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THE INFLUENCE OF THE MAINTENANCE SYSTEM ON THE PRODUCTIVE PERFORMANCES OF THE LOHMANN BROWN CLASSIC HYBRID HENS

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Abstract

The purpose of the present research was to analyze comparatively the productive performances of the Lohmann Brown Classic hybrid hens, kept in batteries with cages and on the ground, on permanent bedding. During the exploitation period (85 weeks in cages, 93 weeks on the ground), was monitored: intensity of egg laying, the dynamics of the production of eggs, egg weight, feeds consumption and the evolution of the body weight of hens. The hens grown in cages achieved superior productivity performances, in comparison to the ground grown hens: average egg laying intensity 87.83% versus 79.61%; average number of eggs at the age of 16 months 417.79 versus 349.23; the average egg weight 68.45 g versus 64.57 g; average body weight of hens 1947.65 g versus 1932.85 g. The daily consumption of feeds per bird varied between 124-171 g in the case of caged hens and between 130-150 g for the ground grown hens.

Key words*: egg laying intensity, egg production, egg weight, hen body weight, maintenance in batteries with cages and on the ground.*

INTRODUCTION

The productions of the birds are the result of the continuous action and interaction of the biological and environmental factors. The performance of an individual is conditioned by the genotype, environment and by the interaction between genotype and environment (Drăgănescu and Grosu, 2005; Popescu-Micloșanu, 2007). Among the environmental factors, the maintenance system, an integral part of the exploitation technology, plays a decisive role in achieving a performance (for example, egg production), as close to the biological potential, characteristic of each breed and hen hybrid. In the industrial system, egg-laying hybrids can be maintained in wide captivity (on the ground) or in close captivity (in cage batteries), both variants presenting advantages and disadvantages, which affect the productive performance and economic efficiency of the exploitation of hybrids for egg - consumption.

MATERIALS AND METHODS

The research was carried out in an industrial poultry farm in the south of the country, a unit specialized in the production of hen eggs for consumption. The biological material analyzed was represented by the hens belonging to the Lohmann Brown Classic hybrid, one of the most widespread and appreciated egg - laying hybrids in the world.

The purpose of the study was to analyze the impact of the maintenance system on the productive performances achieved by this hybrid, exploited superintensively (in cage batteries) and intensively (on the ground, on permanent bedding). The analyzed population was 22.299 hens operated in "blind" halls, for 85 weeks, in 4-level pyramidal batteries (BP4) and 8350 hens, kept on the ground, on permanent litter, operated for 93 for weeks. At the population of the hall where the chickens were kept in batteries, the density of 4 chickens/cage was ensured (the surface of a cage 2000 cm^2, returning 500 cm^2 cage/bird),

and at the population of the hall of exploitation on the ground, the density was 7 chickens/m^2.
During the exploitation period, the egg-laying intensity, the dynamics of the numerical egg production and the absolute weight of the egg, the dynamics of the feed consumption and the evolution of the body weight of the chickens were monitored.

RESULTS AND DISCUSSIONS

The intensity of egg-laying, a biological factor that influences and conditions the eggs production, expresses the number of eggs produced by a number of birds in a certain period of time. The percentage of egg-laying can be related to the number of chickens fed, to the number of chickens introduced into the hall or to number of females present in the hall. The egg-laying intensity can be calculated daily, weekly or monthly (Popescu-Micloșanu Elena, 2007). For more accurate monitoring of egg production, it is advisable to establish the egg intensity weekly and report it on the number of foddered hens (variant considered in this study).
The intensity of the egg-laying by the hens kept in the cage batteries, was high during the entire exploitation period, reaching the maximum value (the maximum value of the egg-laying) of 91.6% at the age of 27 weeks, then an extended plateau period, followed by another 92% egg-laying peak at the age of 52 weeks and slow production decline, reaching the minimum egg-laying percentage (73.7%) at the age of 104 weeks (Table 1, Figure 1).
In the case of the Lohmann Brown Classic hens operated in intensive system on the ground, the egg-laying intensity showed a continuous upward evolution from the beginning of the egg-laying, up to the age of 27 weeks when the egg-laying peak was reached (94.7%), the value being 3.1% higher compared to the batch maintained in batteries. The egg-laying intensity remained at a high level (90.1%) until the age of 37 weeks, then slowly decreased and reached a minimum value of 71.4%, at the end of the exploitation period (week 112) (Table 2, Figure 1).
During the entire period of operation, the hens exploited in the batteries achieved the average egg-laying intensity of 87.83%, and those kept on the ground on permanent bedding, achieved an average of 79.61%. Both batches showed a good egg-laying intensity, which is within the recommendations mentioned in the "Lohmann Brown Classic Hybrid Growth Guide", and the maximum values corresponding to the egg-laying peak are close to the maximum percentage (94.9%) that this hybrid can reach.
The values obtained in the analyzed groups are close to those specific to Lohmann Brown hybrids, which show a pronounced egg-laying precocity and reach the average egg-laying intensity of 88.5-81.9% at the age of only 24 weeks.
In the industrial system of breeding and exploitation, the birds that achieve early the maximum production of eggs, maintain their productive level for a long period (prolonged plateau phase) and show a slow decline in egg-laying intensity are preferred. Both batches analyzed showed high productive longevity (104 weeks hens maintained in batteries, 112 weeks hens kept on the ground), higher than the average longevity specific to hen egg-laying hybrids (77-80 weeks) (Vacaru-Opriș et al., 2002; Popescu-Micloșanu, 2007; Van et al., 2009; Usturoi, 2008).
In dynamics, the numerical production of eggs is on a certain egg curve, which is characteristic to each breed, line, hybrid and which comprises an ascending period (corresponding to the beginning of the egg-laying and the progressive increase of the percentage of egg-laying), a time when the number of eggs is maximal (the egg-laying peak), one plateau phase (production remains relatively constant) and one descendant period (the number of eggs gradually decreases until the egg-laying ceases) (Usturoi and Pădureanu, 2005; Usturoi, 2008).
In the industrial system, the exploitation of hens for the production of eggs for consumption is no longer profitable when the intensity of the egg-laying falls below the value of 65% (Popescu-Micloșanu, 2007).
The intensity of the egg-laying of the analyzed herd represented graphically in the form of the egg-laying curve is illustrated in Figure 1.

Table 1. The egg-laying intensity of Lohmann Brown Classic hens kept in cage batteries

Age (weeks)	The egg-laying intensity per hen foddered (%)	Age (weeks)	The egg-laying intensity per hen foddered (%)	Age (weeks)	The egg-laying intensity per hen foddered (%)	Age (weeks)	The egg-laying intensity per hen foddered (%)
21	7.2	42	90.2	63	91.2	84	90.3
22	38.1	43	90.1	64	91.0	85	89.9
23	81.9	44	89.9	65	91.2	86	89.8
24	91.2	45	90.1	66	91.2	87	89.5
25	92.8	46	90.4	67	91.3	88	89.3
26	91.4	47	90.3	68	91.3	89	89.2
27	91.6	48	90.6	69	91.7	90	88.7
28	91.3	49	91.1	70	91.5	91	88.7
29	91.1	50	91.0	71	91.7	92	88.5
30	90.8	51	91.8	72	91.6	93	88.4
31	90.6	52	92.0	73	91.9	94	87.8
32	90.6	53	91.9	74	91.4	95	86.8
33	90.8	54	91.9	75	91.0	96	86.3
34	90.5	55	92.0	76	91.2	97	86.1
35	90.0	56	91.9	77	91.1	98	85.2
36	90.3	57	91.8	78	90.7	99	85.4
37	90.3	58	91.5	79	90.3	100	82.7
38	90.6	59	91.7	80	89.9	101	74.4
39	90.9	60	91.5	81	89.5	102	74.6
40	90.5	61	91.4	82	89.9	103	74.7
41	90.4	62	91.2	83	90.1	104	73.7
Average intensity = 87.83							

Table 2. The egg-laying intensity of Lohmann Brown Classic hens kept on the ground

Age (weeks)	The egg-laying intensity per hen foddered (%)	Age (weeks)	The egg-laying intensity per hen foddered (%)	Age (weeks)	The egg-laying intensity per hen foddered (%)	Age (weeks)	The egg-laying intensity per hen foddered (%)
21	7.1	44	84.8	67	84.0	90	72.5
22	25.7	45	85.0	68	84.0	91	71.9
23	64.8	46	84.6	69	83.9	92	71.1
24	88.5	47	83.0	70	84.6	93	70.3
25	92.8	48	83.7	71	85.2	94	70.5
26	94.4	49	82.8	72	83.6	95	70.7
27	94.7	50	82.9	73	83.9	96	70.1
28	94.0	51	82.1	74	84.4	97	70.7
29	93.8	52	83.2	75	83,7	98	70.1
30	94.4	53	83.8	76	83.8	99	70.0
31	94.2	54	82.6	77	82.8	100	70.0
32	93.2	55	79.9	78	82.4	101	70.6
33	92.9	56	80.7	79	80.8	102	70.5
34	92.2	57	80.8	80	79.7	103	70.4
35	91.3	58	80.7	81	79.9	104	71.4
36	90.3	59	80.0	82	78.7	105	71.6
37	90.1	60	80.4	83	78.1	106	71.1
38	88.8	61	81.7	84	76.9	107	71.6
39	88.2	62	83.4	85	76.6	108	71.4
40	87.2	63	84.6	86	75.9	109	71.6
41	86.0	64	87.4	87	74.9	110	71.4
42	85.4	65	87.9	88	73.8	112	71.4
43	85.0	66	87.7	89	73.4	-	-
Average intensity = 79.61							

The upward part of the egg-laying curve, from the beginning of the egg-laying until the highest level of egg-laying intensity increased gradually, extending over a period of approx. 6 weeks for both lots. The plateau of the egg-laying curve, corresponding to maintaining the intensity of the egg-laying at a high level, lasted a long time, especially in the hens maintained in the batteries, and the downward part of the egg curve showed the slow decrease of the egg-laying intensity. The results show that the hens raised in close captivity, achieved a higher egg-laying intensity by 9.98% than the hens exploited on the ground. The birds that benefited from the freedom of movement in the hall, consumed some of the energy and protein of the food for the surplus of movement.

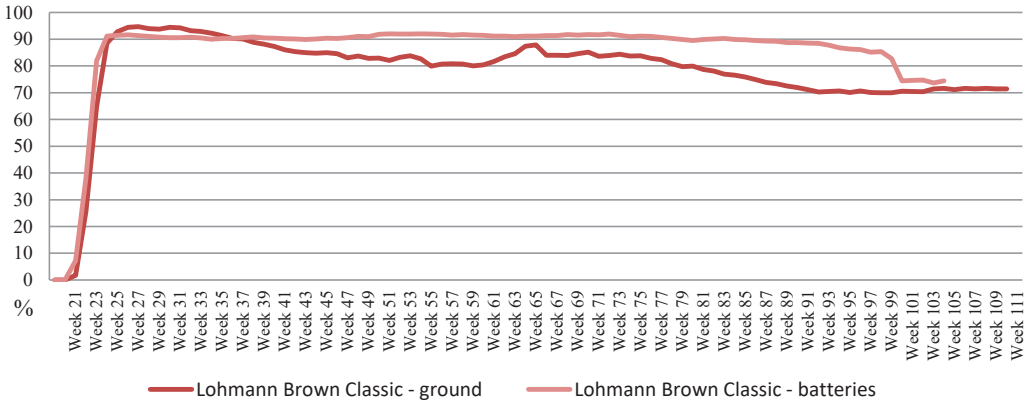

Figure 1. The egg curve of Lohmann Brown Classic hens kept on the ground and in the batteries

During the entire period of exploitation, the total numerical production of eggs made by the Lohmann Brown Classic hens kept in the batteries was 10,712,943 pieces, and the hens intensively grounded produced 3,692,607 pieces (Table 3).

Table 3. Monthly and total egg production of Lohmann Brown Classic hens kept in batteries and on the ground

Month of egg-laying	Number of eggs (pcs.)	
	Hens exploitation in batteries	Hens exploitation on the ground
1	385,551	12,953
2	626,655	210,757
3	600,079	224,611
4	615,468	226,761
5	612,396	209,151
6	589,532	206,391
7	613,430	201,127
8	595,668	190,213
9	611,459	191,521
10	606,392	182,720
11	546,940	200,441
12	604,797	187,243
13	578,902	166,419
14	587,277	180,004
15	565,496	164,432
16	576,224	161,331
17	540,847	147,709
18	439,623	147,435
19	349,157	145,443
20	67,050	140,254
21	-	195,691
TOTAL	*10,712,943*	*3,692,607*

The average weekly production of eggs produced by the hens maintained in the batteries was 126,034.62 pcs., and the hens kept on the ground made 39,705.45 pcs. In both batches analyzed, the exploitation period was longer than that provided in the "Lohmann Brown Classic Hybrid Growth Guide" (up to 90 weeks of age). Therefore, in order to determine the average egg production per hen, the number of eggs obtained in 16 months of eggs was taken into account, in order to make a comparison with the productive potential with which this hybrid is credited. The average egg production per hen exploited in the batteries was 417.79 pcs. and per hen exploited on the ground was 349.23 pcs. The average individual egg production achieved in 16 months of eggs-laying by the Lohmann Brown Classic hens exploited in batteries, is superior by 68.56 pieces to the production obtained from the same hybrid exploited on the ground, on permanent bedding. The average individual production of eggs made by the hens exploited in batteries is higher than the one mentioned in the "Growth Guide" (400-405 eggs in 16 months of laying), and the egg production of the hens exploited on the ground, is below the genetic potential of the hybrid. For the total period of exploitation, the hens kept in the batteries achieved the average individual production of 480.42 eggs in 85 weeks, and the hens kept on the ground produced each 442.23 eggs in 93 weeks.

The weight of the eggs is the main criterion on which the consumption eggs are marketed. Depending on the size of the eggs and how the hens from which the eggs come from were kept, the cost price of the consumption eggs differs. The weight of the eggs is a character with high genetic determinism (h^2 = 0.55 - Usturoi, 2008), and its value increases with the aging of the birds.

The weighing of the eggs produced by the hens of the analyzed batches, showed an upward evolution of the weight of the eggs throughout the period of exploitation of the hens, registering higher values in the batch exploited in batteries (50.95 g/egg at the age of 20 weeks, 73.20 g to 104 weeks) than in the case of the ground exploited lot (50.87 g/egg at 20 weeks, 71.95 g at 112 weeks), even higher than those stipulated in the morpho-productive standard of the Lohmann hybrid Brown Classic (Table 4). During the entire period of exploitation, the average weight of eggs produced by the hens maintained in the batteries was 68.45 g, and that of the eggs produced by the hens maintained on the ground was 64.57 g. Regardless of the maintenance system, most of the eggs they were in category L (large eggs, weighing between 63.0-72.9 g), followed by category M (medium eggs, weighing between 53.0-62.9 g) (Beate and Peitz, 2008).

Table 4. Average weight of eggs produced by Lohmann Brown Classic hens

Age (weeks)	Weight egg of hens kept in batteries (g)	Age (weeks)	Weight egg of hens kept in batteries (g)	Age (weeks)	Weight egg of hens kept on the ground (g)	Age (weeks)	Weight egg of hens kept on the ground (g)
20	50.95	66	70.95	20	50.87	66	65.05
22	52.30	68	71.02	22	50.90	68	65.05
24	56.60	70	71.30	24	55.65	70	65.68
26	62.20	72	71.58	26	56.23	72	65.73
28	63.30	74	71.90	28	57.48	74	66.20
30	63.55	76	72.00	30	58.33	76	66.28
32	64.00	78	72.00	32	59.70	78	66.50
34	64.80	80	72.20	34	60.95	80	66.78
36	65.63	82	72.85	36	61.38	82	67.05
38	65.83	84	72.98	38	61.92	84	67.35
40	65.83	86	73.00	40	62.28	86	67.95
42	65.90	90	72.85	42	62.98	90	67.02
44	66.63	92	73.05	44	62.95	92	67.58
46	67.05	94	73.40	46	63.48	94	67.80
48	67.15	96	73.50	48	63.70	96	68.20
50	67.95	98	73.65	50	63.85	98	68.38
52	68.60	100	73.87	52	63.95	100	68.93
54	68.70	102	73.15	54	64.30	102	70.90
56	69.38	104	73.20	56	64.33	104	71.00
58	69.63	106	-	58	64.58	106	71.15
60	70.02	108	-	60	64.60	108	71.65
62	70.12	110	-	62	64.82	110	71.81
64	70.20	112	-	64	64.95	112	71.95
Average: 68.45				*Average: 64.57*			

The egg-laying hens in the analyzed groups were fed phasically: Phase 1 of egg-laying (approximately weeks 19-45), Phase 2 of egg-laying (approximately weeks 46-65), Phase 3 of egg-laying (after 65 weeks). The food was administered 4 times daily, ensuring the energy and protein level corresponding to each combination feed recipe, depending on the expected egg intensity. The automatic feeding system allowed the rigorous monitoring of food intake, the control of the body weight of the hens being carried out periodically. The amount of feed consumed was permanently monitored and recorded monthly, in both the hens operating facilities. The feed consumption is significantly influenced by the microclimate factors, but also by the quality of the combined feed. The birds in the two analyzed batches achieved the lowest feed consumption in the first feeding stage (age 19-45 weeks), respectively in the first 7 months of exploited, the lowest average consumption of 130 g feed/hen/day was recorded in the 5th month in the hall where the hens were exploited on the ground, at which point, the chickens exploited in the batteries consumed 145 g of feed/hen/day (Table 5). Feed consumption increased gradually from the first month of egg-laying up to the 9th month (171 g/hen/day) for hens exploited in batteries, respectively until 9-10 months (150 g/hen/day) for hens kept on the ground. After reaching the maximum level of consumption in the aforementioned months, the intake gradually regresses until the last month of exploited (124 g/hen/day in the hens operated in batteries, respectively 135 g/hen/day in the hens kept on the ground). For the total period of exploitation, the

consumption of feed is higher in the case of hens exploited in batteries, due to the larger number and the larger body weight (Table 5). The analysis of the dynamics of food consumption shows lower feed consumption in the first 9 months of operating for the chickens belonging to the Lowmann Brown Classic group operated in wide captivity (on the ground), and in the next period of operation (from 10 months to the end of the cycle exploitation), the hens kept on the ground consumed higher amounts of feed than the hens exploited in close captivity (in batteries). In both variants of the maintenance of hens (on the ground and in the batteries), the consumption of feed was higher than mentioned in the "Lohmann Brown Classic Hybrid Growth Guide". Under optimum maintenance conditions, during the production period, Lohmann Brown Classic hens consume 110-120 g combined feed per feed day per bird.

Table 5. Feed consumption of Lohmann Brown Classic hybrid hens kept in ground and in batteries

Exploitation period	Specification	Hens exploited on the ground	Hens exploited in batteries
Month 1 (31/30 days)	Average lot (heads)	8320	22220
	Fodder consumed (kg/lot/period)	31882	89176
	Average consumption (g/head/day)	132	133
Month 2 (31 days)	Average lot (heads)	8260	22120
	Fodder consumed (kg/lot/period)	34598	105513
	Average consumption (g/head/day)	135	140
Month 3 (30 days)	Average lot (heads)	8200	22010
	Fodder consumed (kg/lot/period)	35725	96030
	Average consumption (g/head/day)	140	145
Month 4 (31 days)	Average lot (heads)	8130	21910
	Fodder consumed (kg/lot/period)	27607	101102
	Average consumption (g/head/day)	134	148
Month 5 (31 days)	Average lot (heads)	8060	21820
	Fodder consumed (kg/lot/period)	29745	87820
	Average consumption (g/head/day)	130	145
Month 6 (31 days)	Average lot (heads)	8000	21730
	Fodder consumed (kg/lot/period)	35034	95763
	Average consumption (g/head/day)	141	146
Month 7 (31 days)	Average lot (heads)	7950	21630
	Fodder consumed (kg/lot/period)	32357	99680
	Average consumption (g/head/day)	145	148
Month 8 (31/30 days)	Average lot (heads)	7890	21560
	Fodder consumed (kg/lot/period)	32041	116703
	Average consumption (g/head/day)	149	160
Month 9 (30/31 days)	Average lot (heads)	7830	21490
	Fodder consumed (kg/lot/period)	40008	114480
	Average consumption (g/head/day)	150	171
Month 10 (31 days)	Average lot (heads)	7760	21420
	Fodder consumed (kg/lot/period)	32736	94553
	Average consumption (g/head/day)	150	142
Month 11 (30 days)	Average lot (heads)	7730	21340
	Fodder consumed (kg/lot/period)	33230	81778
	Average consumption (g/head/day)	138	136
Month 12 (31 days)	Average lot (heads)	7370	21230
	Fodder consumed (kg/lot/period)	35822	88873
	Average consumption (g/head/day)	146	135
Month 13 (31/30 days)	Average lot (heads)	7300	21120
	Fodder consumed (kg/lot/period)	31149	91867
	Average consumption (g/head/day)	146	144
Month 14 (28 days)	Average lot (heads)	7230	21000
	Fodder consumed (kg/lot/period)	31385	71204
	Average consumption (g/head/day)	140	139
Month 15 (31/30 days)	Average lot (heads)	7160	20900
	Fodder consumed (kg/lot/period)	33722	76990
	Average consumption (g/head/day)	148	132
Month 16 (30/31 days)	Average lot (heads)	7080	20810
	Fodder consumed (kg/lot/period)	33893	90991
	Average consumption (g/head/day)	144	141
Month 17 (31 days)	Average lot (heads)	7005	17180
	Fodder consumed (kg/lot/period)	30643	80555
	Average consumption (g/head/day)	145	151

Continue table 5

Exploitation period	Specification	Hens exploited on the ground	Hens exploited in batteries
Month 18 (30 days)	Average lot (heads)	6930	17080
	Fodder consumed (kg/lot/period)	32007	69270
	Average consumption (g/head/day)	149	145
Month 19 (31 days)	Average lot (heads)	6860	17015
	Fodder consumed (kg/lot/period)	27690	65810
	Average consumption (g/head/day)	130	124
Month 20 (31 days)	Average lot (heads)	6790	16990
	Fodder consumed (kg/lot/period)	30006	65500
	Average consumption (g/head/day)	138	124
Month 21 (31 days)	Average lot (heads)	6720	-
	Fodder consumed (kg/lot/period)	28900	-
	Average consumption (g/head/day)	135	-

Body weight is one of the biological factors that significantly influences the number of eggs of farm birds. The largest egg productions are obtained from birds whose body weight is close to the average of the breed or hybrid to which they belong. Overweight birds produce smaller eggs, even than those whose body weight is below the average of their population (Usturoi, 2008; Vacaru-Opriş et al., 2000). The body weight also determines the specific consumption of feed, an important indicator of the economic efficiency of the process of exploitation of birds for egg production. The hens from the analyzed groups were monitored regarding the evolution of the body weight and its uniformity from the population of the halls (age 19 weeks), for a period of 85/93 weeks, as long as the operating process lasted, depending on the maintenance system. The determination of the body weight of the hens was achieved by the individual weighing about 10% of the herd, every two weeks. Each week during the exploitation period (with minor exceptions), the hens exploited in the batteries showed body weights slightly higher than those specific to the hens kept on the ground, due to the hight captivity (movement limitation) (Table 6).

Table 6. Body weight of Lohmann Brown Classic hens during the period of exploitation

Age (weeks)	Body weight hens maintained in batteries (g)	Age (weeks)	Body weight hens maintained in batteries (g)	Age (weeks)	Body weight hens maintained on the ground (g)	Age (weeks)	Body weight hens maintained on the ground (g)
20	1610	68	2010	20	1532	68	2010
22	1640	70	2010	22	1630	70	2012
24	1720	72	2010	24	1660	72	2015
26	1770	74	2015	26	1692	74	2016
28	1760	76	2020	28	1719	76	2021
30	1800	78	2024	30	1720	78	2022
32	1840	80	2026	32	1728	80	2024
34	1860	82	2028	34	1717	82	2026
36	1870	84	2032	36	1780	84	2029
38	1880	86	2035	38	1820	86	2031
40	1880	88	2038	40	1822	88	2036
42	1902	90	2041	42	1860	90	2035
44	1920	92	2045	44	1888	92	2037
46	1922	94	2050	46	1902	94	2042
48	1930	96	2050	48	1915	96	2043
50	1950	98	2055	50	1925	98	2044
52	1955	100	2058	52	1932	100	2043
54	1960	102	2060	54	1934	102	2045
56	1970	104	2070	56	1941	104	2048
58	1978	106	-	58	1950	106	2050
60	1980	108	-	60	1992	108	2050
62	1980	110	-	62	1998	110	2052
64	1995	112	-	64	2001	112	2055
66	2000			66	2000	-	-
Average: 1947.65				*Average: 1932.85*			

At the beginning of the operation (week 20), the body weight of the hens raised in the batteries was slightly higher (1610 g), than the body weight of the hens raised in the ground (1532 g) (Table 6). During the period when the maximum egg-laying intensity was reached

(week 27), the average body weight of the hens kept in the batteries reached 1760 g, of the hens raised on the ground was 1719 g, and in the last week of operation, the body weight of the hens kept in the batteries recorded the average value of 2070 g (week 104) *versus* 2055 g (week 112) in the case of hens exploited on the ground (Table 6). For the total production period, the average body weight of hens exploited in batteries was about 14.8 g higher than that of hens kept on the ground (1947.65 g *versus* 1932.85 g). The body weight of the hens from the analyzed groups was less than the standard body weight specific to the Lohmann Brown Classic hybrid, with small differences between the groups.

CONCLUSIONS

Both batches showed a good percentage of eggs, the average intensity of the egg-laying achieved during the entire period of operation of the hens maintained in cage batteries, being higher than that obtained by the hens kept on the ground (87.83% *versus* 79.61%). Both groups reached the egg-laying peak (91.6% and 94.7%, respectively) early, at the age of 27 weeks, the plateau of the egg-laying curve was long and the descending phase was slow (over 71% egg intensity at the end of the operation).

The total numerical production of eggs made during the entire period of exploitation of the hens maintained in the batteries, was higher than that obtained from the hens kept on the ground (10,712,943 pieces, compared to 3,692,607 pieces). And the average number of eggs per hen kept in batteries was higher than per hen exploited on the ground (417.79 pieces versus 349.23 pieces at the age of 16 months).

The weight of the eggs produced by the hens of both groups, showed an upward dynamics from the beginning of the egg-laying (50.95 g/egg hens exploited in cages, 50.87 g/egg hens exploited on the ground), until the birds reformed (73.20 g/egg *versus* 71.95 g/egg). In the dynamics of the exploitation, the hens kept in the batteries produced larger eggs: for the total period of exploitation, the average weight of the eggs produced by the hens maintained in the batteries was 68.45 g, and that of the eggs produced by the hens kept on the ground was of 64.57 g. Regardless of the maintenance system, most of the eggs belonged to category L (large eggs). The feed consumption increased from the first egg-laying month to the 9th month for the hens exploited in captivity, respectively until the 9th to 10th months for the hens exploited on the ground, and then the feed intake progressively regresses until the last month of exploitation. The average daily feed intake per bird varied between 124-171 g in hens kept in batteries and between 130-150 g in hens kept on the ground.

The body weight registered an upward dynamic from the population of the halls (1610 g/hen exploited in batteries, 1532 g/hen maintained on the ground), until depopulation (2070 g/hen maintained in the batteries, respectively 2055 g/hen maintained on the ground). At all stages of exploitation (with minor exceptions) and for the entire period of operation, the hens maintained in the batteries showed a higher body development than those maintained on the ground (during the entire period of operation, the average body weight of the hens kept in the batteries was higher by approx. 14.8 g to that of hens kept on the ground -1947.65 g *versus* 1932.85 g).

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* Lohmann Brown Classic hybrid growth guide.