

Press Release - 21 May 2021

Genetic determinism of laying hens – a key to accompany the transition to cage-free farms

Researchers at INRAE and NOVOGEN show that laying behaviours are influenced by genetic factors. To carry out their work, published on 20 May in the *PLOS ONE* journal, they used electronic nests to monitor the individual laying behaviour of more than 2,000 hens, farmed in large groups on floor and without cages over a 40-week period. The influence of genetics on the laying rate is a promising avenue to select laying hens suitable for cage-free farming systems and to accompany the anticipated end of caged farming in Western countries.

Knowing which hen is laying in the nest, where and at what time are crucial questions that science must answer to accompany the development of efficient cage-free farming systems. INRAE researchers, in collaboration with the selection company Novogen are interested in these questions.

To respond to them, they monitored the laying behaviour of more than 2,000 hens, 1,430 Rhode Island (brown egg laying breed) hens and 1,008 White Leghorn (white egg laying breed) hens, farmed on the floor for 40 weeks. These hens have at their disposal electronic nests that recognise each of them through a specific transponder tagged on one of their leg. The electronic nest continuously records a variety of information that was, until now, impossible to measure on large groups of hens kept on the floor, such as the time of day the individual lays. This information has been used to calculate characteristics of the egg-laying rate such as the average and variability of the egg-laying time of day, or the number of breaks (discontinuation of egg laying for one or more days) per hen over the entire period. The result was that the hens laid eggs between 2 hours and 3 hours 20 after sunrise on average and made between 4 and 8 breaks.

These measurements on a large number of related hens have allowed the scientists to study the variability of laying characteristics: up to 68% of differences in laying rate are of genetic origin! And the use or not of nests for laying is also a behaviour of which 13 to 26% of variability is influenced by genetic factors. Another habit of hens to take into account to ensure optimum collection of eggs.

To accompany the transition to new production systems that are more sustainable and respectful of animal welfare, it is necessary to find alternatives that guarantee that production is maintained, both in terms of quality and in quantity. For breeders, electronic nests can be used to measure the characteristics of the laying rate and nest use under farming conditions close to cage-free production systems. These traits, inheritable and well correlated with egg production, could therefore be exploited in breeding programmes to improve laying in the nests for these cage-free systems.

These initial results point the way for the selection of hens able to move around freely in large groups while ensuring the efficiency of laying in nests. Further studies are needed to identify the regions of the genome and the genes that govern the expression of these new traits.

Reference

L Becot, N Bedere, T Burlot, J Coton, P Le Roy (2021) **Nest acceptance, clutch, and oviposition traits are promoting selection criteria to improve egg production in cage-free systems.** PLOS ONE 16(5): e0251037.

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