Name and surname:	**Krzysztof Grzymajło**
Academic Degree	dr hab. (DSc.)
Institute/Department	Department of Biochemistry and Molecular Biology
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ORCID:	0000-0002-1163-0679
UPWr Base of Knowledge - link	https://bazawiedzy.upwr.edu.pl/info.seam?id=UPWr51f62c196ed44292a4a18c87cf2d9bca&affil=&lang=pl
Researchgate:	https://www.researchgate.net/profile/Krzysztof-Grzymajlo
Personal website / Working group website:	
Participation in projects in last 5 years (chronological; with distinction into PI (kierownik) and RF (wykonawca)):	1) (PI) "The role of the sanA gene in Salmonella pathogenicity" 2019/35/O/NZ6/01590; 2020-2024 2) (PI) "Innate immune response during first stages of Salmonella infection" PPN/BEK/2018/1/00270; 2019 3) (PI)"Host-pathogen-microbiota interactions at the first stages of Salmonella enterica infection" 2020/38/E/NZ6/00182 ; 2021-2026
Do you plan to engage support of second supervisor or auxiliary supervisor?	NO
PhD topic:	**The role of probiotics in host-pathogen interaction at the first stages of Salmonella enterica infection**
Research discipline in Doctoral School	Veterinary Science
3) Short description of the research problem to be solved in the PhD (minimum 1000 characters):	Salmonella infections are one of the most important epidemiological issues worldwide, affecting directly about 200 million people globally, as well as a serious economic problem with an estimated cost as high a 3 billion euros per year only in European Union. Salmonella, a food and water-born Gram-negative bacterial pathogen, includes more than 2600 serovars infecting many animal species, from reptiles to birds and mammals. Salmonella infection depends on its initial stages – adhesion followed by invasion of host cells. Among the number of adhesive structures, type 1 fimbriae (T1F) are one of the most extensively studied. T1F are relatively long, rod-shaped structures composed primarily of FimA monomers with a lectin-like FimH protein present at the tip, directly responsible for binding to host cells. Based on the ability to binding high mannose structures frequently present at the host cells surface proteins, there are four major T1F phenotypes investigated to date: 1) high-binding; 2) low-binding; 3) non-binding and 4) no T1F production. What is more, our preliminary studies show that single nucleotide polymorphism (SNP) of the fimH gene in the S. Typhimurium SL1344 genome is directly connected with those phenotypes. The majority of work regarding the first stages of Salmonella infection is focused on direct interaction with host cells, like enterocytes, M-cells, or macrophages, in many cases with the use of immortalized cell lines models. However, colonization of the gastrointestinal tract by enteric pathogens always occurs in a broader context, strongly determined by host-specific gut microflora, which can impact host-pathogen interactions. The gastrointestinal tract is occupied by billions of microbes which can act as a physical barrier against invading bacteria by blocking pathogen access to the epithelial layer. Therefore, a complete infection model should include interactions between the host, its microbiota, and infecting pathogen, which define a specific triangle of interactions. The proposed research aims to investigate the role of Salmonella T1F under the light of the interaction between Salmonella, the intestinal microbiota, and the host during the first stages of infection. The Salmonella infection process can be affected by additional, non-pathogenic microbes called probiotics, which can have a beneficial effect on the host health. Therefore, the second major goal is to enhance microflora ability to stop or limit Salmonella infection at its initial stages by enhancing its adhesion properties.
Professional skills for PhD candidate (e.g. master program, specializations, softwares, language, analytical techniques, minimum 500 characters):	Master's degree in veterinary medicine, microbiology, biotechnology, or in a related field - Sound understanding of molecular mechanisms of bacterial pathogenesis (with particular emphasis on the Salmonella genus) - Basic proficiency in the use of biological databases and online resources/tools - Experience in laboratory work: a) Molecular biology skills: PCR methods, DNA electrophoresis, DNA/RNA extraction, plasmid isolation, generation of deletion mutants, cloning; b) Cell biology skills: in vitro culture of cell lines; c) Microbiology skills: cultivation of bacteria, adhesion and invasion assays; - Ability to work with animals in a research setting - Teamwork skills and strong motivation for scientific work - Ability to critically analyze and interpret data - Good written and spoken English communication skills
Details of the project to support PhD research	
a) Project title:	Host-pathogen-microbiota interactions at the first stages of Salmonella enterica infection
b) Agreement number:	2020/38/E/NZ6/00182
c) Number of months in the project to support PhD (in months; starting from 1st of October 2022):	45
Project website:	