IMPROVEMENT OF THE MORPHO-PRODUCTIVE INDEXES AT THE ROSS-308 BROILER BREEDERS, THROUGH INCREASED PHOTOSTIMULATION

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Abstract

The researches focused on the eggs yield improvement at the „Ross 308" hens breeders, through the optimisation of the lighting schedule. The groups method, mixed with the periods one, was applied. Two groups have been established (Lc and Lexp), comprising each 5260 hens and the required roosters; the fowl have been observed during 20-60 weeks age period. Both groups received the standard phostostimulation schedule, as specified by the producer. However, the Lexp group received 1 supplemental hour of lightning/week and 10 lux higher lighting intensity. The live weight was found within the standard curve in both groups and the hens in the experimental group were 0.15-3.60g heavier than those in the control group. Although the mortality percentage was close between groups (9.85% in Lc and 9.29% in Lexp), the culling generated by prolapses was 0.59% lower in Lexp. Eggs yield reached 183.65 pieces in Lexp compared to just 178.25 pieces in Lc, leading thus to an improved feed conversion ratio, meaning 3.11% better at the experimental group. The main conclusion of the study states that the usage of an increased photostimulation schedule on the "Ross 308" broiler breeders provides an appropriate correlation between the sexual maturity onset and the reaching moment of the optimal live weight, generating thus higher morpho-productive indexes, compared to those achieved within the classical photostimulation version.

Key words: hens, reproduction, photostimulation, production

INTRODUCTION

The metabolic and endocrine processes of the fowl are significantly influenced by the light as a factor whose action is exerted through lasting time, intensity and through its alternation with dark periods, as well [3]. Any exception from the specific lighting schedule negatively interfere with fowl activity, especially with the reproductive one, generating major consequences on the yield level [5], and mostly on the quality of the produced eggs [4].

According to the management guide, the photostimulation of the "Ross-308" breeder must be setup at 4 weeks prior to laying onset [7]. The experience of the Romanian reproduction poultry companies revealed that it is not indicated to apply any technological schedule, unless this is adapted to the local conditions, because it could lead to a partial expression of the genetic potential. It was also found that the exact moment of the photostimulation starting is highly conditioned by the breeders group uniformity [6].

Besides these, we proposed to investigate the possibilities to improve the morpho-produtice performances of the heavy breed reproduction hens – parents of the "Ross-308" chicken commercial hybrid, through the optimization of the lighting schedule applied to them.

MATERIALS AND METHODS

The experiments have been run on 11992 reproduction fowl, parents of the "Ross-308" chicken commercial hybrid, divided in 2 groups, a control one (Lc) and an experimental one (Lexp), including each 5260 hens and 526 roosters.

Standard lighting schedule was provided to the control group: passage from 8 hours light/day (19th week), to 11 hours light/day (20th week); light lasting period increased with an hour at each 2 weeks, till 27 weeks, when the period reached 15 hours/day.

The lighting schedule of the experimental group reached 9 ore/day during 19th and 20th weeks, then the lighting period increased with an hour at each 2 weeks, finally reaching 16 hours light/day in the 28th week. The lighting intensity provided to the experimental group was of 60 lux, compared to the 50 lux value, provided to the control group.

The fowl have been accommodated on permanent litter, in 2 halls of 1200m^2 each, identical as endorsements (circular watering devices with valve; D.N.C. feeding equipment; suspended feeders for males supplemental feeding and nests disposed on two levels, one nest at 4 females). The females received feeding room of 8.5 cm/hen, while the males received 18 cm/cock; watering room reached 3.0 cm/individual.

The ratio between genders has been modified in accordance with the fowl age (10 roosters/100 hens at brooding, then the males amount gradually decreased, reaching 6 males/100 hens during the 60th week).

Fowl have been studied during a 40 weeks period (since 20 weeks till 60th week, inclusively) and the dynamics of the main morpho-productive indexes have been observed:

- Body weight: individual weighting run on 250 birds from each group.
- Eggs production: eggs yield and laying intensity.
- Feed intake: consum mediu (g/cap/zi) şi indice de conversie a hranei (g n.c./ou)
- Fowl health status: weekly flock casualties (mortality + culling)

RESULTS AND DISCUSSIONS

Weight gain dynamics. A rigorous selection has been practiced when the two groups have been established, in relation with the fowl body development. Therefore, it was possible to maintain their weight on the weight curve specific to this poultry category *(tab. 1)*.

Table 1
Body weight dynamics of the studied hens

Age (wks.)	Standard weight (g)	Lc		Lexp.	
		$\overline{X}$ ±s $\overline{x}$ (g)	V%	$\overline{X}$ ±s $\overline{x}$ (g)	V%
20	2155-2300	2185.70±7.77	5.62	2186.92±7.83	5.66
22	2465-2640	2608.21±10.62	6.44	2610.01±9.00	5.45
24	2800-2950	2822.73±11.10	6.22	2824.37±11.84	6.63
26	3070-3220	3063.14±13.35	6.89	3064.48±13.13	6.78
28	3270-3420	3383.55±15.90	7.43	3384.92±15.72	7.34
30	3390-3540	3538.89±18.28	8.15	3539.23±20.68	9.22
32	3420-3570	3565.14±21.23	9.31	3566.32±20.09	8.81
34	3450-3600	3598.52±20.18	8.77	3599.33±21.91	9.52
36	3480-3630	3622.73±22.60	9.74	3623.11±22.35	9.63
38	3510-3660	3657.34±24.90	10.62	3658.87±23.72	10.11
40	3540-3690	3687.00±21.96	9.33	3688.12±24.36	10.34
42	3570-3720	3717.72±23.62	9.99	3718.96±24.31	10.28
44	3600-3750	3742.11±24.15	10.14	3743.34±24.02	10.09
46	3630-3780	3771.31±23.07	9.67	3772.16±25.65	10.75
48	3660-3810	3808.03±23.70	9.82	3809.26±27.92	11.56
50	3690-3840	3832.73±24.64	10.11	3833.37±26.89	11.03
52	3720-3870	3861.09±25.13	10.29	3862.99±27.44	11.23
54	3750-3900	3898.51±25.37	10.28	3898.42±29.08	11.37
56	3780-3930	3917.78±27.41	11.06	3918.87±30.86	12.45
58	3810-3960	3946.61±28.26	11.32	3947.23±31.98	12.81
60	3840-3990	3988.83±29.95	11.87	3989.16±32.50	12.88

Thus, at the beginning of the experiment (fowl of 20 weeks old), the average body weight of the hens in the control group reached 2185.70±7.77 g, while those in the experimental group weighted 2186.92±7.83g. As fowl turned old, the body weight increased, reaching levels of 3565.14±21.23g-control group and of 3566.32 ±20.09g-experimental group during laying peak (32nd week of life). At the end of the experiment (60th week) the average weights were of 3988.83±29.95g-control group and 3989.316±32.50g-experimental group. The initial uniformity of the fowl maintained during the entire experiment, the variation coefficient indicating low and average variability (5.62-11.87% in control group, respectively 5.6-12.88% in the experimental one).

Flock casualties and their reasons. The observations made on the studied flocks allowed us to evaluate the way through the experimental factor, meaning the lighting schedule, influenced the correlations between the fowl somatic development, laying onset and the physiological answer. It is known that when the sexual maturity onset is accelerated through photostimulation [2], without an optimal body development, the situation frequently leads to prolapses occurrence, which imposes the culling of the sick individuals [1].

Our researches revealed the higher quality of the lighting schedule applied in the experimental group, which provided to the fowl the possibility to achieve an optimal body weight, required to sustain an intense laying rhythm. Although the mortality level was closer in both groups (5.20% in Lc and 5.23% in Lexp) across the entire studied period (20-60 weeks), the culling level imposed by prolapses was lower at the hens in the experimental group (4.06%), compared with the situation in the control group (4.65%), leading to just 9.29% casualties in the experimental group, compared to 9.85% in the control one *(fig. 1)*.

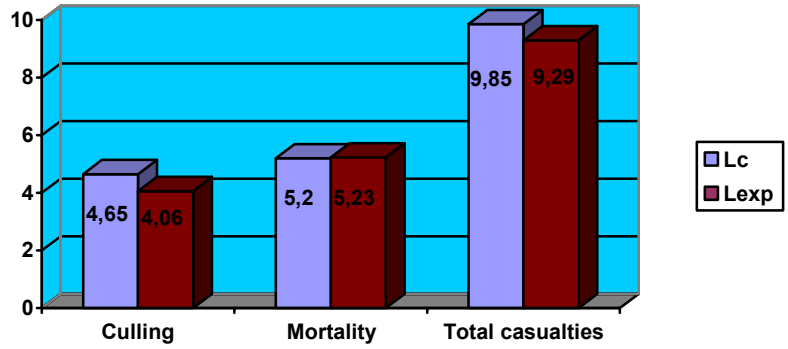

Fig. 1 Flock casualties of the studied hens

Eggs yield and laying intensity. The lighting schedule recommended by the company producing "Ross-308" adult breeders should ensure laying onset at the flock age of 23 weeks [7], but the experience of the aviculture experts in our country suggests that the first eggs are laid later, this moment being related to hens weight.

The data we achieved *(tab. 2)* indicate that the fowl in both groups – control and experimental, began to lay since the 26th week of life, consequently to their selection for body weight uniformity. Thus, there have been eliminated from the groups those best performers hens, which began to lay earlier. For this reason, the laying intensity reached its maximum level just during the 32nd week of birds life. However, the levels were of 93.0% in control group and 95.88% in the experimental one. The difference related to

laying intensity dew to the fact that the hens in the experimental group were not forced to begin laying through light stimulation. Therefore, they benefit from enough time to complete their body development and especially their reproductive system. Eggs yield of the studied fowl has been correlated with the achieved laying intensity, reaching a level of 178.25 pcs./hen in Lc group and 183.65 pcs./hen in the experimental one. Both values were higher than the theoretic potential of the "Ross-308" breeders, specified at a 175 eggs/hen level.

Table 2
Eggs yield and laying intensity of the studied hens

Age (wks.)	Theoretic laying curve (%)	Lc				Lexp.			
		Average flock size (hens)	Eggs yield (pcs.)		% laying	Average flock size (hens)	Eggs yield (pcs.)		% laying
			Overall (pcs.)	Average (pcs.)			Overall (pcs.)	Average (pcs.)	
23	4.7	5098	-	-	-	5089	-	-	-
24	11.7	5083	-	-	-	5077	-	-	-
25	32.9	5070	-	-	-	5067	-	-	-
26	52.0	5060	3339	0.66	9.43	5056	4146	0.82	11.71
27	73.3	5032	7497	2.15	21.28	5034	8860	2.58	25.14
28	83.9	5003	14608	5.07	41.71	5011	15083	5.59	43.00
29	86.4	4971	24755	10.05	71.14	4990	26197	10.84	75.00
30	86.3	4941	28756	15.87	83.14	4971	30024	16.88	86.28
31	86.0	4908	31214	22.23	90.85	4949	32663	23.48	94.28
32	84.8	4873	31723	28.74	93.00	4926	33053	30.19	95.85
33	83.6	4850	31476	35.23	92.71	4907	32680	36.85	95.14
34	82.5	4841	31418	41.72	92.71	4903	32654	43.51	95.14
35	81.3	4834	30986	48.13	91.57	4895	32258	50.10	94.14
36	80.3	4831	30821	54.51	91.14	4887	31814	56.61	93.00
37	79.0	4829	30712	60.87	90.85	4886	31514	63.03	92.14
38	78.0	4826	30693	67.23	90.85	4882	31391	69.49	91.85
39	76.7	4823	30626	73.58	90.71	4878	31316	75.91	91.71
40	75.6	4820	29884	79.78	88.57	4876	31255	82.32	91.57
41	74.4	4819	29106	85.82	86.28	4873	30553	88.59	89.56
42	73.1	4818	28715	91.78	85.14	4872	29865	94.72	87.57
43	72.0	4814	28258	97.65	83.85	4872	29524	100.78	86.57
44	70.8	4808	28078	103.49	83.42	4871	29323	106.80	86.00
45	69.6	4806	27442	109.20	81.57	4865	28898	112.74	84.85
46	68.4	4803	27377	114.90	81.43	4860	28868	118.68	84.85
47	67.2	4800	26400	120.40	78.57	4854	28735	124.60	84.57
48	66.0	4797	26287	125.88	78.28	4851	28523	130.48	84.00
49	64.8	4795	26276	131.36	78.28	4848	27863	136.22	82.10
50	63.5	4794	26223	136.83	78.14	4840	27023	141.80	79.76
51	62.4	4792	25604	142.17	76.33	4834	26002	147.17	76.84
52	61.1	4792	24433	147.26	72.84	4830	25182	152.38	74.48
53	59.8	4789	22807	152.02	68.03	4823	24049	157.36	71.23
54	58.7	4788	21275	156.45	63.48	4820	22292	161.98	66.06
55	57.3	4785	20385	160.71	60.85	4811	20604	166.26	61.18
56	56.2	4780	19113	164.70	57.12	4803	19320	170.28	57.46
57	54.9	4777	18050	168.48	53.98	4795	18193	174.07	54.20
58	53.7	4775	17072	172.05	51.07	4785	17196	177.66	51.34
59	52.4	4772	15700	175.34	47.00	4777	16003	181.01	47.86
60	51.2	4767	14108	**178.25**	42.28	4769	14146	**183.65**	42.37

Feed intake of the fowl in both groups has been assessed for 3 main laying periods and for the overall period (20-60 weeks), basing on the average flock sizes, on the total amounts of consumed and on the eggs yield, as well.

Thus, the average daily feed intake was situated at levels of 164.36/bird/day in the

control group fowl and 166.58g/bird/day at those in the experimental group, till the laying peak moment (20-31 weeks), of 181.26 g/bird/day-control group and 180.33 g/bird/day-experimental group, during the second studied period (32-41 week, respectively of 189.30g/bird/day in control group and 189.51 g/bird/day in the experimental one, during the last period, meaning between the 42nd and the 60th week of life.

The average feed intake, for the overall studied period (20-60 weeks) reached 176.14 g/individual/day in the control group and 177.04g/individual/day at the experimental one. The feed conversion ratio (g feed/egg), calculated for the entire experimental period reached 293.07 in the control group and just 284.22 in the experimental one, as a consequence of the better eggs yield achieved by the hens in this group *(tab. 3)*.

Table 3
Feed intake of the studied fowl

Notice	Age period/Experimental group							
	20-31 weeks		32-41 weeks		42-60 weeks		20-60 weeks	
	Lc	Lexp	Lc	L1exp	Lc	L1exp	Lc	L1exp
Average flock size (hens)	5021	5045	4932	4990	4786	4816	4993	5018
Overall feed intake (kg/group)	69320	70959	62580	62990	120500	121385	252400	254970
Average intake (g/hen/day)	164.36	166.58	181.26	180.33	189.30	189.51	176.14	177.04
Eggs yield (eggs/group)	110169	116973	307445	318488	443603	461609	861217	897070
Feed conversion ratio (g/egg)	629.22	603.51	203.55	197.78	271.64	262.96	293.07	284.22

CONCLUSIONS AND ADVISORY

Several conclusions issued from the researches carried on the breeders of the "Ross-308" chicken commercial hybrid:

- ***fowl weight*** increased concomitantly as flock turned old, but, in each control moment, it was found within the standard weight curve, nearby its upper limit;
- ***flock livability*** has been found within normal limits, while the 0.56% difference between the two studied groups was exclusively charged to the higher culling proportion, caused by prolapses at the control group;
- ***eggs yield*** has been found as very good, being higher than the theoretic potential, with 3.25 eggs/hen in control group, respectively with 8.65 eggs/hen in the experimental one;
- ***feed conversion ratio*** (g feed/egg) was positively correlated to the achieved eggs yield, being 3.11% lower at the hens in the experimental group, compared to those in the control group.

Basing on the acquired results, it could conclude that at least within the conditions of our country, it is opportune to extend with an hour the daily lighting schedule of the "Ross-308" breeders, providing thus the appropriate somatic development, required to support an intense laying rhythm. It also imposes the usage of a 60 lux light intensity since the very beginning of the photostimulation schedule, in order to achieve the completion of the fowl sexual maturing. Another relevant aspect consist in grouping the reproduction fowl as uniformly as possible, considering the body development, as guaranty of a better flock livability.

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