Shelter Animal Management and Trends in Taiwan

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Trends in the number of dogs entering and departing Taiwan public shelters are analyzed in this article. There were 40 public shelters surveyed from 2000 to 2005 for dog entries and departures. The results indicate that (a) adoption rates and relinquished animal numbers increased, and euthanasia rates decreased at the beginning of the study, but they are showing signs of reversal; (b) shelters in cities have higher adoption rates than those in rural areas; (c) euthanasia remains the main means of controlling dog numbers in most shelters; and (d) potential adopters in Taiwan prioritize animal health and body size when selecting dogs for adoption.

There is a need for increased and persistent public education to ensure continued progress is made in encouraging people to treat companion animals responsibly. In addition to educational efforts, creating new, specialized shelters for housing highly adoptable animals can alleviate the space constraint problems in existing kennels and improve the welfare of stray dogs.

Taiwan faces dramatic challenges in handling its large population of unwanted companion animals. According to the U.S. Census Bureau (2012), Taiwan has the fifth highest population density in the world, which is associated with

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significant stray companion animal issues. During the late 1980s and early 1990s, the number of strays per capita escalated dramatically, presenting significant animal welfare and hygiene problems (Fei, 2005; Hsu, Severinghaus, & Serpell, 2003). In response, the Taiwanese government enacted the Animal Protection Act in 1998, making Taiwan the 54th country in the world to put animal protection into legislation (Phipps, 2005; Republic of China, 2012). As a result, the public shelter system increased notably between 1998 and 2006, as shelters were receiving strays captured by local township “cleaning squads”—Animal Control Officers (ACO). Public shelters also work with government bodies and organizations to spearhead public awareness campaigns for animal welfare and responsible pet caregiving. Widespread media attention arising from numerous reports of mismanagement at shelters, including cruel executions and dog fighting (one case ending in cannibalism) in Taipei, Banchao, Hualien, and Taichung shelters also helped to increase public awareness. (Cases of cannibalism never recurred due to public outrage and pressure on public shelters to reform.)

Subsequently, the population of pet and stray dogs in Taiwan decreased from 1999 to 2005, from 666,594 to 487,134 (Fei, 2005), that is, from 3.3 stray dogs per 100 people to 0.79 dogs per 100 people (Bureau of Animal and Plant Health Inspection and Quarantine [BAPHIQ], 2010).

Although this is a positive trend, stray animal populations in Taiwan are still unfavorable compared with those of countries with similar populations. For example, in Australia the number of stray dogs received by the largest national shelter operator was 0.32 per 100 people (Australian Bureau of Statistics, 2011; Royal Society for the Prevention of Cruelty to Animals Victoria, 2012). There are significant health and safety risks to staff as shelter management struggles to keep up with the number of dog intakes. Despite the government’s efforts, space limitations remain a key factor determining shelter population size, which is the case throughout the world (Marston & Bennett, 2003; Marston, Bennett, & Coleman, 2004). Public ignorance regarding the consequences associated with releasing animals onto the streets is a major contributor to the number of strays. Due to religious and cultural beliefs, it is common practice to simply abandon dogs onto streets so that they can avoid death in shelters (Hsu et al., 2003). Hence, there is a rapid turnover of captured animals, with a holding period of only 7 days; it is 28 days in Victoria, Australia (Royal Society for the Prevention of Cruelty to Animals Victoria, 2012). Like most euthanasia cases in the United States, a majority of euthanized animals are healthy and are put down simply due to surplus (Kass, New, Scarlett, & Salman, 2001).

To address stray animal problems in Taiwan, we provide an overview of public shelter management based on dog intake and departure data, and discuss why trends have not continuously improved. We also relate this data to economic factors to improve our understanding of the stray dog problem in Taiwan. We
then propose ways for shelters to improve animal welfare and implement the no-kill philosophy.

**METHODS**

**Study Design**

The study covers all 40 existing urban and rural public shelters across Taiwan and offshore islands, which were surveyed from 2000 to 2005 (Figure 1). Data from shelters in the same county/city were pooled together to form 25 study sites. The distribution of shelters in Taiwan tends to correlate with population density: Taipei County, one of the largest counties in Taiwan, has the most shelters with 12 in operation. Kinmen has more shelters than other counties.
with larger populations such as Hualien, because Kinmen consists of a number of small islands, each with their own shelter.

Data Collection

Annual surveys were administrated to each target shelter between 2000 and 2005 to collect the number of dogs entering and leaving the shelters. Shelters began receiving species other than dogs after 2002, but our study was designed to focus on dogs as they pose the greatest public health risk. In 2005, 18% of Taiwanese families owned at least one pet, with the most common household pets being dogs (70%) followed by cats (11%; Fei, 2005). Pet ownership is less than half that of the United States, where the majority of households own at least one pet (Pet Food Institute, 2011). Survey variables included the number of dogs entering and departing shelters. The entry variables included (a) ACO captured, (b) relinquished, and (c) returned to shelters. The departure variables included (a) euthanasia, (b) reclamation, (c) adoption, (d) death, (e) escape, and (f) others. (“ACO captured” refers to stray dogs captured off the streets, “relinquished” refers to owners giving up pets at shelters, “returned to shelters” refers to returned adopted animals, “reclamation” refers to pets who were found by their owners, and “death” refers to any other reasons for death other than induced euthanasia.) We have 6 years worth of data on the aforementioned nine parameters for each of the 25 sites and one national indicator given by the average of all study sites.

Per Capita Income and Shelter Flow

Per capita gross domestic product (GDP) was quoted from the National Statistics Bureau (2011) and compared with shelter flow figures (intake and departure numbers). GDP per capita was used as an indicator of household income as it is widely perceived as the best reflection of living standards; it can be regarded as a measure of the returns to factors of production in an economy. There are limitations to the use of GDP on theoretical (e.g., treatment of depreciation; social inequality) and practical grounds (e.g., data gaps including service sectors; England, 1998; Landefeld, Seskin, & Fraumeni, 2008). However, because there are not many alternative proxies for standards of living, we have selected the use of GDP as the best available measure, which is in line with conventional economics literature.

We assume that in years with higher per capita GDP, there would be increases in the personal willingness to purchase dogs from the pet shop (as “luxury” items). We therefore hypothesize that in these years there are also more dogs abandoned to the shelter.
Questionnaires for Shelter Visitors

Surveys were conducted on shelter visitors to gauge the relative importance of various dog characteristics when considering adoption from shelters. There were 193 randomly selected adult shelter visitors who completed the questionnaires after they had visited the shelters in Hsinchu and Changhua counties. Both closed- and open-ended questions about the shelter management were used.

RESULTS

Shelter Flow

Table 1 shows aggregate shelter entrance numbers for all shelters, categorized as ACO captured, relinquished, and returned from earlier adoptions. There is only a single figure for returned data as this was first recorded in 2005. The immigrant numbers are heavily skewed toward ACO captured (averaging 88% over 6 years), suggesting a heavy reliance on cleaning squads to collect animals from the streets. The percentage of relinquished animals (3.47–17.13%) was significantly lower than the percentage found in shelter studies in the United States (43%; Wenstrup & Dowidchuk, 1999).

Shelter figures show some positive trends over time; however, the improvements are limited. The proportion of dogs who were ACO captured decreased while the proportion relinquished increased from 2000 to 2003. The opposite trend was observed after 2003 (proportion of ACO capture increased while relinquished figures decreased).

We also consider economic circumstances to gauge their influence on pet abandonment. Figure 2 compares national shelter flow with GDP per capita over the study period. Although the data set is limited, GDP and shelter flow

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACO captured</td>
<td>63,358</td>
<td>53,760</td>
<td>59,140</td>
<td>65,231</td>
<td>73,288</td>
<td>57,252</td>
</tr>
<tr>
<td>(97%)</td>
<td>(91%)</td>
<td>(87%)</td>
<td>(83%)</td>
<td>(85%)</td>
<td>(88%)</td>
<td></td>
</tr>
<tr>
<td>Relinquished</td>
<td>2,278</td>
<td>5,465</td>
<td>8,878</td>
<td>13,485</td>
<td>12,635</td>
<td>7,401</td>
</tr>
<tr>
<td>(3%)</td>
<td>(9%)</td>
<td>(13%)</td>
<td>(17%)</td>
<td>(15%)</td>
<td>(11%)</td>
<td></td>
</tr>
<tr>
<td>Returned</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>197</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.31%)</td>
</tr>
<tr>
<td>Total</td>
<td>65,636</td>
<td>59,225</td>
<td>68,018</td>
<td>78,716</td>
<td>85,923</td>
<td>64,850</td>
</tr>
</tbody>
</table>

Note. ACO = animal control officer; ND = no data.
appear to have a positive correlation (except in 2005). Pet dog ownership and subsequent abandonment generally follows the country’s economic condition.

Our interviews with shelter staff highlighted concerns about overcapacity; kennel space is limited because of overcrowding. The possibility of using space for other purposes, such as education, veterinarians, and boarding for animal cruelty cases, is overshadowed by the need to contain stray dogs. Not only does the excess population raise ethical issues regarding the treatment of surplus animals but it also poses risks to the health and safety of the shelter staff.

**Shelter Emigration**

Figure 3 shows animal departure figures for euthanasia, reclamation, adoption, death, and other by year across all shelters. Euthanasia rates declined from 2000 to 2001, but they steadily rose over the rest of the observation period. The falling trend in euthanasia rates prior to 2001 is more evident considering the euthanasia figure in 1999 was 89% (BAPHIQ, 2010).

We considered shelters’ departure rates by county/city using ternary diagrams in Figure 4. Cities/counties were grouped into (a) county with direct control under province: Taipei County, Taoyuan County, Hsinchu County, Miaoli County, Taitung County, Changhua County, Nantou County, Yunlin County,
Chiayi County, Tainan County, Kaohsiung County, Pingtung County, Taitung County, Hualien County, Yilan County, and Penghu County; (b) cities with direct control under province: Keelung City, Hsinchu City, Taichung City, Chiayi City, and Tainan City; (c) cities with direct control under central government: Taipei City, Kaohsiung City; and (d) islands: Kinmen County, Lienciang. County/cities under central government control have the largest budget and resources. Cities controlled by the province fare less well compared with Taipei and Kaohsiung, but they fare better than the counties.

For reference we included the national average of shelters’ performance. Ternary diagrams of shelter performance can assist with the understanding of and communication regarding stray dog management in developing economies relative to developed countries. We hypothesized that the least developed countries would dominate the bottom-left corner, indicating high numbers of deaths in shelters associated with low animal welfare awareness; newly industrialized countries would dominate the bottom-right corner, suggesting stray dog control is mainly enforced through compelling legislation and euthanasia; and developed economies would be evenly distributed but with some concentration around the upper-right corner as populations develop awareness about animal welfare. Based on Figure 4, Taiwan fits well with expectations of shelter management in a newly industrialized economy, and there is a slight trend toward the top-right corner.
The high incidence of euthanasia suggests that the majority of shelters in Taiwan euthanize dogs as the principal means of dealing with surplus animals. There are also several good performers, such as Chiayi City, that have a 70% adoption rate. Rural counties tend to exhibit higher euthanasia rates relative to adoption; the groups exhibiting the highest euthanasia rates over the 6 years are Tainan County (91%), Lienchiang County (91%), and Taichung County (90%). (Data points for each city/county are not identified, but they can be provided upon request from the authors.)

The observations on the bottom left of the diagram are of greatest concern as they represent low adoption rates and departures almost entirely due to death. Taitung in particular shows alarming trends, with almost all departures comprised
of euthanasia or deaths while in the shelter. The reasons for this trend may relate to public education or poor animal treatment, which causes high death rates, further reducing the likelihood of adoption.

There is a significant difference in the trends shown in urban and rural cities/counties. The average percentages of adoptions and reclamations are 32% in cities and only 14% in counties (with a statistical significance of $p < .05$). Small islands exhibit high rates of euthanasia and deaths in the shelter, with almost no adoption. Urban shelters have greater success with adoptions and owners reclaiming pets than those in rural areas.

The visitor questionnaire, which asked potential adopters to rank their considerations when choosing dogs from shelters, showed that healthy appearance is the first priority (34%), followed by body size (25%), animation (17%), age (14%), and purebred or mixed (10%). Based on these data, a greater emphasis should be placed on improving shelter animal health. Providing information on such considerations to shelter visitors can help increase adoption rates (Neidhart and Boyd, 2002).

**DISCUSSION AND CONCLUSIONS**

Our 2000 to 2005 study of the management of dogs in Taiwan was based on the immigrant and emigrant data of all 40 public shelters. We discussed reasons the positive trend (of increased adoption and reduced euthanasia) observed at the start of the study period is showing signs of reversal. We emphasized the need for continued public education and the creation of new shelters as ways to improve the welfare of unwanted companion animals in Taiwan.

The proportion of dogs entering shelters due to ACO capture averaged 88% from 2000 to 2005, indicating that most shelter dogs come from the streets. Although street dogs can be the result of uncontrolled reproduction or dogs directly abandoned by previous owners, Fei (2002) indicates that most of the offspring of stray dogs in Taiwan die from perennial diseases such as canine distemper. This is consistent with other studies that indicated that street dogs have low reproduction rates due to malnutrition and disease (e.g., Boitani, Francisci, Ciucci, & Andreoli, 1995). We can therefore surmise that the stray dog population is mainly due to household abandonment. Hsu et al. (2003) also show that a majority of pet owners in Taiwan are unwilling to relinquish their unwanted pets to public shelters. Instead people choose to discard them on the streets without prior castration or ovariohysterectomy. This leaves local government with no choice but to fund ACO personnel to remove stray dogs from the streets. Similar circumstances are apparent in developing Asian economies such as India (Edwards, 2005). Continued education for people to reconsider
pet ownership or to relinquish their pets to shelters remains the key to reducing the number of stray dogs in shelters.

Fei (2002) shows that, leading up to 2002, the population of household dogs decreased gradually along with an increase in the dogs’ average age. This trend suggests that pet owners in Taiwan are keeping pets longer than before. There are also positive trends displayed in our data, which show that the proportion of shelter immigrants from ACO capture decreased while the proportion of relinquishment increased up to 2003. However, adoption rates fell after 2002. Initial positive signs of reduced euthanasia rates prior to 2001 also appear to be in reverse. The rate of adoption over the same period also moves in an inverse direction to euthanasia. Although the data are insufficient to draw solid conclusions, these trends may be the first signs that educational efforts, such as those initiated under the Animal Protection Act of 1998, are beginning to lose effectiveness.

We also compared household income (per capita GDP) and shelter immigration in Taiwan. Although a more robust analysis is necessary to draw solid conclusions, it does appear that shelter dog numbers (due to either abandonment or relinquishment) exhibit a positive correlation with GDP per capita. There is still a crucial need to increase and sustain efforts to educate the public about responsible pet ownership, emphasizing that pet ownership is a lifetime commitment.

The ternary diagram of shelter departure was utilized as a means of consistently comparing shelters and to identify those that require improvements. Shelters in Taiwan fit the expectations of those for a newly developed economy, with some movement toward higher adoption rates and lower euthanasia rates. Statistically significant differences in shelter characteristics were observed between those in urban and rural areas, particularly in terms of adoption rates, possibly due to differences in educational resources regarding animal welfare issues. There is a need for educational efforts targeted at rural areas to increase the lifelong adoptions of animals and decrease abandonment.

Although the no-kill policy should be the primary objective for most animal shelters in Taiwan, euthanasia remains the principal means of managing the animal population. The open-door policy results in an excess of animals being brought to the shelters whereas too few are being adopted. To increase adoption rates, kennels should direct efforts toward improving shelter animals’ health—the concern of highest priority for potential adopting families. The valuation of pet characteristics differs by culture and needs to be taken into account when designing stray management strategies. For example, the quality of behavior of shelter dogs is the most important characteristic for adoption in the United States (Rhodes, 2002); in Italy age is given the most weight (Normando et al., 2006); and in Taiwan the health of shelter animals is the most important. Considering the current state of shelter overcrowding, the lack of open space for exercise or for separating problematic animals from the others makes it difficult to keep
dogs healthy. Creating special shelters specifically designed to house healthy, adoptable animals who were transferred from other shelters can help alleviate overcrowding in existing shelters, improve the animals’ well being, and ensure the safety of the shelter staff.

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