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Short Communication:
Production performance of hubbard broilers with different floor spaces under hot climatic conditions of pakistan

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Abstract

The experiment was conducted to investigate the effect of four stocking densities on the production performance i.e. Weight Gain, Feed Consumption, Feed Conversion ratio (FCR) and Mortality of Hubbard broilers chicks. Four of the stocking density treatments; 10birds/m², 12birds/m², 9birds/m² and 8birds/m² were provided to the four groups A, B, C and D, respectively. The experiment was conducted for 2 to 6 week of age of the birds (7 days adaptation period and 35 days experimental period). Water and feed were provided ad libitum. Twenty three hours light was provided. When the data calculated for weight gain, feed intake, and feed conversion ratio was analyzed statistically; the difference between the stocking density treatments was found to be non-significant. Mortality for the four groups A, B, C and D was recorded as 6.67, 10.00, 3.33 and 0.00 percent, respectively. However, the birds those were highly stocked showed the highest mortality in the study.

Key words: Broiler Production, Performance, Stocking Density, Hot Climate

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Introduction

In broiler production housing and managemental conditions are critical factors in maintenance of good production and control of diseases. Stocking density plays an important role in broiler production. Poultry industry always opts for higher density stocking because increasing space allowances in production systems can have a major negative economic effect on industry as revenue per unit of space is increased linearly with density (Petek et al., 2010). Provision of floor space may be one of these critical factors. In less floor space situation, air flow at the level of the bird is often reduced, resulting in reduced dissipation of body heat to the air. The overall effect on broiler chickens of reducing floor space can be resulted in reduced growth rate, feed efficiency and livability, and in some cases, carcass quality as well (Puron et al., 1995).

Stocking densities vary considerably with various countries and husbandry systems as it is considered top priority in animal welfare and affects birds' performance (Buijs et al., 2009). Although there is a clear positive correlation between stocking density and economic return (Buijs et al., 2009; Petek et al., 2010), but studies have shown that provision of less floor space or higher stocking densities compromise the welfare of animals involved. With the increase in stocking density, the metabolic waste and heat production increase with the increase in housing temperature increase above 30°C (Meluzzi & Sirri, 2009). In Pakistan without considering the season, usually one square foot floor space per bird is provided when broilers are kept on litter. This much space is provided to avoid over dampness of the litter, which can be detrimental to the growing broilers. Assuming no change in performance, higher stocking density results in higher profitability per kilogram of chicken produced (Feddes et al., 2002) but more mortality and reduction in broiler growth performance due to high environmental or ambient temperature has been well documented and elaborated especially at later growth period. Higher stocking density reduces the cost of production e.g. fixed cost and produces more meat or kilograms of broilers per unit area. Thus up to a critical point, profitability increases with increased stocking density (Lallo et al., 2012).

Broilers can perform well only if balanced ration is provided in excellent managemental conditions. Stocking density is one of the managemental conditions which play a vital role in the productive performance of broilers. If proper floor space is not available to the birds, it may cause stress (Buijs et al., 2011). As stocking density will affect the physiology of the bird which may ultimately influence the performance of the bird so an optimum stocking density will maximize profitability. Therefore, this study was planned to investigate the effect of different stocking densities on the production performance of Hubbard broilers under high temperature environmental conditions of Pakistan in open sided naturally ventilated house.

Materials and Methods

The experiment was conducted during April-May, in duration of six week at the Poultry Research Centre (PRC), University of Agriculture Faisalabad, Pakistan. One hundred eighty day-old Hubbard broiler chicks were purchased from a commercial hatchery (SB Chicks) and reared in a group for one week as adaptation period. At 8th day, 120 birds of medium weight were selected and divided into 12 experimental units or replicates (10 chicks per replicate). These replicates were allotted to four treatments A (control), B, C and D. Each treatment was having three replicates. Each replicate (consisting of 10 birds) of A (control), B, C and D was provided with 10 birds/m², 12 birds/m², 9 birds/m² and 8 birds/m² stocking density, respectively.

All the birds were fed *ad libitum* with same commercial broiler starter ration (Ani Feeds Pvt. Ltd. Pakistan) for first four weeks of age and then the birds were fed *ad libitum* with same commercial broiler finisher ration (Ani Feeds Pvt. Ltd. Pakistan) upto 6 week of age. Vaccination schedule was followed for Newcastle Disease (ND) and Infectious Bursal Disease (IBD). For prevention of Coccidiosis, Coxidar liquid (Barrett Hodgson Pakistan, Pvt., Ltd.), was given to the chicks @ 3ml per litre of drinking water. To reduce the stress on the birds, water soluble vitamins (A, D, E and K) were also given to the birds through the drinking water. The observations were made from day 8 to 6 week of age on the live performance parameters; weight gain, feed consumption, feed conversion ratio and mortality.

Statistical Analysis

The data collected for weight gain, feed consumption and feed conversion ratio in the research trial was analyzed by the analysis of variance (ANOVA) technique in Completely Randomized Design (CRD). The difference in the means was compared by the Least Significant Difference (LSD) while data for mortality was analyzed by Chi Square Test.

Results

Production Performance

Weight Gain

The data regarding weight gain was calculated at the end of the experiment (6 weeks of age). Total weight gain per bird (2-6 weeks) of groups A, B, C and D was recorded as 1851.337, 1823.556, 1745.777 and 1834.663 grams, respectively (Table 1). The highest weight gain per bird was in group A. The lowest weight gain was recorded for the group C. When the data was subjected to analysis of variance (ANOVA) under Completely Randomized Design (CRD), non-significant difference was observed between the treatments.

Table 1. Effect of Stocking Density on Weight Gain, Feed Consumption, FCR and Mortality

Description	Treatments			
	A	B	C	D
Initial body Weight (g)	82.000	82.001	81.999	82.000
Final body Weight (g)	1933.337	1905.557	1827.777	1916.663
Weight gain (g)	1851.337	1823.556	1745.778	1834.663
Feed consumption (g)	3987.333	4098.667	4081.333	4123.667
Feed Conversion Ratio (FCR)	2.154	2.248	2.338	2.248
Mortality (%)	6.667	10.000	3.333	0.000

Feed Consumption

The average feed consumption per bird (2-6 weeks) was 3987.333, 4098.667, 4081.333 and 4123.667 grams for the groups A, B, C and D, respectively (Table 1). When the data was subjected to the statistical analysis, the results were found non-significant.

Feed Conversion Ratio (FCR)

Feed Conversion Ratio (FCR) per the bird (2-6 weeks) was 2.154, 2.248, 2.338 and 2.248 for the group A, B, C and D, respectively (Table 1). When the data was subjected to the statistical analysis, the results were found to be non-significant.

Mortality

The average mortality percentage (2-6 week) for the groups A, B, C and D was 6.667, 10.00, 3.333 and 0.000 %, respectively. The mortality percentage was highest for the group B and lowest for the group D.

Discussion

The results were in agreement with the results of Tong et al. (2012) who observed non-significant effect of stocking density on the weight gain but they reported that there was a tendency of reduced growth at higher stocking density. In the present study, increase or decrease in weight gain for the birds kept at four different stocking densities was not in a regular pattern. The weight gains for the birds of groups A, B and D were almost identical, it means that treatments of stocking densities were not affected by high environmental temperature because of high ventilation rate used and air movement at the level of birds (Feddes et al., 2002).

Feed consumption was almost identical for the groups B and C whereas group D consumed more feed than the birds of group B. In group D, some birds may have to travel farther to access a feeder and therefore they have used more feed to maintain themselves and for production as well. Feed consumption may be negatively affected by increased stocking density (Feddes et al., 2002). Feed intake was not decreased in a linear method as birds' stocking density was increased form 8 birds/m² to 12birds/m² in this study.

The results were in line with Feddes et al. (2002) who reported non-significant results for feed conversion ratio for the broiler chicks under different stocking densities. In this study, the poorest feed

conversion ratio (FCR) was for the group C but not affected significantly by the stocking density treatments. In the control group A the average feed conversion ratio (FCR) was 2.15, which was the best in the four treatments of floor space. The FCR for both of the groups B and D was same (2.25). However, the effect of floor space on FCR was found to be non-significant.

The birds died during the experimental period were diagnosed for the cause of mortality. They showed the signs of heat stroke and Sudden Death Syndrome (SDS). The results for mortality in this study were similar to the findings of Sekeroglu et al. (2011), Buijs et al. (2009) and Feddes et al. (2002) who reported that stocking density had no significant effect on mortality. However, the results in this study were much similar to the findings of Imaeda (2000) who reported that the mortality was increased during the summer season. He explained that it seems that the higher incidence of Sudden Death Syndrome (SDS) contributes to a significant increase in the total mortality in summer, as number of SDS deaths expressed as a percentage of total number of deaths increased by 10%. Heat stress mortality showed an increasing trend with increasing density and the same case could be happened here in this study as birds were found dead due to heat stroke and it could be due to low air flow at the birds' level at high stocking density (Feddes et al., 2002).

Conclusion

The present study showed non significant difference between the four treatments of stocking density or floor space provisions i.e. weight gain, feed consumption, feed conversion ratio (FCR) and mortality were found to be having non significant difference between the four treatments of stocking densities. Hence it can be concluded that if there is no effect of stocking density on the live performance of broiler chicks then they can be stocked at maximum density (12birds/m²) without any detrimental effect on the live production performance keeping the weather conditions in mind of a certain region in general and specifically of Pakistan where the weather temperature is increased up to 45ºC and this high environmental temperature may cause high mortality when the birds would be highly stocked. The above study demonstrates that reducing stocking density on broiler farms will significantly improve broiler welfare. However, because stocking density is so critical in maintaining economic viability, further research should be conducted to find an optimal stocking density at which suitable levels of broiler welfare and economic returns are achieved.

Conflict of Interest

The author(s) of this manuscript solemnly declare that there is no any type of conflict of interest.

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