A holistic approach to poultry gut health

Key findings:

- Since the ban of antibiotic growth promoters (AGPs) in the European Union, the industry has been looking for valid alternatives to improve health, immune status and performance in animal agriculture.

- The industry focuses on developing solutions that mimic the effects of AGPs. However, the exact mode of action of the AGPs to improve poultry performance is not fully understood.

- Most AGPs alternatives try to prevent the proliferation of pathogenic bacteria and to modulate indigenous bacteria to improve immune status and performance.

- As an industry, we have made limited progress in improving gut health. Maybe we need to change the approach to find the most optimal solution.

- As part of a stable ecological system, pathogens per se do not represent a threat to animal health. The dynamic nature of the gastrointestinal microflora in chickens makes maintaining the right balance in the microbial ecosystem.

- Despite a large amount of scientific work has been done on the topic, a lack of consistent improvement has been registered.

- To improve gut health more consistently, a broader approach, involving a combination of nutrition, feed technology and husbandry management needs to be taken. In addition, gut-health is too complex to be solved from only one point of view. Input should be obtained from different disciplines, including food technology, human nutrition, veterinary and human medical sciences.

- DSM will start an holistic program to come to tailor made solutions to improve the gut ecosystem with the objective of reducing the use of antibiotics in the poultry industry.
Jan Sikkema is Director of the Center for Development and Innovation at the University Medical Center Groningen (UMCG). Academically trained in Microbiology and Biochemistry at the University of Groningen, he obtained a PhD in Industrial Microbiology at the Wageningen University in 1993.

In 2007, with more than 10 years experience in R&D, he was appointed Program Director of the Ti Food and Nutrition (www.tifn.nl), a public private partnership combining the research expertise of academia, institutes and major food companies, where he was responsible for supervising the research programs on Food Microbiology, Metabolism, Oral Health and Gastrointestinal Health. In 2011, he moved to Groningen where he initiated the Center for Development and Innovation of the University Hospital (UMCG) and became Director of the Business Generator Groningen, the Technology Transfer Organization of the University of Groningen and the UMCG.

Key findings:
- Advanced biochemical techniques have allowed good progress on the research into the human gastrointestinal tract.
- This has allowed scientists to begin to uncover the intricate interactions between the epithelial barrier of the gut, the immune system, the liver and the microbiota.
- Host-microbe interactions appear to play an important role in several diseases within humans including obesity, diabetes, certain types of cancer and CVD.
- These results are finding new application in poultry health and nutrition.
Michel Jacques Duclos is the Director of the Unité de Recherches Avicoles at INRA (French National Institute for Agriculture and Research) and Co-responsible of the UMT BIRD (Institut Technique de l’aviculture). Graduated with honors at the University of Lyon in DEA Development Physiology, he obtained his doctorate in Animal Physiology from the University Paris VI.

In 2001, he was habilitate as a 2001 Research Mentor. In 2004, he became the group leader of Team Growth and Metabolism. He was involved in several scientific societies, including the EPC2014 in Stavanger, Norway, where he was Member of the Scientific Committee, and the Eggmeat2015 in Nantes, where he was Chairman of the Scientific Committee.

Key findings:

- The study of the interactions between genetics and nutrition is an old concern that has gained new impetus with the development of high-throughput genomic approaches.

- What is nutrigenomics?
  It is the study of the impact of nutrition on gene activity and its effects on the expression of phenotypes (health, gut functionality, carcass or meat quality).

- This impact can be exerted through nutrients or their derivatives, including metabolites from the gastrointestinal microbiota.

- A better understanding of the mechanisms by which nutrition affects gene activity, will allow the proposal of new nutritional strategies to guide phenotypes.

- Nutrigenetics is the study of the genetic determinants of the variability of individual responses to nutrition.

- Research in the field of nutrigenetics is still emerging for livestock.

- Eventually the tools of nutrigenetics will predict the potential for adaptation of genotypes to various feeds.

- Together, nutrigenetics and nutrigenomics should permit us to be able to identify the master genes that control the different phenotypes.