Productive Response of Certain Laying Hens Hybrids, Reared Within Various Farming Systems

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ABSTRACT

Laying hens accommodation in conventional cage batteries will be forbidden from 2012, the alternative husbandry systems being created for replacement. However, they were not tested under production conditions or, more important for certain actual genotypes. The researches focused on the production response given by two laying hybrids (Lohmann Brown-A and Hisex Brown-B), exploited under different systems (Lc=conventional cages rearing, in climate controlled hall; L1exp=rearing in opened cages batteries, in climate controlled hall; L2exp=rearing at ground, in climate controlled hall; L3exp= rearing at ground, in a hall providing access to external paddock). Although fowl weight was found within standard, at the end of experiments, in Lohmann hybrids, the conventional cages hens (Lc-A) proved to have 4.46-8.06% higher values than those reared under alternative systems conditions, while in Hisex hybrids, hens from classic batteries (Lc-B) were 0.80-2.66% heavier than those in experimental groups. Lohman hens accommodated in conventional cages (Lc-A) achieved an average yield of 325.05 eggs/hen, which meant 4.22-15.89% higher than other husbandry versions. In Hisex hens, fowl from Lc-B group laid and average amount of 324.17 eggs, thus 3.28-15.87% more than the hens from experimental group. During 60 exploitation weeks, casualties rate in Lohmann hens reached 11.66% in control group and 7.36-11.08% in experimental ones, while in Hisex hens, mortality was found between 12.08% in control and 8.08-9.17% in the experimental ones. Conclusion of research was that alternative systems decreased laying hens production performances, although it fulfilled welfare needs, inducing also reliability diminution. It was also find that analysed genotypes gave different responses to the new tested husbandry versions.

Key words: *alternatives, rearing, hens, production*

INTRODUCTION

Across the world, approximately 75% of laying hens flocks are acomodated in batteries, in environment controlled halls, under the principles of the superintensive husbandry system (3).

The modern laying hybrids have great adaptability at the batteries accommodation system. Hovever the selection run for eggs yield improvement also generated birds with aggressive temperament, whom exteriorisation intensity depends on the used genotype (3).

Although is economically efficient, laying hens husbandry in cage batteries arisen negative reactions from animals welfare organisations (2). Thus, starting with 2012, eggs producers from the European Union should replace the conventional exploitation system with other alternative systems (1).

The technical solution used in order to increase the fowl amount per used surface unit (batteries with enlarged cages) could lead to the occurrence of certain behavioural problems, with direct consequences on hens productivity and liveability.

Another proposed version for the aviculture practice is the free-range husbandry, in halls opened toward paddocks. This solution exposes the fowl to the germs form the outer environment (3, 4).

Considering these stated above, we aimed to study the productive response of two different genotypes (“Lohmann Brown” and “Hisex Brown” laying hens hybrids) at the rearing conditions provided by certain alternative husbandry systems, with vertical or horizontal design.

MATERIAL AND METHOD

The biological material comprised 4266 hens belonging to "Lohmann Brown" laying hybrid, allocated in 4 experimental groups (Lc-A, L1exp-A, L2exp-A and L3exp-A) and also 4266 hens - "Hisex Brown" laying hybrid (Lc-B, L1exp-B, L2exp-B and L3exp-B), which differed through the applied technology and by the specific endorsements *(tab. 1).*

Table 1. Experimental design

Notice		Experimental groups			
Hybrid	Lohmann Brown	Lc-A	L1exp-A	L2exp-A	L3exp-A
	Hisex Brown	Lc-B	L1exp-B	L2exp-B	L3exp-B
Rearing technology		Conventional batteries	Opened batteries (no front panels)	At ground, on permanent litter	At ground, on permanent litter and access to outer paddock
Accomodation		Conventional cage -area=2000 cm^2 -sizes: L=0.4m; w=0.5m	Laying and resting cages -area: 2000 cm^2 -sizes: L=1.2m; w=0.5m Feeding and water intake cages -surface: 2000 cm^2 -sizes: L=1.2m; w=0.5m	Hall -area: 252m^2 -sizes: L=25,2m; w=10m	Hall -area: 252 m^2 -sizes: L=25,2m; w=10m External paddock -area: 3780m^2 -sizes: L=60m; w=63m
Brooding flock size		432 hens/group	432 hens/group	1512 hens/group	1890 hens/group
Brooding density		- 4 hens/cage of 2000 cm^2	- 12 hens/each 2 cages of 6000 cm^2	- 6 hens/m^2 hall	- 7.5 hens/m^2 hall - 0.5 hens/m^2 paddock
Surface provided/hen		- 500 cm^2	-500 cm^2 in laying and resting cage -500 cm^2 in feeding and water intake cage	- 0.17m^2	- in hall: 0.13 m^2 - în paddock: 2.0 m^2

The fowl in control groups (Lc-A and Lc-B) were reared in accordance with the superintensive system conditions – conventional cages, therefore a density of 4 hens/cage of 2000 cm^2 (500 cm^2 cage floor/hen).

In the hens from groups L1exp (L1exp-A and L1exp-B), the rearing was realised in halls endorsed with opened batteries (without front panels). The cages of a battery line served for nesting and rest, 500cm^2/hen being provided, while the cages in the nearby battery served for feeding and water consumption (500 cm^2/pasăre); the floor gap between two neighbour batteries was covered with litter.

In L2exp groups (L2exp-A and L2exp-B), the hens were reared within the intensive system, in halls endorsed with permanent litter, at a density of 6 hens/m^2. The feeders and water devices were alternately deployed, while nests were positioned around the walls.

The hens in groups L3exp (L3exp-A and L3exp-B) were reared in the semiintensive system, in halls with litter on the floor (7.5 hens./m^2 of hall), with free access in the outer paddock, where a density of 0.5 hens/m^2 was provided. Water and feed sources were placed both in halls and paddocks, in a covered area.

The researches lasted 60 weeks, starting when fowl turned 20 weeks old and lasted till they reached the age of 80 weeks. The main morpho-productive parameters were investigated throughout this period:

- **body weight dynamics**-individual weighting, run weekly on individualised specimens from each group;
- **eggs yield dynamics**-record of whole eggs amount, yielded during each week by each experimental group;
- **laying intensity** (*I %)* – using the relation:

$$I = \frac{Qx100}{NxK}, \text{ in which:}$$

Q = total amount of laid eggs, during "K" days;
N = fowl flock size, which laid the eggs (Q).

- **feed intake:**
  - overall (kg/group/period)
  - average daily intake (g/hen/day)
  - feed conversion ratio (g feed/egg)
- **flock health status**-weekly recording of flock casualties and reporting to the existing flock.

RESULTS AND DISCUSSIONS

1. Body weight. At the beginning of our investigations (week 20), fowl weight was closer between groups, for both hybrids, as a consequence of a rigorous selection, run prior to brooding.

Thus, for the "Lohmann Brown" hybrid, fowl weight varied between 1577.22±35.96g (L1exp-A group) and 1603.04±15.61g (L2exp-A group), while in the "Hisex Brown" hybrid, the variation limit were comprised within 1652.87±12.87g (L3exp-B) and 1656.17±26.46g (L1exp-B).

As fowl turned old, their weight progressively increased, certain differentiations occurring between groups, due to variable energy expenses, generated by more or less movement possibilities, in accordance with the applied technology in each group *(tab. 2).*

Relevant results issued at the end of the experiment (80th week of fowl life), when "Lohmann Brown" hens reached live weights of 2125.13±69.71g for conventional cages version (Lc-A group), of 2030.29±69.64g in those accommodated in opened cages (L1exp-A group), of 1953.89±47.22g in those reared on permanent litter (L2exp-A group) and of 1959.88±44.84g for the hens having access toward external paddock (L3exp-A).

A similar situation occurred for the "Hisex Brown" fowl, whose live weight reached 2064.79±32.13g (Lc-B group), 2048.33±46.58g (L2exp-B group), 2033.13±69.71g (L2exp-B group) and just 2009.88±44.84g (L3exp-B group) *(tab. 3).*

2. Laying intensity. Both "Lohmann Brown" and "Hisex Brown" hybrids theoretically reach the laying peak at 28 weeks old, with levels of 93% and 94%.

In our experiment, the "Lohmann Brown" fowl achieved the production peak in terms, with levels of 91.56% in Lc-A, of 88.35% in L1exp-A, of 78.11% in L2exp-A and of just 75.33% in L3exp-A group. The "Hisex Brown" hens reached the maximal laying intensity during their 28th week of life, with lower values, of just 90.95% in Lc-B group, of 87.25% in L1exp-B, of 77.42% in L2exp-B and of 74.98% in L3exp-B *(tab. 4 and tab. 5).*

In "Lohmann Brown" hens, the average laying intensity, calculated for the whole studied period (20-80 weeks), reached 76.14% in Lc-A group, 72.91% in L1exp-A group, 66.89% in L2exp-A group and 64.03% in L3exp-A group *(tab. 4)*, compared to 78.80%, as the theoretical hybrid performance specifies.

Within the same timeframe (20-80 weeks), the "Hisex Brown" hens have achieved the following average values of the lazing intensity: 75.88% in Lc-B group; 62.98% in L1exp-B; 66.14% in L2exp-B and 63.82% in L3exp-B *(tab. 5)*. The "Hisex Brown" hybrid is expected to reach an average laying intensity of 81.95%.

3. Eggs yield. At the end of the production cycle, the hens belonging to "Lohmann Brown" hybrid recorded an average production of 325.05 eggs/hen in Lc-A group, of 311.34 eggs/hen in L1exp-A, of 283.48 eggs/hen in L2exp-A and of just 273.40 eggs/hen in L3exp-A *(tab. 4)*; during the 60 weeks of exploitation, the "Lohmann Brown" hybrid could lay 337.5 eggs/hen.

The same influence of the husbandry technology system was observed in "Hisex Brown" hybrid. The hens average yield reached 324.17 eggs/hen in Lc-B group, of 313.54 eggs/hen in L1exp-B group, of 282.54 eggs/hen in L2exp-B group and of 272.72 eggs/hen in L3exp-B group *(tab. 5)*. The "Hisex Brown" management guide indicates a theoretical performance of 339 eggs/hen.

4. Feed intake. Freedom of movement, granted to the studied fowl, generated different levels of feed consumption, also related to the eggs yield throughout the productive life.

In "Lohmann Brown" hybrid, the fowl accommodated in conventional batteries (Lc-A group) realized the highest eggs yield with the most convenient feed intakes (112.63g/hen/day-average daily intake; 145.34g/egg-feed conversion ratio), while the hens reared in the hall providing access to the outer paddock (L3exp-A group), had the most reduced eggs yield and the highest feed consumption values (129.96g/hen/day and 200.38g/egg) *(tab. 6)*.

Similar situation occurred in "Hisex Brown" hens, the lowest feed consumption (114.85g/hen/day-average feed intake; 150.29g/egg-feed conversion ratio) being established in the group accommodated in conventional battery (Lc-B), while the highest (131.18g/hen/day and respectively 204.05g/egg) in the group reared in the hall providing access toward outer paddock (L3exp-B) *(tab. 7)*.

5. Flock casualties. The external climate factors beneficially influenced the health status of both hybrids, therefore low mortality rate occurred in those birds accommodated in halls providing access to outer paddock (7.36% in Lc-A group and 8.08% in Lc-B group).

Table 2

Dynamics of body weight in "Lohmann Brown" hybrid

Fowl age (weeks)	Lc-A		L1exp-A		L2exp-A		L3exp-A	
	$\overline{X} \pm s_{\overline{x}}$ (g)	V%	$\overline{X} \pm s_{\overline{x}}$ (g)	V%	$\overline{X} \pm s_{\overline{x}}$ (g)	V%	$\overline{X} \pm s_{\overline{x}}$ (g)	V%
20	1577.82±24.93	11.17	1577.22±35.96	16.12	1603.04 ± 15.61	9.74	1602.87 ± 12.87	8.03
22	1730.57±30.08	12.29	1714.45±43.50	17.94	1734.88 ± 18.18	10.48	1734.29 ± 17.53	10.11
24	1802.39±33.55	13.16	1789.06±43.83	17.32	1793.02 ± 22.31	12.44	1794.83 ± 20.80	11.59
26	1845.81±37.28	14.28	1833.39±42.76	16.49	1814.06 ± 25.23	13.91	1816.17 ± 23.68	13.04
28	1901.69±40.86	15.19	1859.40±45.37	17.25	1824.28 ± 25.08	13.75	1825.30 ± 25.85	14.16
30	1935.44±41.72	15.24	1870.98±48.93	18.49	1832.57 ± 29.17	15.92	1834.91 ± 27.87	15.19
32	1940.89±41.65	15.17	1885.74±47.50	17.81	1837.79 ± 29.61	16.11	1840.02 ± 28.04	15.24
34	1946.38±43.74	15.89	1894.62±55.71	20.79	1843.12 ± 30.19	16.38	1845.58 ± 28.26	15.31
36	1958.25±42.07	15.19	1898.21±54.53	20.31	1850.18 ± 30.36	16.41	1852.77 ± 29.16	15.74
38	1984.48±46.01	16.39	1907.39±55.52	20.58	1854.22 ± 30.48	16.44	1857.16 ± 29.73	16.01
40	1993.33±45.79	16.24	1912.01±55.28	20.44	1857.17 ± 30.79	16.58	1860.22 ± 30.06	16.16
42	2002.33±45.48	16.06	1919.08±56.05	20.65	1862.93 ± 31.43	16.87	1864.30 ± 31.21	16.74
44	2009.40±46.33	16.30	1923.74±54.93	20.19	1867.34 ± 34.00	18.21	1870.21 ± 32.04	17.13
46	2012.02±45.99	16.16	1930.63±57.70	21.13	1871.89 ± 37.47	20.02	1874.03 ± 33.98	18.13
48	2016.38±45.66	16.01	1937.29±59.29	21.64	1875.91 ± 39.60	21.11	1878.14 ± 35.76	19.04
50	2019.41±48.21	16.88	1941.30±57.74	21.03	1882.74 ± 40.44	21.48	1885.29 ± 36.91	19.58
52	2023.86±49.79	17.39	1952.41±61.97	22.44	1886.11 ± 41.00	21.74	1888.56 ± 37.85	20.04
54	2027.17±49.32	17.20	1959.58±61.78	22.29	1889.74 ± 41.23	21.82	1892.68 ± 38.33	20.25
56	2030.84±52.19	18.17	1964.62±64.27	23.13	1893.84 ± 42.19	22.28	1896.71 ± 38.75	20.43
58	2035.75±52.93	18.38	1970.89±66.09	23.71	1899.17 ± 42.37	22.31	1903.25 ± 39.30	20.65
60	2039.11±53.67	18.61	1977.33±66.81	23.89	1906.86 ± 43.02	22.56	1910.10 ± 39.61	20.74
62	2044.74±52.75	18.24	1985.27±66.44	23.66	1909.41 ± 43.17	22.61	1913.79 ± 40.11	20.96
64	2048.91±54.71	18.88	1991.11±66.41	23.58	1912.32 ± 43.18	22.58	1917.38 ± 38.44	20.05
66	2056.89±59.29	20.38	1994.29±64.99	23.04	1916.02 ± 44.39	23.17	1920.20 ± 39.61	20.63
68	2064.34±59.24	20.29	2001.37±67.63	23.89	1921.43 ± 45.13	23.49	1925.26 ± 40.03	20.79
70	2071.93±59.19	20.20	2008.74±65.82	23.17	1925.33 ± 45.40	23.58	1928.48 ± 40.25	20.87
72	2077.17±61.37	20.89	2011.24±68.33	24.02	1933.33 ± 45.84	23.71	1936.74 ± 41.00	21.17
74	2084.22±62.46	21.19	2014.23±69.26	24.31	1935.48 ± 46.06	23.80	1940.12 ± 41.94	21.62
76	2092.18±62.32	21.06	2021.98±68.81	24.06	1941.25 ± 46.30	23.85	1945.33 ± 42.48	21.84
78	2108.12±71.23	23.89	2025.22±71.09	24.82	1946.38 ± 46.54	23.91	1950.05 ± 43.02	22.06
80	2125.13±69.71	23.19	2030.29±69.64	24.25	1953.89 ± 47.22	24.17	1959.88 ± 44.84	22.88

Table 3

Dynamics of body weight in "Hisex Brown" hybrid

Fowl age (weeks)	Lc-B		L1exp-B		L2exp-B		L3exp-B	
	$\overline{X} \pm s_{\overline{x}}$ (g)	V%	$\overline{X} \pm s_{\overline{x}}$ (g)	V%	$\overline{X} \pm s_{\overline{x}}$ (g)	V%	$\overline{X} \pm s_{\overline{x}}$ (g)	V%
20	1655.11±16.07	9.71	1656.17±26.46	15.98	1654.82±24.93	12.77	1652.87 ± 12.87	10.06
22	1782.24±17.61	9.88	1754.58±28.37	16.17	1762.57±30.08	12.84	1734.29 ± 17.53	11.32
24	1799.76±17.82	9.90	1829.13±31.20	17.06	1872.39±33.55	13.48	1794.83 ± 20.80	11.59
26	1859.31±18.54	9.97	1864.42±32.33	17.34	1885.81±37.28	14.01	1816.17 ± 23.68	13.04
28	1882.44±19.05	10.12	1899.53±32.35	17.03	1911.69±40.86	14.75	1825.30 ± 25.85	14.16
30	1915.21±19.59	10.23	1900.79±33.53	17.64	1928.44±41.72	15.90	1834.91 ± 27.87	15.19
32	1922.12±19.97	10.39	1905.69±33.52	17.59	1937.89±41.65	16.04	1840.02 ± 28.04	15.24
34	1931.11±20.24	10.48	1924.71±33.53	17.42	1949.38±43.74	16.26	1845.58 ± 28.26	15.31
36	1936.37±20.84	10.76	1948.33±36.99	18.99	1953.25±42.07	16.35	1852.77 ± 29.16	16.74
38	1942.45±21.15	10.89	1957.37±36.68	18.74	1955.48±46.01	16.40	1857.16 ± 29.73	17.01
40	1958.18±21.83	11.15	1962.12±36.46	18.58	1963.33±45.79	16.53	1860.22 ± 30.06	17.16
42	1963.53±22.17	11.29	1979.11±36.93	18.66	1972.33±45.48	16.86	1864.30 ± 31.21	18.74
44	1972.88±22.77	11.54	1980.66±37.14	18.75	1979.40±46.33	18.22	1870.21 ± 32.04	19.13
46	1984.07±23.37	11.78	1983.75±37.18	18.74	1982.02±45.99	20.11	1874.03 ± 33.98	20.13
48	1985.64±23.93	12.05	1987.27±39.51	19.88	1984.38±45.66	21.02	1878.14 ± 35.76	21.04
50	1989.61±24.65	12.39	1991.30±43.43	21.81	1987.41±48.21	21.46	1885.29 ± 36.91	21.58
52	1992.38±25.06	12.58	1995.41±43.84	21.97	1989.86±49.79	21.72	1888.56 ± 37.85	22.04
54	2000.84±25.43	12.71	1999.58±42.67	21.34	1997.17±49.32	21.88	1892.68 ± 38.33	22.25
56	2004.09±25.89	12.92	2004.64±43.58	21.74	1998.84±52.19	22.23	1896.71 ± 38.75	23.43
58	2011.44±27.05	13.45	2010.85±43.67	21.69	1999.75±52.93	22.36	1903.25 ± 39.30	23.65
60	2016.23±27.54	13.69	2017.38±43.88	21.75	2005.11±53.67	22.50	1910.10 ± 39.61	23.74
62	2021.64±28.06	13.88	2019.29±43.93	21.86	2008.74±52.75	22.60	1913.79 ± 40.11	24.96
64	2026.13±28.59	14.11	2021.16±43.62	21.58	2014.91±54.71	22.56	1917.38 ± 38.44	25.05
66	2030.71±29.01	14.29	2029.32±44.93	22.14	2016.89±59.29	23.05	1920.20 ± 39.61	25.63
68	2040.49±29.36	14.39	2031.41±44.87	22.09	2018.34±59.24	23.54	1935.26 ± 40.03	25.79
70	2049.20±30.10	14.69	2033.68±45.37	22.31	2024.93±59.19	23.88	1948.48 ± 40.25	25.87
72	2050.14±30.61	14.93	2038.30±46.17	22.65	2027.17±61.37	24.32	1956.74 ± 41.00	26.17
74	2057.80±31.05	15.09	2040.35±45.27	22.19	2029.22±62.46	24.65	1960.12 ± 41.94	26.62
76	2059.39±31.24	15.17	2042.79±46.29	22.66	2030.18±62.32	24.89	1975.33 ± 42.48	26.84
78	2060.45±31.38	15.23	2045.31±45.30	22.15	2031.12±71.23	25.62	1990.05 ± 43.02	27.06
80	2064.79±32.13	15.56	2048.33±46.58	22.74	2033.13±69.71	26.29	2009.88 ± 44.84	27.88

Table 4

Eggs yield and laying intensity in "Lohmann Brown" hybrid

Week	Lc-A				L1exp-A				L2exp-A				L3exp-A			
	Flock size (hens)	Total yield (eggs/ week)	Laying intesity (%)	Cumulated yield (eggs/hen)	Flock size (hens)	Total yield (eggs/ week)	Laying intesity (%)	Cumulated yield (eggs/hen)	Flock size (hens)	Total yield (eggs/ week)	Laying intesity (%)	Cumulated yield (eggs/hen)	Flock size (hens)	Total yield (eggs/ week)	Laying intesity (%)	Cumulated yield (eggs/hen)
20	431.5	1154	38.2	2.67	431	1115	36.96	2.59	1500.5	3875	36.89	2.58	1884.5	4873	36.94	2.59
21	431	1753	58.10	6.74	430	1694	56.28	6.53	1495	5775	55.18	6.44	1882	6908	52.44	6.26
22	431	2261	74.91	11.98	429.5	2184	72.64	11.61	1491.5	7080	67.81	11.19	1880.5	8497	64.55	10.78
23	430.5	2503	83.06	17.79	429	2418	80.52	17.25	1489.5	7449	71.44	16.18	1879.5	9058	68.85	15.59
24	430	2642	87.79	23.93	429	2552	84.98	23.20	1488	7878	75.63	21.47	1879	9591	72.92	20.69
25	429.5	2689	89.44	30.19	429	2598	86.51	29.26	1486.5	8041	77.28	26.88	1879	9803	74.53	25.91
26	429	2729	90.87	36.55	429	2636	87.78	35.40	1485	8085	77.78	32.32	1879	9866	75.01	31.16
27	428.5	2731	91.05	42.92	428.5	2638	87.95	41.56	1483	8092	77.95	37.78	1878.5	9884	75.17	36.42
28	427.5	2740	91.56	49.33	428	2647	88.35	47.74	1481.5	8101	78.11	43.25	1877.5	9900	75.33	41.69
29	427	2722	91.07	55.70	428	2629	87.75	53.88	1480.5	8077	77.94	48.70	1876.5	9873	75.16	46.95
30	426.5	2702	90.50	62.03	427.5	2610	87.23	59.98	1480	8058	77.78	54.14	1875	9846	75.02	52.20
31	426	2688	90.14	68.34	427	2696	86.85	66.06	1478.5	8033	77.62	59.57	1873.5	9815	74.84	57.44
32	426	2683	89.97	74.63	427	2691	86.68	72.13	1476	8002	77.45	64.99	1872.5	9789	74.68	62.67
33	426	2648	88.80	80.84	426.5	2657	86.65	78.12	1474.5	7967	77.19	70.39	1871.5	9752	74.44	67.88
34	425.5	2622	88.08	87.00	425.5	2631	84.87	84.07	1473	7925	76.86	75.77	1870.5	9705	74.12	73.07
35	425	2617	87.66	93.16	424.5	2626	85.01	90.02	1471	7879	76.52	81.13	1869	9654	73.79	78.24
36	424	2588	87.63	99.29	423.5	2613	84.77	95.95	1469.5	7828	76.10	86.46	1867.5	9593	73.38	83.38
37	422.5	2578	87.44	105.41	422.5	2498	84.46	101.86	1468	7777	75.68	91.76	1866	9531	72.97	88.49
38	421.5	2562	87.27	111.52	421.5	2488	84.32	107.76	1466	7723	75.26	97.03	1864.5	9496	72.76	93.58
39	420.5	2538	87.04	117.61	420.5	2475	84.08	113.64	1464.5	7672	74.84	102.27	1863.5	9414	72.17	98.63
40	420	2523	86.33	123.65	419.5	2452	83.50	119.48	1463.5	7624	74.42	107.48	1862	9353	71.76	103.65
41	420	2492	85.82	129.66	418.5	2437	83.19	125.30	1462	7574	74.01	112.66	1860.5	9292	71.35	108.64
42	420	2492	84.76	135.59	418	2407	82.26	131.08	1459.5	7517	73.58	117.81	1860	9238	70.95	113.61
43	419.5	2470	84.11	141.47	418	2385	81.51	136.76	1457.5	7464	73.16	122.93	1859.5	9183	70.55	118.55
44	419	2463	83.97	147.35	418	2378	81.27	142.45	1456	7405	72.65	128.01	1858.5	9113	70.05	123.45
45	418.5	2424	82.74	153.14	418	2340	79.97	148.04	1454	7343	72.15	133.06	1858	9050	69.58	128.32
46	418	2398	81.95	158.88	418	2314	79.08	153.57	1451.5	7280	71.65	138.08	1857.5	8983	69.09	133.16
47	418	2376	81.20	164.56	418	2292	78.33	159.05	1449	7217	71.15	143.06	1856	8914	68.61	137.96
48	417.5	2364	80.89	170.22	417.5	2280	76.01	164.51	1446.5	7153	70.64	148.01	1854.5	8843	68.12	142.73
49	416.5	2346	80.53	175.86	417	2268	77.69	169.96	1444	7090	70.14	152.92	1853.5	8776	67.64	147.46
50	416	2322	79.74	181.44	417	2242	76.81	175.33	1442.5	7031	69.63	157.79	1852	8705	67.15	152.16
51	415.5	2307	79.32	186.99	417	2229	76.36	180.67	1441	6973	69.13	162.63	1851	8637	66.66	156.83
52	414.5	2288	78.85	192.51	416.5	2210	75.80	185.98	1439.5	6906	68.53	167.43	1851	8565	66.10	161.46
53	414	2558	77.91	197.96	416	2181	74.89	191.22	1437.5	6838	67.96	172.19	1851	8491	65.53	166.05
54	414	2339	77.26	203.37	415.5	2162	74.33	196.42	1434.5	6765	67.37	176.91	1850	8412	64.96	170.60
55	413.5	2218	76.63	208.73	415	2141	73.70	201.58	1432.5	6696	66.78	181.58	1848	8329	64.39	175.11
56	413	2196	75.96	214.05	415	2121	73.01	206.69	1430.5	6628	66.19	186.21	1846	8248	63.83	179.58
57	413	2172	75.13	219.31	415	2098	72.22	211.75	1428	6557	65.60	190.80	1844	8166	63.26	184.01
58	413	2156	74.57	224.53	415	2082	71.67	218.76	1426	6490	65.02	195.35	1842	8083	62.69	188.40
59	412.5	2131	73.80	220.70	415	2059	70.95	221.76	1423.5	6420	64.43	199.86	1839.5	8000	62.13	192.75
60	411.5	2097	72.79	234.79	415	2025	69.71	226.64	1420.5	6348	63.84	204.33	1836.5	7914	61.56	197.06
61	410.5	2072	72.11	239.84	414.5	2002	68.99	231.47	1416	6261	63.17	208.75	1833	7815	60.91	201.32
62	409	2051	71.64	244.85	414	1981	68.36	236.25	1412.5	6179	62.49	213.12	1829	7715	60.26	205.54
63	407	2026	71.11	249.83	414	1957	67.53	240.98	1408	6093	61.82	217.45	1824.5	7614	59.62	209.71
64	405.5	2007	70.71	254.78	413.5	1938	66.95	245.67	1404	6010	61.15	221.73	1820	7513	58.97	213.84
65	404.5	1967	69.47	259.64	413	1898	65.65	250.28	1400	5927	60.48	225.96	1816	7414	58.32	217.92
66	403.5	1936	68.54	264.43	413	1868	64.61	254.78	1396	5845	59.81	230.15	1812	7315	57.67	221.96
67	403	1912	67.78	269.17	413	1844	63.78	259.24	1392	5763	59.14	234.29	1808	7216	57.02	225.95
68	402.5	1886	66.94	273.85	412.5	1816	62.89	263.64	1388.5	5682	58.46	238.38	1804	7120	56.38	229.90
69	401	18853	66.01	278.47	412	1790	62.07	267.98	1385.5	5605	57.79	242.43	1799.5	7020	55.73	233.80
70	399.5	1836	65.72	283.07	412	1776	61.58	272.29	1382.5	5528	57.12	246.43	1795	6921	55.08	237.66
71	398	1800	64.61	287.59	411.5	1739	60.37	276.52	1379.5	5442	56.36	250.37	1791	6814	54.35	241.46
72	396.5	1756	63.27	292.02	410.5	1696	59.02	280.65	1376.5	5358	55.61	254.26	1787	6707	53.62	245.21
73	395.5	1726	62.34	296.38	409.5	1667	58.15	284.72	1373.5	5274	54.85	258.10	1783	6601	52.89	248.91
74	394.5	1698	61.49	300.68	408.5	1640	57.35	288.73	1370.5	5189	54.09	261.88	1778.5	6494	52.16	252.56
75	393.5	1655	60.08	304.89	407.5	1599	56.06	292.65	1367.5	5106	53.34	265.61	1773.5	6386	51.44	256.16
76	392	1638	59.69	309.07	406.5	1582	55.59	296.54	1364.5	5022	52.58	269.29	1769	6279	50.71	259.71
77	390.5	1581	57.84	313.12	406	1527	53.73	300.30	1361.5	4940	51.83	272.92	1764.5	6173	49.98	263.21
78	389	1558	57.22	317.13	405.5	1502	53.02	304.01	1358	4855	51.07	276.49	1760	6068	49.25	266.66
79	387	1541	56.88	321.11	404	1489	52.62	307.69	1354	4773	50.36	280.01	1756	5964	48.52	270.06
80	385	1519	56.38	**325.05**	402	1467	52.13	**311.34**	1349	4680	49.56	**283.48**	1752.5	5863	47.79	**273.40**

Table 5

Eggs yield and laying intensity in "Hisex Brown" hybrid

Week	Lc-B				L1exp-B				L2exp-B				L3exp-B			
	Flock size (hens)	Total yield (eggs/ week)	Laying intesity (%)	Cumulated yield (eggs/hen)	Flock size (hens)	Total yield (eggs/ week)	Laying intesity (%)	Cumulated yield (eggs/hen)	Flock size (hens)	Total yield (eggs/ week)	Laying intesity (%)	Cumulated yield (eggs/hen)	Flock size (hens)	Total yield (eggs/ week)	Laying intesity (%)	Cumulated yield (eggs/hen)
20	431	610	20.21	1.41	430	929	30.88	2.16	1502	3533	33.60	3.24	1884	4274	32.41	3.12
21	429	1411	46.99	4.70	427	1638	54.81	5.99	1499	5290	50.41	6.77	1880	6401	48.64	6.52
22	427	2184	73.07	9.81	425.5	2076	69.69	10.87	1497	6604	63.02	11.18	1876	8240	62.75	10.77
23	424	2457	82.79	15.60	424.5	2347	78.98	16.40	1495	7685	73.44	16.18	1872	9153	69.85	15.59
24	421	2561	86.90	21.68	423.5	2385	80.47	22.03	1493.5	8011	76.63	21.47	1869	9671	73.92	20.69
25	420	2591	88.14	27.85	422.5	2497	84.44	27.94	1492	8050	77.08	26.88	1867	9714	74.33	25.91
26	419.5	2635	89.75	34.13	421.5	2543	86.19	33.97	1490.5	8053	77.18	32.32	1865	9727	74.51	31.16
27	419	1646	90.23	40.43	421	2565	87.03	40.06	1488.5	8049	77.25	37.78	1863	9751	74.77	36.42
28	419	1668	90.95	46.85	421	2571	87.25	46.17	1485	8048	77.42	43.25	1861	9768	74.98	41.69
29	418.5	1653	90.57	53.19	421	2565	87.04	52.26	1481.5	8021	77.34	48.70	1859	9742	74.86	46.95
30	417.5	1640	90.33	59.51	420.5	2561	87.01	58.35	1479.5	8004	77.28	54.14	1857	9700	74.62	52.20
31	416.5	2615	89.68	65.79	420	2548	86.66	64.42	1479	7984	77.12	59.57	1855	9666	74.44	57.44
32	415.5	2581	88.74	72.00	420	2535	86.24	70.46	1477.5	7981	77.05	64.99	1853.5	9637	74.28	62.67
33	414	2511	86.65	78.06	420	2529	86.03	76.48	1477	7960	76.99	70.39	1852.5	9614	74.14	67.88
34	413	2490	86.13	84.09	419.5	2521	85.85	82.49	1476.5	7944	76.86	75.77	1851.5	9593	74.02	73.07
35	412.5	2481	85.91	90.10	418.5	2494	85.13	88.45	1475.5	7903	76.52	81.13	1850.5	9558	73.79	78.24
36	411	2432	84.54	96.02	418	2486	84.95	94.40	1475	7857	76.10	86.46	1849.5	9500	73.38	83.38
37	409.5	2414	84.22	101.91	417.5	2476	84.73	100.33	1474.5	7811	75.68	91.76	1848.5	9442	72.97	88.49
38	408.5	2403	84.05	107.79	416.5	2457	84.28	106.22	1473.5	7763	75.26	97.03	1847.5	9410	72.76	93.58
39	407.5	2396	83.98	113.67	416	2449	84.11	112.11	1472.5	7714	74.84	102.27	1846.5	9328	72.17	98.63
40	406.5	2383	83.74	119.53	415.5	2434	83.68	117.97	1472	7668	74.42	107.48	1845.5	9270	71.76	103.65
41	405	2364	83.38	125.37	414.5	2416	83.27	123.80	1471.5	7623	74.01	112.66	1844.5	9212	71.35	108.64
42	404	2350	83.11	131.19	414	2392	82.54	129.58	1471	7577	73.58	117.81	1843.5	9156	70.95	113.61
43	403.5	2334	82.64	136.97	414	2367	81.68	135.3	1470.5	7531	73.16	122.93	1842.5	9099	70.55	118.55
44	402.5	2317	82.25	142.73	414	2363	81.54	141.01	1469.5	7473	72.65	128.01	1841	9027	70.05	123.45
45	401.5	2298	81.78	148.45	413.5	2321	80.17	146.62	1469	7419	72.15	133.06	1840	8962	69.58	128.32
46	400.5	2258	80.54	154.09	412.5	2288	79.24	152.17	1468.5	7365	71.65	138.08	1839.5	8896	69.09	133.16
47	399.5	2243	80.21	159.70	412	2264	78.52	157.66	1467.5	7309	71.15	143.06	1838.5	8835	68.61	137.96
48	398.5	2216	79.44	165.26	412	2246	77.88	163.11	1467	7254	70.64	148.01	1837.5	8762	68.12	142.73
49	398	2201	79.01	170.79	411.5	2225	77.23	168.52	1467	7203	70.14	152.92	1836.5	8695	67.64	147.46
50	398	2189	78.58	176.29	410.5	2196	76.41	173.87	1465.5	7143	69.63	157.79	1836	8630	67.15	152.16
51	398	2177	78.13	181.76	409.5	2181	76.09	179.20	1463.5	7082	69.13	162.63	1835.5	8565	66.66	156.83
52	398	2145	76.99	187.15	409	2174	75.93	184.52	1462	7013	68.53	167.43	1834.5	8488	66.10	161.46
53	397.5	2128	76.47	192.50	408.5	2137	74.74	189.75	1460.5	6948	67.96	172.19	1833.5	8410	65.53	166.05
54	397	2105	75.75	197.80	407.5	2120	74.33	194.95	1459.5	6883	67.37	176.91	1832.5	8333	64.96	170.60
55	397	2092	75.29	203.07	406.5	2095	73.64	200.10	1459	6820	66.78	181.58	1831.5	8255	64.39	175.11
56	396.5	2056	74.09	208.26	406	2079	73.16	205.22	1458.5	6758	66.19	186.21	1830.5	8179	63.83	179.58
57	395.5	2041	73.74	213.42	406	2071	72.89	210.32	1457.5	6693	65.60	190.80	1829.5	8101	63.26	184.01
58	394.5	1992	72.12	218.47	406	2037	71.70	215.34	1456.5	6629	65.02	195.35	1828.5	8024	62.69	188.40
59	393.5	1979	71.84	223.50	406	2009	70.70	220.29	1456	6567	64.43	199.86	1827	7946	62.13	192.75
60	392.5	1943	70.72	228.45	405.5	1974	69.56	225.16	1455	6502	63.84	204.33	1825	7864	61.56	197.06
61	391.5	1924	70.19	233.36	404.5	1940	68.53	229.95	1453	6425	63.17	208.75	1824	7777	60.91	201.32
62	391	1920	70.14	238.27	404	1921	67.94	234.70	1451	6347	62.49	213.12	1823	7690	60.26	205.54
63	390.5	1916	70.11	243.18	403.5	1899	67.25	239.41	1448	6266	61.82	217.45	1821	7600	59.62	209.71
64	389.5	1890	69.67	248.06	402.5	1889	67.05	244.10	1443	6178	61.15	221.73	1818.5	7507	58.97	213.84
65	389	1879	68.99	252.89	402	1836	65.24	248.67	1437.5	6086	60.48	225.96	1815.5	7412	58.32	217.92
66	389	1869	68.63	257.69	402	1821	64.71	253.20	1432.5	5997	59.81	230.15	1812.5	7317	57.67	221.96
67	389	1866	68.54	262.49	401.5	1786	63.56	257.65	1428	5912	59.14	234.29	1809.5	7222	57.02	225.95
68	388.5	1863	68.51	267.28	400.5	1759	62.74	262.29	1424	5827	58.46	238.38	1806	7128	56.38	229.90
69	388	1859	68.45	272.07	400	1733	61.88	266.62	1419.5	5742	57.79	242.43	1802	7030	55.73	233.80
70	387.5	1845	68.03	276.83	399	1717	61.47	271.92	1415	5656	57.12	246.43	1798	6932	55.08	237.66
71	387	1833	67.65	281.57	398	1649	61.07	276.06	1411.5	5569	56.36	250.37	1793	6821	54.35	241.46
72	386.5	1830	67.65	286.31	398	1649	59.18	280.20	1407.5	5479	55.61	254.26	1787.5	6709	53.62	245.21
73	386	1824	67.50	291.03	398	1636	58.72	284.31	1403	5387	54.85	258.10	1782.5	6599	52.89	248.91
74	385.5	1819	67.40	295.75	397.5	1599	57.48	288.33	1398	5293	54.09	261.88	1775	6468	52.06	252.56
75	385	1815	67.35	300.47	397	1584	57.02	292.32	1393	5201	53.34	265.61	1767.5	6327	51.14	256.16
76	384.5	1812	67.34	305.19	396.5	1558	56.12	296.25	1389	5112	52.58	269.29	1762.5	6219	50.41	259.71
77	383.5	1807	67.33	309.91	395.5	1538	55.55	301.13	1385	5006	51.63	272.90	1757.5	6112	49.68	263.21
78	382.5	1803	67.33	314.63	395.5	1515	54.72	305.96	1381	4879	50.47	276.45	1752.5	6017	49.05	266.66
79	382	1799	67.28	319.40	394	1493	54.12	309.75	1377	4825	50.06	279.89	1747	5909	48.32	270.06
80	382	1795	67.12	**324.17**	393.5	1469	53.28	**313.54**	1373	4724	49.15	**282.54**	1740.5	5810	47.69	**272.72**

Table 6

Feed intake in "Lohmann Brown" hybrid

Age period	Notice	Experimental group			
		Lc-A	L1exp-A	L2exp-A	L3exp-A
20-45 weeks (182 days)	Average flock size (hens)	425	425	1478.5	1872
	Feed intake (kg/group/period)	8224	8909	33071	42963
	Average intake (g/hen/day)	106.32	115.18	122.9	126.1
	Eggs yield (pcs./group/period)	65118	62895	194898	238479
	Feed conversion (g/egg)	126.29	141.65	169.7	180.2
46-65 weeks (140 days)	Average flock size (hens)	411	415.5	1425.5	1836
	Feed intake (kg/group/period)	6444	6728	25904	34238
	Average intake (g/hen/day)	111.99	115.66	129.8	133.2
	Eggs yield (pcs./group/period)	43993	42480	132862	165137
	Feed conversion (g/egg)	146.48	158.38	194.9	207.3
66-80 weeks (105 days)	Average flock size (hens)	394	407	1372	1782.5
	Feed intake (kg/group/period)	4954	5795	17878	23826
	Average intake (g/hen/day)	119.74	135.60	124.1	127.3
	Eggs yield (pcs./group/period)	25897	25005	79062	98941
	Feed conversion (g/egg)	191.29	231.75	226.1	240.8
20-80 weeks (427 days)	Average flock size (hens)	408	416.5	1429	1820.5
	Feed intake (kg/group/period)	19622	21432	76853	101027
	Average intake (g/hen/day)	**112.63**	**120.51**	**125.95**	**129.96**
	Eggs yield (pcs./group/period)	135008	130380	408168	504163
	Feed conversion (g/egg)	**145.34**	**164.38**	**188.29**	**200.38**

Table 7

Feed intake in "Hisex Brown" hybrid

Age period	Notice	Experimental group			
		Lc-B	L1exp-B	L2exp-B	L3exp-B
20-45 weeks (182 days)	Average flock size (hens)	416.5	422.5	1486.5	1863
	Feed intake (kg/group/period)	8531.63	9151.27	33769.18	43410.62
	Average intake (g/hen/day)	112.55	119.01	124.82	128.03
	Eggs yield (pcs./group/period)	59642	63682	195556	235972
	Feed conversion (g/egg)	143.05	143.70	172.68	183.96
46-65 weeks (140 days)	Average flock size (hens)	395	407.5	1452	1827
	Feed intake (kg/group/period)	6356.74	6932.72	26414.20	33801.33
	Average intake (g/hen/day)	114.95	121.52	129.94	132.15
	Eggs yield (pcs./group/period)	43512	47298	135471	163326
	Feed conversion (g/egg)	146.09	146.57	194.98	206.95
66-80 weeks (105 days)	Average flock size (hens)	385.5	397.5	1403	1775.5
	Feed intake (kg/group/period)	4737.89	5134.13	18925.56	24861.97
	Average intake (g/hen/day)	117.05	123.01	128.47	133.36
	Eggs yield (pcs./group/period)	29654	35222	80609	97978
	Feed conversion (g/egg)	159.77	145.76	234.78	253.75
20-80 weeks (427 days)	Average flock size (hens)	407	412.5	1437.5	1811.5
	Feed intake (kg/group/period)	19959.67	21344.34	78408.41	101469.11
	Average intake (g/hen/day)	**114.85**	**121.18**	**127.74**	**131.18**
	Eggs yield (pcs./group/period)	132808	128202	411636	497276
	Feed conversion (g/egg)	**150.29**	**166.49**	**191.11**	**204.05**

In the flocks accommodated in climate controlled halls, even on litter even in batteries (conventional or front opened), mortality rate was higher, both in "Lohmann Brown" (7.46-11.66%), and "Hisex Brown" (9.12-12.08%) *(tab. 8* and *tab. 9)*.

We mention that flock casualties were produced by certain accidents, no cases of infectious-transmissible diseases being reported.

Table 8

Flock casualties in "Lohmann Brown" hybrid

Age (weeks)	Lc-A			L1exp-A			L2exp-A			L3exp-A		
	Weekly flock		Cumulated casualties (%)	Weekly flock		Cumulated casualties (%)	Weekly flock		Cumulated casualties (%)	Weekly flock		Cumulated casualties (%)
	Beginning	End		Beginning	End		Beginning	End		Beginning	End	
20	432	431	0.23	432	430	0.46	1504	1497	0.99	1886	1883	0.37
21	431	431	0.23	430	430	0.46	1497	1493	1.26	1883	1881	0.48
22	431	431	0.23	430	429	0.69	1493	1490	1.46	1881	1880	0.53
23	431	430	0.46	429	429	0.69	1490	1489	1.53	1880	1879	0.58
24	430	430	0.46	429	429	0.69	1489	1487	1.66	1879	1879	0.58
25	430	429	0.69	429	429	0.69	1487	1486	1.73	1879	1879	0.58
26	429	429	0.69	429	429	0.69	1486	1484	1.86	1879	1879	0.58
27	429	428	0.92	429	428	0.92	1484	1482	1.99	1879	1878	0.63
28	428	427	1.15	428	428	0.92	1482	1481	2.06	1878	1877	0.68
29	427	427	1.15	428	428	0.92	1481	1480	2.13	1877	1876	0.73
30	427	426	1.38	428	427	1.15	1480	1480	2.13	1876	1874	0.84
31	426	426	1.38	427	427	1.15	1480	1477	2.33	1874	1873	0.89
32	426	426	1.38	427	427	1.15	1477	1475	2.47	1873	1872	0.94
33	426	426	1.38	427	426	1.38	1475	1474	2.54	1872	1871	0.99
34	426	425	1.61	426	425	1.61	1474	1472	2.68	1871	1870	1.04
35	425	425	1.61	425	424	1.84	1472	1470	2.82	1870	1868	1.15
36	425	423	2.08	424	423	2.07	1470	1469	2.89	1868	1867	1.20
37	423	422	2.31	423	422	2.30	1469	1467	3.03	1867	1865	1.31
38	422	421	2.54	422	421	2.53	1467	1465	3.17	1865	1864	1.36
39	421	420	2.77	421	420	2.76	1465	1464	3.24	1864	1863	1.41
40	420	420	2.77	420	419	2.99	1464	1463	3.31	1863	1861	1.52
41	420	420	2.77	419	418	3.22	1463	1461	3.45	1861	1860	1.57
42	420	420	2.77	418	418	3.22	1461	1458	3.66	1860	1860	1.57
43	420	419	3.01	418	418	3.22	1458	1457	3.73	1860	1859	1.62
44	419	419	3.01	418	418	3.22	1457	1455	3.87	1859	1858	1.67
45	419	418	3.25	418	418	3.22	1455	1453	4.01	1858	1858	1.67
46	418	418	3.25	418	418	3.22	1453	1450	4.22	1858	1857	1.72
47	418	418	3.25	418	418	3.22	1450	1448	4.36	1857	1855	1.83
48	418	417	3.49	418	417	3.46	1448	1445	4.57	1855	1854	1.88
49	417	416	3.73	417	417	3.46	1445	1443	4.71	1854	1853	1.93
50	416	416	3.73	417	417	3.46	1443	1442	4.78	1853	1851	2.04
51	416	415	3.97	417	417	3.46	1442	1440	4.92	1851	1851	2.04
52	415	414	4.21	417	416	3.70	1440	1439	4.99	1851	1851	2.04
53	414	414	4.21	416	416	3.70	1439	1436	5.20	1851	1851	2.04
54	414	414	4.21	416	415	3.94	1436	1433	5.41	1851	1849	2.15
55	414	413	4.45	415	415	3.94	1433	1432	5.48	1849	1847	2.26
56	413	413	4.45	415	415	3.94	1432	1429	5.69	1847	1845	2.37
57	413	413	4.45	415	415	3.94	1429	1427	5.83	1845	1843	2.48
58	413	413	4.45	415	415	3.94	1427	1425	5.97	1843	1841	2.59
59	413	412	4.69	415	415	3.94	1425	1422	6.17	1841	1838	2.75
60	412	411	4.93	415	415	3.94	1422	1419	6.38	1838	1835	2.91
61	411	410	5.17	415	414	4.18	1419	1415	6.66	1835	1831	3.13
62	410	408	5.66	414	414	4.18	1415	1410	7.01	1831	1827	3.35
63	408	406	6.15	414	414	4.18	1410	1406	7.29	1827	1822	3.62
64	406	405	6.39	414	413	4.42	1406	1402	7.57	1822	1818	3.84
65	405	404	6.63	413	413	4.42	1402	1398	7.85	1818	1814	4.06
66	404	403	6.87	413	413	4.42	1398	1394	8.13	1814	1810	4.28
67	403	403	6.87	413	413	4.42	1394	1390	8.41	1810	1806	4.50
68	403	402	7.12	413	412	4.67	1390	1387	8.62	1806	1802	4.72
69	402	400	7.61	412	412	4.67	1387	1384	8.83	1802	1797	5.00
70	400	399	7.86	412	412	4.67	1384	1381	9.05	1797	1793	5.22
71	399	397	8.36	412	411	4.92	1381	1378	9.27	1793	1789	5.44
72	397	396	8.61	411	410	5.17	1378	1375	9.49	1789	1785	5.66
73	396	395	8.86	410	409	5.42	1375	1372	9.71	1785	1781	5.88
74	395	394	9.11	409	408	4.67	1372	1369	9.93	1781	1776	6.16
75	394	393	9.36	408	407	5.92	1369	1366	10.15	1776	1771	6.44
76	393	391	9.87	407	406	6.17	1366	1363	10.37	1771	1767	6.66
77	391	390	10.12	406	406	6.17	1363	1360	10.59	1767	1762	6.94
78	390	388	10.62	406	405	6.42	1360	1356	10.88	1762	1758	7.17
79	388	386	11.14	405	403	6.94	1356	1352	11.17	1758	1754	7.40
80	386	384	**11.66**	403	401	**7.46**	1352	1346	**11.08**	1754	1751	**7.36**

Table 9

Flock casualties in "Hisex Brown" hybrid

Age (weeks)	Lc-A			L1exp-A			L2exp-A			L3exp-A		
	Weekly flock		Cumulated casualties (%)	Weekly flock		Cumulated casualties (%)	Weekly flock		Cumulated casualties (%)	Weekly flock		Cumulated casualties (%)
	Beginning	End		Beginning	End		Beginning	End		Beginning	End	
20	432	430	0.44	432	428	0.92	1504	1500	0.27	1886	1882	0.21
21	430	428	0.91	428	426	1.39	1500	1498	0.40	1882	1878	0.42
22	428	426	1.38	426	425	1.62	1498	1496	0.47	1878	1874	0.63
23	426	422	2.31	425	424	1.85	1496	1494	0.60	1874	1870	0.84
24	422	420	2.76	424	423	2.08	1494	1493	0.67	1870	1868	0.95
25	420	420	2.76	423	422	2.32	1493	1491	0.80	1868	1866	1.06
26	420	419	3.00	422	421	2.56	1491	1490	0.87	1866	1864	1.17
27	419	419	3.00	421	421	2.56	1490	1487	1.07	1864	1862	1.28
28	419	419	3.00	421	421	2.56	1487	1483	1.34	1862	1860	1.39
29	419	418	3.24	421	421	2.56	1483	1480	1.54	1860	1858	1.50
30	418	417	3.48	421	420	2.80	1480	1479	1.61	1858	1856	1.61
31	417	416	3.72	420	420	2.80	1479	1479	1.68	1856	1854	1.72
32	416	415	3.95	420	420	2.80	1478	1477	1.75	1854	1853	1.77
33	415	413	4.41	420	420	2.80	1477	1477	1.75	1853	1852	1.82
34	413	413	4.41	420	419	3.04	1477	1476	1.82	1852	1851	1.87
35	413	412	4.65	419	418	3.28	1476	1475	1.89	1851	1850	1.92
36	412	410	5.12	418	418	3.28	1475	1475	1.89	1850	1849	1.97
37	410	409	5.36	418	417	3.52	1475	1474	1.96	1849	1848	2.02
38	409	408	5.60	417	416	3.76	1474	1473	2.03	1848	1847	2.07
39	408	407	5.84	416	416	3.76	1473	1472	2.10	1847	1846	2.12
40	407	406	6.08	416	415	4.00	1472	1472	2.10	1846	1845	2.17
41	406	404	6.55	415	414	4.24	1472	1471	2.17	1845	1844	2.22
42	404	404	6.55	414	414	4.24	1471	1471	2.17	1844	1843	2.27
43	404	403	6.79	414	414	4.24	1471	1470	2.24	1843	1842	2.32
44	403	402	7.03	414	414	4.24	1470	1469	2.31	1842	1840	2.43
45	402	401	7.27	414	413	4.48	1469	1469	2.31	1840	1840	2.43
46	401	400	7.51	413	412	4.72	1469	1468	2.38	1840	1839	2.48
47	400	399	7.75	412	412	4.72	1468	1467	2.45	1839	1838	2.53
48	399	398	7.99	412	412	4.72	1467	1467	2.45	1838	1837	2.58
49	398	398	7.99	412	411	4.96	1467	1467	2.45	1837	1836	2.63
50	398	398	7.99	411	410	5.20	1467	1464	2.65	1836	1836	2.63
51	398	398	7.99	410	409	5.44	1464	1463	2.72	1836	1835	2.68
52	398	398	7.99	409	409	5.44	1463	1461	2.86	1835	1834	2.73
53	398	397	7.99	409	408	5.68	1461	1460	2.93	1834	1833	2.78
54	397	397	8.18	408	407	5.92	1460	1459	3.00	1833	1832	2.83
55	397	397	8.18	407	406	6.16	1459	1459	3.00	1832	1831	2.88
56	397	396	8.49	406	406	6.16	1459	1458	3.07	1831	1830	2.93
57	396	395	8.74	406	406	6.16	1458	1457	3.14	1830	1829	2.98
58	395	394	8.99	406	406	6.16	1457	1456	3.21	1829	1828	3.03
59	394	393	9.24	406	406	6.16	1456	1456	3.21	1828	1826	3.14
60	393	392	9.49	406	405	6.40	1456	1454	3.35	1826	1824	3.25
61	392	391	9.74	405	404	6.64	1454	1452	3.49	1824	1824	3.25
62	391	391	9.74	404	404	6.64	1452	1450	3.63	1824	1822	3.36
63	391	390	9.99	404	403	6.87	1450	1446	3.91	1822	1820	3.47
64	390	389	10.24	403	402	7.12	1446	1440	4.32	1820	1817	3.63
65	389	389	10.24	402	402	7.12	1440	1435	4.67	1817	1814	3.79
66	389	389	10.24	402	402	7.12	1435	1430	5.02	1814	1811	3.95
67	389	389	10.24	402	401	7.37	1430	1426	5.30	1811	1808	4.11
68	389	388	10.52	401	400	7.62	1426	1422	5.58	1808	1804	4.33
69	388	388	10.52	400	400	7.62	1422	1417	5.93	1804	1800	4.55
70	388	387	10.79	400	398	7.87	1417	1413	6.21	1800	1796	4.77
71	387	387	10.79	398	398	7.87	1413	1410	6.42	1796	1790	5.10
72	387	386	11.04	398	398	7.87	1410	1405	6.77	1790	1785	5.38
73	386	386	11.04	398	398	7.87	1405	1401	7.05	1785	1780	5.66
74	386	385	11.30	398	397	8.12	1401	1395	7.48	1780	1770	6.22
75	385	385	11.30	397	397	8.12	1395	1391	7.76	1770	1765	6.50
76	385	384	11.56	397	396	8.37	1391	1387	8.04	1765	1760	6.78
77	384	383	11.82	396	395	8.62	1387	1383	8.32	1760	1755	7.06
78	383	382	12.08	395	394	8.87	1383	1379	8.60	1755	1750	7.34
79	382	382	12.08	394	394	8.87	1379	1375	8.88	1750	1744	7.69
80	382	382	**12.08**	394	393	**9.12**	1375	1371	**9.17**	1744	1737	**8.08**

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CONCLUSIONS

The achieved data indicated that the morpho-productive traits measured in the studied laying hens hybrids were clearly influenced by both used husbandry system and genotype.

Thus, in "Lohmann Brown" hybrid, fowl weight, measured at the end of the experiment (80th week of life) was 3.92% higher in the group accommodated in classical batteries (Lc-A) and 0.72-4.16% lower in the groups reared in alternative systems (L1exp-A ÷ L3exp-A), compared to the standard weight. Eggs yield was 3.69-18.99% lower than the theoretical value. Feed conversion ratio was higher than the recommended value (142.9g/egg), thus +1.71% in the hens accommodated in conventional cages (Lc-A) and +15.03…+40.22% in the experimental groups (L1exp-A ÷ L3exp-A). Referring to the casualties level, the data indicated 2.36-6.66% higher values than those indicated in the hybrid management guide (5% mortality).

In "Hisex Brown" hybrid, weight of the fowl when the experiment ceased were 0.01-2.67% lower than the theoretical ones, while eggs yield was 4.37-19.55% less than hybrid standard. Feed conversion ratio was 9.7-48.9% higher than the theoretical one (137g/egg). Recorded flock casualties in "Hisex Brown" hens were 1.48-5.48% above the maximal standard value.

Consequently, we could state that the alternative systems introduced in laying hens husbandry practice fulfil the welfare requirements and also generate big financial differences, compared to the classical battery system.

Therefore, we still recommend the exploitation of laying hens in batteries, in the conventional ones at the moment. Moreover, there should be tested, under farming conditions, other battery types, build under the requirements of the specific legislation (modified, improved, ecological batteries), that must provide reliability in eggs yielding and ergonomic production facilities.

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