

Special Report

Demographic trends for animal care and control agencies in Ohio from 1996 to 2004

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Objective—To examine changes between 1996 and 2004 in regard to numbers of animals handled, medical care provided, expenses, numbers of employees, and agency policies for animal care and control agencies in Ohio.

Design—Cross-sectional survey.

Sample Population—223 animal care and control agencies.

Procedures—A questionnaire was mailed to animal care and control agencies in Ohio to collect information for 2004; results were compared with published results of a similar survey.

Results—165 of the 223 (74%) agencies responded. Estimated total number of animals handled in 2004 was 315,519, which represented a decrease of 7% compared with 1996. However, although number of dogs taken in decreased 17%, number of cats taken in increased 20%. Between 1996 and 2004, the euthanasia rate decreased from 65.3% to 56.8%, and the adoption rate increased from 24.5% to 33.6%. Number of dogs euthanatized decreased 39%, but number of cats euthanatized increased 14%. The proportion of agencies with a spay-neuter policy increased from 56% to 71%, and the proportion that maintained an association with a veterinarian increased from 39% to 80%. For dogs handled by county dog warden agencies, the odds of euthanasia were higher if the agency did not have a spay-neuter policy (odds ratio, 1.36).

Conclusions—Results suggest that the status of dogs handled by animal care and control agencies in Ohio improved between 1996 and 2004, but that the status of cats deteriorated. (*J Am Vet Med Assoc* 2006;229:48–54)

In the past quarter century, great efforts have been made to address the pet overpopulation problem in the United States. Previous authors¹⁻³ have estimated that between 13.5 and 18.6 million dogs and cats were euthanatized at animal shelters in the United States each year during the 1970s, but a more recent estimate currently places the annual figure as being between 4 and 6 million.⁴ Statistics have been reported in certain states that have also shown a decline in euthanasia of animals at shelters. In particular, in states where publicly funded spay-neuter programs have been in existence, animal statistics from shelters have been collected for more than a decade. In New Jersey, animal intake at shelters decreased by 29% and the euthanasia rate decreased by 10% between 1984 and 1999, despite an 8% increase in the state population.⁵ In New Hampshire, the mean annual euthanasia rate at animal shelters decreased by 77% after a state-funded spay-neuter assistance program was implemented.⁵

Because of a lack of information on animal care and control agencies, a comprehensive survey of animal care and control agencies in Ohio was performed to collect baseline statistics on the number of animals handled by these agencies during 1996 and to characterize agency policies, procedures, and needs.⁶ Less-detailed versions of the survey were performed to obtain information for 1997 through 2000. The purpose of the present study was to repeat the comprehensive survey to obtain information for 2004. The primary objective of the present survey was to examine trends among animal care and control agencies in Ohio since 1996 in regard to numbers of animals handled, medical care provided, expenses, numbers of employees, and policies of the agencies. The secondary objectives were to analyze trends in euthanasia rates and animal intake per capita for dogs and to identify factors associated with those trends. Factors that were considered in particular included whether the agency had a spay-neuter policy and whether the agency routinely used veterinary services.

Materials and Methods

For the present and previous⁶ studies, 3 types of organizations were included in the definition of animal care and control agencies: county dog warden agencies, municipal animal control agencies, and humane societies. Animal control in Ohio differs from that in most states in that state law mandates each county have an agency with an appointed

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Presented in part at the Conference of Research Workers in Animal Diseases, St Louis, December 2005.

The authors thank John Silva and Terry Conant of the Ohio Dog Wardens Association and Sharon Harvey, Dori Villalon, and Jodi Buckman of the Ohio Federated Humane Societies for assistance with survey development and follow-up.

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chief dog warden (the state law does not refer to cats). Although primarily responsible for control of stray dogs and enforcement of laws regarding stray dogs, wardens may also choose to handle owner-released dogs as well as other species. Municipal animal control agencies are usually located in cities that are part of a larger metropolitan area. These agencies are responsible for animal control in their own municipality and usually deal with numerous species, including wildlife. Humane societies consist of private non-profit organizations that usually were established to assist unwanted animals, typically by providing housing, adoption, and community education. Often in Ohio, the county humane officer in charge of cruelty investigations works for the local humane society. Some humane societies have contracts with local government agencies to perform animal control functions. In the present study, when the county agency to which the appointed dog warden was assigned (ie, the county dog warden agency) and a humane society acted as a single organization, we considered them to be a combined organization.

To allow results of the present survey to be compared with results of a similar previous survey,⁶ breed rescue groups were not included. Such groups are often transient in nature and difficult to identify. In addition, breed rescue groups typically focus on a single breed of dog and do not provide general animal services to the public, such as housing or education.

For the present survey, a comprehensive survey similar to the initial 1996 survey⁶ was used. The survey was reviewed by members of the Ohio Dog Wardens Association, the Ohio Federated Humane Societies, and a municipal officer. A common final survey instrument was used for all types of agencies.^a A database of all animal care and control agencies in Ohio was compiled from the internal list used for previous surveys, various Internet sources, and the Humane Society of the United States regional mailing lists. Phone calls were made prior to the survey to validate the existence of and proper addresses for agencies included in the study.

A standardized survey method was used.⁷ A letter of introduction explaining the purpose of the survey was sent to all agencies in February 2005. The survey itself was mailed in April 2005, and a postcard reminder was sent to agencies that had not responded by 3 weeks after the initial mailing. A final packet, similar to the initial one, was sent to those agencies that had not responded within 3 weeks after the initial postcard reminder was mailed. Representatives of The Ohio State University, the Ohio Dog Wardens Association, and the Ohio Federated Humane Societies placed telephone calls to the remaining nonrespondents between June and August 2005 to remind them to complete the survey. Survey responses were accepted through September 2005.

The survey included questions regarding general information about each agency; expenses and revenues; numbers of staff members and volunteers; number of animals handled during 2004 (by intake and disposition category as well as by species); adoption fees; adoption policies; methods for euthanasia and disposal of carcasses; medical care provided, including vaccination protocols, spay-neuter policy, and associations with veterinarians; and agency needs and the most important community animal welfare issue. For the needs assessment, agencies were asked to rank various areas on a scale from 1 (not important) to 5 (very important) and to indicate their 3 most pressing needs, drawn from the previous list or self-identified.

The survey method used for the present survey was the same as that used in a previous survey,⁶ which had requested information for 1996. For 1997 through 2000, similar methods were used to survey animal care and control agencies in Ohio, but a more limited questionnaire was used.

Statistical analysis—Median and range were calculated for responses that consisted of continuous data, and proportions were calculated for responses that consisted of categorical data. Standard software was used.^b Some agencies reported the number of animals by species but were unable to report the number of animals by intake category. For these agencies, numbers of animals in each intake category were extrapolated on the basis of mean percentages reported by agencies able to classify animals on the basis of intake categories. Animals received from other agencies and animals transferred to other agencies were not included in analyses to ensure that such animals were not counted twice.

For total expenses, animal intake, and animal disposition, estimates for the state as a whole were calculated. For total expenses, median expenses by agency type were calculated. To estimate total expenses for the state as a whole, the median value by agency type was assigned to each nonrespondent agency and each respondent agency that did not provide information on expenses, and these values were added to total expenses for respondents that provided information on expenses. For animal intake and animal disposition, median numbers of animals were calculated for respondents grouped by agency type (ie, municipal agencies and humane societies). Median numbers were also calculated for each category on the basis of the known percentage of animals in each category. Categories for animal intake included strays, owner surrendered, and cruelty-neglect-other; categories for animal disposition included adopted, reclaimed by owner, euthanatized, and other-died-lost. To estimate animal intake and disposition values for the state as a whole, the median value was assigned to each nonrespondent agency and each respondent agency that did not provide information on animal numbers. These values were then added to total numbers for respondent agencies that provided information on animal numbers. Although all dog wardens who were sent a survey responded, 3 dog wardens were not able to report animal numbers. Because these dog wardens reported animal numbers in 2000, values reported for 2000 were used as estimates for animal intake and disposition. Number of animals taken in by all agencies in the state and number of animals euthanatized were calculated as a proportion of the human population and as a proportion of the animal population in the state. For these calculations, state and county human population estimates were obtained from the US Census Bureau,⁸ and animal population estimates were obtained from the AVMA.^{9,10}

To analyze responses to the 3 most pressing needs, a weighted-mean score was calculated by assigning the need ranked first a value of 3 points, the need ranked second a value of 2 points, and the need ranked third a value of 1 point.

For the county dog warden agencies, adequate data were collected during the 6 years that surveys were performed to allow for longitudinal data analysis to examine trends in dog intake and euthanasia rates. For this analysis, a combined county dog warden agency and humane society that acted as a single organization was treated as a county dog warden agency. County dog warden agencies that transferred all dogs to another agency were not included in this analysis. Covariates that were included in the analysis included total yearly expenses, total numbers of full-time and part-time employees, use of veterinary services (yes vs no), and presence of a spay-neuter policy (yes vs no). Total numbers of employees were calculated for each year by adding the total numbers of full-time and part-time employees, with part-time employees each assigned a weight of 0.5 full-time employee. All yearly expenses were adjusted for inflation to be equivalent to 2004 dollars.¹¹

To model the odds that a dog would be euthanatized by a county dog warden agency, a generalized linear mixed-

effects model with a logit link function was used.^c The response variable was modeled as a proportion for each dog warden agency by means of events per trials syntax (ie, number of dogs euthanatized per number of dogs handled). A random intercept was included in the model for each dog warden agency to allow for agency-specific effects. The model assumed conditional independence, meaning that all observations for a given dog warden agency were assumed to be independent, given the random intercept. Model building was done by means of a forward selection process. A variable for year was forced into the model because of the hypothesized change in rate over time. Each potential covariate was then tested for entry into the base model. At each stage, the covariate with the lowest Wald *P* value was added to the previous model.¹² This process was continued until the addition of no additional covariate significantly improved the model at an α value of 0.05, as determined by the Wald test. Once all main effects were determined, relevant quadratic and interaction terms were examined, with entry again determined on the basis of an α value of 0.05, as determined by the Wald test. Diagnostic testing was performed to test the assumption of linearity in the logit for continuous variables. A histogram was used to evaluate normality of the random intercepts, and a predicted versus residual value plot was used to examine equality of the variances.

To model the number of dogs handled by county dog warden agencies, a linear mixed-effects model was used.^d To account for differences in sizes of the counties served, intake rates were standardized by dividing the number of dogs taken in by the population served, with population served determined on the basis of state and county human population estimates obtained from the US Census Bureau.⁸ The outcome, expressed as dogs per person served, was found to be approximately normally distributed when log transformed.

Therefore, the natural logarithm of the intake rate was modeled as a continuous variable. A random intercept was included in the model to allow for agency-specific effects. The model building was carried out as described for analysis of the odds of euthanasia. With the use of a random intercept, an exchangeable correlation structure was assumed for the residuals. Diagnostic testing was performed to examine normality of the random intercepts and equality of the variances as described.

Results

Surveys were mailed to 223 animal care and control agencies, of which 165 (74%) responded. All 88 (100%) county dog warden agencies responded, along with 23 of 33 (70%) municipal animal control agencies, and 65 of 113 (58%) humane societies (11 county dog warden agencies and humane societies provided combined responses for the survey; each was counted separately for calculation of response rates by agency, but responses were included only once for all other analyses).

Expenses and numbers of employees and volunteers—Median values for annual expenses and number of full-time employees during 2004 were calculated by type of animal care and control agency (Table 1). Estimated total expenses for all animal care and control agencies in Ohio during 2004 were \$57.7 million, which was a 69% increase compared with estimated total expenses during 1996, after adjustment for inflation (\$34.2 million). Estimated total amount of money allocated by county and city governments in Ohio for use by animal care and control agencies during 2004 was \$25.8 million, which was a 39% increase compared with esti-

Table 1—Estimated annual expenses and number of employees during 1996 and 2004 for animal care and control agencies in Ohio.

Agency type	No. of agencies responding		Expenses (\$)		No. of full-time employees	
	1996	2004	1996	2004	1996	2004
County dog warden agency	66	77	106,000 (16,900–1,500,000)	135,000 (14,500–3,500,000)	2 (0–38)	2 (0–53)
Humane society	67	65	90,000 (1,500–1,700,000)	151,000 (4,200–4,300,000)	1 (0–28)	1 (0–40)
Municipal animal control agency	47	23	41,000 (3,600–275,000)	52,000 (900–800,000)	1 (0–15)	1 (0–12)

Values represent median (range). Values for 1996 have been reported previously,⁸ but were now adjusted for inflation to be equivalent to 2004 dollars.

Table 2—Estimated total numbers of animals handled by animal care and control agencies in Ohio during 1996 and 2004.

Category	Dogs		Cats		Other animals		Total	
	1996	2004	1996	2004	1996	2004	1996	2004
Animal intake								
Stray	141,791 (66.2)	118,153 (66.2)	57,186 (49.8)	95,208 (73.8)	8,960 (88.0)	6,720 (84.5)	207,937 (61.3)	220,081 (69.8)
Owner surrendered	68,983 (32.2)	56,386 (31.6)	56,196 (48.9)	31,483 (24.4)	383 (3.7)	1,095 (13.8)	125,562 (37.0)	88,964 (28.1)
Cruelty-neglect-other	3,369 (1.6)	4,054 (2.2)	1,495 (1.3)	2,286 (1.8)	844 (8.3)	134 (1.7)	5,708 (1.7)	6,474 (2.1)
Total	214,143 (100)	178,593 (100)	114,877 (100)	128,977 (100)	10,187 (100)	7,949 (100)	339,207 (100)	315,519 (100)
Animal disposition								
Adopted	51,662 (24.4)	63,783 (37.5)	29,477 (26.3)	39,828 (29.7)	329 (3.5)	948 (12.3)	81,468 (24.5)	104,559 (33.6)
Reclaimed	29,302 (13.9)	26,919 (15.9)	1,004 (0.9)	1,240 (0.9)	58 (0.6)	20 (0.3)	30,364 (9.1)	28,179 (9.0)
Euthanatized	128,637 (60.9)	78,470 (46.2)	80,922 (72.2)	92,168 (68.8)	7,872 (82.9)	6,458 (84.1)	217,431 (65.3)	177,096 (56.8)
Other-died-lost	1,745 (0.8)	691 (0.4)	627 (0.6)	846 (0.6)	1,237 (13.0)	251 (3.3)	3,609 (1.1)	1,788 (0.6)
Total	211,346 (100)	169,863 (100)	112,030 (100)	134,082 (100)	9,496 (100)	7,677 (100)	332,872 (100)	311,622 (100)

Values are given as number of animals (%).

mated total amount allocated during 1996, after adjustment for inflation (\$18.6 million). In estimating total expenses for all animal care and control agencies in Ohio during 2004, extrapolations were used for 89 (40%) of the agencies.

Overall, 32 of the 164 (20%) animal care and control agencies that responded reported that they did not have any full-time employees during 2004, and 22 (13%) reported that they did not have any full- or part-time employees. Seventy-eight of 158 (49%) agencies indicated that they spent money on employee training during 2004. Eighty-three of 164 (51%) agencies employed volunteers during 2004, compared with 70 of 175 (40%) agencies that employed volunteers during 1996.

Median age of buildings used by animal care and control agencies during 2004 was 20 years (range, 0.25 to 150 years). Thirty-six of 115 (31%) agencies reported having built a new facility, or completed a substantial addition, since 1996.

Number of animals handled—Of the 165 agencies that responded, 153 (93%) were able to provide information on the number of animals handled during 2004 (Table 2). Information on disposition was available for 3,897 fewer animals than the number of animals taken in during 2004; this difference was assumed to represent animals still residing at the agencies at the end of the year. Agencies did not classify 29,514 (9%) animals in regard to intake categories, and these animals were assigned to intake categories on the basis of mean percentages of animals in each category. In estimating total numbers of animals handled during 2004, extrapolations were used for 63 (28%) agencies. Total numbers of animals taken in and euthanatized were calculated as a proportion of the human and animal population in the state (Table 3).

Adoption fees and policy—Of the 165 agencies that responded, 131 (79%) provided adoption services, compared with 82% that did during 1996. The remaining agencies transferred animals to other agencies that were responsible for adoption. Adoption fees for a dog or puppy ranged from \$5 to \$150 (median, \$55), and adoption fees for a cat or kitten ranged from \$0 to \$80 (median, \$55). By contrast, median adoption fees during 1996, after adjustment for inflation, were \$25 for a dog or puppy and \$41 for a cat or kitten. Of the 121 agencies that listed the adoption services they provided,

82 (68%) included the cost of spaying or neutering in the adoption fees, compared with 46% of agencies that did during 1996. Only 16 (13%) agencies did not include any services in their adoption fees, compared with 21% that did not include any services in their adoption fees in 1996.

Methods of euthanasia and carcass disposal—Of the 155 agencies that provided information on methods used to euthanatize animals during 2004, 108 (70%) used pentobarbital sodium, 34 (22%) used carbon monoxide, and 29 (19%) transferred animals to another agency or veterinarian for euthanasia (some agencies used > 1 method). Of the 155 agencies that provided information on methods of carcass disposal, 30 (19%) used incineration, 93 (60%) used a landfill, 19 (12%) used common burial, and 13 (8%) used other methods (eg, transferred the carcass to another agency). Except for the use of rendering, which was no longer legal in Ohio in 2004, these percentages were similar to percentages reported for 1996.

Medical care—Of the 101 agencies that had a spay-neuter policy (Table 4), 42 (42%) indicated that all animals were spayed or neutered before they were discharged from the facility, 30 (30%) indicated that animals were spayed or neutered before or after adoption, 41 (41%) provided a certificate that could be redeemed with local veterinarians for spaying or neutering of the animal, and 5 (5%) used another policy (agencies could select > 1 policy).

Other policies—Of the 165 agencies that responded, 37 (22%) indicated that they did not house animals during 2004. These agencies used foster homes or transferred all animals to other agencies. Overall, 77 of 156 (49%) agencies had a foster program, and 23 of the 65 (35%) humane societies had a trap-neuter-return program for feral cats. Only 1 animal control agency reported having a trap-neuter-return program for feral cats. Of 156 agencies that responded, 93 (60%) indicated that they scanned animals for a microchip when they received the animals, and 13 (8%) reported that they implanted microchips in animals that were adopted. By contrast, in 1996, 48% of agencies scanned animals for a microchip, and 4% implanted microchips in animals that were adopted.

Pit bull-type dogs—Of the 144 agencies that reported they had a policy related to the handling of pit bull-type dogs, 23 (16%) indicated that they do not accept such dogs, 87 (60%) indicated that they accepted such dogs but do not allow them to be adopted, and 34 (24%) indicated that they accepted such dogs and put them up for adoption. In total, 68 agencies reported handling 8,834 pit bull-type dogs during 2004, compared with 2,141 pit bull-type dogs handled by 101 agencies during 1996. Of the 8,834 pit bull-type dogs handled during 2004, 1,425 (16%) were reclaimed by their original owner or adopted by a new owner and 7,409 (84%) were euthanatized. This represented 9% of the dogs euthanatized during 2004.

Needs assessment and welfare issues—The top 5 needs reported by responding agencies, as determined

Table 3—Estimated total numbers of animals taken in and euthanatized by animal care and control agencies in Ohio during 1996 and 2004 as a proportion of state human and animal population.

Variable	Dogs		Cats		Total	
	1996	2004	1996	2004	1996	2004
Animal Intake						
Per 1,000 people	19.14	15.59	10.27	11.26	29.41	26.84
As percentage of animals in Ohio	9.50	7.17	4.44	4.55	6.80	5.78
Animals euthanatized						
Per 1,000 people	11.50	6.85	7.23	8.04	18.73	14.89
As percentage of animals in Ohio	5.71	3.15	3.13	3.25	4.33	3.21

Table 4—Medical services provided by animal care and control agencies in Ohio during 1996 and 2004.

Medical service	County dog warden agency	Humane society	Municipal animal control agency	Total
Spay-neuter policy				
1996	17/56 (30)	60/65 (92)	10/34 (29)	87/155 (56)
2004	32/67 (48)	63/64 (98)	6/12 (50)	101/143 (71)
Associated with veterinarian				
1996	12/65 (18)	49/66 (74)	8/47 (17)	69/178 (39)
2004	41/68 (60)	64/64 (100)	10/12 (83)	115/144 (80)
Vaccinated animals				
1996	11/56 (20)	48/61 (61)	5/33 (15)	64/150 (43)
2004	30/66 (45)	62/63 (98)	6/11 (55)	98/140 (70)
Tested dogs for heartworm				
1996	1/56 (2)	30/61 (49)	2/33 (6)	33/150 (22)
2004	6/66 (9)	47/59 (80)	3/11 (27)	56/136 (41)
Dewormed animals				
1996	7/56 (13)	57/63 (90)	5/33 (15)	69/152 (45)
2004	22/66 (33)	62/64 (97)	6/11 (55)	90/141 (64)
Tested cats for FeLV infection				
1996	ND	ND	ND	ND
2004	1/8 (13)	50/60 (83)	4/10 (40)	55/78 (71)

Values are given as number of agencies that provided that service/number of agencies that responded (%).
ND = Not determined.

on the basis of weighted-mean scores, were capital-facility improvement, increased funding, additional paid staff, veterinary services, and improved legislation. Similarly, during 1996, the top 5 needs were capital-facility improvement, increased funding, improved legislation, improved education, and veterinary services. Of the 134 agencies that provided information on the most important animal welfare issue in their community, 40 (30%) listed feral and stray cats, 21 (16%) listed overpopulation (not species specific), 18 (13%) listed cruelty and neglect, 18 (13%) listed abandoned and stray dogs, 13 (10%) listed lack of spay-neuter services, and 24 (18%) listed other miscellaneous issues.

Dog intake and euthanasia rates—Between 1996 and 2004, mean dog intake rate for county dog warden agencies decreased from 23.1 to 17.2 dogs/1,000 individuals served. Linear mixed-effects modeling indicated that year was the only variable significantly associated with intake rate, with intake rate during 1998, 1999, 2000, and 2004 significantly lower than intake rate during 1996.

Similarly, between 1996 and 2004, mean dog euthanasia rate for county dog warden agencies decreased from 68% to 48%. Linear mixed-effects modeling indicated that year, spay-neuter policy, and county population were significantly associated with the dog euthanasia rate (Table 5). Examination of the odds ratios indicated that a dog handled by a county dog warden agency during 2004 was half as likely to be euthanatized as was a dog handled during 1996 ($P < 0.001$). In addition, a dog handled by a county dog warden agency without a spay-neuter policy was 1.36 times as likely to be euthanatized as a dog handled by an agency with such a policy ($P = 0.022$), and the odds that a dog handled by a county dog warden agency would be euthanatized increased as county population increased ($P = 0.046$). Yearly expenses, total number of employees, and use of veterinary services were not found to be significantly associated with euthanasia rate. No significant higher order or interaction terms were found.

Table 5—Results of generalized linear mixed-effects modeling of factors associated with euthanasia of dogs by county dog warden agencies in Ohio between 1996 and 2004.

Variable	OR (95% CI)	P value
Year		
1996	Reference	NA
1997	0.89 (0.80–1.00)	0.048
1998	0.88 (0.79–0.99)	0.027
1999	0.89 (0.80–1.00)	0.043
2000	0.87 (0.77–0.97)	0.013
2004	0.50 (0.41–0.62)	< 0.001
Spay-neuter policy		
Yes	Reference	NA
No	1.36 (1.05–1.77)	0.022
County population	1.01 (1.00–1.02)	0.046

OR = Odds ratio. CI = Confidence interval. NA = Not applicable.

Discussion

When combined with results of our previous study,⁶ results of the present study reveal that animal care and control agencies in Ohio saw a large reduction in the annual number of dogs handled between 1996 and 2004. Specifically, total intake of dogs decreased by 16.6%, which represented a decrease from 19.14 to 15.59 dogs/1,000 people. In addition, not only were fewer dogs taken in by animal care and control agencies during 2004, but far fewer were euthanatized. The number of dogs euthanatized decreased by 39.0%, which represented a decrease from 11.50 to 6.85/1,000 people.

Our analyses of data for county dog warden agencies indicated that there was an association between having a spay-neuter policy and a lower euthanasia rate. This suggests that county dog wardens may be taking responsibility to improve the disposition of dogs that they handle. In particular, it is possible that county dog warden agencies that have implemented spay-neuter policies have greater motivation to have dogs adopted into new homes. We found that there was a substantial increase in the proportion of county dog warden agencies that provided medical care, such as vaccination and intestinal deworming, to the animals

they handled, and it seems likely that providing these services resulted in healthier dogs and improved the public perception of dogs available for adoption from county dog warden agencies, which may have contributed to the decrease in euthanasia rate. Importantly, although having a spay-neuter policy was associated with a decrease in euthanasia rate, this should not be taken as proof of a cause-and-effect relationship. Rather, it is possible that having a spay-neuter policy is an indicator of other management practices that may reduce the euthanasia rate.

We did not observe a similar association between having a spay-neuter policy and a decrease in dog intake rates for county dog warden agencies. Although county dog warden agencies handled most dogs in the state, the present study did not take into account the effects of other spay-neuter programs, such as those offered by humane societies and other groups.¹³ We also believe there is a lag effect before the effects of a spay-neuter program can be measured in a community. Thus, the increase in the proportion of animal care and control agencies with a spay-neuter policy between 1996 and 2004 would not necessarily have been reflected in dog intake numbers.

Other factors that we did not measure may also have been responsible, in part, for the decrease in dog euthanasia and intake rates. Foster care programs that have been developed by various animal care and control agencies provide an outlet for treatment of animals with medical or behavioral problems and may provide for temporary housing of excess animals during busy periods. This may have led to higher adoption rates and a subsequent decrease in the euthanasia rate. Similarly, rescue groups have flourished in the past decade in Ohio, and an increasing number of dogs may be initially taken in by one of these groups instead of the traditional animal care and control agencies. Rescue groups traditionally only handle animals they believe are adoptable and only euthanize dogs under extreme circumstances. Because of the difficulty in surveying these groups, we do not have an accurate picture of the number of dogs that are filtered through these groups either directly from owners or as strays and the subsequent impact on intake and disposition rates for traditional animal care and control agencies. An additional factor that may have had a large impact on the intake rate is the potential change in owner attitudes toward their pets since 1996, when the survey was first conducted. With increasing attention on both the human-animal bond and the overpopulation problem, pet owners may have become more responsible, with the result that fewer dogs were taken in by animal care and control agencies.

Unfortunately, results of the present study suggest that the disposition of cats handled by animal care and control agencies in Ohio has not improved since 1996. Total number of cats taken in by these agencies increased by 19.7%, representing an increase from 10.27 to 11.26 cats/1,000 people. The number of cats euthanatized increased by 13.9%, which represented an increase from 7.23 to 8.04 cats/1,000 people. The growing cat problem in Ohio was recognized by animal care and control agencies, as 30% listed feral and stray

cats as the most important animal welfare problem in their communities.

Cats have become the most commonly owned pet in the United States, with an estimated 72.5 million cats owned in the United States in 2004.^{9,14} In addition, there are an unknown number of feral cats in the country. With the growing popularity of cats as pets has come an increase in the magnitude and complexity of problems associated with the management of unwanted cats, engendering substantial debate as to the most appropriate solutions. Only 1 state, Rhode Island, requires cats to be licensed and to wear identification; in all other states, cat control is left to the local authorities.¹⁵ Many states, such as California, have mandatory spay-neuter policies for animals that leave shelter facilities, and the AVMA supports state and local ordinances mandating spaying or neutering of such animals, licensing of cats, and keeping cats indoors.¹⁶ Many animal welfare groups and veterinarians support the use of trap-neuter-return programs for feral cats,¹⁷ and 23 of 65 (35%) humane societies in the present study reported that they have instituted such programs. However, the effectiveness of various cat control laws and trap-neuter-return programs is not clear, and additional research is needed to measure their impact.

The present study revealed a substantial increase in the number of pit bull-type dogs euthanatized in Ohio since 1996. Approximately three fourths of the 7,409 pit bull-type dogs that were euthanatized by animal care and control agencies during 2004 were located in counties with large metropolitan areas. In Ohio, any dog of a breed commonly known as a pit bull is automatically considered vicious, and there is a growing debate nationally about the best way to deal with dangerous dogs. Although the effectiveness of breed-specific bans is not clear, an estimated 200 municipalities nationwide have enacted some type of breed-specific ban, despite opposition from various national groups, including the AVMA and Humane Society of the United States.¹⁸⁻²⁰

Despite increases in the proportion of animal care and control agencies that provide medical care to the animals they handle and the proportion that have an association with a veterinarian, animal care and control agencies still identified veterinary services as one of their top 5 most important needs during 2004. Veterinarians play a critical role in helping these agencies care for the animals under their control, and shelter medicine has become an important field.

As with any study that focuses on a particular geographic area, care should be taken in extrapolating results of the present study to the situation in other states. We do believe, however, that our methods for examining trends over time are useful to other states attempting to characterize their animal care and control agencies. We also believe that the broad trends we saw in regard to proportion of agencies providing medical care, proportion of agencies that have an association with a veterinarian, and dog intake and euthanasia rates are likely to be reflected in other areas of the country. Given the critical role that veterinarians play in animal welfare and overpopulation, it is important for veterinarians to be aware of these broad trends.

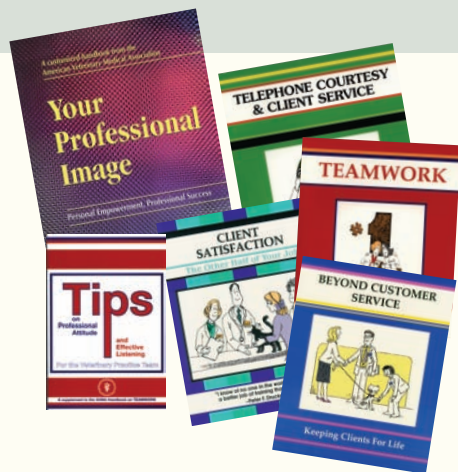
- a. Copies of the survey are available from the corresponding author on request.
- b. Stata, version 9.1, StataCorp, College Station, Tex.
- c. PROC GLIMMIX, version 9.1, SAS Institute Inc, Cary, NC.
- d. PROC MIXED, version 9.1, SAS Institute Inc, Cary, NC.

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