

Towards breeding for increased resistance to coccidiosis in chicken



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Avian coccidiosis is a major concern, ranking in the top-three health problems and being the most important parasitic disease for poultry production. It causes huge economical loss by affecting growth and feed efficiency even in its subclinical forms and death of the animals in the most severe cases. Clearly, cost of the coccidiosis is largely due to the effects of the disease as compared to the cost of the treatments. The most commonly used chemotherapeutics are the anticoccidials, but because of increasing pressure to ban them, alternatives strategies need to be developed. Vaccines do exist but there are not yet a practical and cheap alternative. EADGENE partners have been initiating several complementary research projects to develop integrating strategies which could combine vaccination with selection for improved host genetic response to coccidiosis.

Validating disease resistance phenotypes for coccidiosis

Implementation of selection for disease resistance is often hampered by a lack of easily measurable, repeatable and relevant disease phenotypes. Firstly, INRA-led research has been measuring and analysing (repeatability, variability, correlations) a panel of disease phenotypes. This was done on experimental chicken lines that are showing large variability for the response to coccidiosis, and also for several *Eimeria* species (the parasites that are responsible for the coccidiosis). Secondly, most pertinent measures have been validated, in pilot study and subsequently in large scale challenge with commercial animals. To

make it possible to select for coccidiosis resistance in the future, it would be ideal to exploit the genetic variability by obtaining growth and blood sample measures that are automatically taken.

Identifying genetic markers and underlying mechanisms of resistance to coccidiosis

Genetic variability in resistance to coccidiosis has been well-documented. EADGENE partners (e.g. INRA and Roslin Institute) have performed mapping studies on various crosses of resistant and susceptible lines, and identified SNPs in several candidate genes controlling coccidiosis resistant traits. Collaborations with poultry breeding companies are also ongoing to identify genetic markers of the validated disease phenotypes in the commercial birds. All these results are integrated with functional approaches (e.g. transcriptomics, immune function measures) to better understand the regulation of the disease process and, in this way, improve the potential breeding strategy.

Towards realistic implementation of disease resistance for coccidiosis in chicken?

Results from ongoing research projects and collaboration with poultry breeding companies show that selection for

improved host genetic response to coccidiosis is feasible, but will have to be implemented case by case by the companies after validation. Such breeding strategies may be still improved in the nearest future by combining improved host genetic response to coccidiosis and enhanced response to coccidiosis vaccine.

Main outcomes

- Validated disease phenotypes for coccidiosis
- Genetic markers for coccidiosis
- Combining improved genetic response to coccidiosis and to coccidiosis vaccine

