BIOSIS

N° 2 - 2018 October - Interaction between plants and animals for innovative feed solutions

THE PLANT

OREGANO: A wide range of interesting properties

A close relative of mint, the genus Origanum belongs to the Lamiaceae family and includes 38 species mostly distributed in the Mediterranean region and Central Asia. The secondary metabolites contained in oregano essential oil provide a wide range of antimicrobial, phytotoxic, anti-inflammatory and antioxidant properties.

vulgare specie, and its numerous subspecies, remains the most prominent and frequently-used one as food-flavoring. The common name "oregano" includes not only the genus Origanum but also *Coridothymus* (C. *capitatus*, the 'Spanish oregano') and *Lippia* (L. *graveolens*, the 'Mexican oregano'). They all have the characteristic odor of oregano.

All parts of the plant have been described in pharmacopoeia monographs but the essential oil (EO) has the richest properties. Its composition varies according to the specie, the plant physiological stage, the altitude or climate. The main constituent is carvacrol or thymol, two bioactive monoterpenic phenols, whose content strongly depends to the species (respectively 0.02 to 81.01 and 0.42 to 85.87%) (1). Other metabolites, such as *p*-cymene, *ß*-caryophyllene, linalool, *α*-and *ß*-pinene, among others, have been identified.

These molecules act synergistically to provide a wide range of interesting properties in cosmetics, perfumery, food safety (preservatives/active packaging), beverage flavoring, agriculture as well as human and animal health. As an example, the species with the highest content in carvacrol and thymol show a maximum antibacterial and antifungal activity against *Pseudomonas aeruginosa*, *Escherichia coli*, *Aeromonas hydrophila*, *Klebsiella pneumonia*, *Bacillus subtilis*, *Staphylococcus aureus* but also against different species of *fungi* and yeast such as *Aspergillus fumigatus* or *Candida albicans* (1).

Origanum extracts show strong antioxidant activities as ROS (reactive oxygen species) scavenger and as a consequence could decrease cellular damage caused by heat stress. Among the studies testing the *in vivo* effect of oregano EO, those of Botsoglou *et al.* (2) show that a supplementation of 100 mg/kg of feed of oregano EO exhibited an antioxidant effect on chickens tissues. Oregano EO also increased the daily live weight gain and the feed conversion of poultry (3).

The essential oil composition varies according to the specie

1. Sarswati et al, 2013. Variation in essential oil composition and anti-microbial activity of Indian Oregano (Origanum vulgare L.) population from Indian Himalayan Region (IHR). J. Med. Plants Res., 7(46), 3375-3384.
2. Botsoglou, N. A., Florou-Paneri, P., Christaki, E., Fletouris, D. J., & Spais, A. B. (2002). Effect of dietary oregano essential oil on performance of chickens and on iron-induced lipid oxidation of breast, thigh and abdominal fat tissues. British poultry science, 43(2), 223-230.
3. Alagawany, M., El-Hack, M. A., Farag, M., Shaheen, H., Abdel-Latif, M. A., Noreldin, A., & Patra, A. (2018). The usefulness of oregano and its derivatives in poultry nutrition. World's Poultry Science Journal, 74(3), 463-474.

World of botanicals

Plants, resilience, immunity and gut microbiota

Resilience is the process that allows individuals to withstand adverse conditions like stress, and recover from them. This process involves bidirectional relationships between the brain and adaptive immunity with a clear modulation by gut microbiota. It was shown recently that grape-derived natural plant compounds may promote stress resilience by inhibiting key inflammatory processes. It is possible that some plant extracts - acting on the gut microbiota - play a similar role.

Dantzer, R., Brain, Behavior and immunity (2018)

Curcumin and heat-stress

Curcumin, the main active compound of Turmeric (Curcuma longa), provides many pharmacological properties including antioxidant activity. In heat-stressed broilers, curcumin alleviated the negative stress-induced oxidant effects on feed efficiency, serum malonaldehyde and corticosterone levels. It was due to a simultaneous activation of glutathione-related enzymes and of NrF2-mediated detoxifying enzyme systems in the liver. Curcumin may therefore be an effective tool against heat stress in poultry.

Zhang et al, 2018, Poultry Science 97

BIOSIS Natural innovative feed solutions

TRIAL

ID PHYT CAPCIN: Better sow and piglet performance

In two recent trials, ID PHYT CAPCIN, a microencapsulated chili pepper powder rich in capsaicinoids, has shown its potential to improve sow and piglet performance.

Due to the high productivity of modern sows, it is necessary to improve farrowing conditions and milk production to wean more, heavier and healthy piglets while maintaining high reproduction performance.
ID PHYT CAPCIN (called "CAPCIN" hereafter) is a microencapsulated chili pepper powder rich in capsaicinoids, the antioxidant and anti-inflammatory active compounds, produced using a patented technology.
Two experiments were done in different Brazilian pig farms. CAPCIN (1.4 g/sow/day) was given to the experimental group few days before farrowing until weaning, a control group receiving no supplementation.
In the first trial (2 x 22 animals; Table 1) sows receiving CAPCIN weaned 0.45 piglets more than control sows (12.9 vs 12.4); their total litter weight was significantly improved (73.3 vs 66.4 kg, p<0,10). At weaning, piglets from treated sows weighed 370 g more than piglets from the control group (5.72 vs 5.35 kg) ; daily weight gain was significantly increased (223 vs 204 g/day, p<0,10). Mortality level was decreased by 20%.
A second trial was set with a larger number of animals to confirm the first results. Two farms were used, one with a good sanitary status (2 x 60 sows), one with severe neonatal and pre-weaning diarrhea, high morbidity and mortality levels in piglets (2 x 80 sows). Less difficult (dystocic) births were observed in the CAPCIN group (16.7 vs 33.3%) in the two farms. At weaning there were less piglets transferred within groups because not obtaining enough milk from their mother (3.6% in the treated group vs 7.1% in the control group). Regarding the growth of the piglets there was a farm effect: when sanitary conditions were very good, piglets from the CAPCIN group had a growth rate slightly improved while the effect was significant for the farm with poor sanitary conditions (see Table 1, p<0,10). Piglet mortality level was slightly lower in the farm 1 for the CAPCIN group (9.51 vs 9.81%) and decreased by 20% in the second farm (11.8% vs 14.85%). Piglet diarrhea scores were improved in the CAPCIN groups for both farms. There are two explanations for the higher weight gains of piglets in the CAPCIN groups. First, healthy piglets have naturally a better growth rate; second, sows receiving CAPCIN in their feed had a higher feed intake as shown on the Figure 1.
In conclusion, in these two trials ID PHYT CAPCIN improved the weight gain of piglets from sows receiving the supplementation in their feed from few days before farrowing and during the full lactation. Because the sanitary status of piglets is improved and the mortality level is reduced, the total litter weight at weaning is significantly increased. The effect is particularly striking when farm conditions are poor. The results from these two studies illustrate the positive effects of ID PHYT CAPCIN on performance of the sow and consequently, of the piglet.

Experiment	Sow group	Age at weaning (days)	Number of piglets at birth	% mortality	number of piglets at weaning	Litter weight (kg)	Final weight (kg)	Daily weight gain (g)
I	Control	20	14,3	8,9	12,4	66,4	5,3	204
	CAPCIN	20	14,3	7	12,9	73,3	5,7	223
II farm 1	Control	21	14,2	9,8	12,8	70,9	5,5	201
	CAPCIN	21	14,2	9,5	12,8	70,8	5,61	205
II farm 2	Control	21	15	14,9	12,8	59,9	5,07	179
	CAPCIN	21	15,6	11,8	13,8	54,6	5,49	200

In red significant effects (p<0.10)

Global

ID4FEED: 1st exhibition at Eurotier

Three months after the Space exhibition in France where ID4FEED exhibited on Altilis stand, a French company specialized in the sale of feed ingredients and additives in France and abroad (Mediterranean Basin, Central Europe, Northern Europe), ID4FEED will be present at Eurotier on the booth n° 3C24. This is an excellent opportunity for the French company to present its range of natural solutions for the global feed industry, and to present its global network of partners.

Launch of ID4FEED web site www.id4feedcom

ID4FEED successfully launched its new corporate website beginning of September, with among others a presentation of its team of experts, of its innovative technologies, and of its natural solutions for the feed industry. This new website also includes news of actuality of the company, videos and articles published by the specialized press, without forgetting "Biosis", the ID4FEED newsletter dealing with the interactions ("Biosis") that exists between the environment, the plant, the animal and its microbiota, and how these interactions may influence their mode of life?

id4feed Ideas for animal feed

DIARY

Hanover (Germany) — **13-16 Nov.**
Eurotier exhibition

Athens (Greece) — **25-29 Nov.**
30th International Symposium on the Chemistry of Natural Products
10th International Congress on Biodiversity

Cappadocia (Turkey) — **26-28 Apr. 19**
The 5th International Mediterranean Symposium on Medicinal and Aromatic Plants