Botanical compounds to support pig performance

In human medicine, plant extracts have been used for centuries. In pig production, their effect is no different, as plant extracts can influence nutrient digestibility. In addition, such phytogenic compounds can also enhance nutrient utilisation by pigs. Increasingly, it is possible to adequately calculate their potential in a nutritional matrix.

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The swine industry is currently grappling with pressing challenges that demand immediate attention. The escalating feed and production costs and the growing demand for swine as a crucial source of animal protein for the expanding global human population exert immense pressure on the industry's food safety and security.
Despite the significant economic challenges posed by the soaring prices of several feed ingredients, there is a beacon of hope. With feed accounting for a substantial 60% to 70% of the total cost to produce a pig, the potential of phytogenic feed solutions to control costs and mitigate losses is a promising solution in these trying times.

Management decisions

Some management decisions can be immediately undertaken to reduce feed costs, like lowering the slaughter weight, implementing multi-phase feeding programmes and changing to pelleted feed. Those are good examples of impacting feed efficiency and positively saving feed costs. Looking at the feed conversion ratio as the kg of feed consumed to produce 1 kg of body gain, it's possible to see how it is directly linked to the feed costs per kg of body weight gain or raised pig.
Over the last decades, many feed additives have been developed and evaluated, among which phytogenic (or botanical) compounds have garnered significant attention from researchers and the livestock industry. Phytogenic feed solutions, including herbs, spices, essential oils and other plant extracts, are derived from plants. Those feed solutions are known for their positive impact on diet palatability and optimised feed intake, which will help support digestive and metabolic processes. In turn, that may positively affect the modulation of gut microflora, which enhance animal performance.

Long history in human nutrition

Plants and their compounds have a long history in human nutrition and medicine. Phytogenic feed solutions are well known for their beneficial effects on animals, from

flavouring and sensory stimulation to antioxidant, anti-inflammatory and microbiome modulation properties. Specific plant bio-actives have been shown to have a “growth-promoting” effect by positively influencing the gastro-intestinal absorptive mucosa morphology (e.g., villus length).

The potential of those additives to stimulate animal performance through their effects on digestive processes and modulation of gut microflora is a topic of great interest and ongoing research. Phytogenic compounds can positively impact how the feed ingredients are digested for nutrients, absorbed, and used by animal metabolism.

Certain phytogenic compounds stimulate the secretion of the animal’s digestive endogenous enzymes and slightly reduce the digesta transit time. Both effects allow more enzymatic action on the ingredients, breaking them down into absorbable nutrients and allowing more time for the enzymatic processes to be more effective. Increased enzyme production improves the feed’s digestion rate, thus improving the diet’s nutritional value.

Apart from better nutrient digestibility, phytogenic compounds can also enhance nutrient utilisation by pigs (similar body weight gain at reduced feed intake). Functional enterocytes can absorb more nutrients in the intestinal lumen. Those cells express more nutrient transporters, allowing extra nutrient uptake and further metabolisation. The improved feed efficiency induced by the phytogenic actives, with the same amount of feed/ingredients ingested, will generate a different outcome. Firstly, more nutrients are available, taken up, and metabolised, and then body mass accretion (growth) is improved in the case of growing/finishing pigs.

Research has shown that spicy substances can naturally boost circulatory and digestive processes. Certain active substances, such as pepper extracts, increase the secretion of digestive juices, stimulate appetite, and improve digestion. In addition, blood circulation in the intestinal wall is increased, accelerating the transport of nutrients and thus contributing to a better distribution of nutrients in the body.

Absorption and retention of nutrients

The robustness of available evidence leaves no doubt about the benefits of phytogenic feed solutions on pigs’ absorption and retention of nutrients. In that way, nutritionists and feed manufacturers can consider the already-mentioned economic performance effects. Adding selected plant bioactives to growing/finishing pigs’ diets can improve feed efficiency and FCR; hence, the animals respond with higher performance. Consequently, the feed costs per kg body weight gain are reduced.

However, another solution allows nutritionists to offer a feed with a reduced nutritional density but ensure a similar level of zootechnical performance compared to pigs produced in the same condition with feed at normal dietary levels but without using these plant extracts. Still, careful economic measures should be taken in specific scenarios to decide the most suitable path, for example, when diet ingredient prices are high, directly impacting diet costs and causing cash flow and even profitability losses to producers.

Estimating the potential

It is possible to estimate the potential to improve the use of nutrients through phytogenic feed solutions based on digestibility assays and even zootechnical performance enhancement data. This estimate can be translated into accurate values as a nutritional matrix, allowing easy and safe application of this potential in nutritionists’ daily formulation practice. Nutrient digestibility enhancements are transposed to nutrient matrix values and applied to least-cost feed optimisation. The

nutritional matrix estimation is a safe and convenient tool that can immediately reduce feed costs upon feed formulation.
Increased pressure regarding rising feed costs explains why feed additives are among the potential solution platforms in animal nutrition. Due to their content of an infinite variety of active ingredients, phytogenic substances represent one of the most exciting and essential classes of current and future feed additives. Thus, botanical compounds can support producers in challenging times to maintain their productivity and financial health.

All technical statements are based on scientific literature; references are available upon request.

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