Feral cats: A review of concerns and control measures

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Abstract

Feral cat populations exist worldwide. Concerns include predation and spread of disease, both within and between species including humans. Control measures described in the literature include depopulation, trap-adoption, trap-neuter-return, and medical reproductive control.

Keywords: Feline, feral, trap-neuter-return, megestrol acetate

Introduction

Cats (*Felis catus)* live outdoors on every continent except Antarctica and on islands of every size, either as natural or introduced species.[1] Because cats are loosely domesticated, with freedom to roam considered acceptable by cat owners in many countries, it is difficult to classify cat populations as owned, stray, or feral. This classification becomes important when considering how best to control the various populations, as one must consider the welfare of the individual cats, public attitudes, and legal implications when designing control programs.[2] A suggested scheme is the following: companion or owned cats are those who live the majority of the time with humans and are dependent on them for basic needs, stray cats are lost or abandoned companion cats that may live outside but do so near human habitation and rely on humans to some extent, and feral cats are those that live outside and are self-sustaining. Feral cats may have been companion cats once and may choose to live near human habitation but do not rely on humans for shelter, food, or water.[2] Another definition for a feral cat would be one that cannot be handled by humans and would not be suitable for adoption into a home as a pet; this definition is complicated by lack of consistent guidelines within or between facilities regarding methods used to identify whether or not a given cat is adoptable.[3,4] A colony of feral cats is defined as a group of three or more sexually intact cats living and feeding in close proximity.[3] This paper is a review of concerns and reported control measures for feral cats living in colonies.

Concerns

Many papers cite the concerns associated with maintenance of large colonies of free-roaming cats. Some suggest benefits as well. These include the social aspects of providing support for these cats and potential building of networks between caregivers.[5,6] Multiple stakeholders must be taken into consideration when evaluating control of feral cat colonies including humans who consider cats a nuisance, who are at risk of their own health from diseases carried or transmitted by cats, or who are concerned about welfare of wildlife or welfare of the cats, and the cats and other animal species themselves.[7] Society at large also has a stake with growing societal opposition to euthanasia and differing understanding of the role of humans in exerting dominion over animals.[6,8]

Concerns about feral cat colonies include loss of wildlife from predation by feral cats, spread of disease from cats to other animals, and potential spread of disease from cats to humans. These concerns must be well understood before sound recommendations can be made regarding control measures.

Predation

It is estimated that there as many feral cats as there are owned cats in the United States, with an estimated population of 73 million in the year 2000.[6] Cats hunt and kill small mammals, reptiles, amphibians, and birds, both adults and nestlings, with one estimate suggesting that over a billion small mammals and millions of birds are killed by cats each year.[9,10] In Wisconsin alone, it is estimated that one to two million free-roaming cats kill about 40 million birds annually.[9] The large number of animals killed is due in part to the density of cats tolerated in a feral colony. One study demonstrated 35 feral cats in the same territory that would have supported only one or two pairs of larger natural predators, such as fox or coyotes.[11] There is collateral damage from cat predation of small animals to these larger predators,

as cats decrease availability of natural food sources.[9] To be complete, one must also recognize that not all decline in prey availability is due to predation from cats and that cats may help support prey populations in some instances by controlling intermediary predators, such as rats.[12,13]

Intraspecific disease transfer

There are no reports in the literature of feral cat colonies specifically spreading disease to owned cats. However, because feral cats do not receive regular veterinary care, including vaccinations, there is a greater risk of their contracting contagious diseases such as feline leukemia and rabies, and transmitting them if they interact with owned cats. There are documented reports of feral cats spreading disease to wild cat populations, including feline leukemia virus to mountain lions and panleukopenia to Florida panthers.[14,15]

Interspecific (zoonotic) disease transfer

Public health concerns center around spread from feral cats to humans of viral diseases, including rabies;[5,16-19] protozoal infections, such as *Toxoplasma gondii*;[16,20-22] fungal infections, including dermatophytosis;[5] and parasites.[23-25] Some might argue that management of feral cat colonies increases public health risk by exposing caregivers to disease and to direct injury; others suggest that risk is decreased by vaccination of cats returned and removal of diseased cats from managed colonies.[6,26]

Rabies is a disease of great significance in all species, including humans. It is fatal to humans unless they are treated immediately after exposure. Rabies is maintained in wildlife and the variant of rabies contracted by domestic animals varies by region, with raccoon, skunk, fox, and bat variants those most commonly seen in the United States. In the most recently published survey of rabies surveillance in the United States, rabid animals were identified in 49 states and on Puerto Rico, with 93% of cases occurring in wildlife and 7% in domestic animals; cats represented 4.3% of the total cases seen, a number nearly four times that reported for dogs.[18] In one survey of feral cats in Italy, two of eight rabid cats were from known feral cat colonies that were managed by human caregivers.[5] Concern exists even if feral cats are vaccinated; in one survey of 840 rabid cats in the United States, 22 (2.6%) had been previously vaccinated at some point in their lives, with three of those animals described as being current on their vaccinations.[17]

Toxoplasmosis is caused by a protozoan organism carried asymptomatically by cats. In one survey of six feral cats trapped in Mexico City, all were seropositive for *Toxoplasma gondii*.[16] In larger studies, prevalence of seropositive cats varied from 73.9 to 84.7%.[21,22] Because of constant exposure to toxoplasma through ingestion of prey species, *Toxoplasma gondii* always is present in feral cat colonies, although prevalence may vary over time and may be higher in adults than in juveniles.[20,22]

Intestinal parasites most commonly identified in feral cat populations are roundworms (*Toxocara cati*), hookworms (*Ancylostoma tubaeforme*) and several species of tapeworm.[23-25] Only a small percentage of cats were identified to be carrying those parasites most readily transmitted to people, including *Toxocari cati* (0.8% of 658 cats) and *Ancylostoma tubaeforme* (14.7% of 658 cats). Reported percentages were higher in cats living on islands than on the mainland.[24]

Passage of protozoa and parasites through feces is not the only public health concern. One investigator estimated that in a single community, the amount of feces deposited outdoors by the 2046 feral cats living there every year was about 29.5 tons.[27] A study tracking sources of *E. coli* in storm sewers feeding rivers and streams demonstrated that the highest percentage from any one source came from cats.[28] It may be that it is not exposure to the cats but rather exposure to their feces that is the greatest public health risk.[26]

Control measures

Eradication

Eradication of feral cat populations has been demonstrated successful only on small islands.[29] Methods for eradication include trapping; hunting, with or without dogs; direct poisoning; indirect

poisoning by placement of poisoned rats or other food sources; and introduction of fatal viral disease, such as panleukopenia.[29] Any eradication method must take into account safety of the environment, of humans and of non-target species, and also consider expense, sustainability of population control, and public support of the eradication and of the method chosen.[30] Complete depopulation is not considered a viable option in most situations.

Trap-placement

An alternative to eradication is depopulation by trapping and placement of all trapped cats into homes or sanctuaries. There is recognition that not all feral cats are adoptable; that is, in fact, one definition of feral.[4] At present, millions of cats are euthanized in shelters in the United States each year because there are not enough homes for them all. Addition of feral cats to this population would lead to euthanasia of even more cats, many of whom might have been adopted in the current system.[30] Creation of cat sanctuaries has not been demonstrated to be economically viable long-term and may actually be associated with increased abandonment of companion cats in the vicinity of the sanctuary.[30]

Trap-neuter-return

Trap-neuter-return (TNR) programs are those best described in the veterinary literature. The reader should be aware that TNR may refer to any number of steps in the system including trapping; health evaluation with or without testing for feline leukemia and feline immunodeficiency virus and fecal flotation examination; vaccination; gonadectomy; decisions regarding adoptability and euthanasia, based on behavior evaluation and health status; and eventual return to the colony.

In some countries, management of feral cat colonies is required because eradication by means of euthanasia is illegal.[31] In other countries, the goal of management is to create a stable neutered population with the eventual goal of decreasing colony size, ideally to zero. Some studies find that TNR programs are associated with a decrease in colony size, and a decrease in complaints about the feral cats as a public nuisance compared to eradication programs.[32-36]

How humane are TNR programs? It has been demonstrated that feral cats respond to vaccination as intended, becoming seropositive and maintaining detectable titers.[37] Feral cats that have been neutered undergo a decrease in metabolic rate and subsequent increase in body weight as do all neutered cats, but do not become obese, with a mean body condition score one year after neuter and return to the colony of 5 ± 1 on a 9–point scale, where 1 is emaciated and 9 is grossly obese.[38-40] Surgery does not appear to be a greater risk for these cats than for owned cats; one study revealed a surgical mortality rate of 0.4% in a large TNR program.[41] Kitten mortality rate in outdoor colonies is reported to be greater than 50%, suggesting that TNR, and subsequent decrease in kitten numbers, is humane because it prevents birth of kittens that would have died in the colony environment.[42]

The primary concerns about TNR programs are their cost and lack of sustainability. In order to maintain a stable population, models suggest that trapping and neutering must be performed on a large scale, sterilizing over 51% of all female cats in the colony that are over one year of age annually such that at least 71% of the queens in the colony are sterilized at any given time.[7,43] In a survey of large managed colonies in Italy, despite large scale trapping and neutering, about 21% of the population consisted of new cats every year.[31] As long as humans continue to abandon cats as strays that can repopulate hospitable locations, the problem of feral cats cannot be completely controlled and it is wisest to assume that complete eradication of colonies will not occur and to understand that due to environmental variations, colony size may even increase with TNR management.[30,44,45] Trapping is labor intensive; one study documented that 8.9 ± 3.9 nights of trapping per cat were required to capture at least 90% of the cats in one colony.[46] There also is the consideration of who bears the cost for the surgeries, which must be performed by veterinarians. It has been suggested that veterinary practitioners should subsidize these programs but that it is inappropriate to suggest that any single aspect of any profession bear the burden of a societal problem.[47]

Medical control of reproduction

Megestrol acetate

Megestrol acetate (MA) is a synthetic progestogen approved for estrus suppression in bitches. No product containing this chemical ever has been approved by the Food and Drug Administration (FDA) for use in cats. Extralabel use is described by the FDA in the following way: extra-label use of drugs in treating animals is allowable only by licensed veterinarians within the context of a valid veterinarian-client-patient relationship, and does not include drug use in treating animals by the layman (except under the supervision of a licensed veterinarian).[48] Unapproved products containing very low doses of MA for oral distribution in feral cat colonies are commercially available. Megestrol acetate has no anabolic or estrogenic properties and is reported to have no masculinizing effect if ingested by queens early in pregnancy.[49,50]

All studies reporting use of MA for reproduction control in feral cat colonies describe weekly oral doses of 2.5–5.0 mg. Reported success rates in preventing conception vary from 57.1 to 100.0%; in at least one of these studies, cats were fed the drug by hand to ensure consistent dosing.[51-53] Male cats given 5 mg MA weekly showed a decline in sex-related behaviors; this effect was not seen at a dose of 2.5 mg weekly.[52] In all reports, inconsistent dosing was associated with quick return to normal fertility in queens.[51,52]

Side-effects of MA can be severe. Reproductive tract abnormalities in treated females include cystic endometrial hyperplasia and pyometra.[51,54] Mammary hypertrophy has been reported as a side-effect in treated male and female cats.[53,55,56] Mammary neoplasia (carcinoma or adenoma) also has been reported.[53,56] Endocrine abnormalities associated with treatment include adrenocortical suppression and diabetes mellitus.[53,57-63] Less severe side-effects include increased appetite, increased thirst and urination, lethargy, and aggression; the latter may be particularly concerning to caretakers of feral cat colonies.[53,64]

Cabergoline

Cabergoline is a prolactin inhibitor that has been demonstrated to effect pregnancy termination in cats after mid-gestation.[65] There is one report of successful termination of pregnancy and control of reproduction in a feral cat colony by hand-feeding of cabergoline to visibly pregnant queens.[66] There are no reports documenting possible side-effects of cabergoline available in food and accidentally ingested by prepuberal cats, adult male cats, or queens early in pregnancy.

Conclusion

At present, the preferred method for management of feral cat colonies is TNR. These programs require consistent funding and commitment and cannot be expected to lead to eradication as long as the environment is hospitable to cats and cats are available for immigration into the area. To address public health concerns, it must be remembered that exposure to feral cat feces may well be a greater risk than exposure to the cats themselves.

Medical therapy would be preferred to TNR programs if it could be shown to be effective and safe, and less labor-intensive. Commercially available products containing MA at very low doses have not been shown to be either effective or safe and cannot be recommended. In the absence of a medical alternative, it is recommended that society invest in education of the public regarding responsible cat ownership, creation of appropriate public policy regarding maintenance of feral cat colonies and funding for TNR programs with the goal of decreasing feral cat populations, and support of research to identify safe and effective contraceptives and sterilants for cats.[6]

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