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EFFECT OF HOUSING SYSTEM, AGE AND HYBRID TYPE ON THE WELFARE OF LAYING HENS

INFLUENŢA SISTEMULUI DE ÎNTREŢINERE, VÂRSTEI ŞI TIPULUI DE HIBRID, ASUPRA BUNĂSTĂRII GĂINILOR OUĂTOARE

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Housing system has a significant effect on the welfare of laying hens, and one of the factors for estimating the welfare is the condition of feathers. The aim of this work was to evaluate this parameter in different housing systems and between two strains (white and brown layers) at the beginning and ending of the production cycle. Feathers were evaluated by scoring system. Obtained results showed that type of the cage as well as the type of hybrid, have significant influence on feather.
Key words: laying hens, cages, hybrid, welfare

Introduction

Animal welfare has a big public and economical significance, especially after production of poultry in commercial cage systems has been introduced.

Welfare is a state of complete mental and physical health, where the animal is in harmony with its environment (Hughes, 1976).

Criteria for welfare can be divided into 5 categories: health, physical condition, production, physiological parameters and behaviour (Broom, 1986). One of the physical parameters is also the condition of feathers. The aim of this paper was to investigate the effect of the cage type and hybrid type to the feather condition in 36^{th} and 70^{th} week of age.

Materials and Methods

Trial was carried out on experimental farm of the Department of Animal Science of the Faculty of Agriculture in Novi Sad, from October to December 2007. Investigated hybrids were: white hybrid – Hisex white and brown hybrid – HyLine brown. The layers were housed in three different cage systems:

1) standard cage system with 5 layers in cage of 500 cm^2 per hen (K);

2) cage system with 5 layers in cage, 650 cm^2 per layer - Big Dutchman (BD);

3) modified cage of 45.255 cm^2 surface with 60 layers per tier, perches, nests and sand (Eurovent EU Big Dutchman).

Investigation was carried out in 36^{th} and 70^{th} week of age. The degree of feather disorder was quantified in the four regions: neck, breast, wings and back, on the scale from 1 to 4, according to the Tauson et all. method (1984). Point 4 was given for the feather without any disorder, while the point 1 represented the significant degree of disorder. At the end of investigation, a summarized average point for each layer was given (total 20 layers per group).

Based on obtained data, statistical analysis was done using method of variance analysis and t-test.

Results and Discussions

Results of investigation of feathers showed, that in the age from 36^{th} week feather damages occur, even if the laying hens are still in starting phase of laying. It has been confirmed that the condition of feathers in all regions is relative good, but that the damage in both hybrids starts at neck region. The overall feather condition was the best at hens, which were kept in modified cage, and it was given the maximum 4 points (Table 1). Very good feather condition was confirmed also at cages, with less stocking density. Results were worse at the standard cage system, but only for the brown layers, and not for white layers. Regarding the effect of hybrid type toward feather condition in given regions, it can be concluded that the hybrid type has statistically significant effect on the overall feather condition and breast region, but no significant effect in the regions of back, neck and wings. Cage type also has statistically significant effect to the overall feather condition in all regions. Also, interaction between hybrid type and cage type is highly significant.

Table 1

Effect of housing system and hybrid type on feather condition of hens at 36 weeks of age

Housing system	*Neck*	*Breast*	*Back*	*Wings*	*Total*
Brown layers					
Cage 1 (K)	3.12 ^{A}	3.77 ^{A}	3.89 ^{A}	3.92 ^{A}	**3.68** ^{A}
Cage 2 (K BD)	3.74 ^{B}	4.00 ^{B}	4.00 ^{B}	4.00 ^{B}	**3.94** ^{AB}
Cage 3 (EU BD)	4.00 ^{c}	4.00 ^{B}	4.00 ^{B}	4.00 ^{B}	**4.00** ^{B}
White layers					
Cage 1 (K)	3.80 ^{A}	4.00	4.00	4.00	**3.95** ^{B}
Cage 2 (K BD)	3.92 ^{B}	4.00	4.00	4.00	**3.98** ^{B}
Cage 3 (EU BD)	4.00 ^{B}	4.00	4.00	4.00	**4.00** ^{B}
Varinat cause					
Hybrid	2.46	8.69 ***	3.6	3.2	31.4 ***
Cage	146.6 ***	483.1 ***	748.5 ***	1435.9 ***	911.9 ***
Hybrid * Cage	9.14 ***	9.14 ***	3.5 *	3.1 *	17.7 ***

$^{A-B}$ Values within column with no common superscript are significantly different ($P<0.05$)

In Table 2, feather condition in 70th week of age is presented. It can be concluded that a significant feather damage in all regions occur at this age. Biggest feather damage was observed at standard cage system, both in brown layers, as well as white layers. As in the 36th week of age, biggest damage is observed in the neck region at the standard cage system, where most of the brown hybrids got 1 point, meaning that their neck region was practically without feathers. Standard cage system had significant effect toward feather damage in other regions at brown hybrid, which resulted with significantly lower points for total feather condition as compared with other two cage types. An identical situation was observed at white hybrid, but overall points for total feather condition were higher in comparison with brown hybrids.

As for variability causes (Table 2), it was shown that the effect of cage type toward feather condition was statistically very significant. No statistical significance of hybrid type and interaction between hybrid type and cage type was found, which means that hybrid type has no influence on feather condition in 70th week of age, but that only cage type has influence.

Table 2

Effect of housing system and hybrid type on feather condition of hens at 40 weeks of age

Housing system	*Neck*	*Breast*	*Back*	*Wings*	*Total*
Brown layers					
Cage 1 (K)	1.15 ^{A}	2.10 ^{A}	2.45 ^{A}	2.35 ^{A}	**2.01** ^{A}
Cage 2 (K BD)	2.00 ^{B}	2.55 ^{B}	3.20 ^{B}	2.85 ^{B}	**2.65** ^{AB}
Cage 3 (EU BD)	2.65 ^{c}	3.15 ^{c}	3.05 ^{B}	3.00 ^{B}	**2.96** ^{B}
White layers					
Cage 1 (K)	1.74 ^{A}	2.68 ^{A}	3.32 ^{A}	3.26 ^{A}	**2.75** ^{A}
Cage 2 (K BD)	2.76 ^{B}	3.18 ^{B}	3.58 ^{AB}	3.53 ^{AB}	**3.26** ^{B}
Cage 3 (EU BD)	3.35 ^{c}	2.80 ^{A}	3.10 ^{A}	3.85 ^{B}	**3.28** ^{B}
Varinat cause					
Hybrid	22.39 ***	3.08	6.59 *	42.51 ***	3.22
Cage	40.10 ***	4.84 *	3.03	8.51 **	12.53 ***
Hybrid * Cage	0.13	3.86	1.99	0.31	2.90

$^{A-B}$ Values within column with no common superscript are significantly different (P<0.05)

The effect of housing system on feather condition of laying hens is a subject of numerous investigations. It has been confirmed, that possibility of cannibalism, feather pecking and aggressive behaviour increases by breeding hens in groups (Al-Rawi & Craig, 1975; Hughes & Wood Gush, 1977; Bilčik & Keeling, 2000). This has not been confirmed in this paper, because, while observing single regions of body, it can be observed that there is no higher feather damage, which would be a characteristic for cannibalism. The worst feather condition was observed at standard cage type (K), especially in the neck region, which suggests higher friction during intake of food and stretching the head out of

the cage. Total feather condition was as well the worst for this type of cage system, which suggests the fact that the other regions of body are being damaged due to high stocking density. Standard cage systems with lower stocking density enable much better conditions, whereas the best results were obtained by the enriched cage systems.

Conclusion

Based on the results, gathered during this experiment, it can be concluded that there is a significant effect of housing system to the feather condition of laying hens, which was the worst in the standard cage type. It was also confirmed that hybrid type has an effect to the feather condition, because it was observed that white hybrid had significantly better feather condition than brown hybrid. This confirmed the fact that standard cage type has a negative influence to welfare of laying hens, because the feather condition is one of the parameters for assessing of animal welfare.

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