Rev. prod. anim., 25 (2): 2013

Pigeon Paramixovirosis: a risk factor for urban and commercial avifauna

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Abstract

Epizootic performance of domesticated pigeon's paramixovirus was studied and evaluated due to its potential risk for aviculture. A census to collect data on pigeon population, hygiene, and management was carried out by the Institute of Veterinary Medicine in Camagüey, Cuba. Data were processed by the chi-square test. Paramixovirus presence in Camagüey municipality and the high risk of its spread to other zones within the province due to violation of anti-epizootic measures was confirmed.

Key Words: *paramixovirus, aviculture, epizootic performance, anti-epizootic measures*

Introduction

Newcastle disease or paramixovirus, is one of the most common infectious diseases in birds, as severe economic losses occur each year in aviculture (Briseño, 2011). The World Animal Health Organization (OIE, 2012) has required organizations to issue compelling reports on the incidence of velogenic Newcastle outbreaks.

It is a contagious virus which attacks domestic birds, such as hens, ducks and pigeons; as well as wild birds, like owls, eagles, vultures and toucans. When the disease is developed quickly, septicemic symptoms prevail and the birds die shortly after without visible symptoms of paramixovirosis. However, when the disease evolves slowly, signs of encephalomyelitis are observed, like paralysis, balance problems, difficulty to eat and drink, shivering and stiff neck, among others. Most pigeons die of Paramixovirus (s.f.).

Navarro (2008) claims that avian paramixovirosis (PMVA) is presented in nine different ways, from PMVA 1-9. PMVA 1, the so-called Newcastle disease (EN); it is divided into five classes: A; B; C; D; E; F; Pigeon and X. Initially, PMVA 1-Pigeon was the one that attacked pigeons, though other paramixovirus infection cases were detected as A; B; C; D; E. It can also appear as Pigeon in quails and chickens.

Throughout history, virus isolates were classified within three pathological types: lentogenic, mesogenic and velogenic, depending on in vivo pathogenicity (Alexander, 2003; Bird Diseases, 2012), and the mean mortality time of inoculated embryos.

In the province of Camagüey, the local Veterinary Diagnostic Laboratory confirmed identification of PMVP-1 in pigeons, through diagnosis to sick pigeons from different owners and active epidemiological control or surveillance samples.

The aim of this article is to evaluate risk factors brought by the disease in the municipality of Camagüey, in order to set up a contingency program.

Materials and Methods

The data for epizoograms were collected by the Provincial Epizootiological Surveillance System (SIVE), from five years (2007-2012), and were confirmed by the Virology Department of the Regional Veterinary Diagnostic Laboratory in Camagüey. Hemoagglutination inhibition virological diagnosis was applied, following the NRAG-631/1982 standards (veterinary diagnosis of Newcastle Disease, by sampling), and NRAG-685/1981 standard (veterinary diagnosis of Newcastle Disease, by controlling).

The total number of pigeons was provided by the Provincial Institute of Veterinary Medicine´s 2011 census.

An exploratory survey was applied to 63 experienced breeders, so the sample was composed of associates from the Cuban Columbidae Federation (FCC) and candidates from the municipality of Camaguey, area and sporting leaders, the municipal representative and the provincial delegate; all six areas comprise 19 people´s councils with a population of 2 800 pigeons. The survey was corroborated by reports of epizootiological surveillance in the municipality of Camagüey.

It has 16 items on breeding handling and hygiene, location and construction conditions of the aviary, origin of the breeding animals, frequency of utensil and personnel outfit cleansing, time of disease appearance in quarters, signs and symptoms observed in sick animals, and other risk factors related to paramixovirosis: body disposal, veterinary orientation, quarantine and presence of other domesticated or migrating birds.

The results were statistically processed by Chi-square and SPSS software, version 15.0.1 (2006).

RESULTS AND DISCUSSION

Using hemoagglutination and based on the data from the Epizootiological Surveillance System, four municipalities were confirmed to have outbreaks of paramixovirosis in pigeons (Fig. 1).

This does not mean that other municipalities were free from the virus. According to the active surveillance program, isolated animals were observed to raise titers against the etiological agent of the disease. The evidence, however, was not enough to declare other outbreaks through the Epizootiological Surveillance System. (Resolution 21/2010 Veterinarian Medicine Institute).

As a result of the provincial census, there is a population of 59 509 pigeons in the province, located in several municipalities (Fig. 2), most of them in the municipality of Camagüey.

It was confirmed that most breeders had no affiliation (Fig. 3), so there are a number of aviary out of proper epidemiological control and orientation.

It must be highlighted that 66.7 % of breeding animals (Fig. 4) come from affiliated aviary, thus reducing the risk of importing already infected or sick animals from uncontrolled aviary.

It was also observed that 82.5 % of aviary is located atop houses, which is favorable, considering that pigeons are away from other domesticated birds. Forty-four percent of the surveyed owners have hens, which is a risk for disease transmission. Some Newcastle (NE) virus, isolated variants from pigeons (pigeon paramixovirus type 1, PMVP-1) do not show all their full virulent potential in domesticated chicken, but might turn virulent during propagation (Dortmans, Rottier, Koch and Peeters, 2011).

The research proved that 58.7 % of aviary was in good construction conditions (concrete), which favors weekly cleaning and hygiene procedures. Fig. 5 shows that 69.9 % of breeders carry out weekly cleaning, and as the aviary is clean, animal stress is reduced. It was proven that more than 90 % of breeders performs trough cleaning; 66.7 % keeps their clothing clean and wash their hands frequently when handling pigeons, which reduces the risk of spreading the disease (Ferrer, Icochea, Salas and Alba, 2008); Guan *et al.* (2008); Zanetti, Berinstein and Carrillo (2008). Additionally, strangers at feeding accounted for 65 %.

The first symptoms involve the digestive system of pigeons (58.7 %), which was highly significant ($P < 0.001$), with the appearance of watery diarrhea along with solid material, at times out of control; intense thirst, tiredness, fatigue and ensuing death.

In other cases, diarrhea is accompanied by nervous symptoms, with seizures, lack of neck and body movement coordination, torticollis, and wing paralysis that hinders flying, even to the perches. Sometimes eye opacity and respiratory disorders are observed.

Another form of manifestation of the disease is through nervous conditions (ataxia), also called giddiness by breeders. Rovira (2012) stated that the basic clinical manifestations first include digestive, and then nervous symptoms. The current form of the disease´s respiratory and eye symptoms are practically inexistent. On the contrary, digestive disorders are very important and consist of watery or hemorrhagic diarrhea, depending on how many intestinal cells have been damaged. Respiratory symptoms are often unnoticed.

Digestive disorders are manifested by watery or bloody diarrhea, depending on the amount of dead cells. To recover lost humidity conditions, pigeons drink 4-5 times more than normal; as a result, urine volume is increased up to five times and cannot be reabsorbed in the cloaca. As a result, it is expelled with some feces. It is common to see water spots in the aviary floor and the nests; and liquid may be seen dropping from the perches.

Very serious cases were observed in England, in chicken infected from food contaminated with PMVA-1 in infected bird excreta (Kommers *et al.*, 2002).

Barbezange and Jestin (2003) have stated that the clinical signs may change according to the strain; in some cases mortality and morbidity are low, in others, very serious quick effects are present, along with anorexia, diarrhea, polyuria, conjunctivitis, edema and neurological signs (torticollis, wing and legs paresia). In many cases pigeons can recover.

Furthermore, Arreguán-Nava, Ledesma-Martínez and Aburto-Fernández (2011) reported that the clinical signs depend on the virus variety. Pigeons inoculated with velogenic viruses were consistent with moderate-severe respiratory signs, characterized by sneezing, continuous tearing and nose secretions. Additionally, the pigeons had diarrhea, anorexia and raised feathers. No neurological signs were observed. The necropsy revealed moderate tracheitis, abundant mucus in the nose, mouth and upper trachea. The lungs were slightly congested; the small intestine was congested and had edema; the large intestine had watery feces; and the cecal tonsils were hyperemic. No pathological changes were observed in all the other organs.

Fig. 6 shows how the disease is more frequent in the first and fourth quarters of the year ($P < 0.001$), especially when sports competitions are held.

During their competing flights, pigeons may get infected as a result of collective transportation in boxes. On occasions, they may recover if the damage is not severe, as reported by Kostka *et al.* (1997), who studied how paramixovirosis is produced during competitions.

When the disease was detected in Camagüey, the likelihood of transmission, propagation, contamination, and healthy bird infection increased (Fig. 7). Usually, only 60 % of sick animals are sacrificed, using any method, regardless of biological safety conditions (solid and liquid remains may produce more propagation).

It was demonstrated that 50 % of the treatments applied had not been indicated or prescribed. Even when there is no specific therapy for diarrheal pigeons, rehydration and administration of electrolytes in water may be recommended. Rovira (2012) suggests vitamin supplementation (A, B or C, depending on the signs), as well as administration of essential amino acids.

A large number of breeders (98.4 %) isolate the sick birds from the healthy ones, but only a few (51 %) incinerate the dead birds, which is not very significant. Breeders usually mix the remains with home wastes; throw them into rivers and in uninhabited areas, which may become another source of propagation.

It is important to highlight that some breeders have strictly followed zoo-sanitary regulations, like sick bird isolation, proper nutrition, and mitigatory treatments, especially in the case of high performance pigeons.

The results of this research suggest that a contingency plan for eradication and control of paramixovirosis include these topics:

1. Breeder training as passive observers of the disease.
2. Compelling report to municipal SIVE authorities of symptoms associated to the disease.
3. Transportation and quarantine controls in aviary.
4. Pre-competition active epidemiological surveillance.
5. Observation of all sanitary measures.
6. Compelling association of breeders to an organization.

CONCLUSIONS

High risk for development and propagation of paramixovirosis has been present in the municipality of Camagüey, as a result of poor observation of anti-epizootiological regulations.

RECOMMENDATIONS

The Institute of Veterinary Medicine in the province should be in constant communication with the Avian Enterprise, on the presence of outbreaks in several areas, given the large number of commercial entities and private breeders.

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Recibido: 15-4-2013
Aceptado: 20-4-2013

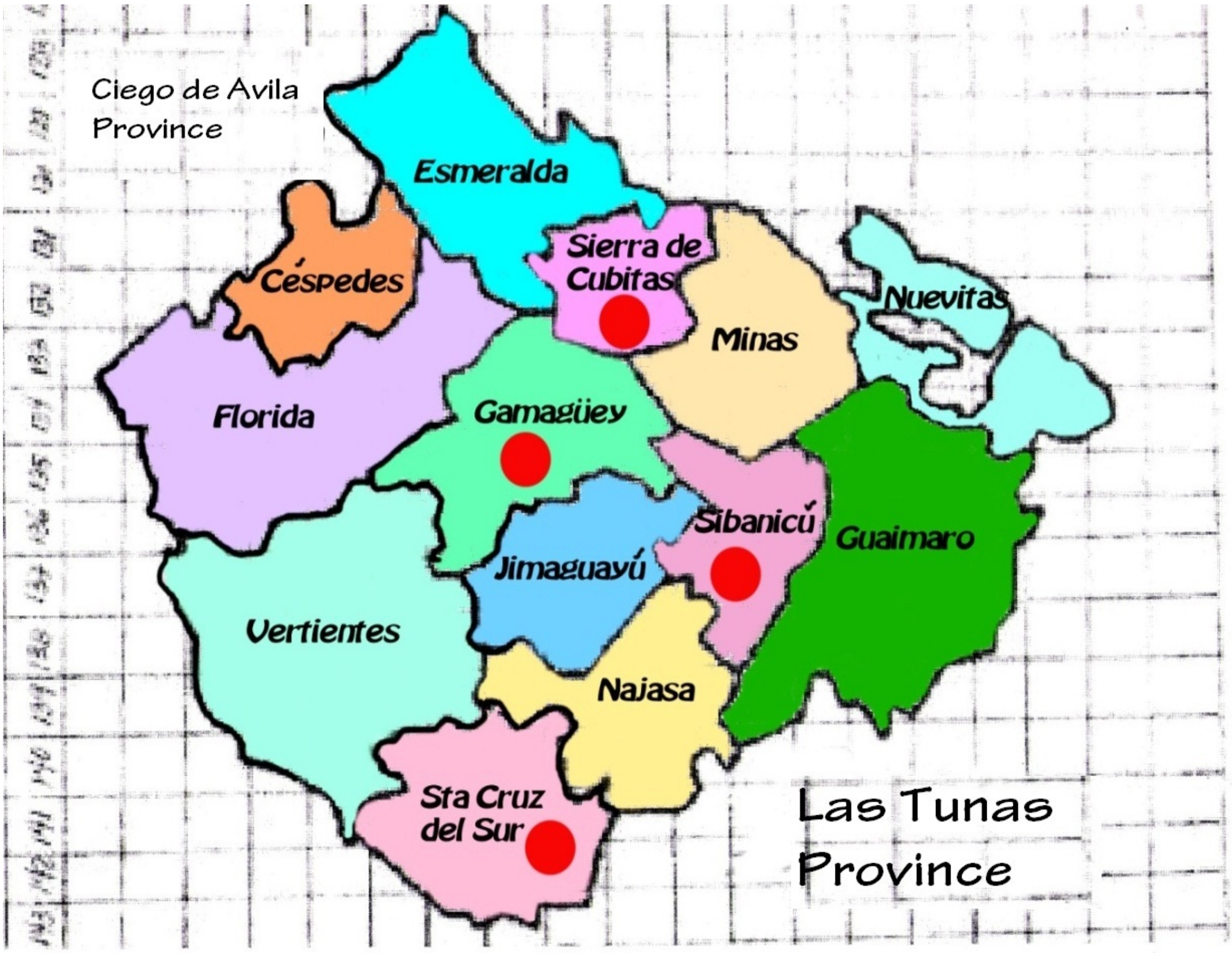

Fig. 1. Map of the province of Camagüey and its municipalities

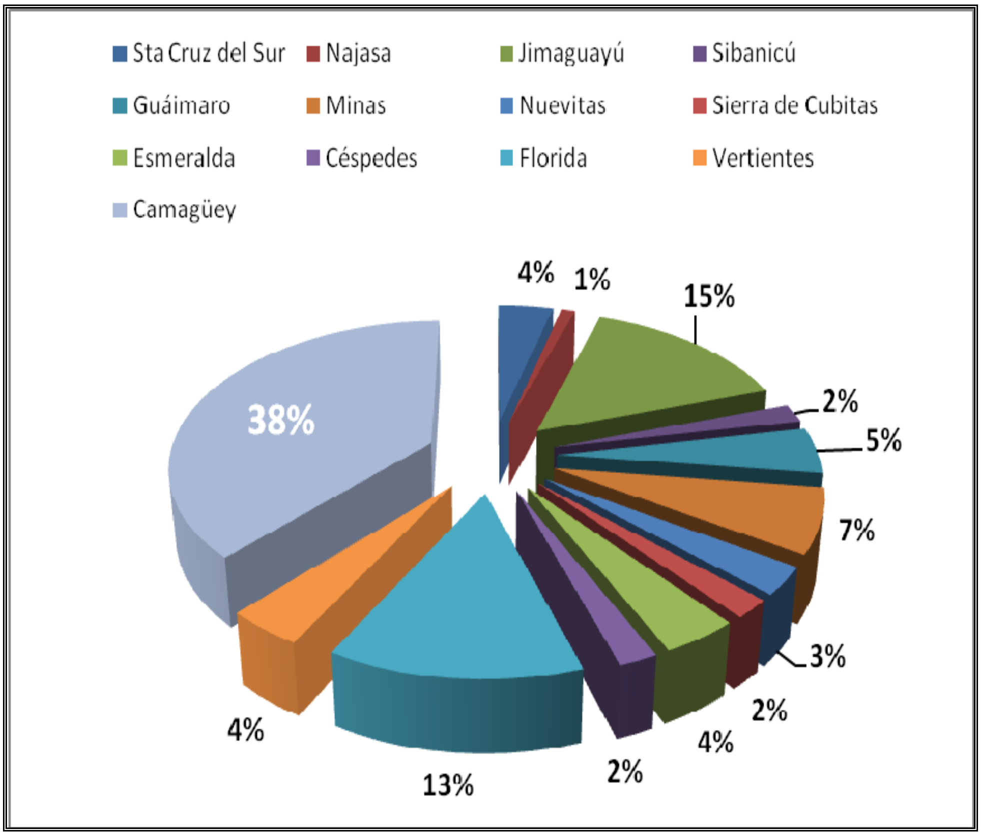

Fig. 2. Provincial pigeon distribution

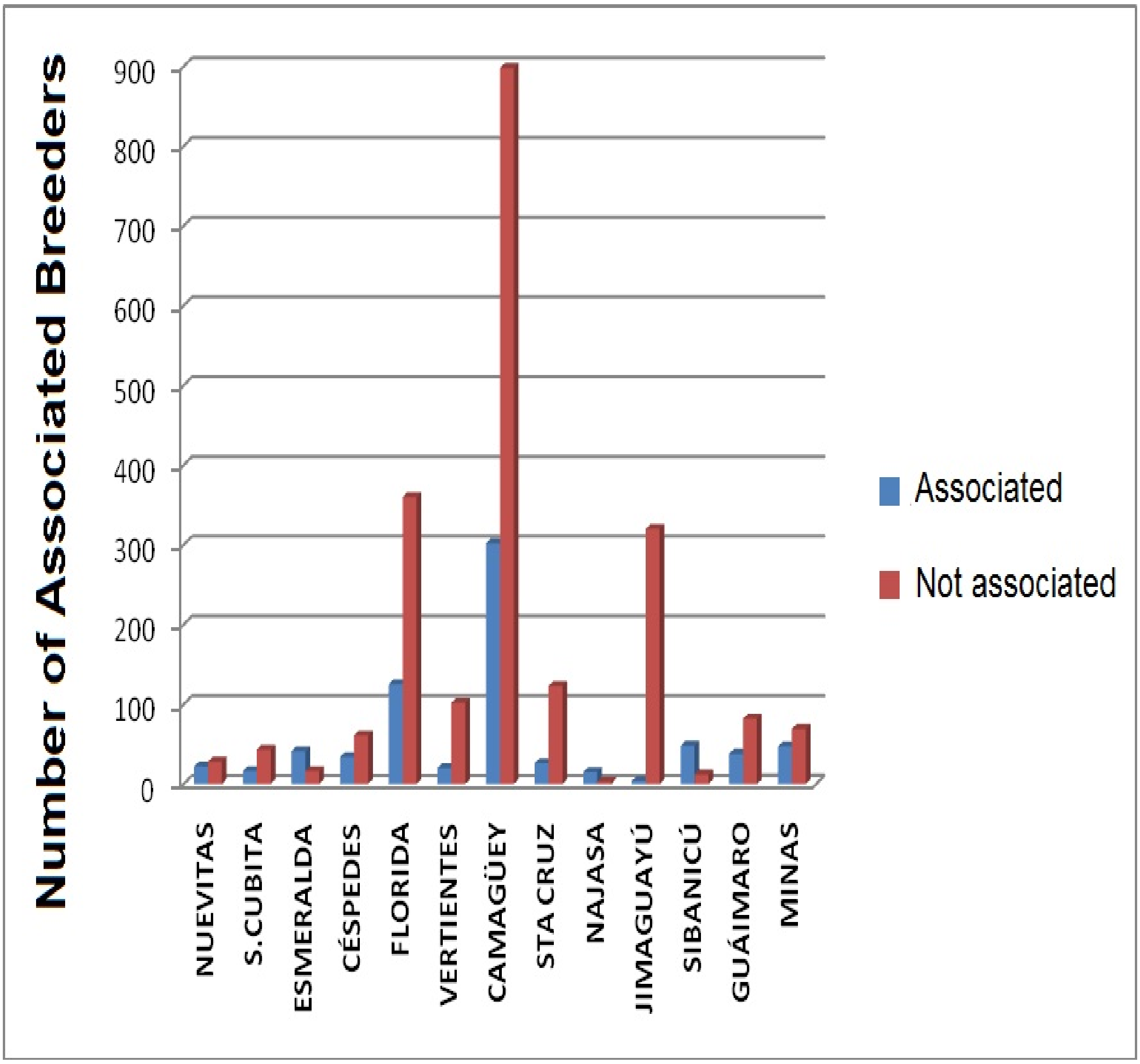

Fig. 3. Pigeon breeders associated/municipality

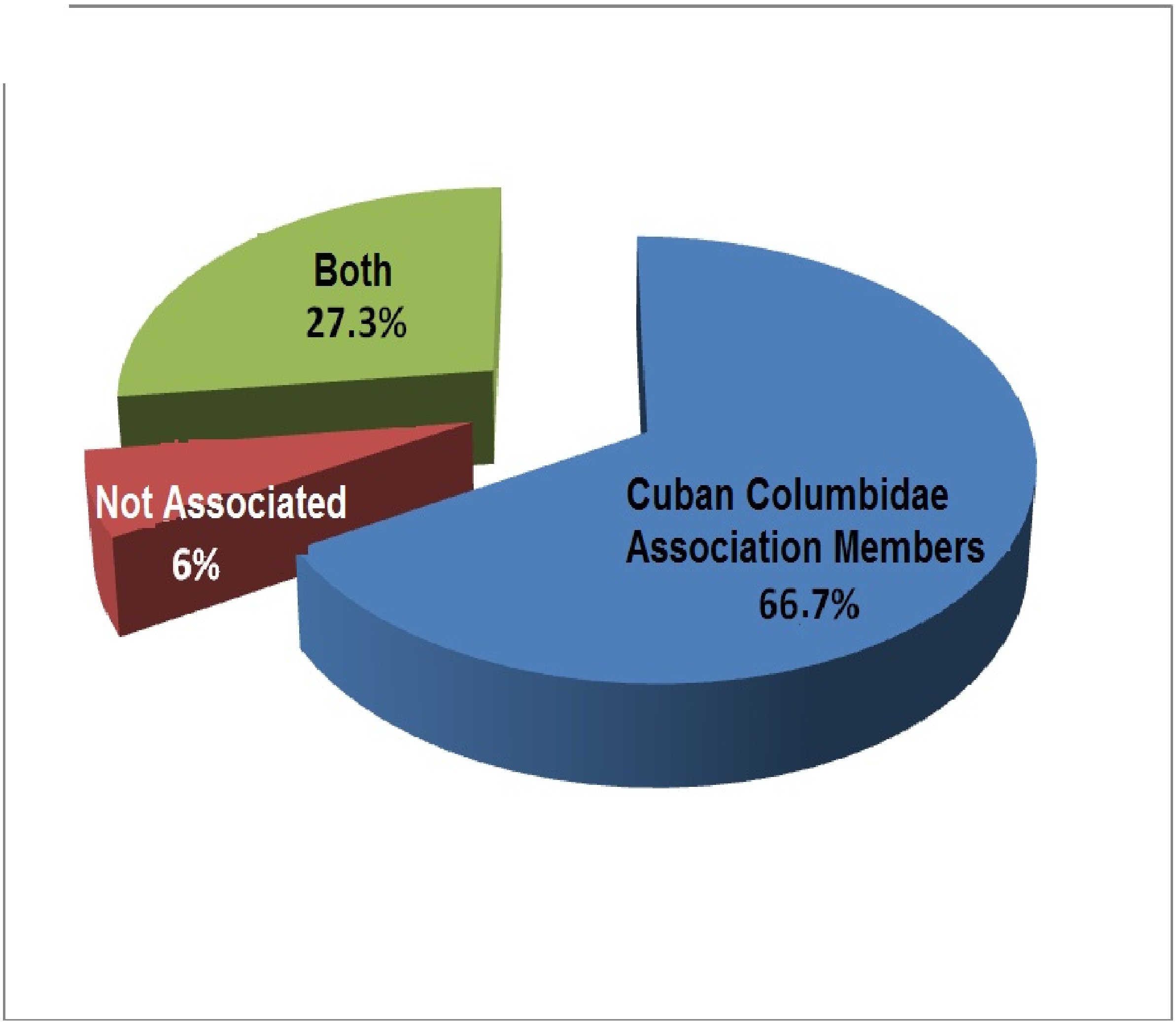

Fig. 4. Origin of breeding animals

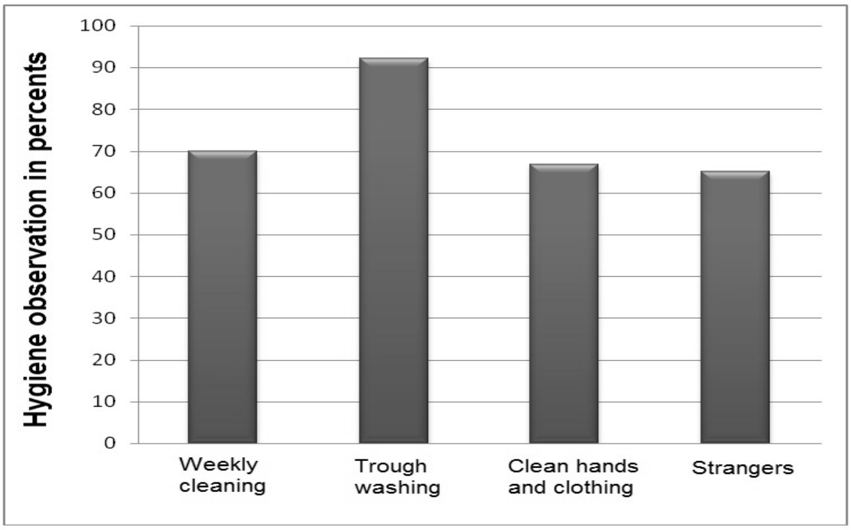

Fig. 5. Risk due to lack of proper hygiene

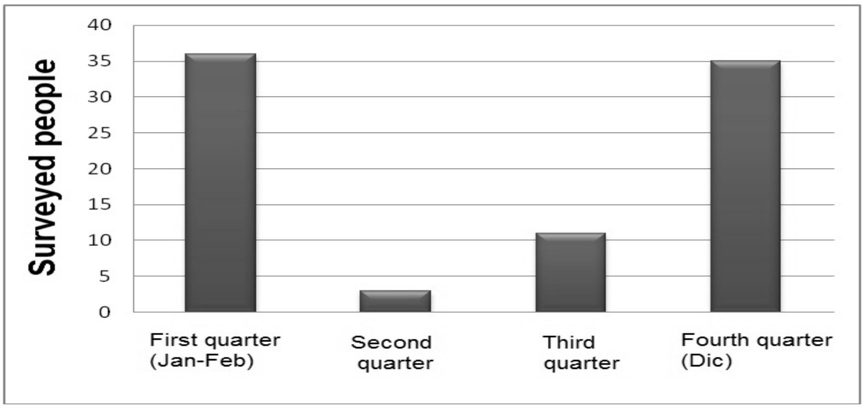

Fig. 6. Frequency of disease occurrence by quarters

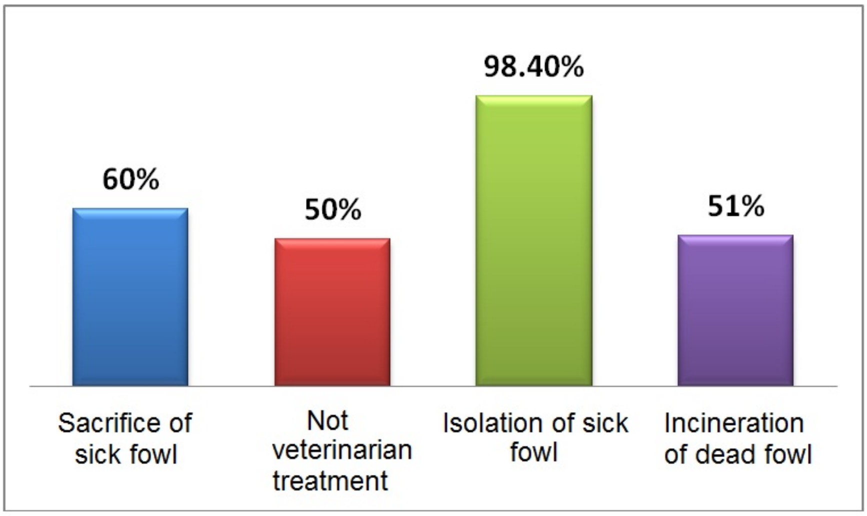

Fig. 7. Observation of anti-epizootiological measures