ADAPTABILITY OF LOHMANN BROWN HYBRID TO DIFFERENT PRODUCTION SYSTEMS

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Abstract

By EU Directive 74/1999 a CE, from 2012 was banished exploitation of laying hens in classical batteries, in all EU states. The actual production systems agreed at European level differentiates by the conditions assured to birds (accommodation area, movement freedom, supplementary endowments, access to the external environment) and is materialized in the quality code which is given to consumption egg. After years '90 Romanian poultry units totally renounced at domestic biological material, preferring commercial hybrids provided by the great multinational firms and whose productive response depends on adaptability at specific conditions from Romania. In the current paper are presented the productive performances of Lohmann Brown hybrid exploited in 4 production systems (battery; loft; permanent layer; free-range), respecting the rearing factors described in hybrid's guide. During studied period (20-60 weeks), the best egg production (249.92 eggs/head) was realises by the hens reared in battery, those one being with 2.22% that the one of the hens reared on permanent layer, with 11.04% face to hens accommodated in loft and with 14.73% that at hens exploited in free-range system. Feed conversion index presents limits between 132.02 g n.c./egg (for hens from battery) and 162.28 g n.c./egg (at the ones reared in free-range system). Under the aspect of survival rate, the best results were at hens reared on permanent layer, with a mortality of only 4.26%, followed by the ones from free-range with 5.38%, and the ones from battery 6.41% and finally by the hens accommodated in loft with 8.72%. The study conclusion was that Lohmann Brown had a good adaptability to different rearing systems, with the remark that productive response is close to its theoretical potential when are applied intensive rearing systems, respectively in battery and on permanent layer.

Key words: *Lohmann Brown, adaptability, rearing system, egg production, conversion index, viability*

INTRODUCTION

Eggs are an important source of valuable nutrients for the human consumer (easily digestible proteins, lipids with a high degree of assimilation, vitamins, minerals etc.), but also the raw material necessary for some branches of the food industry (ice cream, mayonnaise, confectionery and bakery products, etc.) (Usturoi, 2008).

Worldwide, more than 80% of egg consumption is covered by those obtained from hens (Sossidou et al., 2009), a situation that required a reconsideration of all the factors involved in modeling the numerical production of eggs and their quality (Usturoi et al., 2011).

From this point of view, new egg-laying hybrids of high genetic value were created (Purdum et all., 2020), and the possibilities of improving the provided growth conditions (Konkol et al., 2020; Vitienes et al., 2022), including the nutritional characteristics of the combined feeds administered to this category of birds, were studied (Bessei, 2018; Petterson et al., 2016).

The banning of classic batteries in 2012 required the introduction of new breeding systems in poultry practice that would comply with the measures imposed by the welfare legislation, but allow the achievement of sufficiently large productions, in profitable conditions (Dikmen et al., 2017; Kozak et al., 2016; Singh et al., 2009).

The current batteries agreed at the community level copied the model of the classic ones (strictly delimited growth space for a group of birds), only the area allocated

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to each specimen was increased and they were equipped with various utilities to allow the manifestation of instincts (perching, bathed etc.) (Denli et al., 2018; Kucukyilmaz et al., 2012; Wall, 2011).

Another option is breeding in an aviary, a solution that provides the birds with superior comfort conditions (larger accommodation area, freedom of movement both horizontally and vertically, the possibility to choose the nest or the watering-feeding area, etc.); it seems that in the coming years this growth system will replace modified batteries (Dikmen et al., 2016; Sosnowka-Czajka et al., 2011).

Breeding birds in freedom (free-range) involves housing the birds in a shelter where the specific microclimate factors are ensured, but which is open to related paddocks so that the birds benefit from all the advantages conferred by the external environment (Kucukkoyuncu et al., 2017).

These technical solutions only partially ensure the two important desired aspects of the exploitation of egg-laying hybrids (compliance with the legislation regarding the welfare and profitability of egg production), because when an ambient environment is not provided at a physiological level or the birds move a lot, the nutrients in the feed they are directed towards covering metabolic and thermoregulatory needs, to the detriment of egg production (Kraus et al., 2019; Silversides et al., 2012; Weitzenburger et al., 2005).

From the mentioned considerations, the present study focused on the performances of the Lohmann Brown egg-laying hybrid, under the specific growth conditions of the production systems currently used in Romanian poultry farming.

MATERIAL AND METHOD

The research was carried out under production conditions, on one of the best-rated egg-laying hybrids in the world, namely, Lohmann Brown.

The experimental variable was represented by the growing system, in this sense, the four technological variants used in the units in our country and agreed upon at the community level were tested, respectively: growing in the improved battery (Eurovent); breeding in the aviary (Natura Nova Twin); growth on a permanent litter; free-range breeding (sheds equipped with an external paddock).

The number of birds in the sheds taken under control was conditioned by the breeding system applied, which was 36,343 heads. in the case of the hall equipped with a battery, of 30013 cap. in the hall with aviary, of 10346 head. in the case of the shed with permanent bedding and 2000 head. in that of the free-range growing hall.

In all analyzed situations, the breeding of the birds was carried out following the recommendations of the guide of the hybrid used, including the feed that was qualitatively differentiated according to the egg-laying intensity of the birds.

The birds from the four rearing variants tested were followed for 40 weeks (from the 20th week of life up to and including the 60th week), during which some specific productive indicators were monitored namely:

- flock losses (%)=daily mortality cases were accumulated for each week of the birds' life, the resulting number being related to the initial flock of the week in question;
- individual egg production (eggs/bird) = weekly egg production by each bird was accumulated over the entire studied period (20-60 weeks);
- egg-laying intensity (%)=was calculated with the formula (Q x 100) / N x K where: Q-number of eggs laid in the reference period; K-number of days; N-the average number of birds to which egg production was reported;
- average feed consumption (g n.c./head/day) = was determined for the age periods 20-45 weeks and 46-60 weeks and respectively, for the total period studied, by reporting the total amount of feed consumed, to the average herd and the number of days of the reference period;
- the feed conversion index (g n.c./egg) = resulted from the ratio of the amount of feed consumed by the birds to the number of eggs laid by them, during the two stages of feeding and for the total period studied.

All the indicators based on which the adaptability of the Lohmann Brown hybrid to different breeding systems was evaluated were recorded and calculated following the agreed methodology in poultry farming.

RESULTS AND DISCUSSIONS

Livestock losses. In the case of laying hens raised on permanent litter, the lowest rate of losses in the herd was recorded, at only 4.26% (426 heads from the initial herd of 10346 heads), an aspect that confirms the fact that the controlled environmental environment specific to closed sheds ensures superior comfort for the birds.

In hens raised in the free-range system, free access to food resources from the external environment and the beneficial influence of atmospheric factors materialized in a good state of health, the herd losses, in this case, being 5.38% (107 from an initial herd of 2000 heads).

The specimens housed in the Eurovent type battery had a very good egg laying rate, but this led to more pronounced exhaustion, which materialized in a larger number of birds withdrawn from the flock (2256 heads from the initial flock of 36343 heads) resulting in a mortality rate of 6.41%.

Breeding in the aviary is a technique that is gaining more and more followers among breeders because it covers a large part of the elements required by the legislation related to ensuring the state of well-being; the free movement of birds in a relatively small space frequently resulted in mechanical accidents that led to the recording of the highest rate of losses in the herd, of 8.72% (2536 heads, from an initial herd of 30013 heads) (table 1).

Table 1 The situation of losses from the herd in the studied hens

Bird age (week)	Increase in battery			Breeding in aviary			Growing on permanent bedding			Free-range breeding		
	Effective weekly		Death rate (%)	Effective weekly		Death rate (%)	Effective weekly		Death rate (%)	Effective weekly		Death rate (%)
	cap.	cap.		cap.	cap.		cap.	cap.		had.	had.	
20	36343	36282	0.17	30013	29958	0.18	10346	10342	0.04	2000	1997	0.15
21	36272	36215	0.35	29958	29882	0.43	10342	10335	0.11	1997	1995	0.25
22	36203	36154	0.52	29882	29793	0.73	10335	10331	0.15	1995	1994	0.30
23	36146	36098	0.67	29793	29709	1.01	10331	10323	0.23	1994	1993	0.35
24	36088	36051	0.80	29709	29662	1.17	10323	10316	0.30	1993	1992	0.40
25	36044	36004	0.93	29662	29593	1.40	10316	10313	0.33	1992	1991	0.45
26	35996	35959	1.06	29593	29501	1.71	10313	10306	0.40	1991	1990	0.50
27	35950	35904	1.21	29501	29404	2.04	10306	10302	0.44	1990	1989	0.55
28	35897	35851	1.36	29404	29357	2.20	10302	10298	0.48	1989	1988	0.60
29	35843	35808	1.48	29357	29298	2.40	10298	10292	0.54	1988	1988	0.60
30	35803	35772	1.58	29298	29226	2.65	10292	10286	0.60	1988	1988	0.60
31	35767	35732	1.69	29226	29147	2.92	10286	10279	0.67	1988	1988	0.60
32	35726	35692	1.80	29147	29067	3.19	10279	10270	0.76	1988	1986	0.70
33	35688	35657	1.90	29067	29017	3.36	10270	10255	0.91	1986	1984	0.70
34	35653	35619	2.01	29017	28965	3.54	10255	10247	0.99	1984	1984	0.70
35	35614	35585	2.11	28965	28892	3.79	10247	10237	1.09	1984	1984	0.70
36	35579	35533	2.26	28892	28824	4.03	10237	10231	1.15	1984	1984	0.70
37	35525	35484	2.40	28824	28750	4.29	10231	10223	1.23	1984	1982	0.80
38	35478	35434	2.54	28750	28701	4.46	10223	10215	1.31	1982	1980	0.90
39	35475	35781	2.69	28701	28605	4.79	10215	10205	1.41	1980	1978	1.00
40	35373	35330	2.83	28605	28531	5.05	10205	10192	1.54	1978	1976	1.10
41	35330	35275	2.99	28531	28472	5.26	10192	10180	1.66	1976	1973	1.25
42	35275	35229	3.12	28472	28378	5.59	10180	10173	1.73	1973	1970	1.40
43	35229	35174	3.28	28378	28294	5.89	10173	10162	1.84	1970	1967	1.55
44	35174	35116	3.44	28294	28226	6.13	10162	10151	1.95	1967	1964	1.70
45	35116	35059	3.60	28226	28145	6.42	10151	10140	2.06	1964	1964	1.70
46	35059	34999	3.77	28145	28107	6.56	10140	10133	2.13	1964	1964	1.70
47	34999	34936	3.95	28107	28041	6.79	10133	10126	2.20	1964	1960	1.90
48	34936	34880	4.11	28041	28004	6.92	10126	10116	2.30	1960	1956	2.21
49	34880	34818	4.29	28004	27922	7.04	10116	10104	2.42	1956	1952	2.41
50	34818	34755	4.47	27922	27874	7.21	10104	10090	2.56	1952	1948	2.61
51	34755	34698	4.63	27874	27817	7.41	10090	10077	2.69	1948	1944	2.82
52	34698	34640	4.80	27817	27758	7.62	10077	10063	2.83	1944	1940	3.02
53	34640	34577	4.98	27758	27673	7.83	10063	10050	2.96	1940	1936	3.22
54	34577	34514	5.16	27673	27645	7.93	10050	10036	3.10	1936	1932	3.43
55	34514	34453	5.34	27645	27581	8.10	10036	10015	3.31	1932	1927	3.69
56	34453	34365	5.60	27581	27522	8.22	10015	9998	3.48	1927	1922	3.95
57	34365	34292	5.81	27522	27432	8.34	9998	9981	3.65	1922	1916	4.26
58	34292	34225	6.01	27432	27399	8.46	9981	9962	3.84	1916	1909	4.63
59	34225	34155	6.21	27399	27364	8.59	9962	9942	4.04	1909	1901	5.02
60	34155	34087	**6.41**	27364	27328	**8.72**	9942	9920	**4.26**	1901	1893	**5.38**

Numerical egg production. The best individual egg production during the 40 weeks of control was achieved by hens housed in the Eurovent battery house (249.92 eggs/head). In the next position were the hens housed in the house with permanent bedding (244.36 eggs/head), then those in the aviary house (222.34 eggs/head), and in the last position the birds that were raised in the free system -range (213.11 eggs/head).

The results obtained can be considered good, since the potential of the Lohmann Brown hybrid for the mentioned age period (20-60 weeks) is 252.1 eggs/head (table 2).

Table 2 Numerical egg production of the studied hens

Bird age (week	Increase in battery			Breeding in aviary			Growth on permanent litter			Free-range growth		
	Effective average (head)	Total production (eggs/week)	Individual production (eggs/seven/head)	Effective average (head)	Total production (eggs/week)	Individual production (eggs/seven/head)	Effective average (head)	Total production (eggs/week)	Individual production (eggs/seven/head)	Effective average (head)	Total production (eggs/week)	Individual production (eggs/seven/head)
20	36312.5	150314	4.14	29985.5	135239	4.51	10344.0	43370	4.19	1998.5	8074	4.04
21	36243.5	154918	8.41	29920.0	137235	9.09	10338.5	55967	9.60	1996.0	8955	8.53
22	36178.5	205389	14.09	29837.5	141768	13.83	10333.0	58605	15.27	1994.5	9005	13.04
23	36122.0	220427	20.19	29751.0	142459	18.61	10327.0	60122	21.09	1993.5	9150	17.63
24	36069.5	228173	26.51	29685.5	144981	23.49	10319.5	62000	27.10	1992.5	9190	22.24
25	36024.0	230677	32.91	29627.5	149619	28.54	10314.5	62767	33.18	1991.5	9220	26.87
26	35977.5	229541	39.33	29547.0	155122	33.79	10309.5	63005	39.29	1990.5	9295	31.54
27	35927.0	231799	45.78	29452.5	156098	39.09	10304.0	63400	45.44	1989.5	9750	36.44
28	35874.0	231469	52.23	29380.5	159242	44.51	10300.0	63660	51.62	1988.5	10070	41.50
29	35825.5	232174	58.71	29327.5	162181	50.04	10295.0	63705	57.81	1988.0	10980	47.02
30	35787.5	233230	65.23	29262.0	166501	55.73	10289.0	63837	64.01	1988.0	11880	53.00
31	35749.5	233484	71.76	29186.5	166947	61.45	10282.5	64252	70.26	1988.0	11900	58.99
32	35709.0	233074	78.29	29107.0	162708	67.04	10274.5	64090	76.50	1987.0	11880	64.97
33	35672.5	232909	84.82	29042.0	160312	72.56	10262.5	63824	82.72	1985.0	11660	70.84
34	35636.0	232554	91.35	28991.0	160030	78.08	10251.0	63690	88.93	1984.0	11640	76.71
35	35599.5	232748	97.88	28928.5	160264	83.62	10242.0	63605	95.14	1984.0	11630	82.57
36	35756.0	232241	104.39	28858.0	158430	89.11	10234.0	63401	101.33	1984.0	11450	88.34
37	35504.5	231019	110.89	28787.0	158904	94.63	10227.0	63252	107.51	1983.0	11420	94.10
38	35456.0	230671	117.39	28725.5	157789	100.13	10219.0	63175	113.69	1981.0	11300	99.80
39	35403.0	231398	123.89	28653.0	157233	105.62	10210.0	63005	119.86	1979.0	11300	105.51
40	35351.5	229930	130.39	28568.0	157100	111.13	10198.5	62930	126.03	1977.0	11200	111.18
41	35299.0	229055	136.88	28501.5	157091	116.65	10186.0	62900	132.20	1974.5	11000	116.75
42	35249.0	228625	143.36	28425.0	157001	122.18	10176.5	62727	138.36	1971.5	10850	122.25
43	35197.5	222364	149.68	28336.0	156981	127.72	10167.5	62665	144.52	1968.5	10790	127.73
44	35141.0	221642	155.99	28260.0	156560	133.26	10156.5	62590	150.68	1965.5	10700	133.17
45	35084.0	220974	162.29	28185.5	154457	138.74	10145.5	62505	156.84	1964.0	10310	138.42
46	35025.0	218929	168.54	28126.0	156943	144.32	10136.5	62147	162.97	1964.0	10260	143.64
47	34962.5	217632	174.76	28074.0	155530	149.86	10129.5	61905	169.08	1962.0	10260	148.86
48	34904.5	216237	180.96	28022.5	154684	155.38	10121.0	61449	175.15	1958.0	10140	154.04
49	34844.5	215442	187.14	27963.0	155195	160.93	10110.0	61155	181.20	1954.0	10090	159.20
50	34781.5	213245	193.27	27898.0	153997	166.45	10097.0	60615	187.20	1950.0	9810	164.23
51	34722.5	212027	199.38	27845.5	153707	171.97	10083.5	60260	193.18	1946.0	9700	169.21
52	34664.5	208298	205.39	27787.5	155054	177.55	10070.0	59695	199.11	1942.0	9650	174.18
53	34605.0	205299	211.32	27715.5	154930	183.14	10056.5	59100	204.98	1938.0	9500	179.08
54	34540.5	200298	217.12	27659.0	154614	188.73	10043.0	58745	210.83	1934.5	9465	183.97
55	34479.5	195519	222.79	27613.0	154633	194.33	10025.5	58330	216.65	1929.5	9440	188.86
56	34254.0	192421	228.41	27551.5	153186	199.89	10006.5	57701	222.42	1924.5	9405	193.74
57	34017.5	188053	233.94	27477.0	154146	205.50	9989.5	56910	228.12	1918.0	9385	198.63
58	33950.5	184954	239.39	27415.5	154349	211.13	9971.5	55025	233.64	1912.5	9300	203.49
59	33884.0	180485	244.72	27381.5	153610	216.74	9952.0	54506	239.12	1905.0	9205	208.32
60	33811.5	176246	**249.92**	27346.0	153138	**222.34**	9931.0	53213	**244.36**	1897.0	9095	**213.11**

Egg intensity. The Lohmann Brown hybrid has a peak production of 94.9% achieved in the 31st week of life. In the case of the rearing variants studied, the maximum laying intensity was reached at term (31st week), but with levels of only 93.30% in battery hens, 89.27% in those raised on permanent litter, 85.51% for those in the free-range system and only 81.71% for those in the aviary.

As for the average egg-laying intensity calculated for the entire period studied (20-60 weeks), it was superior in birds reared in those systems that limit movement, the nutrients in the feed being oriented towards basic production (89.27% in the battery house and 87.28% in the house with permanent bedding), compared to birds raised in the systems that ensure freedom of movement (79.39% in the house with aviary and only 76.13% in the open house in the outdoor paddock) (table 3).

Table 3 Egg-laying intensity (%) of the studied hens

Bird age (week	Increase in battery			Breeding in aviary			Growth on permanent litter			Free-range growth		
	Effective average (head)	Total production (eggs/week)	Egg intensity (%)	Effective average (head)	Total production (eggs/week)	Egg intensity (%)	Effective average (head)	Total production (eggs/week)	Egg intensity (%)	Effective average (head)	Total production (eggs/week)	Egg intensity (%)
20	36312.5	150314	59.14	29985.5	135239	64.43	10344.0	43370	59.89	1998.5	8074	57.71
21	36243.5	154918	61.06	29920.0	137235	65.52	10338.5	55967	77.34	1996.0	8955	64.09
22	36178.5	205389	81.10	29837.5	141768	67.88	10333.0	58605	81.02	1994.5	9005	64.50
23	36122.0	220427	87.18	29751.0	142459	68.40	10327.0	60122	83.17	1993.5	9150	65.57
24	36069.5	228173	90.37	29685.5	144981	69.77	10319.5	62000	85.83	1992.5	9190	65.89
25	36024.0	230677	91.48	29627.5	149619	72.15	10314.5	62767	86.93	1991.5	9220	66.14
26	35977.5	229541	91.54	29547.0	155122	75.00	10309.5	63005	87.31	1990.5	9295	66.71
27	35927.0	231799	92.17	29452.5	156098	75.71	10304.0	63400	87.90	1989.5	9750	70.01
28	35874.0	231469	92.18	29380.5	159242	77.43	10300.0	63660	88.29	1988.5	10070	72.34
29	35825.5	232174	92.58	29327.5	162181	79.01	10295.0	63705	88.40	1988.0	10980	78.90
30	35787.5	233230	93.10	29262.0	166501	81.28	10289.0	63837	88.63	1988.0	11880	85.36
31	35749.5	233484	93.30	29186.5	166947	81.71	10282.5	64252	89.27	1988.0	11900	85.51
32	35709.0	233074	93.24	29107.0	162708	79.86	10274.5	64090	89.11	1987.0	11880	85.41
33	35672.5	232909	93.24	29042.0	160312	78.86	10262.5	63824	88.84	1985.0	11660	83.92
34	35636.0	232554	93.22	28991.0	160030	78.85	10251.0	63690	88.76	1984.0	11640	83.81
35	35599.5	232748	93.40	28928.5	160264	79.14	10242.0	63605	88.72	1984.0	11630	83.74
36	35756.0	232241	92.79	28858.0	158430	78.43	10234.0	63401	88.50	1984.0	11450	82.45
37	35504.5	231019	92.95	28787.0	158904	78.86	10227.0	63252	88.35	1983.0	11420	82.27
38	35456.0	230671	92.94	28725.5	157789	78.47	10219.0	63175	88.32	1981.0	11300	81.49
39	35403.0	231398	93.37	28653.0	157233	78.39	10210.0	63005	88.16	1979.0	11300	81.57
40	35351.5	229930	92.91	28568.0	157100	78.56	10198.5	62930	88.15	1977.0	11200	80.93
41	35299.0	229055	92.70	28501.5	157091	78.74	10186.0	62900	88.21	1974.5	11000	79.59
42	35249.0	228625	92.66	28425.0	157001	78.90	10176.5	62727	88.06	1971.5	10850	78.62
43	35197.5	222364	90.25	28336.0	156981	79.14	10167.5	62665	88.04	1968.5	10790	78.30
44	35141.0	221642	90.10	28260.0	156560	79.14	10156.5	62590	88.04	1965.5	10700	77.77
45	35084.0	220974	89.98	28185.5	154457	78.28	10145.5	62505	88.01	1964.0	10310	74.99
46	35025.0	218929	89.29	28126.0	156943	79.71	10136.5	62147	85.58	1964.0	10260	74.63
47	34962.5	217632	88.92	28074.0	155530	79.02	10129.5	61905	87.30	1962.0	10260	74.60
48	34904.5	216237	88.50	28022.5	154684	78.86	10121.0	61449	86.73	1958.0	10140	73.98
49	34844.5	215442	88.33	27963.0	155195	79.29	10110.0	61155	86.41	1954.0	10090	73.77
50	34781.5	213245	87.58	27898.0	153997	78.86	10097.0	60615	85.76	1950.0	9810	71.87
51	34722.5	212027	87.23	27845.5	153707	78.85	10083.5	60260	85.37	1946.0	9700	71.21
52	34664.5	208298	85.84	27787.5	155054	79.71	10070.0	59695	84.68	1942.0	9650	70.99
53	34605.0	205299	84.75	27715.5	154930	79.86	10056.5	59100	83.95	1938.0	9500	70.02
54	34540.5	200298	82.84	27659.0	154614	79.85	10043.0	58745	83.56	1934.5	9465	69.89
55	34479.5	195519	81.01	27613.0	154633	79.90	10025.5	58330	83.12	1929.5	9440	69.89
56	34254.0	192421	80.25	27551.5	153186	79.53	10006.5	57701	82.38	1924.5	9405	69.81
57	34017.5	188053	78.97	27477.0	154146	80.14	9989.5	56910	81.38	1918.0	9385	69.90
58	33950.5	184954	77.83	27415.5	154349	79.91	9971.5	55025	78.83	1912.5	9300	69.47
59	33884.0	180485	76.09	27381.5	153610	80.10	9952.0	54506	78.24	1905.0	9205	69.03
60	33811.5	176246	74.46	27346.0	153138	80.04	9931.0	53213	76.55	1897.0	9095	68.49

Consumption of combined feeds. In the age period 20-45 weeks, the lowest daily consumption of combined feed was recorded by hens reared in the battery (114.24 g d.c./head/day), and the least convenient by the specimens from the free-range system (120.07 g n.c./head/day), a situation also valid for the second stage of growth (46-60 weeks) when the values obtained were 116.13 g n.c./head/day and respectively, 122.15 g n.c. /head/day.

Naturally, the average daily consumption of combined feed calculated for the entire studied period showed the lowest levels in battery-housed hens (115.16 g n.c./head/day), followed by those reared on permanent litter (116.76 g n.c./head/day), of hens in the aviary (119.56 g n.c./head/day) and free-range birds (121.81 g n.c./head/day) (table 4).

Feed conversion index. This productive parameter was correlated with the consumption of combined fodder and the egg production achieved during the respective period.

Thus, the best values of the conversion index were in hens reared in the battery, both during feeding phases (128.18 g n.c./egg in the period 20-45 weeks and 139.36 g n.c./egg in the period 46-60 weeks), as well as for the total period studied (132.02 g n.c./egg), and the least favorable in hens raised in the free-range system (157.73 g n.c./egg in the period 20-45 weeks; 173.93 g n.c./egg during the period 46-60 weeks; 162.28 g n.c./egg for the total period studied**).**

In the other two rearing systems, intermediate feed conversion values were recorded, both in the period 20-45 weeks (134.19 g n.c./egg in hens raised on a litter; 156.58 g n.c./egg in hens in the aviary), as well as during the period 46-60 weeks (140.40 g n.c./egg in hens reared on a litter; 152.07 g n.c./egg in hens in the aviary) and over the entire period studied (136.38 g n.c./egg in reared hens on a litter; 154.93 g n.c./egg in aviary hens) (table 4).

Table 4 Consumption of combined feeds in the studied birds

Age period (week)	Specification	The growth system			
		in the battery	in aviary	on permanent litter	free-range
20-45 (182 days)	Average effective (cap.)	35701.0	29079.0	10243.0	1982.0
	Fodder consumed (kg/period)	742284	631381	215915	43312
	Average daily consumption (g/head/day)	114.24	119.30	115.82	120.07
	Egg production (pieces/period)	5790799	4032252	1609049	274599
	Feed conversion index (g n.c./egg)	128.18	156.58	134.19	157.73
46-60 (105 days)	Average effective (cap.)	34573.0	27736.5	10030.5	1928.5
	Fodder consumed (kg/period)	421571	352450	123657	24734
	Average daily consumption (g/head/day)	116.13	121.02	117.41	122.15
	Egg production (pieces/period)	3025085	2317716	880756	144705
	Feed conversion index (g n.c./egg)	139.36	152.07	140.40	170.93
20-60 (287 days)	Average effective (cap.)	35215.0	28670.5	10133.0	1946.5
	Fodder consumed (kg/period)	1163855	983831	339572	68046
	Average daily consumption (g/head/day)	115.16	119.56	116.76	121.81
	Egg production (pieces/period)	8815884	6349968	2489805	419304
	Feed conversion index (g n.c./egg)	132.02	154.93	136.38	162.28

CONCLUSIONS

The data regarding the adaptability of the Lohmann Brown laying hen hybrid to the production systems currently applied in our country indicated that battery operation remains the most advantageous operation solution.

Thus, the hens raised in the Eurovent battery (model agreed at the community level) had the lowest rate of flock losses (4.26%), lower by 1.12-4.46% than the birds raised in other systems of growth.

The same technological solution, i.e. breeding in the battery, allowed the achievement of the best egg production, of 249.92 pcs./bird (higher by 2.22-14.73% than in the other tested exploitation variants) and this in the conditions of the best feed conversion index, of 132.02 g n.c./egg (lower by 3.30-22.92% compared to hens raised in other production systems)

In conclusion, it can be stated that the Lohmann Brown egg-laying hybrid has good adaptability to the different rearing systems applied in poultry practice, but especially to intensive ones (in battery and on permanent bedding), technical solutions that offer the birds better conditions of externalizing the productive potential.

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