

Attitudes toward and perceptions of free-roaming cats among individuals living in Ohio

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Objective—To characterize attitudes toward and perceptions of free-roaming cats among individuals living in Ohio.

Design—Cross-sectional study.

Sample Population—Households in Ohio.

Procedures—A random-digit-dial telephone survey was performed, and 1,250 households were contacted.

Results—703 of the 1,250 (56.2%) households completed interviews. Five hundred fifty-three (78.7%) participants reported seeing free-roaming cats at least occasionally, and 184 (26.2%) reported having fed free-roaming cats during the previous year. However, only 42 (22.8%) participants who fed free-roaming cats had ever taken one to a veterinarian, and 43 (23.4%) participants who fed free-roaming cats reported that at least one of the free-roaming cats had produced a litter in the preceding year. Differences existed between cat owners and other participants and among urban, suburban, and rural residents in regard to their attitudes toward free-roaming cats and the need for government regulations.

Conclusions and Clinical Relevance—Results suggested that free-roaming cats were common in Ohio, but that attitudes toward and perceptions of free-roaming cats differed between cat owners and other participants and among participants grouped on the basis of residential area. Thus, developing statewide approaches for regulating free-roaming cats may be challenging or unrealistic. (*J Am Vet Med Assoc* 2008;232:1159–1167)

Cats have surpassed dogs as the most popular pet in the United States, with 38.4 million households owning an estimated 88.3 million cats.¹ Despite this national popularity, there is still considerable controversy regarding free-roaming cats. A free-roaming cat is defined as a cat that lives outdoors at least part of the time. This includes pet cats that are allowed to spend time outdoors, lost and abandoned owned cats, tame unowned cats, and feral cats. A great deal of attention has been given over the past 2 decades to managing free-roaming cat populations, particularly feral cat populations.^{2–6} Although many authors have advocated the use of trap-neuter-return methods to manage feral cat colonies, others have suggested that no cats, including owned pet cats, should be allowed to roam freely because of the potential negative impact they have on wildlife and the destruction they can cause.^{7–9}

Unfortunately, the increase in the popularity of cats as pets has been accompanied by an increase in the number of cats entering animal shelters each year. In Ohio, for instance, the number of cats entering animal shelters increased 20% and the number of cats that were euthanatized increased 14% between 1996 and 2004,¹⁰ even though the human population was relatively stable during this timeframe. At the same time, controversy exists as to whether animal control laws, such as restricting free-roaming cats and mandating cat li-

ABBREVIATION

CI Confidence interval

censing, are the most effective ways to reverse this increase in the number of cats entering animal shelters.

Despite the complexity of issues surrounding free-roaming cats, little work has been done to assess individual attitudes toward free-roaming cats. The purposes of the study reported here, therefore, were to evaluate attitudes and perceptions toward free-roaming cats among individuals living in Ohio and to examine differences in attitudes and perceptions between cat owners and non-cat owners and among individuals living in various residential areas (ie, urban, suburban, and rural).

Materials and Methods

A professional survey research company^a was hired to conduct a representative telephone survey of Ohio residents 18 years and older; a random-digit-dialing sampling methodology was used. The telephone survey was conducted during February and March 2007. The company's primary responsibility was conducting the telephone survey and refining the questionnaire through focus group feedback.

Questionnaire development—The initial questionnaire was developed by the author and reviewed by a small group of veterinarians and individuals in charge of animal shelters. The revised questionnaire was then reviewed by the survey research company with regard to wording of individual questions. The survey instrument was pretested during 4 focus group sessions conducted in January

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2007 in various locations throughout Ohio; focus group locations included urban, suburban, and rural residential areas. For each focus group session, 8 to 12 participants were randomly recruited from a list of residents in the focus group area. The survey research company moderated all 4 focus group sessions, which were concerned with reviewing questionnaire content and wording. Results from the focus group sessions were used to develop the final questionnaire.

Questionnaire content—The survey consisted of questions primarily related to participants' attitudes and perceptions about free-roaming cats.^b The first part of the survey focused on attitudes toward cats, how often participants saw free-roaming cats in their neighborhoods and the number of free-roaming cats seen, and participants' feelings toward these cats. The question regarding participants' feelings toward free-roaming cats was open-ended. Answers were categorized as neutral feelings about free-roaming cats (eg, no opinion or did not think about the cats), positive or sympathetic feelings about free-roaming cats (eg, felt sorry for these cats, wanted to help these cats, worried about the cats' health, liked seeing the cats, or liked the fact that these cats hunted), negative or angry feelings about free-roaming cats (eg, did not want these cats around, did not like the cats hunting, worried about the spread of disease, or disliked cats), or anger or frustration regarding the problem of free-roaming cats (eg, anger toward the owner, wanted someone to fix the problem, or frustrated that the problem was too big to fix).

The second part of the survey focused on participants who fed free-roaming cats and included questions on feeding frequency and number of cats fed during the past year, the number of cats that had produced litters during the past year, and whether the participant had ever taken a free-roaming cat they fed to a veterinarian or animal shelter.

The third part of the survey addressed pet ownership of the participants and included questions on types of pets owned (ie, cat, dog, or other) and, for cats owners, questions regarding cat neuter status, amount of time cats spent outdoors, source of acquisition, and method of identification used, if any (eg, microchip or tag). Owners of cats that did not have a tag or microchip were asked why they did not provide identification for their cats.

The fourth part of the survey was designed to solicit information regarding all participants' attitudes and beliefs about free-roaming cats, with a focus on regulation of cats. Participants were asked whether they were aware of any laws in their area regulating free-roaming dogs or cats, whether they considered free-roaming cats to be a problem in their neighborhood or in Ohio in general, whether they thought that cats that strayed from their homes would be able to find their way home or be able to survive on their own, whether they perceived a need for laws to prohibit cats from roaming freely, whether owners should be required to identify their cats, whether cats should be licensed, whether the local government should be responsible for controlling free-roaming cats, whether cats should be kept indoors only, whether they supported the use of trap-neuter-return programs to manage free-roaming cats, whether they perceived a need for mandatory spay-neuter laws

for cats, whether they supported the use of tax dollars for low-cost spay-neuter programs for cats, and whether they supported laws requiring mandatory rabies vaccination of owned cats. Likert-scale questions were used for this part of the survey; possible responses were strongly agree, agree, neutral, disagree, strongly disagree, and don't know.

The last part of the survey consisted of questions designed to obtain demographic information on the participants, including age (ie, year of birth), gender, marital status, highest grade or year of school completed, racial and ethnic background, approximate household yearly income, and type of residential area (ie, urban, suburban, or rural).

Sampling methodology—A list-assisted sampling method¹¹ was used to select the sampling frame for the survey, which represented all counties in Ohio. Sampling was started by defining primary sampling units in sets of 100 banks or clusters. The sampling frame was then constructed from all telephone numbers included in 100 of these banks in which there was at least 1 listed telephone number in the telephone directory.^c Whether each of these 100 banks was included in or excluded from the sampling frame was determined with the assistance of commercially available lists. Finally, a systematic sample was selected from all telephone numbers in the sampling frame. Once a household was identified, a random within-house sampling method was used whereby all adults living in the household had an equal chance of being chosen for participation.

On the basis of standard power equations,¹² we calculated that 700 participants needed to be included in the study to estimate a proportion of 50% with 95% confidence with a margin of error of no greater than 3.7%.

Data collection—All telephone interviews were conducted by the survey research company's trained personnel who used a standard computer-assisted telephone interviewing software program.^d During the calling phase, at least 6 attempts at different times of the day and on different days were made before the participant was classified as a nonresponder. Households with a disconnected telephone number were replaced with another telephone number.

Statistical analysis—Mean and SD were calculated for responses that consisted of continuous data, and proportions were calculated for responses that consisted of categorical data. To account for sampling variance, 95% CIs were also calculated and reported for the sample as a whole but were not included for subgroup analyses. Specific comparisons to identify differences in responses between cat owners and all other participants and between participants from urban, suburban, and rural areas were identified a priori. For comparisons involving dichotomous categorical data, the χ^2 test was used, except that the Fisher exact test was used when the expected value for any cell was < 5 .

For the 16 Likert-scale questions on attitudes and perceptions toward free-roaming cats, responses were scored as follows: strongly disagree = 1, disagree = 2, neutral = 3, agree = 4, and strongly agree = 5. Mean response scores were compared between cat owners and all other participants and among participants in the

various residential area types by means of the Kruskal-Wallis test. Participants who answered don't know and participants who did not know their residential area type were excluded from these analyses.

We hypothesized that several of the questions would be consistent in measuring various constructs. Thus, we tested the level of agreement among 5 questions related to participants' belief that free-roaming cats were a problem and the level of agreement among 3 questions related to participants' support for laws regulating free-roaming cats. Level of agreement was assessed by means of the Cronbach α value. A value ≥ 0.70 was considered to indicate good reliability.

For all analyses, values of $P \leq 0.05$ were considered significant. Standard statistical software was used.^c The survey was given exempt approval status by The Ohio State University Institutional Review Board.

Results

During the study period, 1,250 households were contacted and 703 interviews were completed, for a response rate of 56.2%. Of the 547 households that did not complete interviews, 291 were households that refused to participate, 91 were households where only an answering machine could be reached, and 165 were households that were still being contacted (ie, multiple attempts had been made to contact the household, but the maximum number of 6 attempted contacts had not been reached) at the time the study was completed.

Demographic characteristics of survey participants—Of the 703 participants, 391 (55.6%) were female and 312 (44.4%) were male. Mean age of the 680 participants who provided their year of birth was 51.7 years (SD, 16.9 years; range, 19 to 92 years). Other demographic characteristics of participants were summarized (Table 1).

Pet ownership by survey participants—Of the 703 participants, 419 (59.6%; 95% CI, 56.0% to 63.2%) owned a pet. Two hundred seventeen participants owned 1 or more cats, which represented 51.8% of the 419 pet owners (95% CI, 47.0% to 56.6%) and 30.9% of all participants (95% CI, 27.4% to 34.3%); 293 participants owned 1 or more dogs (69.9% of pet owners [95% CI, 65.5% to 74.3%] and 41.7% of all participants [95% CI, 38.0% to 45.3%]); and 74 participants owned 1 or more other pets (17.7% of pet owners [95% CI, 14.0% to 21.3%] and 10.5% of all participants [95% CI, 8.2% to 12.8%]).

Overall, 556 participants (79.1%; 95% CI, 76.1% to 82.1%) were familiar with the use of microchips as identification devices for pets, with the percentage of pet owners (354/419 [84.5%]) who were familiar with microchips being significantly ($P < 0.001$) higher than the percentage of non-pet owners (202/284 [71.1%]) who were familiar with microchips.

Participants who indicated that they owned 1 or more cats were asked several additional questions about neuter status, outdoor activity, and source of acquisition of the cats; whether cats wore an identification tag or had a microchip; and for cats without a tag or micro-

Table 1—Demographic characteristics of participants (n = 703) in a survey of attitudes toward and perceptions of free-roaming cats among individuals living in Ohio.

Variable	No. of respondents	Percentage	95% CI
Residential area			
Urban	173	24.6	21.4–27.8
Suburban	303	43.1	39.4–46.8
Rural	202	28.7	25.4–32.1
No response*	25	3.6	2.2–4.9
Marital status			
Married or significant other	376	53.5	49.8–57.2
Single	169	24.0	20.9–27.2
Widowed	78	11.1	8.8–13.4
Divorced	60	8.5	6.5–10.6
Other	9	1.3	0.5–2.1
No response	11	1.6	0.6–2.5
Highest grade or year of school completed			
Elementary	15	2.1	1.1–3.2
High school	292	41.5	37.9–45.2
4-y college	166	23.6	20.5–26.8
Graduate or professional degree	108	15.4	12.7–18.0
Trade school or 2-y college	114	16.2	13.5–18.9
No response	8	1.1	0.4–1.9
Racial and ethnic background			
White	591	84.1	81.4–86.8
Black	60	8.5	6.5–10.6
Asian	8	1.1	0.4–1.9
Hispanic Latino	11	1.6	0.6–2.5
Other	11	1.6	0.6–2.5
No response	22	3.1	1.8–4.4
Approximate total yearly household income			
< \$20,000	81	11.5	9.2–13.9
\$20,001–\$35,000	97	13.8	11.2–16.4
\$35,001–\$50,000	109	15.5	12.8–18.2
\$50,001–\$75,000	120	17.1	14.3–19.9
\$75,001–\$100,000	73	10.4	8.1–12.6
> \$100,000	78	11.1	8.8–13.4
No response	145	20.6	17.6–23.6

*Participant did not know or refused to answer

chip, the reasons why these identification methods were not used (Table 2). Rural participants (55/70 [78.6%]) were significantly ($P < 0.001$) less likely to have had their cats neutered than were suburban (96/96 [100%]) or urban (45/47 [95.7%]) participants. Rural residents (21/69 [30.4%]) were also significantly ($P < 0.001$) less likely to keep their cats indoors than were urban (31/47 [66.0%]) or suburban (73/95 [76.8%]) participants.

Attitudes toward cats in general and toward free-roaming cats—When asked which category best described their feelings toward cats, 146 of the 703 (20.8%; 95% CI, 17.8% to 23.8%) participants described themselves as cat lovers, 286 (40.7%; 95% CI, 37.0% to 44.3%) said that they liked cats, 144 (20.5%; 95% CI, 17.5% to 23.5%) said that they did not care about cats 1 way or the other, 122 (17.4%; 95% CI, 14.5% to 20.2%) said that they did not like cats, and 5 (0.7%; 95% CI, 0% to 1.3%) said that they did not know how they felt about cats or refused to answer the question. The percentage of cat owners who described themselves as cat lovers or liking cats (202/215 [94.0%]) was significantly ($P < 0.001$) higher than the percentage of all other participants who described themselves in these ways (230/483 [47.6%]).

Two hundred three of the 703 participants reported seeing free-roaming cats in their neighborhoods (other than their own cats) on a daily basis (28.9%; 95% CI, 25.5% to 32.2%), 99 reported seeing them on a weekly basis (14.1%; 95% CI, 11.5% to 16.7%), 35 reported seeing them on a monthly basis (5.0%; 95% CI, 3.4% to 6.6%), 216 reported seeing them on occasion (30.7%; 95% CI, 27.3% to 34.1%), 141 reported never seeing them (20.1%; 95% CI, 17.1% to 23.0%), and 9 reported that they did not know how frequently they saw them. For the 337 participants who saw free-roaming cats monthly or more often, the number of different free-roaming cats they saw during any given month ranged from 1 to 2 cats ($n = 137$ [40.7%; 95% CI, 35.4% to 46.0%]), 3 to 5 cats (126 [37.4%, 95% CI, 32.2% to 42.6%]), 6 to 10 cats (40 [11.9%; 95% CI, 8.4% to 15.3%]), or > 10 cats (26 [7.7%; 95% CI, 4.9% to 10.6%]), with 8 participants reporting that they did not know the number of cats seen. Suburban residents were significantly ($P < 0.001$) less likely to see free-roaming cats than urban or rural residents, and number of cats seen during any given month was significantly ($P < 0.001$) lower for suburban residents than for urban or rural residents.

Table 2—Characteristics of participants ($n = 217$) who reported owning cats in a study of attitudes toward and perceptions of free-roaming cats among individuals living in Ohio.

Variable	No. of respondents	Percentage	95% CI
Cats spayed or neutered			
Yes, all cats	185	85.3	80.5–90.0
Yes, some cats	14	6.5	3.2–9.7
No	17	7.8	4.2–11.4
No response	1	0.5	0–1.4
Amount of time cats spend outdoors			
None (indoors only)	128	59.0	52.4–65.6
< 1 h a day	20	9.2	5.3–13.1
1–3 h a day	23	10.6	6.5–14.7
3–6 h a day	14	6.5	3.2–9.7
6–12 h a day	11	5.1	2.1–8.0
> 12 h a day	18	8.3	4.6–12.0
No response	3	1.4	0–2.9
Source of currently owned cats†			
Stray	97	44.7	38.0–51.4
Neighbor, friend, or family member	84	38.7	32.2–45.2
Animal shelter or humane society	44	20.3	14.9–25.7
Pet store	17	7.8	4.2–11.4
Breeder	11	5.1	2.1–8.0
Other	22	10.1	6.1–14.2
Forms of identification worn by cats			
Tag, microchip, or both	43	19.8	14.5–25.2
Tag	38	17.5	12.4–22.6
Microchip	7	3.2	1.6–21.6
Primary reason for cats not wearing a tag			
Cat is indoors only	92	51.4	44.0–58.8
Cat does not get lost	43	24.0	17.7–30.3
Cat does not tolerate wearing a collar	15	8.4	4.3–12.5
Concerned cat may get hurt wearing a collar	5	2.8	0.4–5.2
Never thought about it	6	3.4	0.7–6.0
Other	18	10.1	5.6–14.5
Primary reason for cats not having a microchip			
Cat is indoor only	74	35.8	29.2–42.3
Cat does not get lost	37	17.9	12.6–23.1
Too expensive	34	16.4	11.3–21.5
Not familiar with microchips	19	9.2	5.2–13.1
Never thought about it	13	6.3	2.9–9.6
Opposed to microchips	13	6.3	2.9–9.6
Unsure how to acquire a microchip	7	3.4	0.9–5.9
Other	10	4.8	1.9–7.8

†Multiple answers were allowed.
See Table 1 for remainder of key.

A total of 546 participants responded to the question regarding their feelings toward free-roaming cats, with 266 (48.7%) expressing positive or sympathetic feelings, 177 (32.4%) expressing neutral feelings, 159 (29.1%) expressing negative feelings toward the cats, and 78 (14.3%) expressing negative or angry feelings toward the situation or owners (multiple responses were allowed). The percentage of cat owners who expressed negative feelings toward free-roaming cats (32/173 [18.5%]) was significantly ($P < 0.001$) lower than the percentage of all other participants who did (127/371 [34.2%]), and the percentage of cat owners who expressed positive or sympathetic feelings toward free-roaming cats (108/174 [62.1%]) was significantly ($P < 0.001$) higher than the percentage of all other participants who did (158/372 [42.5%]). There were no significant differences in percentages of cats owners and percentages of all other participants who expressed neutral feelings toward the cats or angry feelings toward the situation. In addition, no differences were found among urban, suburban, and rural participants.

Feeding and management of free-roaming cats—One hundred eighty-four of the 703 (26.2%; 95% CI, 22.9% to 29.4%) participants reported that they had fed free-roaming cats during the previous year (Table 3). This was 184 of the 552 (33.3%; 95% CI, 29.4% to 37.3%) participants who reported that they had seen free-roaming cats. The percentage of cat owners who fed free-roaming cats (94/175 [53.7%]) was significantly ($P < 0.001$) higher than the percentage of all other participants who did (90/377 [23.9%]), and rural residents (71/168 [42.3%]) were significantly ($P = 0.017$) more likely to feed free-roaming cats than were suburban (70/228 [30.7%]) or urban (38/135 [28.1%]) residents. Feeding and management of free-roaming cats did not differ between cats owners and other participants, with the exception that 34 of the 42 (81%) participants who reported having taken a free-roaming cat they were feeding to a veterinarian were cat owners and only 8 (19%) were not cat owners; these percentages were significantly ($P < 0.001$) different. For resident types,

suburban residents fed free-roaming cats less often than rural or urban residents ($P = 0.005$).

Awareness of laws regulating cats and spay-neuter programs for cats—When asked whether they were aware of any laws in their area regulating free-roaming cats, 89 of the 703 (12.7%; 95% CI, 10.2% to 15.1%) participants answered yes, 402 (57.2%; 95% CI, 53.5% to 60.9%) answered no, and 212 (30.2%; 95% CI, 26.8% to 33.6%) answered that they did not know. When asked whether they were aware of any laws in their area regulating free-roaming dogs, 473 (67.3%; 95% CI, 63.8% to 70.8%) answered yes, 121 (17.2%; 95% CI, 14.4% to 20.0%) answered no, and 109 (15.5%; 95% CI, 12.8% to 18.2%) answered that they did not know. There was no difference in percentage of participants aware of laws regulating free-roaming dogs between dog owners and other participants. When asked whether any private or government agencies in their community offered trap-neuter-return programs, 79 of the 703 (11.2%; 95% CI, 8.9% to 13.6%) participants answered yes, 328 (46.7%; 95% CI, 43.0% to 50.4%) answered no, and 296 (42.1%; 95% CI, 38.4% to 45.8%) answered that they did not know. There was no significant difference in percentages of participants aware of trap-neuter-return programs between cat owners and other participants; among urban, suburban, and rural participants; or between those who fed free-roaming cats and those who did not.

Beliefs about free-roaming cats and regulations—Cat owners were significantly more likely than other participants to believe that free-roaming cats on average had shorter lifespans than owned cats, to support trap-neuter-return programs as a way to control free-roaming cats, to support the use of tax dollars for low-cost spay-neuter programs for free-roaming cats, to oppose laws mandating cat licensing, to oppose laws prohibiting cats from roaming freely, to oppose mandates requiring owners to identify their cats, and to oppose having the local government be responsible for controlling free-roaming cats (Table 4). Ur-

Table 3—Responses of individuals (n = 184) who reported having fed free-roaming cats in the previous year regarding feeding and management of free-roaming cats.

Variable	No. of respondents	Percentage	95% CI
Typical number of cats fed in the past year			
1–2	90	48.9	41.6–56.2
3–5	34	18.5	12.8–24.1
6–10	20	10.9	6.3–15.4
> 10	21	11.4	6.8–16.1
No response	19	10.3	5.9–14.8
Typical feeding frequency			
Daily	46	25.0	18.7–31.3
Several times a week	15	8.2	4.2–12.1
Weekly	14	7.6	3.7–11.5
Occasionally	96	51.2	44.9–59.4
No response	13	7.1	3.3–10.8
Litters seen in the past year			
Yes	43	23.4	17.2–29.5
No	98	53.2	46.0–60.5
No response	43	23.4	17.2–29.5
Taken cats to a veterinarian			
Yes	42	22.8	16.7–28.9
No	141	76.6	70.5–82.8
No response	1	0.5	0–1.6
Taken cats to an animal shelter or humane society			
Yes	36	19.6	13.8–25.4
No	147	79.9	74.0–85.8
No response	1	0.5	0–1.6

Table 4—Opinions of participants (n = 703) in a survey of attitudes toward and perceptions of free-roaming cats among individuals living in Ohio regarding laws and regulations intended to control free-roaming cats.

Statement	Respondent category*	No. (%) of respondents						P value†
		Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Don't know	
Free-roaming cats typically have a shorter lifespan than owned cats								
	All (703)	126 (17.9)	384 (54.6)	92 (13.1)	50 (7.1)	10 (1.4)	41 (5.8)	
	Cat owner (217)	52 (24.0)	123 (56.7)	23 (10.6)	12 (5.5)	2 (0.9)	5 (2.3)	0.003
	Other (486)	74 (15.2)	261 (53.7)	69 (14.2)	38 (7.8)	8 (1.7)	36 (7.4)	
	Urban (173)	29 (16.8)	95 (54.9)	22 (12.7)	16 (9.3)	1 (0.6)	10 (5.8)	0.346
	Suburban (303)	64 (21.1)	162 (53.5)	48 (15.8)	11 (3.6)	4 (1.3)	14 (4.6)	
	Rural (202)	31 (15.4)	115 (56.9)	18 (8.9)	19 (9.4)	4 (2.0)	15 (7.4)	
Humane societies typically receive government funding to handle free-roaming cats								
	All (701)	16 (2.3)	191 (27.3)	129 (18.4)	167 (23.8)	29 (4.1)	169 (24.1)	
	Cat owner (216)	4 (1.9)	59 (27.3)	38 (17.6)	55 (25.5)	8 (3.7)	52 (24.1)	0.741
	Other (485)	12 (2.5)	132 (27.2)	91 (18.8)	112 (23.1)	21 (4.3)	117 (24.1)	
	Urban (172)	5 (2.9)	36 (20.9)	41 (23.8)	40 (23.3)	8 (4.7)	42 (24.4)	0.181
	Suburban (303)	7 (2.3)	78 (25.7)	48 (15.8)	79 (26.1)	14 (4.6)	77 (25.4)	
	Rural (201)	4 (2.0)	67 (33.3)	38 (18.9)	45 (22.4)	7 (3.5)	40 (19.9)	
Most free-roaming cats handled by animal agencies are eventually adopted								
	All (703)	15 (2.1)	138 (19.6)	90 (12.8)	319 (45.4)	54 (7.7)	87 (12.4)	
	Cat owner (217)	4 (1.8)	41 (18.9)	21 (9.7)	97 (44.7)	25 (11.5)	29 (13.4)	0.062
	Other (486)	11 (2.3)	97 (20.0)	69 (14.2)	222 (45.7)	29 (6.0)	58 (11.9)	
	Urban (173)	8 (4.6)	38 (22.0)	25 (14.5)	79 (45.7)	11 (6.4)	12 (6.9)	0.120
	Suburban (303)	3 (1.0)	56 (18.5)	35 (11.6)	149 (49.2)	25 (8.3)	35 (11.6)	
	Rural (202)	3 (1.5)	36 (17.8)	30 (14.9)	81 (40.1)	17 (8.4)	35 (17.3)	
Most cats that stray are able to find their way home on their own								
	All (703)	50 (7.1)	394 (56.1)	82 (11.7)	128 (18.2)	10 (1.4)	39 (5.6)	
	Cat owner (217)	16 (7.4)	119 (54.8)	27 (12.4)	43 (19.8)	3 (1.4)	9 (4.2)	0.561
	Other (486)	34 (7.0)	275 (56.6)	55 (11.3)	85 (17.5)	7 (1.5)	30 (6.2)	
	Urban (173)	12 (6.9)	100 (57.8)	21 (12.1)	30 (17.3)	4 (2.3)	6 (3.5)	0.685
	Suburban (303)	20 (6.6)	166 (54.8)	33 (10.9)	59 (19.5)	4 (1.3)	21 (6.9)	
	Rural (202)	17 (8.4)	115 (56.9)	25 (12.4)	34 (16.8)	2 (1.0)	9 (4.5)	
Free-roaming cats are a problem in Ohio								
	All (702)	91 (13.0)	295 (42.0)	117 (16.7)	113 (16.1)	10 (1.4)	76 (10.8)	
	Cat owner (217)	30 (13.8)	93 (42.9)	30 (13.8)	36 (16.6)	7 (3.2)	21 (9.7)	0.991
	Other (485)	61 (12.6)	202 (41.7)	87 (17.9)	77 (15.9)	3 (0.6)	55 (11.3)	
	Urban (173)	25 (14.5)	66 (38.2)	35 (20.2)	26 (15.0)	5 (2.9)	16 (9.3)	0.706
	Suburban (302)	36 (11.9)	127 (42.1)	54 (17.9)	45 (14.9)	3 (1.0)	37 (12.3)	
	Rural (202)	28 (13.9)	90 (44.6)	27 (13.4)	34 (16.8)	2 (1.0)	21 (10.4)	
Free-roaming cats are a problem in my neighborhood								
	All (703)	75 (10.7)	133 (18.9)	50 (7.1)	338 (48.1)	94 (13.4)	13 (1.9)	
	Cat owner (217)	16 (7.4)	43 (19.8)	13 (6.0)	114 (52.5)	27 (12.4)	4 (1.8)	0.315
	Other (486)	59 (12.1)	90 (18.5)	37 (7.6)	224 (46.1)	67 (13.8)	9 (1.9)	
	Urban (173)	24 (13.9)	48 (27.8)	6 (3.5)	67 (38.7)	26 (15.0)	2 (1.2)	0.004
	Suburban (303)	26 (8.6)	43 (14.2)	20 (6.6)	159 (52.5)	47 (15.5)	8 (2.6)	
	Rural (202)	22 (10.9)	36 (17.8)	22 (10.9)	102 (50.5)	18 (8.9)	2 (1.0)	
There should be a law prohibiting cats from roaming freely								
	All (703)	97 (13.8)	247 (35.1)	109 (15.5)	205 (29.2)	32 (4.6)	13 (1.9)	
	Cat owner (217)	15 (6.9)	58 (26.7)	36 (16.6)	87 (40.1)	20 (9.2)	1 (0.5)	< 0.001
	Other (486)	82 (16.9)	189 (38.9)	73 (15.0)	118 (24.3)	12 (2.5)	12 (2.5)	
	Urban (173)	22 (12.7)	57 (33.0)	25 (14.5)	60 (34.7)	7 (4.1)	2 (1.2)	0.004
	Suburban (303)	48 (15.8)	117 (38.6)	48 (15.8)	73 (24.1)	11 (3.6)	6 (2.0)	
	Rural (202)	23 (11.4)	62 (30.7)	33 (16.3)	68 (33.7)	14 (6.9)	2 (1.0)	
Cat owners should be required to provide identification (tag or microchip) for their cats								
	All (703)	135 (19.2)	399 (56.8)	61 (8.7)	81 (11.5)	15 (2.1)	12 (1.7)	
	Cat owner (217)	26 (12.0)	93 (42.9)	32 (14.8)	53 (24.4)	11 (5.1)	2 (0.9)	< 0.001
	Other (486)	109 (22.4)	306 (63.0)	29 (6.0)	28 (5.8)	4 (0.8)	10 (2.1)	
	Urban (173)	35 (20.3)	97 (56.1)	15 (8.7)	20 (11.6)	4 (2.3)	2 (1.2)	0.001
	Suburban (303)	71 (23.4)	171 (56.4)	27 (8.9)	23 (7.6)	8 (2.6)	3 (1.0)	
	Rural (202)	23 (11.4)	118 (58.4)	19 (9.4)	35 (17.3)	3 (1.5)	4 (2.0)	
I oppose licensing of cats								
	All (703)	26 (3.7)	155 (22.1)	76 (10.8)	344 (48.9)	90 (12.8)	12 (1.7)	
	Cat owner (217)	14 (6.5)	78 (35.9)	28 (12.9)	78 (35.9)	19 (8.8)	0	< 0.001
	Other (486)	12 (2.5)	77 (15.8)	48 (9.9)	266 (54.7)	71 (14.6)	12 (2.5)	
	Urban (173)	5 (2.9)	35 (20.2)	17 (9.8)	83 (48.0)	30 (17.3)	3 (1.7)	0.001
	Suburban (303)	11 (3.6)	56 (18.5)	29 (9.6)	166 (54.8)	37 (12.2)	4 (1.3)	
	Rural (202)	9 (4.5)	58 (28.7)	29 (14.4)	84 (41.6)	19 (9.4)	3 (1.5)	

Table 4 continued on next page.

Table 4—Opinions of participants (n = 703) in a survey of attitudes toward and perceptions of free-roaming cats among individuals living in Ohio regarding laws and regulations intended to control free-roaming cats (continued).

Statement	Respondent category*	No. (%) of respondents						P value†
		Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Don't know	
Local governments should be responsible for controlling free-roaming cats								
	All (703)	50 (7.1)	268 (38.2)	91 (13.0)	238 (33.9)	32 (4.6)	23 (3.3)	< 0.001
	Cat owner (217)	12 (5.5)	67 (30.9)	29 (13.4)	86 (39.6)	16 (7.4)	7 (3.2)	
	Other (485)	38 (7.8)	201 (41.4)	62 (12.8)	152 (31.3)	16 (3.3)	16 (3.3)	
	Urban (173)	15 (8.7)	72 (41.6)	22 (12.7)	54 (31.2)	6 (3.5)	4 (2.3)	0.003
	Suburban (302)	23 (7.6)	121 (40.1)	46 (15.2)	93 (30.8)	13 (4.3)	6 (2.0)	
	Rural (202)	9 (4.5)	65 (32.2)	22 (10.9)	84 (41.6)	13 (6.4)	9 (4.5)	
Cats should be kept strictly indoors as pets								
	All (703)	46 (6.5)	187 (26.6)	79 (11.2)	341 (48.5)	44 (6.3)	6 (0.9)	0.146
	Cat owner (217)	14 (6.5)	56 (25.8)	21 (9.7)	102 (47.0)	23 (10.6)	1 (0.5)	
	Other (486)	32 (6.6)	131 (27.0)	58 (11.9)	239 (49.2)	21 (4.3)	5 (1.0)	
	Urban (173)	8 (4.6)	43 (24.9)	18 (10.4)	92 (53.2)	9 (5.2)	3 (1.7)	< 0.001
	Suburban (303)	24 (7.9)	93 (30.7)	40 (13.2)	134 (44.2)	12 (4.0)	0 (0)	
	Rural (202)	11 (5.5)	39 (19.3)	18 (8.9)	108 (53.5)	23 (11.4)	3 (1.5)	
Trap-neuter-return programs are a good way to manage free-roaming cats								
	All (703)	89 (12.7)	449 (63.9)	78 (11.1)	58 (8.3)	12 (1.7)	17 (2.4)	0.031
	Cat owner (217)	35 (16.1)	143 (65.9)	19 (8.8)	17 (7.8)	2 (0.9)	1 (0.5)	
	Other (486)	54 (11.1)	306 (63.0)	59 (12.1)	41 (8.4)	10 (2.1)	16 (3.3)	
	Urban (173)	26 (15.0)	110 (63.6)	18 (10.4)	14 (8.1)	1 (0.6)	4 (2.3)	0.040
	Suburban (303)	42 (13.9)	202 (66.7)	26 (8.6)	24 (7.9)	4 (1.3)	5 (1.7)	
	Rural (202)	20 (9.9)	123 (60.9)	30 (14.9)	18 (8.9)	5 (2.5)	6 (3.0)	
Stray cats can typically survive on their own								
	All (703)	23 (3.3)	218 (31.0)	103 (14.7)	292 (41.5)	38 (5.4)	29 (4.1)	0.876
	Cat owner (217)	8 (3.7)	71 (32.7)	37 (17.1)	77 (35.5)	21 (9.7)	3 (1.4)	
	Other (486)	15 (3.1)	147 (30.3)	66 (13.6)	215 (44.2)	17 (3.5)	26 (5.4)	
	Urban (173)	11 (6.4)	53 (30.6)	25 (14.5)	68 (39.3)	10 (5.8)	6 (3.5)	0.148
	Suburban (303)	9 (3.0)	81 (26.7)	46 (15.2)	135 (44.6)	19 (6.3)	13 (4.3)	
	Rural (202)	3 (1.5)	71 (35.2)	30 (14.9)	84 (41.6)	7 (3.5)	7 (3.5)	
I support mandatory spay-neuter laws for cats								
	All (703)	86 (12.2)	337 (47.9)	90 (12.8)	156 (22.2)	18 (2.6)	16 (2.3)	0.898
	Cat owner (217)	32 (14.8)	101 (46.5)	17 (7.8)	56 (25.8)	7 (3.2)	4 (1.8)	
	Other (486)	54 (11.1)	236 (48.6)	73 (15.0)	100 (20.6)	11 (2.3)	12 (2.5)	
	Urban (173)	21 (12.1)	84 (48.6)	20 (11.6)	41 (23.7)	5 (2.9)	2 (1.2)	0.014
	Suburban (303)	42 (13.9)	156 (51.5)	36 (11.9)	59 (19.1)	5 (1.7)	6 (2.0)	
	Rural (202)	19 (9.4)	87 (43.1)	29 (14.4)	52 (25.7)	8 (4.0)	7 (3.5)	
I support using tax dollars to support low-cost spay-neuter programs for cats								
	All (703)	41 (5.8)	293 (41.7)	101 (14.4)	220 (31.3)	38 (5.4)	10 (1.4)	< 0.001
	Cat owner (217)	14 (6.5)	112 (51.6)	31 (14.3)	50 (23.0)	10 (4.6)	0	
	Other (486)	27 (5.6)	181 (37.2)	70 (14.4)	170 (35.0)	28 (5.8)	10 (2.1)	
	Urban (173)	9 (5.2)	87 (50.3)	16 (9.3)	49 (28.3)	9 (5.2)	3 (1.7)	0.004
	Suburban (303)	23 (7.6)	128 (42.2)	48 (15.8)	90 (29.7)	10 (3.3)	4 (1.3)	
	Rural (202)	1 (0.5)	71 (35.2)	35 (17.3)	69 (34.2)	18 (8.9)	1 (0.5)	
I support laws requiring cats be vaccinated against rabies								
	All (703)	143 (20.3)	475 (67.6)	32 (4.6)	47 (6.7)	2 (0.3)	4 (0.6)	0.107
	Cat owner (217)	42 (19.4)	140 (64.5)	11 (5.1)	22 (10.1)	1 (0.5)	1 (0.5)	
	Other (486)	101 (20.8)	335 (68.9)	21 (4.3)	25 (5.1)	1 (0.2)	3 (0.6)	
	Urban (173)	35 (20.2)	123 (71.1)	5 (2.9)	4 (4.1)	1 (0.6)	2 (1.2)	< 0.001
	Suburban (303)	74 (24.4)	200 (66.0)	15 (5.0)	14 (4.6)	0 (0)	0 (0)	
	Rural (202)	28 (13.9)	135 (66.8)	12 (5.9)	24 (11.9)	1 (0.5)	2 (1.0)	

*Numbers in parentheses represent numbers of respondents in that category.
†For each question, the first P value is for the comparison between cat owners and other, and the second P value is for the comparison among urban, suburban, and rural respondents.

ban, suburban, and rural participants differed significantly in their belief that free-roaming cats were a problem in their neighborhood, that there should be laws prohibiting cats from roaming freely, that identification should be required for cats, that owners should be required to license cats, that local governments should be responsible for controlling free-roaming cats, that cats should be kept strictly indoors as pets, that trap-neuter-return programs were a good way to control free-roaming cats, that there should be mandatory spay-neuter laws for cats, that tax-dollars should be used for low-cost spay-neuter programs for cats, and that rabies

vaccination should be mandatory for cats. There was not a significant level of agreement among the 5 questions related to participants' belief that free-roaming cats were a problem or among the 3 questions related to participants' support for laws regulating free-roaming cats.

Discussion

Results of the present study suggested that feeding of free-roaming cats was much more common in Ohio than previously reported in other parts of the country. In the

present study, 184 of the 703 (26.2%) respondents reported feeding free-roaming cats, compared with 12% of participants in a study¹³ in Alachua County, Fla; 10% of participants in a study¹⁴ in Santa Clara County, Calif; 9% of participants in a study¹⁵ in San Diego County, Calif; and 8% of participants in a study¹⁶ in Massachusetts. Ninety of the 184 (48.9%) participants who reported feeding free-roaming cats said that they had fed 1 or 2 free-roaming cats during the previous year, which was slightly lower than numbers of cats fed in these previous studies (mean, 2.6 to 3.7 cats). In addition, 302 of the 703 (43.0%) participants in the present study reported seeing free-roaming cats in their neighborhoods on a daily or weekly basis. The high proportions of participants who saw or fed free-roaming cats in the present study, compared with previous studies, may have been due, in part, to an increase in the popularity of cats in general and an increase in the number of unwanted cats, as reflected in the increase in the number of cats entering Ohio animal shelters.¹⁰ It may be that newer studies on feeding practices in other areas of the country would also reflect this increase in the number of people feeding free-roaming cats. In addition, in the present study, participants were asked about free-roaming cats, and no attempts were made to distinguish between owned and unowned cats. Thus, it is possible the number of participants feeding free-roaming cats was higher because some of the cats were owned.

In a previous study¹³ of free-roaming cats in Alachua County, Fla, only 11% of caretakers attempted to have free-roaming cats neutered. Similarly, in the present study, only 42 of the 184 (22.8%) participants who reported feeding free-roaming cats had ever taken any of these cats to a veterinarian for any type of veterinary care. One reason for this low percentage may be the lack of affordable resources, particularly low-cost spay-neuter services, for free-roaming cats. Only 79 (11.2%) participants in the present study reported that they were aware of a trap-neuter-return program in their community. Although 296 (42.1%) reported they did not know whether such a program existed in their community, it is likely that there is limited access to these types of programs in many parts of Ohio. In a survey¹⁰ of Ohio shelters conducted during 2004, for instance, only 23 (35%) humane societies and 1 public animal control agency reported that they offered trap-neuter-return programs for free-roaming cats. This lack of availability of programs and lack of use of veterinary care are particularly unfortunate given that 43 of the 184 (23.4%) participants who fed free-roaming cats reported that at least 1 litter had been born in the previous year. There is a great need for collaboration among veterinarians, humane groups, and individuals who feed free-roaming cats to develop solutions to help provide spay-neuter programs and veterinary care for these cats. Without these solutions, the number of free-roaming cats in Ohio will undoubtedly continue to rise.

Two hundred seventeen of the 703 (30.9%) participants in the present study reported owning 1 or more cats, which was consistent with the national average for cat ownership.¹ There was a dichotomy in the present study with regard to participants' feelings toward cats, with almost all (94.0%) cat owners describing themselves as cat lovers or liking cats, whereas only 47.6 of all other participants described themselves in the same way. Interestingly, 32.4% of the participants who expressed an opinion about free-roaming cats had neutral feelings.

Similarly, only 29.6% of participants strongly agreed or agreed with the statement that free-roaming cats were a problem in their neighborhoods. In contrast, 45.0% of participants strongly agreed or agreed with the statement that free-roaming cats were a problem in Ohio.

Many differences were identified between cat owners and other participants in the present study with regard to regulation of cats. For example, cat owners were much less supportive of laws prohibiting cats from roaming freely. Overall, only 181 (25.8%) participants strongly agreed or agreed with the statement that they were opposed to licensing of cats, but the percentage of cat owners who strongly agreed or agreed with this statement (42.4%) was substantially higher than the percentage of other participants who did (18.3%). These findings were similar to those from a study¹⁷ in 3 counties in California. Similarly, 48.9% of participants strongly agreed or agreed with the statement that a law should exist to keep cats from roaming freely, but only 33.6% of cats owners strongly agreed or agreed with this statement whereas 55.8% of other participants did, and a similar dichotomy was observed in responses to the statement that the local government should be responsible for controlling free-roaming cats. Not surprisingly, even though the percentage of cat owners who supported mandatory spay-neuter laws for cats was similar to the percentage of other participants who did, the percentage of cat owners (58.0%) who supported the use of tax dollars for low-cost spay-neuter programs was higher than the percentage of other participants who did (42.8%). Overall, most participants agreed with the statement that trap-neuter-return programs are a good way to manage free-roaming cats, but a slightly higher percentage of cat owners than other participants strongly agreed or agreed with this statement (82.0% vs 74.1%, respectively). These findings are consistent with findings in other communities¹⁷ and give support for lawmakers in Ohio who may attempt to address the problem of free-roaming cats by establishing low-cost spay-neuter and trap-neuter-return programs, but also show it may be more difficult to pass more restrictive types of laws requiring licensing of cats or implement regulations against allowing cats to roam.

Differences identified in the present study among participants in suburban versus urban versus rural areas present many challenges in managing free-roaming cats. In general, rural residents were more likely to feed free-roaming cats and let their own cats roam freely and were less likely to have their cats spayed or neutered. Urban residents strongly agreed or agreed with the statement that free-roaming cats were a problem in their neighborhood (41.6%) more often than suburban residents (22.8%). Suburban residents were also less likely to see free-roaming cats and saw fewer of them than did urban or rural residents. In general, rural residents were less supportive of laws and regulations regulating free-roaming cats than were urban or suburban residents. In particular, rural residents differed from one or both of the other groups in regard to expressing greater opposition to cat licensing and less support for prohibiting cats from roaming freely, having the local government be responsible for cat control, requiring cats be kept indoors, establishing mandatory spay-neuter laws, using tax dollars for low-cost spay-neuter programs, and mandating rabies vaccination of all cats. Traditionally, cats have been used to control rodent populations by farmers and it is not uncommon for barns to

house free-roaming cats. Also, rural residents are traditionally believed to be less in favor of government involvement, and it was not surprising to find them to be less supportive of laws regulating cats. These differences in attitudes among residential types suggest that a one-solution-fits-all approach through state laws may not be the best approach to manage free-roaming cats and that local approaches may be the most satisfactory to citizens. More research is needed to understand these differences in demographic groups and the impact they have on managing free-roaming cats.

Findings from the present study also suggest that only a minority of cat owners have some type of permanent identification (ie, tag or microchip) for their cats, with only 43 of the 217 (19.8%) cat owners having a tag, microchip, or both on their cats. This was despite the fact that 84.5% of pet owners in the study were familiar with the use of microchips. When participants were asked for the primary reason why their cat did not have a tag, the 2 reasons given most often were that the cat lived strictly indoors (51.4%) and that the cat did not get lost (24.0%). When participants were asked for the primary reason why their cat did not have a microchip, the 3 reasons given most often were that the cat lived strictly indoors (35.8%), the cat did not get lost (17.9%), and microchips are too expensive (16.4%). The prevalence of microchips in the present study was slightly lower than national estimates,¹⁸ and the prevalence of tags was comparable to the prevalence in a previous study¹⁹ of search and identification methods used to recover lost cats. Findings in the present study suggest that owners do not believe that identification is important for cats, particularly when they are kept indoors. Yet in the study¹⁹ examining search and identification methods for recovery of lost cats, 40% of the cats that were lost were indoor-only cats. Most participants also strongly agreed or agreed (63.2%) with the statement that cats that stray from home most likely will find their own way home, but this was almost twice the percentage of lost cats that found their way home in a previous study.¹⁹

Responses to 2 of the questions in the present study illustrate the need for better education of the public regarding animal care and control. Only 473 (67.3%) participants were aware that laws existed regulating dogs from roaming freely in their communities, whereas all 88 counties in Ohio have laws that do not permit dogs to run at large.¹⁰ When asked the same question about cats, only 89 (12.7%) participants believed such laws existed in their community (regulations prohibiting cats from roaming freely are administered at the municipal level in Ohio). Also, 29.5% of participants strongly agreed or agreed with the statement that humane societies typically receive government funding to handle free-roaming cats. However, although some humane societies in Ohio may contract with local municipalities to receive funding to handle cats, the amount of funding is likely much less than what was believed by participants in this study. Humane societies have an opportunity to do a better job in educating the public that most cat care in Ohio is done through donated dollars and not as a result of government funding.

As with any study, there were important limitations to the present findings. No information on nonresponders was collected, making it impossible to assess the impact of nonresponder bias on the findings. Because the study was done in a single geographic area in the United States, care must be taken when extrapolating the results to other

areas. However, Ohio is ranked seventh in population and has 2 of the 50 largest cities in the country.²⁰ The sampling methodology used in this study suggested that results were representative of attitudes and perceptions of Ohio residents, and it may be reasonable to suggest that other areas of the country may be similar to Ohio.

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- a. Strategic Research Group, Columbus, Ohio.
 - b. Copies of the survey are available from the author on request.
 - c. Genesys Sampling Systems, Fort Washington, Pa.
 - d. Computer-Assisted Survey Execution System (CASES), version 4.3, University of California, Berkeley, Calif.
 - e. Stata, version 10.0, StataCorp, College Station, Tex.
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