Plastics have been on the market for over 100 years, and due to their practical properties, the trend of using them in agriculture, industry and even in our daily lives has spread worldwide. Globally, the use of plastics is increasing year by year, and the current data shows that their production will exceed 368 million tons in 2019. Considering the estimated global population growth and current consumption and waste habits, plastic production is expected to double by 2025 and more than triple by 2050. Furthermore, the waste produced is not disposed of properly and represents one of the fastest growing parts of municipal waste. Among plastic waste, microplastic particles (MP), which are smaller than 5 mm, are of particular concern, mainly because of their long residence time in the environment, their small size and their ability to penetrate cells and cause harmful effects. MPs are considered as emerging pollutants in the environment and are increasingly detected and quantified, especially in the aquatic environment. Although the distribution and effects of MP in the environment are being studied, there is still too little literature on their effects on human and animal health. MPs have been reported to be commonly found in seafood and other marine organisms sourced directly from markets and supermarkets. They have been found in drinking water - both bottled and tap - beer, table salt, honey, sugar, milk and canned foods, lipsticks, toothpaste, dietary supplements, juice clarifiers and food packaging materials, and in air. Oral administration of MP has been shown to lead to accumulation in the liver, kidney, intestine, and brain, which has been shown to lead to oxidative stress, energy imbalances, neurotoxicity, and behavioral disorders.

The most popular plastic for packaging a variety of edible products is polyethylene terephthalate (PET), which is widely used because of its low cost, light weight, and ease of transport. The PET microplastic has been found in drinking water - bottled and from the tap - table salt, fish meal and atmospheric fallout. Despite the widespread use of PET in industry and its presence in the environment and in many foods, its effects on human and animal health have yet to be described. Most research has focused on the toxicity of MP in invertebrates. The aim of our study is to determine the influence of microplastic particles (PET) on the neuroendocrine axes - HPG (hypothalamic-pituitary-gonadal) and HPA (hypothalamic-pituitary-adrenal) in immature gilts. The use of the pig as an experimental model in our study is justified because of its similarity to humans in many anatomical and physiological characteristics. Exposure to MPs at early life stages could be associated with disturbances in the regulation of reproductive/endocrine systems in adulthood. Moreover, the proposed experiments on immature gilts have an additional advantage by excluding the influence of estrous cycle hormones on the activity of the two hormonal axes studied.

The experiment is performed on immature gilts about 8 weeks old. The animals will be divided into three groups: 1) control group receiving orally empty gelatin capsules; 2) experimental group receiving orally a low dose of microplastic; 3) experimental group receiving orally a high dose of microplastic. To determine the effects of PET on selected components of HPG and HPA axis, the global transcriptome and proteome profiles will be generated. In addition, the changes in the biological parameters of the ovaries (histological/ hormonal/ follicular reserve/ inflammation/ oxidative stress/ apoptosis) and adrenal cortex (histological/ hormonal/ oxidative stress/ apoptosis) will be determined. The presenceor accumulation of microplastics in tissues and body fluids will also be determined. The results obtained will provide new and valuable data on the possible effects of microplastics on various biological functions. The use of RNA-Seq/miRNA-Seq methods for global transcriptome analysis and liquid chromatography/tandem mass spectrometry (LC-MS /MS) for proteome analysis will provide several important data on the expression of genes and proteins related to the organism's response to microplastics and will provide a basis for further studies in this area.