BIOSIS

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N° 10 - 2022 March - Interaction between plants and animals for innovative feed solutions

Biosis Days 2021

A second edition focused on the potential of phytogenics to fight metabolic stress in farm animals

Speakers and customers surrounded by part of ID4FEED team in Annecy, France

ID4FEED organized its second edition of the Biosis Days last 25 and 26th of October, 2021. The event was held in Annecy (France) in Les Pensières for Global Health (Mérieux Foundation) and was also digitally transmitted online. The theme of the year was "Metabolic stress in animals: basis, effects on health and productivity, place of phytogenics".

The conferences were held in Les Pensières for Global Health

François Gautier, CEO of ID4FEED, opened this second edition by explaining the objective of this annual conference, which is to share with the animal nutrition sector the latest research as regards to the interactions (Biosis) between the environment, the plants and the animals under the effects of co-evolution (xenohormesis).

A boat-trip on Annecy Lake was organized for the participants

Session 1 - Metabolic Stress & Pharmacognosy

Stress impact on the physiological parameters: focus on pigs

Dr Vanessa Louzier, Professor in the Veterinary School of VetagroSup, started with an introduction on the impact of stress on the physiological parameters with the example of pig. Stress is a process with multifactorial origins in livestock farming (eg social pressure, ambient conditions, transport, animal handling,…). Stress produces metabolic responses (biochemical, physiological or immunological changes) that could generate negative effects on animal health and performance (lower feed efficiency and weight gain, decreased yields, more diseases and mortality,…). Various biomarkers of stress can be used in pigs: adrenaline, cortisol or testosterone production, immunoglobulin A or interleukin-18 secretion. Ideally, a panel of various biomarkers should be used to assess the stress response in animals.

1) by improving the rearing conditions

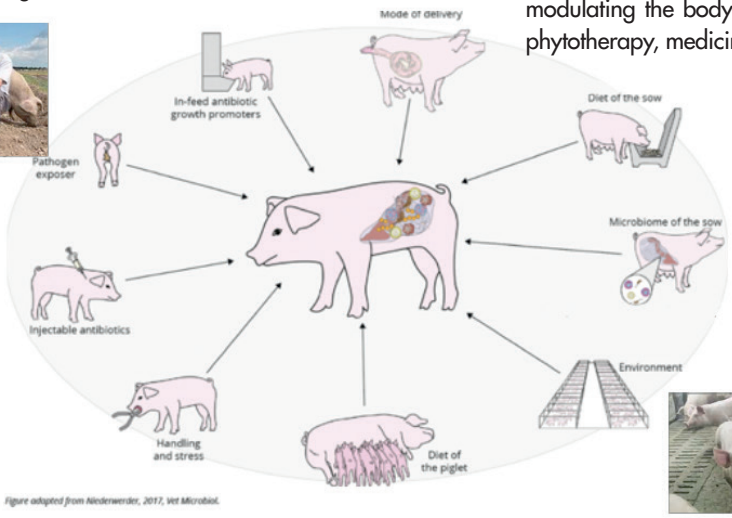


Figure adapted from Niederwerder, 2017, Vet Microbiol.

4) reducing the consequences of stress on the metabolism by modulating the body's response to stress : food supplements, phytotherapy, medicine...

3) promoting a microbiome that can withstand stress

2) enrichment of the environment of the animal

VetAgro Sup

It is possible to fight « bad » stress

The gut microbiome as a key player

Then, **Dr Sebastien Fromentin**, Research Engineer in MetaGenoPolis – INRAE gave a presentation on the gut microbiome as a key player. For the past decade, a determinant role of the gut microbiome has emerged in multiple different health contexts in humans and animals thanks to new high-throughput sequencing techniques. The symbiotic relationship between host and gut microbiome starts from birth and can sometimes be disrupted and this will lead to various diseases. It is possible to restore the symbiosis between the host and the gut microbiome by playing on 4 pillars: promoting the richness of the microbiota, preventing oxidative stress and inflammation and supporting intestinal permeability. Fermenters are useful tools to discover new gut microbiome leverages.

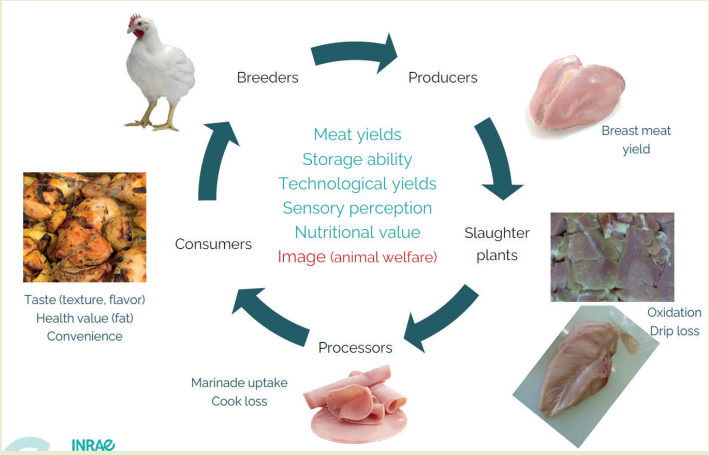
How to select and characterize botanicals before testing their activities on animals: from theory to practice

Dr Denis Bellenot, in charge of the analytical department at ITEIPMAI concluded this first session with some keys on how to select and characterize botanicals before testing their activities on animals. "The greatest enemy of knowledge is not ignorance; it is the illusion of knowledge" is something we should always have in mind when working with plants. The first step is the acquisition of reliable information on what has been done in the literature. It is necessary to choose the key-words and synonyms, as well as the period of time considered. Formatting data is needed, in order to better sort the articles. Crossing with references textbooks in phytochemistry is also useful (eg Bruneton book). Finally, a scoring grid will be of interest to select the most relevant articles (eg Check'Mex tool). The second step concerns the characterization of the herbal material, the identification of the active principles or the quality markers and their traceability during feed processing and in the final animal products.

Session 2 - Control of metabolic stress by farm management

How can metabolic challenges affect muscle physiology and meat quality in chicken?

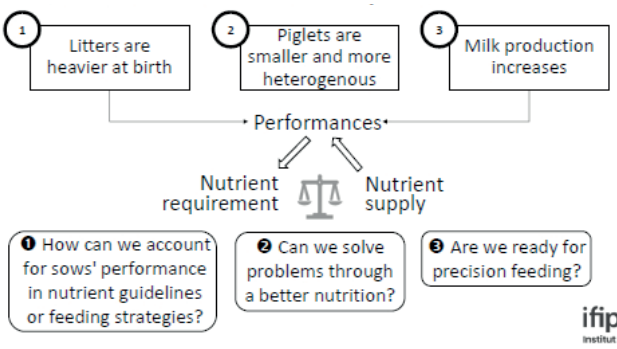
Dr Cécile Berri, Director of the UMR Avian Biology & Poultry Research at INRAE Nouzilly, addressed the topic of metabolic challenges and their consequence on muscle physiology and meat quality in chickens. In 20 years, the breast meat weight and yield have increased by almost 50%. The increased in breast meat production was mainly achieved by muscle fiber hypertrophy and accompanied by a decrease in muscle glycogen reserves. This led to the appearance of breast muscle myopathies about 10 years ago, such as pH-related defects, white striping, wooden breast and spaghetti meat that became a major challenge for the broiler industry as they are not compatible with quality expectations of consumers. Today, there is no effective strategy to reduce the prevalence of myopathies that does not affect performance but current research is focused on developing noninvasive phenotyping methodologies to improve selection efficiency and evaluate innovative management or feeding strategies (eg the use of guaninoacetic acid as energy precursor or increased vitamin D status).



New quality expectations

Feed every sow in the herd for a better farm sustainability

Dr Nathalie Quiniou, Research Engineer at IFIP (French technical institute for pig & pork) addressed the topic of feeding every sow in the herd for a better farm sustainability. Due to genetic selection, sows are more and more prolific. Increased litter size is associated with extra nutritional requirements for the sow during the gestation in relation to a greater fetal development and during the lactation in relation to a greater milk production. In a same farm, there are many sows with different characteristics (eg backfat thickness or P2, body weight,…). Individual nutrition of sow in the herd is one of the solutions that can improve the sustainability of the farm. Knowing the stage of gestation or lactation, the parity, the weight, the P2 measurement, the physical activity, the ambient temperature, the litter characteristics will make it possible to supply the right amount and right composition/quality of feed to the right animal on the right day. It is particularly important in stress situations like during heat stress exposure because of the difficulty to cover the nutrient requirements.



Sows are more and more prolific

Metabolic adaptation: a challenge for transition dairy cows

Dr Francis Enjalbert, Professor in the Veterinary school of Toulouse covered the challenge of metabolic adaptation for transition dairy cows. Early lactation dairy cows have to face an abrupt increase of nutrient requirements due to milk production. High genetic cows give a strong priority to the mammary gland, which can result to some side-effects such as nutrient shortage at blood or tissue levels. The cow adapts by mobilizing tissue reserves and increasing feed intake. In turn, this can result in metabolic disturbances, including subclinical or clinical metabolic diseases, oxidative stress and chronic inflammatory state, affecting production and defenses of animals.

id4feed Ideas for animal feed

DIARY

Rennes (France) **SPACE**	13-15 Sep.
Annecy (France) **Biosis Days**	5-6 Oct.
Hannover (Germany) **Eurotier**	15-18 Nov.

Session 3 - Control by phytogenics

Metabolic challenges in the postnatal period of chicks: consequences on physiology & complementary health practice development

Dr Laurence Guilloteau, senior scientist at INRAE, focused her presentation on metabolic challenges in the postnatal period of chicks. The postnatal period is critical for chicks as they are exposed to potentially stressful environmental changes in the hatchery and during transportation to the rearing houses. An experimental model of delayed placement reproducing adverse postnatal conditions including specific stressors for 24h after hatching was presented. This challenge had immediate effects on metabolism, redox balance and long-lasting effects, such as impaired growth (-6% at D33) and muscle yield of chickens. Fecal metabolome analysis could be useful to define stress or adaptation and to assess practices designed to improve chicken health and welfare. Alternative practices to support immune system are interesting to study, such as the strategy of using Essential Oils (EO) from medicinal plants as a self-medication to support animals' growth and welfare through an increase of antioxidative and anti-inflammatory activities.

Improving the performance and health status of sows and their litters under heat stress conditions with capsaicinoids administration

Pr Caio Abercio da Silva, also presented two trials dealing with the effects of dietary *Capsicum* supplementation (ID PHYT CAPCIN) on productivity of sows. The first trial involved 132 pregnant sows under heat stress conditions. The supplemented group received 1.4g ID PHYT CAPCIN / sow / day between 95d of gestation up to 21d of lactation. Supplementation tended to increase weaning weight and ADG of piglets (+14g/d) and significantly decreased the frequency of diarrhea. The colostrum of sows tended to have more IgG. The second trial was studying the effect of the product alone or in combination with Vitamin D_3 between 85 days of gestion until weaning. The supplementation with *Capsicum* significantly decreased the diarrhea frequency at 1 week of age and at weaning and increased the litter weight at weaning (+1.25 kg). No interaction was observed with vitamin D_3.

Effects of dietary *Capsicum* supplementation on productivity of Holstein Dairy Cows in two different seasons

Pr Francisco Palma Renno then presented the effects of dietary *Capsicum* supplementation (ID PHYT CAPCIN) on productivity of cows in two different seasons. After an overview of Brazilian milk production systems, the interest of the use of *Capsicum* for dairy cows was presented. The first trial was done on 36 Holstein cows under heat stress conditions (high temperature and humidity index) during 11 weeks. The inclusion of *Capsicum* significantly increased the milk production (between +0.38 and +1.35 kg/d) and the fat corrected milk (FCM). Then, another trial of *Capsicum* during autumn was presented. This trial involved 24 Holstein cows during 21 days and the supplementation increased the milk yield (+0.75 kg/d) and the FCM, as well as the feed efficiency.

Heidi book: Poultry – a new approach to design phytogenic solutions adapted to field challenges

This second edition was closed with the presentation of "HEIDI BOOK: POULTRY" by Clémence Messant, operational Director of ID4FEED. This book provides a database synthesizing the relevant literature using plant and plant extracts potentially interesting for their effect on the performance and welfare of poultry. Organized in 10 chapters representing some practical applications on the field, the first edition of the book counts 303 lines, 105 plants and 272 scientific references. This book can be purchased through ID4FEED upon request.*

**For more details, see https://id4feed.com/scientific-content/heidi-book-poultry-edition-1*