



The Farmer's Voice

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Did You Say Essential Oils?

People around the world have traditionally used plants and spices to prevent or cure certain diseases and ailments, as well as to stimulate specific physiological functions. Depending on the case, either the entire plant is used, or just the flowers, leaves, buds, bark, fruit, pods, or seeds. Ceylanese cinnamon, for example, can be used either for its linalool-rich leaves or for its bark, which is full of cinnamic aldehyde, or cinnamaldehyde.

The use of plant extracts and active ingredients in animal

feed is growing fast, especially now that antibiotic growth factors have been banned. These include plant powders (with their heterogeneous combinations of active ingredients), extracts, or the active ingredients themselves. Indian saffron is used for its rhizome, which is rich in active ingredients. These include curcumin (antioxidants), of which the rhizome contains 1-3%, whereas extracts contain up to 95%.

Extracts and active ingredients are beginning to replace plant powders for reasons of product security. They offer the advantages of standardized composition, the elimination of undesirable products that occur naturally in the plant, and seasonal variations.

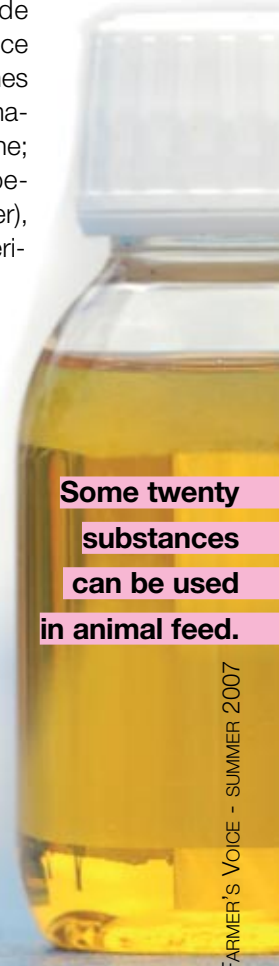
Animal feed today uses just over 20 different active ingredients. From the phenol family, known for its anti-inflammatory, antioxidant, antiradical, antiseptic, immunostimulant, and general tonic properties, carvacrol (taken from oregano), thymol (thyme), and eugenol (cloves) are used. In the monoterpene alcohol family, menthol is used as an analgesic, anti-inflammatory, carminative, and digestive stimulant. Apart from its analgesic, anti-infective, and general tonic properties, cinnamaldehyde (cinnamon) is an

anti-inflammatory, antiradical, antioxidant, digestive stimulant, and even an antispasmodic and vasodilator. Animal feed producers also use 1,8-cineole (eucalyptus) from the oxide family; alpha- and beta-pinene (pine), and limonene (lemon) from the monoterpene family; anethole (anis), which belongs to the phenol methyl esters; allicin (garlic), which is a sulphured component; the alkaloids capsaicin (chili pepper) and sanguinarine; the saponoside glycyrrhizin (licorice root); the ketones camphor (rosemary) and menthone; and lastly, piperine (black pepper), which is a piperidine amide.

Welcome to our first issue!

Pancosma, a leading supplier of plant extracts, essential oils, and active ingredients derived from plants, is pleased to present you with issue No. 1 of The Farmer's Voice. The aim of this publication is to share the experience of farmers who use these additives in their animal feed. Even though plant extracts have proven their efficacy and are steadily gaining recognition at feed manufacturer research centres, we felt that the time had come to present tangible results obtained by farmers who have incorporated these products.

The two farmers featured in this issue were singled out by a major manufacturer that adds essential oils to its animal feed products. They are based in western France and raise highly productive dairy cows. Their practical experience confirms that essential oils boost milk quantity and increase livestock fertility.



Some twenty substances can be used in animal feed.



**Francis
Renaud**

Ouchette Cooperative Farm (GAEC) 75 Dairy Cows

Approaching 12,000 kg with No Additional Work

“Essential oils make our livestock perform better. They help maximize our milk production with few restrictions, while allowing the cattle to express their genetic potential with no increase in veterinary or food costs.”

The three Renaud brothers—Christian, Lionel, and Francis—have an annual milk output of some 700,000 litres from an average of 75 dairy cows. “We have so much room for more cows, that we could easily produce an additional 200,000 litres”, says Francis, who is in charge of feed at the GAEC Ouchette, cooperative farm between the three brothers (Deux-Sèvres). Before teaming up with his brothers in 1991, he worked as a salesman for an animal feed company. Since then, he has been the one who deals with the technicians, although the three brothers together make the final decisions. “We tend to trust products and have been steady users of the same brand of feed since the creation of the cooperative farm in 1984.” In September 2006, when Maurice Rondeau (Coop de Civray) suggested they use essential oils, he decided to give them a try. The technician felt that the region was well suited to this type of innovation, which allows to increase the inclusion rate of urea in the feed. “We need fermentable nitrogen in this region. For a year now, we have been very satisfied with the results in several herds, which are approaching 12,000 kg. As I see it, essential oils are a breakthrough in bovine nutrition which is revitalising the market.”

Ouchette is a very specific farm, with a favourable climate and pasture land that supports locally rare crops such as lupin—which is instrumental in providing fermentable nitrogen—and a high rate of grazing. “The cows go out when they want. We are lucky to have a good climate for grass.” The choice consisted in switching from soy meal and the previously used manufactured feed to feed containing essential oils.

Ever since the farm began using essential oils, production has jumped by 1,000 kg per cow with no additional feed cost per litre of milk. In the producer’s opinion, “It’s simple, as we now give them only one type of feed. We’ve lowered their fat content, which enables us to sell more milk. And the livestock has been fattened to perfection. Naturally, as this was the first year and we happened to have a good corn crop, it’s hard to attribute all these gains to essential oils alone, yet the tendencies are indeed there, and they are considerable.” A complete ration system supplements summer grazing. The Ouchette herd has a very good genetic level, but it is not typically intensive. “We don’t want to increase our workload”, says the producer, who encounters no fertility problems. “Our oldest cows have six to seven milking periods, and many have five.”

In addition to livestock feed, one of the keys to good breeding is preparing the heifers; the other is preparing them for the dry period. “There’s no need to buy complex feed. Thanks to growth control, we know exactly what we’re doing, and we can get our heifers up to 620 kg in two years. Why pay more when we already have corn?” Francis feels that any new technique must be applied to a herd for which as many parameters as possible have already been optimised.

In his opinion, the winter response to incorporating essential oils was excellent, and he is expecting an even better response with grazing. He is waiting impatiently for the upcoming results of the milk inspection.

“Before using essential oils, we had trouble keeping our livestock adequately fattened while maintaining a persistent peak during the milking period. Now, we’ve picked up 50-60 kg of live weight without having overweight cows. Learning to set the animals’ rations takes several weeks when essential oils are added. Our average per shed was 10,150 kg in March 2006 and 11,600 kg in March 2007. I hope we soon exceed an average of 12,000 kg per shed for the 75 cows.”

BEFORE AND AFTER The difference thanks to essential oils

| October | 2005 ⁽¹⁾ | 2006 ⁽²⁾ |
|---|---------------------|---------------------|
| Lactation number | 6,3 | 6,4 |
| Kg of milk for the producing cows | 26,3 | 32,5 |
| Number of dairy cows | 77 | 74 |
| Fat in g/kg | 41,6 | 40 ₍₃₎ |
| Protein in g/kg | 31,6 | 32,4 |
| Feed cost: euros/1,000 kg, excluding fodder | 56,9 | 48,5 |
| Wheat straw (kg per day) | 1,5 | - |
| Alfalfa hay (kg per day) | 1 | 1,7 |
| Rye grass (ensilage) (kg per day) | 12 | 10 |
| Corn (ensilage) (kg per day) | 30 | 37 |
| Flattened barley (kg per day) | 2,5 | 1,5 |
| Lupin meal (kg per day) | 0,75 | 1 |
| Soya meal (kg per day) | 1,3 | - |
| Beet pulp (kg per day) | 2 | - |
| Minerals (grams per day) | 50 | 50 |
| Protein concentrate (kg per day) | 2,5 | 4,5 |

(1) a safe ration of 21% cellulose and 275g of fermentable sugars

(2) an adjusted ration with 17.5% cellulose and 300g of fermentable sugars

(3) with fat content corrected, milk production increased by 10,000 l



Tuilerie Cooperative Farm (GAEC): 100 Dairy Cows

Cows that Give More Milk, are in Better Condition, and are More Fertile—The Winning Combination

“We immediately noticed two important things. First, our livestock is in better condition early in the milking period, with highly persistent peaks among the most productive cows, which can give 56.2, 57.4, or even 58.8 kg/day. Second, inseminations are down noticeably, from 2.8 to 1.7 injections per cow. Essential oils have helped boost milk production, enhance livestock fattening, and increase fertility.”

The Chambeau family—father Didier, mother Nicole, and son Grégory—decided to try essential oils in July 2006. A year later, they exceeded 12,000 kg per cow, with averages running as high as 12,225 kg for 100 cows in July 2007. At the farm he set up two miles away in 2002, Grégory has added 350,000 litres in quotas and 90 ha to the GAEC Tuilerie, he created with his parents, that now has 250 hectares and the right to produce 900 000 litres. With a new building since 2005, and a new mixing machine, the herd does no grazing. Its surfaces are divided up into wheat (78 hectares), corn (45 hectares, including 31 for ensilage), spring barley (19), rapeseed (45), sunflower (25), with some prairies left fallow (15). “We also sneak in rye grass before the sunflower or corn, on an average of some twenty hectares per year, in order to diversify our feed sources.” Ensilage is grouped

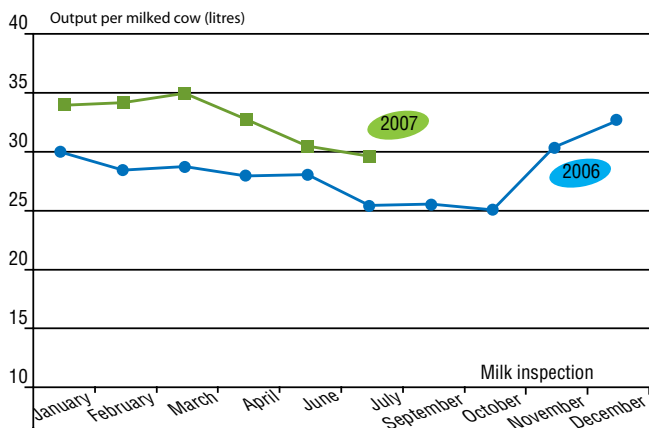
together in bundles over a hundred yards long, which offer good storage conditions and save us the trouble of building silos.

The initial impact of incorporating essential oils, starting in July 2006, was a daily production increase of 4-5 kg per cow, reduced fat content, slightly lower protein content, and increased fertility. The production increase enables the producer to make a better selection among their cattle with the aim of achieving genetic improvement of the herd. These results have been achieved with stable or even lower veterinary costs. “Our feed cost went up by 0.085 euros per litre of milk, but each cow produces 4-5 kg more per day, so our net margin has increased markedly”, says Grégory, who is part of a group of breeders and can therefore make comparisons with neighbouring colleagues.

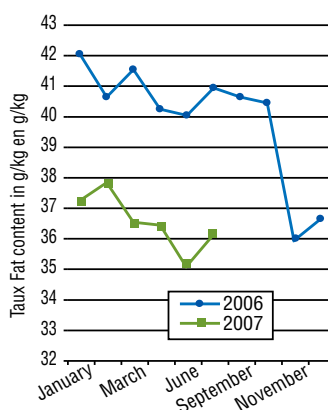
The building is designed so that a single person can carry out all the daily chores on all 100 cows and calves. The animals are rinsed twice a day to keep them clean. The water stream flushes the excrement into a cesspool, which is emptied twice a year.

It took several weeks to set the animals’ rations after adding essential oils, taking stall feeding into account. It is important to make rations safe by increasing cellulose intake while reducing the amount of fermentable sugars. “We have no more to slaughter any animal due to hoof problems”, concludes Grégory.

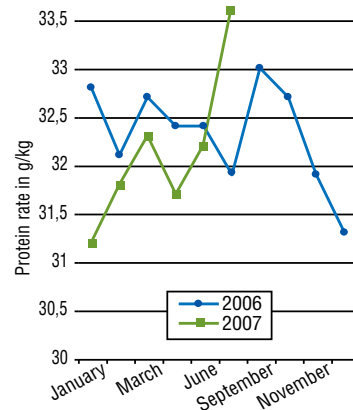
Clearly higher production



Lower fat content boosts milk sales



And protein soars



David Bravo

Head of R&D, Pancosma Bioactive

Traceability, Security, Transparency, and Efficiency

"I've known Pancosma and its products for many years. What I find attractive about the company is its systematic adherence to four major values in which I believe: product traceability, security, transparency, and of course, efficiency, while scrupulously complying with regulations."



DAVID BRAVO, who has been head of R&D at Bioactive since September 2006, has more than 10 years' experience in animal nutrition and holds a Ph.D. in ruminant nutrition.

The composition of Xtract Dairy is perfectly clear: 28% eugenol and 17% cinnamaldehyde. These compounds are identical to the ones found in nature, because the plants that synthesise them produce other elements as well. Cinnamon produces 90% cinnamaldehyde but also a certain amount of coumarin, which can be toxic. "We have chosen to work with pure products to ensure efficacy and consistent results."

"When growth factors were prohibited, the market responded by offering a little of everything, including lots of "black box" mixtures of unknown composition. With the various crises that animal feed manufacturers have undergone, it is very important to ensure security of supply, and familiarity with product composition is an integral part of that security."

Efficacy is also ensured by producing Xtract Dairy in micro spheres. "Our patented process ensures that particles have a precise size dis-

tribution. The mixture is adsorbed onto silica and coated with methylcellulose to ensure a high degree of product tolerance in livestock."

Efficacy can also be seen in animal performance. *"To create this product, we conducted research in several stages, starting with defining the need. Ruminants have a very low nitrogen yield—between 5% and 14%—whereas chickens transform over 30% of the alimentary nitrogen they ingest. We thus needed to devise a product capable of increasing the quantity of residual nitrogen in the rumen, while decreasing deamination, such as the production of ammonia. Energy absorption was another consideration. We sought a product that would both enhance feed fermentation in the rumen and positively modify volatile fatty acid profiles, in other words, a product that would generate more propionate and butyrate but less acetate."*

Xtract Dairy began with the in vitro review of 26 plant extracts, few of which proved capable of reorienting ammonia and volatile fatty acid production, each in the desired direction. The short-listed additives were introduced into the artificial rumen, but only two of them—eugenol and cinnamaldehyde—passed the tests and proved suitable for microencapsulation. *"Garlic could have worked, but it raises technical difficulties. Carvacrol and thymol, which are derived from oregano and thyme,*

have bactericidal properties that are incompatible with the flora present in the rumen."

The next phase involved reference trials in the field, such as those published by the Journal of Dairy Science. *"When I arrived, I conducted a meta-analysis of all in vivo tests. The results confirmed that a full-scale test, which a leading French feed manufacturer conducted on over 1,700 dairy cows, demonstrated the scope and consistency of the product's effects: an average of 1.5 kg of additional milk production per cow, as well as increased protein secretions and reduced urea secretions."*

Post-absorptive impact testing continues today in Hungary, France, Spain, and Canada. *"Additional propionate production certainly affects energy-related pathologies, particularly at the beginning of the milking period."* This will be the next chapter in the Xtract Dairy story.

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