

# Promoting growth and feed efficiency with plant extracts

Given the total ban on AGPs in Europe and the current discussion of this in other parts of the world, using phytomolecules as an alternative to AGPs offers a viable and promising economic substitute. Studies show plant extracts have great potential to fill the gap left by the AGP ban.

BY ELISA ARNAUD, PANCOSMA

**A**ntibiotic growth promoters (AGP) started to be introduced in livestock farming about 50 years ago. They were used to improve production while limiting costs. Given that – due to the diversity of their targets and their ability to develop resistance – antibiotics are special drugs, their frequent use in livestock farming has led to the emergence of resistant bacteria that cause certain treatment regimens to fail. The European Union banned their use as growth promoters in 2006 and since then they could only be distributed by veterinarians for therapeutic treatment.

## Antimicrobial resistance challenge

In 2018 the World Health Organization stated in a report that despite the measures already in place, antibiotic resistance is one of the biggest threats to global health, food safety and development. The emergence of resistant strains that are not sensitive to antibiotics is still a challenge in the agricultural sector today. Banning AGPs is not a sustainable solution and requires monitoring of nutritional strategies and interventions, as well as measures to prevent and control disease.

## Close monitoring of the propagation of resistance

Using pharmacological, epidemiological and clinical data, committees of experts work to establish concentration thresholds beyond which antibiotics are no longer effective against a given bacterium. In France, this is the Antibigram Committee of the French Society of Microbiology. A bacterial species is considered to be sensitive to a given antibiotic if the Minimum Inhibitory Concentrations (MICs) of the majority of strains are less than or equal to the average concentrations reached by the antibiotic during treatment. Working closely with laboratories, the European Food Safety Authority (EFSA) draws up plans every year to monitor the emergence of resistance. Samples of tissue and faeces from healthy animals are collected through slaughterhouses and MICs of 'sentinel' bacteria are determined using a sample group of antibiotics. EFSA has been collecting and analysing data for Europe since 2001.

## European data

Using the data collected by EU member states, EFSA produces annual summary reports together with the European Centre for Disease Prevention and Control (ECDC) and the European Medicines Agency (EMA). They gather information on antibiotic resistance but also zoonoses and outbreaks of foodborne diseases. These reports then give a picture of how the situation is developing throughout Europe.

In addition to this, the European Commission launched the 'One Health' (*une seule santé*) Action Plan in 2017, recognising that human health is closely linked to the health of animals and the environment. The programme is a collaboration between 39 partners, including government experts in human and animal health, EU scientific agencies (ECDC, EMA and EFSA) and Commission experts from 19 European countries.

**Table 1 – Summary of the meta-analysis of 38 trials on broilers.**

	Negative control	AGP treatment	XTRACT® 6930	P-value
Feed intake (g/d)	81.99	84.04	84.09	0.40
Average daily gain (g/d)	48.9b	50.4a	51.3a	0.001
FCR (g/g)	1.73a	1.71ab	1.68b	0.01



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**Including phytomolecules in poultry diets could enable chickens to achieve similar levels of growth and performance as those on diets supplemented with an antibiotic growth promoter.**

The programme focuses on three main objectives:

- Making the European Union an example of 'good practice'.
- Promoting research, development and innovation by finding new solutions to prevent infectious diseases and control the spread of antimicrobial resistance (AMR).
- Stepping-up EU efforts worldwide to provide guidance on AMR and its associated risks in an increasingly interconnected world.

## Spanning the globe

In the international context, countries have been working together in the Codex Alimentarius since 2006 through an Intergovernmental Task Force on Antimicrobial Resistance (AMR). The Codex Alimentarius is a special programme of the United Nations' Food and Agriculture Organization (FAO) and the World Health Organization (WHO). Its work involves collecting standards, codes of practice and recommendations, and aims to safeguard and improve food safety in the food-processing industry, consumer safety and environmental protection. The purpose of the Intergovernmental Panel on AMR is to provide scientific advice on how to assess and manage human health risks associated with the presence of antimicrobial-resistant micro-organisms in food products. The European Union and the United States also consult each other on issues of antimicrobial resistance through a Transatlantic Action Group.

## Developing natural alternatives

Given the increase in resistance and the ban on the use of antibiotics as growth promoters, it is essential to consider alternative solutions. To meet this demand many additives on the market have been tested. Among them, plant extracts have shown themselves to be beneficial in efforts to replace these molecules, not by aiming to destroy pathogens but by

helping animals to overcome the presence of such more effectively. Numerous publications have demonstrated the ability of certain extracts to reduce inflammation caused by the pathogen (e.g. capsaicinoids from capsicum oleoresin found in red peppers) or to potentiate the response of the acquired immune system (e.g. curcuminoids which are only found in turmeric root oleoresin).

## Combination of plant extracts

Pancosma, an internationally-renowned Swiss company, was a pioneer in the development of additives based on plant extracts. These are classified in the category of 'sensory additives' and – further to the evaluation of a dossier demonstrating their ability to improve performance in a target species – may be registered as zootechnical feed additives. Pancosma launched the first zootechnical feed additive, XTRACT Evolution-B, based on standard and finely formulated plant extracts onto the market in 2015. Its positive effects on feeding efficiency and weight gain in broilers were then also officially recognised by the EFSA committee.

## New generation of additives

Further studies have since shown that this additive (XTRACT Evolution-B), based on a carefully selected mixture of phytomolecules made up of carvacrol (oregano), cinnamaldehyde (cinnamon) and capsicum oleoresin (red pepper), has the potential to provide an alternative to antibiotic growth promoters. Based on data collected from field trials over 20 years, including this additive in poultry diets could enable chickens to achieve similar levels of growth and performance as those on diets supplemented with an antibiotic growth promoter (avilamycin, bacitracin, flavophospholipol or enramycin). A meta-analysis (see Table 1) provides an overview of the effects of this mixture based on 38 trials with broilers in which negative controls or poultry feed supplemented with AGPs were compared with the natural solution.

## Viable alternative

AGPs have long been considered to be the most effective solution for minimising production costs. However, their harmful effect on the development of antibiotic-resistant strains of bacteria has major health implications and is a cause for concern to both health and consumer authorities. The experience in Europe has shown that simply banning AGPs is not enough to restrict their use in industry. General and multidisciplinary measures are needed to arrive at a comprehensive solution. Given the total ban on AGPs in Europe, using phytomolecules as an alternative to promote growth as well as improve feed conversion rates, offers a viable and promising economic alternative. In view of the suggested stricter controls or almost total ban on AGPs in other parts of the world, the results of these studies on bioactives could offer a more interesting alternative to AGPs.