The aim of the study is to investigate the influence of exocrine pancreas (pancreatic enzymes) on protein metabolism to amino acids and growth performance in young piglets. Due to the close relationship between diet and health, the physiology of the gastrointestinal tract (GIT) is the subject of a broad scientific interest both in the field of animal husbandry, veterinary and medicine. Although the main function of the GIT is the metabolism of nutrients, relatively little attention has been paid to the digestion of proteins.

For years, it has been believed that proteins must be completely broken down into their constituent monomers - amino acids, in order to be absorbed by cells and released into the blood stream. Recent studies, however, have shown that some peptides (molecules composed of two or more amino acids) might avoid hydrolysis and enter the circulation intact. Thus, in addition to providing nutrients, peptides can also exert a variety of physiological functions. However, the mechanism of peptides absorption and their action have not been fully elucidated.

The most important enzymes involved in the digestion of proteins are pancreatic endopeptidases. Since it is known that different ratios between enzyme types result in different metabolic products, one can speculate that the degree of peptide absorption in the GIT will depend on the quantitative and qualitative composition of pancreatic endopeptidases. It has been hypothesized that pigs with exocrine pancreatic insufficiency (EPI), an established animal model to study uptake of macronutrients with significantly inhibited pancreatic enzyme, will absorb dietary protein mainly in the form of free amino acids, which is also a reason of their growthretardation. However, supplementation of EPI pigs' diet with a pancreatic enzyme will cause a metabolic shift resulting in the absorption of proteins mainly in the form of peptides. In turn, the increased absorption of peptides will positively affect the development of the small intestine, which will directly translate into improved growth performance of piglets. Therefore, it is assumed that it is peptides, not amino acids, that play a key role in the regulation of gastrointestinal and wholebody function, and exocrine pancreas is crucial for proper digestion and absorption of proteins.

Importantly, so far the studies on protein metabolism have been focused on determining the effect of a given factor only on the amount and type of individual amino acids. While there are 20 types of proteinbuilding amino acids, there can be as many as 400 and 8000 types of di- or tri-peptides, respectively. Therefore, in this project, it is planned to compare the overall qualitative post-enzymatic profile of the protein breakdown in the GIT (peptides vs. amino acids). Moreover, most of the scientific experiments have been limited to the in vitro approach using cell lines or tissue sections, however this approach has many disadvantages and makes it difficult to understand a given process taking into account all interactions occurring in a living organism. This can be at least partially overcome using the in vivo porcine model proposed herein.

The original and unprecedented approach to the issue of protein metabolism, in combination with modern analytical techniques planned to be used, proves that the proposed research project is highly innovative. The planned project will contribute to elucidating the role of pancreatic enzymes and peptides in regulating the function of the GIT and growth of piglets. The obtained data may then help identify single peptides that play a key role in metabolism, as well as to develop feed additives for piglets to improve their growth performance and welfare. Moreover, given that EPI is a condition that affects also humans, the obtained results might be also highly valuable for human medicine.