

Avian Metapneumoviruses (aMPV) are a strongly infectious RNA viruses that cause turkey rhinotracheitis (TRT) in flocks of turkeys. Infections with aMPV cause a great loss to the poultry industry which result from decrease of body weight gains, mortality, drop in egg production and immunosuppression. Despite the common vaccination of turkeys against TRT, outbreaks of the disease are recorded frequently. In Poland, big part of turkey production is functioning based on turkey poults imported from Canada (which is considered free from TRT). This situation causes that big part of turkeys poults in Poland possess (MDA+) or do not possess (MDA-) maternally delivered antibodies (MDA) against aMPV in the first weeks of life, which is the time that most turkey flocks are vaccinated against TRT (usually on the first day of life).

Both local and systemic mechanisms of protection are involved in the immunity to TRT. It has been reported previously that after vaccination and infection with aMPV humoral immunity of the macroorganism is stimulated and it corresponds with the level of specific IgA in the upper respiratory tract washings and the level of IgY in the serum. On the other hand, our previous research concerning TRT immunoprophylaxis of turkey poults of different immunological status (MDA+ or MDA- birds) demonstrated that humoral immunity stimulation is inhibited by the presence of maternally derived anti-aMPV antibodies.

Stimulation and the activity of cell-mediated immunity is considered to be decisive indicator of protection against aMPV infection. Considering the differences of both cell-mediated and humoral immunity stimulation after vaccination of MDA+ or MDA- birds, that have been reported earlier, it seems legitimate to perform the research studies concerning the influence of anti-aMPV MDA on the factual level of immunity development to experimental infection with fully pathogenic field aMPV strain.

Considering the above this project's main research hypothesis is that anti-aMPV MDA inhibit the replication of vaccine virus which decreases its immunogenicity (which has been confirmed in our previous research). This situation results in decreased immunological system stimulation and therefore in the lack of vaccine induced immunity and the possibility of the clinical disease (despite the vaccination). Scientific aim of this Project is to investigate the influence of anti-aMPV MDA on vaccine induced immunity development to experimental aMPV infection.

Evaluation of vaccine induced immunity to experimental aMPV infection, which will be estimated based on the result of innovative, 4 step evaluation procedure involving: (1) clinical examination (scoring system), (2) histopathological examination of the upper respiratory tract (URT) structures, (3) the level of aMPV replication in the URT (qRT-PCR) and the level of aMPV shedding (sentinel animals, qRT-PCR). Additionally the level of *in vivo* immune memory acquisition will be determined based on the an evaluation of protective indicators: (1) the level of specific anti-aMPV IgA in the URT washings (ELISA), (2) the level of specific IgY in the serum (ELISA) and (3) the level of expression of genes involved in cell cytotoxicity within the mononuclear cell isolated from birds' spleens (qRT-PCR) after experimental infection.

Planned under the Project investigations with the use innovative scoring system of anti-infectious immunity development, ELISA technique and molecular biology will be one of the few investigations in the world that would address the aMPV immunopathogenesis, and one of very few in turkey pathology (in general). Scientific issues undertaken in the Project will be investigated with the use of cutting-edge research equipment, which will make the obtained results especially reliable. The elaboration of innovative laboratory methods in this Project will not only open new research possibilities in the context of aMPV and other turkey's pathogens immunopathogenesis but will also enable studies on the evaluation of vaccine induced immunity in other birds' species.

Completion of the research studies that are planned within this Project will provide the answer - whether and how do MDA contribute to the unsatisfactory TRT epidemiological situation and to the cases of TRT outbreaks in vaccinated flocks of turkeys. Due to the lack of specific treatment of TRT in turkeys, they are given protective antibiotics (bacterial complications). The study results will help to verify the current vaccination programs and will help to develop new ones for the initial period of breeding, thus reducing the loss caused by TRT. Additionally, this Project may serve for further applicable experiments, which will be implemented in field veterinary aviopathology practice in the light of construction and execution of TRT vaccination strategies in flocks of turkeys of different immunological status.