Protein Level the Influence and the Period of Combined Feed Administration in Ross 308 Hybrid in Serbia

Daniel Omoran, Lavinia Stef, Călin Julean, Eliza Simiz*

Banat’s University of Agricultural Sciences and Veterinary Medicine, “King Michael I of Romania” from Timisoara, 300645, Calea Aradului 119, Romania

Abstract
There are various researches where during growth period of broilers are used 2 or 4 combined feed (CF) recipes, with different nutritional characteristics, which can cover the chickens need, and which can also satisfy the technical-economical condition. The purpose of this work was to assess the possibility to simplify the way of feeding the chickens Ross 308 hybrid, by reducing the number of forage recipes from 4 to 3, and by administering combined feed with a protein level of 4% higher during the so-called growing period (11-33 days). In meat chickens, Ross 308 hybrid, for which the growing technology was applied with 4 types of CF: starter, I grower, II grower and finisher, at the age of 43 days, there was obtained an average body weight of 2557.81 g, an intake of 4790 g/chicken, a feed conversion ratio of 1.90, the feed costs to achieve 1 kg live weight being of 0.685 euros; in chickens fodder-fed with 3 CF structures, the body weight was of about 5.6% higher, a close feed intake, and the same feed conversion ratio, and the foraging costs related to kg live weight were of 0.15% higher. The conclusion is the simplification of broiler feeding technology reducing from 4 and 3 structures of combined feed by administering a CF with up 4p% more protein, during the so-called growing period.

Keywords: broilers, nutrition, protein level.

1. Introduction
The foraging costs represent about 70 percent of the total amount of variable production costs and they depend on the structure of the recipe [1, 2]. Chicken growing response is influenced by several factors, i.e. the feed composition, and the physical nature of feed diet [3, 4]. Some authors [2, 5, 6] assert that these responses can be either positive or negative depending on the properties of the diet and on the growing conditions. The reduction of crude protein (CP) content in the recipes for broilers can diminish the feed cost and allows the use of alternative fodders. Some researchers have found that the CP reduction would not affect the growing performances [7].

However, the growing rate and efficiency is smaller, and the composition of carcass becomes lower in chickens fed with recipes where CP has been reduced by more than 3 percent, even when all known nutritional requirements are met [8-10]. CP reduction under a minimum level even with essential amino acids (EAA) maintained level has led to a delayed growing, with higher feed intake, thus leading to feed conversion ratio (FCR) increase. This means that, consonant with many researchers, the valines are not able to fully replace CP in diets [11, 12]. These comments are not consonant with the results of the people who found that an optimal performance can only be reached by satisfying the EAA needs [13, 14]. In most of the prior similar studies, there was a minimum level of constraint for CP: the reduction under this level of performance suddenly affected [15]. The use of a feed diet with a low content of crude protein has as purpose the reduction of N
quantity in droppings, thus reducing the N loss for the environment [16, 17]. The time of grower period in broiler has decreased from year to year. Broiler selection in the second half of the 20th century was firstly performed to obtain higher meat productions at minimum production costs, the animal feed mainly increasing the costs. This led to the development of some broiler strains whose production features and objectives, which include the reaching of a maximum biological potential, i.e. the fast growing rate, the high slaughter rates, and the feed conversion ratio, ensuring a maximum cost-efficiency and profitability in this type of production. At the moment, chickens can reach body weights of 2 kg with a feed intake of 3 kg in a period of only 5 weeks [18, 19]. This quick growing rate strongly connected to the very high capacity of protein deposit, combined with a high feed intake as a result of genetic selection in the last decades [20]. Nutritionally speaking, such a genetic selection has led to changes in the nutritional requirements, which has as a result a continuous change of the structures of combined feed (CF) by the fodder manufacturers [21].

2. Materials and methods

The purpose of this work was to assess the possibility of simplifying the feeding method in chickens - Ross 308 hybrid -, by reducing the number of fodder recipes from 4 to 3, and by administering, during the so-called grower period (11-33 days), a combined feed with a protein level higher with 4p percent, in order to help the poultry breeders and fodder manufacturers formulate diets adapted for poultry and economic conditions. The experiment was performed on a group of 10000 for 43 days, under the growing conditions specific to KALIMERO farms. Chickens were divided into two experimental variants, as follows:

- **V1** – made of 5000 chickens *four phase* fed with notified combined mixture: CF starter (23% CP, 3048 kcal ME/kg), CF grower I (22% CP; 3111 kcal ME/kg), CF grower II (18%CP, 3178 kcal ME/kg) and CF finisher (17% CP, 3200 kcal ME/kg);

- **V2** – made of 5000 chickens *three phase* fed with CF starter (23% CP, 3048 kcal ME/kg), CF grower (22% CP; 3111 kcal ME/kg), and CF finisher (17% CP, 3200 kcal ME/kg);

Regarding the combined feed (CF) intake, there are four phases in the experimental variant 1 and three phases in the experimental variant 2, thus:

- **Phase I: Starter** from one day to 10 days in both experimental variants;
- **Phases II:** Grower I (between day 11 and day 20) and Grower II (between day 21 and day 33) in V1, and Grower I (from 11 to 33 days) in V2;
- **Phase III:** Finisher from 34 days to 43 days in both variants.

The assessment of nutritional substances intake of feed administered was set by specific laboratory tests mainly performed in the ENOLOŠKA STANICA VRŠAC Laboratory from Serbia. Using the standard method, the following parameters were monitored: feed intake (FI), body weight (BW) (was set by individual weights at ages of 10, 20, 33 and 43 days, which also correspond to the moment of change of the type of administered combined feed), daily mean growth (DGM), feed conversion ratio (FCR).

The experimental data was statistically processed and interpreted by using the SPSS IMB 22 software [22], using the analysis of variant and Student testing.

3. Results and discussion

**Combined feed intake in broilers within the experiment**

The combined feed intake was close in both experimental variants, thus, at the end of the analyzed period, the experimental variant 2 registered a total consumption of 5070 g CF, about 5.84 percent higher compared to the experimental variant 1, which registered a total consumption of 4790 g CF.

With reference to this indicator, it can be estimated that the intake periods and the nutritional characteristics of combined feed used have not significantly influenced the feed intake in chickens belonging to the two experimental groups.
The intake, during the entire grower period in chickens within V2, of a CF by 4% more crude protein but in a single structure, compared to two recipes, during the same period in chickens in V1, has determined that, in this phase, the crude protein intake within V2, be higher by 21.3% than V1, and during the entire experimental period, the crude protein consumption between V2 – V1 be higher by 15.3%, which explain the values of upper productive indices obtained in chickens within V2.

The evolution of body weight in broilers within the experiment is shown in the Table 1 and chart in the Figure 3.

During the start period, i.e. 1-10 days, chickens were fed with the same type of combined feed, with an energetic level of 3048 kcal ME/kg and with a protein level of 23% that had a weight growing effect from 41 g at the age of 1 day to 263.13 g at the age of 10 days in V1 and to 270.25 g in V2; the differences between the environments of the two groups being only of 7.12 g, statistically insignificant (p>0.05);

During the growing period I and II, chickens in V1 have consumed the two types of CF shown, and there have been obtained environments of the body weights of 767.28 g at the age of 20 days and of 1706.32 g/chicken at the age of 30 days. As regards the chickens in V2 that, during this growing period have consumed CF with an energetic level of 3111 kcal ME/kg and a protein level of 22%, have registered an average body weight of 1810.21 g at the age of 33 days, which is significantly higher (p<0.01), by 6.08 p% compared to chickens in V1;

During the finisher period from 34 to 43 days, chickens in both experimental variants were fed with the same CF recipe, the body weight differences at the end of the experiment being of 2557.81 g in V1 and of 2704.78 g in V2 keeping them at a significant difference (p<0.01) as a result of using, during 11-33 days, a CF with a protein content of about 4 p% higher.

<table>
<thead>
<tr>
<th>Age</th>
<th>V1</th>
<th>V2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean ± SD</td>
<td>Mean ± SD</td>
</tr>
<tr>
<td>10</td>
<td>263.13 ± 3.035</td>
<td>270.25 ± 3.125</td>
</tr>
<tr>
<td>20</td>
<td>767.28 ± 9.986</td>
<td>788.90 ± 10.355</td>
</tr>
<tr>
<td>30</td>
<td>1706.32 ± 24.855</td>
<td>1810.21 ± 29.668</td>
</tr>
<tr>
<td>43</td>
<td>2557.81 ± 34.382</td>
<td>2704.78 ± 34.793</td>
</tr>
</tbody>
</table>
The total growing efficiency and the daily average efficiency during the grower periods in experimental variants within the experiment are shown in Table 2, and graphically shown in the Figure 4.

The productive effect, which is higher in chickens within V2 compared to V1 recorder at 33 days is also maintained at the end of experiment. Thus, at the age of 43 days, after the finisher phase, chickens in V2 have obtained a total efficiency of 2663.78 g (daily mean growth 61.95 g/chicken) which is 5.5% higher compared to variants V1 where the total efficiency was of 2516.81 g (daily mean growth 58.53 g/chicken).

The reduction of the number of fodder recipes from 4 to 3 with a CF intake, during the entire grower period, with a protein content of about 4 p% higher, ensures a total and also an average daily efficiency of 5.84% higher in chickens within V2 compared to chicken within V1 reference variants.

Table 2. Evolution the weight gain and daily mean gain growth

<table>
<thead>
<tr>
<th>Period (days)</th>
<th>Weight gain (g/head/period)</th>
<th>Daily mean growth (g/head/period)</th>
<th>Relative differences (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>V1</td>
<td>V2</td>
<td>V1</td>
</tr>
<tr>
<td>0-10</td>
<td>222.13</td>
<td>229.25</td>
<td>22.21</td>
</tr>
<tr>
<td>0-20</td>
<td>726.28</td>
<td>747.90</td>
<td>36.31</td>
</tr>
<tr>
<td>0-33</td>
<td>1665.32</td>
<td>1769.21</td>
<td>50.46</td>
</tr>
<tr>
<td>0-43</td>
<td>2516.81</td>
<td>2663.78</td>
<td>58.53</td>
</tr>
</tbody>
</table>

**Feed conversion ratio-FCR**

Another bioproducive mark analyzed was the feed conversion ratio, a mark which has a greater relevance in assessing the effect of the period of combined feed intake during growing period of broilers at an age of 1 day up to delivery. The analyses of this mark shows that during the grower period (until the age of 33 days) when the protein level of combined feed intake is distinguished, the feed conversion ratio cumulated in chickens within V1 was of 1.76, i.e. at a comparable value of 1.77, which was also set in chickens within V2. During the entire experimental period, the feed conversion ratio has been leveled in both variants at 1.90, which means that the change of growing combined feed recipes did not influence this mark.

**The analysis of feeding costs**

The analysis of feeding costs was set for the entire grower period depending on the purchase price of feed and on CF structure on grower phases (Figure 4).
As expected, according to data shown in Figure 4, the highest expenses with fodders are met in chickens within V2 with 1.856 euro/head, but when expressing the expenses reported per kg livestock, it can be noticed that in chickens within V2, these costs are only 0.15% higher compared to V1, which allows to recommend the application of a tri-phase diet and with the nutritional values of CF provided in the protocol also economically speaking.

4. Conclusions

In Ross 308 broilers within the variant V1 where was applied the usual growing and feeding technology in Serbia, with 4 types of combined feed, under the conditions of the experiment performed at KALIMERO farm, at the age of 43 days, there were obtained chickens with an average body weight of 2557.81 g, and at a 4790 g intake/chicken, the feed conversion ratio was of 1.90, and the expenses with fodders to achieve 1 kg livestock were of 0.685 euros;

In broilers (the same hybrid) within the variant V2, under the conditions of this experiment, with the grower period of 20-33 days, there was administered a sole recipe of CF, but with a protein level of 4p% higher, there were obtained chickens with the body weight of about 5.6% higher at a corresponding feed intake, and at the same feed conversion, but with fodder expenses reported at kg livestock of 0.15% higher.

The possible recommendation to be performed at the end of the experiment would actually be at the Serbian farmer’s option, who can choose the variant to simplify the broiler feeding technology, meaning to reduce from 4 to 3 structures of combined feed by administering, during the grower period, a CF up to 4% more protein; this variant allows to obtain a body weight of 5.6% higher, at the same feed conversion ratio, but at foraging costs of 0.15% higher. The other option remains the broiler growing variant which applies in Serbia at present.

Acknowledgments

We would like to express our gratitude for the valuable expertise, advice and helpful support received from the late Prof. DAN DRINCEANU in organizing and conducting the research.

References


21. SPSS, Statistics version 22.0. IBM SPSS Inc, USA.