

Functional flavourings: a key lever for animal production

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Flavourings have been used for many years in animal feed in order to guarantee its palatability. However, Phodé expertise enabled to develop, not only aromatic flavourings, but flavourings with strong functionalities for animal production, creating the Cristalfeed range: attractant functionality, positive-reward functionality, combined to high palatability.

The science behind the Cristalfeed products and their benefits on animal feeding behaviour enable to secure the animal feed intake despite the various feeding challenges (transitions, masking of bad tastes, changes of formulation or raw materials), and to lead animals towards their "Better-Being".

Phodé scientific expertise: the Cristalfeed range functionalities, dedicated to animals

Animals are at the heart of Phodé's focus, defining and developing smart flavourings with benefits for livestock animals relies on various areas of expertise that go beyond the aromatic field.

Thanks to Phodé research since 20 years, specific molecules that attract naturally the animals on a wide range of concentrations have been identified and synergistic combinations have been selected to become the functional attractant cores of the Cristalfeed products. On top of this, palatability cores have been also developed to obtain Cristalfeed products that are complete with enhanced properties.

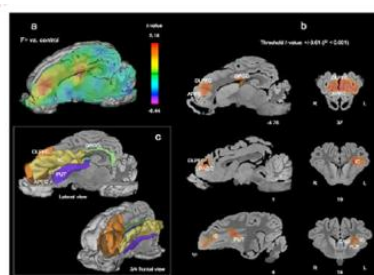
Of course, the Cristalfeed range has been developed to be adapted to different species, or physiological stages (young animals / adults).

The benefits of Phodé sensory cores on the brain have been observed, using the pig model. In that way, the activation of the pleasure and reward neuronal circuits by Phodé sensory cores has been validated.



Flavour exposures after conditioned aversion or preference trigger different brain processes in anaesthetised pigs

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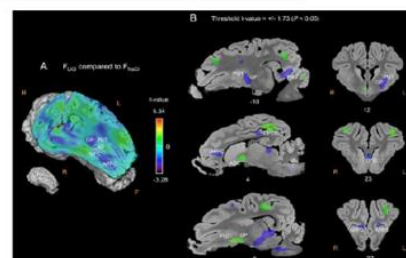
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Exposures to Conditioned Flavours with Different Hedonic Values Induce Contrasted Behavioural and Brain Responses in Pigs

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Phodé expertise in galenic: exclusive innovative galenic

Aromatic molecules are fragile molecules and therefore can be damaged during pelletisation process. On top of that, flavorings in feed have two major functions fundamentally that are opposed:

- an immediate release of the molecules:
 - o in the air, in order to be sensed by the animals (and humans)
 - o in the mouth of the animals during chewing, in order to be detected by the oropharyngeal receptors and recognized by the brain
- a time-controlled release: to last over the time in the bag, and to last over the time once incorporated into the feed.

In order to produce flavorings of high quality and able to answer this challenge, Phodé experts in galenic have developed an exclusive galenic: the Crystalik Impregnation. Thus, the physico-chemical conformity of the Cristalfeed products is validated through a series of tests by Phodé analytical laboratory:

- Homogeneity testing
- Granulation study
- Grain-size study
- Accelerated ageing
- Morphological analysis
- Stability study
- Gas chromatography - mass spectrometry

Phodé aromatic expertise: Cristalfeed olfactory profile and Ellipse

On top of the functionalities dedicated to the animals, the Cristalfeed products have been developed by Phodé experts to give a balanced olfactory profile perceptible by humans. Multiple factors have to be taken into account, such as the olfactory identity, intensity, persistence.

In order to represent the olfactory identity coupled with the intensity of each olfactory note along with a time dynamics, Phodé experts have developed the innovative tool "Ellipse". It is then possible to obtain a unique identity picture of a flavouring.

Even with today's analytical measurement tools, it is impossible to control and underpin the sensory complexity of an aroma. A trained internal sensory panel is therefore responsible for evaluating the flavorings' conformity: blind olfactory and taste tests (the flavouring in pure form as well as when incorporated into various final applications, masking diagnostics, discrimination tests, etc.)

Cristalfeed: animal functionalities, feed functionalities, sensory identity

Phodé expertise in science, in the aromatic field, in galenic has enabled to develop a wide range of functional flavourings designed to secure the feed intake of livestock animals and lead them to their "Better-Being". Using the functionalities of the Cristalfeed range makes it possible to improve various aspects of feeding behaviour, ensure the "Better-Being" of the animals, and therefore create a more suitable and productive environment.