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Impact of Water Sprinkling Frequency on the Production Performance of Commercial Layers During Summer Season

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Abstract: The project was planned to study the effectiveness of cooling through surface wetting on the performance of 384 Single Comb White Leghorn layers maintained in cages during summer season. Group A was kept as control where no water was sprayed for surface wetting of layers. Group B was sprayed with water once daily at 12.00 noon, group C was sprayed twice a day at 12.00 noon and at 2.00 p.m. and group D was sprayed thrice a day at 12.00 noon, 2.00 p.m. and at 4.00 p.m. The egg production was improved by 3.368 and 4.882 percent in birds where water was sprayed once as compared to control and twice daily. Egg production was better at 1.187 percent where water was sprayed 3 times a day than those of twice. It was observed that thrice sprinkling was 0.89, 3.374 and 4.881 percent more efficient in feed conversion ratio as compared with twice, once and control, respectively. Control group had 0.303, 2.185 and 2.185 percent less final body weight than group of once, twice and thrice.

Key words: Water sprinkling frequency, production performance, layers

Introduction

High environmental temperature during summer season is stressful and has deleterious effects on productive and reproductive performance of layers (Wilson, 1949; Van Kampen, 1981). Egg production drastically falls to as low as 30 percent adversely affecting the economic potential of poultry farmers. Low egg production rates leads to the trend of disposing of sizeable number of layers as culled birds (Ahmed *et al*., 1993). Therefore, efforts should be made to maintain the productive performance of layers during high environmental temperature conditions.

The managerial practices including conductive cooling through water cooled roosts, water sprinkling in laying houses and surface wetting of poultry birds may be useful techniques (Wilson *et al*., 1983; Berry *et al*., 1990; Muiruri and Harrison, 1991a; Harrison *et al*., 1993; Li *et al*., 1992). The effectiveness of surface wetting by water sprinkling on the body of layers under cage keeping conditions for cooling effect, has not yet been studied under local summer conditions. Therefore, the project was planned to study the effectiveness of cooling through surface wetting on the performance of Single Comb White Leghorn layers.

Materials and Methods

Three hundred and eighty four, 45 week old Single Comb White Leghorn (WLH) layers reared at Poultry Research Centre (PRC), University of Agriculture, Faisalabad were used for this project. The layers were tagged and randomly divided into 12 experimental units of 32 layers each and allotted randomly to 4 groups viz., A, B, C and D comprising 3 replicates each. The replicates were kept in identical cage units for experimental period of 14 weeks in Completely Randomized Design. Surface wetting of layers was accomplished by sprinkling with measured amount of 2 litres of water for each 32 layers' replicate at each time of water spraying with the help of spraying machine. After visual appraisal of extreme heat accompanied with thermal panting of layers, which was nearly at 12.00 noon and 4.00 p.m. Group B was sprayed with water once daily at 12.00 noon, group C was sprayed twice a day at 12.00 noon and at 2.00 p.m. and group D was sprayed thrice a day at 12.00 noon, 2.00 p.m. and at 4.00 p.m. Group A was kept as control where no water was sprayed during the observation period of 14 weeks. By water the layers appeared visibly wet and feather web lost their normal appearance. The data was recorded for the initial and final body weight of layer on weekly basis.

The data thus collected were analyzed using analysis of variance technique and the means were compared by Duncan's Multiple Range Test (Steel and Torrie, 1980).

Results and Discussion

High environmental temperature during summer season has deterious effects on productive performance of layers (Wilson, 1949; Van Kampen, 1981). During this study egg production was statistically higher in all groups of experimental layer as compared with the control group. Water spraying twice and thrice had significantly increased egg production as compared with the group where water was sprayed once. Whereas the difference in egg production was non-significant between the group of twice and thrice a day sprinkling of water.

The egg production was improved by 3.368 percent in birds where water was sprayed only once daily at 12.00 noon as compared to non-sprayed control. Egg production was further improved 4.882 percent in birds where water was sprayed twice daily at 12.00 noon and 2.00 p.m. than those of once. Egg production was still better by 1.187 percent in birds were water was sprayed 3 times a day (12.00 noon, 2.00 p.m and 4.00 p.m) than those of twice. Performance of layer can be improved by lowering down the high environmental temperature (Table 1) (Bell and Adams, 1992;

Table 1: Production parameters of layers influenced by surface wetting

Treatments	Hen day (%)	Feed consumption	Feed efficiency/dozen	Body weight (kg)
Control	73.811 ± 4.260	0.629	1.461 ± 0.044	1.647
Once	76.384 ± 4.608	0.642	1.440 ± 0.069	1.650
Twice	80.305 ± 5.974	0.650	1.404 ± 0.078	1.683
Thrice-a-day	81.270 ± 6.195	0.660	1.393 ± 0.086	1.683

El-Boushy and Raterink, 1993; Peguri and Coon, 1993). The sprinkling of water disported the heat from body of layer to encounter the determental effects of that stress during high environmental temperature. Production was enhanced by using different cooling methods e.g. water cooled roosts, evaporation pad cooling and tunnel ventilation and by conductive cooling during high temperature periods (Muiruri and Harrison, 1991a; Li *et al*., 1992; Harrison *et al*., 1993). However, Le *et al.* (1986) recorded that temperature of 32.3°C had no significant effect on egg production of white leghorn layers.

There was significant difference in mean feed consumption per birds in groups maintained under different spraying time as compared with the control group. Non significant difference was observed in mean feed consumption between the group sprinkled once and control. Layer where water sprinkled twice and thrice consumed significantly ($p < 0.01$) more feed as compared with the control group. Thrice sprinkling group consumed 1.485, 4.833 and 6.787 percent more feed as compared with group of twice, once and control respectively. Although the layers got sprayed thrice consumed more feed but had higher egg production level than other groups. Group of layers got sprayed twice consumed 3.449 and 5.382 percent more feed as compared with those of once and control respectively. Group got sprayed once daily consumed 2.001 percent more feed as compared with control over 14 weeks of observation period.

The high ambient temperature had direct influence on the feed consumption of caged layers. The feed consumption was slightly improved accordingly when ambient temperature stress was slightly relieved by lowering of maximum day temperature. Surface wetting by water sprinkling effectively improved feed consumption and the increase in feed consumption corresponded to the number of water sprays per day. The heat stress was evidently reduced which increased the feed consumption by three times spray of water on the layers. High temperature had been reported to decrease daily feed intake (Panye, 1966; Van Kampen, 1981; Muiruri and Harrison, 1991b; Bell and Adams, 1992; Leeson and Caston 1993; Peguri and Coon, 1993), Lowering of environmental temperature by water sprinkling effectively improved feed consumption and the increase in feed consumption corresponded to the number of water sprays per day.

Feed conversion ratio per dozen egg basis was 1.461, 1.440, 1.404 and 1.393 in birds kept under control, once, twice and thrice-a-day sprinkling of water, respectively. Statistically, group sprayed with thrice-a-day was significantly most efficient in feed conversion as compared to rest of the treatments. Birds with sprinkling of water was also significantly more efficient in feed conversion than those of once and control. Once sprinkling treatment had non-significant difference in feed conversion ratio in comparison to control.

It was observed that thrice-a-day sprinkling of water group was 0.89, 3.374 and 4.881 percent more efficient in feed conversion ratio as compared with those of twice, once and control, respectively. Group with twice was 2.564, 4.059 percent more efficient as compared with groups of once and control. Group with once sprayed was 1.458 percent more efficient in feed conversion than control group over the experimental period of 14 weeks.

It was observed that comparative feed conversion ratio was directly influenced by surface wetting of layers. It was further observed that feed conversion ratio was improved depending upon number of sprays of water on the body of layer during stressful summer days. The heat stress was evidently better dissipated and feed conversion ratio was comparatively improved by spraying water 3 times a day. Two times spraying of water a day was still better than spraying of water once a day only. Once time spraying of water daily was visibly better than control group where the feed conversion ratio was found to be least efficient. It was concluded that increased number of water spraying per day had better and salutary effect on the performance of layers during summer.

Comparative feed conversion ratio (FCR) had a direct influence by surface wetting of layers and feed conversion ratio was improved by the number of water sprays per day. Similarly Le *et al*. (1986) also found low FCR at high environmental temperature. Cooled roosts also improved the feed efficiency in hens (Muiruri and Harrison, 1991b). However, laying hens when kept under natural summer conditions and co-related with temperature above 35°C and high relative humidity, showed that feed efficiency was excellent in heat stressed hens because of decline in feed intake but less reduction in egg production (Panye, 1966; Daniel and Balnave, 1981; Smith *et al*., 1983).

There was non-significant difference in initial and final body weights of layers in all groups. Group with once sprinkling has 2.00 percent lower final body wight than group with twice and thrice. However group with twice was almost similar to group with thrice. It was observed that surface wetting of layers had no effect on the final live weight under high temperature summer conditions while it was indicated in some other studies that high temperature had significantly lowered the body weight of layers (Le *et al*., 1986; Herburt *et al*., 1992; Leeson and Caston, 1993).

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