Institute: National Research Institute of Animal Production, Kraków

Title: Assessment of the impact of innovative high-protein non-GMO feeds of domestic origin on the gastrointestinal tract development, health status and rearing indices of piglets.

Name of potential supervisor: prof. dr hab. Małgorzata Świątkiewicz

Background information:

The requirement for high-quality protein feed grows with the increasing demand for protein of farm animals, characterized by higher and higher productivity. An alternative to the popular imported GMO soybean meal can be products obtained from unmodified soybeans grown in Poland. There is a growing interest in small and medium-sized farms in the processing of small amounts of soybean seeds obtained from their own crops and intended for animal feeding. However, in soybean seeds the compounds (for example trypsin inhibitors) showing an anti-nutritional effect for monogastric animals are present. For this reason, raw soybeans should be subjected to a baro-thermal treatment, with optimally selected technological parameters, which inactivate these compounds, but do not deteriorate the quality of the protein. Another feed material studied in the project will be insect meal, which shows a number of desirable features: protein with a favorable amino acid composition, bioactive substances, high amount of lauric acid, no GM modification, no risk of transmitting zoonoses. In addition, breeding insects is an effective method of bio-recycling, is not harmful to the environment, and the waste from insect production can be utilized as soil fertilizer. The insect protein production could significantly reduce the ecological footprint of feed production, thus contributing to greater sustainability in animal husbandry. Feeds that, apart from their nutritional value, have a pro-health effect are very desirable when the use of antibiotic feed additive is banned and the use of antibiotics for medical purpose is becoming highly restricted.

The main question to be addressed in the project:

The aim of the research is to obtain knowledge on the safety and nutritional value of products from domestic n-GMO soybean seeds and insect-derived products, as the protein feeds for pigs. The impact of these materials on gastrointestinal tract development and metabolic status, pig health status, nutrient digestibility and production rates will be assessed.

Information on the methods/description of work:

The experiment will be carried out on weaned piglets, divided into groups fed with a different feed mixture. All mixtures will be iso-protein and isoenergetic, but will differ in the type and amount of protein feed tested. The digestibility experiment, which will allow to study the digestibility of nutrients in mixtures containing the innovative protein sources, will be carried out using the marker method using chromium oxide. At the end of the experiment, all animals will be euthanized and the samples of blood, intestines' sections and digestive chyme will be taken. The analyzes of hematological and biochemical blood indicators, the level of antibodies, histological and immunohistochemical analysis and morphometric measurements of the intestinal walls will be conducted.

Additional information (e.g., special requirements from the candidate):

The potential candidate should: have knowledge in the field of feed science and livestock nutrition, with particular emphasis on pig nutrition; know the basic methods of testing the quality and nutritional value of feed; conduct digestibility tests on animals; use small laboratory equipment; have knowledge in the field of instrumental analysis; know immunohistochemical and immunoenzymatic methods; perform staining and morphometric measurements; recognize the histological structures of the intestinal walls and evaluate the histological picture; assess the level of antibodies; analyze the collected data and use a statistical program. The candidate should have the experience in working in a research team during the research projects realization and an internship/volunteering at a research institution. The candidate

should have the experience in active participation in scientific conferences and in presenting research results. Knowledge of English, Word and Excel will also be essential during the research.

Place/name of potential collaborator:

The research will be conducted in cooperation with the University of Life Sciences in Poznań; the Kielanowski Institute of Animal Physiology and Nutrition of Polish Academy of Sciences in Jabłonna.

References:

Gasco L., Biasato I., Dabbou S., Schiavone A., Gai F. 2019. Animals fed insect-based diets: state-of-the-art on digestibility, performance and product quality. Animals 9, 170, 1-32 (doi:10.3390/ani9040170)

Stein H.H., Lagosa L.V., Casas G.A. 2016. Nutritional value of feed ingredients of plant origin fed to pigs. Animal Feed Science and Technology 218, 33–69 (doi.org/10.1016/j.anifeedsci.2016.05.003)

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