Essential oils and their digestive properties in pigs

by Luis Mesas Mora, Norel SA, Barcelona, Spain.

An essential oil is a liquid that contains volatile compounds from plants with a complex chemical composition. Essential oils can be extracted from leaves, stems, flowers, bark, roots or other plant elements. In nature, essential oils act as chemical communication elements. It is believed they contain information and concrete messages for the plant's behaviour and survival. The functions of essential oils are, among others:

- Protection against noxious microorganism, fungus and insects.
- Attraction to certain animals and insects aiding pollination.
- Control of the maturity and aging process of leaves, fruits, etc.
- Help prevent dehydration and sunburn.

Industrially, essential oils are obtained by distillation or chemical extraction from the complete plant or parts of it (leaves, roots, fruits, bark). The extraction methods depend on what type of botanical material is being used. The most typical ones are:

- **Steam distillation:** This consists of an extractor tank full of water in which the botanical material and the water is mixed and then heated and the vapour passes through a coil or refrigerated condenser. The condensed vapour settles in a separate container (Florentine flask). The oil floats to the top of the water surface and it is collected in glass or aluminium recipients.

- **Solvent extraction:** Similar to the steam distillation but in that case the material would be previously crushed, ground or soaked. Then, it is stirred to help oil dissolution in the solvent. Commonly used solvents are ethanol, hexane or methanol. Afterwards, the solvent is removed. The condenser used is a Soxhlet. The essential oils obtained by this method can not be used for phytotherapy since a residue of solvent could be present in the finished product.

- **Expression:** Raw materials are pressed by a press or a scraper machine. In the past, the extraction was made by hand by the sponge method. This method is used for obtaining oils from oranges, lemons and mandarin oranges. These oils have both aromatic and taste properties.

- **Supercritical fluid extraction:** This is a new technique which consists in placing the material in a tank and adding a gas, often carbon dioxide due to its inertia. Under high pressure carbon dioxide is liquified and can act like a solvent. To remove the carbon dioxide, you simply need to remove the pressure under which it is kept. The carbon dioxide is recovered and the oil is obtained.

Table 1. Some of the essential oils and their digestive properties. Adapted from K. Charis (2000).

Name	Active compound	Medicinal properties
Garlic	Allicina	Digestive stimulant, antiseptic
Anise	Anethole	Digestive stimulant, galactagogues
Celery	Phtalides	Appetite and digestive stimulant
Cinnamon	Cinnamaldehyde	Appetite and digestive stimulant, antiseptic
Capsicum	Capsaicin	Anti-diarrhoeal, anti-inflammatory tonic stimulant
Cardamom	Cineol	Appetite and digestive stimulant
Cloves	Eugenol	Appetite and digestive stimulant, antiseptic
Cumin	Cuminaldehyde	Digestive, galactagogues
Coriander	Linalool and borneol	Digestive stimulant
Fenugreek	Trigonelline	Appetite stimulant
Laurel	Cineol	Appetite and digestive stimulant, antiseptic
Mint	Menthol	Appetite, and digestive stimulant, antiseptic
Nutmeg	Sabinene	Digestive stimulant and anti-diarrhoeal
Parsley	Apiol	Appetite and digestive stimulant, antiseptic
Pepper	Piperine	Digestive stimulant
Rosemary	Cineole	Digestive stimulant, antiseptic, antioxidant
Salvia	Cineol	Digestive stimulant, antiseptic, carminative
Thyme	Thymol	Digestive stimulant, antiseptic, antioxidant

In animal nutrition and due to the prohibition of antibiotics which promotes animal growth in Europe, we can take advantage and apply these properties to increase health (antiseptic, bactericide, antibiotics) and in food intake (fungicides, antioxidant, appetite stimulants, digestives).

Some essential oils act in the digestive system increasing appetite and gastrointestinal secretions, they stimulate enzyme secretions and the peristalsis improving digestion and assimilation of nutrients.

Raw material	Inclusion (%)
Barley	30.0
Wheat	36.9
Flours	3.0
Soy 47.5 (ground)	20.3
Sweet whey	4.0
Soybean oil	2.3
L-Lysine	0.56
DL-Methionine	0.15
L-Threonine	0.14
Calcium carbonate	1.11
Monocalcium phosphate	0.76
Sodium chloride	0.23
Vitamin-mineral regulator	0.3

Table 2. Experimental starter diet.

An experiment was conducted to investigate the effect of spicy flavour with essential oils on piglet feed intake and performance. Piglets were early weaned at the age of 21 days.

The experiment was conducted at Norel SA's farm in Onzonilla, León, Spain. The piglets received one of the two treatments: Control or Fluidarom 1003 (300g/T). There were three replicates of each treatment.

The study was four weeks long and the diets were isonutritive covering or exceeding NRC (1994) requirements for animals at this age.

There is a tendency to have a higher final weight (10.80%) in animals that were fed Fluidarom flavoured feeds; Feed intake was increased in 3.3% in animals that ingested spicy feeds, weight gain was 19.28% higher and the conversion index was 14% better.

This experiment indicates the utility of using essential oils to increase piglet productivity. Although there were not statistical differences among intake, the weight, ADG and conversion index were increased.

That result might confirm that the digestion and the animal state were better due to the intake of essential oils. ■