

## Quality of life in animals

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During the past 3 decades, there has been a growing interest in the concept of **quality of life (QOL)** as it relates to human beings.<sup>1</sup> As survival intervals for human patients with incurable diseases have improved and recognition of the potential undesirable effects of treatment on a patient's enjoyment of life has increased, a gap has emerged between what can be achieved, from the health provider's perspective, and what should be achieved, from the patient's perspective. Traditional measures of patient outcome—survival rate and disease-specific clinical measurements such as hematologic variables—have increasingly been seen as incomplete,<sup>2</sup> and the focus on mortality and morbidity in health care has been steadily superseded by broader considerations of QOL.<sup>3</sup> A focus on QOL ensures that the patient's perspective is placed at the forefront of decisions involving health care.

Quality of life considerations are central to virtually every aspect of the welfare and humane care of animals, particularly health care. Assessments of which treatment to use, or whether to treat at all, and of treatment efficacy all involve QOL considerations. The present report was designed to present the justification, relevance, necessity, and validity of QOL assessment in animals; review the use of QOL assessments in veterinary and pediatric human medicine; propose a definition and model for the concept of QOL in animals; and suggest guidelines for clinical application of QOL assessments in veterinary medicine.

### Use of the Term "Quality Of Life" in Veterinary Medicine

The National Library of Medicine's MEDLINE database and the Veterinary Information Network's information database were searched to examine current use of the term "quality of life" in veterinary medicine. English-language articles related to clinical veterinary medicine in which the term "quality of life" was used in the title, abstract, or summary were retrieved. Of the reports identified, 33<sup>4-36</sup> were randomly selected and reviewed.

All reports stated or implied that QOL was an important factor in health care, but QOL was not defined in any of the reports, and some investigators used other terms interchangeably with QOL, implying comparable meaning. All alternative terms referred to health status and included free of significant clinical

signs,<sup>9</sup> diminished clinical manifestations of disease,<sup>6</sup> normal versus sick,<sup>34</sup> and pain relief and improved function of the patient.<sup>33</sup> In 11 reports,<sup>4,5,7,19,21,26-29,34,36</sup> owners or veterinarians were asked to rate the animal's QOL. Of these, only 1<sup>34</sup> provided criteria for the rating system: excellent (normal), good (usually normal), poor (usually sick), and very poor (always sick). Three other reports<sup>5,28,29</sup> provided rating systems without giving criteria for determining the ratings. In 1,<sup>28</sup> QOL was rated as very poor, poor, reasonable, good, or very good. In the other 2,<sup>5,29</sup> QOL was rated as excellent, good, fair, or poor.

Quality of life was discussed as an objective in 4 reports.<sup>8,13,23,33</sup> Improved QOL was referred to as "an objective in the feeding and care of the older animal,"<sup>13</sup> and as the objective in the diagnosis and management of musculoskeletal problems.<sup>8</sup> Quality of life was used as an outcome measure to compare efficacy of 2 treatments in 2 reports.<sup>7,34</sup>

Three reports<sup>5,21,28</sup> discussed QOL as a factor contributing to the decision for euthanasia of an animal. In a study of dogs with congestive heart failure,<sup>21</sup> poor QOL was reported by 13% of pet owners to be the most important factor in making the decision for euthanasia. In a study of cats with cancer,<sup>5</sup> all owners reported using the animal's QOL in their decision for euthanasia. In a study of medical management of dogs with portosystemic shunts,<sup>28</sup> the owner's assessment of the dog's QOL was the most important factor affecting their decision to request euthanasia.

This review of the literature suggested that current usage of QOL in veterinary medicine can be summarized as follows: the term QOL is being used but not defined; authors typically assume that individuals assessing QOL know what is meant and leave evaluators to define the term in their own ways; criteria for assessing or measuring QOL are rarely provided; QOL is equated to health status, so that assessments of QOL are assessments of health status; QOL is being used as an outcome objective and to compare efficacy of treatments; and QOL is being used to make decisions regarding euthanasia of animals.

### Defining Quality of Life

Quality of life is an enormously broad and complex concept. The potential benefits of QOL assessments are well accepted, yet there is no consensus concerning its definition or the factors that affect it.<sup>37</sup> Like "happiness," it is one of those terms that we all intuitively understand but which defies straightforward

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and succinct description.<sup>38</sup> There are a number of models of QOL, but they differ substantially in regard to the structure of the concept.<sup>39</sup> In the absence of a well-accepted operational definition, investigators have approached the subject by identifying the particular components (usually called “domains”) that are to be included and measured.<sup>40</sup>

In everyday language, as well as in the scientific, psychological, and philosophical literature, several terms are used in the evaluation of the subjective nature of an individual’s life.<sup>41</sup> Quality of life is closely related, and may be equivalent, to a number of other concepts, such as well-being<sup>42-44</sup> (sometimes specified as subjective,<sup>44-46</sup> emotional,<sup>44,45</sup> psychological,<sup>47</sup> or mental<sup>47</sup> well-being), welfare,<sup>41</sup> happiness,<sup>42,47</sup> life satisfaction,<sup>43,44,46</sup> and contentment.<sup>47</sup>

### Features of Quality of Life

**Subjective experience**—Quality of life refers to a state of mind; it is a conscious, subjective, mental experience. Regardless of how the components of and conditions for QOL are analyzed or categorized, and regardless of whether the contributing factors are from physical or emotional origins, QOL can have meaning only when it is understood to be a conscious mental experience.

**Role of affect**—Affect (subjective feelings) plays a preeminent and, I propose, exclusive role in all interpretations of QOL in animals. For sentient animals, emotions appear to be a relatively constant experience. Human and nonhuman animals seem to experience affect, to some extent, during virtually all of their waking life, and all affect seems to have a hedonic quality (ie, it is either pleasant or unpleasant). Therefore, affect contributes pleasantness or unpleasantness on a continual basis to personal experience.<sup>45</sup> When people evaluate their well-being, the ratio of their affective pleasantness to unpleasantness over time plays a central role, and studies show that emotional pleasantness is one of the strongest predictors of life satisfaction.<sup>45</sup> It follows, then, that a definition of QOL will include the concept of emotional pleasantness. Specifically, better QOL refers to a preponderance of pleasant rather than unpleasant affect in one’s life over time.<sup>45,48</sup>

Affect appears to play such a central role in QOL that it can be regarded to be the single common denominator for all factors that influence QOL. That is, it is through affect that anything influences QOL, and any factor that does not have an influence on affect is not relevant to QOL. For instance, illness impacts QOL because of its associated feelings of discomfort.<sup>49</sup> Physical impairments and disabilities may impact QOL if they have an effect on feelings of comfort and pleasure, but if neither comfort nor pleasure is affected, then these physical impairments or disabilities do not impact QOL.

An important aspect of affect as it relates to QOL is that affect is a continuum. Feelings vary on a wide range from pleasant to unpleasant, and QOL, a function of affective states, likewise varies along a continuum. Because affect varies not only between individuals, but also in the same individual over time and under

different circumstances, there are no clear-cut demarcations or recognizable cutoff points on the continuum, above which QOL is “satisfactory” (or “acceptable,” “reasonable,” or “good”) or below which QOL is “unacceptable.”

**The individual nature of quality of life**—In people, QOL is determined by the nature of the individual’s experiences and by the values and meaning that the person attaches to those experiences.<sup>50</sup> Individual preferences, values, and needs, which derive from the individual’s unique genetic make-up and learned experiences, lead each individual to assign different values and priorities to different aspects of life. For example, one individual may value social companionship over physical health, whereas another individual may have the opposite values. These priorities of value and preference will differ in important ways among individuals; therefore, the components of QOL will have different values to each animal or person.<sup>39</sup>

There is now a general consensus that QOL should be assessed from the perspective of the individual, incorporating that individual’s values and preferences.<sup>51</sup> However, gaining insight into the perspective of the patient is not always straightforward. In human pediatric medicine, it is often very difficult to achieve an accurate understanding of the perspective of the child or to determine which dimensions of health are most important and how the child values individual matters.<sup>1</sup> In veterinary medicine, the problem is monumentally more complex, because the patients are of another species. Nevertheless, the principle of assessing QOL from the viewpoint of the patient remains the goal. Fortunately, innovative research methods are providing new insights into animals’ personal preferences and values.<sup>52,53</sup>

### General Concepts

**Comfort and discomfort**—Central to the subjective nature of QOL is the array of affective states comprising comfort and discomfort. These states constitute a continuum of feeling, ranging from comfort to extreme discomfort (Fig 1). The comfort-discomfort continuum comprises a major part of the emotional pleasantness and unpleasantness that contribute to QOL. The term comfort relates to the experiential mental state of ease and peaceful contentment with no (or minimal) discomforts.<sup>54</sup> Discomfort, on the other

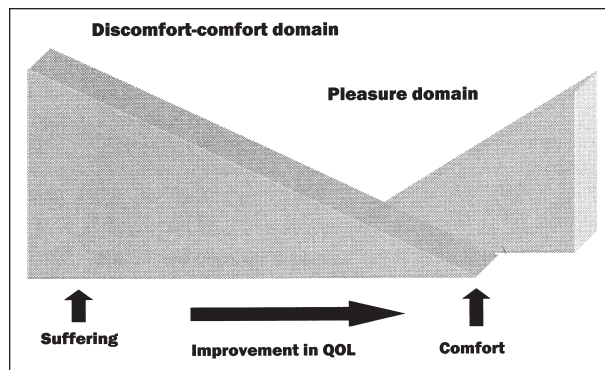


Figure 1—Illustration of the 2 domain model of quality of life in animals.

hand, relates to any unpleasant or disagreeable feeling, or any negative affect. Sources of discomfort may be of physical (eg, thirst, hunger, disease, nausea, full urinary bladder, pruritis, temperature extremes, and pain) or emotional (eg, fear, anxiety, loneliness, grief, frustration, and boredom) origin. Suffering refers to discomfort of extreme or prolonged intensity.<sup>43</sup>

**Needs**—Needs constitute a fundamental component of an individual's QOL. In fact, needs have been considered so central to QOL that some investigators have proposed QOL models in which needs are the basic foundation. These needs models posit that for people, QOL is highest when all, or most, of a person's needs are met and becomes progressively lower as fewer needs are met.<sup>39</sup> In animals, fulfillment of fundamental needs has been recognized as an important aspect of well-being. Dresser<sup>35</sup> has suggested that well-being in animals implies "that the individual's physiologic, security, and behavioral needs are fulfilled."

Needs are generally interpreted as requirements for normal function; basic needs must be satisfied for an animal to maintain a state of physical and psychological homeostasis.<sup>42</sup> Physical needs have been easier to identify than psychological needs,<sup>42</sup> undoubtedly because of the subjective nature of psychological needs. Hurnik<sup>56</sup> has defined needs as the physiologic requirements of an organism necessary for normal development and maintenance of good health and has categorized needs as life-sustaining, health-sustaining, and comfort-sustaining. Satisfaction of needs is not necessarily identical with satisfaction of desires (wants).<sup>56</sup> Desires are those things that an individual prefers to have or to have happen but are not necessary for normal functioning. Odendaal<sup>57</sup> has suggested that basic needs must be fulfilled for an animal to have an acceptable QOL.

Modifying previous definitions,<sup>53,56</sup> we can say that for an animal, a need is something that would result in discomfort or a threat to an animal's life or well-being if it were unfulfilled. Needs satisfaction, therefore, lessens discomfort or threats to well-being, thereby assuming a prominent role in QOL. A desire (want) is something that increases pleasure. Hence, an unfulfilled desire does not result in discomfort, and fulfillment of all desires is not necessary for a high QOL; however, fulfillment of a desire increases emotional pleasantness, improving QOL.

**Control**—A large body of research involving humans has demonstrated that of the factors that contribute to QOL, one of the most important is a sense of control.<sup>46,48</sup> A sense of control over one's life and circumstances is one of the most reliable predictors of positive feelings of well-being in human beings.<sup>44</sup> Control has also been shown to have an important influence on emotional well-being and health of animals.<sup>58</sup>

Our understanding of how a sense of control contributes to emotional well-being in animals derives from research on the concept of learned helplessness. Studies involving use of escapable and inescapable electric shocks—wherein animals would or would not have the control to escape from or turn off the shock—has revealed the differential effects of control, and the

findings have consistently led to the conclusion that controllability of aversive environmental stimuli is of fundamental value to emotional well-being. Whereas no psychological changes were detected in the animals that had control over the shocks, the animals that were subjected to repeated sessions of uncontrollable shocks in time developed a mental state of learned helplessness, in which the animals would simply stop all efforts at escape, sitting passively when shocked. Helplessness refers to the perception that one has no control over one's own environment,<sup>58</sup> and is a debilitating emotional condition.<sup>58</sup> A depressed emotional state (learned helplessness is often used as a model of human depression) will generalize to the entire life experience, and an animal that has reverted to a state of learned helplessness becomes unable to cope with even simple and routine tasks in life, such as competing for food or avoiding social aggression.<sup>58</sup> The emotional effects of learned helplessness, resulting from lack of control, contribute substantially to discomfort in the individual's subjective experience.

A sense of control appears to be critically important for comfort and a pleasant emotional state. Conversely, a sense of an absence of control can result in a substantial increase in unpleasant affect. In human medical practice, provision of hope and a sense of control has been shown to be an important aspect of patient care.<sup>38</sup> Even when the effect on treatment or survival is minimal, establishing a sense of control over one's own disease can have a substantial effect on the way symptoms are experienced.<sup>38</sup> Restoring a sense of control to a patient's life is now considered to be an important goal in medical care.<sup>38</sup>

**Social relationships**—In social animals, social emotions appear to have evolved to promote bonding, affiliations, and relationships and to motivate reestablishment of contact if individuals become separated.<sup>59</sup> Regulated by endogenous opioids<sup>60</sup> and oxytocin,<sup>61</sup> social bonds appear to be associated with pleasant affect, and separation and isolation with an unpleasant affect. If social relationships are disrupted, severed, or impaired, a number of unpleasant feelings are activated to motivate the animal to reestablish the social association. Disruption of the mother-infant bond in mammals is associated with intense emotional responses in the infant—termed separation anxiety or separation distress—that promote reunion.<sup>62</sup> Separation distress is also experienced in mature animals when they become separated from an individual (which need not be a conspecific) to which they have established a social bond or attachment.<sup>62</sup> The strong affect associated with social relationships has the potential to substantially influence QOL.

**Health**—Health is likely the most extensively documented, best understood, and most widely accepted factor contributing to QOL. It is for this reason that QOL is often mistakenly equated with health status. Disease has an impact on QOL in several ways. The discomfort of disease<sup>63</sup> contributes a powerful negative affect to one's overall subjective experience, and relief of this discomfort is a primary reason people seek health care.<sup>49</sup> Physical impairments and disabilities

associated with disease have the potential to induce discomfort and limit one's opportunities for experiencing pleasurable, affective states, thereby negatively affecting QOL.

**Stress**—A comprehensive discussion of the immensely complex issue of stress is beyond the scope of this report. In my view, stress contributes to QOL only through its association with affective discomfort states, such as fear, anxiety, pain, loneliness, and boredom, and the classic physiologic stress response involving activation of the hypothalamic-pituitary-adrenal axis may or may not play a role in QOL. Any stress reaction that operates below the level of consciousness and does not directly or indirectly influence the animal's affect is not directly relevant to QOL. However, stress may have indirect effects on QOL through, for example, its adverse effects on somatic health,<sup>64</sup> which creates discomfort.

The most important aspect of stress as it pertains to QOL appears to be the animal's ability to respond to demands of its environment and to cope effectively with challenging and aversive stimuli. The ability to cope appears to be the factor most correlated with the impact of stress on emotional well-being<sup>47</sup> and physical health.<sup>58</sup> The level of well-being of an animal may be better reflected in how the animal copes with the stress it experiences, than in how much stress it actually encounters.<sup>47</sup>

### Quality of Life Domains

Researchers generally agree that QOL is a multidimensional experience.<sup>65,66</sup> Accordingly, QOL is traditionally viewed as a compilation of certain domains and dimensions.<sup>66</sup> A domain is a particular focus of attention, such as psychological or social functioning.<sup>40,65</sup> A dimension is generally considered a component of a domain. For example, the domain of physical functioning might include dimensions of mobility and strength.<sup>1</sup>

Although authors disagree on the specific domains that comprise QOL, some core domains are included in most measures of QOL.<sup>66</sup> The 3 basic domains of QOL that have been identified and are most consistently included in discussions of human QOL are physical, psychological, and social functioning.<sup>65</sup> Various models identify different core dimensions for these domains; however, some models propose different domains and dimensions. For instance, a QOL model developed for people with mental retardation included 8 core dimensions<sup>67</sup>; a model developed for children integrated the physical, psychological, and social domains into 6 core domains<sup>3</sup>; and a model developed for children with cancer included 19 domains.<sup>68</sup>

The difficulties that have been encountered in determining specific domains of QOL in humans are greatly compounded when we consider QOL of non-human animals. Because QOL in all sentient species appears to depend on a preponderance of pleasant versus unpleasant feelings,<sup>45,48</sup> and knowing that discomfort denotes all of the unpleasant feelings, it can be concluded that the basic requirement for high QOL is a relative freedom from discomforts. The comfort-discomfort states are the affective experiences through

which many factors exert their influence on QOL. For example, health disorders negatively impact QOL through discomfort states associated with disease.<sup>63</sup> Similarly, social isolation influences QOL through discomfort states associated with social emotions, such as loneliness. Therefore, I propose that affective comfort and discomfort states comprise one of the basic components of QOL.

However, comfort-discomfort states are only a portion of the affective composition of QOL. All QOL models developed for humans include pleasant experiences as an important component. For humans and animals, a life of comfort may be a contented and satisfied life, but it is not necessarily reflective of optimal QOL. As an example, consider 2 dogs with equal levels of comfort, but one has, in addition, a rich array of pleasant experiences such as frequent trips to the park, lots of periods of play, many people to interact with, and a variety of delicious foods to eat. There can be little doubt as to which dog has the higher QOL; it is the dog with comfort and pleasures.

### A Two Domain Model of Quality of Life in Animals

I propose that QOL in animals is comprised exclusively of affect. Accordingly, it is through affect that anything influences QOL; if something has no influence (direct or indirect, present or future) on affect, then it is not relevant to QOL.

As a result, I believe that a 2 domain (comfort-discomfort and pleasure) model can be developed to describe QOL in animals (Fig 1). The 2 domains reflect the primacy of affect and allow the major affects to be grouped. The comfort-discomfort domain incorporates the affective states of discomfort, which may be of physical or emotional origin. Discomforts of physical origin include such conditions as illness, pain, nausea, pruritus, hypoxia, thirst, hunger, constipation, temperature extremes, and the like. Discomforts of emotional origin include fear, anxiety, boredom, frustration, loneliness, separation distress and anxiety, depression, and hopelessness or helplessness. The pleasure domain likewise consists of affective states that may be of physical or emotional origin. Pleasures of physical origin include such things as physical contact and gustatory pleasures. Pleasures of emotional origin include social companionship and mental stimulation.

### Definition of Quality of Life in Animals

On the basis of this 2 domain model of QOL in animals, the following definition for QOL in animals is proposed: Quality of life is a multidimensional, experiential continuum. It comprises an array of affective states, broadly classifiable as comfort-discomfort and pleasure states. In general, the greater the pleasant and lesser the unpleasant affects, the higher the QOL. Quality of life is a uniquely individual experience and should be measured from the perspective of the individual.

### Measurement of Quality of Life

Measurement of QOL has engendered great controversy and debate in the human field, and there is no

consensus as to the best method for assessing QOL. The usual method of collecting QOL information is through patient self-assessment questionnaires,<sup>69</sup> but because of its highly subjective nature, QOL remains difficult to quantify.

Most often, QOL is measured through use of a survey instrument designed to obtain the desired data.<sup>40</sup> The survey instrument may comprise a single question such as "How do you rate your quality of life?" or may contain multiple items that may or may not be categorized into separate domains.<sup>40</sup> A number of standard instruments have been developed to measure QOL in human beings. Most instruments are designed to generate a single aggregate score<sup>39</sup>; however, as logical as these scores appear, their inherent meaning remains a matter of debate.<sup>39</sup>

**Objective and subjective measurement**—Measurement of QOL requires quantification of a subjective phenomenon. Because of the inherent difficulties of such an enterprise, many studies of QOL involving humans have been directed at the use of objective indicators to reflect the subjective status of patients.<sup>70</sup> Examples of objective criteria include activity level, physical functioning, disease and physiologic indices, appetite, and social support and interactions. Subjective criteria involve the way an individual feels about aspects of life (eg, health, companionship) and life overall.

Instruments designed to measure objective criteria have an appeal because of the greater ease of quantifying the measured items. In contrast to subjective measures of QOL, objective measures are valuable because they permit standardization and provide an established anchor point that can be compared across studies.<sup>71</sup> In addition, for individuals who cannot offer meaningful insight into their own subjective mental states, such as human neonates and infants, the mentally disabled, and animals, objective criteria are often relied on as representative of the subjective states comprising QOL. However, the relationship between objective and subjective assessments has been examined in human studies,<sup>38,71</sup> and results suggest that there is a discrepancy between objective life status and subjective life satisfaction for some individuals, necessitating that both objective and subjective criteria be assessed when QOL is investigated.

**Proxy measurement**—Measuring QOL from the individual's own perspective is problematic when patients are incapable of providing first-hand information regarding their subjective experience. Most often, such individuals are neonates, infants, mentally disabled, or severely ill. Researchers, not wanting to exclude such individuals from QOL analyses, have devised instruments to acquire QOL information from closely associated alternative sources, such as parents, spouses, partners, caregivers, siblings, and health care providers. Such individuals are termed "proxy" informants. Because of language barriers, subjective information concerning QOL of nonhuman animals must, with few exceptions,<sup>52,53</sup> come from sources other than the animal itself. Accordingly, the issue of proxy measurement has important implications for assessment of QOL in animals.

The necessity of relying on data from proxy informants raises the question of how accurate QOL assessments from health care providers and other individuals involved in a patient's care are. The accuracy of proxy ratings has been studied extensively in adolescent and adult humans by comparing data from proxy informants with data from patients themselves.

The challenges associated with assessing QOL in pediatric human patients are different from those associated with assessing QOL in adult patients, and closely parallel those faced in assessing QOL in animals. Infants lack the cognitive and language abilities to convey QOL information or express care preferences.<sup>3</sup> Furthermore, infants and children often have very different priorities from their adult caregivers,<sup>37</sup> which greatly complicates proxy ratings of a child's QOL, because adult caregivers do not share the child's mental framework for interests, desires, and goals.<sup>66</sup>

Quality of life of neonatal surgical patients was assessed by surgeons and nurses<sup>72</sup>; substantial variability was found in proxy assessments, based on experience of the nurses and surgeons. Numerous studies provide evidence to suggest that proxy responses by parents correlate poorly with the perceptions of the child they are representing.<sup>73,74</sup> In an extensive review of the literature on child QOL instruments, Pal<sup>3</sup> reported that proxies such as parents and teachers agreed fairly well in reporting on child functioning, but that low parent-child concordance was found in other QOL domains, such as certain types of subjective feelings in regard to illness and emotional states. Poor agreement between children and parents on measures of private experiences, such as emotions and subjective states, regardless of whether the child is healthy or sick, is well-documented.<sup>75</sup>

## Measurement of Quality of Life in Animals

Criteria for measuring QOL in animals are lacking. Although little has been written about QOL in animals, much has been written about concepts that appear to be closely related to QOL, such as well-being,<sup>42-47</sup> welfare,<sup>41</sup> happiness,<sup>42,47</sup> life satisfaction,<sup>43,44,46</sup> and contentment.<sup>47</sup> Because of the likely overlap of many of these concepts with the concept of QOL, much of what has been proposed regarding measurement of these concepts appears relevant and applicable to the concept of QOL. Specific assessment criteria have been categorized by authors in various ways, and include behavioral factors<sup>47,76,77</sup> (normal and abnormal behavior and preference studies<sup>52,53</sup>), neurochemical and endocrine factors<sup>76-78</sup> (eg, catecholamines, glucocorticoids, and others), health status,<sup>47,78</sup> physical functioning (disability<sup>78</sup>), immune function,<sup>76-78</sup> morphologic changes,<sup>76,78</sup> and brain imaging.<sup>76</sup> The 2 domain QOL model is dependent on affect. Therefore, assessment criteria, like the QOL factors they are intended to measure, have value only insofar as they are associated directly or indirectly with affective states. Measurement criteria that are not associated with affective states are not relevant to QOL and, hence, play no role in assessing QOL.

The goal of measuring QOL in animals from the perspective of the animals is not currently attainable.

Important barriers pose immense challenges to understanding nonhuman minds; among them, language barriers and the vast differences between species, sexes, breeds, age groups, and individuals regarding needs, preferences, values, and sources of discomfort and pleasure. However, with innovative behavioral research techniques (eg, preference testing,<sup>78</sup> aversion learning,<sup>32</sup> and demand curve analysis<sup>33</sup>) providing a window to subjective feelings, the private feelings of animals appear to be increasingly accessible. For now, however, development of a practical proxy instrument offers the greatest hope for a useful method of measuring QOL in animals. The ideal proxy instrument must address all recognized sources of comfort-discomfort and pleasure in its selection of items for evaluation and must be able to gain information about the magnitude of affective states. Assessment of QOL in animals should ensure that criteria being used are relevant to the animal's QOL.

### Clinical Application of Quality of Life Measurement in Animals

In the absence of a valid instrument for measuring QOL in animals, clinical application of QOL measurements must currently be guided by general principles, rather than a precise numeric score. It is reasonable to propose that the paramount objective in animal care—medical and nonmedical—is to maximize QOL. According to the 2 domain model of QOL, this goal is accomplished by the dual effort of minimizing discomforts and optimizing (not necessarily maximizing) pleasures. Insofar as possible, all unpleasant and pleasant affect must be assessed and factored into a composite view of the animal's overall affective status, because it is this composite of affect that represents our best view of QOL. Quality of life must be assessed with the most information about the individual as possible (personal needs, desires, preferences); preferably, proxy evaluations would be provided by the person or persons who have the greatest knowledge of the individual animal's preferences, personality, and nature.

The intuitive value of QOL argues for use of QOL as an endpoint in animal health care. However, the validity of QOL measurements has not been scientifically substantiated, and because of potential inaccuracies in proxy evaluations, particularly proxy evaluations given by human caregivers for nonhuman animals, it would be prudent to exercise appropriate cautions when using QOL assessments.

The potential value and applications of assessments of QOL in animals are vast, and QOL measures offer promising application in such diverse areas as clinical medicine and in determining minimum standards for animal confinement and housing, breeding practices (companion and food animal), intensive farming, use of animals in entertainment, and laboratory research. Of particular value to animal welfare is the application of QOL to instances of mistreatment, neglect, and abuse. Because of its importance for animal well-being in general and in clinical medicine specifically, QOL research warrants priority status. One of the most important objectives for research into QOL in animals is to determine factors related to affective

states of discomfort and pleasure in animals, to establish how those factors vary with species, breed, sex, and age and among individuals, and to identify methods for measuring affective states in animals. In addition, it is necessary to develop and validate an instrument for proxy assessment of QOL in animals and to develop and validate an instrument for assessment of QOL from the animal's perspective. Quality of life assessments should be included in clinical trials of medical treatments, and strategies for maximizing QOL should be identified. Some of these objectives will be easier than others to attain. All present difficult challenges, and a collaborative multidisciplinary approach that uses veterinarians, ethologists, cognitive scientists, comparative psychologists, animal scientists, immunologists, neurobiologists, physiologists, pathologists, and epidemiologists will be required.<sup>78</sup> A concerted effort to understand QOL offers the greatest opportunity for the betterment of the lives of all animals that we care for.

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