



Guidelines for Standards of Care in Animal Shelters

The Association of Shelter Veterinarians • 2010

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Introduction

The Association of Shelter Veterinarians (ASV) is an international organization whose mission is to improve the health and well-being of animals in shelters through the advancement of shelter medicine. This document is the result of work that the ASV began in 2008 to address the lack of guidelines or standards of care for animals in shelters.

The first step in the process was to convene a taskforce to define the scope of this project. An exhaustive review of the scientific literature was undertaken to uncover as much data as possible pertaining to housing, care, health, and well-being of dogs and cats in population settings. Members of the taskforce then undertook writing this document over a period of 2 years. In some cases, answers were not available in the literature; in those instances, recommendations have been based on the collective expert opinion of the authors.

Every attempt was made to balance animal welfare science with practical and realistic recommendations specific for shelters. The guiding principle was

always animals' needs, which remain the same regardless of the mission of an organization or the challenges involved in meeting those needs. As with any specialty, shelter medicine continues to evolve; studies and clinical experience continue to provide new information that animal caregivers must consider in order to provide truly humane care. Principles of animal care that were believed to be appropriate just a few years ago may no longer be considered to be effective or humane. Shelters should bear this in mind and be willing to adapt as they review their programs.

The *Guidelines for Standards of Care in Animal Shelters* is intended to be a living document that will be periodically reviewed and revised. This document does not attempt to provide specific operational instructions, as these must be tailored to each individual setting. References are provided that can be used to obtain more detailed information. It is the authors' greatest hope that this document will serve shelter animals and those who care for them by providing scientific and humane guidelines for their care.

Background

Historically, the provision of care for stray, unwanted, and owner-relinquished animals in the United States dates back to the founding of the first large-scale animal shelters in New York, Boston, and Philadelphia in the late 1800's. Most shelters were originally intended for handling large numbers of dogs for brief periods of time as part of animal control programs. That mission drove shelter design and operation for nearly 100 years. Animal sheltering has evolved considerably since those early days.

Sheltering organizations can now be found for almost any companion or domestic animal species (e.g., rabbits, birds, rodents, horses, livestock), and for many exotic species as well. The entities delivering services vary from large, well-established agencies with significant resources, to grass-roots groups, loosely-networked individuals, or individuals acting alone. The spectrum of programs is equally diverse, including: traditional open-admission shelters; care-for-life sanctuaries and hospices; home-based rescue and foster-care networks; virtual internet-based animal transport programs; behavioral rehabilitation centers; limited or planned admission shelters; no-kill or adoption guarantee shelters; high volume adoption agencies; and many permutations of these various approaches. In this document the term "shelter" is meant to apply to all of the entities mentioned above.

In contrast to many other settings such as zoos or laboratories (AZA 2009, 2010; ILAR 1996), the care of animals in shelters remains unstandardized and unregulated at the national level. Although as of 2010, at least 18 states require animal shelters to be registered or licensed (CO, GA, IL, IA, KS, MA, ME, MI, MN, MO, NE, NH, NJ, NC, PA, RI, VT, WI), and six require establishment of an advisory board (CO, KS, LA, ME, MO, TX) (ASPCA 2006a, 2006b; MDAR 2009); these regulations are inconsistent and often inadequately monitored at the state or local levels.

1. Challenges to Ensuring Welfare

The heterogeneous, fragmented nature of shelter systems, coupled with the lack of a consistent regulatory structure, has made it difficult to ensure adequate care for shelter animals. This difficulty is compounded by a multitude of challenges.

There is a growing body of literature documenting a long list of stressors for animals entering shelters, such as: leaving a familiar environment; confinement; adapting to new sounds, smells, and unfamiliar animals; and being handled by unfamiliar people. As occurs in zoo, farm, and laboratory settings, shelter animals can be challenged by boredom, frustration, isolation, social deprivation and other stresses arising out of confinement (Griffin 2006; Stephen 2005). Length of stay has been clearly identified as a risk factor for animal illness in shelters (Dinnage, 2009; Edinboro 2004).

Many facilities, which were historically designed for short-term handling of animals (e.g., for stray holding period), are poorly suited to meet the physical and behavioral needs of animals (Beerda 1997, 1999a, 1999b, 2000; Griffin 2006; Hennessy 1997; Holt 2010; Hubrecht 1992; Kessler 1997, 1999b; McCobb 2005; Ottway 2003; Tuber 1996). Various factors have contributed to increased length of stay. At many shelters there is a greater potential for animals to be confined to inadequate institutional or quasi-institutional settings from months in many cases, to the remainder of their lives in others, compounding concerns about their welfare. The same issues recognized for many years by the zoological community (Maple 2003) are now confronting shelters.

Over the past 15 years, there has been an explosive growth of grass-roots sheltering efforts. This expansion of the number of persons working on behalf of homeless companion animals has undoubtedly saved many animal lives, and overall is a very positive development. Concern arises, however, when animal care is provided by

individuals with good intentions but with little to no appropriate training in population husbandry, animal behavior, animal health, and/or veterinary medicine. Lack of awareness of information about sheltering or lack of connections to the larger shelter community may be additional barriers to ensuring adequate care.

There have been a growing number of incidents where shelter conditions have caused severe animal suffering and unnecessary death (ALDF website; Dudding 2009; HSUS 2007; Mckinnon 2009; Peat 2009; WBZN 2009). A growing number of allegations of cruelty have been filed against shelters or sanctuaries for failure to provide adequate and humane care (LA Times 2010). Lack of acceptable standards of care and failure to recognize or respond to animal suffering has contributed to these cases.

Many of these issues are not unique to the sheltering community. Over a quarter century ago, scandals revolving around substandard animal care, neglect and mismanagement rocked the laboratory animal world (Blum 1994) and the zoo community (Maple 2003). For laboratories, this led to significant federal regulation of animal care; for zoos, this triggered considerable internal dialogue and enhanced self-regulation (Wielbnowski 2003). Debates about farm animal welfare continue with less apparent progress. Consequently, the failure to self-regulate husbandry in some concentrated animal feeding operations (“factory farms”) has begun to drive the public to seek legislative solutions (e.g., ballot initiatives to ban gestation and veal crates).

2. The Need for Standards

Despite the lessons learned from the high-profile examples referenced above, and the availability of substantial resources to guide shelter operations (ASPCA 2009; HSUS 2010; Miller 2004b, 2009; NACA 2009c; Peterson 2008; UC Davis website), it is regrettable that serious deficiencies in companion-animal care in shelters continue to occur. There is convincing evidence that societal expectations for the care and welfare of animals

have increased. This ethic is reflected in the professional literature as well as in extensive guidelines and/or codes of ethics issued by trade organizations, regulatory bodies, advisory boards and policy-making agencies for animals in almost every conceivable setting except animal shelters [e.g., zoological parks (AZA 2009, 2010; Kohn 1994), research laboratories (CACC 1993; ILAR 1996; SCAW 2001), breeding kennels (AKC 2006, 2008), catteries (CFA 2009; CVMA 2009), exotic wildlife sanctuaries (ASA 2009; Brent 2007; GFAS 2009), animal agriculture (FASS 1999; Mench 2008; Veissier 2008), pet industry retailers (PIJAC 2009), boarding kennels (CVMA 2007; New Zealand 1993; PCSA 2009), domestic wildlife rehabilitation (Miller 2000), animal rescue (ARA), equine rescue and retirement facilities (AAEP 2004; GFAS 2009)].

It might be assumed that anti-cruelty statutes would protect shelter animals, but these statutes are often not sufficient to ensure that animals in either public or private shelter and rescue settings receive proper care. One reason for this is that many retain 19th-century wording, which is difficult to interpret in modern settings, i.e.:

“Whoever overdrives, overloads, drives when overloaded, overworks, tortures, torments, deprives of necessary sustenance, cruelly beats, mutilates or kills an animal, or causes or procures an animal to be overdriven, overloaded, driven when overloaded, overworked, tortured, tormented, deprived of necessary sustenance, cruelly beaten, mutilated or killed;... and whoever, having the charge or custody of an animal, either as owner or otherwise, inflicts unnecessary cruelty upon it, or unnecessarily fails to provide it with proper food, drink, shelter, sanitary environment, or protection from the weather, and whoever, as owner, possessor, or person having the charge or custody of an animal, cruelly drives or works it when unfit for labor, or willfully abandons it, or carries it or causes it to be carried in or upon a vehicle, or otherwise, in an unnecessarily cruel or inhumane manner or in a way and manner which might endanger the animal carried thereon, or knowingly and willfully authorizes or permits it to be subjected to unnecessary torture suffering or cruelty of any kind commits the crime of cruelty to animals”.

It can be difficult to apply this outdated anti-cruelty language to address modern concerns

about physical and psychological suffering from confinement as well as suffering from illness or death. Furthermore, there can be a large gap between adequate care and deficiencies serious enough to prosecute under existing cruelty statutes. This leaves the possibility that substantial numbers of animals will live in substandard conditions within organizations expected to protect animal welfare. In some cases, the organizations that are at fault for providing inappropriate or negligent care are governed by the same entity that investigates animal cruelty, creating a conflict of interest.

Because the legal definition of animal cruelty varies from state to state it is beyond the scope of these guidelines to specifically and directly address animal cruelty. However, it is clear that when failure by an individual to provide certain minimum standards of care constitutes animal cruelty, the same standards must apply to shelters. Good intentions or lack of resources should not serve as an excuse for municipalities or private organizations to permit or perpetuate animal cruelty.

3. The Five Freedoms and Companion Animals

The American Veterinary Medical Association (AVMA) has brief care guidelines for companion animals including some recommendations for humane societies (AVMA 2008). They have also stated, through the AVMA Animal Welfare Principles,

that animals should be treated with respect and dignity throughout their lives (AVMA 2006).

A broader, independent set of standards developed from within the shelter veterinary community is needed to identify best and unacceptable practices as well as minimum standards of care for shelter animals – whether in a large organization, a small home-based effort, or something in between. In order to be flexible enough to guide any type of sheltering situation, standards need to clearly describe some general principles without being overly prescriptive.

The welfare principles enumerated as the Five Freedoms (Table 1) (Farm Animal Welfare Council 2009) provide a model that is applicable across species and situations, including animal shelters. The Five Freedoms were created in 1965 in the United Kingdom as a result of a report by the Brambell Commission (which later became the Farm Animal Welfare Council) to address welfare concerns in agriculture settings. There is ample evidence that the Five Freedoms are broadly accepted as guidelines for welfare for all animals. For example, a survey of large animal faculty at veterinary schools indicated strong support for these principles in the United States (Heleski 2005), and it has been recommended that they are equally useful as a framework for zoo animal welfare (Wielebnowski 2003). The Five Freedoms also form the basis for minimum standards for dogs, cats, and animals in boarding facilities promulgated by the New Zealand Ministry of Agriculture (New Zealand 1998, 2007) and recently, for standards from the Canadian Veterinary Medical Association for cats (CVMA 2009). This approach has also been embraced by the laboratory animal community (Bayne 1998; CACC 1993; ILAR 1996; SCAW 2001). As performance standards, rather than engineering standards, the Five Freedoms define outcomes and imply criteria for assessment, but do not prescribe the methods by which to achieve those outcomes. The *Guidelines for Standards of Care in Animal Shelters* has been written using the Five Freedoms for Animal Welfare as the basis for all sections in this document.

Table 1. Five Freedoms For Animal Welfare (Farm Animal Welfare Council 2009).

1. Freedom from Hunger and Thirst	by ready access to fresh water and a diet to maintain full health and vigor
2. Freedom from Discomfort	by providing an appropriate environment including shelter and a comfortable resting area
3. Freedom from Pain, Injury or Disease	by prevention or rapid diagnosis and treatment
4. Freedom to Express Normal Behavior	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

How to use this document

There are 12 sections in the document. Each section should be read in its entirety so that recommendations are not taken out of context and misunderstood. Shelters should not focus solely on the limited number of unacceptable practices or call outs that have been separately highlighted. These represent summary points that draw attention to some issues of great concern, but do not provide sufficient basis for thorough evaluation of a program.

No sheltering organization, regardless of its circumstances, i.e., budget, size, etc., should engage in any practice that is deemed unacceptable. Unacceptable practices must be corrected without delay. For example, failure to identify and provide analgesia for painful conditions is unacceptable and corrective steps must be taken immediately. Whenever a practice is identified as “must”, it is believed that without adherence to this recommendation, the delivery of a minimum level of acceptable or humane care is not possible. Use of the word “should” implies a strong recommendation.

It is recognized that implementation of “ideal” recommendations may not be possible in all circumstances but would certainly enhance care for animals. A glossary of terms is provided at the end of this document to aid in understanding.

The terms “long-term” and “short-term” are used in several sections of this document (e.g., Facilities, Behavior, Medical Health and Physical Well-being). It is difficult to define when a shelter stay shifts from being short-term to long-term, and the impact of length of stay may affect individual animals differently. Therefore, recommendations found throughout this document that refer to long-term stays do not have a specific timeframe associated with them. Ideally, recommendations to ensure physical and behavioral health and well-being for long-term care should be implemented as soon as possible, regardless of length of stay expectations, but especially whenever a stay is anticipated to exceed 1 or 2 weeks.

Management and record keeping

Lines of authority, responsibility, and supervision should ideally be put in writing, reviewed periodically and updated when roles change.

Implementation of the recommendations in this document requires adequate resources, planning, training, and monitoring; these operational principles form the foundation upon which many other elements described in this document must rest. To build this foundation, organizations must have a clearly defined mission; policies and protocols that reflect current information; adequate staff training and supervision; and proper management of animal care. Because animal health is interwoven into virtually every facet of sheltering or rescue programs, veterinarians should be integrally involved with development and implementation of an organizational plan, and must have supervision of medical and surgical care of animals. Organizational functioning, employee health and well-being, and animal wellness are inextricably linked (Reeve et al 2004; Rogelberg et al 2007).

authority, responsibility, and supervision should ideally be put in writing, reviewed periodically and updated when roles change. Authority and responsibility must be given only to those who have the appropriate knowledge and training. Many decisions involve issues of resource allocation as well as population health and individual animal welfare; in these cases broad consideration must be given to all factors, and decisions may well be made by a group of qualified individuals. However, in cases where animal welfare could be compromised, a veterinarian's decision should not be overridden. Supervision and accountability for all staff and volunteers are essential to ensure that policies and protocols guide daily activities.

Adequate training is required to ensure humane animal care, as well as staff and public safety.

1. Establishment of Policies and Protocols

A clearly defined mission forms the basis for development of organizational policies, including those relating to animal care, intake, treatment, adoption, and euthanasia. Policies must address the resources and legal/contractual obligations of the organization. Protocols must be developed and documented in sufficient detail to achieve and maintain the standards described in this document, and updated as needed to ensure that they reflect current information and pertinent legislation (Hurley 2008a). All staff (and volunteers as needed) must have access to up-to-date protocols. Expert input on all policies and protocols related to maintenance of physical and behavioral animal health should be provided by a veterinarian. Ideally, this veterinarian would have training or experience in shelter medicine as well as knowledge about the particular population.

3. Training

Adequate training is required to ensure humane animal care, as well as staff and public safety (ILAR 1996). This includes allocating time and resources for employees and volunteers to complete training prior to undertaking responsibility for tasks. The skills, knowledge and training to accomplish each task must be successfully demonstrated before proficiency is assumed. Continuing education should be provided in order to maintain and improve skills. Documentation of training should be maintained.

A unique identifier (name and/or number) and record must be established for each animal upon intake.

2. Management Structure

A clearly defined structure that outlines accountability, responsibility, and authority for management within the organization is essential and must be communicated to all staff and volunteers. Lines of

4. Animal Identification and Record Keeping

A unique identifier (e.g., name and /or number) and record must be established for each animal upon intake. Identification should be physically affixed to the animal (e.g., collar or tag) for the duration of the animal's stay unless this poses a safety risk for animals and/or staff. Basic elements of a record should include: the identifier, results of microchip scan, microchip number if present, source of animal, dates of entry and departure, outcome, species, age, gender, physical description (breed and colors), and available medical and behavioral information. (See section on Population Management and section on Medical Health and Well-being for more information on medical records and population data collection.)

Facility Design and Environment

Shelters must provide an environment that is conducive to maintaining animal health. Facilities must be appropriate for the species, the number of animals receiving care and the expected length of stay in order to ensure physical and psychological well-being of the animals. The design should provide for proper separation of animals by health status, age, gender, species, temperament, and predator-prey status (see section on Medical Health and Physical Well-being and section on Behavioral Health and Mental Well-being for more information), and include sufficient space for the shelter operations described in this document (intake, examination, holding, adoption, isolation, treatment, food storage, laundry, and when necessary, euthanasia).

Entrances and exits, hallways, and rooms should be arranged so that movement through the facility (“foot traffic”) and cleaning, as described in the Sanitation section, should proceed from the areas housing the most susceptible to disease and/or healthiest animals to those who are most likely to be a source of contagious disease. One set of guidelines recommends that at least 10% of the facility housing capacity should be made available for isolation of animals diagnosed with or suspected of having infectious diseases (New Zealand 1993). Organizations that provide services to privately owned animals (e.g., spay/neuter or veterinary clinics) should separate those animals from shelter animals.

1. Primary Enclosure

A primary enclosure is defined as an area of confinement such as a cage, run, kennel, stall, or pen, where an animal eats, sleeps, and in most sheltering situations spends the majority of its time. The primary enclosure must be structurally sound and maintained in safe, working condition to properly confine animals, prevent injury, keep other animals out, and enable the animals to remain dry and clean. There must not be any sharp edges, gaps or other defects that could cause an injury or trap a limb or other body part. Secure latches or other closing devices must be present. Wire-mesh bottoms or slatted floors in cages are not acceptable for

primary enclosures for cats and dogs. Enclosures that permit care and cleaning without removal of the animals (e.g., double-sided or compartmentalized enclosures) are very important to prevent disease transmission and should be provided for recently admitted or ill animals and those who are younger than 20 weeks of age.

The primary enclosure should be readily cleaned and disinfected. Even in home-based shelters, where the home itself or a room within the home may be the primary enclosure, sanitation is important. Until disease concerns have abated, newly arrived animals should be housed in areas of the home, or enclosures within the home, that can be properly and easily sanitized.

Tethering is an unacceptable method of confinement for any animal and has no place in humane sheltering (HSUS 2009a). Constant tethering of dogs in lieu of a primary enclosure is not a humane practice, and the Animal Welfare Act prohibited its use in 1997 for all regulated entities (APHIS 1997a).

Primary enclosures must provide sufficient space to allow each animal, regardless of species, to make normal postural adjustments, e.g., to turn freely and to easily stand, sit, stretch, move their head, without touching the top of the enclosure, lie in a comfortable position with limbs extended, move about and assume a comfortable posture for feeding, drinking, urinating and defecating (AAEP 2004; CFA 2009; Hansen 2000; King County 2009; Kulpa-Eddy 2005; New Zealand 1993). In addition, cats and dogs should be able to hold their tails erect when in a normal standing position. Primary enclosures should allow animals to see out but should also provide at least some opportunity to avoid visual contact with other animals (Carlstead 1993; Overall 1997; Wells 1998).

A range of minimum dimensions have been suggested for primary enclosures for dogs and cats (CFA 2009; Griffin 2006; New Zealand 1993). Most of these recommendations exceed

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what is typically found in many shelters. Because of the wide range of body sizes for dogs, specific recommendations for minimum kennel sizes are not included in this document. However, the size of each primary enclosure must be sufficient to meet the physical and behavioral parameters described above. Less than 2 feet of triangulated distance between litterbox, resting place and feeding area has been shown to adversely affect food intake for cats (Figure 1) (Bourgeois 2004). Cats housed in cages with 11 square feet of floor space were found to be significantly less stressed than those with only 5.3 square feet of space (Kessler 1999b). The Cat Fanciers' Association recommends a minimum of 30 cubic feet per cat (CFA 2009). Shelters should strive to exceed these dimensions, particularly as length of stay increases. (See section on Group Housing for dimensions recommended for group housing.)

In addition to size considerations, proper layout of the primary enclosure is essential to maintain animal health and welfare. Food and water bowls or receptacles must be provided. The location of food, water, and litter containers relative to each other, resting areas, doors, etc., can have a significant impact on the well-being of animals (CACC 1993).

Separation between food, urination and defecation, and resting areas should be maximized. A primary enclosure must allow animals to sit, sleep and eat away from areas of their enclosures where they defecate and urinate. This can be accomplished through the use of double-sided or compartmentalized enclosures; single enclosures for cats of sufficient size as

described in the figure above; or walking dogs with sufficient frequency on a daily basis that they do not need to urinate or defecate within their enclosures, provided this can be accomplished without undue risk to health and safety.

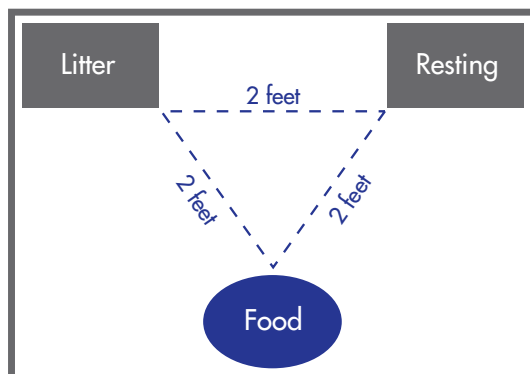
Attention should be paid to the habits of individual animals. Confinement, even in compartmentalized housing, will inhibit some dogs, from urinating or defecating. Many cats will avoid defecation and urination if litterbox location or substrate is aversive (CACC 1993; Neilson 2004). Cats must have a litterbox large enough to comfortably accommodate their entire body.

For cats, vertical as well as horizontal dimensions are extremely important because cats show a preference for spending more time on raised surfaces and high structures than on the floor. Some dogs also prefer to rest on elevated surfaces. Elevated resting places should be provided whenever possible, as long as this would not restrict animal movement within the enclosure. A soft resting place should be made available for all animals to provide comfort and prevent pressure sores from developing (Crouse 1995; New Zealand 1998).

Cages or crates intended for short-term, temporary confinement or travel (e.g., airline crates, transport carriers, cages or crates designed to restrict mobility during a defined period for recovery or treatment including small stainless steel cages less than 2 ft x 2 ft), are unacceptable as primary enclosures and are cruel if used as such (CFA 2009; Miller 2000). Crates or cages must not be stacked upon each other in a manner that increases animal stress and discomfort, compromises ventilation, or allows waste material to fall from the cage above into the cage below.

Poor cat housing is one of the greatest shortcomings observed in shelters and has a substantially negative impact on both health and well-being. Existing housing can be modified to improve feline welfare (e.g., cutting portholes in stainless steel cages

Figure 1. Minimal spacing recommended between litterbox, resting place, and food.



to increase available space and create multi-compartment housing units) (UC Davis 2009). Cats must have places to hide (e.g., paper bag or box large enough to provide concealment) and should have high points to perch upon (Carlstead 1993; Crouse 1995; De Monte 1997; Griffin 2002, 2006, 2009a; Hubrecht 2002; Rochlitz 1999, 2002; Wells 2000). One study found that the ability to hide led to decreased stress hormones in cats (Carlstead 1993). Ideally, cats should not be restricted to floor level cages, since these are more stressful compared to elevated cages.

As the length of stay increases (e.g., beyond 1–2 weeks), it becomes progressively more important to provide space that is both mentally and physically stimulating; alternatives to traditional housing must be provided. For animals housed long term, the physical environment must include opportunities for hiding, playing, resting, feeding, and eliminating. For cats, the environment should also allow for scratching, climbing and perching. Protected indoor-outdoor access is ideal for most species, especially when animals are held long term. Outdoor spaces must be suitably enclosed to protect from adverse weather, vandalism, and prevent escape or predation.

2. Surfaces and Drainage

Non-porous surfaces that can be easily disinfected and are durable enough to withstand repeated cleaning should be used in all animal areas and must be used in those areas housing puppies and kittens, or animals who are infectious or who are newly admitted with an unknown health history. These principles are equally important in home-based programs. A sealed, impermeable surface, such as sealed concrete or epoxy is ideal for flooring (New Zealand 1993). Carpeting should not be used in animal housing areas because it cannot be effectively cleaned and disinfected. In a home-based setting or light use situation, linoleum or tiled floors may be acceptable, but seams and grout lines require higher maintenance and attention to sanitation than a sealed surface. Points where walls meet floors should also be sealed. Peeling,

scratched or chipped floors that cannot be properly sanitized should be repaired or replaced.

Special accommodation (e.g., soft bedding or slip-proof mats) is required for animals with arthritis, muscle weakness, or other mobility impairments as these animals may have difficulty rising if surfaces are too slippery. Floors should be gently sloped to enable wastes and water to run off into drains. Waste water should not run off into common areas or adjacent kennels. Adequate drainage must be provided (New Zealand 1993). When drains are located in common areas special care must be taken to sanitize and disinfect those areas prior to allowing animal access. Drain covers should be designed to prevent toes from being caught in drains.

3. Heating, Ventilation, and Air Quality

Temperature and humidity recommendations vary with the species of animal being housed, but it is essential that each primary enclosure allows an animal to comfortably maintain normal body temperature (AVMA 2008a; New Zealand 1993). Temperature and humidity levels should be evaluated at the level of the animal's body within its enclosure.

For dogs and cats, the AVMA recommends the ambient temperature should be kept above 60°F (15.5°C), and below 80°F (26.6°C), and the relative humidity should range from 30 to 70% (AVMA 2008a). Because of breed, body condition, medical condition, haircoat, facial conformation, and age differences, animals must be monitored individually to ensure their comfort and to ensure they can adequately maintain their body temperature. If animals appear too cold (i.e., shivering or huddling together for warmth) or too hot (i.e., excessive panting), necessary measures must be taken to ensure animal comfort and safety (i.e., adjustments to the thermostat, additional bedding, fans, movement to another area of the shelter, health evaluation, etc.) Proper bedding materials, when kept clean and dry, can help animals maintain appropriate body temperature.

Cages or crates intended for short-term, temporary confinement or travel are unacceptable as primary enclosures and are cruel if used as such.

Fresh air is essential for maintenance of good health and well-being as well as limiting the spread of infectious diseases (CFA 2009). Proper ventilation removes heat, dampness, odor, airborne microbes, and pollutant gasses such as ammonia and carbon monoxide, while allowing for the introduction of fresh, oxygenated air. Ventilation must be maintained at a high enough rate to provide clean air in all areas of the shelter including within primary enclosures. All ventilation systems must be adequately maintained and air quality should be monitored at the level of the animal. Between 10 and 20 room air exchanges per hour with fresh air is the standard recommendation for adequate ventilation of animal facilities (European Council 1986; Johnson 2004; ILAR 1996).

Ventilation requirements vary depending on population density and pollutants in the air. A facility may require a higher ventilation rate when it is at full capacity compared to when it is relatively empty, as animals themselves are a major source of heat, humidity and ammonia. Other pollutants also increase with the number of animals housed. Ventilation rates may need to be adjusted seasonally and should not be thermostat-controlled. Systems that circulate air only when the temperature or humidity require adjustment do not provide adequate ventilation throughout the year. Ventilation must be accomplished without compromising maintenance of appropriate temperatures.

Because canine respiratory pathogens can be easily transmitted through the air, isolation areas for dogs should have separate air circulation from the rest of the facility (Appel 1972). Separate air exchange for feline isolation areas are a lesser priority as cats do not readily aerosolize their pathogens (Gaskell 1982; Wardley 1977). To prevent droplet transmission of respiratory viruses, however, cat cages facing each other should be spaced more than 4 feet apart (Gaskell 1977; Povey 1970; Wardley 1977). Although adequate ventilation to provide good air quality is essential, investment in enclosures and other aspects of facility design

that reduce fomite transmission (e.g., double-sided enclosures that allow animals to remain inside their enclosures during cleaning) is also critical to animal health. Even excellent ventilation will not overcome the harmful effects of inadequate housing.

Good air quality requires good sanitation and cleaning to reduce sources of airborne particles and gaseous contaminants such as ammonia, carbon monoxide, and hydrogen sulfide (FASS Guide 1999). Published guidelines for maximum ammonia exposures reflect hazards to human health or adverse effects on animal production and should not be used as an indicator of proper sanitation. Although some of the regulations for concentrated animal feeding operations cite minimum ammonia levels at or below 10 parts per million (ppm), acceptable levels in a shelter should be less than 2 ppm (G. Patronek 2010, unpublished data). In properly run shelters, ammonia should be below this level even before morning cleaning. Dust control is important because microbes may be transmitted by airborne dust (FASS 1999). Airborne dust can contain a variety of bioactive aerosols, particularly endotoxins, which have pro-inflammatory effects and a negative impact on lung function (Donham 2002; Rylander 2006, 2007).

4. Light

Facilities should be designed to offer as much natural light as possible. When artificial light is used, it should closely approximate natural light in both duration and intensity (CFA 2009; Griffin 2006; New Zealand 1993; Patronek 2001). Enclosures should be positioned so individual animals can avoid being exposed to excessive amounts of light or darkness. For example, cats on the lower level of a cage stack would spend most of their day in shadows unless light fixtures are mounted such that light shines into the lower level cages (CFA 2009). Cages should be spaced far enough apart to allow ambient light to reflect off the ceiling and floor. Adequate amounts of darkness are as important as light. Light and darkness should be provided so that they support the natural (circadian) rhythms of wakefulness and sleep.

Adequate lighting is also necessary for effective observation of animals (AAEP 2004).

5. Sound Control

An appropriate acoustic environment is essential for good animal health and welfare. Noise should be minimized in animal areas. Dog and cat hearing is more sensitive than human hearing so it can be assumed that noise levels that are uncomfortable to humans are even more uncomfortable for animals. Many common features of animal shelters contribute to elevated noise levels, including: forced air ventilation, barking dogs, non-porous building materials, use of power hoses, metal kennel gates, and metal food bowls. Excessive noise contributes to adverse behavioral and physiological responses (Spreng 2000).

Excessive noise from barking dogs is a particular welfare concern because of both its magnitude and duration (Sales 1997). Cats, in particular, are adversely affected by the sound of barking dogs (McCobb 2005). Sound levels in a shelter can exceed 100 db, largely due to barking (Coppola 2006). Sound is measured on a logarithmic scale, so a 90 db sound is 10 times louder than an 80 db sound. Any sound in the 90–120 db range can be felt as well as heard and may lead to irreversible hearing loss in humans. For comparison, a jackhammer produces noise in the 110 db range, and a subway train 95 db. Levels of 50–70 db or higher are considered likely to be detrimental to the hearing of rodents and rabbits (CCAC 1993). (See section on Public Health for information on occupational safety.)

Because sound can have a detrimental effect, interventions to reduce sound in shelters are important for animal health and well-being. Architectural strategies to minimize the impact of noise (e.g., arrangement of caging, materials selection for cages, doors, and latches) should be implemented in facility design or be added to an existing facility. Appropriate architectural strategies combined with behavior modification or enrichment strategies to

reduce barking can dramatically reduce noise levels (Griffin 2009a; Johnson 2004). Staff must also be instructed to avoid creating excessive noise during routine activities (e.g., slamming cage or kennel doors, tossing metal bowls). Noise-producing equipment should be located as far away from the animals as possible (Hubrecht 2002). Sound-absorbent materials must be durable enough to permit repeated cleaning and should either be out of the animal's reach or resistant to destruction (Hubrecht 2002). Shelters should be designed so that cats are not exposed to the noise of barking dogs (McCobb 2005). In a study of shelter dogs, visual contact with other dogs improved welfare and did not increase barking (Wells 1998); therefore preventing visual contact should not be used as a general strategy to reduce barking.

Music has been used to reduce animal stress in a variety of different settings (Line 1990; Wells 2002). While anecdotal reports support this finding, little data exist to recommend its use for shelters. Music or other sounds as a form of enrichment need to be considered carefully, particularly if animals have no way to move away or control their exposure. Many animals, including dogs, are able to hear frequencies above what humans can hear. Therefore, if music is introduced, radios or other sound systems should not be placed directly on cages and the volume should not exceed conversational levels. In one study, heavy metal music was shown to increase barking and arousal, whereas classical music had a calming effect (Wells 2002).

6. Drop Boxes

Although shelters often face challenges posed by limited operating hours for public access, the use of unattended “drop boxes” where live animals are placed by the public in receptacles for later intake may result in animal suffering or death and should be avoided. Alternatives should be provided (e.g., drop-off arrangements with police department or veterinary emergency clinics). Information about these alternatives should be made available to the public.

The use of unattended “drop boxes” where live animals are placed by the public in receptacles for later intake may result in animal suffering or death and should be avoided.

Population Management

Population management describes an active process of planning, on-going daily evaluation, and response to changing conditions as an organization cares for multiple animals. Effective population management requires a plan for intentionally managing each animal's shelter stay that takes into consideration the organization's ability to provide care that meets the recommendations outlined in this document. The capacity to provide humane care depends on the number and condition of animals admitted and their duration of stay; the size and condition of the facility; staffing levels and training; and other factors as well as the number of available enclosures. There are many ways to maintain a population within an organization's capacity for care whether in a shelter or home-based rescue organization. Active population management is one of the foundations of shelter animal health and well-being (Hurley 2004a), and must be based on an appreciation that capacity to provide humane care has limits for every organization, just as it does in private homes. When a population is not managed within an organization's capacity for care, other standards of care become difficult or impossible to maintain.

within available primary enclosures. (See section on Facilities and section on Group Housing for information on adequate housing.) Ideally, shelters should maintain their populations below maximum housing capacity to allow for daily intake as well as more flexibility when choosing appropriate enclosures for each animal. Maximum housing capacity must not be exceeded. Even though enclosures may be available, it may be necessary to leave some empty due to other constraints on capacity for care (e.g., staffing levels and opportunities for enrichment).

The National Animal Control Association (NACA) and the Humane Society of the United States (HSUS 2010) recommend a minimum of 15 minutes of care time per day for feeding and cleaning each animal housed in the shelter (9 minutes for cleaning and 6 minutes for feeding) (HSUS 2010; NACA 2009b). For example, if 40 animals are present, a minimum of 10 hours of care would be required for basic care (40 animals @ 15 minutes/animal = 10 hours). Ability to provide services such as medical and behavioral evaluation or treatment, adoption, spay/neuter or euthanasia can be similarly evaluated based on average time for service (Newbury 2009a, 2009b). Staffing or volunteer work hours must be sufficient to ensure that the basic needs of animals in the shelter are met each day.

Length of stay has a dramatic effect on the experience and needs of animals in shelter care. The type of care and enrichment provided to sheltered animals must be appropriate to the length of stay (Patronek 2001). Average or median length of stay is also a key factor contributing to the number of animals present in the shelter each day, which in turn affects the ability to provide adequate care. For example, if an average of 5 cats per day enter the shelter and each stays an average of 5 days, the average daily population would be 25 cats. If the average length of stay rises to 10 days with no change in the average intake, then the average daily population would double to 50 cats.

1. Capacity for Care

Every sheltering organization has a maximum capacity for care, and the population in their care must not exceed that level. Factors that determine capacity for care include: the number of appropriate housing units; staffing for programs or services; staff training; average length of stay; and the total number of reclaims, adoptions, transfers, release, or other outcomes. Many factors can alter the capacity for care. For example, loss of animal care staff, or malfunctioning enclosures, can temporarily decrease the capacity for care until such time as new persons are hired and appropriately trained, or enclosures are repaired or replaced. Operating beyond an organization's capacity for care is an unacceptable practice.

Maximum housing capacity must be based on the number of animals who can be adequately housed

Capacity to provide humane care has limits for every organization, just as it does in private homes.

Adequate staffing must be available to ensure that each critical point of service (e.g., vaccination or medical evaluation, spay/neuter surgery, or a physical move to adoption) is delivered promptly. Delays resulting in even one to two additional days of care may result in crowding and poor animal welfare in facilities that operate near maximum capacity. Expected demand for these critical points of service should be estimated based on the expected numbers of animals who will need each service and the length of time it takes to complete each procedure (e.g., number of animals needing evaluation or spay neuter surgery prior to adoption). Operating beyond capacity for care will result in unwanted outcomes including: delays or failure to provide necessary care; use of substandard housing; increases in staff and animal stress; haphazard mixing of animals; increased risk of infectious disease exposure; and increases in negative interactions between animals (Hurley 2008b; Newbury 2009a, 2009b). Operating beyond capacity for care creates a vicious cycle; services required for moving animals through the system are delayed. These delays prolong average lengths of stay for animals, leading to increased daily population. This further taxes the organization's capacity for care, worsens conditions, and threatens animal well-being (Newbury 2009a, 2009b). Once a shelter has exceeded its capacity for care it is no longer possible to ensure the Five Freedoms.

2. Protocols for Maintaining Adequate Capacity for Care

Shelters must have policies and protocols to maintain adequate capacity for care and housing. Policies

must provide a means of balancing admission with the outcomes available (e.g., adoption, transfer, release, return to owner, euthanasia, or others). Increasing the number of animals housed beyond the capacity for care is an unacceptable practice.

Inspection of all animals must be performed daily in order to routinely evaluate and monitor adequacy of capacity and to identify needs for housing, care, or service (CFA 2009; New Zealand 1993). Appropriate interventions must be made before animal numbers exceed the capacity for care and housing. Waiting to respond until capacity has been exceeded results in animal suffering.

3. Monitoring Statistical Data

Monitoring population statistics over time is a necessary component of a population management plan. At minimum, statistics must include monthly intake (e.g., stray, owner surrendered) and outcomes by type (e.g., adoption, euthanasia, returned to owner) for each species. For optimal population management and monitoring, an animal census (animal inventory) should be taken, evaluated, and reconciled with records daily to ensure accuracy of data collection as well as facilitate evaluation of capacity. Ideally, population statistics should also include an evaluation by age group, health and behavior status at intake as well as at outcome. More detailed data monitoring such as tracking incidence of disease at intake (pre-existing) and during shelter stay (from previous exposure or shelter acquired) is a best practice.

Effective population management requires a plan for intentionally managing each animal's shelter stay that takes into consideration the organization's ability to provide care.

Operating beyond an organization's capacity for care is an unacceptable practice.

Sanitation

Good sanitation is an integral part of humane animal housing. Proper cleaning and disinfection practices help reduce the transmission of infectious diseases to both animals and people, and result in a cleaner and healthier environment (Cherry 2004; Hoff 1985; Lawler 2006; Weese 2002). A clean shelter also has the added benefits of increasing the comfort level of the animals and presenting a positive image of the shelter to the public. Protocols for proper sanitation are essential for any sheltering program. Providing education and training as well as ensuring compliance with those protocols is also essential.

1. Cleaning and Disinfection

Physical cleaning is defined as the removal of urine, fecal matter, and other organic material from the environment (Gilman 2004; Smith 2005). Cleaning should result in a visibly clean surface, but may not remove all of the harmful pathogens. Disinfection is the process that will kill most of the contaminants in a given area (Gilman 2004). Sanitation, for the purposes of this document, is defined as the combination of cleaning and disinfection, and is a requirement for all shelters and rescue homes. Sterilization is the destruction of all microbes, including spores, and is generally reserved for surgical instruments, surgical gloves, and other equipment necessary for sterile procedures. True sterilization of cage and kennel surfaces does not occur in a shelter (Gilman 2004).

Whether or not infectious disease occurs is dependent on several factors: the host (exposed animal), the virulence of the pathogen, the amount of the pathogen present, and the duration of exposure (Lawler 2006). Infectious dose defines a threshold amount of a pathogen required to cause infection and disease. By cleaning and using disinfectants properly, the number of pathogens in the environment is decreased, reducing the dose delivered if an animal is exposed. Sanitizing with the proper frequency decreases the duration of exposure. In the event of a disease outbreak, sanitation protocols and practices should be reviewed to determine if there are problems with

the products or practices. Very often, even though protocols appear adequate, changes in practices (e.g., inaccurate dilution of disinfectants or changes in day-to-day cleaning practices) have contributed to outbreaks (Petersen 2008). Sanitation protocols must be revised as needed during an outbreak to address specific pathogens.

a) Sanitation Procedures

An assessment of the facility, animal population, training, equipment and procedures to be employed must be considered when developing sanitation protocols. Ideally, sanitation protocols should be developed and periodically reviewed in consultation with a veterinarian experienced in shelter medicine. While information about shelter sanitation may be extrapolated from many sources, protocols must be based on current knowledge and recommendations developed specifically for animal shelters, and must include specific methods and agents for achieving the goals of both cleaning and disinfection. An increasing number of resources exist providing guidelines tailored to the shelter environment (Dvorak 2009; Miller 2004b; Peterson 2008; UC Davis 2009).

Enough staff must be assigned to complete sanitation tasks promptly each day so that animals spend the majority of their time in sanitary conditions. As an example, out of the total of 15 minutes recommended per animal for daily husbandry, NACA and HSUS guidelines recommend a minimum of 9 minutes per animal per day for routine cleaning. Thus 40 dogs @ 9 minutes/dog = 360 minutes. This total time of 360 minutes (6 hrs) would allow sufficient time for a 10-minute disinfectant contact time in each kennel because other activities or tasks (e.g., cleaning other kennels, laundry) can be accomplished while the disinfectant sits.

Selection of proper cleaning and disinfectant products is essential. Detergents and degreasers must be used as needed to maintain clean surfaces free of visible dirt and debris. Disinfectants must be chosen that will be effective under the conditions

Enough staff must be assigned to complete sanitation tasks promptly each day so that animals spend the majority of their time in sanitary conditions.

present in a given environment (e.g., presence of organic matter), and with demonstrated activity against the pathogens for which the animals are at risk (Etrepi 2008). Unenveloped viruses such as parvovirus, panleukopenia, and feline calicivirus are of particular concern, but other disinfection-resistant agents such as coccidia and *Microsporum canis* may also be problematic. Some disinfectants have been shown by independent studies not to be effective against these durable pathogens (e.g., quaternary ammonium compounds against unenveloped viruses), in spite of EPA-approved labeling by manufacturers (Eleraky 2002; Kennedy 1995; Moriello 2004; Scott 1980). Products that have not been independently validated against unenveloped viruses and other pathogens of concern should not be used as the sole disinfectant.

The facility should be cleaned in order of animal susceptibility to disease and potential risk to the general population, starting with the most susceptible animals and ending with those who carry the highest risk of transmitting infectious disease. Separate cleaning supplies should be designated for each area. Appropriate protective clothing (gloves, gowns, and/or boots), should be used in each area, and removed before proceeding to care for other animals in the population. (See section on Public Health for recommendations on personal protective equipment.) Failure to follow a specified order of cleaning may result in susceptible populations being exposed to disease (Gilman 2004; Smith 2005).

In general, the order of cleaning and care, from first to last, should be:

- 1) *healthy puppies and kittens and healthy nursing bitches and queens;*
- 2) *healthy adult animals;*
- 3) *unhealthy animals.*

Thorough sanitation of primary enclosures before a new animal enters is essential. Sanitation protocols must include removal of gross organic matter, pre-

cleaning of surfaces with a detergent or degreaser, application of a disinfectant at the correct concentration and for sufficient time, rinsing, and drying. When water or cleaning and disinfecting products will be sprayed in or near the area of the primary enclosure, animals must be removed from the cage or kennel, or separated from the area being cleaned by guillotine doors to prevent splatter, soaking of the animals and stress. It is an unacceptable practice to spray down kennels or cages while animals are inside them.

Animals who are housed long-term in the same enclosure require less frequent disinfection of their enclosure, but daily cleaning is still essential to maintain sanitary conditions. In many instances, cages and kennels can be cleaned using the “spot cleaning” method, where the animal remains in its cage while the cage is tidied, and soiled materials, urine and feces are removed. Spot cleaning may be less stressful for the animal as it requires less animal handling and does not remove familiar scents (Patronek 2001). Daily cleaning is also necessary in cage free housing and home environments.

Improper cleaning may increase pathogen transmission (Curtis 2004). Practices that track pathogens from one enclosure to another put animals at risk. Mopping should be avoided if possible. When mopping cannot be avoided (e.g., when hosing is not possible) a disinfectant with good activity in the presence of organic matter must be used, and contaminated mop water should not be used from one housing area to another. Acceptable sanitation cannot be accomplished using water alone, nor using only a disinfectant (e.g., bleach) with no detergent properties. Care should be taken when mixing cleaning products as the resulting mixture could be ineffective or even toxic. Alternative methods of disinfection such as ultraviolet (UV) light or reliance on freezing during cold weather are not sufficient for sanitation in shelters or rescue facilities.

Improper housing and poor facility design can also contribute to pathogen transmission. Housing for

Spraying down kennels or cages while animals are inside them is an unacceptable practice.

recently admitted or ill animals and those who are younger than 20 weeks of age should be designed to permit cleaning without extensive handling of the animal or removal to an area that has not been sanitized (e.g., double-sided or compartmentalized housing). Animal housing areas should be designed to withstand spraying of water and cleaning fluids; adequate drainage is essential. (See section on Facilities for information on appropriate shelter design to support cleaning and disinfection.)

b) Fomite Control

A fomite is an object that may be contaminated with pathogens and contribute to transmission of disease. The human body and clothing may serve as fomites. As apparently healthy animals as well as those who are obviously ill may be shedding pathogens, any complete sanitation protocol must address proper hygiene of shelter staff, volunteers, and visitors, including signage, supervision, and hand sanitation.

Adequate hand sanitation is one of the best ways to prevent disease transmission and should be required before and after handling animals and fomites. Hand sanitation is achieved through hand washing, use of hand sanitizers, and proper use of gloves. Sinks should be available in all animal housing and food preparation areas, and must be equipped with soap and disposable paper towels. Hand sanitizer dispensers should be provided in all animal handling areas. It should be noted that hand sanitizers are ineffective against some of the most dangerous pathogens found in shelter settings (e.g., parvoviruses, caliciviruses) and cannot be relied on as the sole means of hand sanitation. Hand sanitizers should be used only on hands that appear clean (Boyce 2002) and should contain at least 60% alcohol. Clothing, even if visibly clean, may still carry pathogens. Protective garments (e.g., gowns, gloves, and boots or shoe covers) should be worn during cleaning or other intensive animal-handling activities (such as treatment of sick animals or euthanasia) and changed before going on with other activities of the day. Fresh protective garments should be worn when handling vulnerable populations, including puppies

and kittens and newly admitted animals. Garments must be changed after handling an animal with a diagnosed or suspected serious illness such as parvovirus.

All equipment that comes in contact with animals (e.g., muzzles, medical and anesthetic equipment, humane traps, gloves, toys, carriers, litterboxes, food bowls, bedding) including cleaning supplies should be either readily disinfected or discarded after use with a single animal. Items that cannot be readily disinfected, such as leather gloves and muzzles, represent a risk to animals. Their use should be avoided especially for animals who appear ill and during disease outbreaks. For example, ringworm has been cultured from leather animal handling gloves in shelter settings. Mobile equipment such as rolling trash cans, shopping carts, and food or treatment carts (including their wheels) may also serve as fomites and should be sanitized accordingly. Scratched and porous surfaces are difficult or impossible to completely disinfect and should be used with caution or discarded (e.g., plastic litterpans, airline carriers, plastic and unglazed ceramic water bowls). Transport cages and traps, as well as vehicle compartments used for animal transport must be thoroughly disinfected after each use.

All clothing and bedding used at the shelter must be laundered and thoroughly dried before reuse. Organic debris (e.g., feces) should be removed from articles before laundering. Articles that are heavily soiled should be laundered separately or discarded. Bedding and other materials heavily contaminated with durable pathogens such as parvoviruses should be discarded rather than risk further spread of disease (Peterson 2008).

Food and water bowls should be kept clean and must be disinfected prior to use by a different animal. Automatic watering devices and water bottles should not be used if they cannot be disinfected before being used by another animal. Use of commercial dishwashers is an excellent

way to thoroughly clean food and water bowls (Gilman 2004; Lawler 2006). The mechanical washing action and high temperatures attained in dishwashers will destroy the majority of pathogens but may not destroy unenveloped viruses such as parvoviruses. If these viruses are a problem a disinfectant should be applied to the dishes before or after going through the dishwasher. When dishes are sanitized by hand, they must be thoroughly washed and rinsed prior to disinfection. Ideally, food and water receptacles should be cleaned in an area separate from litter boxes or other items soiled by feces. At minimum, litterpans and dishes must not be cleaned at the same time in the same sink, and the sink should be thoroughly disinfected between uses.

Foot traffic also plays a role in fomite transmission. Certain areas of the shelter, like isolation and quarantine areas, should be restricted to a small number of shelter staff. Transport of sick animals throughout the shelter, especially from intake areas to holding or euthanasia areas, should be planned to minimize spread of disease. Floors, as well as other surfaces (e.g., tables, and countertops), should be immediately sanitized after contact with urine, feces, vomit, or animals known or suspected to have infectious disease.

Footbaths are inadequate to prevent infectious disease spread and should not be relied on for this purpose. Poorly maintained footbaths may even contribute to the spread of disease. Achieving adequate contact time (e.g., 10 minutes) is impractical, and footbaths require frequent maintenance because the presence of organic debris inactivates many disinfectants. Dedicated boots that can be disinfected or disposable shoe covers are more effective and should be used in contaminated areas (Morley 2005; Stockton 2006). It is unacceptable for animals to walk through footbaths.

2. Other Cleaning

Outdoor areas around the shelter must be kept clean, recognizing it is impossible to disinfect gravel, dirt, and grass surfaces. Access to areas that cannot be disinfected should be restricted to animals who appear healthy, have been vaccinated and dewormed, and are 5 months or older. Ideally, feces should be removed immediately from outdoor areas, but at minimum must be removed at least daily. Standing water should not be allowed to accumulate in areas around the shelter because many pathogens thrive and mosquitoes breed readily in these moist environments.

Foster homes are an integral part of many shelter programs. Complete disinfection of a private home is impossible. All foster caregivers should be trained to minimize contamination of their homes by confining newly arrived foster animals or those showing signs of illness in areas that can be readily disinfected.

3. Rodent/Pest Control

Many rodents and insects harbor bacteria and other pathogens that can contaminate food products, resulting in food spoilage or direct transmission of disease to the animals (Urban 1998). Areas of food storage are particularly vulnerable to infestation. All food should be kept in sealed bins or containers that are impervious to rodents and insects (New Zealand 1993). Food should be removed from runs at night if rodents and insects are present. If a shelter is experiencing a problem, solutions must be humane, safe, and effective.

Medical Health and Physical Well-being

Health is not merely the absence of disease or injury but is also closely tied to an animal's physical and mental well-being (Hurnik 1988). Proper medical management and health care for shelter animals is an absolute necessity and must include attention to overall well-being. It is commonly accepted that animal shelters have a responsibility to provide for the health and welfare of all animals who enter their care. Unfortunately, compromised animal health and welfare have been documented in animal shelters, and without proper precautions shelters can experience severe disease outbreaks resulting in wide-scale death and/or euthanasia. Animals often arrive at shelters already experiencing health challenges, and even healthy animals entering new, expertly designed facilities may have their welfare compromised, or risk becoming ill without a functional medical healthcare program. Without proper medical care, shelter animals can suffer and die unnecessarily (HSUS 2007; King County Animal Services Report).

Shelter medical programs must include veterinary supervision (see Glossary for definition) and the participation of trained staff to provide evaluation, preventive care, diagnosis and treatment (ASV position statement on veterinary supervision in animal shelters). Disease prevention should be a priority, but appropriate treatment must also be provided in a timely fashion. Preventive healthcare that is appropriate for each species should include protocols that strengthen resistance to disease and minimize exposure to pathogens (Fowler 1993). Training and continuing education for those who carry out the protocols must be provided. Ensuring compliance with protocols should be a part of program management.

Shelter healthcare protocols should support individual animals regaining and maintaining a state of physical health and are essential for maintaining an overall healthy population by reducing the frequency and severity of disease. Individual animal welfare must be maintained within the balance of decisions and practices that support the overall population.

Comprehensive shelter medical programs that begin on intake and continue throughout each animal's shelter stay are the foundation of a shelter housing a population of increasingly healthy animals (AAHA 2006; CFA 2009; FASS 1999; Griffin 2009a; Larson 2009; Miller 2004a; New Zealand 1998). Decline of animal health and welfare after intake; sick or injured animals languishing without proper treatment; wide scale disease outbreaks; animals dying as a result of shelter-acquired disease or injury; and frequent zoonotic disease transmission in the shelter are indicators of a poor healthcare program (FASS 1999). (See section on Physical Health and Well-being for information concerning expected mortality rates.)

1. Veterinary Relationship and Recordkeeping

All health care practices and protocols should be developed in consultation with a veterinarian; ideally one familiar with shelter medicine. A formal relationship with a veterinarian should be in place to ensure that those responsible for daily animal health care have the necessary supervision and guidance. The best way to ensure that health care practices are in keeping with professionally accepted standards is to implement written standard operating procedures (SOPs).

Medications and treatments must only be administered under the advice or in accordance with written protocols provided by a veterinarian, and all drugs must be dispensed in accordance with federal and state regulations.

Accurate medical records are essential. Whenever possible a medical and behavioral history should be obtained from owners who relinquish animals to the shelter. Shelters must document all medical care rendered to each animal. Ideally, records should include each animal's date of entry, source, identification information, a dated list of all diagnostic tests including test results, treatments (including any medications with drug dose and route of administration) and procedures, and

immunizations while in the care of the shelter. All medical information should be provided in written form with the animal at the time of transfer or adoption.

2. Considerations on Intake

Each animal's individual health status should be evaluated and monitored beginning at intake and regularly thereafter (AAEP 2004; UC Davis 2009). This allows any problems or changes that develop during an animal's shelter stay to be recognized, distinguished from pre-existing conditions, and addressed.

A medical history, if available, should be obtained from the owner at the time of surrender. Any available information should be solicited when stray animals are impounded as well. Ideally, this information should be obtained by interview, although written questionnaires are acceptable. Each animal should receive a health evaluation at intake to check for signs of infectious disease and/or problems that require immediate attention (UC Davis 2009). Intake evaluations should be documented in the medical record. Every attempt should be made to locate an animal's owner, including careful screening for identification and microchips at the time of intake. Intake health evaluation should therefore include scanning multiple times for a microchip using a universal scanner. Research has shown that the likelihood of detecting microchips increases with repeating the scan procedure multiple times (Lord 2008). (See subsections below for information on vaccination and other intake treatments.)

Separation of animals entering shelters is essential for proper maintenance of health and welfare. Beginning at intake, animals should be separated by species and age as well as by their physical and behavioral health status. Young animals (puppies and kittens under 20 weeks [5 months] of age) are more susceptible to disease and so should be provided with greater protection from possible exposure, which can be more easily accomplished when they are separated from the general

population. Starting from the time of intake and continuing throughout their stay, healthy animals should not be housed or handled with animals who have signs of illness. (See section on Behavioral Health and Well-being for more information on intake procedures.)

3. Vaccinations

Vaccines are vital lifesaving tools that must be used as part of a preventive shelter healthcare program. Vaccination protocols used for individual pets in homes are not adequate in most population settings. Strategies must be specifically tailored for shelters because of the higher likelihood of exposure to infectious disease, the likelihood that many animals entering the shelter are not immune (Fischer 2007) and the potentially life-threatening consequences of infection. Some vaccines prevent infection whereas others lessen the severity of clinical signs (Peterson 2008). Panels of experts (AAFP 2006; AAHA 2006) agree that protocols must be customized for each facility, recognizing that no universal protocol will apply to every shelter situation.

Guiding principles for core vaccination in shelters, that are generally applicable to most shelters, are available (AAFP 2009; AAHA 2006). Within this framework, specific vaccination protocols should be tailored for each program with the supervision of a veterinarian, taking into consideration risks and benefits of the vaccines, diseases endemic to the area, potential for exposure, and available resources (Miller & Hurley 2004; Miller & Zawistowski 2004)

Because risk of disease exposure is often high in shelters, animals must be vaccinated at or prior to intake with core vaccines. Pregnancy and mild illness are not contraindications to administering core vaccines in most shelter settings because the risk from virulent pathogens in an unvaccinated animal would be far greater than the relatively low risk of problems posed by vaccination (AAFP 2009; AAHA 2006; Larson 2009). Core vaccines for shelters currently include feline viral rhinotracheitis, calicivirus, panleukopenia (FVRCP) for cats (AAFP

Animals must be vaccinated at, or prior to, intake with core vaccines.

An emergency medical plan must be in place to provide appropriate and timely veterinary medical care for any animal who is injured, in distress, or showing signs of significant illness.

2009) and distemper, hepatitis, parainfluenza, and canine parvovirus (DHPP)/distemper, adenovirus 2, parvovirus, and parainfluenza virus (DA2PP) and *Bordetella bronchiseptica* for dogs (AAHA 2006). The use of modified live virus vaccines (MLV) is strongly recommended over killed products for core shelter vaccines in cats and dogs, including those that are pregnant, because they provide a faster immune response.

Rabies vaccination on intake is not considered a priority in most shelters, as the risk of exposure to this disease is not high within most shelter environments. However, animals should be vaccinated against rabies when a long-term stay is anticipated; when risk of exposure is elevated; or when mandated by law. At minimum, animals should be vaccinated for rabies at or shortly following release.

Shelters that house animals for extended periods of time have an obligation to ensure that vaccinations are repeated in accordance with shelter medicine recommendations (AAFP 2006; AAHA 2006). Re-vaccination is recommended for puppies and kittens until maternal antibody wanes. Puppies and kittens must be re-vaccinated (DHPP and FVRCP, respectively) at 2–3-week intervals for the duration of their shelter stay or until they are over 18–20 weeks old.

Shelters that do not vaccinate with core vaccines immediately on entry, or do not vaccinate all animals, are much more likely to experience deadly outbreaks of vaccine preventable disease (Larson 2009). Protocols for managing adverse reactions must be provided by a veterinarian and required treatments must be accessible. Training on proper vaccine storage and administration, and treating reactions, should be supervised by a veterinarian. The location for injection of a specific vaccine (i.e., rabies in the right rear leg) should follow administration site guidelines (AAFP 2006; AAHA 2006). Records of any immunizations provided while in the care of the shelter should be kept.

4. Emergency Medical Care

An emergency medical plan must be in place to provide appropriate and timely veterinary medical care for any animal who is injured, in distress, or showing signs of significant illness (AAEP 2004; CFA 2009; CVMA 2009; FASS 1999). Staff should be trained to recognize conditions that require emergency care. The emergency care plan must ensure that animals can receive proper veterinary medical care and pain management promptly (either on site or through transfer to another facility) or be humanely euthanized by qualified personnel as permitted by law.

5. Pain Management

Shelters often care for animals with acute or chronically painful medical conditions. The American College of Veterinary Anesthesiologists (ACVA) defines pain as a complex phenomenon involving pathophysiological and psychological components that are frequently difficult to recognize and interpret in animals (ACVA 2006). Pain must be recognized and treated to alleviate suffering. Unrelieved pain can result in chronic physical manifestations such as weight loss, muscle breakdown, increased blood pressure and a prolonged recovery from illness or injury (Robertson 2002). Early pain management is essential. Failure to provide treatment for pain is unacceptable.

Recognizing and alleviating pain in a wide variety of species can be complex and difficult (Paul-Murphy 2004). Individual animals have varying reactions to stimuli and may manifest a variety of clinical and behavioral signs (ACVA 2006). Although there are multiple scales and scoring systems published for gauging animal pain, few have been validated and there is no accepted gold standard system for assessing pain in animals (IVAPM 2005). However, it is generally assumed that if a procedure is painful in human beings then it must also be painful in animals (ACVA 2006; APHIS 1997b). It is the shelter's responsibility to combine findings from physical examination, familiarity with species and breed, individual behavior, and knowledge of the

degree of pain associated with particular surgical procedures, injuries and/or illnesses in order to assess pain.

Pharmacologic and non-pharmacologic approaches to the treatment of pain are evolving; in either case, treatment should be supervised by a veterinarian. Analgesia must be of an appropriate strength and duration to relieve pain. Non-pharmacologic (e.g., massage, physical therapy) approaches that help increase comfort and alleviate anxiety can be used to supplement pharmacologic interventions. When pain can be anticipated, analgesia should be provided beforehand (pre-emptive). Animals must be reassessed periodically to provide ongoing pain relief as needed. When adequate relief cannot be achieved, transfer to a facility that can meet the animal's needs, or humane euthanasia must be provided.

6. Parasite Control

Many animals entering shelters are infected with internal and external parasites (Bowman 2009). Though not always clinically apparent, parasites can be easily transmitted, cause significant disease and suffering, persist in the environment, and pose a risk to public health (CAPC 2008; CDC 2009). Shelters have a responsibility to reduce risk of parasite transmission to humans and animals. An effective parasite control program should be designed with the supervision of a veterinarian. Animals should receive treatment for internal and external parasites common to the region and for any obvious detrimental parasite infection they are harboring. Treatment and prevention schedules should be guided by parasite lifecycles and surveillance testing to identify internal and external parasites that may be prevalent in the population. Ideally, animals should receive parasite prevention on entry and regularly throughout their shelter stay to prevent environmental contamination and minimize risk to people in the shelter. At minimum, because of the public health significance, all dogs and cats must be de-wormed for roundworms and hookworms before leaving the shelter. Because

many parasite eggs are very difficult to eradicate from the environment, prompt removal of feces, proper sanitation, and treatment as described above are important steps to help ensure that individual, environmental, or population level parasitism does not threaten the health of animals or humans.

7. Monitoring and Daily Rounds

Rounds must be conducted at least once every 24 hours by a trained individual in order to visually observe and monitor the health and well-being of every animal. Monitoring should include food and water consumption, urination, defecation, attitude, behavior, ambulation, and signs of illness or other problems (CFA 2009; New Zealand 2007; UC Davis 2009). Monitoring should take place before cleaning so that food intake and condition of the enclosure as well as any feces, urine, or vomit can be noted. For animals housed in groups, monitoring should also take place during feeding time, so that appetite (food intake) or conflicts around food may be observed. Any animal that is observed to be experiencing pain; suffering or distress; rapidly deteriorating health; life-threatening problems; or suspect zoonotic medical conditions must be assessed and appropriately managed in a timely manner (AAEP 2004; CDA 2009; CFA 2009; New Zealand 2007).

When apparently healthy animals remain in care for longer than 1 month, exams including weight and body condition score should be performed and recorded by trained staff on at least a monthly basis. Veterinary examinations should be performed twice each year or more frequently if problems are identified. Geriatric, ill, or debilitated animals should be evaluated by a veterinarian as needed for appropriate case management.

There are many examples of health conditions that require ongoing assessment and management including, but not limited to, dental conditions, retroviral infections, endocrine imbalances, and basic appetite/weight changes. In addition, animals must be provided with appropriate grooming

Medical rounds must be conducted at least daily by a trained individual in order to visually observe and monitor the health and well-being of every animal.

and/or opportunities to exhibit species-specific behaviors necessary for them to maintain normal healthy skin and haircoat or feathers (CDA 2009; CFA 2009; New Zealand 1998). Dirty, ungroomed or matted haircoats are uncomfortable, predispose animals to skin disease, and in extreme cases can lead to severe suffering. Appropriate grooming and/or bathing is an essential component of animal health and should never be considered cosmetic or optional.

8. Nutrition

Fresh, clean water and proper food are basic nutritional requirements for physical health. Fresh, clean water must be accessible to animals at all times unless there is a medical reason for water to be withheld for a prescribed period of time. Water should be changed daily and whenever it is visibly soiled. Food that is consistent with the nutritional needs and health status of the individual animal must also be provided. The amount and frequency of feeding varies depending on life stage, species, size, activity level, health status of the animal and the particular diet chosen. Food must be fresh, palatable, free from contamination and of sufficient nutritional value to meet the normal daily requirements to allow an animal to attain maximum development, maintain normal body weight, and rear healthy offspring. Food in animal enclosures should be examined regularly to ensure it is free of debris and not spoiled. At minimum, uneaten food must be discarded after 24 hours. Food that has been offered to an animal and remains uneaten must not be fed to another animal.

Ideally, a consistent diet should be fed to all animals, rather than a variety of products. Feeding a consistent diet minimizes gastrointestinal upset, stress, and inappetence associated with frequent diet change, and helps to ensure the product is fed in appropriate quantity. The feeding of raw food diets is not recommended in shelters because of concerns about bacterial or parasite contamination and public health risk (CVMA 2006; Finley 2008, Lejeune 2001; Lenz 2009; Morley 2006).

At minimum, healthy adult dogs and cats (over 6 months old) must be fed at least once per day (CDA 2009; CFA 2009). Ideally, dogs should be fed twice daily (New Zealand 1998); cats should ideally be fed multiple small meals or encouraged to forage throughout the day (Vogt 2010). If food is not available to cats all day, at minimum, they should be offered food twice daily. Healthy puppies and kittens must be fed small amounts frequently or have food constantly available through the day (free-choice) to support higher metabolic rates and help prevent life-threatening fluctuations in their blood glucose levels (hypoglycemia). Debilitated, underweight, pregnant, and lactating animals should receive more frequent feedings to support increased metabolic needs. Veterinary input should be sought when developing a feeding protocol for a population of animals, or when treating starved animals or individuals with unique nutritional and health needs.

Food intake must be monitored daily. Animals should be weighed and body condition assessed routinely. Animals have highly variable metabolic requirements (Lewis 1987). Each animal should be fed to meet individual needs and prevent excessive gain or loss of body weight. Animals displaying inappetence, or extreme weight loss or gain must be evaluated by a veterinarian and treated as necessary.

Food and water must be provided in appropriate dishes, which should be designed and placed to give each animal in the primary enclosure access to sufficient food and water. Food and water dishes must be safe, sufficient in number, and of adequate size. When more than one animal is housed in an enclosure, careful monitoring and grouping to match animals with similar nutritional needs are essential. Animals who guard food or prevent access by cage mates must be housed or fed separately. Location of food and water containers should also allow easy observation, access for cleaning and filling and should prevent contamination from litter, feces, and urine. If automatic devices or drinking bottles are used, they should be examined daily to

Food that is consistent with the nutritional needs and health status of the individual animal must be provided.

Animals who guard food or prevent access by cage mates must be housed or fed separately.

ensure proper function and cleanliness and must be disinfected between users.

Old food creates a health hazard by spoilage and/or attraction of pests. Food distributed to animals that remains uneaten within 24 hours must be removed and discarded to prevent spoilage. A schedule of regular sanitation must be followed for all food and water containers. Food preparation and storage areas must be easily sanitized and maintained in a clean condition. Supplies of food should be stored in a manner to prevent spoilage or contamination. Refrigeration is needed for perishable foods. Food should not be fed after the expiration date. Factors such as exposure to heat or air may also decrease shelf life. Toxic substances and vermin should be kept out of contact with food, food storage, and preparation areas (AAEP 2004). Stored food should be clearly labeled if removed from the original package.

9. Population Well-being

Individual animal health and overall population health are interdependent. Without one the other cannot exist in most shelter settings. Shelter medical staff must therefore regularly monitor the status of individual animals and the population as a whole to allow for early detection of problems and prompt intervention. Ideally, shelters should also monitor and assess frequency of specific problems (e.g., upper respiratory infections, parvoviruses) set realistic goals, develop targeted strategies, and monitor the effectiveness of medical health programs, ultimately leading to better overall population management and individual animal welfare. This type of surveillance will also facilitate early recognition and reporting of problems, accurate diagnosis, effective interventions, and data collection. Animal health plans must be reviewed in response to changes observed in animal health, illness or deaths.

In addition to tracking trends related to specific health problems, a periodic review of the rate of illness (morbidity) or deaths (mortality) should be conducted. Shelter deaths are often indicators of

rising levels of infectious diseases (e.g., parvovirus or upper respiratory infection; URI) which require a response by the shelter. Shelter deaths after entry, not related to euthanasia, should never represent more than a very small proportion of animal intakes. For example, statewide data for municipal animal control and public or private rescue groups and humane societies in Virginia for the years 2004–2007 indicate that <2% of cats and <1% of dogs received by those facilities were reported as having died in the shelter. (This information is published annually by the Virginia Department of Agriculture and Consumer Services, Office of the State Veterinarian.) A survey of 11 open-intake animal shelters (including large, municipal shelters in communities such as Los Angeles and New York City) revealed an average “shelter death rate” (calculated as number of dogs and cats that died in the shelter’s care divided by total live dog and cat intake) of 0.75% (range 0.18–1.61%) (HSUS 2007). Numbers in excess of this indicate a situation requiring immediate measures for control.

10. Response to Disease or Illness

Response to disease and illness must be an integral part of every shelter health program. A disease response plan should include measures to minimize transmission to unaffected animals or people and ensure appropriate care of the affected animal (Hurley 2009). Because of the wide variety of pathogens, modes of transmission, and types of facilities, no single response can suit every circumstance (ASV position statement on infectious disease outbreak management, 2008). (See section on Public Health for more information on prevention of disease transmission.)

a) Isolation

All facilities should have a means of providing isolation that will allow for humane care and not put other animals at risk (CDA 2009). Isolation may be accomplished physically on-site or through transfer to an appropriate facility. When isolation is impossible, or inadequate to control transmission

of the particular pathogen, the shelter must carefully weigh the consequences of exposure of the general population against euthanasia. Allowing animals with severe infectious disease to remain in the general population is unacceptable. Even animals with mild clinical signs of contagious disease should not be housed in the general population as doing so creates a substantial risk of widespread disease transmission.

Failure to provide treatment for pain is unacceptable.

b) Diagnosis

In the event of severe or unusual conditions, or outbreaks of infectious disease, diagnosis or identification of specific pathogens should be sought. Initially, a clinical or working diagnosis, as determined by a veterinarian, may provide the basis for treatment and response. When a specific pathogen has not been identified, a risk assessment must be performed based on the suspected pathogens and the number of animals who have been in contact with the infected animals.

Animals with a suspected infectious disease must be isolated until diagnosis or subsequent treatment determines them to be a low risk to the general population. When an animal dies from unexplained causes, a necropsy along with histopathology should be performed to provide information to protect the health of the rest of the population.

Protocols to define and manage common illnesses based on clinical signs should be developed and used in consultation with a veterinarian. Protocols should detail the expected course of disease and response to treatment. Veterinary input should be sought when disease or response to treatment does not follow expected course.

c) Outbreak Response

During an outbreak, physical separation must be established between exposed, at-risk and unexposed animals or groups of animals. In some circumstances, it may be necessary to stop intake or adoptions in order to prevent disease spread. In other circumstances, a properly set up isolation room

may suffice to control the spread of disease. Ideally, animal movement should stop until a targeted control strategy can be implemented. Animal handling and foot traffic should be limited. In response to an outbreak, protocols (vaccination, sanitation, movement, etc.) should be reviewed to ensure that measures are effective shelter-wide against the pathogens of concern. Animals should be monitored for signs of disease during an outbreak at least twice daily. Shelters should avoid returning recovered or exposed animals to the general population while there is significant risk they may transmit disease to other animals. When releasing a sick or infectious animal from the shelter, full disclosure should be made to the person or organization receiving the animal. Shelters must also take care that all federal, state, and local laws are followed concerning reportable diseases.

Although rarely the only option, depopulation is one means of response to a disease outbreak. Before depopulation is undertaken, many factors including transmission, morbidity, mortality, and public health must be taken into account. All other avenues must be fully examined and depopulation viewed as a last resort (ASV position statement on infectious disease outbreak management, 2008).

11. Medical Treatment of Shelter Animals

Treatment decisions should be based upon a number of criteria such as the ability to safely and humanely provide relief, prognosis for recovery, the likelihood of placement after treatment, and the number of animals who must be treated. Duration of treatment expected, expense and resources available for treatment should also be considered.

The legal status of the animal must never prevent treatment to relieve suffering (which may include euthanasia if suffering cannot be alleviated). Shelters must have specific protocols to provide immediate care when legal status is an issue.

During a disease outbreak, physical separation must be established between exposed, at-risk and unexposed animals or groups of animals.

Decisions must balance both the best interest of the individual animals requiring treatment and the shelter population as a whole. When treatment is needed, shelters are responsible for the safety of the animals, the people working with the animals, and the surrounding environment. Effective and safe use of medication requires a reasonably certain diagnosis, proper administration, and monitoring the course of disease so that success or failure can be determined. Those providing treatment must have the necessary training, skills, and resources to ensure treatment is administered correctly and safely.

Shelters should also have clear policies for handling disease problems that may develop after adoption. Adopters or those taking animals from the shelter should be informed about the presence of any disease or condition known to be present at the time of adoption and provided a copy of any treatment records.

Professional supervision is required for use of all prescription drugs, controlled and off-label medication (FDA 2009a, 2009b). Protocols for

medication, developed in consultation with a veterinarian, for management of common diseases should be provided to staff. All treatments should be documented.

The use of antimicrobials in shelter populations warrants special mention. Bacteria are capable of developing resistance to certain drugs. In some cases, they are able to pass this resistance to other bacteria, including those that cause infections in both animals and people. To prevent antimicrobial resistance from developing, it is vital to limit antimicrobial use to those situations where these drugs are clearly indicated (AAHA /AAFP 2006; AVMA 2008b). Antibiotic selection and dosing should be specific to the infection and animal being treated; and, when possible, based on appropriate diagnostics. Inappropriate use of antibiotics is not a substitute for good preventive medical care. Guidelines for antimicrobial use in companion animals have been published and these principles should also be applied to the shelter setting (AAHA/ AAFP 2006; AVMA 2008b).

Allowing animals with severe infectious disease to remain in the general population is unacceptable.

Behavioral Health and Mental Well-being

Staff must be trained to recognize animal stress, pain, and suffering as well as successful adaptation to the shelter environment.

Good health and well-being depend on meeting both the mental and behavioral needs, as well as the physical needs, of animals (Griffin 2009a; Jenkins 1997; McMillan 2000, 2002; Wells 2004a; Wojciechoska 2005). Individual animals have a wide variety of psychological needs that are determined by such factors as species, genetic makeup, personality, prior socialization and experience. Behavioral care must take the perspective of each individual animal into consideration as well as the conditions experienced by the population (Griffin 2009a; McMillan 2000, 2002; Wojciechoska 2005).

The structural and social environment, as well as opportunities for cognitive and physical activity, are important for all species of animals (ILAR 1996). An appropriate environment includes shelter and a comfortable resting area, in which animals are free from fear and distress and have the ability to express normal, species typical behaviors. Lack of control over one's environment is one of the most profound stressors for animals. The stress induced by even short-term confinement in an animal shelter can compromise health; and when confined long-term, animals frequently suffer due to chronic anxiety, social isolation, inadequate mental stimulation and lack of physical exercise (Fox 1965; Griffin 2009a, 2006; Hennessy 1997; Patronek 2001; Stephen 2005; Tuber 1999; Wemelsfelder 2005). Proper behavioral healthcare is essential to reduce stress and suffering as well as to detect problem behaviors that may pose a safety risk to humans or other animals.

Stress and the development of abnormal behaviors are exacerbated when opportunities for coping (e.g., hiding, seeking social companionship, mental stimulation or aerobic exercise) are lacking. Behavior problems compromise health and welfare as well as potential for adoption (Griffin 2009a).

1. Considerations on Intake

a) Behavioral History

A thorough behavioral history and the reason(s) for relinquishment should be obtained at the time of intake. Any available information should be solicited when stray animals are impounded as well. Ideally, this information should be obtained by interview, although written questionnaires are acceptable. The history should be used to alert staff to the presence of potential problems, such as aggression or anxiety, and to inform staff of any individual needs, so that proper care can be provided for that animal (Griffin 2009a).

Shelters should be aware that histories provided, although important, may be either incomplete or inaccurate. For example, some problem behaviors such as aggression may be under reported or under stated (Marder 2005; Segurson 2005; Stephen 2007). All incidents or reports of a history of aggressive behavior along with the context in which they occurred must be recorded as part of an animal's record.

b) Minimizing Stress

Animals experience a variety of stressors in shelters, beginning with the intake process (Coppola 2006, 1997; Griffin 2009a; Hennessey 1997). Care must be taken to minimize stress during this crucial time in order to minimize problems, which may delay or even prevent acclimation or adjustment to the shelter environment and prolong or intensify anxiety and mental suffering (Grandin 2004). During intake procedures, particular care should be taken not to place cats within spatial, visual or auditory range of dogs (Griffin 2009a, 2009b; McCobb 2005).

2. Behavior Evaluation

Assessment of an animal's behavior must begin at the time of intake. Just as care is taken to note any physical problems that may require attention, behavioral problems (stress, fear, anxiety, aggression) that require intervention or affect how that animal can be safely handled should also be noted at the time of

intake and entered into an animal's record. Actions should be taken to respond promptly to behavioral needs (Griffin 2009a). Ongoing assessment of each animal's behavior should continue throughout the animal's stay in the shelter.

Manifestations of normal and abnormal behavior indicate how successfully an animal is coping in their environment (Fox 1965; Griffin 2002, 2009a, 2006; Houpt 1985; McMillan 2002; Overall 1997, 2005). Therefore, staff must be trained to recognize body language and other behaviors that indicate animal stress, pain, and suffering as well as those that indicate successful adaptation to the shelter environment. When animals are well adjusted and their behavioral needs are satisfied, they display a wide variety of normal behaviors including a good appetite and activity level, sociability, grooming, appropriate play behavior and restful sleeping. Behavioral indicators of stress, social conflict, pain or other suffering, include persistent hiding, hostile interactions with other animals, reduced activity or appetite, depression and/or social withdrawal, barrier frustration or aggression, stereotypic behaviors (e.g., repetitive spinning, jumping or pacing) or other abnormal behaviors (Fox 1965; Griffin 2002, 2006, 2009a; Houpt 1985; McMillan 2002; Overall 1997, 2005).

The needs of individual animals will vary. Animals must be monitored daily in order to detect trends or changes in well-being and respond to their behavioral needs. Staff should record their findings each day (Griffin 2009a; UC Davis 2009). Departures from the normal behavior and appearance of an animal may also be an indication that the animal is in pain (ACVA 2006). When pain or suffering is recognized in animals, it is imperative that prompt, appropriate steps be taken to alleviate it. (See section on Medical Health and Physical Well-being for additional information on pain management.)

Some individual shelter animals may experience severe stress that is difficult to alleviate even with

optimal practices. However, if many animals are displaying signs of unrelieved stress, steps must be taken to improve the shelter's stress reduction protocols. For humane reasons, long-term confinement must be avoided for feral animals and for those who remain markedly stressed/fearful and are not responding to treatment/behavioral care (Griffin 2009b; Kessler 1999a, 1999b).

Ideally, a systematic behavioral evaluation should be performed on all animals prior to re-homing or other placement (Griffin 2009a). Some evaluations have been peer-reviewed, commonly accepted, studied and/or published, but none is scientifically validated for predicting future behavior in the home with certainty. However, information gleaned during such testing (e.g., level of activity and arousal) may be useful for characterizing the animal's personality, determining behavioral needs in the shelter, matching animals with appropriate adopters and identifying individual animals who may not be suitable for re-homing or other placement (Animal Rescue League of Boston 2010; Bollen 2008; Christensen 2007; Hetts 2000; Griffin 2009a; Ledger 1995; Ledger 1997; Netto 1997; Neidhart 2002; Sternberg 2003; Van der borg 1991). Organizations that develop their own evaluation should do so in consultation with a veterinarian or behaviorist familiar with the science and theory of behavior assessment. Staff performing evaluations must receive adequate training in performance, interpretation, and safety. A standardized behavior examination form should be used and each evaluation should be documented. Formal behavioral evaluation should not necessarily invalidate information provided by the owner or observations made during staff interactions with an animal. An overall assessment must include all of the information (history, behavior during shelter stay, and formal evaluation) gathered about the animal.

Criteria for a systematic behavioral evaluation of cats are less well established than for dogs (Siegford 2003). However, cats should be assessed by observing behavior, and interacting with the cat to help enhance in-shelter care (e.g., recognition

of shy, stressed, fearful, poorly socialized or feral cats) and help guide appropriate placement (Griffin 2009a, 2009b, 2006; Lowe 2001).

3. In-shelter Care

a) Environment

Enclosures

Appropriate housing that meets the behavioral needs of the animals minimizes stress (Griffin 2006, 2002; Hawthorne 1995, Hubrecht 2002; Loveridge 1994, 1995, 1998; McCune 1995a; Overall 2005, 1997; Rochlitz 1998, 1999, 2002, 2005). Even short-term housing must meet the minimum behavioral needs of animals, providing separate areas for urination/defecation, feeding and resting and sufficient space to stand and walk several steps, and sit or lie at full body length. (See section on Facilities for guidelines for animal housing.)

Separation

Beginning at the time of admission, separation of animals by species is essential to provide for their behavioral needs as well as proper health and welfare (Griffin 2009a). Prey species (e.g., birds, guinea-pigs, hamsters, gerbils, rabbits) should be housed away from predatory species (e.g., ferrets, cats, dogs) at all times (Quesenberry 2003). It is extremely stressful for them to be housed in an area where they are subjected to olfactory, auditory, and visual contact with predatory species. Because cats may be profoundly stressed by the presence and sound of dogs barking, they should be physically separated from the sight and sound of dogs (Griffin 2009a, 2009b; McCobb 2005). Novel environments tend to be especially stressful for shy, poorly socialized, feral and geriatric cats and dogs (Dybdall 2007; Griffin 2009b; Hiby 2006; Patronek 2001). Ideally, these animals, or any animal that is showing signs of stress, should be housed in separate, calm, quiet areas beginning at intake. Even moving an animal to a quieter location within the same ward may prove beneficial.

Enrichment should be given the same significance as other components of animal care and should not be considered optional.

b) Daily Routine

Regular daily schedules of care should be followed because the stress from husbandry is increased when it is unpredictable and may even result in chronic fear and anxiety (Carlstead 1993; Griffin 2002, 2006, 2009a). Conversely, when stressful events are predictable, animals may experience calm and comfort between stress responses (McMillan 2002). Animals also respond to positive experiences in their daily routines. Feeding and playtime may be greatly anticipated, thus scheduling positive daily events should be a priority (Griffin 2002, 2006, 2009a). Lights should be turned off at night and on during daytime hours (Griffin 2002) to support animals' natural circadian rhythms. Irregular patterns or continuous light or darkness are inherently stressful.

c) Enrichment and Socialization

Enrichment refers to a process for improving the environment and behavioral care of confined animals within the context of their behavioral needs. The purpose of enrichment is to reduce stress and improve well-being by providing physical and mental stimulation, encouraging species-typical behaviors (e.g., chewing for dogs and rodents, scratching for cats), and allowing animals more control over their environment. Successful enrichment programs prevent the development and display of abnormal behavior and provide for the psychological well-being of the animals. Enrichment should be given the same significance as other components of animal care, such as nutrition and veterinary care, and should not be considered optional (ILAR 1996). At a minimum, animals must be provided regular social contact, mental stimulation and physical activity (ILAR 1996). For some animals, social needs may be partially fulfilled through interaction with members of the same species.

Interactions with People

Regular positive daily social interactions with humans are essential for both dogs and cats (with the exception of feral animals) (Coppola 2006; Crowell-Davis 1997; 2004; Griffin 2006; Hennessy 1998, 2002; Hetts 1992; Hubrecht

1992, 1993; Tuber 1996, 1999). These interactions are crucial for stress reduction and are a powerful form of enrichment (Coppola 2006; Hennessy 1998, 2002; Hetts 1992; Hubrecht 1992, 1993; McMillan 2002; Tuber 1996). Ideally, caregivers should be assigned to care for the same animals on a regular basis, so that the caregivers become aware of the behaviors of each individual animal and the animals become accustomed to the individual caregiver (Griffin 2002, 2006, 2009a).

Performance of daily husbandry is not a means to provide for the social needs of animals. Animals should receive some type of positive social interaction outside of the activities of feeding and cleaning on a daily basis (e.g., walking, playing, grooming, petting, etc.). This is especially important for animals housed long-term. For animals housed short-term and with unknown health backgrounds, social interaction must be balanced with infectious disease control. When animals must remain confined for health or behavioral reasons, positive social interaction still should be provided without removing the animal from the enclosure.

For puppies and kittens less than 4 months old, proper socialization is essential for normal behavioral development. Without daily handling and positive exposure to a variety of novel stimuli, animals may develop chronic fear and anxiety or suffer from the inability to adjust normally to their environments (Griffin 2006; Lowe 2001; McCune 1995b; McMillan 2002). For these reasons, a high priority must be placed on ensuring proper socialization of young puppies and kittens. This may be best accomplished outside of the shelter (e.g., in foster care) (Griffin 2006; McMillan 2002; Reisner 1994). For puppies and kittens housed in a shelter, socialization must be balanced with infectious disease control. Socialization should be provided by workers or volunteers wearing clean protective clothing in an environment that can be fully disinfected between uses.

Training programs for dogs and cats (e.g., to condition or teach basic obedience commands or tricks) also serve as an important source of stimulation and social contact (Griffin 2009a; Laule 2003; Thorn 2006). For dogs, such training has been shown to increase chances for re-homing (Leuscher 2008). Training methods must be based primarily on positive reinforcement in accordance with current professional guidelines (APDT 2003; AVSAB 2007; Delta Society 2001).

Behavioral Considerations for Long-term Shelter Stays

For long-term shelter stays, appropriate levels of additional enrichment must be provided on a daily basis. (See section on How to Use This Document for discussion of long-term stay.) Long-term confinement of any animal, including feral or aggressive animals, who cannot be provided with basic care, daily enrichment and exercise without inducing stress, is unacceptable.

Alternatives to traditional cage housing (e.g., large enriched cages, home or office foster care, room housing) must be provided for any animal staying in a shelter long term. Cats must be allowed an opportunity to exercise and explore in a secure, enriched setting. Similarly, dogs must be provided with daily opportunities for activity outside of their runs for aerobic exercise (Griffin 2009a; Loveridge 1998). Exercise may be stimulated through interactive games such as fetch or via supervised playgroups with other dogs. For both cats and dogs, rooms with a home-like environment may also be used to provide enrichment and stress reduction. Precautions, as described in other sections, should be taken to ensure that disease transmission and stress are minimized.

Any animal that is observed to be experiencing mental suffering, distress or behavioral deterioration must be assessed and appropriately treated in a timely manner or humanely euthanized. Just as a severe or rapid decline in an animal's physical health constitutes an emergency situation and

Long-term confinement of any animal, including feral or aggressive animals, who cannot be provided with basic care, daily enrichment and exercise without inducing stress, is unacceptable.

Alternatives to traditional cage housing must be provided for any animal staying in a shelter long term.

requires an urgent response, so do such changes in the behavioral or mental health of an animal.

Reproductive stress from estrous cycling and sex drive can decrease appetite, increase urine spraying, marking and fighting, and profoundly increase social and emotional stress. For these reasons, animals who are housed long-term should be spayed or neutered as the rapid decline in spraying, marking, and fighting and the elimination of heat behavior and pregnancy will greatly mitigate animal stress (Hart 1973, 1997; Johnston 1991). This also serves to facilitate group housing and participation in supervised playgroups for exercise and social enrichment.

Other Types of Enrichment

Enrichment should also be provided for animals while in their enclosures through opportunities for play (e.g., toys or human interaction). Feeding enrichment is another important source of stimulation and can be easily accomplished by hiding food in commercially available food puzzle toys, cardboard boxes, or similar items with holes such that the animal has to work to extract pieces of food (Griffin 2006, 2009a; Schipper 2008; Shepherdson 1993). Feeding enrichment has also been shown to increase activity level and reduce barking behavior (Schipper 2008). Other forms of mental and sensory stimulation (e.g., olfactory, visual, auditory, tactile and pheromone) are additional and important ways of providing enrichment (Graham 2005a, 2005b, Griffith 2000; De Monte 1997; Tod 2005; Wells 2004a, 2004b). For example, cats benefit from the provision of scratching posts; dogs benefit from the provision of items to chew and may also benefit from classical music (Wells 2002)

played at controlled volumes or certain aromas (such as chamomile or lavender) (Graham 2005a). Animals may also benefit from visual stimulation and the ability to observe their surroundings (Ellis 2008).

d) Behavioral Modification

Behavior modification is an individualized treatment strategy designed to change an animal's behavior. Practices must adhere to the well-described scientific principles of animal behavior and learning including positive reinforcement, operant conditioning, systematic desensitization and counter-conditioning (AVSAB 2007). In some cases, the use of medications, prescribed by a veterinarian, in combination with behavior modification techniques, may be required. The use of physical force as punishment or use of force in anger is an unacceptable means of behavior modification; these methods are potentially harmful to the animal and dangerous for the staff. (AVSAB 2007; Hutchinson 1977; Patronek 2001). Descriptions of unacceptable disciplinary techniques are available (New Zealand 1998; AHA 2001; CVMA 2004).

Sufficient resources (e.g., trained staff, time for behavioral treatment, adequate housing and working space) must be available to provide appropriate care if behavioral modification is attempted. The techniques required are generally labor-intensive and time-consuming and must be applied consistently over a period of time in order to be successful. Attempting behavior modification with aggressive animals poses concerns due to safety and liability risks; animals believed to be dangerous should not be re-homed (Bollen 2008; Crowell-Davis 2008; Phillips 2009).

The use of physical force as punishment or use of force in anger is an unacceptable means of behavior modification; these methods are potentially harmful to the animal and dangerous for the staff.

Group Housing

The purpose of group housing in shelters is to provide animals with healthy social contact and companionship with other animals in order to enhance their welfare. In the context of this document, group housing refers to playgroups as well as group housing two or more animals in the same primary enclosure. Group housing requires appropriate facilities and careful selection and monitoring of animals by trained staff. This form of social contact is not appropriate for all individuals.

1. Risks and Benefits of Group Housing

There are both risks and benefits to group housing. Inappropriately used group housing creates physical risks of infectious disease exposure and injury or death from fighting. It also creates stress, fear, and anxiety in some members of the group. Group housing makes monitoring of individual animals more difficult, resulting in failure to detect problems or inadequate access to necessities like food and water for some animals. Staff safety may also be compromised when animals are housed in groups as it is generally more difficult to manage more than one animal in an enclosure. However, appropriately planned groupings for housing or play can be acceptable, and may even be desirable, when tailored to individual animals (Griffin 2002, 2006; Gourkow 2001; Kessler 1999b; Mertens 1996; Overall 1997; Rochlitz 1998). Benefits of group housing include opportunities for positive interaction with other animals including play, companionship, physical connection, and socialization. Group housing can be used to provide a more enriched and varied environment.

2. Facilities

Essential physical features of a facility to support planned group housing include adequate size of the primary enclosure; multiple feeding stations and resting areas; and adequate space for urination and defecation. Adequate size of group housing is imperative to allow animals to maintain adequate social distances. For group housing of cats, a variety of elevated resting perches and hiding places must

be provided to increase the size and complexity of the living space (Dowling 2003; Griffin 2006; Overall 1997; Rochlitz 1998). A minimum of 18 square feet per cat has been recommended for group housing (Kessler 1999b). Although no minimum has been recommended for dogs, for all species the size should be large enough to allow animals to express a variety of normal behaviors. (See section on Facilities for more information on primary enclosures.) Sufficient resources (e.g., food, water, bedding, litterboxes, toys) must be provided to prevent competition or resource guarding and ensure access by all animals.

3. Selection

Both group housing and playgroups require careful selection and monitoring of animals by staff or volunteers trained to recognize subtle signs of stress and prevent negative interactions (e.g., guarding food or other resources). Selection considerations include separation by age, behavioral assessment prior to grouping, and prevention of infectious disease through screening, vaccination and parasite control.

Random grouping of animals in shelters is an unacceptable practice. Animals must not be housed in the same enclosure simply because they arrived on the same day or because individual kennel space is insufficient. Unrelated or unfamiliar animals must not be combined in groups or pairs until after a health and behavior evaluation is performed; animals should be appropriately matched for age, sex, health, and behavioral compatibility. Unfamiliar animals should not be placed in group housing until sufficient time has been given to respond to core vaccines. Intact animals of breeding age should not be group housed (Hickman 1994). If group housing is utilized short-term for intact animals, they must be separated by gender. Sexually mature dogs and cats should be spayed/neutered and allowed sufficient recovery time prior to group housing.

Animals who are not socialized to other animals as well as those who actively bully other animals must

Animals must not be housed in the same enclosure simply because they arrived on the same day or because individual kennel space is insufficient.

Options for individual housing must be available for animals when co-housing is not appropriate.

Random grouping of animals in shelters is an unacceptable practice.

not be grouped with other animals (Kessler 1999a; Overall 1997). Grouping animals who fight with one another is unacceptable. Allowing animals to fight is cruel and animals who have engaged in fighting with one another must not be grouped together. Caution must be used when attempting to include any animal with a history of fighting in a group.

Grouping animals who fight with one another is unacceptable.

Smaller groups are preferable to allow effective monitoring and reduced risk of conflict as well as decreased infectious disease transmission. Ideally, a group size of 10–12 should not be exceeded for cats (Dowling 2003; Griffin 2006; Rochlitz 2005). For the safety of dogs as well as caregivers, dogs should be combined in even smaller groups (e.g., no more than 4–6 dogs).

The addition of new animals always results in a period of stress for the group. If there is constant turnover (animals joining and leaving) within the group, animals may remain stressed indefinitely. For these reasons, turnover within groups should be minimized.

Because of their susceptibility to infectious disease, puppies and kittens under 20 weeks of age should

not be group housed unless they are littermates. Single, unrelated puppies or kittens may be group housed for socialization purposes if they must stay in the shelter long-term or if the risk from lack of social interaction is greater than that for infectious disease. When placing single orphaned kittens and puppies with an alternate mother, with or without a litter, risks and benefits to health and behavior for all animals must be weighed. Even for littermates, all requirements for group housing must be met.

4. When Group Housing is Inappropriate

Options for individual housing must be available for animals when group housing is not appropriate. For some animals, even group housing with familiar animals can be detrimental. Single enriched housing must be provided for animals who are fearful or aggressive towards other animals, are stressed by the presence of other animals, require individual monitoring, or are ill and require treatment that cannot be provided in group housing (Kessler 1999a; Griffin 2006). Because it may take days to weeks to acclimate to a group environment, enriched individual housing is preferable when a shorter stay is anticipated (Griffin 2009a).

Animal Handling

Handling must always be as humane as possible and appropriate for the individual animal and situation. The minimal amount of physical restraint needed to accomplish the task without injury to people or animals should be used. Humane handling requires an appraisal of each animal's behavior, adequate numbers of properly trained staff, suitable equipment that is readily available and in good working condition, appropriate choice of location for procedures, personal protection such as gloves or push boards, and judicious use of tranquilizers (Fowler 1995; Griffin 2006).

1. Restraint

When physical restraint is necessary to avoid human injury or injury to an animal, it should be of the least intensity and duration necessary. Animals often respond best to gentle restraint and react negatively when "over-restrained" (Griffin 2006). Research indicates that gentle human contact has the additional benefit of mitigating the adverse effects of unpleasant stimuli (McMillan 2002). Resistance to handling and restraint is almost always the result of fear or anxiety, which are compounded when force is used. Overly forceful handling is more likely to result in increased fear and aggressive behavior, and injury to animals and people (AVSAB 2007; Blackwell 2008; Hutchison 1977). Adequate training is key to limiting the use of unnecessary force during handling and must be provided to anyone who will be handling animals. Judicious use of tranquilizers can be the most humane option for handling a frightened, fractious, or feral animal. It is unacceptable to use physical force as punishment or to use force in anger (AVSAB 2007; Patronek 2001).

2. Location and Timing

Selection of a calm, private, quiet environment, and allowing time for animals to acclimate prior to handling can help minimize stress and may reduce the amount of restraint required (ASV position statement on euthanasia 2010). Handling methods

should prevent escape. Even when animals remain confined within a room, recapture is stressful. When the animal does not need urgent intervention, delaying a procedure to allow that animal time to relax in a quiet environment before handling is the best option (Fowler 1995; Griffin 2006, 2009a; Haug 2007).

3. Equipment

Each situation should be evaluated individually and each piece of equipment should be assessed for its potential to cause harm or increase stress. Even appropriate equipment may be inhumane or unsafe if not maintained in good working condition. Techniques or equipment suitable for one situation may be inappropriate for another. For example, although catch poles (also known as control or rabies poles) can be effective for handling large dogs, they should only be used when other more gentle alternatives cannot be used. The use of catch poles for routine restraint of cats, including carrying or lifting, is inhumane and poses significant risk of injury to the animal; therefore they must not be used for such purposes (Griffin 2006; HSUS 1996). Humane traps, purpose-designed boxes or nets should be used for handling fractious cats, or cats who appear unaccustomed to handling. Cages or crates that do not provide easy access for humanely removing an unwilling, frightened, or reluctant animal, either because of design constraints, damage to the cage or crate, or corrosion of the fasteners, should be avoided.

4. Feral Cats

Appropriate procedures for handling and minimizing stress in feral cats have been described (Griffin 2009b; Levy 2004; Slater 2001). For example, when capturing or transporting feral cats, squeeze cages, feral cat boxes, or humane box traps with dividers should be used for the most humane restraint and for administering tranquilizing injections prior to handling.

Adequate training is key to limiting the use of unnecessary force and must be provided to anyone who will be handling animals.

The use of catch poles for routine restraint of cats is inhumane and poses significant risk of injury to the animal.

Euthanasia

When performing euthanasia in a shelter, each individual animal must be treated with respect.

When performing euthanasia in a shelter, each individual animal must be treated with respect (AVMA 2007). A veterinarian with appropriate training and expertise for the species involved should be consulted to ensure that proper procedures are used. Any euthanasia method used in a shelter must quickly induce loss of consciousness followed by death, while ensuring the death is as free from pain, distress, anxiety, or apprehension as possible. The euthanasia method must be reliable, irreversible and compatible with the species, age and health status of the animal (AVMA 2007). Any agent or method that is unacceptable according to the AVMA Guidelines on Euthanasia is also unacceptable for use in shelters. The identity of each animal to be euthanized must be determined with certainty beforehand, including scanning multiple times for a microchip using a universal scanner (Lord 2008) and verifying that the animal is properly designated for the procedure. An assessment must be made of each animal's size, weight and temperament so the appropriate drug dose, needle and syringe size as well as restraint method can be used.

The identity of each animal to be euthanized must be determined with certainty beforehand.

Safety of the personnel and the emotional impact of euthanasia must be considered. Procedures should be in place to prevent and address compassion fatigue throughout the organization, as compassion fatigue and burnout can be serious problems for all shelter personnel, not just those performing the actual procedures.

1. Euthanasia Technique

The most humane methods used for euthanasia of shelter animals are intravenous (IV) or intraperitoneal (IP) injection of a sodium pentobarbital solution. Injection techniques, routes of administration, dosages and methods to verify death vary by age, size, weight, condition and species of animal, including birds and reptiles. When euthanizing dogs and cats in a shelter, IP injections of a pure sodium pentobarbital (free of additional drugs or additives) solution should be used only for cats, kittens, and small puppies. Animals given IP injections should be placed in quiet, dark, confined areas or held

and monitored to ensure a smooth transition into unconsciousness because excitement reactions and delayed unconsciousness are not uncommon with this route (Fakkema 2009; Rhoades 2002). In dogs and cats, oral dosing of sodium pentobarbital should be reserved for use in animals who cannot be safely approached, trapped or handled (Rhoades 2002). The time to reach unconsciousness may be prolonged with oral dosing; the drug is not always fatal when administered orally; and completion of euthanasia may require a subsequent injection of sodium pentobarbital (Rhoades 2002). Regardless of the route of administration, whenever progression to death is prolonged, an additional injection of sodium pentobarbital should be given. Sodium pentobarbital must not be injected by any non-vascular route (e.g., subcutaneously, intramuscularly, intrathoracic, intrapulmonary, intrahepatic, or intrarenal) other than the IP route discussed above, as these routes are associated with pain and distress. Intra-cardiac injections are unacceptable unless it has been reliably verified that the animal is unconscious, comatose or anesthetized (i.e., lack of deep pain/toe withdrawal reflex).

To avoid causing undue stress and anxiety, the least amount of physical restraint necessary to perform the procedures safely must be used. Pre-euthanasia drugs should be administered to animals who are aggressive, severely distressed or frightened. The most appropriate pre-euthanasia drugs are anesthetics: a common and cost-effective combination is a mixture of ketamine and xylazine (Fakkema 2009). Acepromazine is not recommended as a sole tranquilizer prior to euthanasia because it provides no analgesia and has unpredictable effects. Xylazine, when used alone, may induce vomiting which can be a welfare concern especially when muzzles are used. Veterinary guidance should be used for selection of pre-euthanasia drugs.

a) Carbon monoxide

The use of carbon monoxide as a method of euthanizing dogs and cats in shelters is unacceptable

Any agent or method that is unacceptable according to the AVMA Guidelines on Euthanasia is also unacceptable for use in shelters.

due to multiple humane, operational and safety concerns (ASV position statement on euthanasia, 2010; NACA 2010). As mentioned previously, an acceptable method of euthanasia must be quick and painless, and should not cause distress. Any gas that is inhaled must reach a certain concentration in the lungs before it can be effective (AVMA 2007). The high gas flow rates necessary to achieve the recommended concentration of 6% can result in noise levels that frighten animals. Placing multiple animals in a chamber may frighten and distress the animals and dilute the effective concentration of carbon monoxide that each animal receives, creating a haphazard euthanasia experience that can be prolonged, painful and ineffective.

Agents inducing convulsions prior to loss of consciousness are unacceptable for euthanasia (AVMA 2007). Carbon monoxide stimulates motor centers in the brain and loss of consciousness may be accompanied by convulsions and muscular spasms (AVMA 2007). One 1983 study of the effects of a 6% concentration of carbon monoxide on dogs could not establish the precise time that loss of consciousness occurred, and dogs were observed to be vocalizing and agitated (Chalifoux 1983). Carbon monoxide is extremely hazardous to human health because it is toxic, odorless and tasteless; it also has the potential to cause an explosion at high concentrations (AVMA 2007; NIOSH 2004). The death of at least one shelter worker using carbon monoxide has been documented (Rhoades 2002; Gilbert 2000; HSUS 2009b; NIOSH 2004). Chronic exposure to low levels of carbon monoxide can also cause serious human health problems (AVMA 2007).

Use of carbon monoxide cannot be justified as a means to save money, take shortcuts, or distance staff emotionally and physically from the euthanasia process. Studies have shown that carbon monoxide is actually more expensive than euthanasia by injection (Fakkema 2009; Rhoades 2002). It takes longer than euthanasia by injection and has not been shown to provide emotional benefits for staff. Some

shelter workers have reported being distressed by hearing animals vocalizing, scratching and howling in the chamber, and by having to repeat the process when animals survived the first procedure.

b) Verification of Death

Death must be verified by multiple methods by trained staff before any animal's body is disposed. This is true even if the animal is not euthanized but presumed to be dead when found. After the animal loses consciousness, the absence of the following should be confirmed: pupillary and corneal reflexes; toe withdrawal; pulse; respiration; and heartbeat. Because lack of a palpable pulse does not confirm that the heart has stopped, cardiac standstill must be confirmed with a stethoscope or visual verification. One method of visual verification is to insert a needle and syringe into the heart to observe for lack of cardiac movement. This method has the advantage of providing visual verification of cardiac standstill and access to the circulatory system should additional euthanasia solution need to be administered. Another certain method of verifying death is by the presence of rigor mortis. Failure to use multiple methods may result in a failure to recognize a coma-like state that animals may emerge from several hours after having been presumed dead.

2. Environment and Equipment

A separate room should be designated for euthanasia in a quiet area away from the main pattern of foot traffic to minimize distractions and interruptions. The room should have adequate lighting and be large enough to comfortably accommodate the equipment, two to three staff members, and the animal being euthanized. In order to prevent distractions and assure a smooth, dignified, and safe operation, only the people directly involved in euthanasia should be in the room when procedures are being performed.

It is important that the euthanasia room is properly equipped in order for a safe and humane procedure to take place. This equipment must include a table

Intra-cardiac injections are unacceptable unless it has been reliably verified that the animal is unconscious, comatose or anesthetized.

The use of carbon monoxide as a method of euthanizing dogs and cats in shelters is unacceptable due to multiple humane, operational, and safety concerns.

that can be readily disinfected, good light source, a universal microchip scanner, hair clippers, stethoscope, a variety of needles and syringes, tourniquets, muzzles, and restraint equipment. Scales for accurate weighing should also be available. A new needle should be used for each animal; multiple uses blunt the needle and cause pain (Rhoades 2002).

The euthanasia surface should be cleaned before every procedure. The euthanasia room and equipment should be cleaned and disinfected after every euthanasia period. Staff performing euthanasia should wear protective garments, which must be removed before going on to other animal care activities.

Animals should not be permitted to observe or hear the euthanasia of another animal, nor permitted to view the bodies of dead animals. Puppies and kittens with their mothers are an exception. When selected for euthanasia, mother animals should be euthanized prior to their offspring so that they will not be distressed at being separated from their litter, or by seeing the puppies or kittens dead. The puppies and kittens should be euthanized immediately following the mother (Sinclair 2004).

3. Record Keeping and Controlled Substances

A record log to document each animal's identification, amount of euthanasia solution and pre-euthanasia drugs received, dispensed and remaining as well as the identity of the person performing the procedure must be kept. All drug

records must be maintained in accordance with federal, state and local regulations, including Drug Enforcement Administration (DEA) regulations. All controlled (DEA Schedule) drugs must be kept secured in a manner consistent with state and federal regulation.

4. Staff Training

All staff participating in euthanasia must be provided with the proper training. Ideally, those who administer drugs should be certified and trained by a licensed veterinarian, a certified or licensed veterinary technician, or a certified euthanasia technician or trainer. Regulations stipulating who may provide training or supervise euthanasia vary from state to state and may vary regionally; shelters are required to act in accordance with state and federal regulations.

Euthanasia training in specific techniques must include the ability to access alternative injection sites, handle various species, assess behavior and temperament for proper animal handling and verify death by multiple methods. Training for field euthanasia should also be provided. The euthanasia technician and the assisting staff must be proficient in animal handling and restraint in order to avoid creating a stressful situation for the animals as well as the staff performing the procedures. Retraining and recertification should be provided periodically, with support services offered to staff to prevent or manage suffering from grief, compassion fatigue, depression or other physical and emotional reactions related to performing the procedures.

Spay and neutering

Animal shelters should require that cats and dogs who are adopted into homes be spayed or neutered (AVMA 2009; Looney 2008; Kustritz 2007). Consideration must be given to individual animal health or circumstances that would create the need for an exception. Surgical sterilization (spaying or neutering) prior to release to adopters, including kittens and puppies as young as 6 weeks old, remains the most reliable and effective means of preventing unwanted reproduction of cats and dogs and decreasing their birthrates (AVMA 2009a; AVMA 2009b; Looney 2008; Kustritz 2007). When prompt, pre-placement surgery is not available and other spaying or neutering programs (e.g., vouchers) are implemented, these programs should include an effective method of follow-up to confirm that the surgery has been completed. Allowing shelter animals to breed is unacceptable.

Spaying or neutering cats and dogs awaiting adoption for more than a few weeks is strongly recommended as the rapid decline in spraying, marking, and fighting and the elimination of heat behavior and pregnancy, which can be expected following spaying or neutering (Hart 1973, 1997; Johnston 1991), will reduce animal stress (Griffin 2009a).

1. Veterinary Medical Guidelines

Detailed guidelines for spaying or neutering programs have been published (Looney 2008). Spaying or neutering surgery must be performed by veterinarians or veterinary students under the direct supervision of a veterinarian in compliance with all legal requirements (AAHA 2008; AVMA 2008; Looney 2008). Medical records must be prepared for every patient indicating the surgical procedure and anesthesia administered. All controlled substances must be maintained in accordance with DEA requirements.

A veterinarian must make the final decision regarding acceptance of any patient for surgery based on physical examination and medical history

(if available) as well as the capacity of the surgery schedule (Looney 2008). Patients undergoing elective surgery should be in good health and free from signs of infectious or other disease. However, veterinarians must weigh the risks and benefits of spaying and neutering patients with mild infectious or non-infectious medical conditions in the context of the animal shelter, where future opportunities for that animal to receive care may not be available and the alternative outcome may be euthanasia. Although some conditions may increase the risk of complications, the benefits of neutering likely outweigh these risks in an animal shelter. Cats and dogs who are pregnant, in estrus, or have pyometra, as well as those with mild upper respiratory disease, can be safely spayed or neutered in most cases (Appel 2004; Looney 2008).

2. Surgery and Anesthesia

Appropriate housing must be provided for each animal before and after surgery (Looney 2008). Enclosures must be secure and provide a flat surface that is clean, dry and warm with adequate space for the animal to turn around, while allowing for safety at various stages of sedation and anesthesia and good visibility by the staff. Animals who are feral or difficult to handle should be housed in enclosures that allow for administration of anesthetics without extensive handling, and they should be returned to their enclosures when adequately recovered but prior to becoming alert (Griffin 2009c; Looney 2008). Ideally, dogs and cats should be housed in separate areas.

While surgery is being performed, the operating area must be dedicated to surgery and contain the necessary equipment for anesthesia and monitoring. Infectious disease control must be practiced to prevent transmission among patients (Looney 2008). Aseptic surgical technique is required and separate sterile instruments must be used for each patient. Balanced anesthetic protocols that include sedation, the provision of pre and post-operative analgesia, stress reduction, muscle relaxation and controlled, reversible loss of consciousness,

Animal shelters should require that cats and dogs who are adopted into homes be spayed or neutered.

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Allowing shelter animals to breed is unacceptable.

are required (AAHA/AAFP 2007; ACVA 2009; Looney 2008). Patients must be monitored by trained personnel (ACVA 2009; Looney 2008). In addition, plans must be in place to handle any emergency that might occur.

In the postoperative period, care must be taken to provide patients with a smooth transition from the anesthetized state (Griffin 2009c; Looney 2008). Patients must be evaluated immediately prior to release and clear instructions (written and verbal) for postoperative care must be provided. Finally, policies for managing complications and emergencies that

occur within the 48-hour period after surgery must be in place (Griffin 2009c; Looney 2008).

3. Identifying Neutered Animals

The use of a permanent tattoo is strongly recommended to mark cats and dogs at the time of spaying or neutering surgery (Griffin 2009c; Looney 2008). Removal of the tip of one of the ears (or pinna) is the accepted global standard for marking or identifying a neutered free-roaming or feral cat (Griffin 2001; Looney 2008). A certificate of spaying or neutering, or other appropriate documentation, should be provided for each animal.

Animal Transport

Animal shelters may be involved in transport of animals locally, regionally or internationally. The term “animal transport” is typically used to apply to programs in which animals are transferred over some distance from one organization or individual to another. However, the recommendations in this section should apply regardless of the purpose, distances or parties involved, as careful management and planning are always required to ensure animals’ comfort and safety and minimize risk of disease transmission.

For many animals, animal transport is a life saving measure, but it also poses risks. Animal transport programs have the potential to spread infectious diseases along animal transport corridors and to new destinations. The stress of transport may increase susceptibility to infection or increase viral shedding. Risk of exposure to infectious disease is increased when animals who originate from multiple sources are transported in the same vehicle. In addition to affecting the individual animals transported, transportation programs may impact other animals at the source and receiving shelters in both positive and negative ways. Therefore, risks and benefits for all animals affected by a transport program must be carefully weighed. Reasonable care and precautions help minimize the risk, and well planned transport programs can be very successful.

These standards are not intended to apply to disaster situations in which sudden large-scale evacuations are necessary. Exceptions may be necessary for transport in emergency situations, where short-term compromises may have to be made; however, pre-planning for potential disasters is recommended to minimize deviation from accepted transport practices. Compromises should not be made when there is ample opportunity to plan.

1. Responsibilities of Participating Individuals and Organization

a) General

Clear, direct, communication is essential among those involved in any transport program. A written record of all involved parties, including responsibilities for each, should be kept in sufficient detail to allow a trace back to the animal’s origins. A contact person must be identified at each transfer point. Ideally, written guidelines that all parties can agree to should be developed (HSUS 2003; PetSmart 2006). Guidelines should address medical and behavioral selection criteria, as well as transportation and destination requirements. For interstate transport, current rabies vaccination is an import requirement for dogs in all states in the United States. The majority of states also require rabies vaccination for cats. A valid Certificate of Veterinary Inspection (e.g., health certificate) is also required by most states. It is recommended that transporters become familiar with the import requirements for all destinations, which, for states in the United States, are usually regulated by the state Departments of Agriculture and/or Health. Although airline requirements are not legal requirements many airlines have specific requirements for animal passengers.

b) Responsibilities at Point of Origin

The shelter where the animals originate should ideally have a comprehensive preventive healthcare program. Animals destined for transport must be vaccinated prior to or upon intake at the organization of origin and should be treated for internal and external parasites. In addition to any examinations required by state or federal transportation regulations, all animals being transported must be examined within 24 hours of transport for any problems. Animals’ health and behavior, as known at the source shelter, must be accurately described and communicated.

Risks and benefits for all animals affected by a transport program must be carefully weighed.

Clear, direct, communication is essential among those involved in any transport program.

Clearly written health records that describe health status and identify animals (health certificate, rabies certificate and copy of shelter record) must accompany each animal. Animals should be identified by a collar, tag, tattoo, microchip, or any combination of these methods so that their information can be matched upon arrival. In order to minimize the risk of infectious disease and optimize welfare, animals should be in good health at the time of transport. However, transportation of animals with illness can be justified when life-saving resources, such as medical care and placement opportunities, are available at the destination and when measures can be taken during transport to provide for their comfort, health, and safety.

c) Responsibilities During Transport

Primary Enclosure and Occupancy

The Live Animal Regulations (LAR) issued and maintained by the International Air Transport Association (IATA) and the Animal Welfare Act do not directly apply to surface transport of shelter animals but they are excellent references for animal transportation. Many of the recommendations below are derived from these regulations.

During transport, animals must have adequate space, comfortable environmental conditions, and good air quality. Additionally, drivers should be careful to avoid subjecting animals to sudden acceleration and deceleration stresses, or excessive lateral movement (cornering), noise or vibration.

Primary enclosures must be large enough for animals to stand and sit erect, to turn around normally while standing, and to lie in a natural position. Unfamiliar animals must not be transported together in the same primary enclosure. If more than one animal is in the primary enclosure, there must be enough space for each occupant to lie down comfortably at the same time without needing to lie on top of each other. The enclosure must be sturdy and permit adequate ventilation. There should be no sharp edges. Flooring must prevent injury, discomfort, and leakage of fluids into other enclosures. Absorbent

bedding should be provided. Animals must be safely and securely confined within the enclosure. Doors on primary enclosures must be secured to prevent accidental opening. Primary enclosures must be secured to prevent movement within the vehicle during transport.

Due to increased vulnerability, extra care must be provided when transporting puppies and kittens including: prevention of exposure to temperature extremes; maintenance of adequate hydration and nutrition; and protection from infectious disease exposure during the transport process. Unless orphaned, kittens or puppies less than 8 weeks old should be transported with the mother in a space large enough for her to lie down on her side with legs extended for comfort and to facilitate nursing. Transporting animals under 8 weeks old across state lines is prohibited by some state laws.

Animals should not be sedated unless recommended by a veterinarian because this can make them more vulnerable to hypothermia, dehydration, and injury. If animals are sedated, veterinary guidance must be provided for their care.

Vehicles

Vehicles must, at minimum, adhere to all federal or local statutes, recognizing that these regulations may not be sufficient to ensure animal safety and welfare. Crates and cages must not be stacked upon each other in a manner that increases animal stress and discomfort, compromises ventilation, allows waste material to fall from the cage above into the cage below, interferes with care and observation, or hinders emergency removal.

Each primary enclosure must be positioned in the animal cargo space in a manner that provides protection from the weather and extremes of temperature. As in stationary facilities, the ambient temperature should be kept above 60°F (15.5°C), and below 80°F (26.6°C) (AVMA 2008a). A thermometer should be placed in the animal area of the vehicle at the level of the animals (NFHS 2010).

Animals in transport must be observed periodically and allowed to rest, exercise, and urinate and defecate at least every 4–6 hours.

Fresh air free of vehicle exhaust fumes must also be ensured (CDA 2009). The vehicle, including the cargo space, should be heated and cooled when necessary to provide for normal thermoregulation (CDA 2009). Placing unconfined or tethered animals in the back of an open pickup truck for transport is unacceptable and illegal in many jurisdictions. Particular attention must be paid to provision of shade, as a vehicle parked in full sun, even in comfortable temperatures, can rapidly exceed safe temperature levels.

Transporter Responsibilities

The vehicle driver or animal attendant must have sufficient training in animal health, welfare and safety issues to recognize and respond to animal needs during transport. Although no federal regulations exist to limit the distance of travel for companion animals, risk to animal health and welfare increase with the length of the journey. For example, the Federal 28 Hour Law requires that, for every 28 hours of interstate travel, all livestock be provided at least 5 hours of rest during which they must be off-loaded and given food and water (US Code Title 49 Chapter 805).

All dogs and cats must be observed and allowed to rest every 4–6 hours (NFHS 2010). In addition, adult dogs must be allowed to exercise and eliminate every 4–6 hours. The AWA requires the driver or animal attendant to observe dogs and cats as often as circumstances allow, but not less than once every 4 hours (USDA/APHIS Section 3.90 Care in transit). Maximum transport time to an intermediate or final destination shelter should be no more than 12 hours (NFHS 2010). Animals should

not be left unattended when it may be detrimental to their health and safety.

Food must be provided at least every 24 hours for adults and more frequently for animals under 6 months old. Caregivers are charged with providing for the individual nutritional needs of the animals. Because of increased physical stresses, requirements for food and water may be increased during transport, compared to normal nutritional needs. If water is not available at all times it must be provided at frequent (at least every 4 hours) observation stops.

Animal enclosures must be cleaned and any litter replaced as often as necessary to prevent soiling of the animals (e.g., vomit, urine or feces). If it becomes necessary to remove the animals in order to clean, safeguards must be in place to ensure animal safety and prevent escape.

d) Responsibilities at Destination

Points of destination must have enough trained personnel ready to receive and evaluate animals upon arrival at the destination facility. Each animal should receive a documented physical examination at the time of arrival. Veterinary care should be available on arrival for any animal requiring care. The facility must have adequate housing prepared for the arriving animals. The need for isolation or quarantine of arriving animals should be determined based on legal requirements, their health status, source, and infectious disease risk, with due attention to incubation periods for pathogens of concern and detrimental effects of increasing length of stay in the shelter.

Placing unconfined or tethered animals in the back of an open pickup truck for transport is unacceptable and is also illegal in many jurisdictions.

Public Health

It is essential that animal shelters take necessary precautions to protect the health and safety of animals, people and the environment in the shelter as well as in the community. An organization's mission should never be achieved at the expense of public health and safety.

Animal shelters must maintain compliance with federal and state occupational and safety regulations regarding chemical, biological, and physical hazards in the workplace. Organizations such as Centers for Disease Control (CDC), National Institute of Occupational Safety and Health (NIOSH) and Occupational Safety and Health Administration (OSHA) produce guidance documents for developing a health and safety program (OSHA Fact Sheet "Job Safety and Health"), and for hazard specific issues that may be relevant to shelters such as chemical safety (OSHA Assistance for Cleaning Industry), waste anesthetic gas exposure (OSHA Safety and Health Topics), sharps disposal (needles, scalpels, and other sharp objects) (CDC "Workbook for... Sharps Safety"), latex allergy prevention (NIOSH Publication No. 98-113, NIOSH Publication No. 97-135), asthma prevention in animal handlers (NIOSH Publication No. 97-116), and noise exposure (OSHA Occupational noise exposure; NIOSH Publication No. 96-110).

Exposure to excessive noise (e.g., barking, slamming cage doors, compressors or other equipment) may lead to irreversible hearing loss; this risk is often under-recognized. Sound levels in some animal shelters regularly exceed 100 db (Sales 1997), creating a health and welfare issue for both the animals and the employees (NIOSH Report No. 2006-0212-3035; NIOSH Report No. 2007-0068-3042). Noise abatement materials should be utilized in animal holding areas, and hearing protection must be provided for employees working in loud environments. (See section on Facilities for information on controlling noise levels.)

Personal protective equipment (PPE), such as gloves, smocks, goggles, masks, etc. must be provided by the employer in order to protect employees from exposure to chemical and biological agents (OSHA Personal protective equipment). PPE must be available in sizes to accommodate all staff, including those with special concerns such as latex allergies. Selection of appropriate PPE will be site- and task-specific (CDC Guidance for the Selection and Use of Personal Protective Equipment (PPE) in Healthcare Settings 2004); therefore a hazard analysis is recommended as part of a health and safety program. Employees and volunteers should wear gloves and change them frequently while cleaning and disinfecting, especially when removing animal waste. Eye protection should be worn when working with cleaning or disinfection agents (NIOSH Report No. 2007-0068-3042).

Frequent hand-washing should be strongly encouraged, especially after handling animals and after removing PPE. Hands should also be washed before eating, smoking or touching eyes or mucus membranes (e.g., applying contact lenses). Ideally, hand-washing stations or sinks should be easily accessible to all visitors, staff and volunteers because hand-washing is the best way to protect people and animals in the shelter from possible disease transmission (CDC 2010).

Smoking should not be allowed in animal shelters because of the risk of fire and documented health hazards to humans and animals associated with second-hand smoke (Rief 1998; Roza 2007).

1. Zoonoses

Zoonotic diseases are defined as those that can be transmitted from animals to people. All people are at risk of infection by zoonotic agents, but those who are immune-compromised are at increased risk. Many people may not be aware of their compromised immune status. Immunity may be weakened due to age, disease, pregnancy, or medical treatment.

Noise abatement materials should be utilized in animal holding areas, and hearing protection must be provided for employees working in loud environments.

The infectious disease surveillance and control recommendations to prevent animal-to-animal transmission discussed in the section on Medical Health and Physical Well-being will also aid in the prevention of disease transmission to humans. Reliable information on specific zoonotic diseases can be found on several websites (CDC 2009; ISU Center for Food Security and Public Health Zoonoses Resources 2010; Seattle and King County Zoonotic Disease Program 2010). Shelters should provide periodic staff and volunteer training and information on the recognition of potentially zoonotic conditions and the means of protecting others from exposure. Training should also identify to whom concerns should be reported and how to respond when zoonotic disease is suspected or confirmed. Ideally, the written infection control plan for the shelter should address zoonotic concerns and be available to all staff and volunteers: a model plan for veterinary hospitals has been published (NASPHV 2008a). Reporting to state human or animal health authorities is required for some diseases (e.g., rabies, anthrax, tularemia, and brucellosis). It is each shelter's responsibility to know which animal diseases are reportable. A list can be obtained from the state veterinarian; information on animal diseases of interest to public health can be obtained from the state public health veterinarian or state epidemiologist.

The public should not have unsupervised access to areas where animals are isolated for zoonotic conditions; staff access to those areas should be limited. Enclosures of animals with suspected zoonotic disease must be clearly marked to indicate the condition and any necessary precautions. Shelters should institute good preventive medicine protocols such as prophylactic deworming and external parasite control to decrease the potential for exposure to zoonotic pathogens (CAPC 2008). Food and drink should not be consumed in areas where animals are housed, and use of items the public may bring in, such as spill-proof cups, pacifiers, teething toys, and baby bottles should be discouraged in these areas (NASPHV 2009).

To further reduce the risk of zoonotic disease transmission, animals should not be allowed in areas where food is prepared or consumed (NASPHV 2009).

Information about zoonotic diseases should be made available to visitors, adopters and foster-care providers. As a person's immune status is privileged medical information the question should not be asked; signage and literature can be used to communicate the increased risk of zoonotic disease for persons who are immune-compromised. Literature should suggest that immune-compromised adopters discuss pet selection with healthcare professionals before adoption. If inquiries are made, shelter staff should refer people to published guidelines or their healthcare provider (CDC 2009; PAWS 2006).

2. Animal-Related Injuries

Each year millions of people are bitten, scratched or otherwise injured by companion animals. While estimates vary widely, researchers agree that bite occurrences are underreported and animal bites represent a significant threat to public health (Patronek 2009). Fewer bites are reported from cats than from dogs; however, a much higher percentage of cat bites become infected compared to dog bites (Garcia 1997). Bite and scratch infections can become quite severe, even if tissue trauma appears minimal, and may even be fatal. It is impossible to predict which injuries will lead to serious infection. Therefore, all persons injured by an animal should seek medical advice.

Rabies is a fatal disease that is present in all of the states except Hawaii, and is prevalent in many parts of the world. Shelter staff must be able to identify potential rabies exposures and understand the regulations that apply to reporting and managing bites to humans and animals. To identify possible rabies exposures, all persons presenting an animal must be asked if the animal has bitten anyone within the last 10 days or had any recent contact with wildlife. All incoming animals should be examined for bite wounds; animals who have potentially

Housing that requires dogs to be removed by use of a control pole or cats to be removed using nets or tongs for daily cleaning and care is unacceptable; alternative housing must be provided for those animals.

been exposed to rabies should be managed in accordance with the NASPHV Rabies Compendium and in consultation with state and local health authorities (NASPHV 2008b).

Due to a higher risk of exposure, persons who routinely work with companion animals or wildlife should receive pre-exposure vaccinations against rabies in accordance with recommendations of the Advisory Committee on Immunization Practices (CDC 2008). To help control animal rabies in the community, animal shelters should vaccinate for rabies prior to adoption whenever possible or require that adopted animals receive vaccinations against rabies after adoption (NASPHV 2008b).

In order to prevent bites and other animal-associated injuries, all staff and volunteers should have proper training in basic animal handling skills, including the recognition of potentially dangerous behaviors. Clear policies must be developed and enforced regarding the management of animals with behavioral concerns. The cages of animals known to be aggressive or potentially dangerous must be clearly marked to advise caution. These animals should be housed such that staff members can safely provide care without removing the animal from the primary enclosure (e.g., double-sided guillotine-separated runs, feral cat boxes). Housing that requires dogs to be removed by use of a control pole or cats to be removed using nets or tongs for daily cleaning and care is unacceptable; alternative housing (e.g., double-sided cages or feral cat boxes) must be provided for those animals. The public should be prevented from having contact with potentially dangerous animals. Access to areas where potentially dangerous animals are held should be restricted; a staff member should accompany visitors when access is necessary.

Animals believed to be dangerous should not be re-homed. A thorough investigation of individual circumstances must be undertaken before consideration is given to re-homing an animal with a history of biting or threatening behavior. Those

with questionable behavior should be thoroughly assessed by persons with training and experience in animal behavior. All behavioral concerns should be documented and discussed with potential owners before adoption; recommendations for management should also be provided.

3. Emerging Diseases and Anti-microbial Resistance

Emerging and re-emerging diseases (e.g., canine influenza virus and virulent systemic feline calicivirus) have been recognized in shelters (Crawford 2005; Hurley 2004c; Schorr-Evans 2003). Since nearly 75% of emerging infectious diseases that affect humans are of animal origin (Taylor 2001), animal shelters should monitor for signs of unusual or severe disease. Early detection can play an important role in minimizing the impact of an emerging disease on both animal and human health. Caring for multiple species, housing animals from various locations, and frequent introduction of new individuals within a population can create a favorable environment for the mutation and spread of pathogens (Pesavento 2007). Separation of species, proper population management, and proper sanitation should be employed to reduce the risk of development of novel pathogens.

The development and spread of antimicrobial resistance is a serious concern in animal shelters. Bacteria are capable of developing resistance to certain drugs. In some cases, this resistance can be passed on to other bacteria, including those that cause infections in both animals and people. One outbreak of multidrug-resistant *Salmonella* in a shelter caused 49 confirmed human illnesses, including 10 hospitalizations (Hurley 2004b); outbreak response included closing the facility for a period of time. It should also be noted that methicillin-resistant *Staphylococcus aureus* (MRSA), while primarily a human pathogen, can contaminate public environments and infect multiple animal species, including cats and dogs (Baptiste 2005; Weese 2005a, 2005b). Routine use of antibiotics to prevent infection in healthy animals is unacceptable

A thorough investigation of individual circumstances must be undertaken before consideration is given to re-homing an animal with a history of biting or threatening behavior.

and must never be used as a substitute for good animal health management (AAFP/AAHA 2006). (See section on Medical Health and Physical

Well-being for more information on medical treatment.)

Routine use of antibiotics to prevent infection in healthy animals is unacceptable and must never be used as a substitute for good animal health management.

Conclusion

The authors hope that shelters and communities will look to this document to ensure that all animals in shelters everywhere are properly and humanely cared for, regardless of the shelter's mission or circumstance. The *Guidelines for Standards of Care in Animal Shelters* are intended as a positive tool for shelters and communities to review animal care,

identify areas that need improvement, allocate resources and implement solutions so welfare is optimized, euthanasia is minimized, and suffering is prevented. The ASV will review feedback to these recommendations and revise this document periodically as additional information becomes available.

References

(All internet sites were accessed October 22, 2010)

American Animal Hospital Association (AAHA). *AAHA canine vaccine guidelines*, revised 2006. Available at: <http://www.aahanet.org/PublicDocuments/VaccineGuidelines06Revised.pdf>

American Animal Hospital Association (AAHA). *AAHA Standards of Accreditation*, 2008. Available at: <https://secure.aahanet.org/eweb/startpage.aspx?site=accredaaha>

American Animal Hospital Association (AAHA), American Association of Feline Practitioners (AAFP). Pain management guidelines for dogs and cats. *J Am Anim Hosp Assoc* 2007; 43:235–48.

American Association of Equine Practitioners (AAEP). *AAEP care guidelines for equine rescue and retirement facilities*, 2004. Available at: http://www.aep.org/pdfs/rescue_retirement_guidelines.pdf

American Association of Feline Practitioners (AAFP). The American Association of Feline Practitioners Feline Vaccine Panel Advisory Report. *J Am Vet Med Assoc* 2009;229:1406–41. Available at: http://www.catvets.com/uploads/PDF/2006_Vaccination_Guidelines_JAVMA.pdf

American Association of Feline Practitioners (AAFP) and American Animal Hospital Association (AAHA). *Basic guidelines of judicious therapeutic use of antimicrobials*, 2006. Available at: http://www.aahanet.org/PublicDocuments/AAFP_AAHA_AntimicrobialGuidelines.pdf

American College of Veterinary Anesthesiologists (ACVA). *American College of Veterinary Anesthesiologists' position statement on the treatment of pain in animals*, 2006. Available at: http://www.acva.org/docs/Pain_Treatment

American College of Veterinary Anesthesiologists (ACVA). *American College of Veterinary Anesthesiologists' monitoring guidelines update*, 2009. Available at: <http://www.acva.org/professional/Position/pstn.asp>

American Humane Association (AHA). *Guide to humane dog training*, 2001. American Humane Association: Denver, CO.

American Kennel Club (AKC). *American Kennel Club position statement on deficiencies in the care and condition of dogs*, 2006. Available at: <http://www.akc.org/rules/policymanual.cfm?page=7#Deficiencies>

American Kennel Club (AKC). *American Kennel Club position statement on proper care*, 2008. Available at: http://www.akc.org/pdfs/canine_legislation/PBLEG2.pdf

American Sanctuary Association (ASA). *Sanctuary criteria*, 2009. Available at: http://www.asaanimalsanctuaries.org/sanctuary_criteria.htm

American Society for the Prevention of Cruelty to Animals (ASPCA). *Shelter regulations (Alabama to Mississippi)*, 2006a. Available at http://www.aspcapro.org/mydocuments/download.php?f=guide_to_shelter_regulations_2006_al_ms.pdf

American Society for the Prevention of Cruelty to Animals (ASPCA). *Shelter regulations (Missouri to Wyoming)*, 2006b. Available at http://www.aspcapro.org/mydocuments/download.php?f=guide_to_shelter_regulations_2006_mo_wy.pdf

American Society for the Prevention of Cruelty to Animals (ASPCA). *Resources and related links. State shelter regulations*, 2009. Available at: <http://www.aspcapro.org/shelter-management-resources-and-related-links.php>

American Veterinary Medical Association (AVMA). Task Force on Canine Aggression and Human–Canine Interactions. A community approach to dog bite prevention. *J Am Vet Med Assoc* 2001; 218:1732–50.

American Veterinary Medical Association (AVMA). *AVMA companion animal care guidelines*, 2008a. Available at: http://www.avma.org/issues/policy/companion_animal_care.asp

American Veterinary Medical Association (AVMA). *AVMA Policy: Judicious therapeutic use of antimicrobials*, updated 2008b. Available at: <http://www.avma.org/issues/policy/jtua.asp>

American Veterinary Medical Association (AVMA). *Model veterinary practice act*, 2008c. Available at: <http://www.avma.org/issues/policy/mvpa.asp>

American Veterinary Medical Association (AVMA). *AVMA Animal Welfare Principles*, 2006. Available at: http://www.avma.org/issues/policy/animal_welfare/principles.asp

American Veterinary Medical Association (AVMA). *AVMA Guidelines on Euthanasia*, 2007. Available at: <http://www.avma.org/resources/euthanasia.pdf>

American Veterinary Medical Association (AVMA). *AVMA policy statement on dog and cat population control*, 2009a. Available at: http://www.avma.org/issues/policy/animal_welfare/population_control.asp

American Veterinary Medical Association (AVMA). *AVMA policy statement on early-age (prepubertal) spay/neuter of dogs and cats*, 2009b. http://www.avma.org/issues/policy/animal_welfare/spay_neuter.asp

American Veterinary Society of Animal Behavior (AVSAB). *Position statement: The use of punishment for behavior modification in animals*, 2007. Available at http://www.avsonline.org/avsonline/images/stories/Position_Statements/Combined_Punishment_Statements.pdf

Animal Legal Defense Fund (ALDF). *Free at Last! ALDF Helps Shut Down Nightmare "Shelter"*. Available at: <http://www.aldf.org/article.php?id=571>

- Animal Rescue Association (ARA). *Animal rescue association code of ethics*. Available at: http://www.anraa.org/downloads/COE_v4.2.pdf
- Animal Rescue League of Boston, Center for Shelter Dogs. *MATCHUP II behavior evaluation*. 2010. Available at: www.centerforshelterdogs.org
- Animal and Plant Health Inspection Service (APHIS). Final Rule: Humane Treatment of Dogs; Tethering. *Federal Register* 1997a;62:43272–5.
- Animal and Plant Health Inspection Service (APHIS). *Painful procedures. Policy 11*. 1997b. Available at: http://www.aphis.usda.gov/animal_welfare/downloads/policy/policy11.pdf
- Appel L. Chapter 22: Spay Neuter. In: Miller L, Zawistowski S (eds). *Shelter Medicine for Veterinarians and Staff*. Ames, IA: Blackwell Publishing, 2004
- Appel M, Gillespie JH. *Canine Distemper Virus*. New York, Vienna: Springer-Verlag, 1972.
- Association of Pet Dog Trainers (APDT). *Code of professional conduct and responsibility*, 2003. Available at: <http://www.apdt.com/about/mission.aspx>
- Association of Shelter Veterinarians (ASV). *Board position statement on euthanasia*. Available at: <http://www.sheltervet.org/displaycommon.cfm?an=14>
- Association of Shelter Veterinarians (ASV). *Board position statement on infectious disease outbreak management*. Available at: <http://www.sheltervet.org/displaycommon.cfm?an=14>
- Association of Shelter Veterinarians (ASV). *Board position statement on veterinary supervision in animal shelters*. Available at: <http://www.sheltervet.org/displaycommon.cfm?an=14>
- Association of Zoos and Aquariums (AZA). *Animal Husbandry and Welfare*, 2009. Available at: <http://www.aza.org/animal-husbandry-and-welfare/>
- Association of Zoos and Aquariums (AZA). *The accreditation standards and related policies*, 2010. Available at: <http://www.aza.org/uploadedFiles/Accreditation/Microsoft%20Word%20-%202010%20Accred%20Standards.pdf>
- Baptiste KE, Williams K, Williams NJ, et al. Methicillin-resistant staphylococci in companion animals. *Emerg Infect Dis* 2005; 11:1942–4. Available at <http://www.cdc.gov/ncidod/EID/vol11no12/05-0241.htm>
- Bayne K. Developing guidelines on the care and use of animals. *Ann NY Acad Sci* 1998; 862:105–10.
- Beerda B, Schilder MBH, Bernadina W, et al. Chronic stress in dogs subjected to social and spatial restriction. I: Behavioural responses. *Physiol Behav* 1999a;66:233–42.
- Beerda B, Schilder MBH, Bernadina W, et al. Chronic stress in dogs subjected to social and spatial restriction. II: Hormonal and immunological responses. *Physiol Behav* 1999b;66:243–54.
- Beerda B, Schilder MBH, Van Hoof JA, et al. Manifestations of acute and chronic stress in dogs. *Appl Anim Behav Sci* 1997;52:307–19.
- Blackwell EJ, Twells C, Seawright A, et al. The relationship between training methods and the occurrence of behavior problems, as reported by owners, in a population of domestic dogs. *J Vet Behav* 2008; 3:207–17.
- Blum D. *The Monkey Wars*. New York: Oxford University Press, 1994.
- Bollen KS, Horowitz J. Behavioral evaluation and demographic information in the assessment of aggressiveness in shelter dogs. *Appl Anim Behav Sci* 2008; 112:120–35.
- Bourgeois H, Elliot D, Marniquet P, et al. *Dietary Preferences of Dogs and Cats*. Focus Special Edition Royal Canin Paris: Aniwa Publishing, 2004.
- Bowman D. Internal parasites. In: Miller L, Hurley K (eds). *Infectious Disease Management in Animal Shelters*. Ames: Wiley-Blackwell Publishing, 2009; pp 209–222.
- Boyce JM, Pittel D. *Guidelines for Hand Hygiene in Health-Care Settings*. MMWR 2002; 51:1–44. Available at: www.cdc.gov/mmwr/preview/mmwrhtml/rr5116a1.htm.
- Brent L. Life-long well being: Applying animal welfare science to nonhuman primates in sanctuaries. *Appl Anim Behav Sci* 2007;10:55–61.
- Canadian Council on Animal Care (CCAC). VI. *Social and behavioral requirements of experimental animals*, 1993. Available at: http://www.ccac.ca/en/CCAC_Programs/Guidelines_Policies/GUIDES/ENGLISH/V1_93/CHAP/CHVI.HTM
- Canadian Veterinary Medical Association (CVMA). *Humane training methods for dogs*, 2004. Available at: <http://canadianveterinarians.net/ShowText.aspx?ResourceID=1506>
- Canadian Veterinary Medical Association (CVMA). *Raw food diets for pets – Canadian Veterinary Medical Association and Public Health Agency of Canada joint position statement*, 2006. Available at: <http://canadianveterinarians.net/ShowText.aspx?ResourceID=554>
- Canadian Veterinary Medical Association (CVMA). *A code of practice for Canadian kennel operations*, 2007. Available at: [http://canadianveterinarians.net/documents/resources/files/93_kennel%20code%20\(entire\)%20july%202007.pdf](http://canadianveterinarians.net/documents/resources/files/93_kennel%20code%20(entire)%20july%202007.pdf)

- Canadian Veterinary Medical Association (CVMA). *A code of practice for Canadian cattery operations*, 2009. Available at: https://canadianveterinarians.net/Documents/Resources/Files/1316_CatteryCodeEnglishFINAL%20June8'09.pdf
- Carlstead K, Brown JL, *et al.* Behavioral and physiologic correlates of stress in laboratory cats. *Appl Anim Behav Sci* 1993; 38:143–58.
- Cat Fanciers Association (CFA). *Cattery standard minimum requirements*, 2009. Available at: www.cfainc.org/articles/cattery-standard.html
- Centers for Disease Control (CDC). *CDC Guidance for the selection and use of personal protective equipment (PPE) in healthcare settings*, 2004. Available at: <http://www.cdc.gov/ncidod/dhqp/pdf/ppe/PPEslides6-29-04.pdf>
- Centers for Disease Control (CDC). *Workbook for designing, implementing, and evaluating a sharps injury prevention program*, revised 2008. Available at: <http://www.cdc.gov/Sharpsafety/>
- Centers for Disease Control (CDC). *Healthy pets, healthy people*, 2009. Available at: http://www.cdc.gov/HEALTHYPETS/browse_by_diseases.htm
- Centers for Disease Control (CDC). *Wash your hands*, 2010. Available at: <http://www.cdc.gov/Features/HandWashing/>
- Chalifoux A, Dallaire A. Physiologic and behavioral evaluation of CO euthanasia of adult dogs. *Am J Vet Res* 1983;44:2412–7.
- Cherry B, Burns A, Johnson GS, *et al.* Salmonella typhimurium Outbreak Associated with a Veterinary Clinic. *Emerg Infect Dis* 2004;10:2249–51.
- Christensen E, Scarlett J, Campagna M, *et al.* Aggressive behavior in adopted dogs that passed a temperament test. *Appl Anim Behav Sci* 2007; 106:85–95.
- Colorado Department of Agriculture (CDA). *Pet animal care facilities program*, 2009. Available at: [http://www.colorado.gov/cs/Satellite/Agriculture/Main/CDAG/1167928257214](http://www.colorado.gov/cs/Satellite/Agriculture>Main/CDAG/1167928257214)
- Companion Animal Parasite Council (CAPC). *General guidelines: controlling internal and external parasites in U.S. dogs and cats*, 2008. Available at: <http://www.capcvet.org/recommendations/guidelines.html#>
- Coppola CL, Enns RM, Grandin T. Noise in the animal shelter environment: building design and the effects of daily noise exposure. *J Appl Anim Welf Sci* 1997; 9:1–7.
- Coppola C, Grandin T, Enns M. Human interaction and cortisol: Can human contact reduce stress for shelter dogs? *Physiol Behav* 2006; 87:537–41.
- Crawford PC, Dubovi EJ, Castleman WL, *et al.* Transmission of equine influenza virus to dogs. *Science* 2005; 310:482–5.
- Crouse MS, Atwill ER, Laguna M, *et al.* Soft Surfaces: A factor in feline psychological well-being. *Contemp Top Lab Anim Sci* 1995;34:94–7.
- Crowell-Davis SL. Aggressive dogs: Assessment and treatment considerations. *Compend Contin Educ Vet* 2008;80:274–80.
- Crowell-Davis SL, Barry K, Wolfe R. Social behavior and aggressive problems of cats. *Vet Clin NA Small Anim Pract* 1997; 27:549–68.
- Crowell-Davis SL. Social organization in the cat: a modern understanding. *J Feline Med Surg* 2004;6:19–28.
- Curtis CF. Current trends in the treatment of Sarcoptes, Cheyletiella and Otodectes mite infestations in dogs and cats. *Vet Dermatol* 2004;5:108–14.
- De Monte M, Le Pape G. Behavioral effects of cage enrichment in single caged adult cats. *Anim Welf* 1997;6:53–66.
- Delta Society. *Professional Standards for Dog Trainers*. Renton, WA: Delta Society, 2001.
- Dinnage J, Scarlett JM, Richards JR. Descriptive epidemiology of feline upper respiratory tract disease in an animal shelter. *J Feline Med Surg* 2009; 11:816–25.
- Donham KJ, Cumro D, Reynolds S. Synergistic effects of dust and ammonia on the occupational health of poultry production workers. *J Agromed* 2002;8:57–76.
- Dowling JM. All together now: Group-housing cats. *Animal Sheltering* 2003; Mar–April 13:13–26.
- Dudding H. *Sheriff's deputies raid City of Memphis animal shelter*. The Commercial Appeal. Oct 27, 2009. Available at: <http://www.commercialappeal.com/news/2009/oct/27/sheriffs-deputies-raid-city-memphis-animal-shelter/>
- Dvorak G, Petersen C. Sanitation and Disinfection. *Infectious Disease Management in Animal Shelters*. L. Miller and K. F. Hurley. Ames, IA: Wiley-Blackwell, 2009; pp 49–60.
- Dybdal K, Strasser R, Katz T. Behavioral differences between owner surrender and stray domestic cats after entering an animal shelter. *Appl Anim Behav Sci* 2007;104:85–94.
- Edinboro CH, Ward MP, Glickman LT. A placebo-controlled trial of two intranasal vaccines to prevent tracheobronchitis (kennel cough) in dogs entering a humane shelter. *Prev Vet Med* 2004;62:89–99.
- Eleraky NZ, Potgeiter IND, Kennedy M. Virucidal efficacy of four new disinfectants. *J Am Anim Hosp Assoc* 2002;38:231–4.

- Ellis SLH, Wells DL. The influence of visual stimulation on the behavior of cats housed in a rescue shelter. *Appl Anim Behav Sci* 2008;113:166–74.
- Eterpi M, McDonnell G, Thomas V. Disinfection efficacy against parvoviruses compared with reference viruses. *J Hosp Infect* 2009; 73:64–70.
- European Council. *European convention for the protection of vertebrate animals used for experimental and other scientific purposes*, 1986. Available at: <http://conventions.coe.int/Treaty/en/Treaties/Html/123.htm>
- Fakkema D. *Euthanasia By Injection Training Guide*, Englewood, CO: American Humane Association, 2009.
- Fischer SM, Quest CM, Dubovi EJ. Response of feral cats to vaccination at the time of neutering. *J Am Vet Med Assoc* 2007;230:52–8.
- Farm Animal Welfare Council. *Five Freedoms*. 2009. Available at: <http://www.fawc.org.uk/freedoms.htm>.
- Federation of Animal Science Societies (FASS). Chapter 2: *General guidelines for animal husbandry from the first revised edition (January 1999) of the GUIDE for the care and use of agricultural animals in agricultural research and teaching*. Available at: <http://www.fass.org/docs/agguide/Chapter02.pdf>
- Finley R, Reid-Smith R, Ribble C, et al. The occurrence and antimicrobial susceptibility of salmonellae isolated from commercially available canine raw food diets in three Canadian cities. *Zoonoses Public Health* 2008; 55:462–9.
- Food and Drug Administration (FDA). *Dispensing veterinary prescription drugs*, 2009a. Available at: <http://www.fda.gov/AnimalVeterinary/ResourcesforYou/FDAandtheVeterinarian/ucm077385.htm>
- Food and Drug Administration (FDA). *Extra-label use of FDA approved drugs in animals*, 2009b. Available at: <http://www.fda.gov/AnimalVeterinary/ResourcesforYou/FDAandtheVeterinarian/ucm077390.htm>
- Fowler M. *Zoo and Wild Animal Medicine*. Current Therapy 3. Philadelphia, PA: WB Saunders Co., 1993; pp 547–9.
- Fowler ME. *Restraint and Handling of Wild and Domestic Animals*. Ames: Iowa State University Press, 1995.
- Fox MW. Environmental factors influencing stereotyped and alleloimimetic behavior in animals. *Lab Anim Care* 1965;15:363–70.
- Garcia VF. Animal bites and Pasturella Infections. *Pediatr Rev* 1997;18:127–30.
- Gaskell RM, Povey RC. Transmission of feline viral rhinotracheitis. *Vet Rec* 1982; 111:359–62.
- Gaskell RM, Wardlesy RC. Feline viral respiratory disease: a review with particular reference to its epizootiology and control. *J Sm Anim Pract* 1977; 19:1–16.
- Gilbert K. *Humane Society Cited in Death of Employee*. The Times & Free Press, Chattanooga, TN, July 25, 2000. Available at: <http://www.virginiavotersforanimalwelfare.com/TennesseeCOdeath7-00.htm>
- Gilman N. Sanitation in the Animal Shelter. In: Miller L, Zawistowski S (eds). *Shelter Medicine for Veterinarians and Staff*, 1st edn. Ames, IA: Blackwell Publishing, 2004; pp 67–78.
- Global Federation of Animal Sanctuaries (GFAS). *Helping sanctuaries help animals*, 2009. Available at: <http://sanctuaryfederation.org/>
- Gourkow N. *The emotional life of cats: Cat sense manual*, 2001. British Columbia Society for the Prevention of Cruelty to Animals, Vancouver, Canada.
- Graham L, Wells DL, Hepper PG. The influence of olfactory stimulation on the behaviour of dogs housed in a rescue shelter. *Appl Anim Behav Sci* 2005a;91:143–53.
- Graham L, Wells DL, Hepper PG. The influence of visual stimulation on the behaviour of dogs housed in a rescue shelter. *Anim Welf* 2005b;14:143–8.
- Grandin T, Johnson C. *Animals in Translation*. New York, NY: Scribner, 2004.
- Griffin B. Wellness. In: Miller L, Hurley KF (eds). *Infectious Disease Management in Animal Shelters*, Ames, IA: Blackwell, 2009a; pp 17–38.
- Griffin B. Scaredy cat or feral cat: Accurate evaluations help shelter staff provide optimum care. *Animal Sheltering* 2009b; Nov/Dec: 57–61.
- Griffin B. Prolific cats: The impact of their fertility on the welfare of the species. *Compend Contin Educ Vet* 2001;23:1058–69.
- Griffin B, Baker HJ. Domestic cats as laboratory animals. In: Fox JG (ed). *Laboratory Animal Medicine*. San Diego, CA: Harcourt Academic, 2002.
- Griffin B, DiGangi BA, Bohling MW. A review of neutering cats. In: August JR (ed). *Consultations in Feline Internal Medicine*, Volume 6. St Louis, MO: Elsevier Saunders, 2009c; pp 776–92.
- Griffin B, Hume KR. Recognition and management of stress in housed cats. In: August JR (ed). *Consultation in Feline Internal Medicine*, 5th edn. St Louis, MO: Elsevier Saunders, 2006; pp 717–34.
- Griffith CA, Steigerwald ES, Buffington T. Effects of a synthetic facial pheromone on behavior of cats. *J Am Vet Med Assoc* 2000;217:1154–6.

- Hansen LT, Berthelsen H. The effects of environmental enrichment on the behavior of caged rabbits. *Appl Anim Behav Sci* 2000;68:168–78.
- Hart BL, Barrett RE. Effects of castration on fighting, roaming, and urine spraying in adult male cats. *J Am Vet Med Assoc* 1973;163:290–2.
- Hart BL, Eckstein RA. The role of gonadal hormones in the occurrence of objectionable behaviours in dogs and cats. *Appl Anim Behav Sci* 1997;52:331–44.
- Haug U. Tips to improve restraint. *Proceedings of the American College of Veterinary Behaviorists and American Veterinary Society of Animal Behavior*. Washington, DC, 2007; pp 77–9.
- Hawthorne AJ, Loveridge GG, Horrocks IJ. Housing design and husbandry management to minimize transmission of disease in multi-cat facilities. *Waltham Symposium on Feline Infectious Disease* 1995; pp 97–107.
- Heleski CR, Mertig AG, Zanella AJ. Results of a national survey of US veterinary college faculty regarding attitudes toward farm animal welfare. *J Am Vet Med Assoc* 2005;226:1538–46.
- Hennessy MB, Davis HN, Williams NT, et al. Plasma cortisol levels of dogs at a county animal shelter. *Physiol Behav* 1997;62:485–90.
- Hennessy MB, Voith VL, Hawke JL, et al. Effects of a program of human interaction and alterations in diet composition on activity of the hypothalamic–pituitary–adrenal axis in dogs housed in a public animal shelter. *J Am Vet Med Assoc* 2002;221:65–71.
- Hennessy MB, Williams M, Miller DD, et al. Influence of male and female petters on plasma cortisol and behaviour: can human interaction reduce the stress of dogs in a public animal shelter? *Appl Anim Behav Sci* 1998;61:63–77.
- Hetts S. *Evaluating Behavioral Health*. HSUS/Animal Care Training, 2000.
- Hetts S, Clark JD, Calpin JP, et al. Influence of housing conditions on beagle behaviour. *Appl Anim Behav Sci* 1992;34:137–55.
- Hiby EF, Rooney NJ, Bradshaw JW. Behavioural and physiological responses of dogs entering re-homing kennels. *Physiol Behav* 2006;89:385–91.
- Hickman MA, Reubel GH, Hoffman DE, et al. An epizootic of feline herpesvirus, type 1 in a large specific pathogen-free cat colony and attempts to eradicate the infection by identification and culling of carriers. *Lab Anim* 1994;28:320–9.
- Hoff JC, Rice EW, Schaefer FW. Comparison of animal infectivity and excystation as measures of *Giardia muris* cyst inactivation by chlorine. *Appl Environ Microbiol* 1985;50:1115–7.
- Holt DE, Mover MR, et al. Serologic prevalence of antibodies against canine influenza virus (H3N8) in dogs in a metropolitan animal shelter. *J Am Vet Med Assoc* 2010;237:710–3.
- Haupt KA. Companion animal behavior: a review of dog and cat behavior in the field, the laboratory and the clinic. *Cornell Vet* 1985;75:248–61.
- Hubrecht RC. A Comparison of social and environmental enrichment methods for laboratory housed dogs. *Appl Anim Behav Sci* 1993;37:345–61.
- Hubrecht R. Comfortable quarters for dogs in research institutions. In: Reinhardt V, Reinhardt A (eds). *Comfortable Quarters for Laboratory Animals*, 9th edn. Washington: Animal Welfare Institute, 2002; pp 56–64. Available at: <http://www.saplonline.org/pubs/cq/dogs.htm>
- Hubrecht RC, Serpell JA, Poole TB. Correlates of pen size and housing conditions on the behavioral of kennelled dogs. *Appl Anim Behav Sci* 1992; 34:365–83.
- Humane Society of the United States (HSUS). How to Use a Control Pole. *Animal Sheltering*, Sep/Oct 1996. http://www.animalsheltering.org/resource_library/magazine_articles/sep_oct_1996/asmSO96_howto.pdf
- Humane Society of the United States (HSUS). *Getting to know you. What agencies need to find out before transferring animals*, 2003. http://www.animalsheltering.org/resource_library/magazine_articles/may_jun_2003/getting_to_know_you.html
- Humane Society of the United States (HSUS). *Animal Services Consultation Program*. Las Vegas, NV: The Animal Foundation Lied Animal Shelter, 2007.
- Humane Society of the United States (HSUS). *The facts about chaining and tethering*. 2009a. Available at: http://www.humanesociety.org/issues/chaining_tethering/facts/chaining_tethering_facts.html
- Humane Society of the United States (HSUS). *North Carolina accident highlights concerns about carbon monoxide euthanasia*. 2009b. Available at: http://www.animalsheltering.org/resource_library/magazine_articles/the_scoop/carbon_monoxide_nc.html
- Humane Society of the United States (HSUS). 2010. *General staffing recommendations for kennel caretaking*. Available at: http://www.animalsheltering.org/resource_library/policies_and_guidelines/kennel_caretaking_staffing.html
- Hurley KF. Outbreak management In: Miller L, Hurley KF (eds). *Infectious Disease Management in Animal Shelters*. Ames, Iowa: Wiley–Blackwell, 2009; pp 39–48.
- Hurley KF. Implementing a population health plan in an animal shelter. In: Miller L, Zawistowski S (eds). *Shelter Medicine for Veterinarians and Staff*. Ames, IA: Blackwell Publishing, 2004a; pp 211–34.

- Hurley KF. Outbreak of drug resistant Salmonella at an animal shelter. *Animal Sheltering* 2004b, November/December:10–12.
- Hurley KF. Sick to death: The false tension between providing care and saving lives. *Animal Sheltering* 2008b; May/June:51–60.
- Hurley KF, Baldwin CJ. Developing infectious disease policies and procedures in an animal shelter. In: Petersen CA, Dvorak G, Spickler AR (eds). *Maddie's Infection Control Manual for Animal Shelters*. Des Moines, IA: Center for Food Security and Public Health, Iowa State University, College of Veterinary Medicine, 2008a; pp 66–79.
- Hurley KF, Pesavento PA, Pedersen NC, et al. An outbreak of virulent systemic feline calicivirus disease. *J Am Vet Med Assoc* 2004c;224:241–9.
- Hurnik JF. Welfare of farm animals. *Appl Anim Behav Sci* 1988;20:105–17.
- Hutchinson RR. By-products of aversive control. In: Honig WK, Staddon JER (eds). *Handbook of Operant Behavior*. Englewood Cliffs, NJ: Prentice Hall, 1977; pp 415–31.
- Institute of Laboratory Animal Research, Commission on Life Sciences, National Research Council (ILAR). *Guide for the Care and Use of Laboratory Animals*, US Department of Health and Human Service, National Institutes of Health, NIH Publication No. 86–23, 1996.
- International Veterinary Academy of Pain Management (IVAPM). *Treating pain in companion animals*. Available at: http://www.vasg.org/ivapm_pet_owner_info_sheet_11_2005.pdf
- ISU Centre for Food Security and Public Health Zoonoses Resources. *Zoonotic disease resources*, 2010. Available at: <http://www.cfsph.iastate.edu/Zoonoses/zoonotic-disease-resources.php>
- Jenkins K. *Recognizing and reducing stress for shelter animals*. Denver, CO: Denver Dumb Friends League, 1997.
- Johnson T. The Animal shelter building: design and maintenance of a healthy and efficient facility. In: Miller L, Zawistowski S (eds). *Shelter Medicine for Veterinarians and Staff*. Ames, IA: Blackwell Publishing, 2004; pp 55–66.
- Johnston SD. Questions and answers on the effects of surgically neutering dogs and cats. *J Am Vet Med Assoc* 1991;198:1206–14.
- Kennedy MA, Mellon VS, Caldwell G, et al. Virucidal efficacy of the newer quaternary ammonium compounds. *J Am Anim Hosp Assoc* 1995;31:254–8.
- Kessler MR, Turner DC. Stress and adaptation of cats (*Felis silvestris catus*) housed singly, in pairs, and in groups in boarding catteries. *Anim Welf* 1997;6:243–54.
- Kessler MR, Turner DC. Socialization and stress in cats (*Felis silvestris catus*) housed singly and in groups in animal shelters and in groups in animal shelters. *Anim Welf* 1999a;8:15–26.
- Kessler MR, Turner DC. Effects of density and cage size on stress in domestic cats (*Felis silvestris catus*) housed in animal shelters and boarding catteries. *Anim Welf* 1999b;8:259–67.
- King County Animal Services. *Strategic Plan and Operational Master Plan 2009–2011*. Available at: <http://kingcounty.gov/council/issues/animals.aspx>
- Kohn B. Zoo animal welfare. *Rev Sci Tech Off Int Epiz* 1994;13:233–45.
- Kulpa-Eddy JA, Taylor S, Adams KM. USDA Perspective on Environmental Enrichment for Animals. *ILAR J* 2005;46:83–94.
- Kustritz MV. Determining the optimal age for gonadectomy of dogs and cats. *J Am Vet Med Assoc* 2007;231:1665–75.
- LA Times. *One-fourth of new animal hoarding cases involve rescuers*, ASPCA expert says. Sept 2, 2010. Available at: [http://latimesblogs.latimes.com/unleashed/2010/09/one-fourth-of-new-animal-hoarding-cases-involve-rescuers-aspc-expert-says.html?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+Unleashedblog+\(L.A.+Unleashed+Blog\)](http://latimesblogs.latimes.com/unleashed/2010/09/one-fourth-of-new-animal-hoarding-cases-involve-rescuers-aspc-expert-says.html?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+Unleashedblog+(L.A.+Unleashed+Blog))
- Lago A, McGuirk SM, Bennett TB, et al. Calf respiratory disease and pen microenvironments in naturally ventilated calf barns in winter. *J Dairy Sci* 2006; 89:4014–25.
- Larson L, Newbury S, Shultz RD. Chapter 5: Canine and feline vaccinations and immunology. In: Miller L, Hurley K (eds). *Infectious Disease Management in Animal Shelters*. Ames, IA: Wiley-Blackwell, 2009; pp 61–82.
- Laule GE. Positive reinforcement training and environmental reinforcement: enhancing animal wellbeing. *J Am Vet Med Assoc* 2003; 223:969–73.
- Lawler DF. Prevention and management of infection in kennels. In: Greene CE (ed). *Infectious Diseases of the Dog and Cat*, 3rd edn. St. Louis: WB Saunders Co, 2006; pp 1046–51.
- Ledger RA, Baxter M, McNicholas J. Temperament testing dogs in a rescue shelter: Improving owner–dog compatibility. In: Rutter SM, Rushen J, Randle HD, Eddison JC (eds). *Proceedings of the 29th International Congress of the ISAE*, Exeter, UK. Wheathampstead, UK: Universities Federation for Animal Welfare, 1995; pp 101–2.
- Ledger RA, Baxter MR. The development of a validated test to assess the temperament of dogs in a rescue shelter. In: Mills DS, Heath SE, Harrington LJ (eds). *Proceedings of the First International Conference on Veterinary Behavioral Medicine*, Birmingham, UK. Wheathampstead, UK: Universities Federation for Animal Welfare, 1997; pp 87–92.

- Lejeune JT, Hancock DD. Public health concerns associated with feeding raw meat diets to dogs. *J Am Vet Med Assoc* 2001;219:1222–5.
- Lenz J, Joffe D, Kauffman M, *et al.* Perceptions, practices, and consequences associated with foodborne pathogens and the feeding of raw meat to dogs. *Can Vet J* 2009;50:637–43.
- Leuscher AU, Medlock RT. The effects of training and environmental alterations on adoption success of shelter dogs. *Appl Anim Behav Sci* 2009;117:63–8.
- Lewis LD, Morris ML, Hand MS. *Small Animal Clinical Nutrition III*. Topeka, KS: Mark Morris Associates, 1987; pp 1–10.
- Levy JK. Feral cat management. In: Miller L, Zawistowski S (eds). *Shelter Medicine for Veterinarians and Staff*. Ames, IA: Blackwell Publishing, 2004; pp 377–88.
- Line SW, Clarke AS, Markowitz H, *et al.* Responses of female rhesus macaques to an environmental enrichment apparatus. *Lab Anim* 1990;24:213–20.
- Looney AL, Bohling MW, Bushby PA, *et al.* The Association of Shelter Veterinarians veterinary medical care guidelines for spay/neuter programs. *J Am Vet Med Assoc* 2008; 233:74–86.
- Lord L, Pennell ML, Ingwersen W, *et al.* In vitro sensitivity of commercial scanners to microchips of various frequencies. *J Am Vet Med Assoc* 2008;233:1723–8.
- Loveridge GG. Provision of environmentally enriched housing for cats. *Animal Technology* 1994;45:69–87.
- Loveridge GG, Horrocks IJ, Hawthorne AJ. Environmentally enriched housing for cats when singly housed. *Anim Welf* 1995;4:135–41.
- Loveridge GG. Environmentally enriched dog housing. *Appl Anim Behav Sci* 1998;59:101–13.
- Lowe SE, Bradshaw JVS. Effects of socialisation on the behaviour of feral kittens. *Proceedings of the Third International Congress on Veterinary Behavioural Medicine*, Vancouver, 2001.
- Maple TL. Strategic collection planning and individual animal welfare. *J Am Vet Med Assoc* 2003;223:966–8.
- Marder A. A comparison of reported canine behavior in pre adoptive and post adoptive homes. *Proceedings of the 5th International Veterinary Behavior Conference*, Minneapolis, MN, 2005.
- Massachusetts Dept of Agriculture (MDAR). *Rescue shelters*, 2009. Available at: http://www.mass.gov/agr/animalhealth/emergency_order.htm
- McCobb EC, Patronek GJ, Marder A, *et al.* Assessment of stress levels among cats in four animal shelters. *J Am Vet Med Assoc* 2005;226:548–55.
- McCune S. Enriching the environment of the laboratory cat. In: Smith CP, Taylor V (eds). *Environmental enrichment information resources for laboratory animals: 1965–1995: Birds, cats, dogs, farm animals, ferrets, rabbits, and rodents*. AWIC Resource series No 1. Beltsville, MD: USDA with Potters Bar, Herts, UK: Universities Federation for Animal Welfare. (UFAW), 1995a; pp 27–42. Available at: <http://www.nal.usda.gov/awic/pubs/enrich/labcat.htm>
- McCune S. The impact of paternity and early socialisation on the development of cats' behaviour to people and novel objects. *Appl Anim Behav Sci* 1995b;45:109–24.
- McKinnon J. Pittsburgh Post-Gazette. *Judge orders owner of Tiger Ranch to jail*. October 6, 2009. Available at: <http://www.post-gazette.com/pg/09279/1003352-54.stm>
- McMillan FD. Development of a mental wellness program for animals. *J Am Vet Med Assoc* 2002;220:965–72.
- McMillan FD. Quality of life in animals. *J Am Vet Med Assoc* 2000;216:1904–10.
- Mench JA. Farm animal welfare in the USA: Farming practices, research, education, regulation, and assurance programs. *Appl Anim Behav Sci* 2008;113:298–312.
- Mertens PA, Unshelm J. Effects of group and individual housing on the behavior of kennel dogs in animal shelters. *Anthrozoos* 1996;9:40–51.
- Miller EA. *Minimum standards for wildlife rehabilitation*, 3rd edn. National Wildlife Rehabilitators Association and International Wildlife Rehabilitation Council, 2000. Available at: <http://theiwrc.org/wp-content/uploads/2010/08/MSWR.pdf>
- Miller L, Hurley K. Chapter 8: Dog and cat care in the animal shelter. In: Miller L, Zawistowski S (eds). *Shelter Medicine for Veterinarians and Staff*. Ames, IA: Blackwell Publishing, 2004a
- Miller L, Hurley K. (eds). *Infectious Disease Management in Animal Shelters*. Ames, IA: Blackwell Publishing, 2009.
- Miller L, Zawistowski S (eds). *Shelter Medicine for Veterinarians and Staff*. Ames, IA: Blackwell Publishing, 2004b.
- Moriello KA Deboer DJ, Volk LM, Sparkes A, Robinson A. Development of an in vitro, isolated, infected spore testing model for disinfectant testing of *Microsporium canis* isolates. *Vet Dermatol* 2004;15:175–80.
- Morley PS, Morris SN, Hyatt DR, *et al.* Evaluation of the efficacy of disinfectant footbaths as used in veterinary hospitals. *J Am Vet Med Assoc* 2005;226:2053–8.
- Morley PS, Strohmeier RA, Tankson JD, *et al.* Evaluation of the association between feeding raw meat and *Salmonella enterica* infections at a Greyhound breeding facility. *J Am Vet Med Assoc* 2006;228:1524–32.

- National Animal Care and Control Association (NACA). *Determining Kennel Staffing Needs*. 2009a. Available at: <http://www.nacenet.org/kennelstaffing.html>
- National Animal Care and Control Association (NACA). Mays D (ed). *Training Manual*. 2009b. Kansas City, MO: National Animal Care and Control Association.
- National Animal Care and Control Association (NACA). National Animal Control Association Guidelines. *Disposition of Animals – Euthanasia*. 2010 Available at: <http://www.nacenet.org/guidelines.html#euthanasia>
- National Association of State Public Health Veterinarians (NASPHV). Zoonotic disease prevention in veterinary personnel. *J Am Vet Med Assoc* 2008a;233:417–31. Available at: http://www.avma.org/services/Compendium_of_Veterinary_Standard_Precautions.pdf
- National Association of State Public Health Veterinarians (NASPHV). Compendium of animal rabies prevention and control. *MMWR* 2008b; 57 / No. RR–2. Available at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5702a1.htm>
- National Association of State Public Health Veterinarians (NASPHV). Compendium of measures to prevent disease associated with animals in public settings. *MMWR* 2009; 58 / No. RR–5. Available at: <http://www.cdc.gov/mmwr/pdf/rr/rr5404.pdf>
- National Federation of Humane Societies (NFHS). *Position statement on animal transport protocols*. 2010. Available at: <http://www.humanefederation.org/TransferOverview.cfm>
- National Institute for Occupational Safety and Health (NIOSH). *Latex allergy: A prevention guide*. NIOSH Publication No. 98-113. Available at: <http://www.cdc.gov/niosh/98-113.html>
- National Institute for Occupational Safety and Health (NIOSH). *Preventing allergic reactions to natural rubber latex in the workplace*. NIOSH Publication No. 97-135. Available at: <http://www.cdc.gov/niosh/latexalt.html>
- National Institute for Occupational Safety and Health (NIOSH). *Preventing Occupational Hearing Loss-A Practical Guide*. Available at: <http://www.cdc.gov/niosh/docs/96-110/default.html>
- National Institute for Occupational Safety and Health (NIOSH). *Preventing asthma in animal handlers*. NIOSH Publication No. 97-116. Available at: <http://www.cdc.gov/niosh/pdfs/97-116sum.pdf>
- National Institute for Occupational Safety and Health (NIOSH). *Evaluation of Carbon Monoxide (CO) Exposures during Euthanasia of Animals at the City of Liberal, Kansas, Animal Shelter*. NIOSH Health Hazard Evaluation Report. HETA #2004-0123-2939, May 2004. Available at: <http://www.cdc.gov/niosh/hhe/reports/pdfs/2004-0123-2939.pdf>
- National Institute for Occupational Safety and Health (NIOSH). *Health Hazard Evaluation Report: Louisiana Society for the Prevention of Cruelty to Animals, Algiers, Louisiana*. NIOSH Report No. 2007-0068-3042. 2007a. Available at: <http://www.cdc.gov/niosh/hhe/reports/pdfs/2007-0068-3042.pdf>
- National Institute for Occupational Safety and Health (NIOSH). *Health hazard evaluation report: Kenton County Animal Shelter, Covington, KY. Cincinnati, OH*. NIOSH Report No. 2006-0212-3035. 2007b. Available at: <http://www.cdc.gov/niosh/hhe/reports/pdfs/2006-0212-3035.pdf>
- Neidhart L, Boyd R. Companion animal adoption study. *J Appl Anim Welf Sci* 2002;5:175–92.
- Neilson J. Thinking outside the box: feline elimination. *J Feline Med Surg* 2004;6:5–11.
- Netto WJ, Planta DJU. Behavioural testing for aggression in the domestic dog. *Appl Anim Behav Sci* 1997;52:243–63.
- New Zealand Ministry of Agriculture. Animal Welfare Advisory Committee. *Code of Recommendations and Minimum Standards for the Welfare of Animals in Boarding Establishments*, 1993. Available at: <http://www.biosecurity.govt.nz/animal-welfare/codes/boarding/index.htm>
- New Zealand Ministry of Agriculture. Animal Welfare Advisory Committee. *Code of recommendations and minimum standards for the welfare of dogs*, 1998. Available at: <http://www.biosecurity.govt.nz/animal-welfare/codes/dogs>
- New Zealand Ministry of Agriculture. Animal Welfare Advisory Committee. *Companion cats code of welfare*, 2007. Available at: <http://www.biosecurity.govt.nz/animal-welfare/codes/companion-cats>
- Newbury SP. Animal flow-through and capacity planning. *Proceedings of the Western States Veterinary Conference*, 2009a.
- Newbury SP. Five key population management factors affecting shelter animal health. *Proceedings of the Western States Veterinary Conference*, 2009b.
- Occupational Safety and Health Administration (OSHA). *Job Safety and Health*. Fact Sheet OSHA 93-01. Available at: http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=FACT_SHEETS&p_id=140
- Occupational Safety and Health Administration (OSHA). *Safety and health topics. Waste anesthetic gasses*. Available at: <http://www.osha.gov/SLTC/wasteanestheticcgases/>
- Occupational Safety and Health Administration (OSHA). *Occupational noise exposure* 1910.95. Available at: http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=standards&p_id=9735

- Occupational Safety and Health Administration (OSHA). *OSHA Assistance for Cleaning Industry*. Available at: <http://www.osha.gov/dcsp/products/topics/cleaningindustry/index.html>
- Occupational Safety and Health Administration (OSHA). *Personal protective equipment*. OSHA 3151-12R. Available at: <http://www.osha.gov/Publications/osh3151.pdf>
- Ottway DS, Hawkins DM. Cat housing in rescue shelters: a welfare comparison between communal and discrete-unit housing. *Anim Welf* 2003;12:173–89.
- Overall KL. Recognizing and managing problem behavior in breeding catteries. In: August JR (ed). *Consultations in Feline Internal Medicine*, Current Therapy 3. Philadelphia, PA: WB Saunders, 1997.
- Overall KL, Dyer D. Enrichment strategies for laboratory animals from the viewpoint of clinical veterinary behavioral medicine; emphasis on cats and dogs. *ILAR J* 2005;46:202–15.
- Patronek GJ, Lacroix C. Developing an ethic for veterinarians and other animal caregivers on abuse, discipline, and restraint. *J Am Vet Med Assoc* 2001;218:514–7.
- Patronek GJ, Slavinsky S. Animal bites: an update. *J Am Vet Med Assoc* 2009;234:336–45.
- Patronek GJ, Sperry E. Quality of life in long term confinement. In: August JR (ed). *Consultations in Feline Internal Medicine*, Current Therapy 4. Philadelphia, PA: WB Saunders, 2001; pp 621–34.
- Paul-Murphy J, Ludders J, Robertson SA, et al. The need for a cross-species approach to the study of pain in animals. *J Am Vet Med Assoc* 2004;224: 692–7.
- Peat D. *Toronto Humane Society raided*. Toronto Sun. November 27, 2009. Available at: <http://www.torontosun.com/news/torontoandgia/2009/11/27/11950476.html>
- Pesavento A, Bannasch MJ, Bachmann R, et al. Fatal *Streptococcus canis* infections in intensively housed shelter cats. *Vet Pathol* 2007;44:218–21.
- Pet Care Services Association (PCSA). *Standards and practices for pet care services providers*, 2009. Available at: http://www.petcareservices.org/files/comm_id_46/STANDARDS_&_PRACTICES.pdf
- Pet Industry for Joint Industry Council (PIJAC). *Animal care guidelines for the retail pet industry*, 2009. Available at: http://www.pijac.org/_documents/guide_finalco.pdf
- Peterson CA, Dvorak G, Spickler AR (eds). *Maddie's Infection Control Manual for Animal Shelters*. Ames, IA: Iowa State University; Center for Food Security and Public Health; 2008.
- Petersen CA, Dvorak G, Steneroden K. Introduction to infection control for animal shelters. In: Peterson CA, Dvorak G, Spickler AR (eds). *Maddie's Infection Control Manual for Animal Shelters*. Ames, IA: Iowa State University, Center for Food Security and Public Health, 2008; pp 4–14.
- Pets Are Wonderful Support (PAWS). *Safe pet guidelines: A comprehensive guide for immunocompromised animal guardians*, 2006. Available at: <http://www.pawssf.org/Document.Doc?id=14>
- PetSmart Charities. *Rescue Waggin'*. 2006. Available at: http://www.humanestrategies.org/html/rescue_waggin_.html
- Phillips K. *Dog bite law*, 2009. Available at: <http://www.dogbitelaw.com/>
- Povey RC, Johnson RH. Observations on the epidemiology and control of viral respiratory disease in cats. *J Sm Anim Pract* 1970;11:485–94.
- Quesenberry K, Quesenberry P, Carpenter JW. *Ferrets, Rabbits and Rodents*. 2nd edn. Philadelphia, PA: Elsevier Science, 2003.
- Reeve CL, Spitzmuller C, Rogelberg SG, et al. Employee reactions and adjustment to euthanasia related work: identifying turning points through retrospective narratives. *J Appl Anim Welf Sci* 2004;7:1–25.
- Reif JS, Bruns C, Lower KS. Cancer of the nasal cavity and paranasal sinuses and exposure to environmental tobacco smoke in pet dogs. *Am J Epidemiol* 1998;147:488–92.
- Reisner IR, Houpt KA, Erb HN, et al. Friendliness to humans and defensive aggression in cats: the influence of handling and paternity. *Physiol Behav* 1994; 55: 1119–24.
- Rhoades R. *Euthanasia Training Manual*. Washington, DC: Humane Society Press, 2002.
- Robertson SA. What is pain? *J Am Vet Med Assoc* 2002;221:202–5.
- Rochlitz I. Recommendations for the housing of cats in the home, in catteries and animal shelters, in laboratories and in veterinary surgeries. *J Feline Med Surg* 1999;1:181–91.
- Rochlitz I. Comfortable quarters for cats in research institutions. In: Reinhardt V, Reinhardt A (eds). *Comfortable Quarters for Laboratory Animals*, 9th edn. Washington, DC: Animal Welfare Institute, 2002. Available at: <http://www.awionline.org/www.awionline.org/pubs/cq02/Cq-cats.html>
- Rochlitz I. Housing and welfare: shelters and catteries In: Rochlitz I (ed). *The Welfare of Cats*. Cambridge, MA: Springer, 2005; pp 177–205.
- Rochlitz I, Podberscek AL, Broom DM. Welfare of cats in a quarantine cattery. *Vet Rec* 1998;143:35–9.

- Rogelberg SG, DiGiacomo N, Reeve CL, *et al.* What shelters can do about euthanasia-related stress: an examination of recommendations from those on the front line. *J Appl Anim Welf Sci* 2007;10:331–47.
- Roza MR, Viegas CAA. The dog as a passive smoker: effects of exposure to environmental smoke on domestic dogs. *Nic Tobacco Res* 2007;9:1171–6.
- Rylander R. Endotoxin and occupational airway disease. *Curr Opin Allergy Clin Immunol* 2006; 6:62–6.
- Rylander R. Endotoxin in the air: Good or bad for you? *Clin Pulm Med* 2007;14:140–7.
- Sales GD, Hubrecht R, Peyvandi A, *et al.* Noise in dog kenneling: Is barking a welfare problem for dogs? *Appl Anim Behav Sci* 1997;52:321–9.
- Schipper LL, Vinke CM, Schilder MBH, *et al.* The effect of feeding enrichment toys on the behaviour of kennelled dogs (*Canis familiaris*). *Appl Anim Behav Sci* 2008;114:182–95.
- Schorr-Evans EM, Poland A, Johnson WE, *et al.* An epizootic of highly virulent feline calicivirus in a hospital setting in New England. *J Feline Med Surg* 2003;5:217–26.
- Scientists Center for Animal Welfare (SCAW). Gonder JC, Smeby RR, Wolfe TL (eds). *Performance standards and animal welfare: definition, application, and assessment, Parts I & II*. Greenbelt, MD: Scientists' Center for Animal Welfare, 2001.
- Scott FW. Virucidal disinfectants and feline viruses. *Am J Vet Res* 1980; 41:410–14.
- Seattle and King County. *Zoonotic Disease Program*, 2010. Available from: <http://www.kingcounty.gov/healthservices/health/ehs/zoonotics.aspx>
- Segurson SA, Serpell JA, Hart BL. Evaluation of a behavior assessment for use in characterization of behavioral problems of dogs relinquished to animal shelters. *J Am Vet Med Assoc* 2005; 227:1755–61.
- Shepherdson DJ, Carlstead K, Mellen JD, *et al.* The influence of food presentation on the behavior of small cats in confined environments. *Zoo Biol* 1993; 12:203–16.
- Siegford JM, Walshaw SO. Validation of a temperament test for domestic cats. *Anthrozoos* 2003;16:332–51.
- Sinclair L. Euthanasia. In: Miller L, Zawistowski S (Eds). *Shelter Medicine for Veterinarians and Staff*. Ames, IA: Wiley-Blackwell, 2004
- Slater MR. Understanding and controlling of feral cats in practice. In: August JR (ed). *Consultations in Feline Internal Medicine*, 4th edn. Philadelphia, PA: W.B. Saunders, 2001; pp 561–70.
- Smith M. Sanitation and disease control. In: *Shelter environment operational guide*. Denver, CO: American Humane Association, 2005
- Spreng M. Possible health effects of noise induced cortisol increase. *Noise Health* 2000;2:59–63.
- Stephen J, Ledger R. Relinquishing dog owners' ability to predict behavioural problems in shelter dogs post adoption. *Appl Anim Behav Sci* 2007;107:88–99.
- Stephen JM, Ledger RA. An audit of behavioral indicators of poor welfare in kennelled dogs in the UK. *J Appl Anim Welf Sci* 2005; 8:79–95.
- Sternberg S. *Successful Dog Adoption*. Indianapolis, IN: Wiley Publishing, 2003.
- Taylor LH, Latham SM, Woolhouse ME. Risk factors for human disease emergence. *Philos Trans R Soc Lond B Biol Sci* 2001; 356:983–9.
- Thorn J, Templeton K, *et al.* Conditioning shelter dogs to sit. *J Appl Anim Welf Sci* 2006;9:25–39.
- Tod E, Brander D, Waran N. Efficacy of dog appeasing hormone in reducing stress and fear-related behaviors in shelter dogs. *Appl Anim Behav Sci* 2005;93:295–308.
- Tuber DS, Miller DD, Caris KA, *et al.* Dogs in animal shelters: problems, suggestions and needed expertise. *Psychological Science* 1999; 10:379–86.
- Tuber DS, Sander S, Hennessy MB, *et al.* Behavioral and glucocorticoid responses of adult domestic dogs (*Canis familiaris*) to companionship and social separation. *J Comp Psychol* 1996;110:103–8.
- University of California (UC Davis). *Koret Shelter Medicine Program*, 2009. Available at: <http://www.sheltermedicine.com/>
- Urban JE, Broce A. Flies and their bacterial loads in greyhound dog kennels in Kansas. *Curr Microbiol* 1998;36:164–70.
- US Code Title 49, Chapter 805. Available at: <http://uscode.house.gov/download/pls/49C805.txt>
- USDA/APHIS. *Animal Welfare Regulations* [Code of Federal Regulations] [Title 9, Volume 1] [Revised as of January 1, 2008] From the U.S. Government Printing Office via GPO Access [CITE: 9CFR3.5] Sec. 3.5 Mobile or traveling housing facilities. Available at: www.aphis.usda.gov/animal_welfare/downloads/awr/awr.pdf
- USDA/APHIS. Section 3.90. Care in transit. Available at: www.aphis.usda.gov/animal_welfare/downloads/awr/awr.pdf
- Van der borg JAM, Netto WJ, Planta DJU. Behavioural testing of dogs in animal shelters to predict problem behavior. *Appl Anim Behav Sci* 1991; 32:237–51.

- Veissier I, Butterworth A, Bock B, *et al.* European approaches to ensure good animal welfare. *Appl Anim Behav Sci* 2008;113:279–97.
- Virginia Department of Agriculture and Consumer Services, *Office of the State Veterinarian*. Available at: http://www.virginia.gov/vdacs_ar/cgi-bin/Vdacs_search.cgi
- Vogt AH, Rodan I, Brown M. *AAFP-AAHA Feline Life Stage Guidelines*, 2010; p 81. Available at: <http://www.aahanet.org/PublicDocuments/FelineLifeStageGuidelines.pdf>
- Wardley RC, Povey RC. Aerosol transmission of feline caliciviruses. An assessment of its epidemiological importance. *Br Vet J* 1977;133:504–8.
- WBZN News. *Tenth Life sanctuary for unwanted pets*, 2009. Available at: <http://www.abc-7.com/Global/story.asp?S=11471395>
- Weese JS, Faires M, Rousseau J, *et al.* Cluster of methicillin-resistant *Staphylococcus aureus* colonization in a small animal intensive care unit. *J Am Vet Med Assoc* 2005a;231:1361–4.
- Weese JS, Rousseau J, Traub-Dargatz JL, *et al.* Community-associated methicillin-resistant *Staphylococcus aureus* in horses and humans who work with horses. *J Am Vet Med Assoc* 2005b;226:580–3.
- Weese JS, Peregrine AS, Armstrong J. Occupational health and safety in small animal veterinary practice: Part II – Parasitic zoonotic diseases. *Can Vet J* 2002;43:799–802.
- Wells D. A note on the influence of visual conspecific contact on the behavior of sheltered dogs. *Appl Anim Behav Sci* 1998;60:83–8.
- Wells D. A review of environmental enrichment for kennelled dogs *Canis familiaris*. *Appl Anim Behav Sci* 2004a;85:307–17.
- Wells DL. The influence of toys on the behavior and welfare of kennelled dogs. *Anim Welf* 2004b;13:367–73.
- Wells DL, Graham L, Hepper PG. The influence of auditory stimulation on the behaviour of dogs housed in a rescue shelter. *Anim Welf* 2002;11:385–93.
- Wells D, Hepper P. The influence of environmental change on the behaviour of sheltered dogs. *Appl Anim Behav Sci* 2000;68:151–62.
- Wemelsfelder F. Animal boredom: Understanding the tedium of confined lives, In: McMillan FD (ed). *Mental Health and Wellbeing in Animals*. Ames, IA: Blackwell Publishing, 2005; pp 79–91.
- Wielebnowski N. Stress and distress: evaluating their impact for the well-being of zoo animals. *J Am Vet Med Assoc* 2003;223:973–7.
- Wojciechowska JI, Hewson CJ. Quality of life assessment in pet dogs. *J Am Vet Med Assoc* 2005;226:722–8.

Glossary of terms

Analgesic – medication to treat pain

Animal Welfare Act – signed into law in 1966. It is the only Federal law in the United States that regulates the treatment of animals in research, exhibition, transport, and by dealers. It does not cover shelters

Antimicrobial – a substance that kills or inhibits the growth of pathogens such as bacteria, fungi, or protozoas, as well as destroying viruses

Bioactive – anything that has an effect on living tissue

Circadian Rhythm – a 24-hour cycle in the life processes of animals, often used in reference to cycles of light and darkness

Cohort – a group that moves together

Depopulation – to significantly reduce the number of animals in the shelter through euthanasia

Disinfection – a process that will kill most of the pathogens in a given area. In shelters a disinfectant is usually a chemical

Endotoxin – substances released by or part of certain bacteria, which can have toxic effects on people or animals

Enrichment – a process for meeting the behavioral needs of animals by improving their environment or behavioral care (e.g., toys, perches, beds, hiding places, etc.)

Euthanasia – to cause the death of an animal using humane techniques. For purposes of this document, humane euthanasia is accomplished with an intravenous or intraperitoneal injection of a solution of sodium pentobarbital

Fomite – an object that may become contaminated and transmit pathogens from one animal to another (e.g., hands, clothing, equipment)

Group-housing – placement of multiple animals in a primary enclosure

Incubation period – the period of time from when an animal is first infected with a pathogen until clinical signs of illness first appear

Infectious dose – the number of pathogens required to cause infection and disease

Intake – the point of admittance of animals into the shelter

Intracardiac (IC) – administered directly into the heart

Intramuscular (IM) – administered into the muscle

Intraperitoneal (IP) – administered into the peritoneal cavity or abdomen

Intravenous (IV) – administered into a vein

Inventory – number of animals in the shelter's care; census

Isolation – a physically separate area of the shelter used to house and treat sick animals

Length of Stay – period of time an animal is under the shelter's care, from intake to exit

Long-term – see "How to Use This Document" section

Neuter – removal of the testicles in a male animal

Off-label use of a medication – use of a medication in any way not indicated by the manufacturer's label

OSHA – Occupational Safety and Health Administration; the federal agency charged with enforcement of safety and health legislation

Glossary of terms

Pathogen – a biological agent that may cause disease or illness in an animal

Primary enclosure – a restricted area designed to confine an animal such as a cage, run, kennel, stall, or pen. In most sheltering situations, this is where an animal eats, sleeps, and spends the majority of its time

Quarantine – a separate area of the shelter used to observe animals for a specified period of time to see if they become sick

Random mixing – haphazard placement of animals originating from different groups together

Re-home – to adopt or place in a private home setting

Rounds – a process of walking through the shelter to visually observe and monitor the needs, status, health, and well-being of every animal

Sanitation – procedures of cleaning and disinfection to remove dirt and control and destroy pathogens in the environment

Socialization – a process of familiarizing animals with a variety of stimuli, including direct contact between animals and humans during their critical period of early development; may also refer to animals of any age spending time with one another

Spay – removal of the ovaries in female animals; may or may not include removal of the uterus

Sterilization – destruction of all pathogens using heat or chemicals; also used in this document in the context of surgical sterilization (e.g., spay or neuter)

Stereotypic behaviors – repetitive behaviors exhibited in the primary enclosure that usually indicate stress such as circling, leaping in the air, pacing

Stressor – any factor that creates stress

Subcutaneous (SC) – administered under the skin

Surveillance – monitoring of a population to detect changes in health, behavior, or welfare

Tethering – securing animals with a rope, chain or other device to a fixed point in order to restrict their movement

Veterinary professional – a veterinarian, veterinary technician or veterinary student

Veterinary supervision – a veterinarian watches over and provides guidance over designated tasks; may or may not involve daily involvement or on-site presence of the veterinarian

Zoonotic – any infectious disease that can be transmitted from non-human animals to humans



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