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Formerly called the Humane Society of the United States and Humane Society International

Street dog sterilization:

Managing a moving target

Effective dog population management programs are essential for long-term, humane control of street dog numbers. Their success depends on strategic program design and a clear understanding of how dog populations reproduce and change over time.

Street dog populations are maintained mainly through annual breeding within the existing population, rather than from new dogs entering from outside or through pet abandonment.

Kathy Milani/Humane World for Animals

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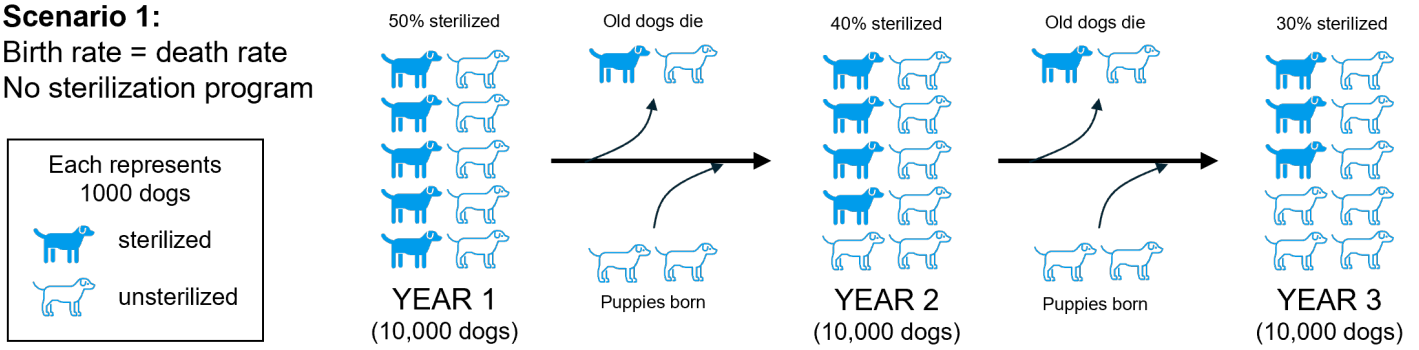
Street Dog Sterilization Dynamics

Key Lesson: Front-loading sterilizations–performing more surgeries early in the program–achieves population control faster and reduces total surgeries needed over time.

Scenario 1:
Birth rate = death rate
No sterilization program



Let's imagine that after a city's street dog population survey, we estimate (and note it can only ever be an estimate, not a precise count) that there are 10,000 dogs living on the street. In that survey we also found that, on average, five out of every 10 dogs are sterilized. Therefore, we estimate that 50% of our 10,000 dogs (5,000) are sterilized, leaving 5,000 unsterilized dogs.

However, this 50% sterilization level will decrease over time as unsterilized dogs continue to reproduce. The remaining unsterilized dogs are still breeding/reproducing and as a result new puppies (who are obviously unsterilized) are being born, and old dogs (some of whom are sterilized) continue to die; this is the case for any animal population, and hence applies to street dogs too. So, even if we assume that the population size (total dog population of a city) remains much the same (some change is inevitable depending on various factors), with the number of puppies born equal to the number of dogs who die each year, the percentage of sterilized dogs decreases.

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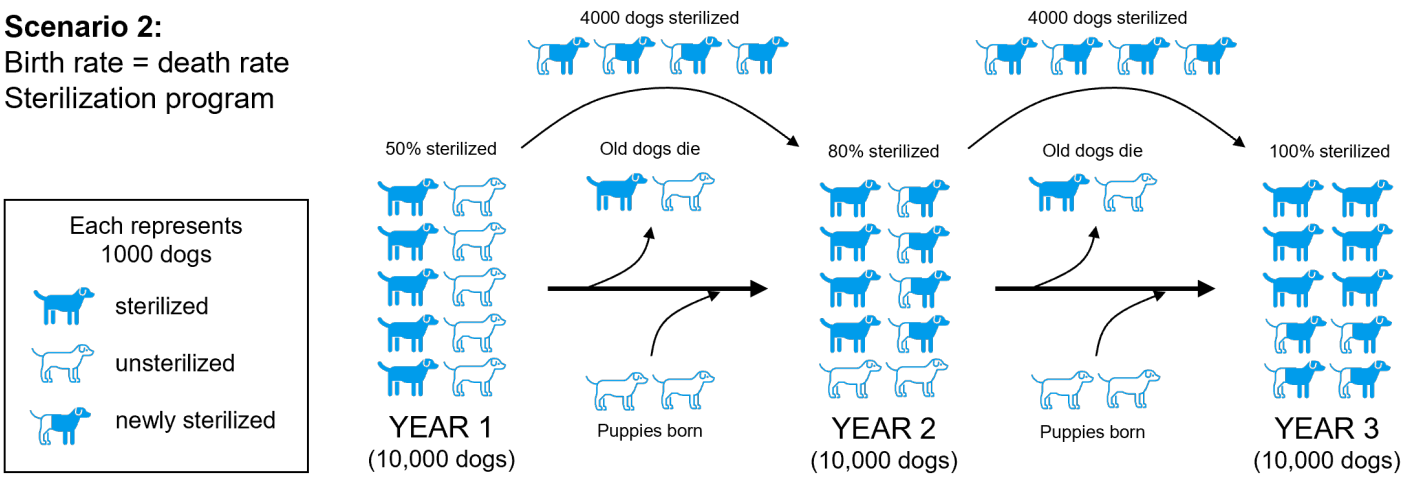
Street dog sterilization dynamics

Scenario 2:
Birth rate = death rate
Sterilization program



In this case, if we want 100% of street dogs to be sterilized, in Year 1 it appears as if we have 5,000 sterilizations left to do. However, unless we can do this within one breeding cycle (which is more than likely impossible), we can see that the number of dogs we need to sterilize increases by 1,000 per year (note that this number depends on the size of the population and number of unsterilized dogs). So, if we only sterilize 1,000 dogs each year, this is canceled out by the population increase, meaning the sterilization proportion remains at 50%: it won't actually increase regardless of how many years we continue to sterilize 1,000 dogs per year. This is the case for most programs in India currently.

Instead, we need to sterilize dogs at a rate faster than population turnover. In this example, that's anything more than 1,000 dogs per year, but its 4,000 dogs per year (in this case 80% of the unsterilized street dog population) to achieve 100% sterilization by Year 3. So, at the rate of 4,000 dogs per year, we actually need to sterilize 8,000 dogs, many more than the total number of unsterilized dogs estimated in Year 1. If we sterilize at a slower rate, it would take even more sterilizations (in this simple example, 2,000 sterilizations per year wouldn't achieve 100% until Year 6, and it would require closer to 12,000 sterilizations).

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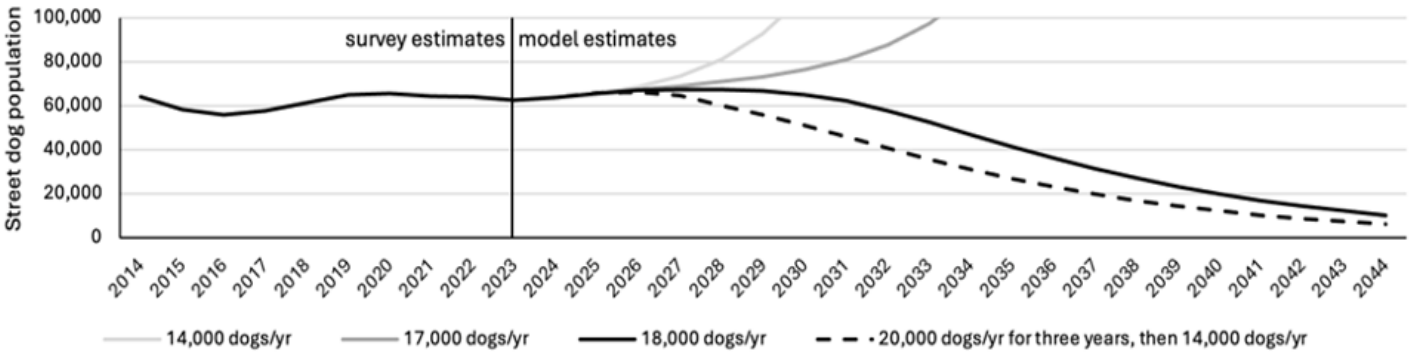
Reaching a critical sterilization proportion

Sterilizing 100% of street dogs is neither feasible nor necessary. In most cases, maintaining sterilization coverage above 80-85% is sufficient to stop population growth and achieve long-term stabilization.

One thing the diagram above doesn't take into account is that, past a certain point, the more dogs you sterilize, the fewer unsterilized puppies enter the population, as fewer dogs exist that can still breed. So, what we need to do is sterilize enough dogs to slow breeding to a rate that allows us to easily maintain a sterilization percentage that prevents further population growth, and even decrease it. This is normally greater than 80-85% of the dog population. Of course, the higher we can get the proportion, the fewer sterilizations we need to maintain it.

Let's look at a real-world example. The graph below shows models based on long-term annual surveys in a large Municipal Corporation in India between 2014 and 2023. These models take into account all the factors discussed so far, with dog birth rates proportional to the number of unsterilized dogs remaining. At the point the model takes over from actual survey data, 64% of a population of 62,539 estimated street dogs are sterilized, leaving an estimated 22,266 unsterilized dogs remaining. Over the program's 10 years of operation, approximately 14,000 dogs per year were sterilized.



The graph above shows that maintaining the current average of 14,000 dogs sterilized per year fails to control the dog population. The same happens even if we increase to 17,000 dogs per year (the total population wouldn't actually increase exponentially as the model shows, but the point is that the population grows). If 18,000 dogs are sterilized per year, however, that is enough to cause a downward trend in the dog population. What is interesting is that if we sterilize 20,000 dogs a year for three years, then we can actually go back to our 14,000 per year and still achieve population control. What's more, the 18,000 scenario requires approximately 200,000 sterilizations over the next 30 years, compared to only approximately 158,000 for the latter. Front-loading extra sterilization in the first few years saves many thousands of surgeries in the long run by reducing breeding rates quickly.

Ultimately, because of dog immigration and other factors, the total dog population is unlikely to ever actually reach zero, and sterilizations will always need to be done however high you get the percentage! But by reaching high levels of sterilization as soon as possible, we can reduce the number of dogs who need to be sterilized in subsequent years, eventually achieving a population that requires only minimal yearly or periodic sterilization efforts to control or continue reducing the street dog population.

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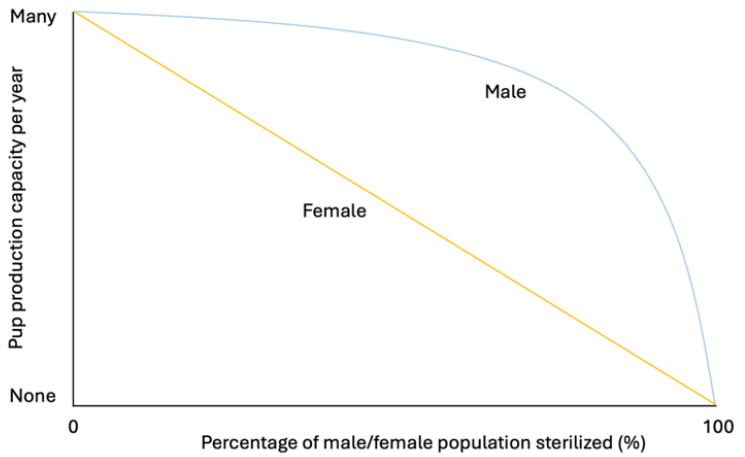
General recommendations

Female-centric sterilizations for street dogs

Prioritize female dogs. Female-centric sterilization has the greatest impact on population control. One unsterilized male can impregnate many females, but each unsterilized female can produce 6–8 pups per year. Sterilizing females therefore prevents the birth of hundreds of pups over time.



The graph shows the effect of female-centric versus male-centric sterilization on pup birth rates. In reality, the female line will also follow a slight curve as carrying capacity inhibits breeding potential at high levels of breeding competition (i.e., many unsterilized females).

Front-loading sterilizations

Start strong.
Concentrating sterilizations early in the program (“front-loading”) reduces the total number of surgeries required in later years.

Geographical approach

Target geographically.
Implement programs area by area, rather than by administrative boundaries, since dogs move freely between neighborhoods.

Pre-breeding sterilization

Time sterilizations strategically.
For example, in many Indian cities, pregnancies peak after the monsoon (October–November). Sterilizing females before this period prevents additional litters.

Importance of location-specific programs

Tailor to local conditions.
Base sterilization rates and timing on local data, such as pup sightings and female lactation rates collected through street dog surveys.