Study of Time Intervals of Egg Formation in Oravka Hens

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Abstract
In this study, we analysed daily the time intervals of egg formation in pure chicken breed Oravka in the second half of egg production on 66 hens for 30 days, from 6 a.m. to 8 p.m. Experiment was realised in deep litter system in pens with automatic egg nest. Feeding of hens was providing by feed mixture for laying hens (crude protein 158.06 g/kg, metabolic energy 11.32 MJ/kg). Feeding and watering were ad libitum. Birds were exposed to natural light as a practiced in rural areas of South-West Slovakia. There were observed that in Oravka chickens the egg forming on average 25.78±0.39 hours, while the range was from 17 to 32 hours. Intervals between successively laid eggs were shortened by the clutch length. Time intervals of egg formation were 26.92±1.87 hours in short clutches (1 to 3 eggs), 25.31±1.65 hours in medium clutches (1 to 8 eggs) and 24.67±1.54 hours in long clutches (more than 9 eggs). Time intervals of egg formation were shortened by prolonging the clutch. The clutch length can significantly affect egg weight.

Key words: Oravka, hen, egg formation, clutch length, time interval

1. Introduction

Egg production of poultry is influenced by a number of laying traits such as clutch/sequence number, clutch/sequence length, the rate of lay, oviposition time, oviposition interval, lag time, frequency of pauses, pause number, number of pause days, pause length, tendency to go broody, and length of the broody period [1-4].
Longer sequence lengths, fewer pauses, shorter pause lengths, and uniform oviposition time indicate good layer performance [5].
Formation of clutches results from longer than 24 h time needed for egg formation [6-8].
Therefore, analysis of time interval between consecutively laid eggs seems closer to the physiology of the egg production process. Bird ovulatory cycle is thought to be controlled by a circadian rhythm, entrained by the daily light-dark cycle, that governs the timing of the preovulatory surge of luteinizing hormone and by the growth and maturation of the follicles. More details on physiological background of egg formation are given by [9,10].
The purpose of this research was to evaluate daily the time intervals of egg formation in dual chicken breed Oravka in the second half of egg production.

2. Materials and methods

Birds were placed in breeding pen with deep litter. Feeding and watering were *ad libitum*.

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Feeding of poultry was providing by commercial feed mixture for laying hens. Nutritional value of diet is shown in Table 1. Birds were exposed to natural light as a practiced in rural areas of South-West Slovakia.

We analysed daily the time intervals of egg formation in pure chicken breed Oravka in the second half of egg production on 66 hens for 30 days, from 6 a.m. to 8 p.m.

We defined the laying series as the number of eggs laid by a hen in a row without a break. We followed the length of the series in our experiment according to [11, 12] as follows: short series (1-3 eggs), medium series (1-8 eggs) and long series (over 9 eggs).

Egg weight was individually determined to 0.01g accuracy using a laboratory scale Owa Labor (VEB Wägetechnik Rapido, Germany).

Data were analyzed using analysis of variance by JASP 0.8.6 software [13]. Significant difference was used at 0.05 probability level and differences between groups were tested by the Duncan‘s Multiple Range Test [14] at the levels of significance.

Table 1. Nutritional value of complete feed mixture

Nutrient	Unit	Feed mixture
Crude protein	g/kg	158,06
ME	MJ/kg	11.32
Lysine	g/kg	8.07
Methionine and cisteine	g/kg	7.02
– from that methionine	g/kg	3.87
Threonine	g/kg	5,99
Calcium	g/kg	35.13
Phosphorus	g/kg	5.48
Sodium	g/kg	2.17
Manganese	mg/kg	148.79
Copper	mg/kg	18.74
Zinc	mg/kg	102.27
Selenium	mg/kg	0.38
Vitamin A	i.u./kg	10,000.00
Vitamin D_3	i.u./kg	2,500.00
Vitamin K	mg/kg	21.27

3. Results and discussion

The structure of the representation of eggs according to their formation is shown in Table 2.

During a 30-day experimental monitoring period of the length of egg formation in 66 hens and all evaluated eggs, we found that the intervals between laying consecutive eggs range from 16 to 32 hours. Due to the rarity of the occurrence of these extreme lengths of egg formation, we statistically evaluated the interval from 23 to 29 hours.

As Table 2 shows, the highest proportion of eggs (up to 30.16%) was formed in 25 hours. We can note that the average duration of egg production in hens of the Oravka chicken breed was 25.78±0.39 hours.

Similarly, [15] recorded mean egg forming from 24.9 to 26.0 hours depending on the genotype.

Intervals between successively laid eggs were shortened by the clutch length. Time intervals of egg formation were a 26.92±1.87 hour in short clutches (1 to 3 eggs), 25.31±1.65 hours in medium clutches (1 to 8 eggs) and 24.67±1.54 hours in long clutches (more than 9 eggs). Time intervals of egg formation were shortened by prolonging the clutch.

Oravka is classified as a chicken breed with dual performance for egg and poultry meat [16-22]. According to [23], the length of the series is significantly different for meat and laying type of hens. A characteristic feature of the laying of laying hens are long series, on the other hand, hens of the meat type lay 3 to 4 eggs in a series, and these short series are interrupted by a 1-day interval.

From the Table 4 it can be seen, clutch length had significant effect on egg weigh. This fact could be as a result of the negative relationships between rate of egg production and egg weight [2, 24-26].

Table 2. Proportional representation of the analyzed eggs according to the length of their formation

Length of egg formation in hours	Percentage
21	0.55
22	0.61
23	5.50
24	18.41
25	30.16
26	19.25
27	12.64
28	8.44
29	3.66
30	0.77

Table 3. Length of egg formation depending on the series

Length of egg series	Egg forming (hours)
Short	26.92±1.87[a]
Medium	25.31±1.65[a]
Long	24.67±1.54[b]

Values shown are mean ± SD (standard deviation)
[a] means in a row with different superscript differ significantly (P<0.05)

Table 4. Effect of length of egg formation and length of series on egg weight

Time interval	Length of egg series	Egg number	Egg weight (g)
23	Short	18	55.68±3.81[a]
	Medium	19	53.04±4.01[b]
	Long	14	53.52±3.76[b]
24	Short	21	53.47±4.12[a]
	Medium	23	52.34±3.89[b]
	Long	22	52.66±4.03[b]
25	Short	24	54.14±4.23[a]
	Medium	21	53.58±3.98[b]
	Long	20	53.54±4.32[b]
26	Short	19	53.86±3.28[a]
	Medium	21	54.03±4.11[a]
	Long	20	53.06±3.74[b]
27	Short	22	54.12±4.89[a]
	Medium	18	53.32±3.65[b]
	Long	19	53.29±4.28[b]
28	Short	21	54.42±4.29
	Medium	18	54.03±3.97
	Long	19	54.79±4.11
29	Short	20	54.98±4.35
	Medium	21	54.11±3.59
	Long	17	54.89±4.68

Values shown are mean ± SD (standard deviation)
[a] means in a row with different superscript differ significantly (P<0.05)

Our findings are consistent with [23, 27-30]. The reports by [30-31] indicate that average follicle growth period is negatively correlated with sequence length. Thus, longer clutches experience shorter growth periods and hence smaller eggs. The trend of decrease in egg weight with clutch length was specifically observed between 2 to 5 egg clutches with no definite trend for longer clutches.

Also, [15] had observed that egg weight decreased significantly with increasing clutch length, but only for sequences with less than 18 eggs.

4. Conclusions

In conclusion, we found that the intervals between successively laid eggs were shortened by the clutch length. Time intervals of egg formation were shortened by prolonging the clutch. The clutch length can significantly affect egg weight.

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