BIOSIS

N° 3 - February 2019 - Interaction between plants and animals for innovative feed solutions

THE PLANT

CITRUS flavonoids are potent antioxidants

Naringin and hesperidin are flavonoids occurring naturally in the pericarp of *Citrus* fruit ; they have interesting biological and technological antioxidative properties.

Flavonoids (or bioflavonoids) are widely distributed in plants. They are found in several parts of the plant, fulfilling a wide range of important functions, such as plant pigments for flower coloration, pollinator attraction, and UV filtration. With more than 9,000 molecules, they may also act in plants as chemical messengers and physiological regulators for their growth and defense.

Flavonoids are chemically characterized by their general structure consisting of a 15-carbon skeleton.

Bioflavonoids have many potential biological effects due to their antibacterial (direct antibacterial activity – similar to or synergistic activity with antibiotics), antiviral (suppression of some virulence factors), antifungal, anti-inflammatory and antioxidant properties (Narayana et al., 2001; Panche et al., 2016; Wang et al., 2018).

In *Citrus* pericarp, bioflavonoids (mostly naringenin, hesperitin and their glycosylated forms, naringin and hesperidin respectively) have interesting antioxidant properties for both technological (protection of oils and fats from going rancid) and biological (tissue and cell protection) applications. For instance, Cavia-Saiz et al. (2010) found a higher in vitro antioxidant activity for hesperidin compared to butylated hydroxytoluene (BHT), and in 56 day-old pigs, hesperidin significantly improved feed efficiency and increased the superoxide dismutase (SOD) level in serum (Park et al., 2015). Moreover, a combination of bioflavonoids including hesperidin, was found to be a prime strategy to ameliorate summer stress effects (lower heterophile-to-lymphocyte ratio) and performance (growth rate, feed efficiency) in broilers (Kamboh et al., 2013). Bioflavonoids may also offer feasible alternatives to other antioxidants for the production of healthier chicken meat by decreasing malondialdehyde values in meat (Kamboh and Zhu, 2013). Finally, oxidative stability of fresh and stored eggs for 0 and 30 days was improved by a combination naringin / hesperidin (Goliomytis et al., 2018).

In Citrus pericarp, bioflavonoids have interesting antioxidant properties

World of botanicals

Phytochemicals as growth promotors

The inclusion of phytochemicals is often proposed as a viable alternative to antibiotic growth promoters, which are commonly used to improve animal productivity. Their effects as feed additives in animals have recently been reviewed (Valenzuela-Grijalva et al., 2017, J. Anim. Sci. Tech., 59 (8)). It was concluded that, based on extensive research, the use of phytochemical growth promotants in broilers was clearly beneficial. Moreover, the beneficial effects were also apparent in pigs, but fewer studies have been conducted with pigs than with broilers and more research with pigs is warranted. Even fewer *in vivo* studies have been conducted with ruminants to ascertain the benefits of these alternative promotants.

Cinnamaldehyde and the intestine

Cinnamaldehyde (CA), the key compound in essential oil derived from cinnamon, has various bioactivities. A recent study (Sun et al., 2017 J. Anim. Sci. Biotech., 59 (8)) showed that, in piglet gut wall cells, CA regulates the distribution of claudin-1 and claudin-3, two tight junction (TJ) proteins, and enhances protein abundance for amino acid transporters in enterocytes.

As TJ are vital for the maintenance of intestinal barrier function, transport, absorption and utilization of dietary nutrients like amino acids, CA may be an effective nutritional tool to improve animal performance.

BIOSIS Natural innovative feed solutions

INTERVIEW

Natalia Mendez : "Global experts in aromatic plants"

Natalia Mendez is Animal Feed Project Manager of Bordas, one of the European leaders in the production of plant extracts and essential oils.

Biosis: Could you describe your company in a few words ?
Natalia Mendez : Destilaciones Bordas Chinchurreta began with the distillation of aromatic plants in a small warehouse in the heart of Seville in 1922. During subsequent years, the company steadily morphed into the significant family business we are today.
The continuous evolution of Bordas has led us from the cultivation, commercialization and extraction of aromatic plants to other sectors such as the manufacture of fruit derivatives and the synthesis of chemical products for the fragrance, food and pharmaceutical industries.

BIOSIS: What products do you offer the feed industry?
N. M. : Our current product offering to the feed industry is based on a close collaboration with ID4FEED in the research and development of sensory stimulants, sweetener compounds (both, natural and artificial), flavor enhancers and proven combinations of these compounds. The overall aim of all our specific products is to improve feed palatability, increase feed intake and enhance animal performance through feed flavour enhancement and optimising eating behavior.

Biosis : What is the nature of the partnership you have with ID4FEED ?
N. M : We collaborate with ID4FEED to develop innovative solutions for the animal feed industry, combining our own capability with ID4FEED's expertise in the areas of phytochemistry, microbiology, and veterinary and food-technology. In 2012 BORDAS, having a long track-record as a leader in the production of aroma-chemicals, plant extracts, essential oils, fruit derivatives and sweeteners for use in the agri-food, pharmaceutical and chemical industry, made the decision to establish a mutually beneficial collaboration with ID4FEED to provide jointly technical solutions to promote the health, performance and welfare of production animals.


"We have a mutual beneficial collaboration with ID4FEED"

Biosis : What are you customers in the feed industry looking for ?
N. M : Since the European ban in 2003 of the preventive use of antibiotic feed additives as growth promoters for animals, the feed industry has been urgently looking for raw materials, ingredients and additives obtained mainly from natural resources as effective alternatives to antibiotic growth promotants. Well known aromatic plants, such as rosemary, oregano, sage, anise, basil, thymus, peppermint and garlic, originating from the Mediterranean area, contain many biologically active compounds which have been found to possess antimicrobial, antioxidant, antiparasitic, antiprotozoal, antifungal, and anti-inflammatory properties. Therefore, extracts derived from these plants have the potential to yield functional ingredients for animal feeds with wordwide applications.

Global

ID4FEED, a new player in eco-extraction

On the 25th of January 2019 ID4FEED signed off on the acquisition of the Valréas eco-extraction platform PEEV (Provence region). This acquisition represents a key step in the development of the company, which plans to invest € 1.2 million in Valréas in 2019 to develop innovative technologies for extraction and galenisation of plant extracts for the feed industry. « Our objective is to continue the development of the PEEV through a viable economic model serving industries as varied as animal nutrition, fine chemicals, pharmacy or cosmetics », says François Gautier, ID4FEED's General Manager.

ID4FEED conference in Bangkok

ID4FEED will organize a conference on « Innovation on phytogenic development for use in animal feed » Tuesday March 12nd 2019, the day before the opening of VIV-Asia exhibition. During this conference, ID4FEED team members will speak about various topics of actuality, such as the Asian phytogenics market situation, the usage of plant and plant extracts in animal nutrition, and the presentation of the research work done in Thailand with Capcin, the first phytogenic product coming from an induced plant.

id4feed Ideas for animal feed

DIARY

Bangkok (Thailand)
JW Marriott Hotel - ID4FEED conference on "Innovation in Phytogenic development for use in animal feed"
12 March

Bangkok (Thailand)
VIV-Asia exhibition/ ID4FEED booth N° 1055 Hall 105
13-15 March

Amelia Island, Florida (USA)
2019 ASTA Annual Meeting and Exhibits
7-10 April