

## **EPIDEMIOLOGICAL AND SEROLOGICAL EXAMINATION SURVEYS IN PIGEONS (*COLUMBA LIVIA*) IN THE CITIES OF VENICE AND TREVISO, NORTHEASTERN ITALY**

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Epidemiological and serological surveys of pigeons were conducted in the cities of Venice and Treviso, northeastern Italy. Although the two cities are only 30 Kms apart, they are very diverse in terms of human habitats and ecological influences. The survey results provide and confirm comparative differences of the presence of human pathogens (zoonosis) in the two cities, such as ornitosis (Clamydia). Because of this, different control criteria for the control of pigeon populations had to be implemented to safeguard public health. The nature of investigations, included serological and epidemiological analyses, the methods implemented for control of pigeon populations, and the overall precautionary measures undertaken from public health safety point of view are described.

### **INTRODUCTION**

In nature there are different kinds of pigeons, the *wild pigeon* (*Columba livia livia*), that lives primarily in rocky environments, carasic environments, sea cliffs, the *domestic pigeon*, that is bred and on which genetic selections was operated for creating meat or ornamental or traveller animals and the *urban pigeon* (*Columba livia var. domestica*) that derives from the domestic pigeon and lives in the cities feeding food furnished by the people.

#### *Causes of urbanization of the pigeons*

Following the thick environmental modifications, processes of urbanization and industrialization accompanied by systematic deforestations of the rural areas, created microclimatic situations that caused in the urban centers exaggerated proliferation of colonies of pigeons. The city offers, in fact, a sure source of food, a small thermal excursion, a great middle temperature in comparison to the rural environment, the almost total absence of wind, the extension of the photo-period, the sites where to be able to build the nest, the almost total absence of predation. These good conditions of life allow the pigeons an increase of the reproductive activity with consequent elevated demografic increase of the population.

The thick colonization doesn't interest only by now the historical center of our cities, but also the outskirtses and the industrial zones. Particularly the city of Venice presents architectural structures of the buildings and the residences with an elevated number of ravines that favour the installation of the pigeons.

### *Environmental damages*

The impoverishment of the urban architectural structures is proportional directly to the concentration of the pigeons. It is easily, therefore, to understand the serious state of degradation that a lot of Italian cities present. The damage depends on the accumulation of guano (every pigeon produces around 2,5 Kgs/year of faeces), on which there is a proliferation of microbial agents that brings down the pH attacking the marmoreal materials, sandstones, etc.; besides some mixtures in the guano are able to react chemically with the components of the structures of stone of the monuments. It is also to consider the physical-mechanic action of the fingernails and the beak that causes microcracks of the surfaces of the monuments, destined, obviously, to widen for the action of the atmospheric agents. Besides the material damage on the architectural structures, the urban decorum is also compromised by the accumulation of guano that determines the dirt of sculptures, fountains etc., worsening their artistic-architectural qualities.

Other drawbacks are dead animals, the dirt of clothes, the risks of slips and falls, the risks of car accidents, the bad odours for stagnation of faeces, situations that determine complaints to the public administrations.

### *Hygienic-sanitary aspects*

About the hygienic-sanitary aspects, the urban pigeons represent for the people a potential danger either direct for the possible vehicle of pathogenic micro-organisms, or indirect for the faeces accumulation in the environment and consequent proliferation of pathogenics.

*The direct potential dangers are:*

#### Salmonellosis

The formalities of transmission between the pigeons are numerous, in particular through food or water contaminated from infected faeces, by aerway breathing dust infected by Salmonellas, by ovaric way directly from the ovary to the egg or through the pores of the hulls of the deposited eggs. Numerous are the searches about the urban pigeons with the intention of establishing their role as carrier/eliminator of Salmonellas and therefore of possible vectors of agents of zoonosis.

#### Ornitosi and Psittacosis

It is a disease sustained by *Chlamydia psittaci*, agent particularly diffused between the birds and overall between parrots and pigeons. It always presents high morbidity and low mortality. The Chlamydia is eliminated with the faeces that, once dried, can spread the micro-organism in the surrounding environment through the pulverization. In the population it interests, in particular way the children, the old persons, the immunodepressed and the carriers of cardio-respiratory pathologies. Clinically it presents a syndrome similar to the influenza with a subacute course of hard diagnosis and there are frequent atypical pneumonias.

#### Campylobacteriosis

It's a disease caused by *Campylobacter jejuni* that is eliminated with the faeces. In the last years it has acquired an increasing importance because the episodes of enteritis in the people are more and more frequent.

### Toxoplasmosis

It's a disease caused by a protozoan *Toxoplasma gondii*. The infected pigeon eliminates plentifully the protozoan with secretion and excretion during the acute phase. Once stopped the clinical phase the parasite creates cysts in the muscles.

The Toxoplasmosis is a very dangerous disease for the women in pregnancy and for the immunodepressed.

*The indirect potential dangers are:*

The accumulation of organic materials (faeces, feathers, carcasses, etc.) transforms the environment in an ideal habitat for the bacteria, with serious risks of contamination for the people.

## **MATERIALS AND METHODS**

From 1997 to 2000, in the laboratories of the sections of Treviso and Legnaro of the *Istituto Zooprofilattico Sperimentale delle Venezie* of Legnaro (Padua), numerous examinations were effected on pigeons withdrawn in Treviso and Venice, for searching of *Salmonella* spp. on the faeces and on the organs, of *Campylobacter* spp. on the faeces, serological examinations for *Chlamydia* and *Toxoplasma* and searching of parasites.

Particularly:

### Treviso

➤ <i>Salmonella</i>	samples n. 08	positives n. 02
➤ <i>Chlamydia</i>	samples n. 46	positives n. 05
➤ <i>Toxoplasma</i>	samples n. 46	positives n. 39
➤ Parasites	samples n. 39	positives n. 28

The search of *Campylobacter* spp wasn't effected. The recognition of the different types of the *Salmonellas* shown the exclusive presence of *S. typhimurium*. The found parasites were *Taenias*, *Coccidias*, *Capillarias* and *Ascarids*.

### Venice

➤ <i>Salmonella</i>	samples n. 246	positives n. 32
➤ <i>Chlamydia</i>	samples n. 246	positives n. 77
➤ <i>Campylobacter</i>	samples n. 246	positives n. 70
➤ Parasites	samples n. 246	positives n. 246

The search of *Toxoplasma* wasn't affected. The recognition of the different types of the *Salmonellas* shown the presence above all of *S. typhimurium*, 1 positiveness for *S. blockley* and 4 for *S. give*. The *Campylobacters* were all *C. jejuni* except 1 *C. lary*. The parasites were the same of Treviso.

## RESULTS AND DISCUSSION

### *Strategies of containment*

The above-mentioned damages (environmental and sanitary) appear, by now, in dramatic way, without the men have the tools to minimize them. To minimize them, not to eliminate them because the cohabitation with the animals becomes a daily demand with the purpose not to exasperate an anthropocentrism that risks to change in an antiseptic loneliness with false mirages of self-sufficiency. An urban architecture, in its spasmodic evolution, didn't consider the possibility of pacific cohabitation with the animals, showing, however, its vulnerability. That's why the cohabitation has to be able to develop an educational situation to reduce the hygienic-sanitary risk. It is important, therefore, that the cities stop the indiscriminate process of the building but the men have to create green areas, some areas of feeding for the animals, etc., that allow the demographic control of the population of urban animals which draw mostly and mostly to that immense source of wealth that the city represents. Close to this urbanistic scenery that presents pacific cohabitations, it is necessary to consider the actual "emergencies" with the purpose to limit the above-mentioned damages. Being complex and multifactorial situations, the interventions have to be multifactorial. Every single intervention is destined to have unsuccess (also the suppression). It is necessary therefore to plan an integrated strategy that considers the following aspects: costs and benefits, attainment of the objectives, respect of the animal welfare, safety of the procedure.

### *Possible lines of intervention*

#### Cultural and sanitary education

The knowledge of the biologic and behavioral aspects of urban pigeons is fundamental, either for who is planning the control or for the citizens. The zoophilists that continue to feed the pigeons with the bread can provoke some dismetabolies that can facilitate to establish situations of disvitaminosis and avitaminosis. Very important it is also the information transmitted to the citizens about that is doing with the purpose to sentitize and to get collaboration. It should use the local press and organize some meetings in the schools, or with the citizens and the animal associations, with the purpose to give correct knowledge of the existing problems and the possible solutions. Extremely important is also the collaboration with the Public Administrations of near locations, to act and to avoid passages of pigeons from big colonies to small colonies in phase of control.

#### Census

The evaluation of the gravity of the problem is surely of fundamental importance before undertaking every type of intervention. Besides this, it allows, in the following phases, to appraise the efficacy of the adopted methodologies.

#### Control of the sites of nest-building

Because a lot of Italian cities are characterized by the big architectural value, a lot of buildings offer ideal conditions for loafing and the roosting of the pigeons. Therefore architectural interventions appear ideal; nevertheless the costs, certainly high, are a big deterrent. The architectural interventions have to be appraised every time that are made some restructurings on public or private buildings. This type of solution will have to hold in consideration the architectural-urbanistic aspects and that ethological of the pigeons. Will have to done, therefore, a very careful evaluation that will involve different professionalisms (town technical office, animal laws office,

sanitary services, specialized firms, etc.). In some monumental cities, to protect the monuments from the animal aggression, was applied the method to hinder the nest-building with passive protections (thin nets, glasses etc...) that are put on ravines, windows, garrets etc. In alternative to the physical block of the nest-building with nets or other protective measures, was proposed and used, especially in the countries of North-Europe, the application of repellent or slippery substances to the mouldings, prominences, etc. in way to force the birds to not to settle and not to nest. Apart the complexity of the work, that must have effected on wide areas of the historical centers, by highly specialized persons, also to respect external integrity of the monuments, the result of these interventions is often limited to move the problem to immediately near areas! These techniques, besides difficulty of search of "acrobats" and resistance of the "animalist" public opinion, involve also the destruction of the nests and the eggs, to be realized periodically and inexorably in proximity of the broodings.

#### Control of the feeding

Undoubtedly the cities represent for the animals a "self-service" in which to constantly draw food. This is surely one of the principal motives that favour the parking of the pigeons and stimulate their reproduction. To intervene on the resources offered from the cities is not simple. The zoophilist that feeds the pigeons is not convinced to stop such activity and neither an ordinance easily can get good effects. The prohibition to feed the pigeons and the consequent sanction, instigates very often inverse reactions. It is very important a cultural maturation of the citizen, which must be informed that the type of food that he generally offers (bread, pasta etc.) it is not ideal for a rational feeding. It can create problems of disvitaminosis or avitaminosis in the animals. We believe, therefore, that the intervention should be cultural and not by imposition.

#### Capture and suppression of the pigeons

The result with this type of intervention is visible immediately, however we underline that it is only temporary. The reproductive activity of the pigeon is opportunist, therefore in shortly time the colony returns to the initial numbers frustrating the used resources. In the city of Barcellona for example in the period between 1986 and 1990, 108.193 pigeons were captured and there wasn't a meaningful reduction of the population, because the migrations from near colonies and for an increased reproductive activity. This proceeding, indifferently from the used type of suppression, arouses the complains of the citizen (zoophilists and not).

#### Use of physical repellents

It consists in the use of steel or plastic nails , of threads crossed by electric current, in the emission of ultrasounds. These methodologies, also valid, don't resolve the problem, they move it only. They have to be appraised in relation of a program that must have studied for the single realities. Always very important also in this case the evaluation of the resources, also for the necessity of frequent maintenances.

#### Biological struggle

It consists in the immission in the urban environment of diurnal and nighttime birds of prey. Particular importance assume the Barn Owl (*Tyto alba*), the Owl (*Strix aluco*), the Hawk (*Falco peregrinus*) and the Taccola (*Corvus monedula*). The presence of these birds of prey acts as deterrent to the to the formation of big colonies of sinanthropic birds, don't forget that, feeding of ill and few vital pigeons, they develop an sanitary on the colony. In this way they decrease the risks of zoonosis previously mentioned.

#### Pharmacological control of the reproduction

A most modern perspective of control of the births in the urban birds is represented by the administration of substances with contraceptive effect, that depress the reproductive activity of these animals. Experiences on the subject are already numerous and they make reference to the employment of different substances as the BUSULFAN, a cytostatic substance able to stop the spermatogenesis and the maturation of the ovaric follicles, FAZACHOLESTEROL, a medicine that reduce the blood level of cholesterol and that interferes in the synthesis of the fats of the yolk to inhibit the fertilization of the egg, or different substances of hormonal nature as the PROGESTERON and the MESTRANOL, able to induce depression of the reproductive activity. It is under consideration the treatment with NICARBAZIN, that is free of undesired systemic effects for the treated animals and doesn't determine anatomical or functional modifications in the big parenchymas that can induce states of physical, objective and subjective suffering. This situation is in perfect assonance and coincidence with what is has known for years in the international bibliography. Doesn't subsist any risk for the human health, because the environmental dispersion of the active principle is very little and happens entirely in areas of limited access to the humans.

#### Plans of intervention

Within a program of control of the urban populations of pigeons is necessary that the Town Administrations operate in collaboration with the competent Veterinary Services for the territory. In the preceding pages we spoke of integrated strategies; we think, in fact, that is important to appraise, of time in time, the single situations and the possible solutions that don't exclude interventions on the structures either public that private, syndical ordinances etc. For integrated strategies, therefore, it is to intend different interventions to put contemporarily also in field.

The plans of intervention because of the different hygienic - sanitary and environmental situations between the two cities have been effected in different way.

#### Treviso

In Treviso the hygienic-sanitary problems have not been considered critical, above all for the not very big number of present pigeons and for the architectonical structure of the old town. Insofar the Plan of intervention principally aimed at the containment of the number of animals through the use of corn containing Progesteron in some preventively individualized areas, the sanitary check-up of the colonies and the prohibition of administration of food from the citizens. Besides the operations of sanitary restoration of the architectonical structures, it has been disposed that the buildings have to be kept or built in the way that cannot become shelter for the pigeons.

#### Venice

In Venice an oportune syndical ordinance was emanated in date 30.09.97 of prohibition of direct administration of food for pigeons with the exception of the zone of Piazza S. Marco and relative proximities. With the same ordinance the owners of buildings in state of abandonment or vacant for long time have been obliged to close all the sites of access to the rooms, attics, etc. potentially usable by the pigeons to enter the buildings and to build dormitories and nests. In December 1998 a census estimated that in Venice the population of the pigeons had reached around 120.000 unities in a surface, that, in expert ethologists opinion, could entertain around 20 - 25.000 unities. With the purpose to reduce the number of pigeons, was emanated on 23.12.98 a new syndical ordinance for the capture of pigeons in the various zones of greatest density and suppression through euthanasia effected with chloroform, action that provoked a lot of complains

from the zoophilists. With the same ordinance was imposed the washing with addition of disinfectants of Piazza S. Marco and the calluses mostly interested by deposits of guano.

The results of the analyses effected on the pigeons in Venice in such period, confirm that exists a correlation between an elevated incidence of illnesses and an excessive number of animals.

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