„ION IONESCU DE LA BRAD”
UNIVERSITY OF AGRICULTURAL SCIENCES
AND VETERINARY MEDICINE - IAŞI
ANIMAL SCIENCE FACULTY

FIELD: ANIMAL SCIENCE
SPECIALIZATION: POULTRY AND FUR ANIMALS
EXPLOITATION TECHNOLOGY

Eng. Radu BĂLĂU

PhD DISSERTATION

“*Contributions on the improvement of productive performances in chicken broilers reared in familial type farms*”

Dissertation for the achievement of “PhD in Sciences” degree
Animal Science field

Scientific leadership:
Prof. Ioan VACARU-OPRIŞ, PhD

IAŞI
- 2011 -

PhD DISSERTATION ABSTRACT

Domestic poultry rearing is a viable source of covering the nutritional requirements of consumers in terms of quantity and quality. Knowledge and management of factors affecting poultry productions represents advantages to improve these products in terms of economic efficiency. When applying the appropriate technologies to rear the birds, substantial income could be achieved by farmers.

In our country, the interests of farmers is higher for producing poultry meat than table eggs. The poultry species they use for meat are part of order *Galliformes*: chicken, turkey, guinea fowl, pheasant, quail and partridge.

Consumers of poultry meat from our country prefer firstly chicken meat, then poultry meat from other species, which is obtained by raising and slaughter of commercial or industrial hybrids; they offer many advantages to farmers, among which we mention a rapid sequence of rearing series, accompanied by an effective turnover of revenues, with the possibility of short-term recovery of investments made to start a business of this type, namely the establishment of a chicken broilers rearing farm.

In this context, the original researches focused on the design and development of the best technological options for raising broilers in the micro family farms. The work includes a study of the dynamics of the poultry flocks, their production and consumption of poultry products globally and nationally.

In order to carry out own research documentation, there have been reviewed those mechanisms that can be operated to increase poultry meat production in family farms, namely: identifying sources of genetic progress, setting targets of artificial selection, breeding and testing selection techniques applied to birds in order to obtain valuable genotypes for production of commercial hybrids; knowledge of offer on the Romanian market and worldwide, as well as advantages and characteristics of each farming system of chickens, type: classic (traditional), intensive super-intensive and alternative. We had chosen the study of alternative broiler growth, for two reasons, namely:

a) most of the familial farms in Romania could introduce easier one or more of these systems, comparing with the intensive and superintensive systems;

b) it is possible that the new EU regulation related to animal welfare, which are against the superintensive and intensive poultry husbandry systems, to become compulsory, starting with year 2012.

The researches have been run in an agricultural-animal farm which belongs to the „TCE 3 Brazi" S.R.L, holding, Girov place. The design of that farm allowed us to set-up the desired experimental conditions, which perfectly simulated the poultry rearing conditions from familial farms.

Laboratory analysis were run in Animal Science Faculty from U.A.S.V.M. „Ion Ionescu de la Brad" Iaşi, as well as into the Sanitar-Veterinary and Food Safety Direction Neamț.

Company TCE 3 Brazi "LLC is privately owned, specialized in agricultural crop production, animal husbandry, processing of animal and vegetal products, wood factoring etc. Each of these areas ensures that finished products are competitive domestically and internationally.

According to the main experimental design, there have been organised **2 (two) experimental series**, entitled:

- **series I**: *„Contributions on the improvement of production performances in chicken broilers reared in familial type farms (part I)"*;
- **series II**: *„Contributions on the improvement of production performances in chicken broilers reared in familial type farms (part II)"*.

In the **experiemental series I**, there have been formed 3 (three) groups of day old chicken broilers, namely: **1 (one) control group – Lc** and **2 (two) experimental groups – L1exp. and L2exp.**, corresponding to 3 (three) technological versions.

In **groups Lc and L1exp.** it was used the same rearing technology of the chcikens, respectively, respectiv: **deep litter rearing, in halls providing acces to outer paddock**, wicth certain differences related to the technological version:

a) in control group – Lc (technological version no. 1):

- windows and doors for access toward outer hall, disposed on the front wall;
- natural ventilation;
- natural lighting;
- heating with radiant brooders;
- conventional feeders;
- vacuum watering devices (starter period) and hanged devices with valves (growing-finishing period);
- manual disposal of faeces;
- grassy paddock.

b) in L1exp. group (technological version no. 2):

- windows with blinds for outer light shuttering, on the front wall;

- doors for access toward outer hall, disposed on the front wall;
- mixed ventilation (natural and artificial);
- mixed lighting (natural and artificial);
- heating with airflow heaters;
- conventional feeders;
- adjustable waterers, nipple type;
- manual disposal of faeces;
- grassy paddock.

c) in L2exp. (technological version no. 3):

- lack of windows and doors for outer access;
- natural ventilation;
- natural lighting;
- heating with airflow heaters;
- Big Dutchmann feeding line;
- Big Dutchmann watering line (nipple type waterers);
- dispenser for drugs and additives into the drinking water;
- automatic command of the hall equipments, into the control room;
- manual disposal of faeces.

In order to confirm/deny the results achieved during the **experimental series I**, it was set up the **experimental series II**, with 4 (four) experimental groups (**Lc1**, **L3exp.**; **L4exp.**; **L5exp.**), on a similar experimental design.

Alternatively, we proposed to study the productive and economic effect of broilers rearing in a space (compartment) which hosted 32 battery cages „AVIMAX", made by the „Big Dutchmann" – Germany company and which allowed to provide a brooding density of 25 chickens/m^2, instead of 14-18 chickens/m^2, in the other studied technological versions.

The building and constructive details of the spaces (compartments) used in broilers rearing were identical, as follows:

Experimental series I	**Experimental series II**
Lc ← →	→ Lc1
L1exp. ← →	→ L3exp.
L2exp. ← →	→ L4exp.

In **L5exp.** group, the chickens were reared in „AVIMAX" ecological type batteries.

The biological material we used was represented by the commercial (industrial) chicken hybrid for meat production, named „ROSS-308".

The chickens were slaughtered at 42 days old, in order to assess the meat quantitative and qualitative production.

In both experimental series, certain **parameters** have been investigated:

a) Microclimate from the chicken rearing rooms (compartments):
   - dynamics of environmental temperature;
   - dynamics of relative air humidity;
   - lighting schedule;
   - ventilation program.

b) Chickens rearing parameters:
   - dynamics of weight gain and the average daily gain;
   - feed intake (average intakes and feed conversion ratio);
   - sanitar-veterinary status of the chickens.

c) Quantitative and qualitative meat production:
   - slaughter yield;
   - weight of main internal organs and their participation in the chickens live weight;
   - participation of cut parts in carcass formation;
   - meat/bones ratio;
   - chemical composition of the meat from breast and thighs and shanks.

d) Economic efficacy of the studied chicken broilers rearing and valorisation.

The applied research methods were those accepted and indicated in the scientific literature.

Main experimental data were statistically processed, basing on the most up to date methods.

Analysis of production and economic performance of broiler chickens "ROSS-308"on which we worked has shown us that the establishment of micro-farm, family type, for the rearing if this category of birds is beneficial, leading to production of poultry meat of high quality, with a low feed conversion index and an incentive profit for farmers.

Micro farms for broilers rearing, of familial type can act as satellite units of closed-circuit poultry companies, together with business benefits to both parties; so these integrating units can provide to micro farms the biological material needed (day old chickens of meat), at terms spelled out by an agreement of cooperation; they also can grant, upon request, technical and

veterinary assistance. In the same context, the units can deliver integrated micro premixtures needed at higher quality parameters.

In turn, the integrators have the advantage that can increase their slaughter capacity, the contribution coming from the micro-integrated chicken business. As a result, the slaughterhouses will work on design capacity, resulting, finally, a higher profit. The fact that microfarms are established, usually in dispersed locations and have small flocks of birds, enables better protection from the veterinary point of view of these herds.

Micro-family farms for broiler chickens growth offers another advantage, namely that, in their different versions can apply different technologies, from the classical ones (deep litter growth in halls with paddock access outside), less costly, to the modern ones (permanent litter growth in blind halls, controlled microclimate and adequate feeding and watering equipment) and ultramodern ones (growing in blind halls, equipped with ecological batteries).

Depending on the level of investments made in technology, profits can be higher or lower.

For the rearing on permanent litter was found that body weight of chickens at slaughter (42days) proportionally increased, as technology was improved; it was reduced the feed consumption per kg of weight gain. Thus, permanent litter growth at a density of 16 broilers/m^2 in halls with access to outside paddock , with no upgrades(LC1-control group) resulted in obtaining an average body weight at the age of slaughter of chickens (42 days) of 2365.19 g and a feed conversion ratio (FCR = kg feed/kg gain), amounting to 2.01.

Improving of ventilation, lighting, heating and watering equipments by simple solutions, which have not led to high costs in L3exp group. (permanent litter growth in halls with outside paddock access) allowed to achieve better average body weight at the age of slaughtering, of 2432.07 g and feed conversion ration of 1.96,even if the brooding density increased at 18 day old chicks/m^2.

Chickens removal from the influence of external environmental factors by rearing them on permanent litter in blind halls, without windows and using controlled microclimate and modern feeding and watering equipments (in group L4exp.) resulted in greater productive potential externalization of the "ROSS-308" hybrid; therefore, at the age of slaughter of chickens (42 days) it was achieved a mean weight of 2522.76 g and feed conversion ratio of 1.91, while brooding density was only 14 day old chicks/m^2.

The transition from horizontal growth, namely from the permanent litter system to the vertical rearing, in the ecologic battery, type "AVIMAX ", produced by the German company "Big Dutchmann ", at a high density of 25 day old chicks/m^2, in blind halls (without windows), microclimate controlled (groupL5exp.) was accompanied by obtaining an average body weight

of chickens at slaughter (aged 42 days), much closer to the productive potential of the chickens "ROSS-308", meaning 2609.89g, with the lowest feed conversion ratio, worth 1.87.

Meat yield given by the broilers in groups **Lc1**; **L3exp.** şi **L4exp.**, from the experimental series **II** was situated at higher level than in the correspondant groups (**Lc**; **L1exp.** and **L2exp.**) from **series I**; the achieved incomes and revenues recorded also a better dynamics.

There is a single plausible explanation for justifying these results: the usage in feed of certain feed additives, for the chickens in **the experimental series II**: **„Biotronic-Se Forte"** – acidifier and **„Biomin-IMBO"**-pro/prebiotic, produced by „BIOMIN-GmbH" company, Austria.

The „**Biotronic-Se Forte**" acidifier was used in 1‰ ratio, in all feed recipes we used (starter; grower and finisher), while the Pro/Prebiotic „**Biomin-IMBO**", was used in variable inclusion rates: 1,5‰ for starter; 1‰ for grower and 0,5‰ for finisher.

Since in our studies proved the superiority of the chickens rearing in ecological type **"AVIMAX" cage batteries**, compared to permanent litter growth, this made us believe that broiler rearing technology in **ecological battery** is void of human conception, although not of the desire of birds.

If, however, usage of these technologies will not be approved, we consider that all variants of tested technology were based on growth of broilers on permanent litter and they could be applied in micro-type family farms; depending on the available level of investments, the farmer can choose the best technological suitable option for his interests.