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Egg Quality Characteristics Influenced by Frequency of Body Wetting of Layers during Summer

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ABSTRACT

Influence of cooling through surface wetting on the egg quality characteristics of 384 Single Comb White Leghorn layers was investigated during summer. The frequency of surface wetting of layers by water spraying positively influenced the egg weight, shell thickness, shell weight, albumen content and height. Wetting the layers thrice a day had a significant ($P<0.01$) impact on the egg characteristics compared with control. Eggs laid by layers sprayed with water once, twice or thrice a day had higher ($P<0.01$) albumen height than control group; likewise, those laid by layers sprayed with water thrice a day had higher ($P<0.01$) albumen height compared with those laid by layers sprayed with water once and/or twice a day.

Key Words: Egg quality; Body wetting; White Leghorn; Layers

INTRODUCTION

In Pakistan, during summer layers are exposed to a number of stresses like growth, disease incidence, harsh environment, reproduction, improper management and imbalance nutrition. Dietary practices of supplementing ascorbic acid in commercial feed has been proved useful and effective (Peebles & Brake, 1983; Freeman *et al.*, 1983; Sahota, 1988; Benabdeljelil *et al.*, 1990; Ahmed *et al.*, 1993) in the management of a majority of such stresses. However, management of heat stress still requires investigations in order to fetch maximum production. The managerial practices including conductive cooling through water cooled roosts, water sprinkling in laying houses and surface wetting of poultry birds have been reported to be useful (Berry *et al.*, 1990; Muiruri & Harrison, 1991; Harrison *et al.*, 1993). The effectiveness of surface wetting by water sprinkling on the body of layers in cage keeping conditions for cooling effect has not yet been studied in Pakistan. This paper describes the influence and effectiveness of cooling through surface wetting on the egg quality characteristics of Single Comb White Leghorn (WLH) layers maintained in cages during summer season.

MATERIALS AND METHODS

Three hundred and eighty four, 45 weeks old WLH layers reared at Poultry Research Centre, University of Agriculture, Faisalabad were used for this project during summer season (June through September). The layers were tagged and randomly divided into 12 experimental units of 32 layers each. These units were allotted randomly to four water sprinkling treatment groups (zero, once, twice, and thrice a day) comprising three experimental units (replicates) each. The replicates were kept in identical cage units for 14 weeks in Randomized Complete Block Design. All other managerial practices regarding feeding and watering were identical.

Group A was kept as control where no water was sprayed for surface wetting of layers. Group B with wetting once daily at 12.00 noon, group C with wetting twice daily at 12.00 noon and at 2.00 p.m.; and group D with wetting thrice a day at 12.00 noon, 2.00 p.m. and at 4.00 p.m. The water sprinkling created sufficient wet conditions to the feathers. The layer appeared visibly wet and feather web lost their normal appearance but because of high temperature conditions, the water evaporated from the body in 30-40 minutes.

The observations regarding egg weight, egg shell thickness and egg shell weight, albumen height, yolk height and yolk diameter were recorded in all groups during the experimental period of 14 weeks. Egg characteristics data recorded on random samples from each replicate, were analyzed by analysis of variance techniques and the means were compared by using Duncan's Multiple Range Test (Steel & Torrie, 1980).

RESULTS AND DISCUSSION

Egg weight. The mean egg weight of layers subjected to water sprinkling to zero, once-a-day, twice and thrice a day was 55.562, 55.869, 55.007 and 58.277 g, respectively. It is evident from the results (Table I) that eggs from layers treated thrice a day had higher

(P<0.01) weight compared with control or even those treated once or twice a day. Similarly the difference of egg weight existed between the single and twice treatments and the control. Eggs from the layers treated thrice a day had 2.179, 4.131 and 4.658% higher egg weight as compared to those obtained from layers treated twice, once and control, respectively. Likewise, group with twice wetting had 1.996 and 2.534% more egg weight than groups with once and control. Group with once wetting had only numerical difference and slightly higher egg weight which was 0.549% greater than control group. It revealed that surface wetting of layers by water spraying influenced the egg weight in all groups. The influence of surface wetting decreased by decreasing the number of sprays of water per day.

Decrease in weight due to high temperature and its improvement by lowering the temperature has also been reported previously (Le *et al.*, 1986; Vasquez & Teeter, 1986; Zolovich & Deshazer, 1990; Bell & Adams, 1992; Peguri & Coon, 1993). However, no effect on egg weight of layers kept on air equilibrated and water cooled roosts at different ambient temperatures was observed (Muiruri & Harrison, 1991a).

Egg shell thickness. The weekly mean shell thickness of eggs in layers under control, once, twice and thrice sprinkling of water daily was 0.332, 0.334, 0.349 and 0.354 mm, respectively. There was non-significant difference in egg shell thickness of control group and once. Once sprinkling had significantly (P<0.01) lesser egg shell thickness than with those wet twice and thrice. Group with twice wetting had no difference in egg shell thickness than group with thrice.

It was observed that group with thrice sprinkling of water had 1.412, 5.649 and 6.214% more egg shell thickness as compared to group with twice, once and control respectively. Group with twice wetting had 4.297 and 4.871% greater egg shell thickness than groups with twice and control, respectively and group with once had 0.598% more thickness of egg shells produced during 14 weeks of observations period than control group.

It appeared that once spray of water daily had little influence on shell thickness but two sprays or more sprays of water daily improved the shell thickness significantly and persistently during observation period. It was obvious from some other studies where higher temperature had decreased significantly egg shell thickness and it could be improved by lowering the high temperature stresses (Vasquez & Teeter, 1986; Zolovich & Deshazer, 1990; Olawuni & Ubosi, 1992; El-Boushy & Raterink, 1993).

Egg shell weight. It was revealed that high temperature and high relative humidity had decreased the egg shell weight but there was least shell weight in control group where no water spray was practiced for surface wetting of layers. It was observed that three water sprays daily was most effective to neutralize the deleterious effects of high temperature and humidity during summer season. Two sprays of water daily for surface wetting of layers was less effective than three sprays daily but comparatively better than with one water spray daily. Group without spray of water could not protect the birds from the deleterious effects of heat stress and had least egg shell weight. Reduction (P<0.01) in egg shell weight due to high temperature as also been reported previously (Andrade *et al.*, 1976; Olawuni & Ubosi, 1992; Naseer *et al.*, 1992).

Albumen height. Statistically significant (P<0.01) difference was found between groups with control, once, twice and thrice sprinkling of water. Eggs obtained from control group had significantly (P<0.01) lower albumen height than groups with once, twice and thrice. Group with once wetting had significantly

Table 1. Egg quality characteristics as influenced by water sprinkling frequency

Wetting frequency	Egg weight (g)	Shell weight (g)	Shell thickness (mm)	Albumin height (mm)	Yolk index
Control	55.562±2.130c	4.783±0.210c	0.332±0.025c	5.932±0.063c	0.400±0.012c
Once	55.869±2.020c	4.818±0.144c	0.334±0.021c	5.971±0.066c	0.410±0.011c
Twice	57.007±1.843b	5.053±0.158b	0.349±0.0226b	6.107±0.170b	0.425±0.015b
Thrice	58.227±2.230a	5.099±0.162a	0.354±0.021a	6.238±0.218a	0.450±0.025c

Different letters given with the figures indicate statistical difference

(P<0.01) lower albumen height than those wet twice and thrice. Similarly, eggs from birds wet twice had significantly (P<0.01) lower albumen height than those wet thrice. The difference in albumen height was considered due to variable tolerance of high environmental temperature stresses in different groups and stresses ameliorated by number of water sprinkling groups. Albumen height could be improved by reducing the high temperature stresses which was observed to be decreased at high temperature stresses (Vasquez & Teeter, 1986; Olawuni & Ubosi, 1992).

Yolk index. Birds under no water sprinkling group had statistically non-significant difference with group wet once, but had significant difference (P<0.01) with birds having twice and thrice sprinkling daily. Group with once wetting had statistically significant (P<0.01) difference with groups twice and thrice wetting. Group with twice sprinkling had also statistically significant (P<0.01) difference with thrice sprinkling group. The difference in yolk index score was considered due to variable tolerance of high environmental temperature stresses in different groups as ameliorated by variable numbers of water sprays. Decrease in the yolk index score due to high temperature and its improvement by lowering high environmental temperature has also been reported previously (Vasquez & Teeter, 1986; Uluoak *et al.*, 1990; Olawuni & Ubosi, 1992).

CONCLUSIONS

Based on the results of the current study, it is suggested that frequent body wetting be practiced for improved performance of the layers during summer.

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