STUDIES REGARDING THE INFLUENCE OF REARING SYSTEM FOR LAYING HENS ON THEIR HEALTH STATE

C. Spridon[1], Paula Viorela Druc[1], Carmen Irimia (Gavrilescu)[1], Roxana Nicoleta Raţu[1], M.G. Usturoi[1*]

[1]University of Agricultural Sciences and Veterinary Medicine-Iasi, Romania

Abstract

Civic associations succeed to change the legislation regarding rearing of laying hens. Phenomenon lead to adaptation of some technological solutions which offer birds those life conditions specific both to welfare and also to obtain superior productive performances. In the current paper are presented the results of a study which aimed the survival rate of laying hens reared in two different systems: in batteries and in lofts. Research took place during 41 weeks, starting with the age of 20 weeks and were consisted in evaluation of flock losses and the causes which generate them. The obtained data shown that total flock losses were of 6.41% for the hens reared in lofts and 4.26% at the ones reared in batteries, face to 3.1% which is recommend by the producer of the utilised hybrid. Regarding the causes which generate the flock losses, at variant with accommodation in lofts was founded a higher rate of hens with mechanical accidents (51.7% face to only 42.1% in batteries) due to frequent movements both horizontally and vertically, to the food/water sources or to laying/rest area. Hens accommodated in batteries presented a higher incidence of obstetrical diseases (34.7% vs. 29.6%) and internal ones (23.2% vs. 18.7%) caused by more intense laying rhythm in comparison with the hens from lofts. Data obtained by us regarding survival rate of laying hens flocks show the fact that this one is clearly influenced by the utilised rearing system, but it is also the dependence of some perturbation factors which could be eliminated by adaptation of some adequate measures.

Key words: hens, eggs, rearing, technology, survival

INTRODUCTION

In the last years, consumers aligned their preferences to products obtained from birds, phenomenon which determine the continuous increasing of aviary production, as well as their quality [4, 7, 12].

Eggs occupy an important place in global aviary production, being obtained from specialised hybrids, exploited in according with the most modern principles [6, 10]; in over 80% of cases, rearing in realised in modernised batteries [9, 11].

Eggs are a rich source of nutritive substances indispensable for human organism, have a high biological value (96%, face to 90% as it is for milk), and also have a high assimilation degree of the nutrients from composition (digestibility coefficient being 80-95%) [10, 12, 13].

When are rationally consumed, eggs are a real stimulant of metabolic functions and resistance to diseases, assuring fortification and good function of nervous system [6, 10].

There are also opponents of egg consumption, due to implication in cholesterol increasing, but also for a possible contain in toxic elements (hormones, heavy metals, pathogen germs etc) [3, 12].

The number of those preoccupied by animals welfare is increasing, and by their actions they succeeded to impose their point of view in legislation, leading to profound changes in aviculture [1, 2, 8, 9].

So for example, was reach to forbidden the utilization of classical batteries for laying hens, to acceptance in aviary practice only of agreed rearing systems, to pay subventions only for the farms which respect the welfare condition etc [12].

In this context, aviary specialists were focused on finding and implementing in practice of some solutions/technological

*Corresponding author: umg@uaiasi.ro
The manuscript was received: 12.10.2017
Accepted for publication: 17.04.2018

equipments which will assure to laying hens conditions for manifestation of their natural instincts, as well as to allow the obtaining of productive performances at a superior level [5, 11, 13, 14, 15].

From those reasons, through the current paper we aimed to study the influence of rearing system on keeping rate of flock for hens specialised in consumption egg production.

MATERIAL AND METHOD

To achieve our goal were studied two rearing systems for laying hens, both of them accepted at European level, as follows: in improved battery Eurovent type and in loft Natura Nova Twin type.

Biological material was represented by hens belonging to ISA Brown hybrid, which were monitored from the age of 20 weeks till 60th week of life; initial flock from the shelter equipped with loft was of 36343 heads, and the one from shelter with battery was 10346 heads, in both cases being respected the density norms so the exploitation to be included into welfare regime.

During our research were tracked and recorded a series of indicators connected with health state of studied birds, as follows:

- flock losses – mortalities were recorded daily, were summed for each life week of birds and were rated to the existent flock at the beginning of respective week.
- causes for flock losses – each individual which exit the flock was subjected to necropsy examination to establish the death cause.

RESULTS AND DISCUSSIONS

Flock losses for the hens reared in lofts.

At the moment of settled up of new birds flocks took place conflicts after which is installed a certain social hierarchy; such disputes could provoke severe hurting or even death of some combatants.

The number of birds lost from flock in the first 3 weeks of check out was 187 heads, with a rate of 61-65 heads/week, respectively 0.17-0.18% from the existent flock in that week; this mortality is low because the pullets' transfer in adult shelter was made at the age of 16 weeks, so the problems with social hierarchy were mainly solved at the moment at which monitoring started (tab. 1).

In the next life weeks of birds, the losses rate diminished, after that became to increase again, in parallel with their aging; so in 30th life week of birds, flock losses were situated at a level of 0.1% (37 heads/week), and in 40th week to reach 0.14% (51 heads/week), and in 50th week at 0.16% (57 heads/week).

In the last 10 weeks of check out was recorded a higher number of hens which were withdrawn from flock; so for example, in weeks 53-55 have been reformed a number of 187 individuals, with a mean mortality rate of 0.18% per week.

The highest rate of losses was in 56th life week of birds, 0.26% (88 heads), after that being stabilised at a level of 0.20% per week in the last three weeks of investigation.

During studied period (20-60 weeks), total flock losses at hens reared in lofts was of 6.41%, face to 3.1% which is mentioned by the producer of utilised hybrid.

Flock losses for the hens reared in batteries. In case of hens accommodated in shelter equipped with *Eurovent battery*, situation of flock losses was a little bit better that at the ones reared in lofts, in the way that per total studied period (20-60 weeks) losses were of only 4.26% (face to 6.41% as it was at rearing in loft), but higher as the one considered to be optimal, 3.1% (tab. 1).

The size of flock losses in the first three weeks of check out was quite reduced, of only 0.15%; after that the losses had a sinuous trend, with levels of 0.06% (6 heads) in 30th life week of birds, 0.13% (13 heads) in 40th week and 0.14% (14 heads) in 50th week.

To the end of studied period, weekly rate of flock losses was higher, 0.17% (17 heads/week) in weeks 56 and 57, 0.19% (19 heads/week) in week 58, 0.20% (20 heads/week) in week 59 and 0.22% (22 heads/week) in week 60.

Table 1 Situation of flock losses at studied hens

Birds' age (weeks)	Rearing in loft				Rearing in battery			
	Birds' flock		Summed flock losses		Birds' flock		Summed flock losses	
	at beginning of week (heads)	at the end of week (heads)	heads	%	at beginning of week (heads)	at the end of week (heads)	heads	%
20	36343	36282	61	0.17	10346	10342	4	0.04
21	36272	36215	126	0.35	10342	10335	11	0.11
22	36203	36154	187	0.52	10335	10331	15	0.15
23	36146	36098	243	0.67	10331	10323	23	0.23
24	36088	36051	290	0.80	10323	10316	30	0.30
25	36044	36004	337	0.93	10316	10313	33	0.33
26	35996	35959	382	1.06	10313	10306	40	0.40
27	35950	35904	437	1.21	10306	10302	44	0.44
28	35897	35851	490	1.36	10302	10298	48	0.48
29	35843	35808	533	1.48	10298	10292	54	0.54
30	35803	35772	570	1.58	10292	10286	60	0.60
31	35767	35732	610	1.69	10286	10279	67	0.67
32	35726	35692	650	1.80	10279	10270	76	0.76
33	35688	35657	686	1.90	10270	10255	91	0.91
34	35653	35619	724	2.01	10255	10247	99	0.99
35	35614	35585	758	2.11	10247	10237	109	1.09
36	35579	35533	810	2.26	10237	10231	115	1.15
37	35525	35484	859	2.40	10231	10223	123	1.23
38	35478	35434	909	2.54	10223	10215	131	1.31
39	35475	35781	962	2.69	10215	10205	141	1.41
40	35373	35330	1013	2.83	10205	10192	154	1.54
41	35330	35275	1068	2.99	10192	10180	166	1.66
42	35275	35229	1114	3.12	10180	10173	173	1.73
43	35229	35174	1169	3.28	10173	10162	184	1.84
44	35174	35116	1227	3.44	10162	10151	195	1.95
45	35116	35059	1284	3.60	10151	10140	206	2.06
46	35059	34999	1344	3.77	10140	10133	213	2.13
47	34999	34936	1407	3.95	10133	10126	220	2.20
48	34936	34880	1463	4.11	10126	10116	230	2.30
49	34880	34818	1525	4.29	10116	10104	242	2.42
50	34818	34755	1588	4.47	10104	10090	256	2.56
51	34755	34698	1645	4.63	10090	10077	269	2.69
52	34698	34640	1703	4.80	10077	10063	283	2.83
53	34640	34577	1766	4.98	10063	10050	296	2.96
54	34577	34514	1829	5.16	10050	10036	310	3.10
55	34514	34453	1890	5.34	10036	10015	331	3.31
56	34453	34365	1978	5.60	10015	9998	348	3.48
57	34365	34292	2051	5.81	9998	9981	365	3.65
58	34292	34225	2118	6.01	9981	9962	384	3.84
59	34225	34155	2188	6.21	9962	9942	404	4.04
60	34155	34087	**2256**	**6.41**	9942	9920	**426**	**4.26**

Causes for flock losses at hens reared in lofts. The main cause of flock losses was represented by mechanical accidents, mainly, broken of wings and legs; rate of birds which presented such problems was 51.7% (1167 heads) from total losses (tab. 2).

On the next place were losses due to obstetrical diseases (29.6%, respectively 668 heads from total losses) and the ones caused by internal disease (18.7%, respectively 421 heads from total losses).

A particular situation was observed in the first 5 weeks of investigations (weeks 20-24 of birds' life), when the number of those flock losses due to accidents was of 241 heads, respectively 45.4% from total losses in

that period (531 heads). In this case, we could talk about mortality due to fights for establishing of social hierarchy (around 20%) and a mortality due to accidents caused by adaptation to new life conditions (80%).

Table 2 Causes of flock losses at studied hens

Birds' age (weeks)	Rearing in loft							Rearing in battery						
	Total losses (heads/week)	Causes						Total losses (heads/ week)	Causes					
		accidents		obstetrical diseases		internal diseases			accidents		obstetrical diseases		internal diseases	
		heads	%	heads	%	heads	%		heads	%	heads	%	heads	%
20	61	45	73.7	12	19.7	4	6.6	4	2	50.0	1	25.0	1	25.0
21	65	52	80.0	11	16.9	2	3.1	7	3	42.9	3	42.9	1	14.2
22	61	51	83.6	7	11.5	3	4.9	4	1	25.0	2	50.0	1	25.0
23	56	48	85.7	6	10.7	2	3.6	8	3	37.5	4	50.0	1	12.5
24	47	45	95.7	2	4.3	-	-	7	2	28.6	3	42.9	2	28.6
25	47	25	53.2	14	29.8	8	17.0	3	-	-	3	100.0	-	-
26	45	24	53.3	18	40.0	3	6.7	7	2	28.6	4	57.1	1	14.3
27	55	38	69.1	16	29.1	1	1.8	4	1	25.0	2	50.0	1	25.0
28	53	26	49.1	16	30.2	11	20.7	4	2	50.0	2	50.0	-	-
29	43	17	39.5	18	41.9	8	18.6	6	4	66.7	2	33.3	-	-
30	37	14	37.8	16	43.2	7	18.9	6	4	66.7	2	33.3	-	-
31	40	22	55.0	12	30.0	6	15.0	7	5	71.4	2	28.6	-	-
32	40	12	30.0	16	40.0	12	30.0	9	3	33.3	3	33.3	3	33.3
33	36	20	55.6	13	36.1	3	8.3	15	5	33.3	6	40.0	4	26.7
34	38	4	10.5	28	73.7	6	15.8	8	4	50.0	2	25.0	2	25.0
35	34	15	44.1	14	41.2	5	14.7	10	4	40.0	4	40.0	2	20.0
36	52	17	32.7	18	34.6	17	32.7	6	2	33.3	3	50.0	1	16.7
37	49	18	36.7	15	30.6	16	32.6	8	3	37.5	3	37.5	2	25.0
38	50	19	38.0	20	40.0	11	22.0	8	4	50.0	2	25.0	2	25.0
39	53	14	26.4	24	45.3	15	28.3	10	6	60.0	3	30.0	1	10.0
40	51	29	56.7	14	27.6	8	15.7	13	6	46.2	2	15.4	5	38.5
41	55	23	41.8	17	30.9	15	27.3	12	5	41.7	4	33.3	3	25.0
42	46	17	36.9	14	30.4	15	32.7	7	3	42.9	3	42.8	1	14.3
43	55	26	47.3	14	25.5	15	27.2	11	3	27.3	3	27.3	5	45.5
44	58	24	41.4	17	29.3	17	29.3	11	3	27.3	4	36.4	4	36.4
45	57	20	35.1	18	31.6	19	33.3	11	4	36.4	3	27.3	4	45.5
46	60	24	40.0	19	31.7	17	28.3	7	3	42.9	3	42.9	1	14.3
47	63	31	49.2	21	33.3	11	17.5	7	4	57.1	2	28.6	1	14.3
48	56	25	44.6	17	30.3	14	25.1	10	4	40.0	5	50.0	1	10.0
49	62	37	59.7	16	25.8	9	14.5	12	6	50.0	4	33.3	2	16.7
50	63	18	28.6	26	41.3	19	30.1	14	7	50.0	3	21.4	4	28.6
51	57	23	40.4	16	28.1	18	31.5	13	7	53.8	2	15.4	4	30.8
52	58	29	50.0	13	22.4	16	27.6	14	8	57.1	3	21.4	3	21.4
53	63	36	57.1	14	22.3	13	20.6	13	7	53.8	3	23.1	3	23.1
54	63	33	52.4	18	28.6	12	19.0	14	8	57.1	4	28.6	2	14.3
55	61	24	39.3	25	41.0	12	19.7	21	10	47.6	7	33.3	4	19.0
56	88	56	63.6	28	31.9	4	4.5	17	4	23.5	10	58.8	3	17.6
57	73	48	65.7	19	26.1	6	8.2	17	6	35.3	8	47.1	3	17.6
58	67	44	65.7	13	19.4	10	14.9	19	7	36.8	5	26.3	7	36.8
59	70	37	52.9	18	25.7	15	21.4	20	6	30.0	7	35.0	7	35.0
60	68	37	54.4	15	22.1	16	23.5	22	8	36.4	7	31.8	7	31.8
TOTAL	**2256**	**1167**	**51.7**	**668**	**29.6**	**421**	**18.7**	**426**	**179**	**42.1**	**148**	**34.7**	**99**	**23.2**

Also in this time interval, 38 hens (7.2%) have been detected with obstetrical diseases and 11 hens (2.1%) with internal diseases.

Regarding flock losses due to obstetrical diseases, the obtained data show the fact that those rate was very high in period of peak and plateau laying, with levels of 30.6-45.3% from total flock losses in that week, the maximum recorded was 73.7%, in 34th life week of birds.

Mortality due to internal diseases had a asymptotic evolution, recorded a rate which oscillated in interval 1.8-33.3%, with mention that in 24th life week of birds weren't recorded such cases.

From the group of obstetrical diseases a higher frequency had it "peritonitis vitelline" mainly detected in age period 25-50 weeks; phenomenon manifested during intense production, when ovulation is accelerated and stimulation hormones for maturation of ovary follicles are secreted in insufficient quantities.

From internal diseases, Necrotic enteritis generated the highest incidence of mortality, especially after age of 50 weeks of birds.

This disease have as etiologic agent Clostridium perfringens bacteria, which could be founded in birds' intestine, faeces, soil, layer and dust; having in view that loft rearing system imply the existence of a layer with

which bird comes in a direct contact, is explicable the higher incidence of this disease.

Causes for flock losses at hens reared in batteries. In the shelter equipped with batteries, on the whole studied period (20-60 weeks) were eliminated from flock a number of 426 hens, from which 179 heads (42.1%) were due to mechanical accidents, 148 heads (34.7%) due to obstetrical diseases and 99 heads (23,2%) due to different internal diseases (tab. 2).

Mortality due to accidents recorded a peak of 71.4% in 31st life week of birds and a minimum of 23.5% in 56th week; also in this case the rate of accidents was higher in the first 4 weeks of research, 30.4%.

Flock losses due to obstetrical diseases recorded a minimum level (15.4%) in weeks 40th and 51st of birds life and a maximum one (100%) in week 25, while the fatalities caused by internal diseases was zero in weeks 25, 28, 29, 30 and 31, reaching a maximum level (45.5%) in weeks 43 and 45 of research.

We mention that at hens reared in batteries was identified a quite large number of individuals which presented the "fat liver syndrome", especially after the age of 40 weeks; the disease being a malfunction of lipids metabolism, similar with obesity at humans, which is manifested under the form of massive fat deposits on abdomen and perirenal on mesentery.

CONCLUSIONS

From the obtained data resulted that per whole studied period (20-60 weeks), flock losses were placed at a level of 6.41% in the case of hens reared in lofts and 4.26% for the ones accommodated in Eurovent battery; producer Hendrix Genetics Company indicate for ISA Brown hybrid a mean mortality of 3.1%

At hens from lofts, the quite high difference (3.31%) between theoretical mortality and the one recorded by us was mainly due to accidents caused by the constructive particularities of the utilised rearing system; this technical solution forces the birds to jump both vertically and horizontally, to reach at sources for water/food or in resting area.

At hens' flock reared in Eurovent battery mortality over-passed with only 1.16% the specifications from technological guide, due largely to advanced exhaustion of birds with aging.

Regarding the causes of flock losses, accommodation variant in loft generated a higher rate of birds which presented mechanical accidents (51.7% face to only 42.1% in battery), while hens accommodated in battery presented a higher incidence of obstetrical diseases (34.7% vs. 29.6%) and of internal ones (23.2% vs. 18.7%) caused by more intense laying rhythm in comparison with the hens from loft.

A particular observation was the one that at each weekend, flock losses were lower and egg production was greater in comparison with the rest of weekdays; phenomenon which could be associated with agitation/anxiety state generated by the noises related to road traffic specific to the road which is close to those two studied farms.

Also, we consider that mustn't be neglected the incidence of the so-called "cage accidents" due to some intense stressing factors (loud noises provoked by personnel activities, shelters' penetration by some "unwanted guests" etc) which scares birds; their reaction is to escape from rearing cages, action which caused their hurting/death.

Data obtained by us regarding survival rate of laying hens flocks show the fact that these one is clearly influenced by the utilised rearing system, but it is also under the dependence of some disturbing factors which could be eliminated by adoption of some adequate measures.

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