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# Impact of Supplementary Feeding on Feral Pigeon Abundance: A Brief Review

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**Abstract:** The worldwide increase in the human population has led to rapid urbanization, transforming wild lands into concrete jungles. Increased urbanization has complex direct and indirect effects on native flora and fauna. Species able to take advantage of such changes may develop dense and stable populations. Feral pigeon is one such bird who gets benefited by human presence. Among the factors that favor a certain species is the availability of food, and feral pigeons can exploit the food resources available in urban environments. Rock pigeons are complete granivores, and foraging flights are taken daily from the nearest farmland to feed on grains. In contrast to rock pigeons, feral pigeons have adapted to cities to forage on items other than grains. Summarizing the crop or stomach content of feral pigeons around the world shows us the variety of diets they currently have. Today, along with the raw grains provided to feral pigeons, their diet also consists of bread crumbs, fried snacks, cakes, and garbage provided to them by humans. The impact of the *ad libitum* availability of food is a marked increase in the reproductive rate. Feral pigeons readily reproduce at any time of the year, resulting in an increased population. The population rise of a single species leads to change in the human conscience of them being harmless animals to pests. Ubiquitous vocalization, acidic excrement that corrodes historic monuments, and their ability to spread diseases are some of the reasons why pigeons are identified as pests.

**Keywords:** Feral pigeon, Supplementary feeding, Urban ecology, Population abundance

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## Introduction

Urbanization is the mass movement of humans from rural to urban areas. This has transformed unpopulated wildlands into habitable lands with some degree of relatively permanent human presence (Meyer and Turner, 1992). There is

virtually no place on earth where humans have not settled, and wherever we go, we significantly alter natural habitats (Alberti *et al.*, 2001; Johnston, 2001). Increased urbanization results in the disappearance of wild portion while turning

them into sprawling metropolis. Approximately 47 per cent of the world's population lived in urban areas in 2000, which dramatically increased to 55 per cent in 2018 (World Urbanization Prospects, 2018). One-third of the global population is estimated to live in cities by 2030 with at least half a million inhabitants. Considering it to be a human settlement, agriculture, or the use of natural resources needed to sustain the human population, nearly all land has been impacted by increased urbanization (Marzluff and Neatherlin, 2006). Species able to take advantages of such urban environments may grow and develop dense populations. Only a few successful species dominate urban avian fauna, such as feral pigeons, European starlings, and house sparrows (Jhonston and Janiga, 1995). With high reproductive capacities and prolonged breeding seasons, feral pigeons have been successfully adapted to the urban environment (Luniak, 2004). Factors such as ameliorated climate, abundant food and water, reduced predators, and increased nest sites allow for the increased productivity of such species (Gehlbach, 1999). While some species thrive because of human settlement, many native species may decline with urbanization because of the scarcity of natural habitats, increases in predators, parasites, competitors, or intolerance of human activity (Beissinger and Osborne, 1982; Mills *et al.*, 1989). Although pigeon feeding has become a leisure activity for people around the world, pigeons are considered an important epidemiological and sanitary problem (Hetmański *et al.*, 2011).

### *What made pigeons Feral?*

Feral pigeons cannot be referred as a different species, but only a variety of rock pigeons, and they do not fall under the taxonomic group "sub-species" as they are population expanding from domesticated ancestors. All historical evidence points to the fact that rock pigeons were among the first animals to be domesticated (Sossinka, 1982). Greek scholars, such as Homer, Socrates, and Aristotle, displayed knowledge of pigeon abilities and wrote about issues of selective

breeding and domestication (Levi, 1963). Grain farmers would be the first to domesticate pigeons because soon after humans began farming in regions containing wild rock pigeons, they would have made their way to human settlements to forage on the grains (Jhonston and Janiga, 1995). A newly emerging agriculture society would also use the nitrogen-rich feces of pigeons as fertilizer. As pigeons began to inhabit human settlements, they became candidates for capture as a food source. Upon capturing for consumption, humans noted them for their "reproductive magic," breeding more times and for a longer season than any other bird and most other animals (Jhonston and Janiga, 1995). Relying on abilities beyond memorization, the rock pigeon has a naturally gifted ability to find its way "home" from long distances (Jerolmack, 2005). This ability of pigeons to convey messages has led to increased domestication. An unprecedented scale of pigeon uses for conveying messages was seen in world war I. When telegraph lines are either tapped or destroyed by enemies, pigeons become a safe source for delivering messages. Soldiers called "pioneers" were explicitly trained by the British Army to take care of and travel on battlefields with up to four pigeons (McCafferty, 2002). The pigeons became so valuable or dangerous in enemy hands that the Germans ordered the destruction of all the pigeon houses when they occupied Belgium and France (Patent, 1997).

From ages, pigeons are referred in different narratives and metaphors around the world. Humans consider monogamy a moral trait, and pigeons display this trait, which has led to their use in rituals and shrines that celebrate love (Jerolmack, 2005). Pigeons were represented as a symbol of fertility and sex in Mesopotamian mythology, while Syrians considered pigeons as sacred animals. The Greek goddess of love, Aphrodite, and the Hindu god of love, Kamadeva, are both portrayed using Dove (Levi, 1963).

As stated above, pigeons have been extensively domesticated in human history, either in the form of food, as a messenger, or for leisure.

This domesticated breed of pigeons readily went feral when released off from their captivity. For instance, when the French peasants destroyed the aristocracy's pigeon houses during the revolution, they would have never paid attention to the possibility of their action, resulting in the existence of feral pigeons in all cities of the world today (Jhonston and Janiga, 1995). Therefore, there is no doubt that feral pigeons originated from domesticated rock pigeons. For thousands of years, pigeons have adapted to human civilization and have become successful in prospering, even in severe urban environments (Jerolmack, 2005).

### *Rapid population growth of feral pigeons:*

Currently, feral pigeons are among the most successful commensal animals in the city (Blechman, 2007). Rock Pigeon (*Columba livia*) used to live in the faces of the cliffs of the Palearctic and north Ethiopian regions, as well as in those of the Indian Subcontinent. In contrast, feral pigeons live everywhere in which humans do (Goodwin, 1983). After the end of the wars, feral pigeons populated cities due to feeding by pigeon enthusiasts, food littered by humans, accidental spoilage, and, on a lesser scale, seasonally occurring natural food (Haag-Wackernagel, 1995). In the USA alone, 52 million people frequently feed on garden birds. Currently, the global market for bird feed is expanding, and is worth more than US\$3000 million annually (United States Fish and Wildlife Service, 2001). In the UK, it has been estimated that 60,000 tons of food is consumed annually by birds (Glue, 2003). A large percentage of households in Europe, North America, and Australia provide supplementary food for wild birds (Fuller *et al.*, 2008). As food supplies were provided *ad libitum*, feral pigeons started to breed throughout the year and expanded their granivorous diet into an omnivorous diet (Murton and Westwood, 1966; Haag-Wackernagel, 1995).

Feral pigeons usually display two types of foraging strategies around the globe: one is feeding directly on the streets around the town (Ryan, 2011; Murton *et al.*, 2014) and the second is on nearby agricultural fields or grain storage

units (Batoool *et al.*, 2020). There is also variation in the type of feed for feral pigeons which depends on the season of the year and their respective geographical location. In Bratislava, Slovakia, and Moscow, feral pigeons usually feed on grains and pulses in agricultural fields during spring and summer. During the harsh winter days, when the soil is frozen and snow is covered, feral pigeons are dependent on public feeding and occasionally on garbage (Jhonston and Janiga, 1995). Similarly, pigeons visit agricultural fields and grain storage units in Punjab, Pakistan and Prague, Czech Republic (Kramarova, 1991; Batoool *et al.*, 2020).

Although agricultural fields are available as feeding spots for feral pigeons in many regions around the world, in closed city centers they rely on public feed around squares, public parks, and gardens (Hetmański *et al.*, 2011). The density of bird-feeding spots in urban environments influences avian abundance. This effect exclusively drives the abundance of urban species such as feral pigeons. In contrast, the density of feeding stations has no effect on avian species richness (Fuller *et al.*, 2008). Along with the public feeding, accidental spillage and garbage are a part of their diet (Ryan, 2011; Murton *et al.*, 1972). A study in Milan, Italy, showed how the pigeon population increases as we move from the rural to the urban center of the city. This is predominately due to supplementary food availability in urban areas, which causes an increase in the pigeon population (Sacchi *et al.*, 2002).

Although factors such as town size, building features, landscape, and human population affect the urban pigeon population, supplementary feeding is the primary factor (Jokimaki and Suhonen, 1998; Sacchi *et al.*, 2002; Przybylska *et al.*, 2012). The effects of supplementary feeding on the abundance and reproductive output of birds have been documented in several studies (Fuller *et al.*, 2008). Pigeons have become food beggars around the streets and have developed special techniques to beg people for food (Jacqueline *et al.*, 1994).

Feeding birds started as a wintering activity in places with a harsh winter climate to provide birds with optimum nutrition, but today it has become a worldwide activity. Pigeon feeding is also associated with culture, as seen in India and several Southeast Asian countries, and is considered a religious offering that provides wishful boons. The two major religions in Southeast Asia, Hinduism, and Islam, consider pigeons sacred animals and associate pigeon feeding with transformation and redemption (Wilde, 2021). Pigeon feeding plays an important role in determining the distribution of feral pigeon populations, and the importance of regular food resources from humans has been highlighted in previous studies (Murton and Westwood, 1966; Fuller *et al.*, 2008; Ryan, 2011). It was also observed in a study in Wellington, New Zealand that pigeons were loyal to their site. They had an average activity range of less than 2 ha. This suggests that abundant food sources were available nearby, and that they did not need to go far to forage (Ryan, 2011).

The average feral pigeon population in the world is around 1 pigeon per 10–20 city inhabitants, these estimates to world population between 165 million to 330 million (Jhonston and Janiga, 1995). Feral pigeons have reached high densities in many cities around the world (e.g., 6.8 pigeons/ha in Wellington, New Zealand (Ryan, 2011), 9.4 pigeons/ha in Barcelona, Spain and Senar, 1992), 7.3/ha in Jena, Germany (Ferman *et al.*, 2010), 8.4 pigeons/ha in Basel, Switzerland (Haag-Wackernagel, 1995), 20.8 pigeons/ha in the inner city of Milan, Italy (Sacchi *et al.*, 2002) and 4-5 pigeons/ha in the inner city of Amsterdam (Buijs and Wijnen, 2001).

## Conclusion

It brings pleasure to people who feed feral pigeons on a regular basis, but the absence of predators, together with large food supplies, allows the expansion of pigeon populations, which can cause conflict between humans and birds (Haag-Wackernagel, 2006). Each feral pigeon produces about 12 kg of excrement each year (Haag-

Wackernagel and Geigenfeind, 2008), spoiling various monuments, buildings and public places. The acidity alone can cause aesthetic damage to marbles and calcareous stones over a period. Fungal growth occurs in pigeon feces, which can damage concrete construction (Bassi and Chiatante, 1976). The cost of its cleaning and repairing can put strain on family and commercial businesses (Jhonston and Janiga, 1995)

Another reason for concern is the ability of feral pigeons to spread disease. In the coronavirus pandemic, we have seen that viral pathogens can spread in the human population through avian agents. Without any direct contact with pigeons, pathogens can be transmitted to humans mainly via excreta, secretions, or feather dust spread into the environment (Morozova *et al.*, 2002; Geigenfeind and Haag-Wackernagel, 2010). Several diseases, such as aspergillosis, borreliosis, coccidiosis, chlamydiosis, equine encephalitis, influenza, paramyxovirus, paratyphoid, toxoplasmosis, and tuberculosis (Jhonston and Janiga, 1995), are transmitted to humans (Schnurrenberger and Hubbert, 1981). Therefore, the rise in pigeon populations due to the ad libitum availability of food via supplementary feeding is a matter of concern.

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