Press release

Evonik Using epigenetics to trace animal welfare

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- Evonik is now able to determine the biological age of chicken for the first time and derive health status from this information
- Building an epigenetics and bioinformatics platform in Singapore
- Test method will be available for commercial use in the short- to mid-term

Essen, Germany. How livestock are kept is increasingly becoming a factor in consumer decisions when buying meat. Evonik has now developed a test for chicken products that shows how the animals were kept and fed. This reliable new method, which was developed with the aid of epigenetics, enhances transparency and therefore raises consumer confidence.

Epigenetics is a branch of biology that determines how the environment an animal has been exposed to influences patterns on its genetic material. This means, for example, that it is possible to check that products declared as free-range are not actually mass-produced with the use of growth-promoting antibiotics. Evonik sees potential users along the entire chicken production chain, especially agricultural enterprises and retailers. Evonik's new epigenetic test will extend its range of system solutions for sustainable meat production.

At present, experts are working to tailor the test method to the requirements of different customers. For this purpose, Evonik is building up an epigenetics and bioinformatics platform in Singapore. This will have around ten employees in the future. Development work is well advanced, so the specific tests can be made available to customers in the short- to mid-term. Consumers should also benefit: through greater transparency about the food on their plates.

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Walter Pfefferle, a biologist who works as a manager at Creavis, Evonik's strategic research entity and business incubator: “Our technology opens up a completely new insight into poultry production. Chickens can now tell their own story.” That is made possible by epigenetics.

This comparatively new branch of science explains, for example, why cells in the liver or muscle develop differently despite identical genomes and why appearance changes with age. Using the knowledge provided by epigenetics and artificial intelligence, about ten years ago scientists derived the first epigenetic clock for humans. This provides information on their biological age.

Researchers at Evonik have now developed a similar epigenetic clock for chicken in collaboration with the team working with Prof. Frank Lyko, who heads the Epigenetics department at the German Cancer Research Center (DKFZ) in Heidelberg. To this end, they analyzed the methylation sites in the chicken genome. These occur when methyl groups are transmitted to selected sites in the genome by enzymes. “Genes are activated and deactivated at these methylation sites,” explains Pfefferle. “Environmental signals influence the enzymes that trigger methylation. In this way, environmental influences leave their mark.”

The scientists have identified more than 20 million methylation sites in the chicken genome. Depending on the methylation pattern, they show what the chicken has experienced. Artificial intelligence (AI) and algorithms help to analyze and interpret the data.

In cooperation with Illumina, a leading provider of systems for large-scale analysis of genetic variation and function, Evonik has now developed an epigenetic chip that allows rapid analysis of, for example, samples of meat, despite the enormous amount of data. A pretreated sample is applied to a test area on the chip, which measures changes in the genome of the sample. The data can be read with a special appliance and are then evaluated using AI-based algorithms. In its laboratories in Singapore, Evonik is now validating the method, feeding data to the algorithms, and exploring new areas of application.

In the coming months, the experts at Creavis aim to find out which factors are important for potential customers in the retail, meat processing, and agricultural sectors. Simple evidence of the health and welfare of livestock, farming methods, performance-enhancing antibiotics, medication, origin, and the method of slaughter is now available. Pfefferle sums up: “Sustainable poultry production that explicitly takes animal welfare into account is becoming realistic.” With the aid of modern science, Evonik now has a technology that can make an appreciable contribution to the European Union's farm-to-fork strategy: for fair, healthy, and environmentally friendly nutrition.

Company information
Evonik is one of the world leaders in specialty chemicals. The company is active in more than 100 countries around the world and generated sales of €15 billion and an operating profit (adjusted EBITDA) of €2.38 billion in 2021. Evonik goes far beyond chemistry to create innovative, profitable and sustainable solutions for customers. About 33,000 employees work together for a common purpose: We want to improve life today and tomorrow.

Information about Creavis
Creavis is Evonik's strategic innovation unit and business incubator. For more than 20 years, it has paved the way for new technologies and innovative business models to make the future a good place to live. Around 200 employees around the world develop sustainable solutions to key challenges resulting from climate change and population growth. In this way they drive forward new commercial ecosystems and value chains.

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