# Growth and Haematological alterations in Broiler Chicken during Overcrowding Stress

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Abstract

Overcrowding of broiler chicks due to less space induced harmful effects which act as predisposing factor in reduction of production and performance in poultry. Supplementation of antistressor products can ameliorate adverse effect of various stressors in poultry. An experiment was designed by inducing overcrowding stress and its management by supplementation of polyherbal antistressor, adaptogenic and immunomodulator formulation Stresroak in broiler chicken. One hundred and fifty day old broiler chicks were randomly divided into five groups of 30 chicks each. Groups I, II and III served as control and were offered with basal diet only. Group I served as control with normal space. The chicks in groups II and III (positive control) were provided space 25% and 50% lesser than normal, respectively. The bird in therapeutic group IV and V were provided 25% and 50% less space along with antistressor Stresroak @1g/1kg of feed, respectively. Growth and performance related parameters like feed consumption, body weight, feed conversion ration (FCR) were evaluated in addition to haematological parameters. Polyherbal formulation not only improved growth and performance in birds, but also normalized the haematological parameters. It was concluded that Stresroak exhibits antistressor and adaptogenic activity to ameliorate the overcrowding stress in poultry.

**Keywords**: stressors, overcrowding, haemoconcentration, polyherbal.

## Introduction

Stress evokes harmful responses that interferes with the general health, productivity and result in immunosuppression (Saxena and Madan, 1997). Anything which disrupts physiological and psychological stability of chicken is the stressor and reaction of stressor is termed as stress (Pande, 2002). Most of today's problems in poultry are caused by combinations of factors such as management, stress, nutrition, overcrowding, poor ventilation, high intensity of light, immunosuppression and exposure to disease agents. Stress is an important cause of reduced performance and increased susceptibility to disease (Isohe and Lillehoj, 1992). Broilers are subjected to frequent stress factors and therefore, it is important to have an effective management program to minimize their effects on the performance and health of the birds (Rosales, 1994). Among the entire stress factors, overcrowding is important common stressor in poultry, which ultimately results in poor production and growth. Overcrowding also increases the exposure to disease causing organism (Scahawat, 2000). With increased environmental temperatures and overcrowding stress, feed utilization efficiency is decreased (Suk and Washburn, 1995). For ameliorating the adverse effects of different managemental stress conditions, use of prebiotics and probiotics was reported by Ghareeb et al. (2008). Polyherbal formulation Stresroak (M/s Ayurvet Ltd. Baddi, India) is scientifically proven to be adaptogenic, immunomodulatory, free radical scavenging and antioxidant rejuvenating actions (Shukla and Srivastava, 1999). Present experiment was designed to study the efficacy of polyherbal product in counteracting overcrowding stress in commercial broiler chicken.

## Materials and Methods

A study was conducted at Instructional poultry farm, Department of Veterinary Pathology, College of Veterinary and Animal Sciences, Parbhani, Maharashtra (India). Healthy day old Vencob 150 broiler chicks of either sex were randomly divided into five groups of three replicates each and each group comprising of 30 chicks, 10 in each replicate. Day old chicks were maintained for 6 weeks under standard

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Table-1. Mean (±SE) weekly body weight of boiler chicks before and after treatment of overcrowding stress at different interval

| Parameters | Weeks | Experimental groups | | | | |
|---|---|---|---|---|---|---|
| | | I | II | III | IV | V |
| Body weight (g) | I | 102a ±1-05 | 94b+0.6 | 86c+1.70 | 98 a ±0.56 | 89 a±1.28 |
| | II | 263 a +3.88 | 250 b ±3-02 | 237 c±1.01 | 255 a ±3.94 | 243b ±1.94 |
| | III | 703a +3.89 | 683 b ±2.85 | 669 b ±3.85 | 689a ±2.76 | 675b ± 3.05 |
| | IV | 1113a +5.60 | 1076b ±10.75 | 1051b ±9.87 | 1094a ±4.00 | 1068b ±9.58 |
| | V | 1426a ±10.75 | 1390b ±5.29 | 1370b±5.29 | 1405a +7.33 | 1383b ±5.63 |
| | VI | 1873a + 6.10 | 1808b ±7.99 | 1750c ±8.85 | 1836d ±8.42 | 1781e ±5.99 |

a, b, c, d, e means bearing different superscripts within a column differ significantly (P <0.01)

managemental conditions and were vaccinated against Ranikhet disease (RD) and Infectious Bursal Disease (IBD). Groups I, II and III served as control and offered with basal diet only. Group I served as negative control and provided with normal space one square feet per bird (sq. ft./bird). Chicks of group II, III, IV and V were induced with overcrowding stress by providing lesser space throughout the experiment. Group II & IV provided with 25% less space than normal and group III & V were provided with 50% less space than normal, respectively. Groups II and III served as positive control and were not given any antistressor while group IV and V were supplemented with Stresroak @1g/1kg feed from 0-42 days. The constituent herbs of polyherbal formulation Stresroak, namely Phyllanthus emblica, Withania somnifera, Magnifera indica, Ocimum sanctum and many more are scientifically proved for their antistressor, immunomodulator, adaptogenic and performance enhancing property (Oyagbemi et al. 2008). Weekly recording of growth and performance parameters was done to record weekly body weight, feed consumption and feed conversion ratio (FCR). Haematological parameters were estimated on day 15th, 30th and 42nd of experiment. Haemoglobin (Hb), Total leukocytic count (TLC) and Differential leukocytic count (DLC) were estimated by the method described by Dacie et al. (1969). Statistical analysis of data was done by using complete randomized design as per the method given by Snedecor and Cochran, (1994).

## Results and Discussion

**Growth and Performance Parameter:** The average body weight of control birds provided with normal space (Group I) after 6th week was (1873 ± 6.10g). In group II (25% less space) was (1808 ±7.99 g) significantly (p <0.01) lower than group IV (Stresroak + 25 % less space). Group III (50% less space) showed significant (p < 0.01) decrease in body weight (1750 ± 8.85g) as compared to group V (50% less space + Stresroak), (1781 ± 5.99g), (Table I). Similar results were reported by (Rizk et al. 2003; and Thomas, et al. 2004). Singh and Sharma, (2003) reported depression in body weight in birds exposed to overcrowding at 0.75 sq.ft. per bird and 0.50 sq.ft. per bird. The adverse effect of overcrowding stress resulted into poor growth, performance and FCR of broilers. Singh and Sharma, (2003) and Rizk et al. (2003) revealed that overcrowding results in poor FCR. The birds of therapeutic groups V (50% less space + Stresroak) showed better FCR 1.45 as compared to positive control group III (50% less space) 1.68 (Table I). Rajmane and Sonawane, (1997) observed that supplementation of Stresroak in stress conditions, help in improving body weight gain and FCR.

**Haematological Parameters:** Elevation in Hb level was evident in the untreated group II (25% less space) and Group III (50% less space) due to overcrowding stress (Table II). Haemoconcentration in overcrowding stress is result of less supply of oxygen to birds resulting in hypoxia, which is a stimulus for erythropoietin secretion and leads to erythropoiesis in stressed birds (Group II and III). The values of Hb concentration of group IV and V (Therapeutic groups) on day 15th and 30th were significantly (p<0.01) reduced in comparision to group II (0.75 sq. ft/bird) and group III (0.5 sq. ft/bird). Present findings were corroborated with findings Bedanova, (2006), who observed that overcrowding elevates Hb concentration in the stress. The mean values of TLC and DLC in birds of group III (0.5 sq. ft/bird) were significantly (p<0.01) reduced when compared with other groups (Table II & III). Also, the values of TLC and DLC of lymphocytes, monocytes, heterophils and eosinophils in group III were significantly (p<0.01) decreased at different intervals when compared to negative control (group I). Similar findings were noticed by Saxena and Madan, (1997) and Rizk et al. (2003), according to whom, overcrowding results in leucocytopenia, eosinopenia and lowers the monocyte and heterophil counts in broiler birds. The evidence of reduction in TLC was concomitant with Rosales et al. (1994); Saxena and Madan, (1997) and Rizk et al. (2003). However,

Table-2. Mean (±SE) Haematological values of Hb (g/dl) and TLC (103/cmm) before and after treatment of overcrowding stress at different intervals in broiler chicken

| Parameters | Experimental group | Treatment interval | | |
|---|---|---|---|---|
| | | 15th day | 30lh day | 42nd day |
| Haemoglobin (g/dl) | I | 9.56 a +0.26 | 9.30a±0.13 | 10.56a ±0.88 |
| | II | 9.05 a + 0.77 | 8.76 a + 0.20 | 10.90a±0.48 |
| | III | 11.86b +0.29 | 10.8b ±0.22 | 11.36a±0.49 |
| | IV | 9.96a±0.56 | 10.1 b +0.54 | 10.76a+0.67 |
| | V | 9.56 a±0.40 | 9.46 a ±0.33 | 10.63a±0.40 |
| Total leukocyte count (TLC)(103/cmm) | I | 37.00 a ±1.55 | 46.33a 02.38 | 44.00 a±3.60 |
| | II | 30.00 b + 1.05 | 35.50a±3.06 | 39.00 a±3.56 |
| | III | 20.66c ± 2.30 | 32.00 b ±2.51 | 35.50 b±3.06 |
| | IV | 35.66 a ±1.28 | 43.66 a ±0.87 | 39.66 a + 1.10 |
| | V | 30.66b +1.15 | 40.66 a +0.65 | 42.66a±1.47 |

supplementation of polyherbal formulation Stresroak@1g per kg of feed to birds under overcrowding stress has lead to normalization of haematological (Hb, TLC and DLC) values in therapeutic group IV and V at different intervals of study.

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Table-3. Mean (± SE) values differential leukocyte count of broiler chicken before and after treatment of overcrowding stress at different intervals of study

| Interval (day) | DLC (%) | Experimental groups | | | | |
|---|---|---|---|---|---|---|
| | | I | II | III | IV | V |
| 15th day | Lymphocyte | 83.50a ±1.26 | 73.16b ±1.97 | 70.50b ±1.10 | 77.16c ±0.68 | 82.16a ±0.79 |
| | Heterophil | 14.50a ±2.43 | 14.00a ±0.94 | 6.33b±1.97 | 11.33a±2-39 | 12.66a ±2.95 |
| | Monocyte | 8.16a ±1.21 | 7.33a±0.96 | 6.50a ±0.31 | 7.33a ±0.65 | 7.66a ±1.24 |
| | Eosinophil | 7.66a ±1.24 | 3.33b ±1-05 | 2.33b ±0.69 | 4.16a ±0.36 | 4.00a±0.33 |
| 30th day | Lymphocyte | 85.50a ±1.70 | 77.50b±1.79 | 74.16"±2.47 | 79.83D ±0.86 | 78.33b ±0.96 |
| | Heterophil | 14.16a±2.83 | 11.50a ±1-26 | 6.16b ±0.28 | 13.16a ±0.36 | 12.16 a±0.86 |
| | Monocyte | 8.16 a±1.21 | 6.16a ±0.83 | 3.50c ±0.39 | 5.33a±1.07 | 6.16a ±0.28 |
| | Eosinophil | 6.33 a±1.65 | 5.16a±0.43 | 3.16b ±0.28 | 4.00 a ±0.81 | 4.33a±0.51 |
| 42nd Day | Lymphocyte | 83.83 a ±1.32 | 80.83a±2.02 | 74.00b ±2.96 | 81.83a±1.32 | 79.50 a±1.37 |
| | Heterophil | 14.67a ±2.76 | 12.33a ±0.80 | 9.16a ±0.98 | 12.33a ±0.79 | 11.50a ±1-26 |
| | Monocyte | 8.66a ±1.63 | 5.66b ±0.45 | 3.83c±0.55 | 6.16b ±0.83 | 4.66D ± 0.56 |
| | Eosinophil | 5.66a ±0.51 | 4.33a ±0.51 | 3.66a ±0.69 | 4.66a ±0.38 | 4.33a ±0.61 |