Research

Assessment of behavior and physical condition of shelter cats as animal-based indicators of welfare

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ABSTRACT

Surveillance of cat shelters by official veterinarians in Austria is based on legal requirements and does not directly assess cat welfare. The aim of this study was to develop animal-based parameters that are feasible to measure in a surveillance setting, stable over time, and reproducible by different raters. We assessed physical condition (body condition, eye and nose discharge, and coat and skin) and behavior of the cats (aggressive interactions, play behavior, behavior toward humans) and also collected data about housing conditions, shelter management, and the shelter cat population. The validity of the animal-based parameters was assessed by examining relationships with housing conditions. Thirty animal shelters housing a median of 63 cats each were studied. Cats were kept mostly in groups (mean size, 7). Adult cats housed in the shelter for at least 4 weeks (24 ± 18 per shelter) were included. Test–retest reliability of the animal-based parameters was assessed by visiting 10 shelters twice approximately 2 months apart. To assess inter-rater reliability (IRR), 36 pens were evaluated by 2 raters. Two parameters were stable over time with acceptable IRR. The proportion of very thin cats (body condition score of 1/5) and the proportion of cats with a poor coat condition correlated highly with no significant difference between visits (*%catsverythin*: $r_s = 0.84$, $P = 0.002$, Wilcoxon test: $P = 0.225$; *%catspoorcoat*: $r_s = 0.86$, $P = 0.002$, Wilcoxon test: $P = 0.128$). IRR was moderate for *%catsverythin* ($r_s = 0.63$, $P < 0.001$) and good for *%catspoorcoat* ($r_s = 0.87$, $P < 0.001$). The physical condition of the cats was found to correlate with housing conditions; for example, an increased proportion of very thin cats correlated with a higher proportion of pens with less than 1 lying area per cat ($r_s = 0.54$, $P < 0.05$) and with a lower proportion of pens with hiding places for all cats ($r_s = -0.54$, $P < 0.05$). Poorer scores for coat condition correlated with longer mean length of stay in the shelter ($r_s = 0.46$, $P < 0.05$), fewer cat toilets per cat ($r_s = -0.37$, $P < 0.05$), and a more unpleasant odor ($r_s = 0.57$, $P < 0.05$). Our results show that simple animal-based parameters can give an indication of how well cats cope with their environment and suggest that the use of these parameters, in addition to the assessment of conformance with legal requirements for shelter surveillance, could be beneficial for cat welfare.

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Introduction

Austrian law forbids the euthanasia of animals merely because they are ownerless, so that animal shelters operate a no-kill policy. The mean length of stay of 1,242 shelter cats was found to be 12 months (Arhant et al., 2011). Some cats may spend the rest of their life in a shelter (maximum, 12 years). The shelter environment must ensure good quality of life, especially for cats that remain there long term.

Much research has been done with farm animals to develop valid and reliable parameters for welfare assessment and feasible protocols for measuring them (e.g., Waiblinger et al., 2006; Knierim and Winckler, 2009; Temple et al., 2013). Besides parameters designed to assure adequate resources and management, animal-based indicators that directly assess animal welfare are extremely important (Webster, 2005; Botreau et al., 2007a). Guidelines, parameters, and tools for welfare assessment have also been recently developed for some companion and laboratory animals (e.g., Hawkins et al., 2011; Cafazzo et al., 2014; Kiddie and Collins, 2014). To our knowledge, however, no animal-based parameters have been evaluated for use in cat shelter surveillance.

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A welfare assessment protocol in shelters with long-term housing should include parameters for chronic stress or health problems (Botreau et al., 2007c) and for positive emotional states (Boissy et al., 2007; Balcombe, 2009). In general, stress leads to an inhibition of behavior in cats, although it can also be the cause of exaggerated behaviors such as hypervigilance and defensive aggression toward people or other cats (for review, see Casey and Bradshaw, 2005). Reduced feeding and grooming behavior are also associated with adverse conditions, such as stressful events, pain, and disease (Bennett and Morton, 2009; Tanaka et al., 2012; Stella et al., 2013). Therefore, body and coat condition might be used as animal-based measures of welfare (Scott et al., 2002). Eye and nose discharge are symptoms of upper respiratory tract infection, a frequent condition in shelter cats (Tanaka et al., 2012; Gourkow et al., 2013) and can thus be used as an indicator of health status. It is also very important to include behavioral measures in a welfare assessment protocol (Botreau et al., 2007c). High frequencies of agonistic behavior can lead to both social stress and injuries and may thus result in poor welfare (Menke et al., 1999; WelfareQuality, 2009; Temple et al., 2011; Andrist et al., 2012). Affiliative and play behaviors are generally associated with positive emotions and are considered to lead to better welfare of the individuals displaying them (Boissy et al., 2007; Balcombe, 2009; Held and Špinka, 2011). However, these behaviors are more difficult to interpret because they could also be increased under stressful conditions and may be part of the animals' coping responses (Held and Špinka, 2011; Hausberger et al., 2012; Temple et al., 2011). The behaviour of an animal toward a person reflects the emotions the animal experiences when confronted with a human, and thus, the animal–human relationship (Waiblinger et al., 2006). Fear of humans is a likely cause of stress and poor welfare in shelter cats and might be used as an indicator of welfare. In addition to other factors, the fearfulness of a cat toward a person seems to depend on environmental factors: Caged cats in a predictable environment with minimal disturbances approached humans with reduced latency, interacted for longer with them, and displayed a higher frequency of affiliative behaviors (Stella et al., 2014).

Another relevant consideration is that all the parameters mentioned previously, that is, physical condition, health status, and behavior can influence the decision to adopt a cat. Potential adopters seem to prefer cats that are sociable and say that appearance affects their choices (Gourkow and Fraser, 2006; Weiss et al., 2012). Ensuring good mental and physical condition of the cats seems to be crucial to not only welfare but also the main goal of a shelter—successful rehoming of cats.

The proposed parameters for physical condition and behavior seem to have at least face validity and are promising indicators of welfare in shelter-housed cats. However, their feasibility and reliability have not yet been investigated. The aim of the work presented here was to test animal-based measures for welfare assessment that can be used for surveillance by official veterinarians and self-monitoring by staff in cat shelters. These parameters need to be feasible to measure in a surveillance setting, to be stable over time, and to have a good inter-rater reliability (IRR) when raters are only given written instructions. We aimed to assess the validity of parameters by exploring relationships with other environmental factors relevant to cat welfare.

Animals, materials, and methods

Participating shelters and housing of cats

In total, we visited 30 shelters that housed cats. All but 1 of them also housed dogs. The median total number of animals per shelter was 105 (range, 14-1348) and of these, the median number of cats was 63 (range, 3-583). The median amount of time that staff had to take care of each cat or dog was 14 minutes per day (range, 4-58 minutes).

In the 30 shelters, we visited 42 cat housing sections. Of these, 57.1% were rooms with an outdoor area, 14.3% had an indoor area only, 21.4% consisted of several rooms with and several rooms without an outdoor area, 2.4% were outdoor kennels, and in 4.8% the cats were housed in cages. The median of the average size of the indoor areas was 9.8 m^2 (range, 2.0-27.7 m^2, N = 29), and the median of the average size of the outdoor areas was 11.2 m^2 (range, 2.2-200 m^2, N = 28). The median of the mean space per cat was 3.3 m^2 (range, 0.6-11.4 m^2, N = 29), and the median of the minimum space per cat was 1.7 m^2 (range, 0.3-9.9 m^2, N = 29). The average mean group size was 7 ± 4 (mean ± standard deviation [SD]), and the average maximum group size was 12 ± 9. In all but 1 shelter, the cats were fed ad libitum. In the 1 shelter that did not feed the cats ad libitum, the cats were fed 2 times a day. On average, cat feed was composed of 45% ± 21% of dry food/cat pellets, 44% ± 18% of canned cat food, and 10% ± 18% of meat and innards.

General procedures

To estimate test–retest reliability of the animal-based welfare measures, 10 shelters were visited twice by the same person (experimenter 1). The mean number of days between visit 1 and visit 2 was 58 days (range, 50-76 days).

To test for IRR, 36 pens in 8 cat shelters were evaluated by 2 assessors. The first rater was always the same person (experimenter 1), and the second rater was 1 of 3 veterinary students. To simulate the use of the parameters by official veterinarians or shelter managers in a surveillance setting, the second raters were given only written instructions.

On arrival at the shelter in the morning, we explained the procedures to the shelter manager and handed over a questionnaire with questions about demographics, admission procedures and management during the quarantine period, enrichment and feeding, and some other aspects of shelter management. We asked them to prepare an up-to-date list of the cat population in the shelter containing at least sex, date of birth, date of admission, and breed of each cat housed in the shelter on the day of our visit. The cat housing areas were assessed between 9:00 AM and 5 PM as requested by the shelter manager.

Data collection in the cat housing facilities was carried out by 2 persons, dressed in green single-use overalls. Experimenter 1 evaluated the physical condition and behavior of cats, and a second person collected data on the housing environment (furnishing, space allowance, outdoor access, etc.). In 6 of the shelters that were visited only once, a trained diploma student assessed the physical condition and behavior of the cats.

The cats were assessed in their home pens. The definitions of the parameters are given in Table 1. To simulate as closely as possible surveillance by an official veterinarian, physical condition and behavior were assessed during the same visit to each pen. First, the experimenters entered the pen and remained calmly near the entrance for 1 minute (to assess the parameter "Making contact with experimenter within the first minute"). Then, the cats were assessed visually; body condition score (BCS) was evaluated by palpation whenever possible. In groups of up to 10 cats, all cats in the group were assessed. In larger groups, a random sample of 10 cats was chosen. If the cats in 1 room were of very similar appearance, a smaller sample, containing only cats that were clearly identifiable, was chosen because the cats were not marked after assessment. Cats that remained in a hiding place were assessed only for aspects that were visible to the experimenter.