

Essential oils enhancing poultry performance

Antibiotics in animal nutrition are strongly under debate. In Europe they are no longer allowed but in other countries like the USA, they are still being used. Essential oils, derived from plants, have proven to be good alternatives and reduce antibiotic resistance in poultry.

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The use of antibiotic growth promoters (AGP) to enhance the efficiency of agricultural animals has been practised for over 50 years. The types of antibiotics used as growth promoters include tetracyclines, penicillins, sulfonamides, and aminoglycosides, and all of these compounds have been shown to increase efficiency, weight gain and survival. The action of AGP's takes place in the gut of poultry animals where they alter the microflora environment. This leads to a decrease in competition for critical nutrients and a reduction in pathogenic metabolites that can depress bird performance. In addition, AGP's have been shown to increase nutrient absorption and also reduce the occurrence of sub-clinical infection. Although AGP's have proven highly effective at improving animal health and performance, bacterial resistance to AGP was first observed in

Carvacrol, found in oregano, has strong antimicrobial activity against a wide range of bacteria.



the late 1950's and subsequently has been well-documented. When antibiotics are added to poultry feed for prolonged periods of time, populations of pathogenic bacterial flora develop resistance to that antibiotic and can become dominant in the gut. The long term result is that the animal is no longer responsive to the antibiotic, and the improvement in animal performance is no longer observed.

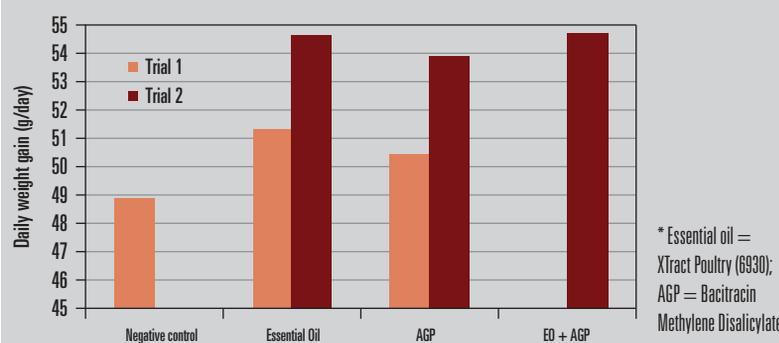
Rotation scheme practice

To reduce the level of AGP resistance, most poultry producers incorporate an AGP rotation scheme into their feeding

program. The logic behind this approach is based on research findings showing that when antibiotic resistance results in sub-optimal animal performance, it can be reversed by switching AGP's. Using this approach, producers have two or more different types of AGP's in a rotation to break the cycle of antibiotic resistance. This approach is highly effective and is currently the feeding scheme of choice among producers who use AGP (approximately 60% of poultry producers in the United States). The issue of antibiotic resistance not only has implications for animal performance, but has also contributed to the growing



Figure 1 - Effect of Essential Oils (EO), Antibiotic Growth Promoters (AGP), or EO + AGP on daily weight gain and feed conversion ratio of poultry.



controversy over whether AGP should be used at all in agriculture. The use of AGP has already decreased dramatically since the 1990s, and consumers continue to demand “antibiotic free” food products. Pathogen resistance and the implications for human health is the primary reason why AGP’s were banned in Europe. As a consequence, poultry producers in Europe, as well as organic and homestead producers in the United States who choose not to use AGP at all, need to have alternative competitive strategies available to them for optimising the health and efficiency of their animals.

All natural products

As an alternative to AGP, there are currently many “all natural” products emerging on the market that have the potential to increase the efficiency of poultry animals. These products include probiotics, prebiotics, trace minerals, enzymes and herbs and spices (essential oils). Essential oils (EO) are compounds that give plants and spices their colour and scent. Many essential oils have antifungal, antioxidant, and antibacterial properties that are used to protect their plant of origin. The antibacterial properties of many essential oils present in clove, garlic, oregano and other plants have been known for years, and these oils have been used to flavour and preserve foods. The essential oils responsible for the antimicrobial activity can be isolated and produced commercially. Recently, the use of essential oils as feed additives for agricultural animals has become an exciting area of study as a means of improving animal productivity. Laboratory research has shown that certain essential oils, including carvacrol (from oregano) cinnamaldehyde (from cinnamon), and capsaicin (from chilli peppers) have been shown to improve the performance of poultry.

Optimise gut microflora

Currently, there are two commercially available EO products for poultry: Regano 500 (Ralco), which is an oregano extract, and XTract Poultry (6930; Pancosma), which is a blend of carvacrol, cinnamaldehyde, and capsaicin. How do they work? The exact mechanisms are not clear, but they appear to alter enzyme activity in the

gut, improve the digestion and uptake of nutrients, and optimise the gut microflora. Some large field trials have been conducted to confirm the beneficial effects of EO on poultry performance, and to compare the efficacy of EO additives to AGP’s. Here we are highlighting two reports. The first is a compilation of data from 13 field trials, and the results were presented at the Poultry Science Association annual meeting in 2008. That report was focused mainly on comparing the efficacy of EO vs. AGP on enhancing poultry performance. The second report is a research trial that was presented at the Poultry Science Association annual meeting in 2010 and was conducted to establish if EO and AGP could be combined to get additive effects in animal performance. *Figure 1* shows the main results of each trial.

Increase in efficiency

In both reports, using an EO feed additive increased daily gain and feed conversion efficiency to a similar degree as AGP. The increase in feed conversion efficiency observed with either additive is particularly relevant during current times with rising feed costs. Feeding the two additives in combination did not appear to have any beneficial effects. Importantly, there was no difference in the effect of EO vs. AGP on breast yield after moisture loss (*Figure 2*). In the second trial, financial analysis was conducted to predict the theoretical return on investment for each feeding strategy. Based on the results (*Table 1*), using EO or AGP resulted in a similar return on investment.

Based on these experiments, EO have been shown to be as effective as AGP in enhancing animal performance, and the cost of adding them into feed programs would be similar to AGP. Therefore, they represent an exciting opportunity for poultry producers to improve bird performance using an all-natural approach. For farms that still use AGP, EO can be incorporated into rotation to improve the efficacy of AGP by breaking the cycle of antibiotic resistance. ♦

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Figure 2 - Effect of Essential Oils (EO), Antibiotic Growth Promoters (AGP), or EO + AGP on breast yield after moisture loss.

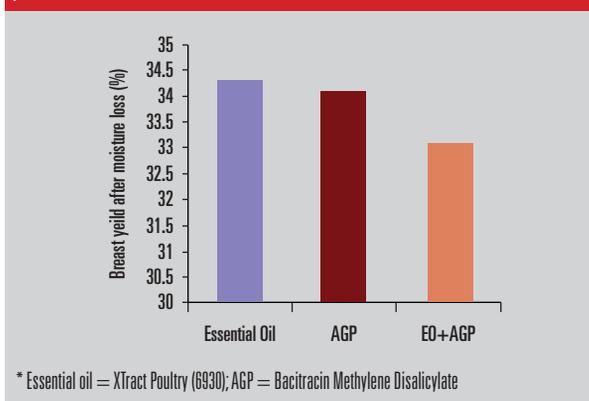


Table 1 - Financial Analysis of feeding Essential Oil (EO), Antibiotic Growth Promoters (AGP), or EO + AGP.

	Feed cost/bird	Return on Investment		
		Whole bird	Breast	Breast after moisture loss
EO	\$1.00	\$2.42	\$1.32	\$1.18
AGP	\$1.02	\$2.35	\$1.33	\$1.18
EO + AGP	\$1.01	\$2.48	\$1.34	\$1.20

Cinnamaldehyde, an aromatic aldehyde and the main active component of cinnamon, has been associated with a decrease in acetate, an increase in propionate, and a marked decrease in methane production.



Capsaicin, the active component of chilli peppers, has both antibacterial and anti-fungal properties.