

## **SOME ECOLOGICAL ASPECT OF BROILER CHICK NUTRITION**

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### **ABSTRACT**

According to the data from numerous published research work and the regulations on antibiotics ban in animal nutrition, one possible way in resolving this problem is presented in the paper. Substitution of antibiotics with probiotics in broiler nutrition is explained, with the ultimate goal of producing safe, quality and healthy poultry meat. In order to be able to produce hygienically safe and biologically valuable poultry meat, comprehensive attention is to be devoted to feed additives, their division and risk management. Significance of probiotics is highlighted as they satisfy the basic requirement, they are acceptable and feasible from the environmental point of view.

### **KEY WORDS:**

antibiotic, probiotic, chicken meat quality

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### **1. INTRODUCTION**

Sudden and rapid changes in modern ways of living, and high concentrations of population in certain areas, significantly impacted eating habits as well as the need for continuous production of substantial quantities of food. On the other hand, due to fast technological breakthroughs and technical advancements in food industry and scarcity of natural resources, there is a perceived need for food quality standardization, with due respect to environmental preservation and protection.

As chicken meat is becoming a source of proteins, valuable nutrients in human nutrition, poultry meat production is getting greater and greater importance. Other advantages of this production include fast growing birds reared in intensive production systems, better return on investment, improved productivity, lower costs and a comprehensive body of proven and documented research work.

In comparison with other types of meat, poultry meat is a light, easily digestible and low density diet, since the share of proteins in it significantly exceeds share of fat. It is easily digestible due to the fact that poultry fat tissue is rich in triglyceride and unsaturated fatty acids.

With the development and industrialization of production process and for the purpose of meeting above mentioned requirements, antibiotics were eventually introduced in poultry nutrition, to be almost completely excluded from this production phase in later stages due to growing amount of research data

demonstrating their harmful effects in poultry nutrition. On the other hand, however, the positive effects of antibiotic-supplemented diets are not to be neglected and the supplementation of pro-nutritional material as an alternative to antibiotic-based growth promoters aimed at better feed utilization, improved feed efficiency, increased production and improved quality of food is becoming more widespread.

With accelerated progress of biotechnology we now have a choice of natural alternatives – pro-nutritional material. They include, above all, some organic acids and lactic acid cultures able to produce lactic acid, which are harmless for human health, do not accumulate in excreta, do not pollute environment and do not leave harmful residues in organism. These alternatives are known as probiotics.

Available research results on the effects of probiotics in animal nutrition are not consistent, but most of them indicate positive effects on broiler nutrition and breast meat quality.

For these reasons and from the point of view of healthy and safe food it can be said that the use of probiotics in animal feeds has many benefits and satisfies the basic requirement - exclusion of all additives leading to the occurrence of undesirable residues in the body or their accumulation in excreta, and consequently environmental pollution. This is the main and essential difference between the use of antibiotics and probiotics in animal feeding systems.

Relationship between nutrition and environmental protection is an issue of concern, and there are various approaches in resolving this problem. Out of numerous options offered in practice, optimum health status and improved nutrient availability are considered as the first and right step in achieving the overall goal, that is, to protect our environment.

Taking into account that scientific research data available in literature on the effects on probiotics on cooked meat, particularly poultry meat, are not documented with adequate production results, the main objective is to concentrate further efforts on field researches in order to determine, if possible, elevations in production parameters and broiler carcass quality, qualitative and quantitative improvements, as well as the improvements in the cooked meat quality – from the standpoint of human nutrition and the consumer.

Regardless the fact that, from the scientific point of view, meat quality evaluation criteria may involve different definitions, the most important criteria seem to be soft, juicy and tasty and, above all, healthy and safe meat.

## 2. ANTIBIOTICS

The benefits of antibiotics use in animal nutrition include; increased weight gain, improved feed conversion and greater resistance to disease challenge. Unfortunately, apart from these positive effects, the use of antibiotics in feed can lead to negative, and even harmful effects (such as increase in number of antibiotic resistant bacteria and antibiotic residues) in final products.

Legislation prescribing antibiotic ban is becoming more and more stringent. As early as in 1986, the addition of these antibiotic growth promoters was completely banned in Sweden. Though Sweden represents an extreme case, there is still a great difference in national regulations related to food products of animal origin (Sinovec, 1996, Gold, 1997).

In our country only non-absorbable antibiotics are allowed to be used in animal feed, namely, those which perform their function in gastrointestinal tract without getting absorbed. However, as there is no reliable proof regarding the absence of residues in tissues, it must be pointed out that non-presence of residues does not necessarily imply their absence, but rather the absence of sensitive and reliable methods and equipment for their detection.

Kovcic and Djokovic (1987) discussed the affects of some dietary additives, in particular, absorbable antibiotics and sulfonamides which are considered responsible for the occurrence of antibiotic resistant bacteria population and antibiotic residues in meat.

A great deal of research work is focused on measuring residues of antibiotic-based feed supplements and veterinary drugs in foodstuffs of animal origin. Saric et al. (2000) talk about the-so-called "hidden additives" that may be found in human food chain, including hormones, antibiotics and other drugs used for treating animals. The main objective of experts engaged in food production, processing and control is to reduce human health risks associated with consumption of food additives and set up limit values, that is, maximum permissible levels for residues of protective agents and veterinary drugs in meat and meat products (Grujic, R., Grujic, S., 1997).

Ivanovic et. al. (1991) suggest that with the application of reliable detection methods it is possible to determine even very low antibiotics concentrations and protect humans from their harmful effects.

Generally speaking, detection results for drug residues in meat depends on a number of factors, the main of which are:

1. Drugs-related factors: absorption rate and speed, distribution in tissues, metabolizability, excretion rate, post-mortem stability in tissues
2. Animals-related factors: animal age and species, nature of disease to be treated, feeding and watering practices during medical treatment, etc.
3. Human-related factors: illegal usage, non-professional application, wrong dosage, effectiveness period, communication gap between veterinarian at farm and veterinarian in slaughtering facility.
4. Factors related to detection methods for meat residues: sensitivity of analytical methods, specificity of methods, possibility of metabolite detection, existence of routine screening tests.

Most authors conclude their studies with the idea of rearing animals with the use of probiotics instead of anti-microbial drugs. This assumption may be promising taken that intensive researches on probiotics usage shall help in resolving problems concerning undesirable antibiotics residues in meat.

### 3. PROBIOTICS

Recently, researchers are becoming increasingly interested in additives that are not accumulating in excreta and hence do not pollute environment when excreted (Savkovic, 1995).

With the use of probiotics similar effects are achieved as with antibiotics, with the exclusion of undesirable effects, such as, residues, resistance, diarrhea, genotoxicity, etc. (dr. Veld, 1997).

Numerous research studies conducted in recent time have confirmed that dietary supplemented probiotics have positive effect on gain increase, improved feed conversion rate, and significant reduction in mortality (Tortuero, 1973, 1989; Han et al. 1984; Meluzzi et al. 1986; Owings et al. 1990; Mohan et al. 1996; Jin et al. 1996a, 1997a and b; Yeo and Kim, 1997; Van Wamberek and Peeters, 1994).

Despite this considerable body of research about the positive effects of probiotics in chicken feeds, there are only few results about their effect on the quality of cooked broiler meat.

Ristic at al. found significant improvements in broilers fed with probiotics, designed as meat taste- enhancer.

Savkovic et al. (2004) have also showed significant improvements in meat quality in broilers fed probiotics-supplemented diets. Sensory evaluation of stewed and roasted meat from probiotics-fed broilers showed that their meat is very soft,

juicy and tasty. Probiotics usage in broiler feeds have been shown to have many benefits, from promoting growth and health status, to providing final product of better taste, higher nutritional value, safer and healthier, and with improved cooking characteristics.

Ecological pathogen control with probiotics is becoming more and more feasible option in rearing animals and food production, due to their positive effects on growth performance and improved quality of final product (Veldi J.H.J., 1997; Woodward J., 1988).

#### 4. CONCLUSION

In order to obtain hygienically and biologically safe poultry meat, special attention is to be devoted to feed additives, risk management and environmental aspects.

A logical approach in resolving environmental pollution issues is to reduce antibiotics usage in animal feed and substitute them with harmless material. For achieving this, further systematic researches are needed which will provide comprehensive results. This is required not only by the professional public insisting on scientifically proven and fact based results but also in response to consumer demands.

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