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Diseases of Pigeons Reared on Small-Holdings in Bangladesh

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Abstract A cross-sectional survey was undertaken on dead pigeons to explore the diseases and conditions associated with the death of pigeons reared at smallholdings and sold at live-bird markets in Bangladesh. 108 dead pigeons were collected from 2 live-bird markets-one in Dhaka and other based at Chittagong districts, 38 smallholdings, of which 20, 3, 3, 5 and 7 were located in Jessore, Dhaka, Chittagong, Magura and Jhenaidah districts respectively. Initially the collected dead pigeons were preserved at the households' refrigerators and then transferred to the department of Microbiology, Chittagong Veterinary and Animal Sciences University, where they were further frozen at -84°C until investigated. All the collected dead pigeons were thoroughly examined postmortem. From each of the dead pigeon (except decomposed carcasses) bacteriological examination done through taking samples from the liver with sterile cotton swabs, and inoculated onto at least two media- McConkey and Mueller-Hinton agar (supplemented with 5% defrinated sheep blood). To identify the organism for any bacterial growths on these two media were examined using the standard procedures. The 4 major disease/conditions associated with the deaths of the pigeons were cervical disruption & related haemorrhages (17.6%), colibacillosis (13.89%), external injuries (8.33%) and morbus cordis (10.18%).
Keywords *Columba Livia; Pigeon Mortality; Smallholdings' Pigeon*

1. Introduction

Pigeons (*Columba livia)* are widely distributed in urban and rural areas of Bangladesh (Figures 13 & 14) and come into close contact with humans in smallholdings, parks, temples, shrines, public gardens and rail road stations. Pigeons are considered one of the most important poultry birds in Bangladesh. Bangladesh is an agricultural based country. Most of the village people of this country are engaged in agriculture, livestock and poultry rearing. A great section of this people is poor and they can hardly rear large domestic animals such as cattle. Instead of the domestic animals they prefer to raise poultry birds like backyard chickens and pigeons because they need a little space and feed supplementation. Due to inadequate supply of standard feed and lack of proper health care

services of the village level, pigeons are more vulnerable to diseases. Unfortunately, there is scanty published information on the population of pigeons in our country and their common diseases. There might be some published information on the management aspects and breed of pigeons found in Bangladesh but epidemiological studies regarding the prevalence of diseases of pigeons or gross pathological findings encountered in Bangladesh have never been performed.

Although there was no published report on the total population of pigeons raised in Bangladesh but one might guess, by assessing the number of pigeons and squabs sold in almost every live bird market that pigeons contribute significantly to the poultry meat sector in the country. If the common disease of pigeons is controlled, their production might be increased. To control and prevent pigeon's diseases the first scientific approach should be the identification of diseases and pathologies associated with them. This short period study was carried out to explore gross pathological changes in some common pigeon diseases in Bangladesh.

2. Materials and Methods

This study was carried out during my internship programme period between August, 2007 to April, 2008. During this period 108 pigeons were dead (Figures 9 & 10). The pigeons were collected from 28 pigeon smallholdings in Chittagong, Dhaka, Magura, Jessore and Jhenaidah districts. There were also 2 live bird markets as the sources of the dead birds. Initially the locally collected dead pigeons were preserved at the households' refrigerators. The collected samples were transferred in the air-tight jar containing ice to the department of Microbiology, Chittagong Veterinary and Animal Sciences University. In the laboratory refrigerator, they were further frozen at -84°C until investigated. All the dead pigeons were thoroughly examined and post mortem were performed according to FAO Animal Health Manual 4 (1998). The entire post mortem examination procedure is briefly described below:

1) General body condition was examined through palpation for symmetry, crepitation, ascites etc.
2) The plumage, skin, legs, feet etc. were examined.
3) Special attention was done in cloaca region for enteritis, salpingitis, uraemia etc.
4) Mucosa of openings (conjunctiva, oral cavity & cloaca) was examined for the presence of lesions of anemia, inflammation, avitaminosis-A.
5) The bird was placed on its right side with the head pointed towards the examiner.
6) Sinus infraorbitalis were opened and examined for Mycoplasma infections, *Haemophilus paragallinarum*, NDV, ILT, etc.
7) The beak was opened and the blunt part of the scissors inserted into the oral cavity which was cut open. This process was continued down the neck to open the esophagus and the crop (Figure 8), Oral cavity, pharynx and esophagus for inflammation, avitaminosis-A, pigeon pox, ILT, etc.
8) Larynx and trachea were subsequently opened and examined for NDV, ILT, Syngamus *trachea* etc.
9) The thymus was incised and examined.
10) The bird was placed on its back with the legs towards the examiner.
11) Skin was incised transversely behind processus xiphoideus and s/c incisions towards both knees were being done to enable the removal of skin over the pectoral muscles to be pulled in cranial direction.
12) Bursa praesternalis were inspected for inflammations associated with immobile birds and Mycoplasma and Reovirus infections.
13) Pectoral muscles were incised to inspect tumors (MD, bleedings as seen in septicaemic carcasses, deep pectoral necrosis).
14) Legs and hips were bent outwards until each head of femur was dislocated (luxated) from its acetabulum.

15) Transverse incision was given behind processus xiphoideus to open into the abdominal cavity.
16) Incisions were being made on both sides of the thorax up to the brachial region / shoulders apertura thoracis cranialis.
17) Sternum with the pectoral muscles were then rotated at 180° upwards and cranially to expose the abdominal and the thoracic cavities, but before this was done sternum was lifted slightly to see if there were indications of bacteriological / virological infections such (swollen organs, bleedings, exudates etc.) In that cases tissue samples were removed or inocula taken as sterile as possible.
18) All air sacs were inspected in situ for the presence of inflammation.
19) Other visible organs were subsequently inspected in situ.
20) The heart with the pericardial sac was removed and examined. The necessary incisions were made to examine all parts (form and colour were also evaluated).
21) The liver and the gall bladder were removed and examined.
22) The spleen was removed and examined for the presence of septicemia.
23) A transverse incision cranially to the proventriculus was made and the whole intestinal tract was removed in a caudal direction. To remove the whole intestinal tract a transverse incision was made 1-2 cm cranial to the cloaca. The oesophagus and the crop were removed by separation from the other tissue and pulled in a cranial direction.
24) The intestinal tract was examined from the serosal surface and opened in a caudal direction starting from the proventriculus. During this procedure pancreas was investigated. When examined for endoparasites the whole intestine was placed in a tray.
25) The entire GIT was examined for the presence of nematodes, cestodes, trematodes and coccidia oocysts.
26) The intestinal mucosa was examined for the presence of necrotic enteritis, salmonellosis, NDV, bleedings and ulcerations.
27) An incision was given through the cloaca in the midline in cranial direction to inspect the whole abdominal cavity including reproductive tract, testicles, kidneys and air sacs.
28) In female birds the reproductive tract was being cut free of its ligaments in a caudal direction and subsequently opened through infundibulum, magnum, isthmus, uterus and vagina which were inspected both from serosal and mucosal surface.
29) In young birds bursa fabricius was opened through its opening to the cloaca and inspected for swelling and oedema of the organ or bleedings.
30) The kidneys were subsequently examined for clostridial infections-pale due to toxins, nephropathies of other causes.
31) Plexus lumbosacralis was examined.
32) Lungs were removed and examined.
33) The brachial plexus was examined.
34) Nervus ischiadicus was examined on both sides (beneath musculus gracilis)
35) Knees and hock joints were opened and inspected and tendons and tendon sheets were being examined during the same procedure. All other joints were palpated and opened in case of swellings or asymmetry for Staphylococcus *aureus, reoviruses, and Mycoplasma synoviae, E. coli, P. multocida and S. gallinarum/pullorum.*
36) Ossification was examined in young birds. Attention was paid to the ribs and their junction to the spine and the cartilaginous part for swelling, avitaminosis A-D.
37) Parallel incisions to the bones were being made on tibia/tarsus to examine for TB.
38) The brain was examined upon indication. (Avian encephalitis, avitaminosis A-E).
39) Lesions found were summarized and the pathogenesis / connection between lesions were evaluated. Finally a tentative diagnosis of a disease/pathological condition of the pigeon was being made based upon anamnesis (disease history), symptoms and lesions demonstrated.

2.1. Bacteriological Examination

Sterile inocula taken from liver were inoculated into McConkey agar surface. Colibacillosis was diagnosed by having large pink colonies on the agar surface after 48 hrs of incubation at 37ºC. If the colonies were very minute and whitish or colorless Salmonellosis was diagnosed for the dead pigeon.

2.2. Virological Examination

No virological sample was collected or assured for the presence of any virus in any of the dead pigeons. However, if there was no colony developed on the McConkey agar surface from inocula taken from liver but had the evidence of splenomegaly and or hepatomegaly and general vascular congestion, the death of the pigeon was considered to be of any kind of viral pathogens.

2.3. Mycological Examination

Any nodules found in the lung, liver or air sacs were examined for the presence of fungi. Wet mount preparations were made from these lesions and examined under microscope with a drop of lactophenol cotton blue. The presence of any hyphal segments or reproductive structures in the sample revealed the presence of fungal disease.

3. Results

Table 1: *Disease and Conditions Associated with the Deaths of 108 Pigeons Investigated having collected them from Chittagong, Dhaka, Magura, Jhenaidah and Jessore Districts*

Disease/Condition	No. (%)	Comments
Massive Haemorrhages in the neck region associated with cervical disruption	19(17.6)	1 was a cachectic carcass and E. coli recovered from 1 carcass, 1 was with haemorrhagic enteritis
Cachexia	6(5.56)	
Colibacillosis	15(13.89)	4 were cachectic and 1 had morbus cordis
Staphylococcosis	3(2.78)	
Granulomatous lesions	2(1.85)	1 had lesion in the thoracic air sac and the other on the liver
Pigeon pox	3(2.78)	
External injuries	9(8.33)	
Haemorrhagic & fatty liver syndrome	3(2.78)	
Morbus cordis	11(10.18)	
salmonellosis	4(3.7)	2 were cachectic
New castle disease	4(3.7)	
Vascular congestion	6(5.56)	
Tuberculosis	3(2.78)	
Red hepatization of lung	2(1.85)	
Others	7(6.48)	7 had 7 different conditions: anal gland abscess, egg peritonitis, enteritis, omphalitis, snake bite mark(possibly, pneumonia and suffocation
Undiagnosed	11(10.18)	5 were decomposed; 2 had the evidence of greenish diarrhoea.

3.1. Bacterial Diseases

Bacterial infections (Figures 1, 2 & 5) included 4 cases of Salmonellosis, 15 cases of Colibacillosis and 3 cases of Staphylococcosis. Salmonellosis was recorded in case no, 28, 69, 77 and 108.

Salmonellosis was associated with diarrhoea, soiled vent, white/green colour feces, yellowish necrotic foci on liver, lung, heart, enlargement of liver, catarrhal enteritis, and yellowish mass in caeca, discoloured (ova), and bronze discolouration of liver. There were 3 cases of Tuberculosis (case no. 62, 92 and 93)

6 cases were diagnosed with septicemia due to the presence of generalized vascular congestion. There was an abscess in the anal gland of this dead pigeon. The organism could enter through this abscess to invade the blood circulation and other tissues causing septicemia.

3.2. Viral Diseases

Three pigeons were supposed to die attributable to viral pathogen ND (case no. 74, 83, 96 and 100). The findings associated with these viral diseases included greenish diarrhoea, hemorrhages at the tips of the glands of the proventriculus, hemorrhages at iliocecal junction, edema, catarrhal inflammation in nasal and conjunctival mucosa, consolidated lung, enteritis, hemorrhage in liver, pale kidney and hemorrhage found in the trachea. 3 cases of the samples were supposed to have the infections with pigeon pox (Figures 6 & 12) (case no. 2, 12 and 89)

3.3. Fungal Diseases

Two cases of fungal infections were recorded (Case no. 1 and 99); the birds were cachectic. In addition, pin head size yellowish nodules in lung were observed, air sacs were found with cloudy and thickened yellowish plaques, in one pigeon necrotic foci were found in liver, spleen, kidneys and proventriculus. In other bird hemorrhages were recorded in the lungs and the kidneys were pale.

3.4. Other Conditions

Massive haemorrhages in the neck region (Figure 7) associated with cervical disruption were found in 19 cases. Morbus cordis (Figure 3) were found in 11 cases and other external injuries (Figure 11) were in 9 cases, Hemorrhagic & fatty liver syndrome were found in 3 cases. Red hepatization of lung was observed in 2 cases.

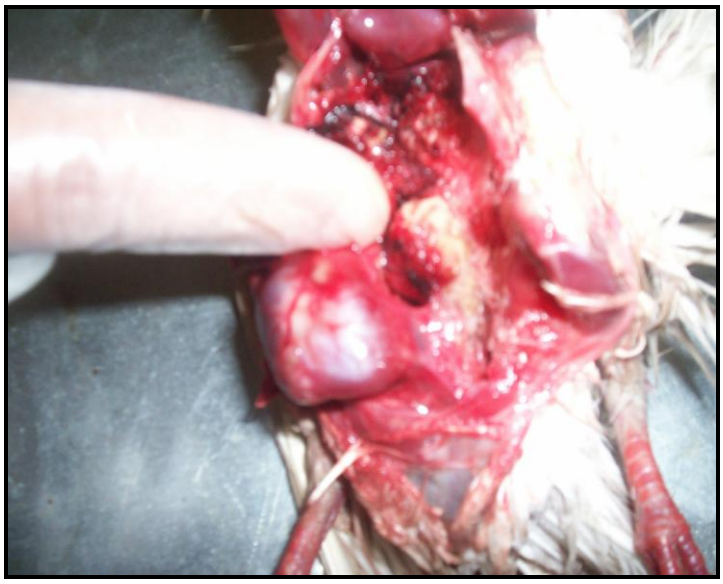

Figure 1: *A Case of Granulomatous Inflammation in a Dead Pigeon*

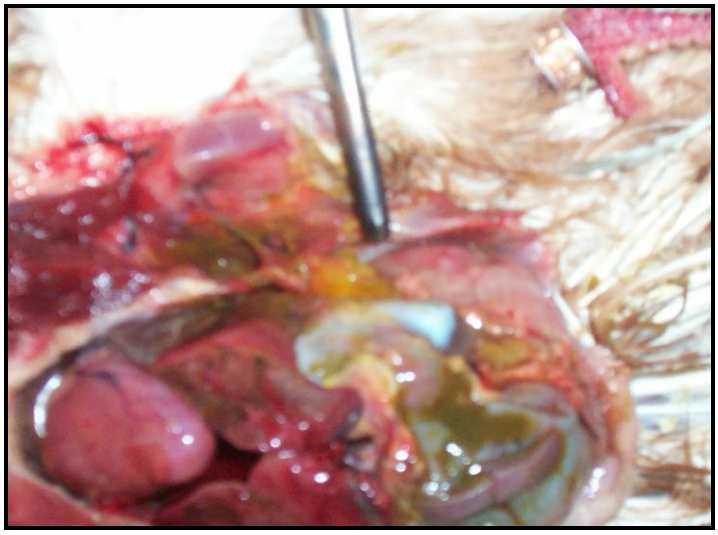

Figure 2: *A Case of Egg Peritonitis in a Dead Pigeon*

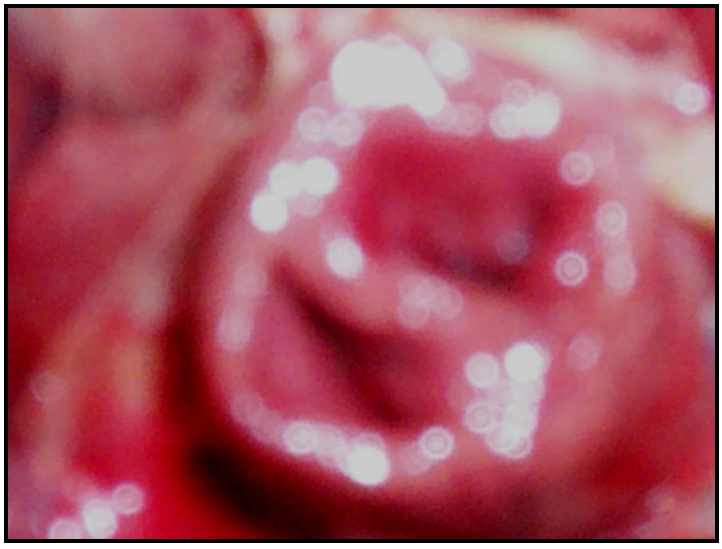

Figure 3: *A Case of Morbus Cordis in a Dead Pigeon Showing Dilatation of the Heart Chambers*

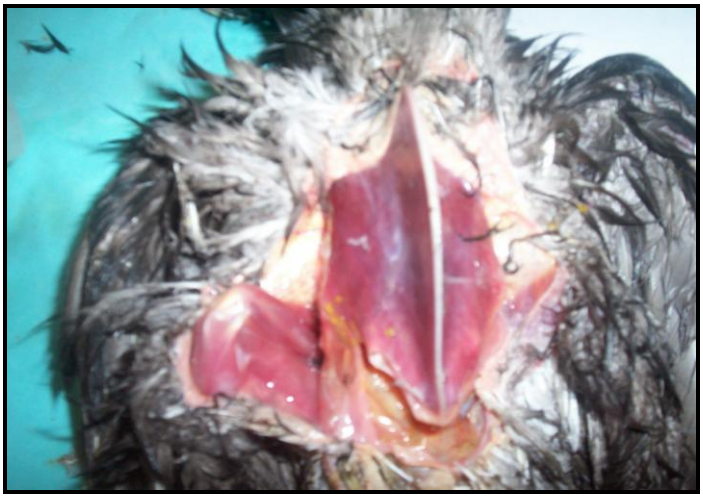

Figure 4: *Cachexia of the Breast Muscle of a Dead Pigeon*

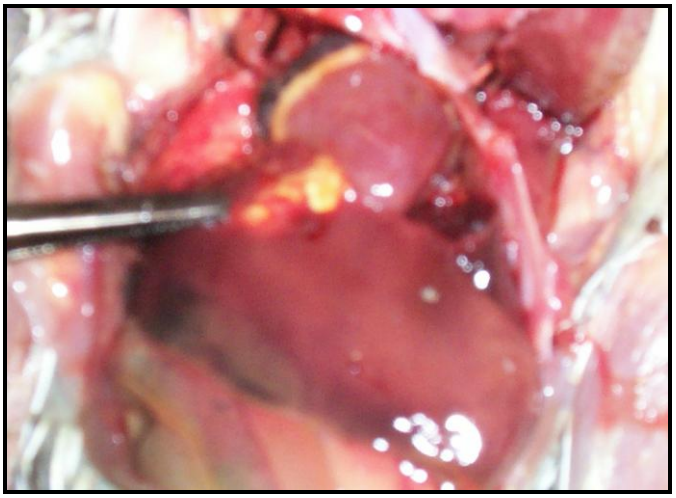

Figure 5: *A Case of Tuberculosis in the Liver in a Dead Pigeon*

Figure 6: *A Case of Pigeon Pox in a Dead Pigeon*

Figure 7: *A Case of Cervical Dislocation in a Dead Pigeon Showing Massive Haemorrhage*

Figure 8: *Crop Content (Gram & Stone) of a Dead Pigeon*

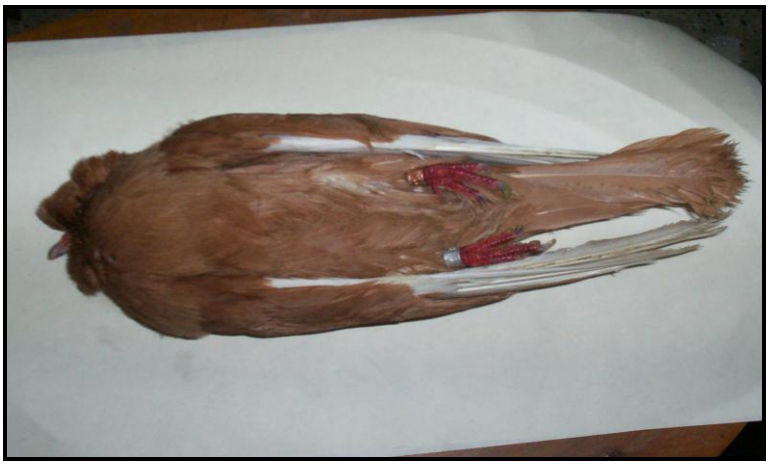

Figure 9: *A Moyurponkhi Pigeon Prior to Post Mortem*

Figure 10: *A Group of Squabs Arranged Prior to Post Mortem*

Figure 11: *A Case of Snake Bite in the Breast Region*

Figure 12: *A Case of Pigeon Pox in a Farm of Chittagong*

4. Discussion

This study shows (Table 1) that 45.63% pigeons were affected with infectious disease and 54.37% was affected with other than infectious diseases; among them 37.3% pigeons were affected with bacterial disease, 6.48% with viral disease, 1.85% with fungal disease, 8.33% pigeons with nutritional disease (Figure 4), 36.78% with external injuries or cervical disruption. About 11.11% cases were undiagnosed.

Bacterial-Abiodun et al., 1998; Abd El-Aziz et al., 2002; Albuquerque et al., 2013; Tanaka et al., 2005; Pasmans et al., 2003; Fukata et al., 1986; Kimpe et al., 2002; Monita Vereecken et al., 2000; Abeera Mubarak and Farzana Rizvi, 2002; Marlier et al., 1997; Medina et al., 2004; Wakamatsu et al., 2006 and Roy et al., 2003 shown the viral infection in pigeon.

Fukushi et al., 1983; Pal et al., 1992 and Prukner-Radovcić et al., 2005 shown the fungal infection in pigeon.

This study seems to be the first report on the gross pathological findings in pigeons reared on smallholdings in Bangladesh. The findings of this study remained uncorrelated due to insufficient published information on this issue in Bangladesh.

Like chicken diseases pigeons of Bangladesh are affected with Salmonellosis and Colibacillosis. Due to insufficient laboratory facilities and time constraints this study failed to identify the serotypes of Salmonella causing disease problems in pigeons. Similarly, the serotypes of *E.coli* prevalent in pigeons need to be investigated further. Because *E.coli* is opportunistic pathogens and is generally mobilized during malnourishment or impairment of the immunity of birds, it is apprehended that the inappropriate feed supplementation to the pigeons in Bangladesh might make them more vulnerable to opportunistic infections such as Colibacillosis.

The viral diseases were presumed based on only post mortem examination findings. More laboratory evidence had to be generated to confirm the involvement of viral pathogens. However, in some countries Newcastle disease was found to cause significant disease problems in pigeons (Marlier et al., 2006). Pigeon pox is another important viral disease affecting pigeons. Based on its characteristic lesions-nodules on the head region, the disease can easily be diagnosed. However, in this study no pigeon pox disease was found, this might be due to the reason that the sample size was poor to find out all of the diseases affecting pigeons in Bangladesh.

Cervical dislocation and haemorrhage, morbus cordis and external injury were found in the post-mortem. It indicates that cannibalism and mishandling of pigeons is one of the major causes for pigeon mortality.

Figure 13: *A Cage Reared Farming of Pigeon*

Figure 14: *A Backyard Farming of Pigeon*

5. Conclusion

This could be the first report on diseases affecting domestic pigeons on smallholding level in Chittagong district. It gives valuable information that most of the domestic pigeons are affected with infectious diseases such as Salmonellosis, Colibacillosis, Staphylococcosis and granulomatous inflammation. During clinical manifestations of those diseases if proper antibiotics are applied the survivability of this poultry birds can be increased, bringing more economic benefits to the farmers/owners and by introduction of vaccines the important viral diseases can be controlled. However, an intensive study should be undertaken encompassing the pigeon population to unveil the overall scenario of pigeon diseases in Bangladesh before a control measure is advocated.

References

Abiodun, A.A., Seepersadsingh, N., Inder, L., and Caesar, K. *Some Bacterial Enteropathogens in Wildlife and Racing Pigeons from Trinidad.* Journal of Wildlife Diseases. 1998. 34 (1) 73-80.

Abeera Mubarak and Farzana Rizvi. *Pathogenicity of Intraocularly Administrated Newcastle Disease Virus in Pigeons.* Journal of Biological Sciences. 2002. 2 (3) 194-195.

Abd El-Aziz, A.S., Elmossalami, M.K., and El-Neklawy, E. Bacteriological Characteristics of Dressed Young Pigeon (squabs) *Columba livia domesticus*. Nahrung. 2002. 46; 51-53.

Albuquerque, Á.H., Cardoso, W.M., Teixeira, R.S.C., Lopes, E.S., Sales, R.J.P.F., Horn, R.V., Rocha-e-Silva, R.C., Bezerra, W.G.A., and Gomes-Filho, V.J.R. *Dissemination of Salmonella Enteritidis by Experimentally-Infected Pigeons.* Brazilian Journal of Poultry Science. 2013. 15 (3) 169-286.

Tanaka, C., Miyazawa, T., Watarai, M. and Ishiguro N. *Bacteriological Survey of Feces from Feral Pigeons in Japan.* The Journal of Veterinary Medical Science. 2005. 67 (9) 951-953.

Medina, F.M., Ramirez, G.A., and Hermandez, A. *Avian Pox in White Tailed Laurel-Pigeons from the Canary Islands.* Journal of Wildlife Diseases. 2004. 40 (2) 351-355.

Pasmans, F., Immerseel, F.V., Heyndrickx, M., Martel, A., Godard, C., Wildemauwe, C., Ducatelle, R., and Haesebrouck, F. *Host Adaptation of Pigeon Isolates of Salmonella Enterica Subsp. Enterica Serovar Typhimurium Variant Copenhagen Phage Type 99 is associated with Enhanced Macrophage Cytotoxicity.* Infection and Immunity. 2003. 71 (10) 6068-6074.

Fukata, T., Uemura, T., Baba, E., Horiuchi, S., and Arakawa, A. *Isolation of Clostridia, Salmonellae and Coccidia from Wild Pigeons in Japan.* British Veterinary Journal. 1986. 142; 291-293.

Fukushi, H., Itoh, K., Ogawa, Y., Hayashi, Y., Kuzuya, M., Hirai, K., and Shimakura, S. *Isolation of Serological Survey of Chlamydia Psittaci in Feral Pigeons in Japan.* Japanese Journal Veterinary Science. 1983. 45; 847-848.

Kimpe, A., Decostere, A., Martel, A., Haesebrouck, F., and Devriese, L.A. *Prevalence of Antimicrobial Resistance among Pigeon Isolates of Streptococcus Gallolyticus, Escherichia coli and Salmonella Enterica Serotype Typhimurium.* Avian Pathology. 2002. 31; 393-397.

Marlier, D., and Vindevogel, H. *Viral Infections in Pigeons.* Veterinary Journal (London, England: 1997. 2006. 172 (1) 40-51.

Pal, M. *Disseminated Aspergillus terreus Infection in a Caged Pigeon.* Journal of Mycopathologia. 1992. 119 (3) 137-139.

Monita Vereecken, Peter De Herdt, Richard Ducatelle and Freddy Haesebrouck. *The Effect of Vaccination on the Course of an Experimental Salmonella typhimurium Infection in Racing Pigeons.* Avian Pathology. 2000. 29 (5) 465-471.

Wakamatsu, N., King, D.J., Kapczynski, D.R., Seal, B.S., and Brown, C.C. *Experimental Pathogenesis for Chickens, Turkeys, and Pigeons of Exotic Newcastle Disease Virus from an Outbreak in California (2002-2003).* Veterinary Pathology. 2006. 43 (6) 925-933.

Roy, P., Dhillon, A.S., Lauerman, L., and Shivaprasad, H.L. *Detection of Pigeon Circovirus by Polymerase Chain Reaction.* Avian Diseases. 2003. 47 (1) 218-222.

Prukner-Radovcić, E., Horvatek, D., Gottstein, Z., Grozdanić, I.C., and Mazija, H. *Epidemiological Investigation of Chlamydophila psittaci in Pigeons and Free-Living Birds in Croatia.* Veterinary Research Communications. 2005. 29 (1) 17-21.

Suedmeyer, W.K., Bermudez, A.J., Barr, B.C., and Marsh, A.E. *Acute Pulmonary Sarcocystis Falcatula-Like Infection in Three Victoria Crowned Pigeons Housed Indoors*. Journal of Zoo and Wildlife Medicine. 2001. 32 (2) 252-256.