

# Phytogenics in natural animal feed

How regulatory and consumer demands are expanding opportunity and driving innovation



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**C**onsumer demand and political pressure are two powerful change drivers for animal nutrition that have spurred tremendous opportunity for plant-based animal feed additives.

While feed additives have long been used to peak animal health, production, and overall performance, their function, makeup and composition are continually evolving to adapt to today's requirements – additionally driven by a bedrock of new science and innovation.

As an example, Antibiotic Growth Promoters (AGPs) have been used for over 60 years, but the European Union banned them overnight in 2006 forcing the feed industry to search for alternatives.

Regulatory pressure and growing consumer demand for natural ingredients has accelerated innovation in phytogenics, defined as a group of natural, plant-based growth promoters or non-antibiotic growth promoters used as feed additives, derived from herbs, spices or other plants.

## All botanical extracts are NOT created equally

Phytogenics are most often in the form of botanical extracts, which can be obtained from plants using a variety of methods, including steam distillation, solvent extraction, CO<sub>2</sub> extraction, cold pressing, alcohol infusion, glycerol extraction and more.

However, there are many factors to determine which type of botanical extract is right for any particular application and function - and all botanical extracts are NOT created equally. For example, essential oils are one type of botanical extract, while

standardised botanical extracts are another.

Essential oils capture the essence of the plant and retain the natural aromas and flavors of their source botanical in the form of an oil, whilst standardised botanical extracts focus on exact levels of specific potent active functional chemical compounds.

Now, aroma compounds that predominate in common and frequent essential oils can also be manufactured via chemical synthesis. In regulations, these are known as nature-identical compounds and are often used to create combination products using them selectively. The manufacturer may call them essential, but they are produced by formulation and not by direct extraction.

It is important to work with suppliers that understand the nuances and requirements for phytogenic extract ingredients for animal feed applications. Following are some important guidelines that can help feed brands in navigating the options, asking the right questions and sourcing the best ingredients for their specific applications.

## Identifying the potent active compounds

Each botanical extract has a complex composition of active chemical compounds, with a growing number of botanical compounds gaining scientific support to deliver a host of functional benefits in animal feed.

Producing these active compounds for use in animal feed requires excellent understanding of agronomy, harvest, and broader botanical science and extraction with stringent production and quality controls that should include raw material testing and botanical source id confirmation, ongoing testing, full transparency and traceability, and certification of safety, quality and authenticity.

Imagine how much more complex things could become if it

turned out that an extract was not even from the right plant, or proper part of the plant - or if pollutants such as pesticides or heavy metals were introduced during the extraction or production process?

Because botanical extracts are inherently natural, their availability is fully dependent on secure agronomy and supply chains – and sustainability. Further, they can have complex natural variations that can affect smell, absorption, functionality and health support benefits.

As one of the largest direct manufacturers of botanical extracts in the world, Layn Natural Ingredients has decades of experience managing the complex supply chain of botanical extracts, establishing strict controls to provide consistent output, and guiding feed formulation using natural botanical extracts.

It is imperative for any brand in this market to work with a reputable, qualified supplier who provides authenticated, non-adulterated ingredients, and has experience managing the complex supply chain of botanicals.

### Understanding the power of standardisation

It is important to distinguish between different types of extracts and the nature of their primary and active compounds. The functionality of these extracts is based on the properties associated with the active compounds contained in them and then incorporating them successfully in animal feed formulations.

Standardised extracts are widely studied for their supportive effects on metabolic health and contain one or more components from botanicals in an exact and guaranteed amount, usually expressed as a percentage, ensuring the amount is consistent in batch to batch of raw ingredient production, and finished feed production.





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## Examples of natural extracts as feed additives

There has been and continues to be tremendous innovation and research taking place in the area of phytochemicals, particularly understanding gained about specific compounds found within plants – including their molecular structures, functionality, effects within the body, and impacts on animal performance.

Some categories of compounds, and botanical extracts within them, in modern day phytochemicals are highlighted below.

### Polyphenols

Polyphenols are one category of over 8000 compounds found naturally in plants. Research on the phytochemical properties of these active compounds and their use as functional additives with metabolic activity, has accelerated enormously and evidence of the benefits of polyphenols for production animals is growing in the peer-reviewed literature.

Some polyphenol-rich phytochemical solutions include:

- Green Tea extract - a metabolic antioxidant that has been shown to help increase of growth performance and meat quality in finishing pigs and broilers. (References: 1-4)
- Grape Seed extract - a metabolic antioxidant that can help counteract the oxidative stress due to mycotoxin interaction within cells. It is a metabolic antioxidant that has been shown to help reduce of the impact of mycotoxicosis. (References: 5-13)
- Bitter Orange extract - a metabolic antioxidant that has demonstrated support for animal performance, healthy inflammation response. Bitter Orange extract has also been shown to help improve egg quality in laying hens and meat quality in broilers. (References: 14,15)
- Pomegranate extract - known to have antibacterial & antioxidant properties. (References: 16,17)
- Rosemary extract - proven uses as both a technologic & metabolic antioxidant. Rosemary extract helps protect lipids from oxidation. Scientifically supported for immune health.

### Saponins

Saponins, triterpene glycosides or steroid glycosides sourced from plants. Uses for saponin extracts range from adjuvants in vaccines, immunity stimulants, and agents for odor control in feces.

Research shows that saponins may have anti-protozoal activity, thus being a potential control tool for coccidiosis, and as an anthelmintic. Some interesting botanicals and the saponins they contain include:

- Soapbark Tree - *Quillaja*
- Bitter Melon – *Momordia*
- Fenugreek - *Trigonella*
- Yucca - *Y. schidigera*

### Carbohydrate extracts

The active ingredients of this class of extracts tend to be polysaccharides - long chains of repeating units within the molecule. Published research on the biological activity of these extracts reports anti-viral properties for fucoidans, and innate immunity enhancement for beta-glucans.

Examples of this include:

- Seaweed extract - contains fucoidan, a sulphated polysaccharide with fucose as its main backbone sugar
- Reishi mushroom - a carbohydrate polymer extract that contains beta-glucans

### Alkaloids

Alkaloid compounds have one thing in common – they have nitrogen within the molecular structure. Research has shown these alkaloids may help improve intestinal microbiome and other components of gut health, thus they can also positively influence animal performance.

Some common examples used as feed additives:

- *Macleaya cordata* extract (sanguinarine)
- *Berberis vulgaris* extract (berberine)
- *Capsicum annum* extract (capsaicin)

### A wide & deep world

The world of botanical extracts is wide and deep. The efficient and optimal use of these modern, natural ingredients as feed additives requires a deep understanding of the intimate nature and composition of specific botanicals and their scientifically supported properties. It also requires expert knowledge of sustainable agriculture, quality and testing methods and extraction best practices.

### About the Author:

Juan Javierre is Nutrition Scientist at Layn Natural Ingredients. He is a Doctor of Veterinary Medicine, as well as a nutritionist and researcher. Juan has over 30 years of experience in animal production in Europe, the Americas, Southeast Asia and China.

