

One of the most important problems in avian pathology are viral diseases, especially those leading to immune system impairment. Ample studies have been carried out so far into the prevalence and importance of various viruses in the pathology of poultry maintained in the commercial production system. However, there are no data on other bird species. Recently, increasing attention has been paid to sport pigeons, which have been refined for many years of their ability to return to their place of origin. Currently, such birds are used for races at distances from 100 to 1000 km, and pigeon winners are highly valuable – their prices reach even hundreds of thousands of euros or more. The above is the reason behind the rapid development of columbopathology, namely the field of veterinary science devoted to the pathology of pigeons.

The rearing system of racing pigeons violates principles of biosecurity as birds originating from various breeding facilities are commonly transported and reared in “one loft race” type facility. This favors the spread of multiple infections and offers conditions for the development of novel variants (recombinants) of various pathogens. One of the most significant viruses occurring in this avian species is the pigeon circovirus (PiCV), infections with this virus are detected in ca. 70% of birds. The PiCV infection is believed to lead to immunity impairment, because atrophy of one of the immune system organs – bursa of Fabricius - has been reported in PiCV-infected birds. Such birds are also more prone to the development of other diseases. Circoviruses are characterized by vast genetic diversity which is due to, among other things, the reassortment phenomenon (recombination), namely an exchange of fragments of the genetic material among various strains of the virus during infection of one organism. The rate and intensity of PiCV recombinants development have not been determined so far. However, the exact mechanisms leading to immunity impairment as a result of pigeon infection with PiCV remain unknown. The planned study aims to investigate the frequency of development of novel PiCV recombinants in racing pigeons kept in “one loft race” type conditions.

An experiment is planned in which subclinically infected with various PiCV strains racing pigeons originating from different breeding facilities will be housed in one room, which will mimic the conditions of “one loft races” rearing. Blood and swab samples will be regularly collected from birds for the recovery of complete PiCV genomes that will be next sequenced and subjected to bioinformatic analyses aimed at determining the genetic diversity and the dynamics of recombination phenomenon among the viruses. In addition, virus shedding rate (based on PiCV genome copy number in cloacal swabs), level of viremia, expression of the gene related to viral infection (interferon) and percentage of apoptotic cells in B lymphocyte subpopulation will be determined in the samples to enable the complete analysis of infection prevalence in the flock.

Results accomplished in the Project will have a significant impact on the scientific discipline owing to their innovative and utilitarian character. Determination of the recombination rate of novel genetic variants of PiCV will enrich the knowledge on the epidemiology of infections and evolution of circoviruses and will form grounds for successive investigations aimed at developing methods for prevention and eradication of this pathogen.