Egg production during the artificial moulting and a new laying cycle of aged hens

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SUMMARY

There are several different methods of inducing artificial moulting of laying hens. One of the most practical methods applied during the last two decades is based on restriction of feed. This method, in practice is very popular and usually gives successful results. The eggs produced during the second egg laying cycle usually have larger weight than those during the first cycle, the quality of the shell is always much better than during the last phase of the first egg laying cycle, egg laying intensity reaches 92-94% of the intensity during the first cycle and the feed conversion is about 10% higher.

The aim of this experiment was to investigate the egg production during the specific points of artificial moulting (preparing period, period of stress and period of recovering) and egg production during the new egg-laying cycle. The aged hens from two genotypes, ISA Brown 88 weeks aged and Hisex Brown 91 weeks aged, were used in the experiment.

The egg laying Intensity during the preparing period was 60.00% in group 1 (ISA Brown) and 58.60% in group 2 (Hisex Brown). The egg laying decrease during the stress period, on the first day was up to 28.53% and 51.51% in groups 1 and 2, respectively. On the 8th day of the stress period the intensity of egg-laying was nearly to the level of zero in both experimental groups.

The first egg of the new laying cycle appeared on 12th day after the stress period end. The second egg-laying cycle started 5 weeks after the ending of the fasting period at the level of 1.47% and 5.79% of the laying intensity in groups 1 and 2, respectively.

The egg production during the second egg-laying cycle (308 days) was 148.8 and 210.8 eggs in groups 1 and 2, respectively.

The genotype of the laying hens shows a large influence on the egg production during the second cycle. In this experiment it was noticed that the

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layers of the Hisex Brown reached higher egg production intensity than the ISA Brown.

Keywords: artificial moulting, laying hens, egg production.

INTRODUCTION

The genotype of the hens has a great influence on the productive performances after moulting during the second egg-laying cycle (Ruszler 1997; Yardimci and Bayram, 2008). Some commercial laying strains (White Hyline, Brown Hyline) after moulting and resting in the period of 10 months laid a large amount of (in average of 200) eggs. These eggs are strong, large and with good quality (Bell, 1988; Baker et al., 1981, 1983; Bell and Kuney, 1984; Matsoukas et al. 1980; Keshavarz and Quimby 2002).

On the basis of the results of several authors (Ruszler 1997; Carey and Brake, 1989) it can be established that artificial moulting induced by fasting the hens is more effective in cases when the hens in the first laying cycle performed high egg production, if the flock did not suffer any stress induced by technological, nutritive or any other origin in the cases of moulting relatively younger layers.

From economical aspect, artificial moulting is more effective when the egg price is low and does not cover the production costs. It should be mentioned that in the second egg-laying cycle, the intensity of egg production ranged from 92 to 94% in comparison to the first cycle. The feed conversion is higher about 10%, the shell strength is weaker, and the egg weight is larger in comparison with the first cycle.

As in our practice there was not a successful modification of artificial moulting of aged hens and hens from different genotypes, the purpose of the present study was to explore the opportunity of successful introduction of aged hens in the second egg-laying cycle.

MATERIAL AND METHODS

The ISA Brown laying hens (12700 hens) and the Hisex Brown laying hens (11992 hens) at the age of approximately 91 weeks were housed in standard cages for egg production. Laying hens were divided in two experimental groups: ISA Brown (group 1) and Hisex Brown (group 2), raised in identical conditions.

Hen nutrition was specially programmed. The program was completed of 3 feed mixtures such as: moult 1, moult 2 and peak (after reaching the peak of production).

The nutritive value of feed mixtures is shown in Table 1.

Table 1. Nutritive value of the feed mixture

Nutritive Value	Type of feed mixture		
	Moult 1, (weeks 1 – 4)	Moult 2, (weeks 5 – 14)	Peak , (weeks 15 – 48)
Dry matter, %	91.01	88.76	88.55
Metabolizable energy kcal/ kg	2770.0	2750.0	2750.0
Crude proteins, %	15.50	16.00	15.60
Crude fat, %	3.68	4.68	3.64
Crude fiber, %	3.68	3.47	3.13
Total ash, %	8.55	10.78	10.97
Lysine, %	0.80	0.84	0.76
Methionine, %	0.47	0.38	0.36
Calcium, %	2.80	3.60	3.80
Phosphorus, %	0.50	0.50	0.38
Sodium, %	0.25	0.22	0.20
Chlorine, %	0.15	0.14	0.14

Before inducing stress, the poultry preparation lasted ten days by feeding and watering *ad libitum,* and lighting 24 hours. The stress was induced by continuous feed removal during 10 days and lighting 8H.

The plan for the daily photoperiod during the experiment is shown in Table 2.

Table 2. Plan for daily photoperiod for experimental laying hens

Period	Lighting program, (hours)
Preparing period	24.00
Stress period (feed removal)	8.00
1st week	8.00
2nd week	8.00
3rd week	8.00
4th week	8.00
5th week	9.00
6th week	9.00
7th week	10.00
8th week	10.00
9th week	11.30
10th week	12.30
11th week	13.00
12th week	14.00

The egg production was monitored with laying intensity. Eggs were collected and the number of eggs was recorded, daily at the same time. The eggs were weighed weekly. Data were tested for significance using the analysis

of variance, the F-test according to Snedecor and Cochran (1989), and the regression analysis of data of egg production.

RESULTS AND DISCUSSION

The egg production of the experimental groups of laying hens is presented in Tables 3 and 4 and in Figures 1 and 2.

Table 3 presents the egg production during the preparing period, decreasing the intensity during the stress and the resting period (Non-productive period while resting and introduction of the active, egg laying condition).

Table 3. Decreasing the egg production during the period of feed removal

	Group 1	Group 2
1. Preparing period		
laying intensity, %	60.00	58.63
2. Stress period		
1 day, %	28.53	51.51
2 day, %	27.42	34.17
3 day, %	12.76	21.72
4 day, %	7.54	8.76
5 day, %	4.78	3.85
6 day, %	2.28	2.23
7 day, %	0.29	1.83
8 day, %	0.06	0.61
9 day, %	0.21	0.69
10 day, %	0.00	0.00
3. Resting period		
11 day, %	0.00	0.00
12 day, %	0.02	0.30
13 day, %	0.01	0.36
14 day, %	0.03	0.64
Week 3, %	0.21	3.42
Week 4, %	0.45	5.22
Week 5, %	1.47	5.79

Laying intensity during the preparing period was from 58.63% in the group 2 and 60.00% in the group 1. The decrease of the egg production during the induced stress with the feed removal was quickest in the group 1 of laying hens which was 28.53% (for 1 day), and in the group 2 was 51.51%. The decrease of the egg production in the following period was with different intensity in the experimental groups because it was decreased on 2.28% and 2.23% in groups 1 and 2 after six days, respectively. On the 7^{th} day the egg

laying intensity was 0.29 and 1.83 in groups 1 and 2, respectively, and on the 10th day it ceased in both groups. El-Deek and Al-Harthi (2004) in their investigations by applying methods with quantitative restriction of the feed reported that the egg-laying intensity ceasing was on the 8th day.

The decrease and cessation of egg-laying is shown in Figure 1.

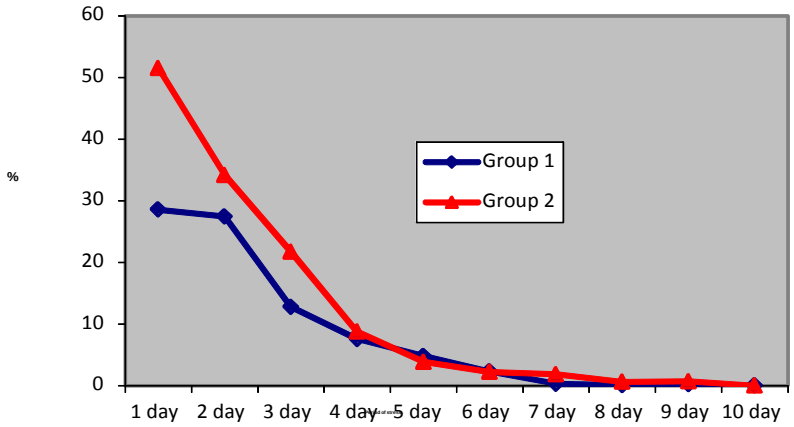

Figure 1. Decrease and cessation of egg laying during the period of stress

The obtained results showed differences among groups during the time of starting the second egg laying cycle. It may be due to the genotype of the laying hens. These findings are in agreement with those of Yardimci and Bayram (2008).

In Table 4 the obtained results of the egg production and the egg laying intensity in different experimental periods are shown.

The lowest egg mass was produced during the first month (resting period). The values were similar for both groups (0.004 kg and 0.05 kg in groups 1 and 2, respectively). The start of egg laying in the group 2 was during the period from 5th week to 8th week with 0.89 kg egg mass, but in the group 1 the start of egg laying was noticed later the during period from 9th week to 12th week with 1.06 kg egg mass per hen. The egg mass production was generally higher in the Hisex Brown (group 2) layers than that of the ISA brown (group 1).

Obtained results of the egg mass production, the daily egg mass production and the total monthly egg production were similar.

From the results shown in Table 4, we obtained the differences in the egg mass production, produced eggs and laying intensity among the experimental groups. These differences may be due to the genotype effect on egg laying. The obtained results of the egg mass production (monthly and daily), produced eggs per hen, expressed in absolute and relative numbers and the persistence of laying,

during the period from starting the laying (cca 50%) till the end of the second egg laying cycle are shown in Table 4 and Fig. 2.

Table 4. Laying intensity during the second egg laying cycle

Group	1 - 4 weeks	5 - 8 weeks	9 - 12 weeks	13 - 16 weeks	17 - 20 weeks	21 - 24 weeks	25 - 28 weeks	29 - 32 weeks	33 - 36 weeks	37 - 40 weeks	41 - 44 weeks	45 - 48 weeks	Total, 308 days
Produced egg mass per hen, kg													
1	0.004	0.17	1.06	1.18	1.14	1.03	0.95	0.88	0.81	0.73	0.66	0.59	9.23[A]
2	0.05	0.89	1.40	1.41	1.35	1.30	1.25	1.20	1.14	1.09	1.04	0.98	13.12[B]
Daily production of egg mass, g/hen													
1	0.16	6.19	37.8	42.16	40.79	36.96	34.10	31.62	29.14	26.04	23.56	21.08	27.47[A]
2	1.83	31.98	50.18	50.22	48.36	46.50	44.64	42.78	40.92	39.06	37.20	35.03	39.06[B]
Number of produced eggs													
1	0.1	2.8	17.1	19.0	18.4	16.7	15.4	14.3	13.2	11.8	10.6	9.5	148.8[A]
2	0.8	14.4	22.7	22.7	21.8	21.0	20.2	19.3	18.5	17.6	16.8	15.8	210.8[B]
Egg laying intensity, %													
1	0.26	9.99	61.10	68.00	65.80	59.60	55.00	51.00	47.00	42.00	38.00	34.00	48.32[A]
2	2.95	51.58	80.94	81.00	78.00	75.00	72.00	69.00	66.00	63.00	60.00	56.50	68.45[B]

[A-B] Values in the same column with no common superscript differ significantly (p<0.01)

The production of egg mass during the 308 days of the laying cycle is 9.23 kg in the group 1 (ISA Brown) and 13.12 kg in the group 2 (Hisex Brown) (p<0.01). The results for the average daily produced egg mass during the 308 days of the laying cycle were 27.47 g and 39.06 g in groups 1 and 2, respectively (p<0.01).

The Hisex Brown hens produced about 30% more eggs during the second egg laying cycle than the ISA Brown which is 210.84 and 148.82 eggs (groups 2 and 1) (p<0.01).

The maximum egg-laying intensity was reached during the period from 13 till 16 weeks in both groups and the average percentage was 68.00 and 81.00 in the groups 1 and 2, respectively. The egg-laying intensity was also shown in Figure 2.

The reasons for these differences are not clear, but it is very well known that the efficiency of induced moulting depends on many factors such as the genotype of birds, the body weight and environmental conditions.

The Hisex Brown hens responded moulting better than the ISA Brown hens considering the produced egg mass, the daily egg mass production, the produced eggs and the egg-laying intensity.

The data we obtained (Fig. 2) indicate that the Hisex Brown hens have more efficient egg production level than the ISA Brown hens. During the preparing period there are no significant differences between the experimental groups, but during the second egg-laying cycle the productive performances are particularly different between the groups. The Hisex Brown

hens reached the maximum of egg-laying in a shorter period than the group of the ISA Brown hens.

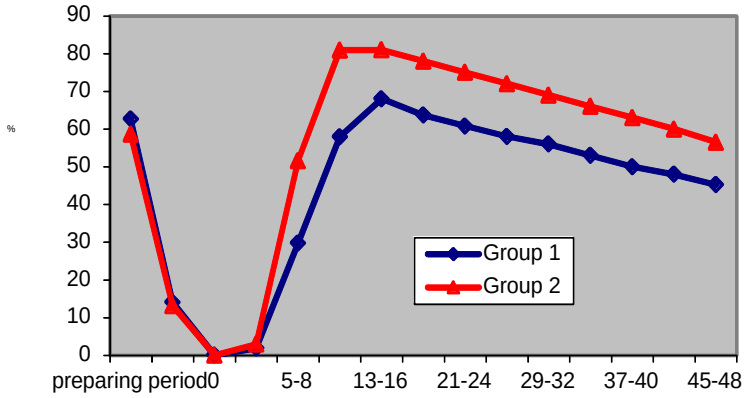

Figure 2. Egg laying intensity during the second egg-laying period

The obtained results show unequivocally that for successful application of induced moulting for the second egg-laying cycle it is necessary to take a good option of the genotype and the application method.

CONCLUSIONS

In this study we obtained the following remarks:

1. The egg production during the preparing period was 60.00% and 58.60% in the Hisex Brown hens and the ISA Brown hens, respectively.

2. The start of egg laying in the second egg laying cycle is after the period of stress in the 5th week, and the maximum of egg laying reached the 13th week after the stress period.

3. During the second egg laying cycle, the level of the total egg production was higher in the Hisex Brown hens (210.84 eggs) than it was in the ISA Brown hens (148.82).

4. In general, the Hisex Brown hens responded moulting better than the ISA Brown hens considering the productive performance during the second egg laying cycle at similar age and environmental conditions (light, feed, water, temperature etc).

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