

ABSTRACT

For human nourishing, eggs represent an important source of energy and nourishing substances, especially of proteins with a high biological value.

In the last years it has been noticed an increasing dynamics of egg consumption per inhabitant among world's third countries as well as in those in course of progress; on the other hand, in most of developed countries, there is a decrease tendency of egg consumption, due to its relatively high content of cholesterol, predisposed agent of disease emergence of the circulation system. Moreover, on the market, there is a highly increased competence among companies interested in the trade of eggs for consumption. The most appreciated and obviously most demanded eggs come from the extensive system of poultry raising, provided with a good quality eggshell and high sensorial quality of the yolk and white of the eggs. The colour has also a nice hue of yellow towards orange.

Considering the extensive system of laying poultry raising, the specialists focus their attention towards finding better solutions of improvement of the egg quality, including the colour of the yolk of the egg, resulted from their intensive raising system.

Regarding those mentioned above, the hereby research paper presents the results obtained by the use of some fodders, provided with colouring role for the improvement of the colour of the yolk of the egg, obtained from the hens raised in battery boxes.

The researches have been performed in the Avicol Complex Lumina Constanța County, on the eggs from an effective amount of 14.750 laying hens/experiment, belonging to the commercial hybrid „Roso-SL”, of Romanian origin.

In total, there were performed 3 (three) experiments, on an amount of 44.250 experiments.

The analysed fodders were: „*Oro Glo Layer Dry*”, „*Kem Glo 5 Dry*”, „CAROPHYLL YELLOW”; their utilisation has been performed in different doses, according to the elaborated experimental protocol.

According to performed experiments, the following aspects were resulted.

In the frame of *series I of experiments* the food of the laying hens was supplemented with: „Oro Glo Layer Dry”, dose of 100 g/t, at group L1exp; „Kem Glo 5 Dry”, dose of 1 kg/t, at group L2exp; „Oro Glo Layer Dry”, dose of 150 g/t + „Kem Glo 5 Dry”, dose of 1,2 kg/t at group L3exp and „CAROPHYLL YELLOW”, dose of 35 g/t at group L4exp, had no influence on the weight of the hens that were studied.

- At the beginning of the experiment, when the hens had 25 weeks, their average body mass was of: $1883,28 \pm 152,34$ g at the controlling group (Lc); $1876,17 \pm 161,34$ g at experimental group 1 (L1exp); $1882,37 \pm 153,81$ g at experimental group 2 (L2exp); $1874,83 \pm 156,42$ g at experimental group 3 (L3exp) and of $1872,09 \pm 160,21$ g at experimental group 4 (L4exp).

At the end of the experiment, when the hens reached the age of 50 weeks, the hens from the experimental groups had the following average body masses: $2217,47 \pm 191,12$ g at group Lc; $2214,50 \pm 187,64$ g at group L1exp; $2218,70 \pm 188,51$ g at group L2exp; $2220,78 \pm 195,08$ g at group L3exp și $2217,85 \pm 189,79$ g at group L4exp.

- The effective losses registered along the development of the experiment were between 4,61 and 5,22%.

- The egg production registered along those 25 weeks of experiments did not present significant differences between those five groups formed in the frame of the experiment, yet it presented differences towards standard laying curve for the used hybrid.

- Food consumption of the hens in the frame of this experiment did not present significant differences among the groups; therefore, at the beginning of the experiment, the average food consumption (g/pcs/day) was between 107,14 at group Lc and 107,68 at group L3exp, while the food conversion rate (g.m.f./egg) was between 117,28 at group L2exp and 118,08 at group L3exp.

At the end of our investigations there have been noticed significant differences between the food conversion rates (g.m.f./egg) performed at the 5 experimental groups, between 145,42 at group L3exp and 146,27 at group L2exp. As far as daily average food consumption (g.m.f./pcs/day) is concerned, it can be noticed that, there are registered higher values than standard value with 3,72-3,99%.

- The average weight of collected eggs at the age of 25 weeks was between $57,4 \pm 0,77$ g at group L1exp and $57,8 \pm 0,74$ g at group L2exp. These values have been slightly reduced than the value stipulated in the guideline for the raise of the commercial hybrid „Roso-SL”.

At the end of those 25 experimental weeks, the following average weights have been registered for the eggs collected from the hens that were analysed: $64,8 \pm 1,03$ g at group Lc;

64,6±0,98 g at group L1exp; 64,7±1,09 g at group L2exp; 64,6±1,12 g at group L3exp and 64,7±1,02 g at group L4exp.

This time also, calculated values for the five experimental groups have been slightly reduced than standard values with 0,15-0,46%.

- Quality rates of analysed eggs (thickness of the mineral eggshell and pH value of the yolk and white of the egg), were not influenced by the experimental agents used in the frame of this experiment („Oro Glo Layer Dry”, „Kem Glo 5 Dry”, „CAROPHYLL YELLOW”). Registered values were between the limits stipulated by the specialized literature that has been consulted.

The intensity of the yolk colour was of 3,88±0,32 at group Lc, less with 91,75-121,64% than that at the experimental groups (L1exp÷L4exp).

In *series II of experiments* same fodders were used, yet in different doses compared to experiment I, in the following manner: „Oro Glo Layer Dry”, dose of 150 g/t, at group L5exp; „Kem Glo 5 Dry”, dose of 1,8 kg/t, at group L6exp; „Oro Glo Layer Dry”, dose of 150 g/t + „Kem Glo 5 Dry”, dose of 2 kg/t, at group L7exp and „CAROPHYLL YELLOW”, dose of 45 g/t at group L8exp, had no influence on the weight of the hens that were studied.

- At the beginning of the experiment, when the hens had 25 weeks, their average body mass was of: 1879,15±144,37 g at the controlling group (Lc2); 1881,22±158,53 g at experimental group 5 (L5exp); 1884,53±149,83 g at experimental group 6 (L6exp); 1878,55±143,27 g at experimental group 7 (L7exp) and of 1887,39±162,52 g at experimental group 8 (L8exp).

At the end of the experiment, when the hens reached the age of 50 weeks, the hens from the experimental groups had the following average body masses: 2220,72±200,11 g at group Lc2; 2216,05±197,66 g at group L5exp; 2220,75±198,55 g at group L6exp; 2218,89±202,17 g at group L7exp and 2221,53±199,91 g at group L8exp.

- The effective losses registered along the development of the experiment were higher than those stipulated in the guideline for the raise of the used hybrid (2,5%). Therefore, at the end of the experiment, when the hens reached the age of 50 weeks, there were registered effective losses between 4,74 and 5,65%.

- The egg production registered along the 25 weeks of experiments did not present significant differences between those five groups formed in the frame of the experiment, yet it presented differences towards standard laying curve for the used hybrid.

Therefore, the top of production of analysed hens was reached at the age of 31 weeks, 4 weeks later than the provisions of the guideline for the raise of the commercial hybrid „Rosio SL”; moreover, the plate of the laying curve has not been properly highlighted.

- Food consumption of the hens in the frame of this experiment did not present significant differences among the groups; therefore, at the beginning of the experiment, the average food consumption (g/pcs/day) was between 107,35 at group Lc2 and 107,89 at group L7exp, while the food conversion rate (g.m.f./egg) was between 117,13 at group L6exp and 117,91 at group L7exp the average consumption of the hens in the frame of the experiment being higher with 0,11-0,77% than the consumption stipulated in the guideline for the raise of the hybrid „Roso-SL”.

At the end of the experiment there have been noticed no significant differences between food conversion rates (g.m.f./egg) performed at the 5 experimental groups, between 145,33 at the group L6exp and 145,88 at the group L8exp.

- The average weight of collected eggs at the age of 25 weeks was between $57,7 \pm 0,82$ g at group L8exp and $58,2 \pm 0,64$ g at group L6exp. These values have been slightly reduced than the value stipulated in the guideline for the raise of the commercial hybrid „Roso-SL” for this rate. From a statistic point of view, there were no significant differences between the five groups of study.

At the end of those 25 experimental weeks, when the hens reached the age of 50 weeks, the following average weights have been registered for the eggs collected from the hens that were analysed: $65,2 \pm 1,03$ g at group Lc2; $65,0 \pm 0,98$ g at group L5exp; $65,1 \pm 1,05$ g at group L6exp; $65,0 \pm 1,02$ g at group L7exp and $65,1 \pm 1,02$ g at group L8exp.

This time, calculated values for the five experimental groups were slightly increased against standard value with 0,15-0,46%.

- Quality rates of analysed eggs, respectively thickness of the mineral eggshell and pH value of the yolk and white of the egg, were not influenced by the experimental agents used in the frame of this experiment („Oro Glo Layer Dry”, „Kem Glo 5 Dry”, „CAROPHYLL YELLOW”). Registered values were between the limits stipulated by the Following the administration in the food of the laying hens of three types of fodders („Oro Glo Layer Dry”, „Kem Glo 5 Dry”, „CAROPHYLL YELLOW”) the colour level of the yolk of the egg has been improved. Therefore, the average calculated grade for the colour intensity of the yolk for group Lc2 was of $4,15 \pm 0,53$, while the experimental groups obtained higher grades than 1,77 up to 2,94 times.

In *series III of experiments* the best experiments from the previous ones were checked and the food of the birds was supplemented with: „Oro Glo Layer Dry”, : 150 g/t + „Kem Glo 5 Dry”: 1,2 kg/t, at group L9exp; „CAROPHYLL YELLOW”: 35 g/t, at group L10exp; „Oro Glo Layer Dry”: 150 g /t + „Kem Glo 5 Dry”: 2 kg/t, at group L11exp and „CAROPHYLL

YELLOW” dose of 45 g/t at group L12exp, had no influence on the weight of the hens that were studied.

- At the beginning of the experiment, when the hens had 25 weeks, the average body mass of studied hens was of: 1874,83±156,42 g at controlling group (Lc3); 1876,17±161,34 g at experimental group 9 (L9exp); 1879,15±144,37 g at experimental group 10 (L10exp); 1883,28±152,34 g at experimental group 11 (L11exp) and of 1881,22±158,53 g at experimental group 12 (L12exp).

At the end of the experiment, when the hens reached the age of 50 weeks, the hens from the experimental groups had the following average body masses: 2214,50±187,64 g at group Lc3; 2218,70±188,51 g at group L9exp; 2220,78±195,08 g at group L10exp; 2220,72±200,11 g at group L11exp and 2216,05±197,66 g at group L12exp.

- Food consumption of the hens in the frame of this experiment did not present differences among the groups; therefore, at the beginning of the experiment, when the hens had the age of 25 weeks, the average food consumption (g/pcs/day) was between 107,13 at group L9exp and 107,41 at group L12exp, while the food conversion rate (g.n.c./egg), was between 116,84 at group Lc3 and 117,81 at group L11exp.

At the end of the experiment, when the hens reached the age of 50 weeks, the food conversion rate (g.m.f./egg), was between 128,23 at group L11exp and 129,23 at group L9exp.

- The average weight of collected eggs at the age of 25 weeks was between 57,4±0,69 g at group L10exp and 58,2±0,64 g at group L12exp. These values have been slightly reduced than the value stipulated in the guideline for the raise of the commercial hybrid „Roso SL” for this rate.

At the end of those 25 experimental weeks, when the hens reached the age of 50 weeks, the following average weights have been registered for the eggs collected from the hens that were analysed: 64,7±1,02 g at group Lc3; 64,7±1,09 g at group L9exp; 65,2±1,03 g at group L10exp; 64,8±1,03 g at group L11exp and 65,0±1,02 g at group L12exp.

This time, calculated values for the five experimental groups were very close to the standard value of – 64,9 g.

- Quality rates of analysed eggs, respectively thickness of the mineral eggshell and pH value of the yolk and white of the egg, were not influenced by the experimental agents. Registered values were between the limits stipulated by the specialized literature that has been consulted.

- Following the administration of fodders in the food of the laying hens the colour level of the yolk of the egg has been significantly improved. Therefore, the average calculated grade for the

colour intensity of the yolk for the experimental groups was of 2,16 – with 3,04 higher than the average grade established for the group Lc3 ($4,01 \pm 0,68$).

The best results were obtained at the group L11exp, which received in its food a mixture of two types of fodders – „Oro Glo Layer Dry”: 150 g/t + „Kem Glo 5 Dry”: 2 kg/t; for this group the average grade was of $12,19 \pm 0,73$.

The average evaluation of hereby researches allows the elaboration of some recommendations, which we consider utile for the Poultry raising complex of Romania. For the improvement of the level of colour of yolk of eggs for consumption, the administration in the food of laying hens of a mixture of two fodders is requested: „*Oro Glo Layer Dry*”, dose of 150 g/tone of mixed forage + „*Kem Glo 5 Dry*”, dose of 2 kg/tone of mixed forage. Therefore, the administration of fodders in the food of studied laying hens for the improvement of the colour level of the yolk of the egg is indicated a mixture of two types of fodders „Oro Glo Layer Dry”: 150 g/t + „Kem Glo 5 Dry”: 2 kg/t.