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Genetic determinism of vaccine response and caecal microbiota composition in free-range hens

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Vaccination is one of the most effective ways to prevent infectious disease in livestock. However, genetic variations and variations in the gut microbiota can affect vaccine response effectiveness.

Genetic variations also have an impact on microbiota variations. Additionally, little is known to date about how the vaccine response is influenced when animals are given outdoor access.

And yet, its supposed effect on improving animal welfare is widely promoted. Modulating the microbiota through a combination of genetic selection and nutrition to improve and ensure a consistent vaccine response in free-range animals is an innovative approach that tackles a major social and health challenge.

To gain a deeper understanding of how the complex interactions between microbiota and genetics impact the vaccine response, the doctoral candidate will study the genetic control of the vaccine response and gut microbiota in a cohort of 400 free-range laying hens reared under experimental conditions. Immune parameters, vaccine response, caecal microbiota composition and behaviour will be analysed with support from immunologists and behaviourists.

The individual genotyping data thus obtained will be used to carry out genome-wide association studies (GWAS) and identify the genomic regions involved in the genetic control of these traits.

Comparing the genetic architectures of the different traits will provide insights into the interactions between traits and enable an initial assessment of the feasibility of genetic selection for a better vaccine response.