BASECLEAR

EXPERTS MEETING

Microbiome & Animal Performance and Health

Organized by BaseClear

Thursday October 29th, 2020

All times are Central European Time (CET)

AGENDA

SESSION 1: MICROBIOME LINK TO ANIMAL PERFORMANCE & HEALTH

Start at 10.30

Chair: Dr. Radhika Bongoni & Dr. Derek Butler

- **Keynote: Ruminations on sustainability:**
  Reducing Methane emissions by targeting the rumen microbiome
  Dr. Nicola Walker | EMEA Principal Scientist – DSM Animal Nutrition & Health
- **Culturomics: revealing microbial diversity**
  Dr. Aleksandrina Patyshakuliyeva | Product Manager Animal Microbiome – BaseClear
- **Effect of immuno-modulating algae extract on monogastric animal**
  Dr. Frédérick Bussy | Algo-Ceutical Product Specialist – Olmix

SESSION 2: MODULATION THE ANIMAL MICROBIOME

Start at 15.00

Chair: Dr. Radhika Bongoni & Dr. Derek Butler

- **Modulation of Microbial Diversity – Opportunities for Health and Wellbeing**
  Dr. Richard Murphy | Research Director – Alltech
- **Probiotic yeasts to improve gut health in swine**
  Dr. Tadele Kiros | R&D Manager-Swine – Phileo by Lesaffre
- **Designing efficacy trials for EU authorisation of feed additives**
  DI(FH) Karin Schöndorfer | Regulatory Affairs Manager – Biomin

BaseClear hosts

Derek Butler

Derek is the commercial director of BaseClear. Derek completed a bachelor's degree in Biotechnology at Dublin City University in 1995, specialising in Genetics and Immunology. He continued his studies at University College Cork and in 2001 received his PhD degree for work on the genetic regulation of lactic acid bacteria. In the same year he took up a post-doctoral position at the University of Groningen where his work focused on the identification of novel enzymatic activities from thermophilic bacteria. In 2004 Derek joined Lactrys where he worked on vaccine development in probiotic bacteria before joining BaseClear in 2006. He has now more than 15 years' experience working on microbial genomics research projects together with industrial partners.

Radhika Bongoni

Radhika is Business Developer at BaseClear, with focus on markets for application of microbial genomics in food, feed and pharma industries. Radhika received her Ph.D. in Food technology (2014) from Wageningen University & Research (the Netherlands) and an MBA (2015) from Tias School for Business & Society (the Netherlands). With techno-commercial expertise, she is involved in business growth and market penetration by fostering relationships with partners. Prior to BaseClear, Radhika was responsible for establishing dietary supplements market in western Europe, India, South Africa and Russia.

DEREK BUTLER, PHD
Commercial director

RADHIKA BONGONI, PHD
Business Developer

Ruminations on sustainability: Reducing Methane emissions by targeting the rumen microbiome

Nicola D. Walker
EMEA Principal Scientist, Clean Cow project, DSM Nutritional Products

ABSTRACT

It has been estimated that the livestock sector is responsible for the production of 14.5% of total anthropogenic greenhouse gas emissions (Gerber et al., 2013); 6% of which comes from enteric fermentation from ruminants. A single dairy cow can produce up to 500 litres of methane / day, 95% of which is belched out in the breath and is formed in the rumen as a consequence of feed breakdown. Ruminants evolved to be able to break down plant material and feed and convert it into meat and milk due to the presence of a complex and diverse microbial ecosystem in the rumen. The ability to digest plant material allows ruminants to be able to graze marginal lands not suitable for arable plant cropping, giving them an advantage over monogastrics (including humans) as they do not compete for cereal feed.

The rumen microbiome consists of bacteria, archaea, protozoa, anaerobic fungi and protozoa. These microbes act in a synergistic manner to break down feed for the host resulting in the formation of Volatile Fatty acids (VFAs) and microbial cells, which act as energy substrates and nutrients for the host. In addition to the microbes involved in the breakdown of feed for the host, other opportunistic microbes are present, including bacteriophage and myco-plasmas, all of which make up the rumen microbiome. Unfortunately, the down-side of the ruminal fermentation process is the conversion by the methanogenic archaea of the CO2 and Hydrogen, that is also formed during fermentation, to methane which is eructated (Wolin 1981). This results not only in a loss of Gross Energy of feed consumed of between 2 to 12% (Johnson and Johnson, 1995) but also a negative effect on the environment due to methane's potency as a greenhouse gas (GHG). As a consequence, research has been carried out trying to identify different methane mitigation strategies as a means to improve the sustainability of ruminant production systems and reduce their carbon hoofprint.

The most extensively studied feed additive that has been developed to date to inhibit methanogenesis is 3-Nitrooxypropanol (3-NOP). This is an enzyme inhibitor identified and designed by in silico modelling that specifically targets the final step in the methanogenic pathway, reducing the activity of the methyl co-enzyme reductase enzyme (Duin et al, 2016).

In a recent meta-analysis it has been shown to reduce methane emissions on average by 39% in dairy cows and 22% in beef cattle and is dose, application and diet dependent (Dijkstra et al, 2018). One key characteristic of 3-NOP is that it actually does not kill its target microbe, it instead just reduces its activity, and once removed from the diet, methane levels return to the same levels they were before starting supplementation. No adaptation of the archaea appears to occur even after long term feeding which is an interesting observation.

The impact of 3-NOP on the micro-biome has been investigated using a range of different Omic techniques. Initial studies used qPCR to quantify total bacteria, archaea and protozoa and key bacterial species. Only minor differences were observed. It was only when deep sequencing analysis, meta-genomics and meta-transcriptomics were applied, small shifts within the microbiome in terms of composition and functionality could be seen. Preliminary data indicated changes in both the bacterial and archaeal composition which could also be linked to functionality and changes in both the fermentation characteristics and fermentation profile as evidenced through measurement of scFA, and other key rumen metabolites. These changes also reflected some of the changes observed at the cow level in terms of animal performance, thus demonstrating the link between the microbiome and the host. Further research is ongoing to investigate the impact of inhibitors or other methane mitigating strategies on the rumen microbiome.

BIO

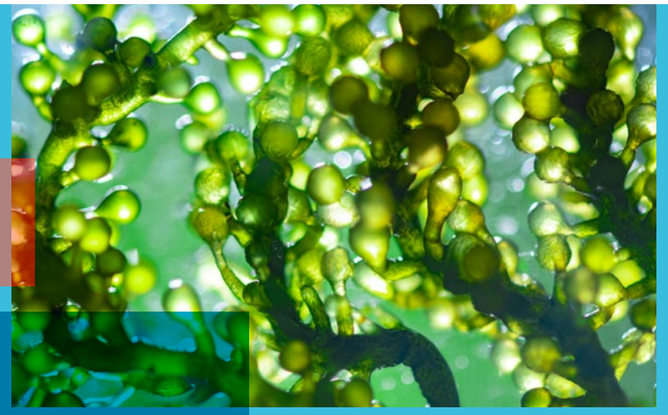
Nicola Walker is the EMEA Principal Scientist on the DSM Clean Cow project investigating the mode of action and effect of a new product Bovaer (3-Nitrooxypropanol, 3-NOP) on methane mitigation and animal performance. An experienced rumen microbiologist and nutritionist, she obtained a PhD in rumen microbiology from the University of Aberdeen, Scotland and has worked as a research scientist in the UK, NZ, France, Canada and Switzerland. In this time, she has investigated a range of different feed additives for their impact on the rumen microbiome and interaction with the host animal in terms of health and production, and the impact of these additives on the environment with respect to reducing methane and nitrogen excretion.

Culturomics: revealing microbial diversity

Dr. Aleksandrina Patyshakuliyeva
Product Manager Animal Microbiome – BaseClear

ABSTRACT
One of the new innovative tools to study diverse and complex animal gut microbiota is culturomics. This approach involves the application of multiple cultivation conditions to capture the vast diversity of gut microorganisms, their isolation and further identification. The importance of culturomics methods is that it allows isolation of novel strains with valuable properties which can be applied as functional feed additives to improve animals gut health and utilization of dietary nutrients, to increase intestinal immunity and to protect against pathogens colonization.

BIO
Aleksandrina Patyshakuliyeva is product manager Microbiome & Animal Performance and Health at BaseClear. She did a PhD in fungal physiology at Westerdijk Institute (KNAW), the Netherlands investigating plant biomass utilization by fungi and obtained a PhD from the University of Utrecht, the Netherlands. She has worked as a postdoctoral researcher at Utrecht University, Wageningen University and NIOO-KNAW and was a visiting researcher in INRA, France and Helsinki University, Finland. During this time, her research centered on applications in sustainable food production, sustainable agriculture and bioremediation. She has explored production of extracellular enzymes, organic acids, siderophores, metabolic pathways and regulators controlling the microbial response to the substrates (plant, algal biomass, asbestos).



Effect of immuno-modulating algae extract on monogastric animal

Dr. Frédérick Bussy
Algo-Ceutical Product Specialist – Olmix

ABSTRACT
Macroalgae, or seaweeds, are eukaryotic and pluricellular organisms, divided in three different groups: green, red and brown. Detailed screening of macroalgal functions revealed new ranges of biological activities including anticoagulant, antiviral and antibacterial, anti-tumoral and immunomodulatory activities. All of them could be of relevance in nutraceutical functional food.
In vitro & in vivo studies have been conducted to evaluate the capacity of the algal extract Marine Sulfated Polysaccharides (MSP) and its potential as a new prophylactic strategy to activate the immune response of poultry and pig. The use of immuno-modulators as macroalgal polysaccharides was able to support the natural defenses of the animals and improve vaccination efficiency. Macroalgal polysaccharides provides a new way to help producers achieving good performance, improving the sanitary status of the animals and opening the way to reduce the use of antibiotics.

BIO
Frederick Bussy spent her childhood in the agriculture sector, she acquired field experiences validate by various farms internships. She worked in different type of productions like sheep, poultry, pigs and dairy cow. Frédérick Bussy obtained her bachelor's degree in animal productions at the University of Le Mans, France. Then she had a Master degree in Animal Science at the University of Tours, France, where she benefitted from the proximity of INRA Nouzilly (National Institute of Agronomic Research), thus learning from the best researchers in poultry sector. Thank to her certificate, she has participated in INRA studies: sheep genetic selection, layers welfare and genetic. In 2013 she joined Olmix group as Algo-Ceutical product specialist. She is in charge on technical service on Algo-Ceutical range.

Modulation of Microbial Diversity - Opportunities for Health and Wellbeing

Dr. Richard Murphy
Research Director - Alltech

ABSTRACT

Profiling and understanding the role of intestinal microbial communities is important for the development and understanding of new and existing feed additives, thus allowing the manipulation of diets to improve performance, health and welfare. Dietary supplements, which focus on rehabilitating or repairing the gut microfloral diversity in order to aid intestinal health and decrease the animal's susceptibility to disease, can be broadly classed as either prebiotics or probiotics. Through the use of techniques based on molecular sequencing technologies, difficulties associated with cultivating intestinal bacteria have been overcome, providing detailed insights into the malleable nature of the microbiome. Over the last number of years, a focus has been placed on identifying the population modulating effects of dietary supplementation with yeast cell wall-based prebiotics. In particular, the role of overall microbial diversity in influencing health and performance has come under increased scrutiny. Ultimately, the goal with nutritional intervention is to normalise gut function through a process of microbial repair and rehabilitation.

BIO

Dr. Richard Murphy is the research director at the Alltech European Bioscience Centre in Dunboyne, Ireland, where he leads a 20 strong team of researchers.
His research activities are diverse, including areas such as trace element and mineral bioavailability, gastrointestinal health, pathogen control, antimicrobial resistance, coordination chemistry and cellular redox reactions.
Murphy maintains strong links with numerous universities and research institutions and has supervised close to 20 Ph.D. and M.Sc. programs which reflect the diverse nature of his research interests.
He has been appointed as an adjunct professor in the Faculty of Science and Health studies at Dublin City University and sits on the board of management of the NICB at DCU where he is the external chairman.

Probiotic yeasts to improve gut health in swine

Dr. Tadele Kiros
R&D Manager-Swine – Phileo by Lesaffre

ABSTRACT
Dr Kiros will delve into the effect of probiotic yeast strain Sc 47 on pig gut microbiota and the role of microbiota on gut health and animal well-being. He will also speak about the latest advances in microbiota modulation and its relation to gut health, animal well-being and zootechnical performance. In addition, the role of probiotic live yeast on microbiota modulation will receive attention.

BIO
Tadele joined Phileo Lesaffre Animal care on March 2016. Currently Tadele is working as swine R&D manager and global R&D coordinator. Tadele has a DVM degree in tropical veterinary epidemiology and a PhD degree in the area of microbiology and immunology.

Designing efficacy trials for EU authorisation of feed additives

DI(FH) Karin Schöndorfer
Regulatory affairs manager, Biomin Holding GmbH

ABSTRACT

When embarking on the journey to designing a successful efficacy study, with the purpose of getting a feed additive authorised on the European market, it is crucial to understand the factors which influence a study's features. There is no such a thing as a "universal recipe" for any given additive. Instead, solutions are becoming increasingly flexible as EFSA's latest "Guidance the assessment of the efficacy of feed additives" (2018) demonstrates.

It is therefore important to consider the underlying dynamics of an additive's effect and purpose, which will determine the outcome of most study design decisions such as about study duration, required number of studies, their expected duration, endpoints and sample size. The story of study design is therefore as much about the product's effects, dose and target species as it is about regulatory requirements.

BIO

Karin Schöndorfer holds a degree in medical and pharmaceutical biotechnology from the University of Applied Sciences in Krems (Austria). After joining Biomin Holding GmbH more than 14 years ago, her specialisation moved from Research and Development to Regulatory affairs with a focus on feed additives in the European Union. A strong affinity for microbiology, statistics and languages as well as a constant curiosity for life-long learning support her skill set.

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