

Males and females differ not only in their susceptibility to viral, bacterial or parasitic diseases, but also react differently to applied treatments or vaccinations. Our previous studies show a significant effect of host sex in immunized and liver fluke (*Fasciola hepatica*) infected animals. Unfortunately, such an important factor as sex is often overlooked in research on new ways of prevention and therapies of animal diseases.

Here, we want to recognize sex-dependent mechanisms that determine the occurrence of protection in immunized and infected sheep females and males, which are one of the main hosts of liver fluke. For this purpose, sheep will be given orally a preparation in the form of freeze-dried leaves of lettuce producing a protein derived from *F. hepatica*, which potential in prevention against liver fluke has been already proven in our preliminary studies. The idea of using transgenic plants for oral immunization is relatively new. A selected antigen of a given pathogen can be obtained in a plant and orally administered as a preparation inducing immunity. In this work, this antigen will be the cysteine protease (CPFhW) from *F. hepatica*. The antigen was administered orally in our earlier studies. Now we want to verify whether using a new way of antigen delivery (one intramuscular and two oral administrations) can improve the effectiveness of immunization in sheep. The immune response to the antigen and protection against infection will be followed by using a range of immunoassays and physiological tests. Analyzes of sex hormones and glucocorticosteroids - hormones of common origin and modulating the immune response will also be performed. The overall goal of research undertaken is to recognize sex-dependent factors that protect against the disease, in order to develop optimal preventions and therapies for both sexes in the future.

Beneficiaries of this project will be scientists working on the immunology of parasitic infections and the development of new control strategies against parasites. We hope that the results obtained during the project will encourage researchers from other disciplines and areas of research interest to consider sex analysis in their future research.