**„ION IONESCU DE LA BRAD" UNIVERSITY OF AGRICULTURAL SCIENCES AND VETERINARY MEDICINE, IASI**

**FACULTY OF ANIMAL HUSBANDRY**

Domain: **Animal Husbandry**

Specialization: **Animal feeding**

Eng. Nicoleta Daniela BORTĂ (married FRUNZĂ)

**PhD DISSERTATION**

# Opportunities to improve broiler chicken feeding

Scientific leader,

Prof. Ioan Mircea POP, PhD

**IASI, 2011**

# Abstract

Poultry meat has gained a worldwide status of great importance amongst products of animal origin consumed by people due to its nutritive qualities, lower costs in comparison to other protein sources of animal origin, but also due to the large variety of processed poultry meat products, highly appreciated by today consumers.

Since feeding amounts to the largest part of the exploitation costs of broiler chickens, nutritionists have the task of finding new modalities of reducing these costs with the goal of increasing economic efficiency in this animal husbandry branch. Discovering and using new sources of feed that do not compete with feed for other animals or food, re-evaluating amounts of new or classic raw materials introduced in recipes and establishing feed norms that reflect the physiological requirements of broiler hybrids as faithfully as possible represent a few of the main levers to be pulled by nutritionists, in order to increase productive and economic efficiency.

Until this moment, poultry meat production has been stimulated by all means in order to find optimal solutions for: obtaining improved hybrids, ensuring a microclimate without great energy requirements from poultry, making recipes that cover requirements of animals without causing casualties, reducing mortality with a well conceived hygienico-sanitary system etc. Present tendencies in this field focus on product quality, striving for obtaining products with high nutritive and biological value, with low cholesterol amounts, enriched with vitamins, and lacking mycotoxins, nitrates, nitrites, heavy metals and other elements with negative impact on human health.

The possibility of improving the quality of animal products through nutritional intervention attracts the nutritionists' attention towards a new concept, namely functional aliments, aliments with added active biological compounds, which contribute to a superior capitalization upon these, organism health and functioning. Superior digestive capitalization upon feed also implies combating antinutritional factors, such as the effect of non-starch polysaccharides from poultry feed, realizing this through use of specific enzymatic products. Analyzing the physiology of this species digestive tract we notice the microorganisms' deficit in the young digestive tract but also the low development speed of these during first days of life compared to growth intensity. This is the reason for which additives with direct action on

digestive tract microflora (probiotics, prebiotics, phytogenic additives) should be used at large scale, broiler chickens being usually slaughtered most lately at the age of six weeks.

Poultry manifests high energy and protein requirements; at the same time, they need a good energo-proteic balance, an adequate content in essential amino-acids, and adequate mineral and vitamin feeding. Broiler are usually fed complete compound feed conceived in order to cover all nutritional requirements, feeding is done ad libidum, focusing, in this case, on obtaining highest possible production performances, according to the genetic potential (Pop et al., 2006).

Feed Improvement of broiler can be made by various means: some of these are: improving feed quality, improving drinking water quality or improving feed additives. Feed quality tends to include four typically forms that define this term and concept, those being: raw material quality (chemical composition and digestibility), quality of feed as ingredients within the technological flow of preparation or fabrication (respecting the parameters), quality of finite products (granule dimension), quality of feeding technologies. Water is an essential element in broiler chickens breeding, any decrease of water amount or increase of water losses may have significant effect on the chickens life and productive performances, thus rendering water tracking very important, so that measures can be taken in case of contamination of water with any undesired element. Additives have been used for a few decades in poultry feed and their efficiency has been proven through achieved performances and also through their economic efficiency. At this moment, their use is directed towards products as natural as possible, from this standpoint a few additives have been eliminated from the market despite their considerable economic efficiency (Castro, 2005).

In the new generation of additives used in poultry feed are included growth promoters and especially extracts and essential oils of medicinal and aromatic plants. Still, large scale use of these plants is discouraged because a single active component can contain many bioactive components, and the active substance content depends on many known and unknown factors, so they may vary between very loose limits (Czirjak, 2009). Aside from this type of additives for improving broiler chickens feed, additives that replace enzymes necessary to this species may be used, thus phytases can be used for better phosphor use, lypases for fats etc. Another category of additives that can be used consist of inactivators or mycotoxin inhibitors, considering that mycotoxins from feed produce derangements with various manifestations, ranging from reduction of consumption or feed bioconversion to diseases of varying gravity and death, symptoms being more or less characteristic (Dancea, 2005).

In order to carry out the experiments three series of chickens were raised during a time span of 2 years, researches being organized in four different experiences: experience A, experience B, experience C and experience D. Researches were performed within the University of Agricultural Sciences and Veterinary Medicine "Ion Ionescu de la Brad", chickens being raised in the raising hall from the Institution's biobase and the analyses (most of them) were performed in its specialty laboratories.

From the large variety of substances and compounds that could be used in poultry feed and are considered to have positive effects on the health state, production performances and economic results, the following were selected for the researches: neutral water (ANK neutral anolyte with 6,5 pH and active chlorine 400-700 mg/L) administered in the drinking water of studied chickens, a butyric acid based compound (55%) in powder form administered in animal feed, a probiotics and prebiotics based product – Enterococcus faecium and inuline, plant extracts – chicory, oregano, anise, seaweed, milk thistle and essential oils – tymol, calvacrol, anethole, limone and a combination of organic and anorganic acids – formic acid, propionic acid, lactic acid, citric acid and sorbic acid.

For **A experience** has been studied a total of 120 broilers, Ross 308 hybrid, divided into three experimental groups: Ac, A1, A2. Research aimed at studying the possibilities of use of water electrolysis in broiler chicken diets in various conditions chloride ions content of drinking water. After the analyses the following facts were noticed:

- Body weights were 2% to 4% greater in the experimental groups than in the control group;
- Feed consumption index was framed between 1, 82 kg n.c./kg growth rate for the control lot and 1, 77 kg. n.c./kg growth rate for the first experimental group at the age of 35 days (age for slaughtering);
- Water consumption increased with approximately 3% at experimental groups in comparison to the control group;
- After calculating economic efficiency, the efficiency of additive use in the drinking water of broiler chickens was proven.

For **B experience** has been studied a total of 75 broilers, Ross 308 hybrid, divided into three experimental groups: Bc, B1, B2. Research aimed at studying the possibilities of use of an additive based on butyric acid, 65%, Baby C4, in fed of broilers in various concentrations administered in combined feed. The following observations resulted from the analysis:

- Increased body weights at the end of the experiment, up to 6% - 8% greater for experimental groups than for the control group.

- Food consumption index ranged between 1,81 kg n.c./kg growth rate for the control group and 1,67 kg n.c./kg growth rate for the second experimental group at the age of 38 days (age at the moment of slaughtering).
- Calculation of economic efficiency proved the use of a 3‰ dose in broiler chicken feed during the first seven days of life to be the most efficient.

For **C experience** has been studied a total of 200 broilers, Cobb 500 hybrid, divided into four experimental groups: Cc, C1, C2 and C3. Research aimed at studying possibilities to use some feed additives in broilers feeding, namely an additive based on organic and anorganic acids with trade name Biotronic, an symbiotic additive Imbo and an additive based on plant extract named Pep. The following observations resulted from the analysis:

- Body weights in the experimental group that were equal or slightly reduced than in the control group
- Consumption index ranged between 1,92 kg n.c./kg growth rate for the control group and 1,85 kg n.c./kg growth rate for the second experimental group at the age of 42 days (age at the moment of slaughtering).
- Use of prebiotics and the plant extract based product leaded to decrease of pathogenic bacteria such as Campylobacter spp., Escherichia coli and Salmonella in the caeci of studied chickens.
- Calculation of economic efficiency concluded the efficiency of additives, greatest efficiency proven by the pro/prebiotic, followed by the plant extract additive, and the least valuable, placed below the control group, was the additive based on organic and organic acids and their salts.

For **D experience** has been studied a total of 150 broilers, Cobb 500 hybrid, divided into three experimental groups: Dc, D1, D2. Research aimed at studying possibilities of use feed additives named Silymarin based on dry extract of Silybum marianum seeds and an complex additive based on plant extract HepaProtect (the active ingredient silymarin). The following observations concluded the analyses:

- Body weights were slightly decreased in the experimental group, as compared to the control group.
- Consumption index ranged between 1,92 kg n.c./kg growth rate for the control group and 1,82 kg n.c./kg growth rate for the second experimental group at the age of 42 days (age at the moment of slaughtering)
- Mortality percentage was 4% lower at the experimental group than at the control group.

- Calculation of economic efficiency proved the efficiency of using the additives in broiler chicken feed, the most efficient additive represented by HepaProtect.

Results of performed experiences proved the efficiency of additives used in broilers diet by reducing the index consumption, weight gain and reduced mortality, not least by improving their welfare.