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Effect of stocking density on Hemato-biochemical parameter of Japanese quail

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Abstract

An experiment was conducted, utilising 540-day old Japanese quail chicks, for a period of 13 weeks which were subjected to three density levels groups i.e. S₁ (150 cm²/ bird), S₂ (200 cm²/ bird) and S₃ (250 cm²/ bird) each having 3 replicates (60 chicks/ replicate) to evaluate the influences of floor space on hemato-biochemical traits in Japanese quail. The hemato-biochemical traits which were recorded were Haemoglobin, Packed Cell Volume, Serum Glucose, Total Serum Protein, Serum Albumin, Serum Cholesterol, Serum Creatinine, Serum Alanine Transaminase (SGPT), Serum Aspartate Transaminase and Hetrophil-Lymphocyte Ratio. The data for all measured variables were analyzed using one way ANOVA procedure of SPSS version 20. The results revealed non-significant ($p < 0.05$) on haemato biochemical profiles of Japanese quails except serum glucose. The haematobiochemical profiles obtained in present study were well within the normal range of Japanese quail under in all floor spaces.

Keywords: Japanese quail, hemato-biochemical traits, Stocking density, Serum Glucose and non-significantly

Introduction

Poultry production is of great importance, especially in developing countries, as a prime source of animal protein supplying meat, egg and also as a source of income because of relatively low cost of keeping poultry (Demeke, 2003) [2]. Now a days, commercial quail farming is getting popularity in India. They have also fast growth, early sexual maturity, short generation interval, high rate of egg production and require less floor space and feed. Quails are ready for market at around 6 weeks of age and also it attains sexual maturity at about 6 weeks of age. The adult weight of quail is about 150 - 200 g.

Correct stocking density is essential to the success of a broiler production system by ensuring adequate room for optimal performance and profit considerations, correct stocking density also has important welfare implications. Assessing accurate stocking density, factors such as climate, housing types, ventilation systems, processing weight and welfare regulations must be taken into account. Thinning a portion of the flock is one approach to maintaining optimum bird density.

Raji *et al.* (1999) [8] observed that two weeks feed restriction did not influence the level of blood glucose and liver glycogen in both sexes of quails. However, feed restriction for four weeks duration resulted in a significant reduction in blood glucose concentration, liver glycogen content in male quails.

Materials and Methods

Experimental procedure

For the study 540-day old Japanese quail chicks, which were randomly kept in three density levels groups i.e. S₁ (150 cm²/ bird), S₂ (200 cm²/ bird) and S₃ (250 cm²/ bird) each having 3 replicates (60 chicks/ replicate) to evaluate the influences of floor space on hemato-biochemical traits in Japanese quail for a period of 13 weeks as shown in table 1.

Table 1: Treatment groups

S. No.	Treatments Groups	Treatment details	Number of birds (Japanese quail)	
1.	S ₁	S ₁ R ₁	Stocking density (150cm ² /bird)	60
		S ₁ R ₂	Stocking density (150cm ² /bird)	60
		S ₁ R ₃	Stocking density (150cm ² /bird)	60
2.	S ₂	S ₂ R ₁	Stocking density (200cm ² /bird)	60
		S ₂ R ₂	Stocking density (200cm ² /bird)	60
		S ₂ R ₃	Stocking density (200cm ² /bird)	60
3.	S ₃	S ₃ R ₁	Stocking density (250cm ² /bird)	60
		S ₃ R ₂	Stocking density (250cm ² /bird)	60
		S ₃ R ₃	Stocking density (250cm ² /bird)	60

Parameters to be studied

The following observations were recorded during the period of the experiment.

Haemato-Biochemical Parameters

At last day of trial, two birds from each replicate was randomly picked up for blood sample collection and estimation of serum biochemistry. The following haemato-biochemical parameters were estimated as per standard method.

- Haemoglobin Percent
- Packed Cell Volume
- Serum Glucose
- Total Serum Protein
- Serum Albumin
- Serum Triglycerides
- Serum Cholesterol
- Serum Creatinine
- Serum Alanine Transaminase
- Serum Aspartate Transaminase
- Hetrophil-Lymphocyte Ratio

Statistical Analysis

The experimental data were subjected to analysis of variance. Means showing significant differences were compared by Duncan's New Multiple Range Test (DNMRT) (Duncan, 1955). Statistical significance was accepted at $p < 0.05$. The results were interpreted and expressed as means \pm SEM.

Results and Discussion

The data on various parameters recorded during the present investigation had been statistically analyzed and the observed results are presented and discussed under the following headings:

The effect of different stocking density on hemato-biochemical parameter in Japanese quail were presented in Table 2 and illustrated in Fig. 1.

1. Haemoglobin and Packed cell volume (%)

The mean values of hemoglobin (%) was found in group S₁ to be 14.24, S₂ to be 14.44 and in group S₃ to be 14.52. The non significant effect ($p < 0.05$) was observed among various treatment groups.

The mean values of packed cell volume (%) was found in group S₁ to be 40.30, S₂ to be 40.01 and in group S₃ to be 39.43. The statistical analysis of data revealed the non significant ($p < 0.05$) effect of stocking density on PCV % in Japanese quail.

2. Serum Glucose (mg/dl)

The mean values of Serum Glucose (mg/dl) in group S₁ is 222.37, S₂ is 238.02 and in group S₃ is 238.27. The significant ($p < 0.05$) effect of stocking density was observed among

various treatment groups with highest value in S₃ and S₂ group as compare to S₁ group.

3. Total serum Protein (mg/dl)

The mean values of total serum protein (mg/dl) was found in group S₁ to be 5.06, S₂ group to be 4.80 and in group S₃ to be 4.52. The statistical analysis of data revealed non-significant ($p < 0.05$) effect among various treatment groups.

4. Serum Albumin (gm/dl)

The mean values of serum albumin (gm/dl) was found in group S₁ to be 3.16, S₂ group to be 3.46 and in group S₃ to be 3.58. The statistical analysis of data revealed non-significant ($p < 0.05$) effect among various treatment groups.

5. Serum Creatinine (mg/dl)

The mean values of serum creatinine (mg/dl) was found in group S₁ to be 0.53, S₂ group to be 0.52 and in group S₃ to be 0.53. The statistical analysis of data revealed non significant ($p < 0.05$) effect among various treatment groups.

6. Serum Alanine Transaminase (SGPT)

The mean values of serum alanine transaminase (U/L) was found in group S₁ to be 59.52, S₂ group to be 60.75 and in group S₃ to be 61.10. The statistical analysis of data revealed non-significant ($p < 0.05$) effect among various treatment groups.

7. Serum Aspartate Transaminase (SGOT)

The mean values of serum aspartate transaminase (U/L) was found in group S₁ to be 27.3, S₂ to be 25.86 and in group S₃ to be 27.65. The statistical analysis of data revealed the non-significant ($P < 0.05$) effect among various treatment groups.

8. Hetrophil-Lymphocyte Ratio (%)

The mean values of Hetrophil-Lymphocyte ratio (%) was found in group S₁ to be 0.74, S₂ to be 0.73 and in group S₃ to be 0.73. The statistical analysis of data revealed the non-significant ($p < 0.05$) effect among various treatment groups.

The effect of management systems on haematobiochemical profiles of Japanese quails raised on various stocking density was observed to be non-significant ($p < 0.05$) except serum glucose (Table 2) The haematobiochemical profiles obtained in present study were well within the normal range of Japanese quail under in all floor spaces.

The results were in agreement with that of Heckert *et al.* (2002) [4] who reared the birds from hatch to 42 days of age with 10, 15 and 20 birds/m² in pens and found non-significant effect of stocking density on H/L ratio at 32 and 42 days of age. Similarly, Dozier III *et al.* (2006) observe that the physiological stress indicators (cholesterol and heterophil: lymphocyte) were not affected with increasing stocking

density in broilers. Nicol *et al.* (2006) [7] in their study kept birds in three stocking densities i.e. 7 birds/m², 9 birds/m² and 12 birds/m² and observed that H:L ratio was within a normal range but by the end of lay H:L ratio was high, with no stocking density effect. Kang *et al.* (2011) [6] in their study on laying hens observed that there was no significant difference in leukocyte differential counts including heterophils (H), lymphocytes (L), monocytes and H:L ratio in different stocking densities. Houshmand *et al.* (2012) [5] also in their study did not noticed any significant difference between the normal and high stocking density with H:L ratio. Contrary to our result, Cravener *et al.* (1992) [1] in their

investigation to found effect of stocking density on the growth performance of birds housed at different stocking densities and noticed that the 7-week heterophill to lymphocyte ratios of birds raised at 0.09 and 0.11 m² per bird were significantly higher than those at 0.05 and 0.07 m² per bird. Also Sekeroglu *et al.* (2011) [9] reared broilers to 3 stocking densities 9, 13 and 17 birds per m² and found that the plasma protein levels were differing significantly among the stocking density groups. Tong *et al.* (2012) [10] reported that different stocking density in male suquin yellow chicken significantly affect the levels of blood total protein whereas, non-significant differences were found in other blood parameters

Table 2: Effect of stocking density on hemato-biochemical parameter

Treatment	Haemoglobin % (gm/dl)	PCV (%)	Serum Glucose (mg/dl)	Total Serum Protein (mg/dl)	Serum Albumin (3.5-5.0 gm/dl)	Serum creatinine (mg/dl)	SGPT (U/L)	SGOT (U/L)	H:L Ratio
S1	14.24	40.30	222.37 ^a	5.06	3.16	0.53	59.52	27.3	0.74
S2	14.44	40.01	238.02 ^b	4.80	3.46	0.52	60.75	25.86	0.73
S3	14.52	39.43	238.27 ^b	4.52	3.58	0.53	61.1	27.65	0.73
SEM	0.39	1.21	4.43	0.18	0.12	0.01	0.92	1.61	0.01
Sig level	NS	NS	<i>P</i> <0.05	NS	NS	NS	NS	NS	NS

Means bearing different superscript within a column differ significantly
 NS: Non significant (*p*>0.05); SEM: Pooled Standard Error of Means

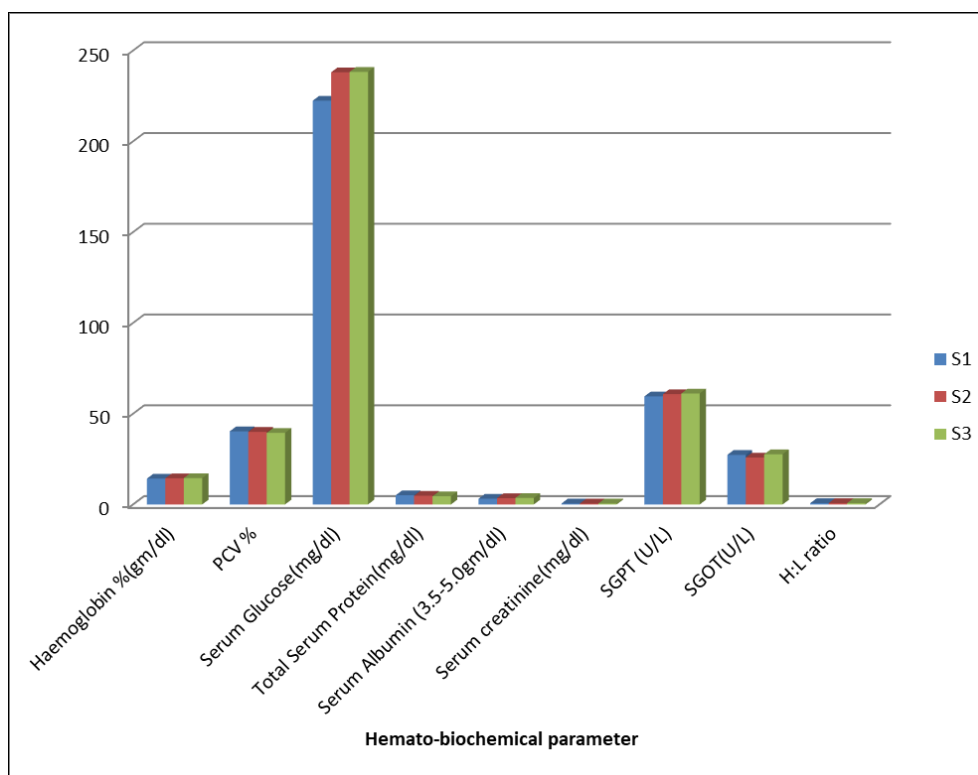


Fig 1: Effect of stocking density on hemato-biochemical parameter

Conclusion

From the present study it could be concluded that the effect of management systems on haematobiochemical profiles of Japanese quails raised on various stocking density was observed to be non-significant (*p*<0.05) except serum glucose. The haematobiochemical profiles obtained in present study were well within the normal range of Japanese quail under in all floor spaces.

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Conflict of Interest

The authors declare that there is no conflict of interest.

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