THE SUPPLEMENTATION EFFECT OF FEED WITH SELENIUM, ZINC AND MAGNESIUM ON EGGS AND MEAT BIOPRODUCTIVE INDICES IN LAYING HENS

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Abstract

The experiment was conducted on 144 hens, for the duration of a production cycle. The biological material used in the experiment was divided into 4 experimental groups. In the experiment we used a structure of mixed supplemented fodder in three experimental variants with selenium, zinc and magnesium. The supplementation of the feed, designed for hybrid hens in the upward phase of the egg laying curve with selenium, zinc and magnesium led to the reduction in the total consumption of feed with additional variants compared with the control group. Feed supplementation with selenium determined the insignificant increase in the egg production, compared to the other variants tested in the upward phase, but a significant increase in the steady and downward phase of the egg laying curve. Zinc supplementation has also led to an insignificant increase in egg production in the upward and downward phases versus the control group. Magnesium supplementation led to the worst results on egg production and their average weight.

Key words: *laying, hens, bioproductive, parameters*

INTRODUCTION

Mineral substances are chemical elements which are indispensable to life, because of the interactions between the ions and the important functions in the development of cells and metabolism (Bârză, 1982; Ghergariu, 1995). They have a plastic role (they make up complex compounds, which are essential for the proper functioning of the body) and a functional role. Microelements are present in small quantities in the tissues of birds, but they perform essential functions for life and growth. In practice a few require supplementation in feeding with fodder: iron, copper, zinc, magnesium, iodide and selenium thus create problems to the birds regarding their productive yield (Crăiniceanu, 2006; Pârvu, 2003; Stoica, 2005). The purpose of this study was to evaluate the modifications induced by the basic food rations supplemented with selenium, zinc and magnesium used in egg-laying hens during a biological cycle on certain bioproductive indicators.

MATERIALS AND METHODS

The experiments were carried out on „Isa Brown" hybrid egg-laying hens in a zootechnical farm in the Western part of the country, where the recommended microclimate conditions have been provided. The combined fodder (CF) recipes have been observed according to the requirements of the hybrid in the experiment in all the three operational phases (upward, steady and downward). A control lot (CG) with 36 hybrid hens and 3 experimental lots of 36 hens each have been constituted (EG-Se, EG-Zn and EG-Mg). The experimental lots have been fed with CF supplemented with 20 g Sel-Plex concentration 1000 mg/100 kg CF with 9.5 g zinc oxide conc. 72%/100 kg CF and the 3rd one with 100 g magnesium oxide conc. 75%/100 kg CF. The statistical interpretation of the data was carried out by means of the Minitab 14 program.

RESULTS AND DISCUSSIONS

During the experimental period of 57 weeks there were no illness cases in the hens in the experimental lots as a consequence of observing the nutritional parameters regarding combined fodder used in the food and of the operating technologies. The average daily consumption (ADC) of fodder recorded at the experimental groups is given in tables 1, 2 and 3 for each phase of the egg-laying curve.

Table 1

Combined fodder consumption (kg) recorded in experimental groups in upward phase

Period (weeks)/ Hens age (weeks)	**CG**		**EG-Se**		**EG-Zn**		**EG-Mg**	
	CF/ hens	ADC / hens	CF/ hens	ADC / hens	CF/ hens	ADC / hens	CF/ hens	ADC / hens
1 (21)	0,770	0,110	0,756	0,108	0,770	0,110	0,742	0,106
2 (22)	0,805	0,115	0,784	0,112	0,791	0,113	0,770	0,110
3 (23)	0,826	0,118	0,805	0,115	0,805	0,115	0,805	0,115
4 (24)	0,840	0,120	0,833	0,119	0,826	0,118	0,805	0,115
5 (25)	0,840	0,120	0,840	0,120	0,854	0,122	0,826	0,118
6 (26)	0,861	0,123	0,854	0,122	0,854	0,122	0,840	0,120
7 (27)	0,875	0,125	0,875	0,125	0,868	0,124	0,840	0,120
8 (28)	0,875	0,125	0,875	0,125	0,875	0,125	0,847	0,121
Total	**6,692**	**0,119**	**6,622**	**0,118**	**6,643**	**0,118**	**6,475**	**0,115**

From the analysis of the data in table 1 (upward phase) it results that during the entire experimental period, the highest CF consumption was recorded at the CG (6.692 kg) followed by the group supplemented with zinc and selenium. The consumption varies from one week to the other, increasing in all the experimental versions, and during the last two weeks analyzed it showed close values.

Table 2

Combined fodder consumption (kg) recorded in experimental groups, in steady phase

Period (weeks)/ Hens age (weeks)	CG		EG-Se		EG-Zn		EG-Mg	
	CF/ hens	ADC / hens	CF/ hens	ADC / hens	CF/ hens	ADC / hens	CF/ hens	ADC / hens
1-4 (32)	3,31	0,118	3,38	0,121	3,32	0,119	3,29	0,118
5-8 (36)	3,32	0,119	3,39	0,121	3,33	0,119	3,3	0,118
9-12 (40)	3,36	0,120	3,42	0,122	3,35	0,120	3,32	0,119
13-16 (44)	3,38	0,121	3,44	0,123	3,35	0,120	3,32	0,119
17-20 (48)	3,40	0,121	3,44	0,123	3,37	0,120	3,35	0,120
21-24 (52)	3,44	0,123	3,48	0,124	3,42	0,122	3,36	0,120
25-28 (56)	3,45	0,123	3,52	0,126	3,44	0,123	3,38	0,121
29-32 (60)	3,47	0,124	3,52	0,126	3,48	0,124	3,4	0,121
33-36 (64)	3,50	0,125	3,54	0,126	3,48	0,124	3,45	0,123
Total	**30,63**	**0,122**	**31,13**	**0,124**	**30,54**	**0,121**	**30,17**	**0,120**

The average daily consumption for the entire experimental period (8 weeks) is found within the limits mentioned in the technological guide of the hybrid. In the steady phase the highest CF consumption was recorded at the EG-Se, followed by the CG (table 2). The ADC also has values which can be found in the technological guide of the hybrid.

The consumption of CF (table 3) in the downward phase in higher in EG-Se (11.30 kg) followed by the CG (11.19 kg) and by the one supplemented with zinc (11.14 kg).

Table 3

Combined fodder consumption (kg) recorded in experimental groups, in downward phase

Period (weeks)/ Hens age (weeks)	CG		EG-Se		EG-Zn		EG-Mg	
	CF/ hens	ADC / hens	CF/ hens	ADC / hens	CF/ hens	ADC / hens	CF/ hens	ADC / hens
1 (65)	0,875	0,125	0,882	0,126	0,861	0,123	0,861	0,123
2 (66)	0,868	0,124	0,875	0,125	0,861	0,123	0,854	0,122
3 (67)	0,875	0,125	0,875	0,125	0,854	0,122	0,854	0,122
4 (68)	0,868	0,124	0,868	0,124	0,861	0,123	0,84	0,12
5 (69)	0,854	0,122	0,875	0,125	0,854	0,122	0,84	0,12
6 (70)	0,861	0,123	0,868	0,124	0,854	0,122	0,84	0,12
7 (71)	0,854	0,122	0,868	0,124	0,854	0,122	0,84	0,12
8 (72)	0,854	0,122	0,868	0,124	0,854	0,122	0,84	0,12
9 (73)	0,854	0,122	0,861	0,123	0,861	0,123	0,84	0,12
10 (74)	0,861	0,123	0,861	0,123	0,854	0,122	0,854	0,122
11 (75)	0,861	0,123	0,868	0,124	0,854	0,122	0,854	0,122
12 (76)	0,854	0,122	0,861	0,123	0,861	0,123	0,854	0,122
13 (77)	0,854	0,122	0,868	0,124	0,861	0,123	0,854	0,122
Total	**11,19**	**0,123**	**11,30**	**0,124**	**11,14**	**0,122**	**11,03**	**0,121**

The egg production was recorded daily, being converted and presented in weekly egg-laying percentages (which were subsequently transformed into angular degrees in order to be able to determine the dispersion index), and for the comparison between groups was used *Anova* test with Tukey test.

From table 4 it is noticeable that the egg production is increasing in all the experimental groups, pointing out the EG-Se which produced a number of 1666 pieces with a weekly average of 208±10.88 pieces, but statistical insignificant compared with the other groups ($p \geq 0.05$).

Table 4

Summarizing table of the evolution of the number of eggs in the upward phase

Period (weeks)	Total /week/group	Mean/day/group		
		$\bar{x} \pm S\bar{x}$	s	CV %
21-28	**CG**			
	1568	196,00±10,33	29,22	14,91
	EG-Se			
	1666	208,00±10,88	30,79	14,79
	EG-Zn			
	1624	203,00±9,89	28,00	13,79
	EG-Mg			
	1484	185,00±8,57	24,24	13,07

Statistical analysis of results in this production phase, revealed that supplementation of CF with minerals did not increase statistical significant the production of eggs.

Table 5

Summarizing table of the evolution of the number of eggs in the steady phase

Period (weeks)	Total /week/group	Mean/day/group		
		$\bar{x} \pm S_{\bar{x}}$	s	CV %
29-64	**CG**			
	7242	804±9,38	28,14	3,5
	EG-Se			
	7442	826±6,61	19,85	2,40
	EG-Zn			
	7298	810±6,97	20,93	2,58
	EG-Mg			
	7003	778±9,13	27,39	3,52

In the steady phase of the egg-laying curve, table 5, egg production is in a slight decrease in all groups and EG-Se stands out, group which produced 7442 pieces with a monthly average of 826±6.61 eggs at a significant difference compared with EG-Mg (7003 eggs). The highest egg-laying percentage during the 36 weeks of experiment is observed in EG-Se. The variability coefficients of the egg-laying percentage for the entire experimental period are low, comprised between 1.78% and 3.49%. In the downward phase of the egg-laying percentage the egg production is decreasing in all groups (table 6), more accentuated decrease being noticed in the EG-Se, which produced a total of 2135 pieces, with an average of 164 eggs, at a significant difference compared to CG.

Table 6

Summarizing table of the evolution of the number of eggs in the downward phase

Period (weeks)	Total /week/group	Mean/day/group		
		$\bar{x} \pm S_{\bar{x}}$	s	CV %
65-77	**CG**			
	2002	154±2,63	9,48	6,15
	EG-Se			
	2135	164 ±2,82	10,15	6,18
	EG-Zn			
	2079	159±3,05	11,01	6,89
	EG-Mg			
	1981	152±2,12	7,64	5,02

For the entire period analyzed in this study we can sustain that the egg production had a low variability coefficient, comprised between 5.02% in EG-Mg and 6.89% in EG-Zn. Analyzing the data cumulated during the 13 weeks of study, it is noticed that EG-Se had the highest lowest egg-laying percentages, being followed by the EG-Zn. As in the case of the number of eggs, evidently the egg-laying percentage registers significant difference during the period of the experiment between EG-Se and CG, but also between EG-Se and EG-Mg.

CONCLUSIONS

Supplementing the CF in the upward phase of the egg-laying curve with selenium, zinc and magnesium led to the reduction of the total CF consumption compared to CG.

Supplementing the CF with selenium determined the significant increase of the egg production compared with the rest of experimental groups.

Supplementing the ration with zinc led to the insignificant increase of the egg production in the upward and downward phase of the egg-laying curve compared to CG and EG-Mg.

In the steady phase of the egg-laying curve, zinc supplementation determined the significant increase of the egg compared with EG-Mg.

Magnesium supplementation of the CF determined the most insignificant results regarding egg production during the entire egg-laying cycle.

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