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THE IMPACT OF A LIGHT PROGRAM WITH ASYMMETRICAL HOUR INTERVALS IN THE PERIOD AFTER THE PEAK OF LAYING TO QUAILS HENS OF "BALOTEŞTI" POPULATION

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Abstract

In order to study the effect of the intermittent light at adult quails after the peak of laying was organized an experiment on a total of 450 quails divided into two batches: a lot has been subjected to continuous illumination with photoperiod duration of 16 hours daily (control group), and the other lot has undergone a lighting program divided according to the following scheme: 10 hours light (natural), 2 hours darkness, 6 hours light (artificial) and 6 hours darkness. The duration of the experiment was 16 weeks and at the beginning of the experiment quails had 29 weeks of laying.
From the research, it was found that the quails from the experimental group registered an average laying percentage high with 16.16% and average production per head with 18.89% higher compared to the control group. The average live weight was higher with 19.61%, and average egg weight was 18.89% higher compared with the control group. Weekly average mortality was 1.11% higher in the control group. Also, the average daily consumption of compound fodder has been about 12.32% higher; in exchange specific consumption was lower with 6.96% at the experimental group compared with the control group.
Given the superior performance recorded in case of experimental batch, it is recommended to use asymmetric fractionated lighting system at quails in the period after laying peak.

Key words: *quail, egg, divided light, performance.*

INTRODUCTION

Raising quails for the production of eggs or meat has spread quite a lot in recent years, particularly in the context of small farms. But considerable difficulties appear as regards the keeping of poultry in these holdings due to use of the wrong or at least not at the optimum level of environmental factors which may exercise a beneficial effect or not in the performance of quails production. Such environmental factor is light, which has more effect on quails through the duration of illumination and its variation than by intensity of light. Rizzoni and Lucceti, relying on June photoperiod, the reproduction period of quails in the wild, recommends a lighting duration of 16 hours and a period of obscurity of 8 hours a day, yet using waking lamps. (Rizzoni and Lucceti, 1963, quote by Velcea M., 1997). Small farmers in our country still often use at laying quails 24 hours light per day (Ioniță et al., 2015).
Recommendations for using of a particular illumination program, either at the youth of quail, either on adult quails, are still quite controversial, especially in the light of new researches of some authors, in which are used divided programmes even from youth period, after that adult quails are subject either for a programme of continuous light with 14-18 hours a day (Popescu-Micloșanu, 2007; Chelmonska et al., 2008; Vali, 2009), either on a divided illumination programme (Ioniță et al., 2015).

Zahoor et al. (2011) studied effects of intermittent light on production of Japanese quail and found that properly designed intermittent lighting (8L:6D:2L:8D) could increase egg production (57.3%), improve feed conversion and reduce mortality (8.33%) compared to conversional (16L:8D) (50.5% and 1.04%).

MATERIALS AND METHODS

Research was conducted on an initial number of 450 adult quail hens from Balotești population, which during the first 28 weeks of laying were subjected to a daily program of 16 hours of light and 8 hours of dark (16L + 8N). Starting with week 29 of laying, quails were split into two groups, in this manner: a batch of 200 quails (control group) were subjected to the same illumination program (16 h light per day) and a batch of 200 quails (the experimental group) have undergone a divided program by the duration of lighting with 16 hours per day (10 h L + 2 h N + 6 h L + 6 h N).

The research was conducted at the quail farm Ionita T. Lucian, individual enterprise located in the Gherghiţa village, Prahova County, Romania. The other environmental conditions in which the experiment was conducted were within the limits set by the specialty literature.

During 29-50 laying weeks, were recorded egg production, mortality, and was determined daily fodder consumption, living body weight and egg weight for each group.

Data were processed using Microsoft Excel 2010 and for testing the differences between averages Student test was used. The average and average error have been calculated for percentages of laying and mortality, daily consumption of combined fodder, specific consumption, living body weight and the egg weight for each batch.

RESULTS AND DISCUSSIONS

1. The average production performances of the initial 1 to 28 weeks of laying

During the period from 1 to 28 weeks of laying (tab. 1), quails from the initial batch that were maintained at the daylight duration of 16 hours, was recorded an average percentage of laying of 65.10%, a production of 4.56 eggs/day per head of and an average percentage of mortality of 0.42%.

Table 1. The average performances of the production at the initial quails batch from 1 to 28 weeks of laying

Specification	% laying	Prod/head/ day	% death rate	Cons c.f. (g)	Specific cons.	Live body weight (g)	Egg weight (g)
X ± s_x	65.10 ± 2.82	4.56 ± 0.19	0.42 ± 0.05	32.78 ± 0.52	54.83 ± 4.23	188.89 ± 2.88	10.28 ± 0.05

The average daily consumption of compound fodder was 32.78 g/head/day, while specific consumption was 54.83 /head/day. The average live weight was 188.89 g, and average egg weight was 10.28 g/egg.

2. The evolution of production performances in laying quails from the two batches analysed in the period from 29 to 50 weeks of laying

Between 29-50 weeks (Table 2, Figure 1), quails from the control group experienced a downward curve in relation to the average percentage of laying (58.55% in the 28th week laying at 48.65% in the 50th week of laying) and average egg production per head and per day (from 4.10 eggs in the 28th week of laying to 3.40 eggs in the 50th week of laying), and the average mortality recorded an increasing trend.

Table 2. The evolution of the average production performances in laying quails from the two batches analysed in the period from 29 to 50 weeks of laying

Batch	Control group			Experimental group		
Week lay	% lay	Prod/head	% death rate	% lay	Prod/head	% death rate
29	58.55	4.10	1.00	58	4.06	0.5
30	58	4.06	1.51	58.67	4.10	0
31	57.78	4.04	1.02	60.35	4.22	0
32	58.5	4.09	1.55	65.67	4.59	0
33	57.5	4.02	1.05	70.45	4.93	0.50
34	56.55	3.95	0.53	75.65	5.29	0
35	57.55	4.02	1.06	80.45	5.63	0
36	55.15	3.86	0	78.96	5.52	0
37	57.55	4.02	1.08	77.55	5.42	0.51
38	56.75	3.97	0.54	78.23	5.47	0
39	55.15	3.86	1.09	79.45	5.56	0
40	57.15	4.00	1.67	77.35	5.41	0
41	58.15	4.07	2.25	75.45	5.28	0.51
42	57.55	4.02	1.15	74.55	5.21	0
43	56.78	3.97	2.33	72.45	5.07	0.51
44	55.45	3.88	1.19	72.4	5.06	0
45	54.15	3.79	0.61	71.55	5.00	0.51
46	54.55	3.81	1.83	71	4.97	0
47	52.15	3.65	1.24	72.34	5.06	0
48	51.75	3.62	0.62	70.34	4.92	0
49	50.75	3.55	1.89	70.67	4.95	0
50	48.65	3.40	2.58	70.15	4.91	0.52
X ± $S_{\bar{x}}$	55.73 ± 0.51 aaa	3.90 ± 0.04 bbb	1.27 ± 0.12 ccc	71.89 ± 1.21 aaa	5.03 ± 0.08 bbb	0.16 ± 0.05 ccc

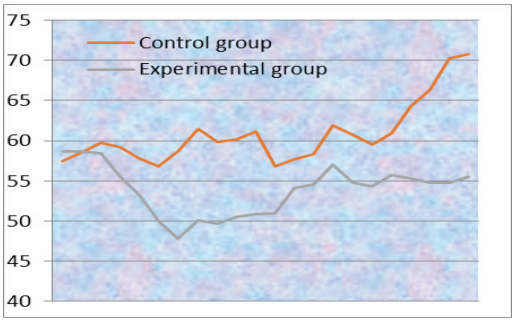

Figure 1. Evolution of the average percentage of laying on 29-50 weeks in the two batches of laying quails

Instead, the quails from experimental group (Table 2, Figure 1) once with changing lighting programme (continuous lighting to divided lighting made up for 16 hours) there has been a situation like a new ascendant curve of laying, meaning that the average percentage of laying and average production per head and per day began to increase (up to 80.45% and 5.63 eggs in 35 laying week) reaching the 50th laying week at an 70.15% average percentage of laying of and an average production of 5.03 eggs.

Also the average percentage of mortality was significantly reduced as effect of changing the illumination programme, this recording significantly lower percentage compared to the average mortality in the control group.

Table 3. The average live body weight, egg weight, daily fodder consumption and specific consumption at quails from the two batches during the period from 29 to 50 weeks of laying

Batch	Control batch				Experimental batch			
Week lay	Body weight (g)	Egg weight (g)	Fodder cons. (g)	Specific consump-tion	Body weight (g)	Egg weight (g)	Fodder cons. (g)	Specific consump tion
29	185.15	10	33.65	57.47	187.55	10.23	34.00	58.62
30	186.25	10.5	33.97	58.56	188.95	10.33	34.44	58.70
31	187.56	10.15	34.55	59.79	195.65	10.55	35.25	58.40
32	189.45	9.90	34.65	59.23	205.5	10.76	36.44	55.48
33	188.67	10.24	33.23	57.79	210.45	10.88	37.55	53.30
34	189.43	10.11	32.15	56.85	220.54	11.1	37.86	50.04
35	186.56	10.00	33.76	58.66	230.56	11.24	38.45	47.79
36	185.43	10.23	33.88	61.43	233	11.88	39.55	50.08
37	186.78	10.33	34.45	59.86	235	12.13	38.56	49.72
38	187.34	10.11	34.15	60.17	237.45	12.11	39.57	50.58
39	185.56	10.00	33.75	61.19	238.55	12.23	40.45	50.91
40	185.00	9.90	32.45	56.78	240.67	12.5	39.45	51.00
41	186.65	9.95	33.56	57.71	240.95	12.54	40.85	54.14
42	187.55	10.05	33.55	58.29	242.25	12.55	40.66	54.54
43	188.56	10.23	35.15	61.90	243	12.65	41.34	57.06
44	186.75	10.11	33.65	60.68	244	12.55	39.65	54.76
45	185.56	10.12	32.24	59.53	245	12.45	38.87	54.32
46	184.67	10.34	33.25	60.95	245.75	12.25	39.55	55.70
47	185.75	10.23	33.54	64.31	255.45	11.85	40.00	55.29
48	186.76	10.43	34.35	66.37	255	11.95	38.55	54.80
49	185.15	10.11	35.65	70.24	257.55	11.87	38.67	54.71
50	185.00	9.67	34.45	70.81	255	11.5	38.95	55.52
$X \pm s_{\bar{x}}$	186.62 ± 0.27 aaa	10.12 ± 0.04 bbb	33.82 ± 0.16 ccc	60.85 ± 0.74 ddd	232.17 ± 4.05 aaa	11.73 ± 0.15 bbb	38.57 ± 0.37 ccc	53.89 ± 0.58 ddd

For quails from the control group, average live weight was maintained at a roughly constant level, while in the case of the quails from experimental group live body weight began to grow with changing lighting program (187.55 g in the 29th week of laying to 232.17 g/head in the 50th week of laying), the differences between the two batches being very significant.

The same trend was apparent in the case of the average egg weight, it remaining constant for quails in the control group and increasing significantly in the case of quails in the experimental group (from 10.23 g at week 29 of laying at 11.50 g/egg in the 50th week lay). Average daily consumption of compound fodder has risen to quails in the experimental group (from 34 g in week 29 of laying at 38.95 g/head/day at week 50 of laying) compared to quails in the control group, in which the consumption remained at a relatively constant level.

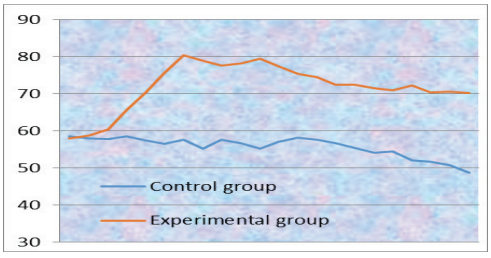

Figure 2. Specific egg consumption trends during the 29-50 weeks of laying quails in the two batches

Between 29-50 weeks of laying, the specific consumption (tab. 3 fig. 2) was significantly lower in the experimental group compared with quails in the control group. In a study conducted in Pakistan by a team led by Jatoi A.S (2013) on a flock of quails that are in the period after the

laying peak, but for a shorter duration (12 weeks during weeks 22-34 of laying), the authors mention the following performances from quails maintained at a programme of 16 hours continuous light per day: 268.81 g/head body weight, 79.49% average percentage of laying, 30.70 g of fodder compound consumption and weight of 11.34 g/egg. The same authors mention higher performance when a programme divided into intervals of asymmetrical lighting of 16 hours a day (8 hours light, 6 hours darkness, 2 hours light, 8 hours darkness). It should also be noted that the same experimental design and during 3-14 weeks of age after which up to 22 weeks quails were maintained at a 16 hours a day program of continuous light.

CONCLUSIONS

In 29-50 weeks of laying period, the quails in the experimental group recorded an average lay of 71.89 ± 1.21%, with 16.16% higher, while the average mortality was lower for quails in the experimental group as quails to the control group (1.11%), the differences between the two groups being very significant. The body weight, egg weight and feed intake were higher for quails in the experimental group (with 19.61% average live body weight, with 18.89% average egg weight and 12.32% average daily consumption of compound fodder) compared with quails in the control group; the differences are very significant. The specific consumption was 6.96% lower at quails in the experimental group compared with the control group; the differences are very significant.

It can be asserted that the use of a lighting divided programme into the period after the laying peak leads to improvement of production performance of quails hens (the case of experimental group), which otherwise would further decline curve pronounced after the laying peak (the case of the control group).

Given the superior performance recorded in case of experimental batch, it is recommended to use the lighting fractionated system with asymmetrical hour intervals at quails in the period after laying peak. Further, it is necessary to carry out studies on production of quails using fractionated lighting programme since the start of laying and even of their youth.

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