During the last 30 years, broiler chickens have been continuously enhanced for the rate of muscle growth. In the period before hatching, the number of muscle fibers increases, while after hatching, their size grows without any change in quantity. Currently maintained broiler chicken lines are characterised by muscle cross-sections about four times larger than those of birds from the mid-20th century.

Such progress in muscle growth brings several issues, one of which is white striping (WS), a type of muscle myopathy (defect) that results in visual and technological impairment of poultry meat quality. This defect is commonly observed by consumers. Its prevalence is steadily increasing in the population of maintained meat type birds and is present worldwide. White stripes visible on the surface of birds' breast muscles occur due to the death of muscle fibers and subsequent saturation with fat and connective tissue. The causes of this defect remain unknown. It is believed to depend on the rapid growth rate of birds and the ability to deliver nutrients and oxygen to individual muscle fibers.

Zinc plays a role in the development of blood vessels, which can influence the nourishment of muscle tissue. However, the use of zinc in animal feed is regulated and limited, as it belongs to heavy metals and negatively impacts environmental conditions.

In this project, we will determine whether the prevalence of WS in meat birds is related to the availability and amount of consumed zinc. According to our previous research and available scientific literature, Zn participates in the process of creating new blood vessels by regulating specific genes and enzymes necessary for macrophage function. In the in vitro studies, we will identify Zn's impact on metabolic pathways involved in oxidative stress responses, new blood vessel formation, and fibrosis. In subsequent in vivo studies, the obtained results will be verified using an animal model to determine changes in the prevalence of white striping and its vascularisation. Additionally, we will identify the extent to which the amount of consumed zinc affects the frequency of this defect.

These studies will establish how the diet composition of animals can contribute to the frequency of a very common muscle defect in broiler chickens. The possibility of incorporating zinc as a nutritional strategy, feasible for practical application, will be evaluated.

The use of bird satellite muscle cells in part of the experiments ensures adherence to the 3R principle, aiming to limit animal experiments and generate knowledge in the field of bird physiology and nutrition.

The project is interdisciplinary, combining elements of endocrinology, molecular biology, and animal nutrition physiology. The implemented project aims to address how nutritional factors (Zn) contribute to the development and/or reduction of the frequency of breast muscle defects in birds. Furthermore, we will determine whether greater zinc availability can reduce the prevalence of this defect.