

## **“Effect of Stocking Density and Light Intensity on Growth Performance of Caged Broilers.”**

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**Abstract:** An experiment was conducted on 81 'day-old' broiler chicks to find out the effect of stocking density and light intensity on growth performance of caged broilers. All broiler chicks were kept into cages and managed under similar managemental conditions. Chicks were randomly divided into nine groups as treatments. viz. T<sub>1</sub> (2 Broiler chicks kept under 15 watt light intensity, T<sub>2</sub> (2 Broiler chicks kept under 25 watt light intensity, T<sub>3</sub> (2 Broiler chicks kept under 40 watt light intensity, T<sub>4</sub> (3 Broiler chicks kept under 15 watt light intensity, T<sub>5</sub> (3 Broiler chicks kept under 25 watt light intensity, T<sub>6</sub> (3 broiler chicks kept under 40 watt light intensity, T<sub>7</sub> (4 broiler chicks kept under 15 watt light intensity T<sub>8</sub> (4 broiler chicks kept under 25 watt light intensity and T<sub>9</sub> (4 broiler chicks kept under 40 watt light intensity) and the chicks of each treatment were further divided into three sub-groups to serve as replicates. All chicks in cage were provided similar standard ration as per NRC (1994). The data on body weight, and gain in weight of broiler chicks were recorded, tabulated and statistically analyzed as per Snedecar and Cochran (1994). Among different treatments T<sub>8</sub> was found significantly effective to obtain higher mean weekly body weight and mean weekly gain in weight of broiler chicks.

**Key Words:** Broiler chicks, Stocking density and light intensity, growth performance.

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### **I. Introduction**

The Indian poultry sector with 7.3% growth in poultry production has witnessed the faster growth of about 6% in eggs and 10% in meat production over the last decades among all animal based sectors. The high growth has placed India at fifth position after U.S.A., China, Brazzil and Maxico with a production of 2.6 million matric tons chickens meat during 2009-10. Value of output received from poultry meat as per the data of National Account Statistics 2011, CSO, GOI for 2009-10 was Rs. 24756 crores. Indian Broiler production growth is estimated at 10 per cent per year, with broiler production reaching a record of 3.2 million tons in 2012.

The broiler farming in India occupies an importance position due to its enormous potential to bring about rapid economic growth, particularly benefiting he weaker section due to its low investment requirement and less market ago. Poultry is today the major source of meat in India. Its share in total meat consumption is 28% as against 14% a decade ago. High mutton prices, religious restrictions for beef and pork and the limited availability of fish outside coastal regions have helped to make poultry meat the most preferred and consumed meat in India.

Stocking density is considered as one of the most important environmental factors because of its established effect on growth of broiler chickens. The effect of stocking density in broilers production has a wide range of extreme complexity as many researches have clearly indicated negative effect of high stocking density on production performance; parameters of quality, broiler health and welfare. Stocking density is a concept of interest to the modern poultry owners: It implies how densely birds can be kept together without affecting their production potentials.

Lighting plays a large role in poultry production and bird performance. It is possible to reduce energy costs by making small changes to the lighting on daily operation. A well designed energy efficient lighting intensity system can mean better lighting levels, lower energy costs and better performance of broiler chicks. Light intensity has an effect on cannibalism and aggression along with feed and water intake. Light as an environmental factor can affect the physical activity of broiler chickens (Lewis and Morris, 1998).

### **II. Materials And Methods**

Eighty one (81) day old-chicks (DOC) of same hatch were procured and reared in battery type cages of Small Animals Laboratory of Sundaesan School of Animal Husbandry and Dairying, SHIATS. The chicks were weighed, by banded and distributed randomly into nine groups as treatments viz. T<sub>1</sub> (2 Broiler chicks kept under 15 watt light intensity, T<sub>2</sub> (2 Broiler chicks kept under 25 watt light intensity, T<sub>3</sub> (2 Broiler chicks kept under 40 watt

light intensity, T<sub>4</sub> (3 Broiler chicks kept under 15 watt light intensity, T<sub>5</sub> (3 Broiler chicks kept under 25 watt light intensity, T<sub>6</sub> (3 broiler chicks kept under 40 watt light intensity, T<sub>7</sub> (4 broiler chicks kept under 15 watt light intensity, T<sub>8</sub> (4 broiler chicks kept under 25 watt light intensity and T<sub>9</sub> (4 broiler chicks kept under 40 watt light intensity) The Chicks of each treatment were further divided into three sub-groups to serve as replicates Self prepared, standard starter ration up to three weeks of age and then broiler finisher ration up to fifth weeks as per BIS(1992), specification for energy and protein were fed.

All chicks in cages were provided similar ration. Clean and safe water was made available at all time. The data on body weight, feed consumption and gain in weight of broiler chicks were recorded, tabulated and statistically analyzed using analysis of variance technique as per Snedecar and Cochran, (1994).

### **III. Results And Discussion**

The mean values of weekly body weight and gain in weight of broiler chicks under different treatments of stocking density and light intensity are summarized in table 1 and Table 2. The mean body weight of DOC in different treatments of stocking density and light intensity viz. T<sub>1</sub> to T<sub>9</sub> was 40.00, 41.33, 41.00, 43.33, 44.00, 43.33, 40.00, 41.33 and 42.33g., respectively. The differences in mean body weight of the DOC were found non-significant indicating random and unbiased distribution of chicks in cages. The mean body weight of one week old broiler chicks in different treatments viz. T<sub>1</sub> to T<sub>9</sub> was 132.00, 131.67, 139.33, 143.67, 130.67, 143.00, 140.67, 140.67 and 133.33 g., respectively and the differences in mean body weight of the chicks at one week age were found non-significant.

The mean body weight of two week old broiler chicks in different treatments viz. T<sub>1</sub> to T<sub>9</sub> was 314.33, 325.00, 348.00, 375.00, 288.33, 326.67, 346.67, 361.00 and 270.33g., respectively. The differences in mean body weight of the chicks at two week age were found significant. However differences among T<sub>1</sub>, T<sub>5</sub> and T<sub>9</sub> were found non-significant being at par. Similarly values of T<sub>4</sub>, T<sub>8</sub>, T<sub>3</sub>, T<sub>7</sub>, T<sub>6</sub> and T<sub>2</sub> also did not show significant differences being at par.

The mean body weight at third week age of broiler chicks in different treatments viz. T<sub>1</sub> to T<sub>9</sub> was 576.33, 606.00, 633.00, 885.33, 644.33, 676.33, 650.67, 806.00 and 562.00 g., respectively. The differences in mean body weight of the broiler at third weeks of age in T<sub>8</sub>, T<sub>4</sub> and T<sub>6</sub> were found significantly effective to obtain higher body weight. However differences among T<sub>7</sub>, T<sub>5</sub>, T<sub>3</sub>, T<sub>2</sub>, T<sub>1</sub> and T<sub>9</sub> were found non-significant being at par. Similarly values of T<sub>6</sub> did not show significant differences being at par.

The mean body weight at fourth week age of broiler chicks in different treatments viz. T<sub>1</sub> to T<sub>9</sub> was 855.67, 962.33, 1002.67, 1207.33, 983.67, 1053.33, 1007.67, 1185.00 and 969.67g., respectively. The differences in mean body weight of the broiler at fourth weeks of age in T<sub>4</sub>, T<sub>8</sub> and T<sub>6</sub> were found significant. However differences among T<sub>7</sub>, T<sub>3</sub>, T<sub>5</sub>, T<sub>9</sub>, T<sub>2</sub> and T<sub>1</sub> were found non-significant being at par.

The mean body weight at fifth week age of broiler chicks in different treatments viz. T<sub>1</sub> to T<sub>9</sub> was 1232.67, 1345.33, 1398.00, 1659.00, 1436.00, 1488.00, 1441.00, 1817.67 and 1434.67g., respectively. The differences in mean body weight of broilers at fifth weeks of age in T<sub>8</sub> and T<sub>4</sub> were found significant. However differences among T<sub>2</sub> and T<sub>1</sub> and also between T<sub>6</sub>, T<sub>7</sub>, T<sub>5</sub>, T<sub>9</sub> and T<sub>3</sub> were found non-significant being at par.

The mean weekly body weight of broilers in T<sub>1</sub> to T<sub>9</sub> was 622.20, 674.07, 834.07, 696.60, 737.47, 717.34, 862.07 and 674.00g, respectively and the differences among these treatments were found significant T<sub>8</sub> followed by T<sub>4</sub> registered significantly higher mean weekly body weight of broilers compared to remaining treatments. However differences among T<sub>3</sub>, T<sub>5</sub>, T<sub>2</sub>, T<sub>9</sub> and T<sub>1</sub> and also between T<sub>6</sub> and T<sub>7</sub> were found non-significant being at par.

The mean gain in weight at one week age of chicks in different treatments viz. T<sub>1</sub> to T<sub>9</sub> was 92.00, 90.33, 98.33, 100.33, 86.67, 99.67, 100.67, 99.33 and 91.00g., respectively and the differences in mean gain in weight of the broilers of one week age were found non-significant.

The mean gain in weight at two week age of broiler chicks in different treatments viz. T<sub>1</sub> to T<sub>9</sub> was 182.33, 193.33, 208.67, 231.33, 157.67, 183.67, 206.00, 220.33 and 137.00g., respectively. The differences in mean gain in weight of the broilers of two weeks of age were found significant. However differences among T<sub>5</sub>, T<sub>9</sub> and also between T<sub>8</sub>, T<sub>3</sub>, T<sub>7</sub>, T<sub>2</sub>, T<sub>6</sub>, T<sub>1</sub> were found non-significant being at par.

The mean gain in weight at third week age of broiler chicks in different treatments viz. T<sub>1</sub> to T<sub>9</sub> was 262.00, 281.00, 285.00, 410.33, 356.00, 349.67, 304.00, 445.00 and 291.67g., respectively. The differences in mean gain in weight of the broilers at third week of age in were found significant. However differences among T<sub>7</sub>, T<sub>9</sub>, T<sub>3</sub>, T<sub>2</sub>, T<sub>1</sub> and also between T<sub>4</sub>, T<sub>5</sub>, T<sub>6</sub> were found non significant.

The mean gain in weight at fourth week age of broiler chicks in different treatments viz. T<sub>1</sub> to T<sub>9</sub> was 279.33, 356.33, 369.67, 422.00, 339.33, 377.00, 357.00, 379.00 and 407.00g, respectively. The differences in mean

gain in weight of the broiler chicks at fourth weeks of age were found significant. However differences among T<sub>5</sub> and T<sub>1</sub> were found non-significant being at par. Similarly values of T<sub>4</sub>, T<sub>9</sub>, T<sub>8</sub>, T<sub>6</sub>, T<sub>3</sub>, T<sub>7</sub> and T<sub>2</sub> also did not show significant difference being at par.

The mean gain in weight at fifth week age of broiler chicks in different treatments viz. T<sub>1</sub> to T<sub>9</sub> was 377.00, 383.00, 395.33, 351.67, 419.33, 434.67, 433.33, 632.67, and 465.00g., respectively. The differences in mean gain in weight of the broiler at fifth week of age in T<sub>8</sub>, T<sub>9</sub> and T<sub>4</sub> were found significantly effective to obtain higher gain in weight. However differences among T<sub>6</sub>, T<sub>7</sub>, T<sub>5</sub>, T<sub>3</sub>, T<sub>2</sub> and T<sub>1</sub> were found non-significant being at par.

The mean weekly gain in weight of broiler in T<sub>1</sub> to T<sub>9</sub> was 238.53, 260.80, 271.40, 323.13, 271.80, 288.94, 280.20, 355.27 and 278.47g, respectively and the differences among these treatments were found significant from this parameter again T<sub>8</sub> followed by T<sub>4</sub> registered significantly higher values of mean weekly gain in weight of broilers as ibid earlier. However differences among T<sub>6</sub>, T<sub>7</sub>, T<sub>9</sub>, T<sub>5</sub>, T<sub>3</sub>, T<sub>2</sub> and T<sub>1</sub> were found non-significant being at par.

**Table 1 : Means values of various parameters under different treatments of the experiment.**

Parameters	Treatments									Results
	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>	T <sub>6</sub>	T <sub>7</sub>	T <sub>8</sub>	T <sub>9</sub>	
Body weight of DOC (g)	40.00 <sup>ab*</sup>	41.33 <sup>a</sup>	41.00 <sup>a</sup>	43.33 <sup>a</sup>	44.00 <sup>ab*</sup>	43.33 <sup>a</sup>	40.00 <sup>ab*</sup>	41.33 <sup>a</sup>	42.33 <sup>a</sup>	NS
Mean weekly body weight of broiler chicks (g)	622.20 <sup>ab*</sup>	674.07 <sup>c</sup>	704.20 <sup>c</sup>	834.07 <sup>a</sup>	696.60 <sup>c</sup>	737.47 <sup>b</sup>	717.34 <sup>b</sup>	862.07 <sup>ab*</sup>	674.00 <sup>c</sup>	S
Mean weekly gain in weight of broiler chicks (g)	238.53 <sup>ab*</sup>	260.80 <sup>b</sup>	271.40 <sup>b</sup>	323.13 <sup>a</sup>	271.80 <sup>b</sup>	288.94 <sup>b</sup>	280.20 <sup>b</sup>	355.27 <sup>ab*</sup>	278.47 <sup>b</sup>	S

\* = Highest

\*\*=Lowest

Note : Figures with similar alphabets show non-significant difference between the values within the parameter.

Week-wise mean values of body weight (g) and gain in weight (g) of broiler chicks reared under different treatments of stocking density and light intensity.

**Table 2: Week-wise mean values of body weight (g) and gain in weight (g) of boiler chicks reared under different treatments of stocking density and light intensity.**

Treatment s	Body weight ofDOC (g)	Mean weekly body wt. of broiler chicks (g)					Mean weekly gain in wt. of broiler chicks (g)				
		1 week age	2 week age	3 week age	4 week age	5 week age	1 week age	2 week age	3 week age	4 week age	5 week age
T <sub>1</sub>	40.00 <sup>ab*</sup>	132.00 <sup>a</sup>	314.33 <sup>b</sup>	576.33 <sup>bc*</sup>	853.67 <sup>ab*</sup>	1232.67 <sup>bc*</sup>	92.00 <sup>a</sup>	132.33 <sup>b</sup>	262.00 <sup>ab*</sup>	279.33 <sup>bc*</sup>	377.00 <sup>bc*</sup>
T <sub>2</sub>	41.33 <sup>a</sup>	131.67 <sup>a</sup>	325.00 <sup>a</sup>	606.00 <sup>c</sup>	962.33 <sup>b</sup>	1345.33 <sup>b</sup>	90.33 <sup>a</sup>	193.33 <sup>b</sup>	281.00 <sup>c</sup>	356.33 <sup>a</sup>	383.00 <sup>c</sup>
T <sub>3</sub>	41.00 <sup>a</sup>	139.33 <sup>a</sup>	348.00 <sup>a</sup>	633.00 <sup>c</sup>	1002.67 <sup>b</sup>	1398.00 <sup>a</sup>	98.33 <sup>a</sup>	208.67 <sup>b</sup>	285.00 <sup>c</sup>	369.67 <sup>a</sup>	395.33 <sup>c</sup>
T <sub>4</sub>	43.33 <sup>a</sup>	143.67 <sup>ab*</sup>	375.00 <sup>a</sup>	785.33 <sup>a</sup>	1207.33 <sup>c</sup>	1659.00 <sup>c</sup>	100.33 <sup>a</sup>	231.33 <sup>d</sup>	410.33 <sup>b</sup>	422.00 <sup>ab*</sup>	451.67 <sup>b</sup>
T <sub>5</sub>	44.00 <sup>ab*</sup>	130.67 <sup>ab*</sup>	288.33 <sup>b</sup>	644.33 <sup>c</sup>	983.67 <sup>b</sup>	1436.00 <sup>a</sup>	86.67 <sup>ab*</sup>	157.67 <sup>c</sup>	356.00 <sup>b</sup>	339.33 <sup>b</sup>	419.33 <sup>c</sup>
T <sub>6</sub>	43.33 <sup>a</sup>	143.00 <sup>a</sup>	326.67 <sup>a</sup>	676.33 <sup>b</sup>	1053.33 <sup>c</sup>	1488.00 <sup>a</sup>	99.67 <sup>a</sup>	183.67 <sup>b</sup>	349.67 <sup>b</sup>	377.00 <sup>a</sup>	343.67 <sup>c</sup>
T <sub>7</sub>	40.00 <sup>ab*</sup>	140.67 <sup>a</sup>	346.67 <sup>a</sup>	650.67 <sup>c</sup>	1007.67 <sup>b</sup>	1441.00 <sup>a</sup>	100.67 <sup>a</sup>	206.00 <sup>b</sup>	304.00 <sup>c</sup>	357.00 <sup>a</sup>	433.33 <sup>c</sup>
T <sub>8</sub>	41.33 <sup>a</sup>	140.67 <sup>a</sup>	361.00 <sup>a</sup>	806.00 <sup>ab*</sup>	1185.00 <sup>d</sup>	1817.67 <sup>ab*</sup>	99.33 <sup>a</sup>	220.33 <sup>b</sup>	445.00 <sup>ab*</sup>	379.00 <sup>a</sup>	632.67 <sup>a</sup>
T <sub>9</sub>	48.33 <sup>a</sup>	133.33 <sup>a</sup>	270.33 <sup>bc*</sup>	562.00 <sup>c</sup>	929.67 <sup>b</sup>	1434.67 <sup>a</sup>	91.00 <sup>a</sup>	133.00 <sup>c</sup>	291.67 <sup>c</sup>	407.67 <sup>a</sup>	465.00 <sup>d</sup>

\* = Highest

\*\*=Lowest

Note : Figures with similar alphabets show non-significant difference between the values within the parameter.

Week-wise mean values of body weight (g) and gain in weight (g) of broiler chicks reared under different treatments of stocking density and light intensity.

#### IV. Conclusion

Based on results of the experiments it may be concluded that stocking density and light intensity had significant effect on body weight and gain in weight of caged broilers. Among different treatments, T<sub>8</sub> (4 Broiler chicks kept under 40 watt light intensity followed by T<sub>4</sub> (3 Broiler chicks kept under 15 watt light intensity) were found significantly effective and registered highest mean weekly body weight (g.) and mean weekly gain in weight (g.) of broiler chicks.

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