



Controlling gut microbiota, salmonella resistance, animal performance and immune response with pathogen-free adult microbiota

Coordinators

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Keywords

Microbiota, enteric pathogens, breeding

INRAE unit

ISP
PFIE
MAIAGE

Partners

Univ. Vet München (Allemagne)
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The MOTHERS project concerns the control of intestinal microbiota in chickens. It aims to inoculate a pre-selected pathogen-free microbiota to allow the establishment of a gut microbiota with beneficial effects on the immune response, a barrier effect against salmonella and the improvement of the zootechnical performance of poultry.

The relationship between a well-balanced gut microbiota and animal health and performance is now well established. For many animals, contact between adults and their offspring is the main route of transmission of gut microbiota. However, the highly aseptic rearing conditions used in poultry hatcheries, where newly hatched chicks are not in contact with their mothers, have altered this transmission, which is crucial for the robustness of the animals. In this context, chickens acquire their gut microbiota from a poor and undefined environmental microbiota. This may subsequently hinder the development of a balanced gut microbiota and, in turn, compromise gut development and reduce resistance to enteric pathogens. In contrast, normal development of the gut microbiota can promote a "barrier effect" against pathogens.

Objectives

This project aims to characterise in depth an adult microbiota isolated at INRAE, called PaFAIM, which is available in sufficient quantity for repeated experiments and can be used as a starter microbiota in chicks. PaFAIM is free of pathogens and antibiotic resistance genes since its initial collection. In this project, we will evaluate whether PaFAIM, used as a starter microbiota, can lead to the development of a complex, well-balanced gut microbiota with beneficial effects on host immune response, animal performance and providing a barrier effect against caecal colonisation by Salmonella, as does an adult gut microbiota.

This will be achieved through a multidisciplinary approach including a multi-omics characterisation at the whole holobiont scale, and an epidemiological modelling



approach. This project will pave the way for the further development of a simplified microbiota, offering a protective effect against intestinal pathogens and increasing the robustness of chicks.

Partners

INRAE division	INRAE unit	Expertise
Microbiology and the Food Chain	ISP	Metabarcoding, metagenomic analyses, <i>in vivo</i> infections in chicken, bacteriology, chicken microbiota, salmonellosis, immunology
SA Animal Health	ISP	Histology, light microscopy techniques (wide field and confocal), image processing
	PFIE	<i>In vivo</i> experimental infections (chicken model), animal behaviour, biochemistry
MATHNUM Mathematics and Digital Technologies	MaIAGE	Modelisation
Partners		Expertise
UNIV. VET MÜNCHEN		Avian immunology
UNIV. HOSPITAL OF RWTH AACHEN		Culturomics, metagenomics

