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EFFECTS OF THE ORGANIC SELENIUM (SEL-PLEX) ADMINISTERED IN LAYING HENS' FEED IN SECOND LAYING PHASE ON PRODUCTION PERFORMANCES AND THE EGGS QUALITY

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Abstract. The research was performed on 162 laying hens, Roso– SL hybrid, divided in three groups, 54 heads/group. Organic Se (Sel-plex) was supplemented in total mixed ratio (TMR) in group 2E using a proportion of 0.03%, and in group 3E of 0,045%. The trial developed within 14 weeks, second laying stage (48 weeks – 62 weeks of age), respectively. The laying hens were individual weighted, in the beginning and in the end of the trial. During trial, the following issues were studied: evolution of body weight, laying intensity, average weight of eggs, forage consumption by egg, egg structure, eggshell quality and Se content in egg. The use of 0.03% organic selenium (Sel-plex) in group 2E and the use of 0,045 % organic selenium in feed administered to group 3E determined an increase of laying intensity by 3.23% (G_3-E) and 1,23% (G_2-E), reducing specific consumption by egg by 3.03%, (G_3-E) and 0,26% (G_2-E) and the reduction of the number of eggs with shell abnormalities at 1,14% (G_3-E) and 1,56% (G_2-E) towards 2,42% in group G1 (C). Also the egg enriches in selenium (20,15 µg/ egg at G_2-E, towards 16,62 µg/ egg at G1-C). The results obtained confirm the favorable influence of the organic selenium on the main production and consumption indices, as well as on the egg quality of laying hens in the second laying stage.

INTRODUCTION

In poultry farming the organic selenium has a series of advantages comparative with the anorganic selenium.

In the trials made worldwide on laying hens it has been ascertained that the addition of organic selenium in feeds led to the improvement of the eggs production, the eggs weight and the egg components (eggs shell, yolk and white), (Rutz şi col. 2003) as well as the improvment of FCR (Pan şi Rutz, 2003). Besides it looks like the organic selenium can be transfered into the eggshell improving thus its quality (Rutz şi col. 2003, Klecker şi col, 2001).

The researches made by Narahari D. Et al 2004 showed that the addition of organic selenium in laying hens feeds lead to the raising of selenium content in egg together with vitamin E.

The accumulation of organic selenium in hens' eggs can represent an efficient way for the organic selenium administration for the reduction of cancer incidence and of other diseases of humans. The enrichment of eggs with organic selenium represents a commercially valuable use for the future.

The supplementation of hens' food with organic selenium not only improves their health and productivity, but can also be a natural way to produce functional food, respectively the production of eggs enriched with selenium (Yaroshenko F.A. şi col. 2003).

The aim of those researches was to establish the influence of Sel-Plex adition in laying hens' food on the production performances and eggs quality in the second laying phase in which usually can be recorded a reduction of production indices and eggs quality.

MATERIAL AND METHODS

The research was performed on laying hens, Roso- SL hybrid, from the Department of Poultry Breeding SDE Cluj-Napoca. The hens included in our trial were within the second laying stage, from 48 weeks of age up to 62 weeks of age. They were divided in 3 groups, 54 heads/group. The hens from all three groups were maintained in the same condition of microclimate (BP-3 cages), density, feeding and maintenance.

The nourishment of all three groups of hen was made with combined fodders, which had the same energetic and protein level. The hens from group 2E received 0,03 organic selenium (Sel-Plex) and the hens from group 3E received 0,045% Sel-Plex. The experimental period was 14 weeks, the hens being individually weighted at the beginning and at the end of the experiment.

During the trial, the following issues were studied: evolution of body weight, laying intensity, average weight of eggs, and forage consumption by egg.

To establish the quality of eggs had been followed: the egg weight, yolk, white and shell mass. The structural components of egg were determined on an 80 eggs sample for each group, randomized harvested throughout and at the end of the trial.

During the trial were studied the outer look of eggs, establishing the number of eggs with shell deterioration. Also there has been established the egg content in selenium, through specific laboratory analysis (atomic absorption spectrometry)

The experimental data were statistically processed using "Student" test with WINSTAT, v. 05.

RESULTS AND DISCUSSIONS

The average values and variability of body weight of laying hens during trial are presented in Table 1.

Table 1

The evolution of body weight in laying hens by experimental cycle (g)

Issue	Group	n	X±sx	V%
Initial body weight (48 weeks of age)	G_1(C)	54	1800,18±20,25	8,27
	G_2(E)	54	1771,48±21,17	8,78
	G_3(E)	54	1775,18±21,32	8,83
Final body weight (62 weeks of age)	G_1(C)	52	1785,09±25,20	10,17
	G_2(E)	52	1788,65±24,47	9,86
	G_3(E)	53	1808,86±24,09	9,69

Analyzing the results it has been ascertained that the differences between group 1 (C) and the experimental groups are insignificant. Thus, at the end of the trial, the hens from group 2 and 3 (E) realized a weight gain of 33,68 g (group 3 E) and 17,17 g (group 2 E) and those of group 1 (C) had registered a weight loss of 15,09 g.

The effects of organic selenium administrated in fodder on main production and consumption indices recorded at laying hens are presented in Table 2.

Table 2

Average values of production and consumption indices recorded in laying hens during entire trial cycle

Issue		Groups		
		G1 (C)	G2 (0.03% Sel-Plex)	G3 (Sel-Plex 0,045%)
Body weight (g)	Initial	1800,18±20,25	1771,48±21,17	1775,18±21,32
	Final	1785,09±25,20	1788,65±24,47	1808,86±24,09
Total weight gain (g)		- 15,09	17,17	33,68
Laying intensity (%)	Absolute	81,71±0,71	82,72±0,96	84,35±0,90
	Relative	100,00	101,23	103,23
Average weight of eggs	g	66,08±0,28	66,90±0,25	66,16±0,25
	%	100,00	101,24	100,12
Daily average egg-weigt production	g	53,99	55,34	55,81
	%	100,00	102,50	103,37
Average daily forage consumption (g)		133,21	134,50	133,35
Average forage consumption /100g egg-weight	g	201,59	201,05	201,56
	%	100,00	99,73	99,98
Average forage consumption/egg	g	163,03	162,60	158,09
	%	100,00	99,74	96,97

Analyzing the main production and consumption indices recorded throughout the experimental period (14 weeks) it has been ascertained that the organic selenium added in hens' feed in dosage of 0,03 respective 0,045% has favorable influence on laying intensity and forage conversion in egg production. The absolute laying intensity recorded in group 2 E was of 82,73% in group 3E 84,35% and in group 1(C) 81,71%, the differences recorded between those three groups being insignificantly.

The relative laying intensity increased by 3,23% in group 3 E, respective 1,23% in group 2E towards group 1(C), demonstrating the positive influence of organic selenium (Sel-Plex) on the laying intensity in hens on the second laying stage.

Regarding the average egg weight, it has been ascertained that the values recorded at the three groups are almost equal., the differences being insignificantly.

The average daily production of egg mass is higher at the experimental groups towards group 1C with 3,37% at group 3E and 2,50% at group 2E; the average forage/ 100g of egg mass consumption was lower at the two experimental groups towards group 1 C with 0,27% 2E and 0,02% 3E.

Sel-Plex administrated in laying hens feeding influences favorable the specific consumption for one egg. Analyzing the forage consumption egg, it has been ascertained that the experimental groups register a lower consumption 3E 158,09 g/ N.C./ egg and 2E 162,6 g N.C./ egg towards group 1C 163,03 g N.C./ egg. This reduction of the specific consumption at 3E was 3,03% and 0,26% at group 2E.

From the data presented in table 3 it has been ascertained that the average egg weight, yolk, white and shell, records values almost equal between the three groups, the differences being insignificantly.

The egg shell thickness present higher values at experimental groups towards group 1C, 3E presenting highly significant differences towards group 1C and distinctly significant differences towards group 2E. The reason for this could be the one that Sel-Plex can be transferred into the egg shell, improving thus egg shell quality (Rutz şi col. 2003).

Table 3

Average weight of the main structural components of egg (g) and average weight of shell (mm)

Issue	n	Groups		
		Control group 1	G2 (0.03% Sel-Plex)	G3 (Sel-Plex 0,045%)
Average weight of egg	80	64,32±0,507	64,74±0,536	64,06±0,659
Average weight of yolk	80	17,87±0,164	17,95±0,241	17,83±0,216
Average weight of white	80	37,72±0,418	37,98±0,442	37,38±0,519
Average weight of shell	80	8,73±0,104	8,81±0,109	8,85±0,110
Average thickness of shell	80	0,508±0,006	0,517±0,006^{xx}	0,541±0,005^{xxx}

xx- p<0,01; xxx- p<0,001

The effects of Sel-Plex addition on eggshell quality (the outer look of eggs shell defects) during the experimental period are presented in Table 4.

Table 4

The effects of organic selenium (Sel-Plex) on the exterior aspect of the egg shell

Issue	Experimental groups		
	Control group 1	G2 (0.03% Sel-Plex)	G3 (Sel-Plex 0,045%)
Normal eggs (%) with intact shell	97,58	98,44	98,86
Eggs with broken shell	2,15	1,37	1,00
Eggs without shell, eggs with soft shell and small eggs (%)	0,27	0,19	0,14

At the end of the trial the number of eggs with shell deformities (broken eggs, eggs without shell or with soft shell) is lower in group 3E being 1,14% towards 2,42% as in group 1 C case; group 3E (Sel-Plex 0,045%) presents an higher number of eggs with intact shell towards both group 1C and group 2E.

Another objective of this research was to establish the egg content in selenium (Table 5).

Table 5

Average values and the variability of egg content of selenium in laying hens

Issue	n	$\overline{X}$ ± $s_{\overline{X}}$	V%
Group 1 (M) sodium selenite	10	16,62 ± 0,18	3,35
Group 2 (E), Sel-Plex 0,3 ppm	10	20,15 ± 0.34^{xxx}	5,41

xxx, p < 0,001

Analyzing the data from table 5 it can bee seen that the values of selenium from egg in group 2E (Sel-Plex 0,3 ppm) are way superior towards group 1C (sodium selenite) results that can be compared with those obtained by Kenyon et al 2003. This fact demonstrates that the administration of selenium in laying hens feeding leads to the accumulation of this element in egg.

CONCLUSIONS

1. The use of organic Se (Sel-plex) in proportion of 0.03%, respectively 0,045% determines the improvement of the main production and consumption indices in laying hens within the second laying stage (aged between 48 – 62 weeks).

2. In the end of the trial, the best results were recorded in laying hens from experimental group 3, a 3.23% increase of laying intensity, and a reduction of 3,03% of specific consumption by egg.

3. The administration of organic selenium in laying hens led to the obtainance of some eggs whose shell thickness is bigger at the groups trated with selenium towards group 1C, being recorded an improvement of eggshell quality.

4. The lower number of eggs shell abnormalities (broken eggs, without shell or with soft shell) recorded in experimental groups 2 and 3 show the role of selenium regarding the improvement of eggshell quality.

5. As a result of organic selenium administration in laying hens feeding, the egg enriches in selenium, fact that can lead to the improvement of health status of this product consumers.

6. Based on the results obtained, we recommend the use of Sel-Plex in dosage of 0,045% in laying hens due to the fact that it improves the laying intensity, the feed conversion and the egg quality.

In conclusion, the use of organic selenium (Sel-Plex) in laying hens feeding present considerable advantages both in the growth technology of laying hens and regarding the humans health as a results of selenium enriched products consumption.

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