Сучасне птахівництво

УДК 636.592.083.31:637.4

Y. VAKULENKO, *candidate of agricultural Sciences, docent, doctoral candidate*
National University of Life and Environmental Sciences of Ukraine

The use of different modes of led lighting on morphological composition of eggs laying hens

The effect of the experimental resource-saving and standard modes led lighting on the morphological indices of eggs of laying hens. The results showed that the combination of intermittent lighting modes with reflectors in the design of led lights has helped to improve egg shell.

Poultry, lighting, laying hens, led, protein, yolk, shell

The role of the egg industry in improving human nutrition overestimated [1]. The morphological characteristics of the eggs depend on many factors, which can be divided into two groups. The first group – factors affecting the hen in the process of forming eggs (breed, age of the bird, its body weight, the level and duration of egg laying, feeding conditions and microclimate. The second group – factors affecting the already demolished the egg (laying hens, conditions of collection, transport and storage of eggs) [2,3,4].

The quality of the eggs is dependent on duration and intensity of illumination. [5].

The aim of our work was to study the effective control of led lighting on the morphological indices of eggs laying hens.

The experiment was conducted in poultry farms "Avis" Lutugino district, Luhansk region. Studies hens of the cross "Lohmann LSL classic" held in 4 battery cages company "Hellmann" (Germany). In groups 1 (control) and 2 experimental groups used typical lighting mode; 3 — and 4 experimental groups – under lighting modes that are designed Stavropol state agrarian University and the State experiment station poultry NAAS of Ukraine. The differences lay in the fact that in the experimental groups used led lamps with reflectors, which scatters the light and promotes uniformity by tier cage battery. Scheme of the experimental studies are shown in table 1.

The mode of feeding the experimental birds was consistent with generally accepted at the poultry farms. The multiplicity of feeding laying hens twice a day (morning and evening). Watering of poultry was carried out with npelra drinkers.

The mass of eggs was determined on the scales VLCT–500;

1. Scheme of experimental studies

The age of the birds	Group			
	1-control	2-experienced	3-experienced	4-experienced
17–18 week	8-hour intermittent light period (8C:16T)	control	8-hour intermittent light period (4L:2D:4L:14D)	7.5- hour intermittent light period (0.5L:0.5D:7L:16D)
19 week	9-hour intermittent light period (9L:15D)	___"__	____"____	7- hour intermittent light period (3L:2D:4L:15D)
20 week	10-hour intermittent light period (10L:14D)	___"__	9- hour intermittent light period (6L:4D:3L:11D)	____"____
21 week	11-hour intermittent light period (11L:13D)	__"__	10- hour intermittent light period (7L:4D:3L:10D)	7.5- hour intermittent light period (0.5L:0.5D:3L:2D:4L:14D)
22 week	12-hour intermittent light period (12L:12D)	__"__	10- hour intermittent light period (7L:4D:3L:10D)	8- hour intermittent light period (1L:1D::3L:2D:4L:13D)
23 week	13 hour intermittent light period (13L:11D)	__"__	__"__	8- hour intermittent light period (1L:3D:3L:2D:4L:11D)
24 week	14-hour intermittent light period (14L:10D)	__"__	__"___	8- hour intermittent light period (1L:3D:3L:2D:4L:11D)
25–26 week	___"___	_"__	___"___	10- hour intermittent light period (2L:2D:3L:2D:5L:10D)
27–30 week	___"____	____"__	____"____	10.5- hour intermittent light period (2L:2D:3L:2D:5.5L:9.5D)
31–32 week	___"___	____"__	____"____	11- hour intermittent light period (2L:2D:3L:2D:6L:9D)
33–34 week	____"____	____"__	____"____	11.5-hour intermittent light period (2L:2D:3L:2D:6.5L:9D)
35 and older	____"____	____"__	____"____	12- hour intermittent light period (2L:2D:3L:2D:7L:9D)
The level of illumination at the level of the feeders				
17–50 week	36–42 (upper tiers) 28–32 (middle tiers) 5–9 (lower tiers)	25–27 (upper tiers), 18–22 (middle tiers), 15–13 (lower tiers)		

L – periods of full light levels ; D – darkness

2. Morphological indicators of eggs, on the average, at the age of 44 weeks

Indicators	Group			
	control		experienced	
	1	2	3	4
The mass of eggs, g	64.8±0.44	66.1±0.36**	67.0±0.81*	70.8±0.55***
Weight protein, g	40.4±0.61	39.5±0.58	39.8±0.77	41.5±0.58
The mass of the yolk, g	17.9±0.38	19.6±0.42**	19.7±0.62*	21.1±0.31*
The mass of the shell, g	6.5±0.09	7.0±0.12**	7.5±0.18***	8.2±0.06**
The shape index,%	75.1±0.53	76.0±0.51	76.3±0.40	76.7±0.60
Elastic deformation, mcm	21.3±0.72	22.8±0.38	23.8±0.56	23.6±0.63

**P<0,05; **P<0,01; ***P<0,001*

Сучасне птахівництво

the weight of albumen, yolk and shell by the individual weighing;

the relative weight of these components in relation to the total egg weight, expressed in%; the shape index is the ratio of the transverse diameter to the longitudinal percentage for measurements of diameter – hexomat IM-1;

elastic deformation of the shell was studied with the help of the device PUD-3.

The research results. The use of intermittent lighting modes with uniform lighting tiers cell batteries in the experimental groups birds (tabl. 2) due to the lens design of led luminaires, led to the demolition of large eggs average weight of 66.1 and 70.8 g against 64.8 g in the control, which is a 2.0–9.3% more.

When applying of the typical lighting mode the use the without reflectors design of led lamps (bird control) weight of the protein was 40.4 g or 62.4% of the total weight of the egg, then in the 2nd and 3rd experimental groups decreased by 0.9 and 0.6 grams or 2.2 ($P<0.05$) and 1.5% ($P<0.05$) than in controls.

Relative to the mass of the yolk, it also differed from the control. In the control group eggs laying hens the content 17.9 g of yolk, as in 2, 3 and 4 the experimental groups it contained more of, respectively, 1.7 g; 1.8 g and 3.1 g or 9.5% ($P<0.01$); and 10.0% ($P<0.01$%) and 17.8% ($P<0.05$).

The same applies to the mass of the shell in the experimental groups, which was greater compared with the control at 0.5 to 1.7 g (7.7 on 26.1% ($P<0.001$).

The same applies to the mass of the shell in the experimental groups, which was greater compared with the control at 0.5 to 1.7 g (7.7–26.1 per cent ($P<0.001$). In the experimental groups the use of intermittent lighting modes with reflectors of led lamps had a positive impact on the quality of the shell, which reduced the number of battle and notches. Elastic deformation and the thickness of the shell increased in 2, 3 and 4 experimental groups respectively by 7.0%; 11.7; and 10.8% and 1.1% ($P<0.05$); 1.7 ($P<0.05$) and 1.7% ($P<0.05$) than in controls.

Conclusions:

1. The positive impact of lighting modes with used led lamps with reflectors, which scatters the light and promotes uniformity by tier cage battery on the mass of yolk – 1.7 g; 1.8 g and 3.1 g or 9.5% ($P<0.01$); and 10.0% ($P<0.01$) and 17.8% ($P<0.05$)

2. The use of intermittent lighting modes with reflectors of led lamps had a positive effect on shell quality: elastic deformation and the thickness of the shell increased in 2, 3 and 4 experimental groups by 7.0 to 11.7% and 1.1–1.7% ($P<0.05$) than in the control. ■

Вивчено вплив експериментальних ресурсозберігаючих і типового режимів світлодіодного освітлення на морфологічні показники яєць курей-несучок. Результати досліджень засвідчили, що поєднання переривчастих режимів освітлення з відбивачами у конструкції світлодіодних світильників сприяло покращенню якості шкаралупи яєць.

Птахівництво, освітлення, кури-несучки, світлодіодні світильники, білок, жовток, шкаралупа

Изучено влияние экспериментальных ресурсосберегающих и типового режимов светодиодного освещения на морфологические показатели яиц кур-несушек. Результаты исследований показали, что сочетание прерывистых режимов освещения с отражателями в конструкции светодиодных светильников способствовало улучшению качества скорлупы яиц.

Птицеводство, освещение, куры-несушки, светодиодные светильники, белок, желток, скорлупа

References

1. Штеле А.Л. Куриное яйцо: вчера, сегодня, завтра / А.Л.Штеле //Агробизнесцентр. – 2004. – 196 с.
2. Куликов Л.В. Характеристика яиц кур «Ломан браун» /Л.В.Куликов // Птицеводство. – 1997. – №3. – С. 20-22
3. Ерисанова О.Е. Влияние «Биокоретрона-форте» на качество яиц кур /О.Е. Ерисанова, Ю.А. Концов // Птицеводство. – 2010. – № 10. – С. 37-39
4. Острякова А.Е. Физико-морфологические качества яиц различных линий и гибридов кур / А.Е. Острякова, Т.В. Иванова, А. П. Подстрешный, В.А. Бреславец // Птахівництво: Між від. темат наук. зб. – 2003. – Вип. 53. – С. 93-100.
5. Keshavarz K. Relationship of light intensity and egg breakage in different tiers on commercial egg laying farms / K. Keshavarz //Cornell Poultry Pointers. – 1995. – Vol. 45. – № l. – P. 8- 10.