and public health and safety, which refers to the degrees of hygiene management and physical cautions implied when keeping an animal in order to avoid significant risk of injury or transmission of disease to the keeper or other persons. Our assignment of animals within the various categories in the primary tier process (Table 1) results from assessments made using the models of Schuppli and Fraser’s and of Koene’s, for which we reviewed available literature on animal biology and husbandry (including physiological, psychological, husbandry, morbidity and mortality, and public health and safety issues). Consensus was sought and obtained for the background information to and categories in all EMODE Tiers and Tables, which were presented for consultation to independent scientists and other biological professionals who possessed no financial vested interest in or were vocationally obligated to practice impartiality to animal keeping and its promotion. Over 500 species and breeds of all classes were tested using EMODE with remarkable consistency. Although this assessment does not represent all animal types kept as pets, it does offer a reasonable cross section of examples.

It is likely that there will be some differing views regarding the degree of ease or difficulty with which an animal can be kept, and these may be significantly influenced by familiarity and experience with a species or a group, or a vested interest. For example, a pet trade organisation may refer to certain animals as ‘easy to keep’ for promotional or belief reasons, whereas experienced veterinarians and biologists may apply greater circumspection. The layperson and others who are not professional biologists would likely benefit from an accessible source of information that offers basic yet evidence-based methodology for classifying animals by ease or difficulty to be kept as a pet. Laypersons may find EMODE helpful for their decision-making. Certain non-biological personnel, for example some administrative staff, may find EMODE helpful establishing criteria for positive lists of animals that are permissible within particular authority jurisdictions.

Our use of the terms ‘animals’, ‘class’, ‘group’, ‘species’ and ‘breed’, are intended to convey the following meanings: *animal(s)* is used as an overarching reference to any animal, thus including class, group, species, or breed. *Class* conveys traditional biological classification (e.g. a fish or mammal). *Species* conveys an identified biological species (e.g. a royal python or African grey parrot). *Group* conveys a collection of relevant species (e.g. primates or domesticated animals). *Breed* conveys a distinct genetic variant within a species (e.g. lop-eared rabbit or Bengal cat).

Interpretation of ‘Easy’, ‘Moderate’, ‘Difficult’, ‘Extreme’

It should be noted that while the terms ‘Easy’, ‘Moderate’, ‘Difficult’, ‘Extreme’ are used in this paper, the term ‘easy’ in particular is not used to imply simplicity.

Animals that inhabit naturalised garden ponds (typically fishes, but occasionally amphibians) may require relatively little management and fall within our ‘easy’ category. Nevertheless, caretakers need to be mindful that animals in ponds are susceptible to problems including overstocking, freezing in winter, parasites and other issues. Many domesticated dogs frequently have healthy associations with humans, impose minimal demands, and enhance their keepers’ lives. However, even the keeping of dogs requires a significant investment of care and expense, with both positive and negative aspects to consider. So it should be taken as read that this paper’s reference to ‘easy’ takes for granted an acceptance of great responsibility, commitment and resources. In other words, the terms used here imply that no animal is ‘totally easy’ and this is reflected in Table 1. It may therefore be presumed that our uses of ‘moderate’, ‘difficult’, and ‘extreme’ difficulty speak for themselves in suggesting that all the species in those categories are highly demanding. The average animal keeper may reasonably keep relatively few animals within those categories, and many are even beyond the husbandry abilities of the most experienced persons. However, as stated elsewhere, EMODE is directed primarily at the novice, regulatory authorities and legislators.

Welfare

The ‘five freedoms’ refer to certain essential biological needs of animals and the caretaker’s responsibility to provide for those needs. While the descriptive principles remain the same throughout the literature, different authors have occasionally modified the guidance to each principle to offer certain clarifications. Here, we present a combined summary borrowing from both the descriptions by the Farm Animal Welfare Council (FAWC 2012) and the Royal Society for the Prevention of Cruelty to Animals (RSPCA 2012), which we feel jointly convey the greatest relevance to this article.

The five freedoms set out that animals’ wellbeing should be assured in the following ways:

1. Freedom from hunger and thirst—by ready access to fresh water and a diet to maintain full health and vigour;
2. Freedom from discomfort—by providing an appropriate environment including shelter and a comfortable resting area;
3. Freedom from pain, injury or disease—by preventing them from getting ill or injured and by making sure animals are diagnosed and treated rapidly if they do;
4. Freedom to express normal behaviour—by providing sufficient space, proper facilities and company of the animal’s own kind;
5. Freedom from fear and distress—by ensuring conditions and treatment, which avoid mental suffering.

The guidance for the five freedoms is necessarily broad and relevant for all animals. According to their author the five freedoms represent “...a practical, comprehensive check list of paradigms by which to address the strengths and weaknesses of any husbandry system” (Webster 2005).

Caging and Artificial Environments

Unlike free-living or semi-wild animals that can meet most or all of their own biological needs, caging an animal inevitably involves restricting its freedom as well as imposing great responsibilities of husbandry on the keeper. In many, if not most, cases, especially where exotic species are concerned, the natural biological needs and lifestyle, including behaviour, physiology, diet, and spatial requirements, are poorly known or unknown, and these considerations are reflected in the categorisation of animals in Tier1/Table 1. Maintaining animals under artificial conditions effectively means that holistic natural phenomena are replaced with provisions perceived as necessary by the caretaker. Those provisions may be neutral, beneficial or harmful. Contrary to many lay perceptions, caged environments are rarely capable of forming self-maintaining ‘microcosms’ and must be dutifully managed in order to maintain even basic integrity. In some instances, the caretaker’s perceptions may be very well founded, but in other cases, the caretaker’s beliefs may be ill-founded or even catastrophic for the animals. Some animals, for example reptiles, may tolerate poor conditions and disease for extended periods of time, giving a false perception of their ‘suitability’.

Consequently, caging any animal, especially where exotic forms are concerned, effectively involves restricting an animal in an atypical challenging environment that is difficult to maintain and is usually under the arbitrary management of caretakers with little or no relevant biological knowledge beyond ‘normal’ practices of pet keepers. Accordingly, for the purposes of the EMODE system any animal that is typically caged is considered as requiring special care and thus all are excluded from the ‘easy’ to keep category. Indeed, we would generally consider that where caging is involved, and in particular where exotic forms are concerned that require highly specialised temperature and humidity care, most if not all of these animals fit into the ‘difficult’ or ‘extreme’ categories. Numerous authors have concluded that captive conditions frequently result in stress, morbidity and premature mortality, for example, invertebrates (Smith 1991; Elwood 2011; Crook 2013), fishes (Wabnitz et al. 2003; Livengood and Chapman 2007; Volpato 2009); Meijboom and Bovenkerk 2013), amphibians (DPI 2006; Arena et al. 2012), reptiles (Warwick 1995; Kreger 2002; Toland et al. 2012; Warwick et al. 2013), birds (Mather 2001; Engebretson 2006; Meehan and Mench 2008; van Zeeland et al. 2009), and mammals (Hediger 1955; Hutchins et al. 1984; Broom and Johnson 1993; Morgan and Tromberg 2007; Soulsby et al. 2009). In summary, there is a risk that current practices may fail to cater for all of the five freedom requirements.

Public Health and Safety

When assessing potential public health and safety risks, three key factors are considered: first, whether or not there is good published information indicating that a zoonosis (a disease transmissible from animal to human) is associated with the animal; second, whether or not health and safety risks associated with the animal

may be managed with ease or difficulty; and third, whether or not adequate, competent professional guidance for avoiding health and safety problems is readily available.

Zoonoses and injuries—an animal was regarded to constitute an important threat to public health if it (or a closely related type) was listed in either Smith and Whitfield (2012) or Warwick et al. (2012). Combined, these publications constitute major recent reviews of zoonoses for domesticated and exotic animals. Zoonotic risk is a complex matter, ranging from the low probability of a severe danger for which there is little prevention and no cure (e.g. Herpesvirus-B associated with macaques) through hazards that are widespread and either self-limiting or potentially serious and with variable success in treatment (e.g. Salmonella associated with reptiles), to those that present moderate threats but are routinely controlled (e.g. worms in dogs). Animals were regarded as constituting an important threat to public safety if they appeared in, or were restricted by, recognised legislation, for example the UK Dangerous Wild Animals Act (1976), or whether there was published evidence demonstrating an association of significant risk of injuries with a particular species (e.g. in Goldstein 1992; Schaper et al. 2009; Warwick and Steedman 2012).

Management of risk was assessed according to the opportunities for transmission, prevention and control of pathogens in the domestic environment.

Availability of relevant independent professional guidance was assessed according to whether or not independent expert guidance was routinely and locally available regarding the animal concerned.

The veterinary community represents the most available and professionally qualified source of independent guidance to the public. However, this professional sector's knowledge-base with regard to non-domesticated animals is considered to be relatively poor on salient matters of exotic animal care (Forbes 2011). Similarly, the primary care medical profession represents the most available and professionally qualified source of independent guidance to the public on health and safety and management of risks, but again knowledge levels appear to be relatively poor regarding exotic animals and public health (Warwick 2004). Therefore, wherever animal care and public health and safety may be reliant on these two key professional sources of advice, the availability of genuine, and impartial, expert guidance was a significant consideration regarding our categorisation of animals. We have regarded 'genuine experts' to include people who hold formal qualifications in scientific, biological, or veterinary subjects, who possess formal awards for specialisations, who are established and published in their field, and who are accountable to formal professional organisations for the quality of information they offer.

Assessing Degree of Ease or Difficulty to Keep Animals as Pets

EMODE (see Appendix 1) adopts a two-tier approach to assessing degree of ease or difficulty to keep animals as pets. Tiers 1 and 2, and Tables 1 and 2 were developed

using consensus decision-making between the authors and consultations with 13 independent advisors.

The primary tier involves assessing animals by class or group and uses non-variable, pre-weighted, categorisation, and the secondary tier involves assessing animals by species or breed and uses variable, incremental, point scores.

Conclusions

EMODE provides a user-friendly and versatile guidance concept, whether for the layperson who may be considering acquiring a pet or for some personnel when considering assigning species to restrictive lists of suitable animals (e.g. ‘positive lists’ as used by governments to control animals in trade and keeping). Although we have tested very many animals, with remarkable consistency, using EMODE there are likely to be occasional anomalous results due to the diversity of species and breeds that are involved. However, we believe that there is sufficient integrity to the EMODE system to offer a reasonable guide for the majority of relevant animals, and at the very least, provide a basis by which an informed judgment can be made on the suitability or otherwise of keeping an animal as a pet.

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Appendix 1: The EMODE System Concept

Assessing Animals as Pets by ‘Easy’, ‘Moderate’, ‘Difficult’, ‘Extreme’

Prospective acquirers of any animal should make every effort to conduct thorough background research before seriously contemplating taking on a pet. Similarly, correctly answering the questions in EMODE Table 2 also requires obtaining good quality, independent information. Veterinarians, zoological parks, *bona fide* animal rescue centres and online animal encyclopaedias can give basic information about most animals.

Assessing Animals by Class or Group (Tier 1)

Assessing animals by class or group enables prospective and actual acquirers of animals to gauge the *generality* of the demands (biological, practical and public health and safety) associated with an animal and its suitability or otherwise as a pet, and acts both as a stand-alone 'quick reference' guide and as a foundation for the secondary tier (Tier 2).

Invertebrates (e.g. crabs, crayfish, snails, insects, spiders, millipedes) include a wide variety of species that require greatly differing degrees of complex maintenance in enclosed environments. Availability, independence, and quality of guidance on care are limited. However, some (e.g. crayfish) may occupy outdoor ponds and require relatively little direct care (beyond effective containment). There are relevant zoonotic and often human safety risks with some species that require careful management, and availability and quality of guidance on injury and disease prevention and control is limited. Accordingly, their range in this summary is wide to reflect that variation.

Fishes (e.g. fishes, eels, rays) include a wide variety of species that require greatly differing degrees of complex maintenance in enclosed environments and manifest a high rate of premature mortality. Availability, independence, and quality of guidance on care are limited. However, many occupy outdoor ponds and require relatively little direct care, although regular observation and some management is essential. There are significant zoonotic risks that require careful management, and availability and quality of guidance on injury and disease prevention and control is limited. Accordingly, their range in this summary is wide to reflect that variation.

Amphibians (e.g. frogs, toads, newts, salamanders) include a wide variety of species that require greatly differing degrees of complex maintenance in enclosed environments and manifest a high rate of premature mortality. Availability, independence, and quality of guidance on care are limited. There are significant zoonotic risks that require careful management, and availability and quality of guidance on injury and disease prevention and control is relatively limited. Accordingly, their range in this summary excludes 'easy'.

Reptiles (e.g. crocodiles, turtles, tortoises, lizards, snakes) include a wide variety of species that require greatly differing degrees of complex maintenance in enclosed environments and manifest high premature mortality. Availability, independence, and quality of guidance on care are limited. There are significant zoonotic and often human safety risks that require very careful management, and availability and quality of guidance on injury and disease prevention and control is limited, and compliance with guidance is very poor. Accordingly, their range in this summary excludes 'easy'.

Birds (e.g. parrots, cockatiels, cockatoos) include a wide variety of animals, and while some (e.g. the more domesticated fowl) are capable of being maintained outdoors, they require greatly differing degrees of complex maintenance in enclosed environments. Availability, independence, and quality of guidance on care are limited. There are significant zoonotic and often human safety risks that require careful management, and availability and quality of guidance on injury and disease prevention and control is relatively limited. In addition, outdoor (and uncaged) occupation is relatively uncommon, thus their range in this summary excludes 'easy'.

Unusual Mammals (e.g. bats, foxes, meerkats, kinkajous, sloths) include a wide variety of animals that require greatly differing degrees of complex maintenance in enclosed environments. Availability, independence, and quality of guidance on care are limited. There are significant zoonotic and often human safety risks that require very careful management, and availability and quality of guidance on injury and disease prevention and control is relatively limited. Accordingly, their range in this summary excludes 'easy'.

Primates (e.g. monkeys, apes, prosimians) include a wide variety of species that require extreme degrees of complex maintenance in enclosed environments and availability and quality of guidance is limited. There are significant zoonotic risks and often human safety risks that require very careful management, and availability and quality of guidance on injury and disease prevention and control is very limited. Accordingly, their range in this summary excludes 'easy' and 'moderate'.

Domesticated Animals (e.g. rats, mice, guinea pigs, rabbits, ferrets, chickens, ducks, geese, pot-bellied pigs, goats, donkeys, horses) includes a wide variety of animals of both species and breed with some animals (e.g. rabbits) capable of being maintained outdoors, and some animals (e.g. horses) essentially housed outdoors. Availability, independence, and quality of guidance on care are fair. There are significant zoonotic and often human safety risks that require careful management, and availability and quality of guidance on injury and disease prevention and control is good. Accordingly, their range in this summary is wide to reflect that variation.

Dogs and Cats range from 'easy' to 'difficult' because the degree of care varies with breed. Availability, independence, and quality of guidance on care are excellent, and even the most challenging species and breeds benefit from widely available qualified guidance. There are significant zoonotic risks that require careful management, and availability and quality of guidance on prevention and control is excellent. Accordingly, they are not listed as 'extreme' in this summary.

Table 1 provides a quick reference summary indication of degree of ease or difficulty to keep animals based on class or group.

Table 1 EMODE: indication of degree of ease or difficulty to keep animals by class or group

'Easy'	'Moderate'	'Difficult'	'Extreme'
	Invertebrates		
	Fishes		
	Amphibians		
	Reptiles		
	Birds		
	Mammals (unusual)		
	Mammal-primates		
	Domesticated animals		
	Dogs and cats		

EMODE includes considerations regarding both the care of the animal with respect to its biological needs as well as human health and safety issues

Assessing Animals by Species or Breed (Tier 2)

Assessing animals by species or breed enables prospective and actual acquirers of animals to gauge the *specificity* of the demands associated with an animal and its suitability or otherwise as a pet. Assessing animals by species or breed is the most refined and informative approach. Where more precise categorisation is required, this secondary tier can be used to narrow the range of ease or difficulty to keep an animal.

Tier 2 builds on the foundation of Tier 1 by carrying forward the minimum degree of ease or difficulty by conversion into a points system of 1–40. For example, ‘reptiles’ convey an automatic 18 pts as a starter base (high moderate level as represented in Table 1), because the application of the principles in Tier 1 set that score for that animal class as a whole—offering a broad guide. Tier 2 may lead to no or additional points being added to the base points, thus an animal’s status may remain unchanged from Tier 1, or may be reassigned higher within that category, or reassigned to a higher category of difficulty, thus refining their status based on the additional information. Table 2 provides a series of simple questions that may or may not add to the foundation score of Table 1. Any points accumulated from Table 2 are added to the foundation points from Table 1, on the scale of 1–40. The animal’s ‘score’ at the bottom of Table 2 gives a refined indication of the ease or difficulty with which it can be kept. Some animals will exceed the ‘40’ threshold, which merely indicates their status high in the ‘extreme’ difficulty category.

Table 2 EMODE: indication of degree of ease or difficulty to keep animals by species or breed. Questionnaire and categorisation

Foundation question		Points	
<i>Which class or group of animal does the species or breed belong to? Assign the animal the number of points (pts) indicated.</i>			
Invertebrate		5 pts	
Fish		5 pts	
Amphibian		18 pts	
Reptile		18 pts	
Bird		18 pts	
Mammal (unusual)		18 pts	
Mammal-primate		20 pts	
Domesticated animal		10 pts	
Dog or cat		5 pts	
Specific questions		Answer	Points
a. <i>If answer is 'yes', assign 5 points.</i> b. <i>If answer is 'no', move to next question.</i>			
1. Is the animal an especially sensitive species (e.g. marine tropical fish, chameleon, human-imprinted bird, bat)? or an especially small and/or delicate animal (e.g. stick insect, neon tetra fish, newt, baby crested gecko)? or an especially sensitive breed (e.g. bulldog, great Dane, Bengal cat)?		yes/no	
2. Does animal have a long potential lifespan (e.g. ≥ 10 years)?		yes/no	
3. Does the animal have specialised feeding habits that can make its dietary requirements subject to restricted supply (e.g. unusual live food or unusual plants)?		yes/no	
4. Does the animal require a specialised habitat/microhabitat (e.g. is the animal dependent on sharing its life with a particular plant)?		yes/no	
5. Is the animal poisonous, venomous, capable of growing large or inflicting appreciable injury at any point in its life?		yes/no	
6. Is anyone in the household/extended circle immunocompromised (e.g. under 5 years, elderly, pregnant, diagnosed with HIV or other immune disease, drug user, receiving chemotherapy such as cancer and anti-rejection drugs)?		yes/no	
Total points (check total points in row below to find EMODE score)			
'Easy'		'Moderate'	
'Difficult'		'Extreme'	
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40			

Worked Examples

Below are 13 worked examples of assessing animal suitability or otherwise as a pet using EMODE, which are intended to assist first-time users of the system. Note an

animal may be wholly in a specific category (e.g. 'Easy') or it may span two categories (e.g. 'Easy' to 'Moderate'). It should be noted that the position of an animal *within* a category (i.e. not only the category itself) is relevant, because several points' variation may indicate significantly different demands regarding care requirements.

Example 1 Goldfish = 5: **Q1** ('no') = 0; **Q2** ('yes') = 5; **Q3** ('no') = 0; **Q4** ('no') = 5; **Q5** ('no') = 0; **Q6** ('no' or 'yes') 0–5; = **total 10 or 15pts**. Degree of ease or difficulty = 'Easy' to 'Moderate'.

Example 2 Clownfish = 5: **Q1** ('yes') = 5; **Q2** ('yes') = 5; **Q3** ('yes') = 5; **Q4** ('yes') = 5; **Q5** ('no') = 0; **Q6** ('no' or 'yes') = 0–5; = **total 25 or 30pts**. Degree of ease or difficulty = 'Difficult' bordering 'Extreme'.

Example 3 African clawed frog = 18: **Q1** ('no') = 0; **Q2** ('yes') = 5; **Q3** ('no') = 0; **Q4** ('no') = 0; **Q5** ('no') = 0; **Q6** ('no' or 'yes') = 0–5; = **total 23 or 28pts**. Degree of ease or difficulty = 'Difficult'.

Example 4 Marine toad = 18: **Q1** ('no') = 0; **Q2** ('yes') = 5; **Q3** ('no') = 0; **Q4** ('no') = 0; **Q5** ('yes') = 5; **Q6** ('no' or 'yes') = 0–5; = **total 28 or 33 pts**. Degree of ease or difficulty = 'Difficult' to 'Extreme'.

Example 5 Bearded dragon = 18: **Q1** ('no') = 0; **Q2** ('yes') = 5; **Q3** ('no') = 0; **Q4** ('no') = 0; **Q5** ('no') = 0; **Q6** ('no' or 'yes') = 0–5; = **total 23 or 28 pts**. Degree of ease or difficulty = 'Difficult'.

Example 6 Burmese python = 18: **Q1** ('no') = 0; **Q2** ('yes') = 5; **Q3** ('no') = 0; **Q4** ('no') = 0; **Q5** ('yes') = 5; **Q6** ('no' or 'yes') = 0–5; = **total 28 or 33 pts**. Degree of ease or difficulty = 'Difficult to 'Extreme'.

Example 7 Budgerigar = 18: **Q1** ('no') = 0; **Q2** ('yes') = 5; **Q3** ('no') = 0; **Q4** ('no') = 0; **Q5** ('no') = 0; **Q6** ('no' or 'yes') = 0–5; = **total 23 or 28 pts**. Degree of ease or difficulty = 'Difficult'.

Example 8 African grey parrot = 18: **Q1** ('yes') = 5; **Q2** ('yes') = 5; **Q3** ('no') = 0; **Q4** ('no') = 0; **Q5** ('yes') = 5; **Q6** ('no' or 'yes') = 0–5; = **total 33 or 38 pts**. Degree of ease or difficulty = 'Extreme'.

Example 9 Kinkajou = 18: **Q1** ('no') = 0; **Q2** ('yes') = 5; **Q3** ('no') = 0; **Q4** ('no') = 0; **Q5** ('yes') = 5; **Q6** ('no' or 'yes') = 0–5; = **total 28 or 33 pts**. Degree of ease or difficulty = 'Difficult' to 'Extreme'.

Example 10 Spider monkey = 18: **Q1** ('no') = 0; **Q2** ('yes') = 5; **Q3** ('no') = 0; **Q4** ('no') = 0; **Q5** ('yes') = 5; **Q6** ('no' or 'yes') = 0–5; = **total 28 or 33 pts**. Degree of ease or difficulty = 'Difficult' to 'Extreme'.

Example 11 Vietnamese pot-bellied pig = 10: **Q1** ('no') = 0; **Q2** ('yes') = 5; **Q3** ('no') = 0; **Q4** ('no') = 0; **Q5** ('yes') = 5; **Q6** ('no' or 'yes') = 0–5; = **total 28 or 33 pts**. Degree of ease or difficulty = 'Difficult' to 'Extreme'.

Example 12 Dog (e.g. small mixed breed) = 5: **Q1** ('no') = 0; **Q2** ('yes') = 5; **Q3** ('no') = 0; **Q4** ('no') = 0; **Q5** ('no') = 5; **Q6** ('no' or 'yes') = 0–5; = **total 10 or 15 pts**. Degree of ease or difficulty = 'Easy' to 'Moderate'.

Example 13 Dog (e.g. German shepherd) = 5: **Q1** ('yes') = 0; **Q2** ('yes') = 5; **Q3** ('no') = 0; **Q4** ('no') = 0; **Q5** ('yes') = 5; **Q6** ('no' or 'yes') = 0–5; = **total 20 or 25 pts**. Degree of ease or difficulty = 'Moderate' to 'Difficult'.

References

- Arena, P., Steedman, C., & Warwick, C. (2012). *Amphibian and reptile pet markets in the EU an investigation and assessment*. Animal Protection Agency, Animal Public, International Animal Rescue, Eurogroup for Wildlife and Laboratory Animals, Fundación para la Adopción, el Apadrinamiento y la Defensa de los Animales, 52.
- Broom, D., & Johnson, K. G. (1993). *Stress and animal welfare*. London: Chapman and Hall/Kluwer.
- Brown, S., & Nye, R. R. (2006). Essentials of the exotic pet practice. *Journal of Exotic Pet Medicine*, 15(3), 225–233.
- Crook, R. A. (2013). The welfare of invertebrate animals in research: Can science's next generation improve their lot? *Journal of Postdoctoral Research*, 1(2), 1–20.
- DPI. (2006). *Code of Practice for the Welfare of Amphibians in Captivity*. Victorian Government Department of Primary Industries Bureau of Animal Welfare 475 Mickleham Rd, Attwood Victoria 3049 Australia.
- Elwood, R. W. (2011). Pain and Suffering in Invertebrates? *ILAR Journal*, 52, 175–184.
- Engelbreton, M. (2006). The welfare and suitability of parrots as companion animals: A review. *Animal Welfare*, 15, 263–276.
- FAWC. (2012). <http://www.fawc.org.uk/freedoms.htm>. Accessed 30 December 2012.
- Figuroa-Diaz, O. (2011). Exotic Animals: Appropriately Owned Pets or Inappropriately Kept Problems? (Ed. L. Hess) *Journal of Avian Medicine and Surgery*, 25(1):50–56.
- Forbes, N. (2011). BVA animal welfare foundation discussion forum. *Snakes alive: do reptiles lead a charmed life? Current reptile husbandry issues*. May 16. London: Royal College of Physicians.
- Goldstein, E. J. (1992). Bite wounds and infection. *Clinical Infectious Diseases*, 14, 633–638.
- Hediger, H. (1955). *Studies of the psychology and behavior of captive animals in zoos and circuses*. New York, NY: Criterion Press.
- Hutchins, M., Hancocks, D., & Crockett, C. (1984). Naturalistic solutions to behavioral problems of captive animals. *Der Zoologische Garten*, 54, 28–42.
- Koene, P. (2012). *Keeping of exotic animals: are all animal species suitable for companion animals*. Import & keeping of exotic animals in Europe: Existing concerns and risks-Current challenges to meeting challenges. Federation of Veterinarians Europe, Belgium 4–5 October 2012.
- Kreger, M. D. (2002). Laboratory housing of reptiles and amphibians. In V. Reinhardt (Ed.), *Comfortable Quarters for Laboratory Animals*. Animal Welfare Institute. <http://awionline.org/pubs/cq02/Cq-amph.html>. Accessed 26 February 2013.
- Livengood, E. J. & Chapman, F. A. (2007). *The ornamental fish trade: An introduction with perspectives for responsible aquarium fish ownership*. FA124 Department of Fisheries and Aquatic Sciences, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, p. 8.
- Mason, G. J. (2010). Species differences in responses to captivity: stress, welfare and the comparative method. *Trends in Ecology & Evolution*, 25(12), 713–721.
- Mather, J. A. (2001). Animal suffering: An invertebrate perspective. *Journal of Applied Animal Welfare Science*, 4(2), 151–156.
- Meehan, C., & Mench, J. (2008). Captive parrot welfare. In A. U. Luescher (Ed.), *The manual of parrot behaviour*. Oxford: Blackwell Publishing. doi:10.1002/9780470344651.ch27.
- Meijboom, F. L. B., & Bovenkerk, B. (2013). Fish Welfare: Challenge for science and ethics—why fish makes the difference. *Journal of Agricultural and Environmental Ethics*, 26, 1–6. doi:10.1007/s10806-012-9399-6.
- Mitchell, A. R. (1999). Longevity of British breeds of dog and its relationships with sex, size, cardiovascular variables and disease. *Veterinary Record*, 27, 625–629.
- Morgan, K. N., & Tromberg, C. T. (2007). Sources of stress in captivity. *Applied Animal Behaviour Science*, 102, 262–302.
- PFMA (2011). Pet Food Manufacturer's Association; 2011 Pet Population Figures.
- RSPCA. (2012). www.rspca.org.uk/animalcare. Accessed 30th December 2012.
- Schaper, A., Desel, H., Ebbecke, M., De Haro, L., Deters, M., Hentschel, H., et al. (2009). Bites and stings by exotic pets in Europe: An 11 year analysis of 404 cases from Northeastern Germany and Southeastern France. *Clinical Toxicology*, 47, 39–43.
- Schuppli, C. A., & Frazer, D. (2000). A framework for assessing the suitability of different species as companion animals. *Animal Welfare*, 9(4), 359–372.

- Serpell, J. A., Coppinger, R., & Fine, A. H. (2006). Welfare considerations in therapy and assistance animals. In A. H. Fine (Ed.), *Handbook on animal-assisted therapy: Theoretical foundations and guidelines* (p. 457). London: Elsevier.
- Smith, J. A. (1991). A question of pain in invertebrates. *ILAR Journal*, 33, 25–31.
- Smith, A. & Whitfield, Y. (2012). *Household pets and zoonoses*. National Collaborating Centre for Environmental Health, pp33. (http://ncceh.ca/sites/default/files/Household_Pets_Zoonoses_Jan_2012.pdf).
- Soulsby, C. D., Iossa, G., Kennell, S., & Harris, S. (2009). The Welfare and Suitability of Primates Kept as Pets. *Journal of Applied Animal Welfare Science*, 12(1), 1–20.
- Toland, E., Warwick, C., & Arena, P. C. (2012). The exotic pet trade: pet hate. *The Biologist*, 59(3), 14–18.
- van Zeeland, Y. R. A., Spruit, B. M., Rosenburg, T. B., Reidstra, B., van Hierden, Y. M., Buitenhuis, B., et al. (2009). Feather damaging behaviour in parrots: A review with consideration of comparative aspects. *Journal of Applied Animal Behaviour Science*, 121, 75–95.
- Volpato, G. L. (2009). Challenges in assessing fish welfare. *ILAR Journal*, 50, 320–327.
- Wabnitz, C., Taylor, M., Green, E., & Razak, T. (2003). *From Ocean to aquarium*. Cambridge, UK: UNEP-WCMC.
- Warwick, C. (1995). Psychological and behavioural principles and problems. In C. Warwick, F. L. Frye, & J. Murphy (Eds.), *Health and welfare of captive reptiles*. London and New York: Chapman & Hall/Kluwer.
- Warwick, C. (2004). Gastrointestinal disorders: are healthcare professionals missing zoonotic causes? *Journal of the Royal Society of Health*, 124, 137–142.
- Warwick, C., Arena, P. C., Lindley, S., Jessop, M., & Steedman, C. (2013). Assessing reptile welfare using behavioural criteria, *In Practice*, 35:3 123–131 (doi:10.1136/inp.f1197).
- Warwick, C., Arena, P.C., Steedman, C., & Jessop, M. (2012). A review of captive exotic animal-linked zoonoses. *Journal of Environmental Health Research*, 12:9–24 (<http://www.cieh.org/jehr/default.aspx?id=41594>).
- Warwick, C., & Steedman, C. (2012). Injuries, envenomations and stings from exotic pets. *Journal of the Royal Society of Medicine*, 105, 296–299. doi:10.1258/jrsm.2012.110295.
- WCU. (2010). *The World Conservation Union IUCN Red List of Threatened Species*. Summary Statistics for Globally Threatened Species.
- Webster, J. (2005). *Animal welfare: Towards eden*. Oxford: Universities Federation for Animal Welfare/Blackwell Publishing.