Twitter and Dog Adoption: An Examination of Factors to Predict Successful Dog

Placement vs Euthanasia in New York City Animal Care Centers

By

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Abstract

The aim of this study is to identify the main phenotypic factors that contributed to the successful placement of 90 dogs housed at the publicly funded New York City Animal Care Centers by examining Twitter profiles of At-Risk dogs. These dogs were placed on the At-Risk list due to space, illness, injury, behavioral problems or excessive fear. After an extensive review of relevant literature, a conceptual framework of hypotheses development was selected to determine the nature of the relationship of the independent variables to the dichotomous dependent variable of rescued or euthanized. The hypotheses were formed around the variables of coat color, sex, age, and Twitter engagement.

The unit of analysis for this research were individual dogs housed at NYCACCs. Twitter profiles of the dogs chosen for this study were examined to collect data on coat color, age, sex and social media engagement. The dogs in the study spent time a varying amount of time at one of the 5 NYCACCs between January of 2019 and the end of March of 2019. Inferential statistics were performed to determine the presence or absence of a correlation between the variables.

The findings of the studyfound no relationship between the variables tested. Therefore, Twitter users had no bias when promoting a dog's profile. This research concludes with a discussion of other factors that may have contributed to a dog being rescued or euthanized.

Chapter 1 – Introduction

On a yearly basis, it is estimated that nationally 3.3 million dogs enter animal shelters in the United States. Of those, an estimated 670,000 are euthanized due to chronic illness, injury or aggressive behaviors determined to be unsafe to potential adopters (American Society for the Prevention of Cruelty). However, the vast majority of the dogs that are euthanized every year are healthy and well-adjusted and are killed due to space. Most people understand that this is the price to pay for keeping stray dogs off of the streets, but it is still tragic and unethical to many Americans who get a great deal of happiness from a life shared with man's best friend.

No-kill cities, defined as "shelters that euthanize only for reasons of critical illness or poor temperament" (Brown et al. 2013), have become increasingly popular in recent years, with Austin, Texas leading upwards of 1500 communities that have pledged to kill no more than 10% of animals that are admitted to their shelters. However, it takes funding and a team of legislators, nonprofit managers and community volunteers to make no kill communities a success (Hawes, 2017). For communities without the resources to change, animals must be destroyed in large numbers to allow space to accommodate incoming animals. Usually these animals are quickly assessed for their physical and behavioral characteristics, and if deemed adoptable by staff, will be put up for adoption. Those that are problematic are usually worked with to attempt to help them to become more adoptable, but those that are aggressive or severely ill are immediately put down (Brown et al, 2013). However, few realize the stresses that being housed in an overcrowded shelter environment long-term may have on a dog; depression, aggression and fear levels often increase dramatically (Menchetti et al, 2015) as evidenced by accelerated heart rate,

as well as increased catecholamine and cortisol levels present in the blood. Stress can inhibit immune system performance, causing infectious diseases like parvovirus and respiratory diseases to proliferate. Because often there is no health care present in many rural shelters and isolation is often not an option, sick animals often have a decrease in adoptability and therefore an increased risk of euthanasia (Pesavento & Murphy, 2013). The constant noise and inability to engage in canine-specific behaviors can often traumatize an otherwise well-adjusted dog and cause adoptability to decrease (Wells, 2003; Hewson et al, 2007). The trauma of human abandonment, sudden isolation, and disruption of routines can wear on a dog's psyche. After relinquishment, dogs just may have a few sad, confused and traumatized days left to live.

Nonprofit managers, animal welfare advocates and volunteers are constantly brainstorming to come up with ways to engage the community to increase the amount of fosters available for temporary placement, but the number of fosters available is never enough. Social media provides a new way to disseminate information about shelter needs very quickly and may help reduce length of stay (LOS) in overcrowded shelters.

The presence of the internet and social media has become very prevalent in our society. People of all ages are users, and though different cohorts seem to enjoy different social media platforms, nonprofit organizations can benefit by engaging their stakeholders by use of social media. Once a page has been "liked" or "followed" by an individual on one of these platforms, it is relatively easy to slide information into the individual's feed, therefore eliminating the need for the individual to access the organization's website for information. Information on social media can be shared quickly and it is a cheap way of engaging with the community. In a 2014 study on dog adoption and social media, Rachae et al found that most shelters didn't use social media

consistently, most likely the result of time or resource limitations. Their social media action plan for the ANNA shelter included hiring social media interns to monitor social media sites regularly and keep the public informed of available animals being housed by the group (Rachae et al, 2014). All three of the main social media platforms – Facebook, Twitter, and Instagram – can be linked, but Rachae et al. (2014) suggested keeping them separate with different purposes. With Twitter's recent allowable character expansion, more information can be posted to relay shelter need on the micro-blogging site.

The purpose of this study is to determine if the promotion of a dog's profile on Twitter actually makes a difference in the adoptability of the dog. It would seem that there would be an obvious positive correlation between Twitter promotion and adoption, but other factors may contradict it.

Chapter Conclusion

To summarize, this chapter introduced the problem of overpopulation of companion animals in shelters. Chapter 2 will discuss the review of the literature and discuss the conceptual framework for this study.

Purpose

This chapter focuses on a review of the relevant literature that was integral to the formation of the hypotheses for this study. First, there is a discussion of the history of the policy problem itself as well as a discussion of historical solutions to the problem. Then, contemporary approaches to the issue of companion animal overpopulation is examined. This literature extends to the use of social media and its ability to connect homeless animals to permanent homes. Finally, a set of hypotheses is developed to frame the relationship between social media practices and adoption practices.

Case Study – New York City, 1856

On July 11, 1856, a story appeared on page 8 of the *New York Daily Times* entitled "Dogs Rampant---To the Rescue." What proceeds from here is the author's colorful diatribe as he rages against the dogs in the street and those who would protect them:

"It is villainous that our pounds should be so little patronized, and such swarms of dogs allowed to run unmuzzled. ... In a brief walk of not more than a third of a mile, yesterday, we counted no fewer than twenty-seven ugly yelping rascals, every one of whose snouts ought to, but did not enjoy the protection of a wire network. . . . There is talk of a rising of the people in imitation of the San Franciscans - of the appointment of a Vigilance Committee - of a grand mass meeting near the City Hall, to initiate a new dog-law - and hang those who have failed to execute the old one. . . . [Dogs] swarm in all the streets, obstruct the pavements, make night hideous with their
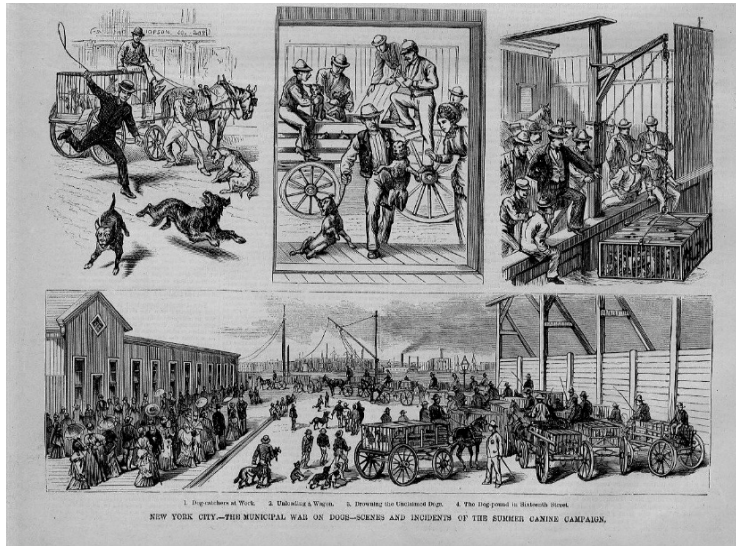
Figure 2.1: Dog Catchers in NYC

howls, and have a worse name than Aldermen in New York" (Wang, 2012, p.1001). Complaints of free-roaming dogs were numerous in the late nineteenth century, and usually for good reason. Rabies was, and still remains in some countries, a threatening disease in urban areas and spreads easily from animal to human via mucous membranes.

A superficial bite from an infected dog could lead to fatal consequences, but not before the victim experiences a series of undesirable symptoms such as agitation, throat pain and spasms, and hallucinations. (CDC, 2005; Ghasemzadeh & Namazi, 2015). It is a complex, degenerative virus-causing disease that has an incubation time of a week to a year for anything it infects. It is difficult to diagnose because the victim may be asymptomatic for a long period after infection. The dog would only start to show signs of the disease when the virus had traveled up from the peripheral nervous system and entered the saliva. From there it is a short trip to the brain and the dog would only have a short time left before death (Ramsey, 2017). Louis Pasteur would invent the attenuated vaccine to use a preventative and prophylactic in 1885, but that failed to alleviate the hysteria in New York City, which would continue into the 20th century (Ramsey, 2017)[1].

Alternatively, people could acquire less-known zoonoses through contact with a dog. Campylobacteriosis, or gastroenteritis caused by infection by *Campylobacter jejuni* or

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[1] Early ways of treating the illness included cutting some of the infected dog's hair and putting it directly into the victim's wound. This is the origin of the phrase "hair of the dog that bit you," which today means that another alcoholic drink is the best cure for a hangover (Oxford Dictionary of Word Origins, 2010).

Campylobacter coli, could pass from dog to human via the fecal to oral route (Wagenaar et al., 2013; Ghasemzadeh & Namazi, 2015; Gras et al., 2013).

Many animals carried the *Pasteurella* species of bacteria, primarily found living in the upper respiratory tract. Any contact with an animal carrier may cause diseases such as meningitis, respiratory infections, or bone and joint infections (Ghasemzadeh & Namazi, 2015). *Salmonella, Brucella, Yersinia enterocolitica, Capnocytophaga canimorsus, Bordetella bronchiseptica, Coxiella burnetii, Leptospira interrogans,* and *Staphylococcus intermedius* are examples of other zoonotic pathogens that could render a population sick. Flea and tick-borne pathogens were another threat to humans, along with ordinary dog-related injuries such as scratches or bites. Beyond being a nuisance, these free-roaming dogs could bite and cause infection to the increasing population (Ghasemzadeh & Namazi, 2015; CDC, 2005).

However, though it was possible that dog bites could happen during an interaction with a street dog, Catherine McNeur, author of Taming Manhattan: Enviromemental Battles in the Antebellum City, finds that in reality, the prevalence of rabies or even serious injury was actually relatively rare:

"To those who feared death by dog bite – a fear fueled by word of mouth stories and newspaper accounts – the origin and pedigree of these dogs did not matter. In the opinion of such people, all dog, especially those left to wander freely through public spaces, posed a threat to the lives and well-being of New Yorkers. Reports of rabies outbreaks came primarily from newspapers, which inspired terror by emphasizing the unknown factors in the contagion. It was impossible to know the exact number of dogs on the streets, let alone the number of those infected, as the dogs were nomadic and therefore uncontrollable and uncountable. Rabies was also difficult to diagnose in

the offending dogs, mainly because they ran off after biting their victim. Bystanders felt justified in tagging particularly aggressive dogs as 'mad.' Without having reliable information about the attackers, every dog bite victim could worry about the possibility of rabies. Savvy salesmen marketed a series of potions that claimed to cure hydrophobia if taken prior to its onset. The long delay before victims developed the signs of the fatal disease left many imagining symptoms and panicking. 'Epidemic terror" infected more people that rabies itself and inspired some to support drastic measures, such as banning or even killing all urban canines."

Not all New Yorkers were onboard with the idea that dogs should be banned or killed. Some of the dogs roaming the streets strays, then known as tramps, but many others were people's beloved pets, hunting companions and guard dogs. It was advantageous to some pet owners that litter and garbage covered the streets of the city; it often helped with the grocery bill that they send their dogs scavenging for a meal amongst trash. The New York City summers were ripe with fleas and ticks, so most dogs stayed outside to avoid infestation of homes in an era before flea and tick control. Because many people preferred their dogs to roam rather than chain them up, the average tramp often intermingled with canines of all levels of urban society (McNeur, 2014; Wang, 2012). As a result, many beloved pets were swept up and killed along with their street wise counterparts.

First Animal Shelters in the United States

Animal Shelters in the United States evolved in the early 1800s from livestock impounds, a remnant from colonial times (Zawistowski & Morris, 2004). Dogs were not much of a problem before the 1800s, as they were spread out and unlikely to catch a zoonotic disease from other dogs that might spread to humans. Dogs guarded property and alerted colonists to

trespassers. They may have provided security from other animals. They protected livestock and aided in hunting. However, as urbanization changed the landscape of New York City in the 1800s, stray dogs outnumbered livestock, and were less valuable to the public, who thought of them as disease- spreading vectors that needed to be eliminated (Wang, 2012; Zawistowski & Morris, 2004; Mcneur, 2014; Pariser, 2014). Municipally-funded shelters admitted any dog dragged in by a bounty hunter or concerned citizen. Because reclaiming a dog would cost a fee to the pound, many dogs brought in were left unclaimed and soon killed, usually violently, and often spectacularly, as carts full of caged dogs were drowned together every afternoon in the East River (Grier, 2006)[2].
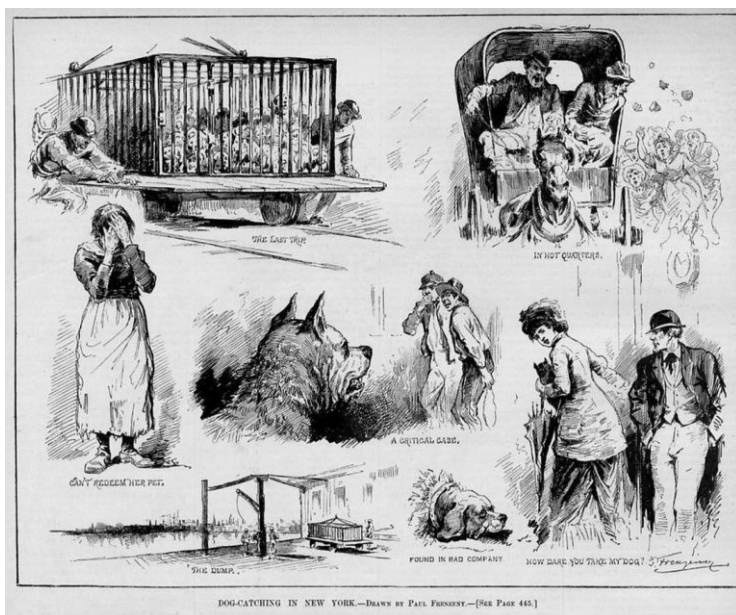

Figure 2.2: Drowning of Dogs in NYC

Exterminating large numbers of dogs became the shelter's main activity, and the city called on public for help with the task. In the 1850s, the city government established a Dog Bureau to find dogs that posed a threat and club, strangle, or drown them to death. Street urchins were encouraged to aid the city in ridding the streets of dogs, obtaining a reward of fifty cents for each dog successfully removed by any means necessary (Wang, 2012; Zawistowski & Morris, 2004; Grier, 2006).

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[2] According to cityroom.blogs.nytimes, a location existed on the East River called the "canine bathtub," where on one day in 1877, 738 dogs and 20 puppies were drowned in just a few hours' time.

The Animal Rights Movement in the United States

The modern animal rights movement in the United States really began to take root in the pre-Civil War era. The new abolitionist movement had people thinking about the concept of slavery and its application to all sentient beings. Author Harriet Beecher Stowe, Philosopher Jeremy Bentham, and Charles Darwin all spoke out about the need for better treatment and protection of animals (Unti, 2004). However, animal rights were ideas without solutions before the Civil War. It was in 1866 that philanthropist and ex-diplomat Henry Bergh, frustrated with traveling the world and witnessing multiple horse beatings, decided to form the American counterpart to Great Britain's Royal Society for the Prevention of Cruelty to Animals (RSPCA), established in 1824.

Henry Bergh and the Establishment of the ASPCA, 1866

Early 1860s saw urban reformers increasingly concerned about the corruption of life in the city. They saw the dog bounty system as barbaric and criminal, especially as unsavory characters began stealing pets to destroy for a reward from the city or kidnapping dogs and holding them for ransom from their owners (Zawistowski & Morris, 2004). Henry Bergh, a native New Yorker, observed:

Figure 2.3: Cartoon depicting Henry Bergh, ASPCA founder

"*With a bribe of fifty cents the idle youths of this City have been, in many*

instances, for the first time seduced into the temptation of stealing and betraying their friendly companions, the dogs."

He went on to illustrate his fear of children witnessing these events:

"*The screams of their condemned four-footed playmates might facilitate the scholars' acquisition of immorality, and prepare them for the State Prison and the gallows!*" (Wang, 2012, p. 1006)

On April 10, 1866, the State of New York granted Bergh funding for the establishment of The American Society of the Prevention of Cruelty to Animals. Today we know it by its acronym, the ASPCA. New York City had passed anti-cruelty legislation several times throughout the century, but none of the new statutes were ever enforced. However, as soon as Bergh had formed his ASPCA, he was determined to enforce the laws that were on the books. The state granted him police power and prosecutorial power over animal protection, and he brought many people to trial for animal abuse related crimes. According to Associate Professor of U.S. history at the University of British Columbia Jessica Wang, (2012), this idea of a privately funded organization having police power over an area would continue to today. "*Animal control is but one of innumerable areas of everyday public policy in which voluntary associations continue to wield police power, perform public functions, and exercise state authority alongside formally constituted governmental agencies., at times in a spirit of partnership, and at other times as intense rivals*" (Wang, 2012, p. 999*).* What would follow into subsequent decades would be conflict between the ASPCA and the New York City Department of Health over who should have the power to clean the streets of roaming dogs.

The Humane Animal Shelter, 1862

Figure 2.4: Caroline Earle White

Caroline Earl White, in 1868, was a creator of a similar society, the state funded Pennsylvania Society for the Prevention of Cruelty to Animals. Norms at the time kept her from joining the Board of Directors because of her sex, so she decided to create the Women's Auxiliary Unit, also called the Women's SPCA. She then established the City Refuge for Lost and Suffering Animals, where modern humane animal shelter practices were established (Zawistowski & Morris, 2004). White oversaw an

animal shelter that had animal welfare in mind. Dogs and cats were given food and medical treatment, and rehoming efforts were first attempted. When an animal was unable to be rehomed, humane euthanasia was performed, via a gas chamber, which delivered carbon monoxide or carbon dioxide to attempt a more humane method of elimination. Though modern sensibilities still question how humane the gas chamber method really is, it illustrates a marked departure from previous methods of extermination of animals deemed unattractive to potential adopters (Miller & Zawistowski, 2014).

Spread of SPCAs around the county

Figure 2.3: Official Seal of the ASPCA

In 1894, a few years after Henry Bergh's death, the ASPCA took up the City of New York's repeated offer to take control of the municipal animal shelters. For this to happen, New York passed the Lost and Strayed Animals code of 1894, which allowed cities to contract with a private agency to provide animal control and provide

humane law enforcement. Dogs now needed a license, and the ASPCA would use the $1 licensing fee to fund animal control for the city. Salaried workers, hired to pick up stray dogs and cats, held them in a rented warehouse. Their efforts were wildly successful in cleaning up the streets and animal shelters began to open up in many cities around the county. Some would enter into agreements with municipal services to provide animal control and others would work independently to provide food, medical care, and rehoming services (Miller & Zawistowski, 2014). Henry Bergh was in contact with other early animal anti-cruelty societies, sharing his mission statement and even encouraging other societies to use SPCA in their name, but it is important to note that these groups weren't affiliated with one another and still aren't today (Miller & Zawistowski, 2013). The word humane is often affiliated with SPCAs as well, but both SPCA and Humane Society are separate groups providing animal sheltering and other services to their communities. It is possible that some are regionally affiliated with each other, but for the most part are completely independent organizations.

The Evolving Shelter

With the creation of the SPCA, many dog impounds in towns across the U.S. followed suit. Individual humane groups were founded in most major US cities, going as far west as San Francisco. In 1877, leaders of these organizations decided to gather and together, under the direction of John G. Shorthall of Illinois, they formed the American Humane Association, created to tackle large-scale animal welfare issues (Zawistowski & Morris, 2004). The early years of the AMA focused on livestock and large animal welfare. However, toward WWI, humane societies began to tackle companion animal overpopulation (Unti, 2002).

Over the years, shelters have become more than places to hold animals to be killed. They often

rescue mistreated animals, investigate cases of animal cruelty, encourage sterilization, and promote animal safety. Advances in medicine have significantly improved the lives of pets housed in shelters. Spay and neuter programs, uncommon in the early part of the twentieth century, are now often a part required after intake for many shelters, along with rounds of vaccines to stop contagion (Zawistowski & Morris, 2004). Modern animal shelters usually fall into one of three categories- municipal animal shelters, private animal shelters and rescue groups. Funding for municipal animal shelters usually comes from tax money raised by the city and allocated to animal services. Municipal shelters must take in all animals regardless of age, health or adoptability. As a result, these shelters are often overpopulated and diseases spread easily among animals. Many municipal animal shelters contract with veterinary services for rudimentary care, which may include spay/neutering services to help reduce the number of individuals of a population. Most animal intakes are required to be put on a hold for several days so that the animal can be reclaimed by the owner before it is adopted out or euthanized. In order to make room for all intakes, animals are always at risk for euthanasia despite being labeled as adoptable (Zawistowski & Morris, 2004).

Private animal shelters are funded by donations and can employ paid caretakers or rely entirely on volunteers to take care of the daily workings of the shelter. These shelters have the advantage of not being required to admit every animal that is relinquished, so often they can be no-kill facilities, or facilities that do not euthanize adoptable animals. No-kill facilities only put down animals that are terminally ill or dangerous to the community (Brown et al., 2013).

Rescue organizations are privately run charities that may or may not have a central facility where dogs are sheltered. Often, dogs are kept in foster homes, or a temporary residence in a caretaker's

home where the dog may be trained and socialized (Zawistowski & Morris, 2004). In these cases, a rescue group will usually pay for food and vet care for the animal to minimize the burden on the foster parent. Most rescue groups rely on an abundance of foster parents to help shelter animals that have been in the rescue group's care for a significant amount of time. Many rescue organizations rescue a certain breed or a certain size of dog. Volunteers will keep in contact with municipal shelters and pull animals that meet the rescue group's criteria out of the shelter to help with shelter overpopulation (Zawistowski & Morris, 2004).

It is difficult to pin down the exact number of animals that are euthanized in shelters every year, though The Humane Society of Central Texas estimates the number as 3.9 million dogs and 3.4 million cats in the United States. Most animal shelters are limited by both space and the amount of volunteers needed to interact and care for animals housed there. However, that is only one aspect of the issue. More insidious is the fact that the animals themselves often develop behavioral or psychological problems after being housed in a shelter for a short time. Depression, aggression, and fear levels often increase dramatically (Menchetti et al, 2015) as evidenced by accelerated heart rate, as well as increased catecholamine and cortisol levels in the bloodstream. In the instance that there is no healthcare present in the shelter and isolation is often not an option, sick animals often have a decrease in adoptability and therefore an increased risk of euthanasia (Pesaveno & Murphy, 2013).

No-kill cities have become increasingly popular in recent years, with Austin, Texas leading upwards of 1500 communities that have pledged to kill no more than 10% of animals that are admitted to their shelters. However, it does take funding and a team of legislators, nonprofit managers and community volunteers to make no-kill communities a success (Hawes, 2017). For

communities without the resources to change, animals must be destroyed in large numbers to allow space to accommodate incoming animals. Usually these animals are quickly assessed for their physical and behavioral characteristics, and if deemed adoptable by staff, will be put up for adoption. Those that are problematic are usually worked in an attempt to help them to become more adoptable, but those that are aggressive or severely ill are immediately put down (Brown et al, 2013). However, as the idea of the no-kill shelter becomes more popular as an alternative to a euthanasia shelter, it is important to realize that there are limitations for these institutions as well. One such limitation is the ability to turn animals away. Once a no-kill shelter is full, it can refuse the intake of new pets, which will most likely result in euthanasia at a kill shelter before long. In addition, some animals may spend years in a no-kill facility before adoption, which may result in behavioral or psychological problems that often result in the return of the animal (Arluke, 2003). Ideally, if there are many in a community that are willing to volunteer as long-term fosters to homeless animals, the no-kill city can provide a more compassionate result for animals in need.

Joshua Frank (2004, p. 108) described the overpopulation of dogs as a problem of human action and inaction:

"In addition, humans have a certain responsibility for the welfare of companion animals. Dogs, the focus of this study, have been bred for thousands of years to serve our needs. They have therefore ceased being truly 'wild' animals and instead have become dependent on us for survival. As creators of a species dependent upon humans, we have a responsibility for that species' welfare. Humans also have a responsibility for addressing dog overpopulation since they are the perpetrators of the problem. Pet store suppliers, commercial breeders, and private owners

intentionally produce millions of animals every year to meet demand. Millions of consumers initially decide to purchase or adopt a dog, only to later abandon the animal because it is inconvenient or no longer suits their needs. Millions more choose not to spay or neuter their dog. Therefore it's human action and inaction that perpetuate dog overpopulation and create the need for the human-made solution of euthanasia."

Twitter

Microblogging advantages of social media have allowed nonprofits to promote ideas to very large audiences. However, there is a need for more research to determine how effective they are at creating action (Guo & Saxton, 2013). Animal shelters and animal advocates often spend a lot of time on social media sharing both photos and videos of animals in need. It would be expected that social media promotion would create higher adoption rates. However, there is no study available that compares adoption rates of shelters that promote residents on Twitter versus shelters that do not promote residents on Twitter.

Conceptual Framework

This section provides the conceptual framework for this study. Because the primary aim of this research is explanatory, conceptual framework to be used is formal hypothesis. A further aim of this study is to contribute to the scarce literature that addresses the impact of Twitter social engagement with adoption outcomes at a traditional (kill for space) animal shelter (Brown et al, 2013). The literature studies that describe how social media can be utilized by nonprofits to aid in community education, but none have specifically examined its impact on animal management. Previous studies have consistently identified characteristics of certain dogs that tend to be more attractive to potential adopters. Purebred dogs are consistently favored over mixed breeds

(Patronek et al., 1995) and have been found to be 1.4 times more likely to be successfully placed (Lepper et al., 2002; Posage et al., 1998). Social interactions with humans also play a large role in a dog's adoptability. Dogs that engage with humans in a friendly manner and are alert at the front of their pen are favored over those displaying fear behaviors, such as shaking or remaining at the back of the pen when shelter visitors walk by (Wells and Hepper, 1992). According to a study by Menchetti et al. (2015), programs employed by shelter management to increase dog sociability have had positive effects on adoption rates. Even the presence of toys and enrichment objects found in the pen with dogs seemed to give visitors the impression the dog was more socialized than pens without them (Wells and Hepper, 1992). Human interaction such as taking the dog for a walk outside of the shelter seemed to decrease stress levels in dogs and contribute to their sociability, and therefore, adoptability (Wells and Hepper, 2000). However, surprisingly, Protopopova et al., (2012) found that dogs trained to look into the eyes of the shelter visitors had no impact on adoption rates.

H$_1$: Coat Color

Coat color, surprisingly, is a phenotypic characteristic of a dog that has literature with conflicting results regarding its impact on probability for successful placement. Dogs with lighter color coats have been shown to be more desirable than dogs with black coats resulting in longer stays at the shelter and a higher incidence of euthanasia (Lepper et al, 2002; Wells & Hepper, 1992). However, more recent studies have shown that dog coat color has virtually no effect on length of stay at shelters (Brown et al., 2013; Svoboda et al., 2015; Protopopova et al., 2016). Normando et al, (2006) posits that the reason for different study results may be regional preference. Rachae et al, 2014 asked participants of a focus group about to discuss physical dog traits that would

affect an adoption and received the reply *"Some people do not want black dog hair everywhere."* Because of the conflict in the literature, coat color will be the first characteristic to test. Therefore, one would expect: **H$_1$: Dogs with darker coats will be less likely to be adopted than those with lighter coats.**

H$_2$: Sex of Dog

Several studies have been conducted which compared the adoptability of male and female dogs. Clevenger & Kass, 2003; Marston et al, 2003; and Lepper et al, 2002 all found that female dogs tended to spend less time in the shelter than their male counterparts, when other identifying characteristics were controlled for. This may be related to problems associated with male dogs such as aggressive behavior or compulsion to escape confinement. (Diesel et al, 2007). The literature has not been consistent, however. Findings in other studies have shown that male dogs are favored over females, possibly because of the risk of an unwanted litter (Soto et al, 2005) or increased fear behaviors in female dogs (Normando et al, 2006). However, not all studies were done on shelters in the United States, so variations in preferability could be due to regional distinctions. Scandurra et al., (2018) studied the behavioral differences in behavior in males and females, and it seems that more of the negative behavioral traits are associated with male dogs. Therefore: **H$_2$: Female dogs will be more likely to be adopted than male dogs.**

H$_3$: Twitter Engagement

The presence of the internet and social media has become very prevalent in our society. It seems to be used by people of all ages, and though different cohorts seem to enjoy different social media platforms, nonprofit organizations can benefit by engaging their stakeholders by use of social media. Once a page has been "liked" or "followed" by an individual on one of these

platforms, it is relatively easy to slide information into an individual's feed, therefore eliminating the need for the individual to access the organization's website for information. Information on social media can be shared quickly and it is a cheap way of engaging with the community. In a 2014 study on dog adoption and social media, Rachae et al found that most shelters didn't use social media consistently, most likely the result of time or resource limitations. Their social media action plan for the ANNA shelter included hiring social media interns to monitor social media sites regularly and keep the public informed of available animals being housed by the group (Rachae et al, 2014). All three of the main social media platforms – Facebook, Twitter, and Instagram – can be linked, but Rachae et al. (2014) suggested keeping them separate with different purposes.

Launched in October of 2006, Twitter is a free social networking site that allows users to micro-blog, or broadcasts short posts called tweets (Lovejoy et al., 2012). Animal shelters and rescue organizations have joined Twitter and other social media sites, to share profiles of animals in need of adoption in their shelters or in foster care (Ma, 2016). As there have not been many formal studies that have evaluated the effect of Twitter engagement on adoption rates of animals in shelters, it seems necessary to determine if a cause and effect relationship exists between the two variables. However, there has been mention of the positive outcome by use of social media by

Figure 2.4: Example of a Tweet Promoting Adoption

shelters in general (Menchetti et al, 2015; Rachae et al, 2014; Phethean et al, 2012). In order to find empirical data to examine the effects of Twitter specifically, the third hypothesis will be concerned with the Twitter social media platform on adoption rates. **H_3: Dogs with a higher amount of Twitter engagement will be more likely to be adopted than those with a lesser amount.**

H_4: Younger dogs will be rescued over older dogs.

Patronek et al., (1996) found that age was a key determinant in relinquishment to an animal shelter along lack of veterinary treatment over time. Dogs that had visited the vet on a somewhat regular basis had a declined risk of relinquishment. Likewise, Lepper et al., (2002) found that dog adoption rates tended to decrease with increasing dog age.

With increasing age usually comes a decrease in mobility, loss of energy, age-related brain changes and chronic illnesses that can be overwhelming to the pet owner. For lower income families, it may be an easier option to relinquish an older dog to a shelter, though it would most likely end up with a poor outcome for dog. However, it is possible that some families prefer older dogs; Patronek et. al.,(1996) posits that increasing age would be correlated with increasing length of ownership, since many certain people may not want the hassle of a puppy. It is a huge investment of time and energy and older dogs are less likely to be.

Conceptual Framework Table

Table 1: Conceptual Framework Table

Title: Twitter and Dog Adoption: An Examination of Factors to Predict Successful Dog Placement vs Euthanization in New York City Animal Care Centers	
Purpose: The purpose of this explanatory research is to utilize Twitter profiles of shelter dogs housed at publicly funded NYC shelters to determine which factors, if any, contribute to successful dog placement in rescue groups or forever homes.	
Formal Hypothesis	**Sources Used to Support Hypothesis**
H₁ : Dogs with darker coats will be less likely to be rescued than those with lighter coats.	Wells and Hepper, 1992; Svoboda et al., 2015; Protopopova et al., 2016; Lepper et al., 2002; Brown et al, 2013; Svoboda et al., 2015; Normando et al.,2006
H₂: Female dogs will be more likely to be rescued than male dogs.	Clevenger & Kass, 2003; Marston et al., 2002; Lepper et al., 2002; Diesel et al., 2007; Solo et al., 2005; Normando et al., 2006
H₃: Dogs with a higher amount of Twitter engagement will most likely to be rescued than those with a lesser amount.	Menchetti et al., 2015; Rachae et al.; 2014; Phethean et al., 2012
H₄: Younger dogs will be rescued over older dogs.	Lepper et al., 2002; Patronek et al., 1996

Chapter 3 – Methodology

Purpose

The purpose of this chapter is to discuss the methodology used to determine which physical characteristics contribute to a shelter dog's adoptability. The data used in this study is existing data gathered by tracking profiles of a random sample of ninety dogs taken in by one of the five New York City Animal Care Centers and shared by volunteers on Twitter. Because the NYCACC Twitter page does not provide the amount of data necessary for an adequate sample size, information is collected from the Twitter page of animal advocate @gaviota330. This user collects daily information from the At-Risk section of the NYCACC home page and creates dog profiles accordingly, to be shared by any number of the 16K followers of this account. The At-Risk section of the NYCACC website contains information on dogs at risk for euthanasia due to space, illness, injury, behavioral problems or excessive fear. Profiles are embedded with a link that redirects back to the animal profile on the organization's webpage: nycacc.org. Once back on the organization's website, further information

Figure 3.1: Example of a tweet promoting adoption

is provided about the animal if the animal is still in the care of NYCACCs. If an error message is reached, the animal is rescued, reclaimed or euthanized. Final information of the dog's status is announced on the Twitter page of @gaviota330 or can be determined by visiting the Facebook page created by animal advocates located at this web address:

<u>https://www.facebook.com/mldsavingnycdogs/</u>. This page records final outcomes of all dogs

passing through NYCACCs in their photo albums.

The dependent variable is the outcome of adoption or euthanasia of the dog. The independent

variables are the color of the dog's fur, sex of the dog, and the amount of Twitter engagement

for the dog profile. Twitter engagement is

defined as the combined number of retweets,

likes and comments of the profile. Likes are

defined as the number beside the heart at the

bottom of the profile, which, when selected, will

save the dog's profile to the individual's Twitter

profile for further access. The first tweet of the

dog's profile @gaviota330 is the one for which

information is collected. The tweet is saved by

liking the dog's profile, and when an outcome is

Figure 3.2: Example of a tweet promoting adoption

recorded for the dog, color, sex and twitter engagement is recorded. The research hypotheses

are operationalized in Table 2.1. The operationalization of the dependent and independent

variables indicate how they are related to the hypothesis.

TABLE 3.1: Operationalization Table

Title: Twitter and Dog Adoption: An Examination of Factors to Predict Successful Dog Placement vs Euthanization in New York City Animal Care Centers			
Purpose: The purpose of this explanatory research is to utilize Twitter profiles of shelter dogs housed at publicly funded NYC shelters to determine which factors, if any, contribute to successful dog placement in rescue groups or forever homes.			
Dependent Variable	*+/-*	*Measurement*	*Data Source*
Adoption Outcome		Adopted = 0 Not Adopted = 1	existing Twitter data
Independent Variables	*+/-*	*Measurement*	*Data Source*
H_1: General Coat Color	-	Light = 0, Medium = 1, Dark = 2	existing Twitter data
H_2: Sex of the Dog	-	Female = 0 Male = 1	existing Twitter data
H_3: Twitter Engagement	-	Number of combined retweets, likes, and comments on dog profile	existing Twitter data
H_4: Age of Dog	-	Dogs age in years	existing Twitter data

Operationalization of the Dependent Variable

Table 3.1 operationalizes the dependent and independent variables as they relate to the hypotheses previously outlined. The dependent variable is dichotomous and indicates whether the dog was adopted or whether it was not. An adoption is coded as a 0 and euthanization is coded 1.

Operationalization of the Independent Variables

For the first formal hypothesis, coat color is determined using a model taken from Brown et al., (2013), This method first establishes a primary coat color of "brown, brindle, black, white, tan,

red, yellow, gray, or tricolor" (Brown et al., 2013) and combines it with a secondary coat color, chosen from the same 9 categories. Then, several groups of coat color were established: a primary light color (yellow, white, gray, etc.) combined with a light color from the secondary color group defined a light colored dog, and was given the code of 0. A primary light color combined with a secondary medium color (tan, red, brindle, or tricolor) also defined a light colored dog, and was given a code of 0. A primary medium color combined with a medium color from the secondary color group defined a medium colored dog and was given a code of 2. A primary medium color combined with a dark secondary color coat or a dark primary and secondary color dog defined a dark colored dog (Brown et al., 2013). The first group of light primary color coat and light secondary coat is given the code of 0 in the operationalization table. The primary light color coat and dark secondary coat is given a code of 1 in the operationalization table. The primary dark color coat and dark secondary coat is given a code of 2 in the operationalization table.

For the second hypothesis, a female dog is represented by a 0 in the operationalization table, while a male dog is represented by a 1 in the operationalization table. Twitter engagement is measured as the sum of the likes, shares and comments accumulated by a dog's profile. This number should indicate the dog's popularity among the organization's followers in the third hypothesis.

Advantages and Disadvantages of Using a Twitter Profile as Unit of Analysis

The units of analyses in this study are dogs in NYCACC shelters. The main advantage to using this type of data collection is it is quick and cost-effective (Babbie, 2016). The Twitter data is relatively easy to access for this study and the data can be collected with just a little digging. However, the

original collector of the data did not collect it to be used as data in a research study. Therefore, it is possible that the data collected could be skewed in some way. In addition, not all dog profiles contained all necessary information that was required. Some of the dogs had a status update tweet and some did not. In the present study, the problems were the consistency and the quality of the existing data.

Controls

It seems necessary to control for location by only including Twitter profiles of dogs in New York City Animal Care Centers. New York City has five different shelters with one located in each borough. There is a very high volume of animals coming through the organization. There is also an unusually high number of outside volunteers dedicated to networking the "boroughbreds" that have inadvertently found residency at one of the NYCACC facilities. Many no-kill activists create profiles of NYCACC animals and often tweet status updates. Controlling for location is necessary as not all shelters in the United States have volunteers or staff who regularly promote their residents on social media. Smaller, more rural shelters usually have less funding than larger, urban shelters and therefore may not have significant Twitter representation. Therefore, animals housed in other shelters besides NYCACCs are not selected for the study.

Limitations

Limitations involved in this study include the varying length of stay of the dogs housed at NYCACC facilities. Some may be placed on the At Risk list on the organization's website, and then later removed for varying reasons. For example, a dog may be ill and put on the At Risk list, but then recover and be moved back into the general population. This may affect the number of tweets

created or the number of retweets/likes/comments attributed to a dog, since length of stay can affect the number of people who are exposed to the dog's profile.

In addition, the difficulty in using retweets/likes/comments of one tweet to determine popularity of a shelter dog's profile is problematic to this study, because of the varying amounts of dog profiles created. Many animal shelters do not encourage outside volunteers to create dog profiles because it may create difficulty for potential adopters to reach the correct people that can help save the dog. Often those with no direct affiliation with a shelter may muddy the waters between the adopter and the shelter by not providing all necessary information in the profile that is created. NYCACC, however, does not seem to be concerned with this and so allows multiple outside volunteers to promote their dogs. Therefore, multiple dog profiles are created and circulated, leading to the difficulty of pinning one down as an indicator of overall popularity with Twitter users.

Statistics

This study will employ the use of a regression analysis to determine the strength of the relationship between the independent variables and the dependent variable. Because the outcome of adopted or not adopted is dichotomous, the type of regression used is logistic regression (Pallant, 2010). If any of the relationships between independent and the dependent variables are determined to be statistically significant, logistic regression will also indicate the amount of predictive power each of the independent variables holds (Pallant, 2010).

Conclusion

This chapter took the hypotheses outlined in the previous chapter and explained how the independent and dependent variables were defined and operationalized for the purpose of this

research using the operationalization table. The data for this research was collected by following a Twitter profile that creates and shares profiles of dogs from the At-Risk section of website nycacc.org and analyzed using logistical regression to determine causation between variables.

Results

This study used logistical regression and linear regression to analyze the impact the independent variables had on the outcome of adopted or euthanized in the ninety dogs in the sample. All dogs were pulled from the At-Risk section of nycacc.org during the months of January 2019 through March 2019. Most dogs that were on the list were housed at NYCACC shelters for a period of a week to a month, though there were some with two-month long stays. None of the dogs were there longer than 2 months. All dogs could be described as medium to large, with no dogs under 20 lbs.

H$_1$: Color of Dog Coat

The logistic regression found that there was no significant correlation between the color of a dog's coat and outcome of euthanized or rescued. Dogs with all coat colors were found to be rescued or euthanized without bias from Twitter engagement. A linear regression then tested if coat color had any effect on the amount of retweets/likes/comments on a dog's profile and found no significant effect.

H$_2$: Sex of Dog

The logistic regression found that there was no significant correlation between the sex of the dog and the outcome of euthanized or rescued. Dogs of both sexes were found to be both rescued and euthanized without bias from Twitter engagement. A linear regression then tested if the sex of the dog had any effect on the amount of retweets/likes/comments on a dog's profile and found no significant effect.

H₃: Amount of Twitter Engagement

The logistic regression found that there was no significant correlation between the amount of retweets/likes/comments on a dog's profile and the outcome of being euthanized or rescued. However, more Twitter engagement may encourage more users to pledge an amount on the nycacc.org webpage, which is to entice rescue charities to pull from NYCACC with the promise of a donation, but that is impossible to measure.

H₄: Age of Dog

The logistic regression found that there was no significant correlation between the age of the dog and outcome of euthanized or rescued. Dogs of all ages were found to be rescued or euthanized without bias from Twitter engagement. A linear regression then tested if age had any effect on the amount of retweets/likes/comments on a dog's profile and found no significant effect.

Tables 4.1, 4.2, and 4.3, on the next page, show the results of the regressions performed on the raw data.

Table 4.1: Logistic Regression Results

	Exp(B)
Male	1.011[ns]
Light Color	-.781 [ns]
Dark Color	-.042 [ns]
Tweet/RT	-.007 [ns]
Tweet Like	.018 [ns]
Comments	-.044 [ns]
Age	.067 [ns]
Constant	1.66
% correct	83.1%
-2LL	80.57

ns: Not Significant

Table 4.2 Linear Regression Results

Covariables	Retweets	Like Tweets
Male	6.53 [ns]	-2.71 [ns]
Light Color	-24.27 [ns]	-8.07 [ns]
Dark Color	5.16 [ns]	9.57 [ns]
Age	1.78 [ns]	1.43 [ns]
Constant	104.91**	44.85**
R square	.04	.09
F value	.956	1.961

** Significant at $\alpha < .01$
ns: Not Significant

Table 4.3 Summary of Results

Variables	Expected Direction	Evidence Supported/Failed to Support
Dependent Variable		
Outcome of Adoption		
Independent Variables		
H_1: Coat Color		failed to support
H_2: Sex of Dog	positive	failed to support
H_3: Twitter Engagement	positive	failed to support
H_4: Age of Dog	positive	failed to support

Chapter 5 – Conclusion

Conclusion

The independent variables of age, coat color, sex and Twitter engagement all were found to be insignificant when tested by regression analysis. This is a surprising result in this study, because much of the existing literature seems to support the result of black dogs not getting adopted (DeLeeuw, 2010; Leonard, 2011; Wells and Hopper, 1992) as often as dogs with other coat colors, older dogs not being adopted, and females being favored over males. Though the lack of a causal relationship between the independent variables, it still should be regarded as a significant finding. It is possible that other factors that were not considered in this study were the actual reasons some dogs were rescued and some dogs were euthanized.

Coat color, sex of dog, and age of dog could be usurped on Twitter depending on the photo of the dog taken at intake. In 2015, Lampe & Witt found that the quality of the photo was significant to a positive outcome for the dog. They found that people preferred pictures of a dog in an outdoor setting as opposed to indoor, standing as opposed to sitting, eye contact being present and were disinterested in photos that were not of good clarity. Traits such as dog wearing a bandana, dog smiling with tongue displayed and sad pictures of dogs in cages did not seem to have a significant emotional effect on participants in the study (Lampe & Witte, 2015).

Often, the NYCACC volunteers will display a story within the dog's picture that describes the circumstances of the dog's relinquishment. Often these stories are upsetting and meant to tug at the heartstrings of those perusing the website, and they are also incorporated into the dog profiles that animal advocates create. It would be difficult to dismiss these stories as a non-impactful element and they may inspire people to make more effort to promote the animal.

Wells and Hopper (1992) found that relinquished dogs were more successful in general, because they had a previous owner who may have trained or housebroken them. Conversely, it is possible that owner relinquishment can have a negative effect on the success of the dog if it is found that the dog was relinquished for behavioral problems (Lepper et al, 2010). Because of that contradiction in the literature, it is difficult to measure if there is an impact with potential rescuers.

Injury or illness may also play a role in the adoption outcome of a dog (Lepper et al., 2010). Individual adopters and rescue groups may not want to adopt a dog that may be an expensive investment. This can also be directly proportional with the age of the dog. An older dog with an established disease will likely have a diminished chance of being rescued.

Finally, it is possible that there could be bias in the Twitter community that retweets dog profiles. Most likely, the majority of the individuals doing so are already animal advocates and, being so, have already educated themselves on the issues surrounding dog adoption. If that is the case, it is another factor to explain the outcome of statistically insignificant results in both of the regression analyses.

Recommendations for Animal Shelters

Though the findings in this study were not significant, social media continues to play a large role in the lives of many Americans, and therefore should not be disregarded. On the subject of Twitter, Lovejoy, Waters and Saxton in 2012 reported that *"Strategic communicators recognize its ability to reach a large number of stakeholders, making it the most used application in public relations, advertising, and marketing campaigns."* It is the recommendation of this study that shelters promote their residents on every social media platform. Tweets themselves may not

show direct results, but social media in general can only help an animal's plight while being housed in NYCACC, because for these unfortunate animals there really is not a downside to overexposure. Therefore, it is still recommended that shelters use every platform possible to promote dogs in their care.

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NAME	ID	SEX	Color Code	Comments	Twitter Engagement	Outcome	AGE
ACHILLES	54521	M	1	11	11	Rescued	1
AFRICA	25882	F	2	7	7	Rescued	4
ALDO	54776	M	2	3	3	Rescued	1
APOLLO	52604	M	2	5	5	Rescued	3
ARIES	56852	M	1	6	6	Rescued	2
BABY BOY	53396	M	1	6	6	Rescued	8
BELINDA	55784	F	1	6	6	Rescued	7
BELLA ROSE	38784	F	1	4	4	PTS	3
BENNY	56527	M	0	7	7	PTS	3
BENNY	54276	M	1	14	14	Rescued	7
BERGEN	55799	M	1	6	6	Rescued	1
BIG FOOT	54599	M	2	8	8	Rescued	2
BLADE	54428	M	2	9	9	Rescued	1
BLUE	55012	M	1	10	10	Rescued	2.5
BRICK	29124	M	1	3	3	Rescued	3
BRUNO	51177	M	2	6	6	Rescued	1
BUDDY	52491	M	1	10	10	Rescued	4
BUSTER	54125	M	2	11	11	Rescued	3
BUSTER	54125	M	2	16	16	Rescued	3
BUTTA	53575	M	1	16	16	Rescued	14
CHOCOLATE	54357	M	2	3	3	Rescued	4
COLBY	53721	M	1	12	12	Rescued	3
COOKIE DOUGH	34800	F	1	7	7	Rescued	2
DESTINE	55076	F	1	4	4	Rescued	2
DIAMOND	57284	F	1	0	0	Rescued	1
DIESEL	57256	M	1	4	4	Rescued	2
DJ	52930	M	1	8	8	PTS	2
DOCTOR THUNDER	40720	F	1	3	3	Rescued	1.5
DORY	55635	F	2	9	9	Rescued	3
ECKO	54568	M	2	4	4	PTS	1
EDGE	52310	M	2	12	12	PTS	8
FALCON	53886	M	1	5	5	Rescued	1
FLACCO	53363	M	1	7	7	PTS	2
FLASH	54340	M	1	8	8	Rescued	3
FRANK SINATRA	52532	M	2	5	5	Rescued	1

NAME	ID	SEX	Color Code	Comments	Twitter Engagement	Outcome	AGE
FRISKY	52914	M	2	4	4	PTS	4
GLADIATOR	55770	M	1	8	8	Rescued	8
GOTTI	55090	M	1	11	11	Rescued	2
GROUCHO MARX		M	1	66	66	PTS	1
HANZ	56632	M	2	8	8	Rescued	5
HOODIE	53382	M	1	6	6	PTS	1
JACK	56155	M	0	0	0	Rescued	2
JENA	47338	F	2	9	9	Rescued	1
KIKI	56908	M	2	2	2	Rescued	8
KILO	54664	M	1	1	1	Rescued	6
KOKO	54526	F	1	15	15	Rescued	7
KUDO	56021	F	1	5	5	PTS	5
LADY	54582	F	1	1	1	Rescued	2
LEVIATHAN	56211	M	1	1	1	Rescued	1
LUCAS	52761	M	1	6	6	Rescued	3
MIAMI	56790	F	1	6	6	Rescued	8
MOCHI	56273	M	1	9	9	Rescued	2
MOJO	54918	M	2	4	4	Rescued	11
MOSHIKI	54446	F	1	9	9	Rescued	3
NANO	56471	M	1	5	5	Rescued	2
NIA	54310	F	0	1	1	PTS	7
OTIS	53400	M	1	7	7	Rescued	5
PABLO	53229	M	2	5	5	Rescued	2
PATTY	56806	F	1	5	5	Rescued	5
PINK	57144	F	1	3	3	Rescued	3
POLLO	54521	M	1	7	7	Rescued	3
PRINCE	56530	M	1	10	10	PTS	2
PRINCESS TIABEANIE	53308	F	1	12	12	Rescued	5
RILEY	56760	M	2	0	0	Rescued	11
ROCK	20694	M	1	5	5	Rescued	11
ROCKSTAR	56449	M	1	4	4	Rescued	1
ROCKY	53111	M	1	7	7	Rescued	2
ROCKY BALBOA	55854	M	2	2	2	PTS	5
ROMAN	55426	M	1	7	7	PTS	8
ROMAN	55457	M	2	5	5	Rescued	1
ROOKIE	53588	M	1	2	2	Rescued	2

NAME	ID	SEX	Color Code	Comments	Twitter Engagement	Outcome	AGE
RUBY	32264	F	1	5	5	PTS	2
SCOOTER	56538	M	1	4	4	Rescued	3
SCRAPPY	56522	M	1	7	7	Rescued	2
SCRAPPY	54429	M	0	17	17	Rescued	15
SETH	53640	M	0	7	7	Rescued	2
SIMBA (1)	56266	M	1	5	5	PTS	2
SIMMONS	55764	M	0	1	1	Rescued	8
SKYLAR	55201	F	1	6	6	Rescued	2
SMOKEY	51868	M	1	6	6	Rescued	1
SOUR PATCH	55813	F	1	1	1	Rescued	8
SPROUTS	56318	M	2	4	4	Rescued	2
TERRI	55887	F	0	9	9	Rescued	13
TINKER BELLE	55159	F	1	3	3	Rescued	1
TITO	54023	M	1	7	7	Rescued	2
TITUS	53383	M	1	2	2	Rescued	8
TUNCHI	56517	M	0	3	3	Rescued	1
VENUS	51966	F	1	10	10	Rescued	7
VERMONT	53225	M	2	3	3	Rescued	4
ZENA SUNSHINE	54308	F	2	16	16	Rescued	9