ARTICLE 2: Food Safety in Poultry - from Farm to Fork without antibiotics

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Abstract:

Antibiotic growth promoters (AGP) have been used as feed additives to improve average body weight gain and feed efficiency in food animals for more than 5 decades. However, there is a worldwide trend to limit AGP use to protect food safety and public health, raising an urgent need to discover effective alternatives of AGP.
The ways in which antibiotics are used in poultry production have changed considerably during the past decade, mainly because of concerns about potential negative human health consequences caused by these uses. Human health improvements directly attributable to these antibiotic-use changes are difficult to demonstrate. Given that some antibiotics will continue to be used in the poultry industry, methods are needed for estimating the causal relationship between these antibiotic uses and actual animal and human health impacts. This is a challenging task because of the numerous factors that are able to select for the emergence, dissemination, and persistence of antibiotic resistance. Managing the potential impacts of antibiotic use in poultry requires more than a simple estimation of the risks that can be attributed to the use of antibiotics in poultry. Risk models and empirical studies that evaluate interventions that are capable of minimizing the negative consequences associated with specific antibiotic uses are desperately needed.

This study has showed that the adding (inclusion) of certain odors to the air of poultry and turkey farm significantly improved the body weight, feed conversion ratio and carcass yield of broilers after a growing period of 42 days. The EOC could be considered as a potential growth promoter for broilers, because it meets the needs of producers for increased broiler performance and the consumers' demands that broiler production is conducted under environmentally friendly conditions. The EOC can be used cost effectively when comparing it costs with those of antibiotics and other commercially available products on the market. However, further and more complete evaluations are required to establish the effect of EOC in diets on the performance of broilers.

Food safety is a growing concern for consumers and for professionals in the foodservice industry. The purpose of this paper is to discuss the critical control points for food safety as food moves from the farm (production) to the fork (consumer consumption). Each person involved in the production, processing, distribution, preparation, and service of food has an important role in assuring that food is safe for consumption.

Background:

Factory farming began in the 1920s soon after the discovery of vitamins A and D. When these vitamins are added to feed, animals no longer require exercise and sunlight for growth. This allowed large numbers of animals to be raised indoors year-round. The greatest problem that was faced in raising these animals indoors was the spread of disease, which was combated in the 1940s with the development of antibiotics. Farmers found they could increase productivity and reduce the operating costs by using mechanization and assembly - line techniques.

Unfortunately, this trend of mass production has resulted in incredible pain and suffering for the animals. Animals today raised on factory farms have had their genes manipulated and pumped full of antibiotics, hormones and other chemicals to encourage high productivity and performance and decrease morbidity. In the food industry, animals are not considered animals at all - they are food producing machines. They are confined to small cages with metal bars, ammonia - filled air and artificial lighting or no lighting at all. They are subjected to horrible mutilations: beak searing, tail docking, ear cutting and castration. Even the most minimum humane standards proposed are thwarted by the powerful food conglomerates.

Animals raised in confinement create an ideal setting for bacteria and disease to spread rapidly. Antibiotics were developed around the time of World War II and were soon adapted into the farming system. In the U.S., almost 50% of all antibiotics are administered to farm animals. The Animal Health Institute (AHI), a trade organization for the veterinary pharmaceutical industry, reported in 2006 that its members sold 26.4 million pounds of antibiotics for animals (Prepared by Keep Antibiotics Working, April 2010). These drugs form a toxic residue in animal tissue. It is much of this same tissue that is sold to consumers as food products. Each year, we see an increase in the number of salmonella poisoning cases from contaminated eggs, meat and milk. These strains of salmonella are difficult to treat because they are antibiotic resistant. Antibiotics are not the only chemicals administered to factory farm animals; many animals are fed growth-promoting hormones, appetite stimulants and pesticides, fertilizers, herbicides and aflatoxins that collect in the animals' tissues and milk.

Introduction:

The average life span for a factory farmed domestic turkey is 2 to 6 years. Commercial flocks are bred to be abnormally large due to genetic alteration, and are purposefully fed a diet laced with drugs and chemicals. These factors, along with the raising of turkeys in intensive confinement systems, can result in later health problems and early death. Pre - mixed turkey feed generally contains antibiotics and animal by - products, and commercial turkey feed is designed to promote fast growth, which is very harmful to an animal that has already been bred to be abnormally large. Turkeys are not suited to crowded confinement systems – including so - called free - range (a fraudulent term). When hundreds, even thousands of birds are forced to sit and stand in a crowded yard or in filthy litter (wood shavings and excrement) breathing burning ammonia fumes and lung - destroying dust, they develop respiratory diseases, ulcerated feet, blistered breasts, and ammonia - burned eyes. Most turkeys are fed antibiotics to promote artificial growth and to control *Salmonella, Listeria, Campylobacter* and other diseases transmittable to humans. *Poultry Science* reports that 72% to 100% of chickens, turkeys, and ducks have *Campylobacter* at the slaughterhouse – despite all the drugs. **Bacterial resistance to antibiotics is a major public health crisis.** Increasingly, bacteria are resistant to multiple antibiotics, leading to infections that are difficult to treat and sometimes impossible to cure, require longer and more expensive hospital stays, and are more likely to be fatal. At the same time, the development of new antibiotics has slowed to a trickle. In some cases, there are now few or no antibiotics that work to treat drug resistant bacterial infections. Meanwhile, scientific studies have shown that consumers are exposed to antibiotic resistant bacteria on their meat and other food. While improper use of antibiotics in the health care sector is problem, organizations such as the World Health Organization (WHO) recognize that the “overuse and misuse of antibiotics in food animals” is a major source of the antibiotic - resistant bacteria that affect humans, leading to infections that are harder to treat.

Antibiotics have been added to poultry mostly to maintain health and production efficiency in the last few decades. However, because of the developmen of resistance by pathogenic bacteria, which can impact on public health, antibiotics are being taken out of poultry diet around the world, beginning in Sweden in the year 1986. When pathogens attach to the mucosa, gut integrity and function are severely affected and immune system threatened. Chicks grown in a pathogen - free environment grow 15% faster than those grown under conventional conditions where they are exposed to bacteria and viruses. Furthermore, it is generally agreed that gut microflora is a nutritional “burden” in fast-growing broiler chickens since an active microflora component may have an increased energy requirement for maintenance and a reduced efficiency of nutrient utilization. The focus of alternative strategies has been to prevent proliferation of pathogenic bacteria and modulation of indigenous bacteria so that the health, immune status and performance are improved.

Not only the animals but also the factory farms are breeding grounds for virulent disease, which can then spread to the wider community via many routes — not just in food, but also in water, the air, and the bodies of farmers, farm workers and their families. Once those microbes become widespread in the environment, it’s very difficult to get rid of them.

The Preservation of Antibiotics for Medical Treatment Act (PAMTA, S. 619/H.R. 1549) requires the FDA to review drugs currently on the market to ensure that they meet the current safety standards for antibiotic resistance if drug manufacturers wish to continue marketing them for nontherapeutic use (e.g., to promote growth or to keep animals from getting sick in overcrowded, unsanitary conditions). In essence, PAMTA means that manufacturers must prove the safety of their existing drugs with regard to antibiotic resistance just as they would for any new antibiotics they plan to bring to the market.

Farm uses of antibiotics are conventionally classified into:

- For treatment of disease (**therapeutic use**). However, if a few animals are found to be sick, often the whole flock or herd will be treated (known as metaphylaxis) to prevent the disease spreading. Thus there is not always a clear distinction between treatment and prevention. Treatment usually occurs at high doses for a relatively short period of time.

- For prevention of disease (prophylaxis). The treatment of animals with low, sub-therapeutic doses of antibiotics in feed or drinking water, when they are not showing signs of disease but there is thought to be a risk of infection. Treatment can be over a period of several weeks, and sometimes longer.

- For 'growth promotion' (no longer permitted as such in the EU, but still common in North America and elsewhere). Very low sub-therapeutic doses of antibiotics are given to animals (particularly intensively kept pigs and poultry) in their feed, nominally to increase their growth-rate and productivity. Treatment is continuous and can last for a large part of the animal's life.

Antibiotic use for disease prevention and growth promotion is ***'non-therapeutic'***.

Regulation 1831/2003 of the European Parliament and of the Council on additives for use in animal nutrition. Regulation 1831/ 2003 stated that antibiotics, other than coccidiostats and histomonostats, might be marketed and used as feed additives only until December 31, 2005. Anticoccidial substances, such as antibiotics ionophores, also will be prohibited as feed additives before 2013. After this date, medical substances in animal feeds will be limited to therapeutic use by veterinary prescription.

However, consumer pressure related to the potential development of antibiotic -resistant bacteria has resulted in the development of non –antibiotic feed additives that may also improve broiler performance. In recent years, aromatic plants and their extracts have received attention as growth and health promoters. It is known that most of their properties are due to the essential oils (EOs) and other secondary plant metabolites. EOs enhance production of digestive secretions, stimulate blood circulation, exert antioxidant properties, reduce levels of pathogenic bacteria and may enhance immune status. The purpose of this paper is to provide an overview of the published data on the potential of EOs and their components in poultry nutrition, and to describe their possible modes of action. The current knowledge on potential antagonistic and synergistic effects is presented and areas for future research are proposed.

Research:

Essential oils have been used to make human foods more appetizing for centuries, and many of them are recognized for their health benefits. Some of these compounds stimulate appetite (e.g. sourcing essence EA732), provide antioxidant protection (e.g. sourcing essence EA273), or suppress microbial growth (carvacrol from oregano).

These plant - based antimicrobial compounds, which function in a fundamentally similar way to antibiotic compounds produced by fungi, could be used to replace some antibiotic growth promoters. To be most effective as growth promoters, these herbal antimicrobial compounds must be supplemented to the feed in a more concentrated form than found in their natural source. As with antibiotics, continued use of these plant-based antimicrobials may result in the development of resistance in some pathogenic bacteria. However, more research is necessary to confirm this risk.

Essential oils from oregano, BHRI Institute patented sourcing essence EA273 are showing the greatest potential as an alternative to antibiotic growth promoters. Oregano contains phenolic compounds, such as carvacrol, that have antimicrobial activity. Like antibiotics, oregano essential oils modify the gut microflora and reduce microbial load by suppressing bacteria proliferation.

There are some claims that oregano oil can replace anticoccidial compounds, not because they inactivate coccidia, but because they increase the turnover of the gut lining and prevent coccidial attack by maintaining a more healthy population of gut cells. This mode of action would increase the animal's maintenance energy requirement because enterocyte turnover is a major proportion of the basal metabolic rate.

Based on all the above mentioned facts BHRI researches will carry out the research in poultry farm in Austria. The research will be carried for a period of 2 month, as it is normal breeding period for turkey. We assume by adding »sourcing« essences ES3569 to the air of the studied farm the behavior of turkeys will be significantly slowed, which will reflect in better nutrition and reduction of different diseases.

Furthermore, BHRI Institute researches explain how the device Scent Generator works in the poultry farm and what is the secret of its revolutionary success.

Scent Generator operates in a manner of simulating natural circulation of essences in nature - by maintaining original molecules and the exact imitation of natural processes of air circulation, such as those found in the nature. Special bottle contains only 100% natural essences and are emitted into the room on the principle of cold transmission, which means no warming and other "classic" (unnatural) processes, so even without the aid of pressure or propellant.

According to the laws of aerodynamics, Scent Generator encourages essences to fill the space in the same way as it does outdoors. The result is that essences have all retained original effects. Therefore, the penetration of essences in human body takes place exactly as

in nature: at a sufficiently high concentration through breathing to enter to the left cerebral hemisphere and to the lungs and then left the physical mechanisms regulate the absorption.

BHRI Institute research team can proudly announce that we have manage to develop and test a new system to reduce the mortality of animal husbandry and reduce the intake of antibiotics by 80%. The system consists of device-diffuser accelerator or cylindrical molecules of compounds of essential oils and natural essential oils compounds or so called »sourcing« essences ES3569.

The purpose of the research is to demontrate and it is empirically proven that with modern technology and natural processes we are successfuly able to influence on the animal reaction on their stressful situation and also indirectly reduction of overall mortality of animal husbandry at least 50 %.

A study was conducted to investigate the effects of plant extracts in essential oils (a blend of clove and cinnamon essential oils) on growth performance and carcass quality characteristics in broilers poultry. Essential oils have been studied as a tool toreduce unwanted bacteria on the basis of their demonstrated in vitro antimicrobial activity, as possible alternatives to improve broiler chicken growth performance and meat yield.

Our researches suggests that such effects are due to:

- lower amino acid oxidation;
- an antibiotic-like action against the intestinal microorganisms, with reduced thickness of the villi and, consequently, reduced protein metabolism of the enterocyte;
- increased activity of the digestive tract enzymes; and
- greater food intake because of improved palatability of the feeds

However, more results are needed to clarify whether essential oils can match the effects of antibiotics as feed additives in broiler diets.

Conclusions:

With the research conducted under the performance of the BHRI Institute we have already successfully proved the use of the of the patented device Scent Generator in parallel with the use of natural sourcing essences (in the field of different neurological disorders and drivers' performance). The research, which will be carried out in Austria will provide in our opinion the same positive effect on poultry as, it was successful on humans. Beside that, the researchers of the BHRI Institute are aware that we can significantly contribute to a safer food chain, because we predict as much as 80% lower intake of antibiotics in food and breeding animals. The results of Austrian farm research will be shortly presented.

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