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Article

Effect of serum from laying hen and antiprolactin drug on egg production of indigenous chicken in Bangladesh

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Abstract: The study was carried out to improve egg production by decreasing the inter sequence pause days in indigenous chicken through the use of antiprolactin agent (Bromocriptine) and serum from laying hen. Sixty indigenous (deshi) chickens of 20-22 weeks of age, were randomly assigned into four groups (A, B, C and D) and each group consisting of 15 hens. Group A designated as control, group B was treated with Bromocriptine orally at a dose of 640 µg/bird/day, group C was treated with serum of laying hen at a dose of 1 ml intramuscularly/bird/day and group D was treated with both serum and Bromocriptine at doses given to group B and C for the period of 15 March, 2015 to 16 June, 2015 and egg production, pause days, prolactin level, hematological parameter and egg qualities were observed. Egg production increased significantly ($p<0.05$) in all treated groups compared to the non- treated control group and the highest production was recorded in group D. Pause days and prolactin levels decreased significantly ($p<0.05$) in all treated groups and lowest were recorded in hens of group D. No significant ($p>0.05$) differences were observed in hematological values among the group of chicken. The present study reveals that combined treatment with Bromocriptine and serum from laying hen increases egg production without affecting the health of indigenous chickens.

Keywords: bromocriptine; egg production; hematological; indigenous chicken; prolactin

1. Introduction

Bangladesh possesses a large variety of chicken mostly of non-descript indigenous type. About 80% of the total population of 160 million is living in the 68,000 villages of Bangladesh and almost each and every village home holds 6 to 7 chickens. Its production cost is also very low due to low nutritional demand, high disease resistance and required little skill. It is reported that Deshi chickens of Bangladesh are low producers and their mature body weights range from 1.0 to 1.2 kg (Barua and Howlider, 1990). Egg production ranged from 35-52/chicken/year (Alam *et al.,* 2014). However, Khan (1983) proposed that by proper selection program egg production of Desi hen could be increased up to 135 eggs per year per bird and they are more resistant to disease and adverse climatic conditions of Bangladesh. If indigenous poultry farming can be developed properly, Bangladesh will be benefited. The very small clutch size and long pause are major hindrances in this indigenous farming system.

The development of broodiness is induced by interactions between the environment, genotype and the endocrine system (Sharp, 1989). The development of broodiness are correlated an increase in the concentration of plasma prolactin (Sharp *et al.,* 1988) and as egg laying stops, a fall in plasma LH and ovarian steroids were observed. Several measures have been taken to reduce the secretion of prolactin through active and/or passive immunization especially in turkey (El Halawani *et al.,* 1995) and bantam hens (Sharp *et al.,* 1989) to prevent a

decrease in prolactin is found before and during the preovulatory LH surge development of broodiness (Scanes *et al.*, 1977).

In mammals, the biological effect of inhibition of prolactin is determined using a dopamine agonist - bromocriptine (Horth and Farmer, 2000). Furthermore, serum collected from the laying hen also might increase the FSH and LH Level of that hen simultaneously; in that way, it would be possible to increase the egg production by enhancing the laying period reducing the brooding tendency to that hen.

Limited research had been performed in Bangladesh in this aspect; therefore, the present research has been carried out with the following objectives:

a) To observe the number of egg production, egg quality and pause days
b) To evaluate the hematological changes and hormonal levels of the chickens
c) To know the adverse effects related to treatment.

2. Materials and Methods

To test the efficacy of antiprolactin drug (bromocriptine) and serum from egg laying hen on native chickens, sixty indigenous (deshi) chickens of 20-22 weeks age were used in this study and these were randomly assigned into four groups (A, B, C and D) and each group consisting of 15 hens. Group A designated as control, group B was treated with Bromocriptine orally at a dose of 640 µg/bird/day, group C was treated with serum of laying hen at a dose of 1 ml intramuscularly/bird/day and group D was treated with both serum and Bromocriptine at doses given to group B and group C for the period of 15 March, 2015 to 16 June, 2015. The chickens are housed under normal husbandry condition. All the birds were fed on traditional diets- broken rice, wheat 65 gm per bird per day and fresh water ad libitum. Egg production, pause days, prolactin level, hematological parameter and egg qualities were observed for 12 weeks.

Serum samples from laying hens (indigenous) were isolated according to standard procedure. Briefly, blood samples were collected from the wing vein of laying hen using a 3ml needle and then transferred into eppendorf tubes and allowed to coagulate for a period of 15 to 20 minutes. Then the blood was centrifuged at 2500 RPM for 15 minutes and serum was separated and stored at 4^{o}C. 1ml of serum was used intramuscularly per day per bird. There, ten birds remain for serum donor and no adverse effects have not found at the site of injection.

Egg production was recorded for each hen at the same time each day during the laying period. The incidence of broken eggs and soft-shelled eggs were identified and recorded.

Egg qualities such as egg weight, shell dry weight, fresh albumin weight, fresh yolk weight, egg shell thickness, the height of the thick albumin, the height of the yolk, the width of the yolk, the width of the egg and diameter of the egg albumin were measured. For determination of egg quality, weight was recorded by an electric weighing balance. The length and the width of egg were measured by a slide calipers. The eggs were then carefully broken down on a glass plate (40 x 20cm) to determine the internal egg qualities.

Blood samples were collected and Total Erythrocyte Count (TEC), Hemoglobin estimation (Hb), Packed Cell Volume (PCV), Erythrocyte Sedimentation Rate (ESR) were measured according to standard procedures.

Plasma prolactin level was measured from plasma isolated from blood at the end of experiment by radioimmunoassay.

Data were analyzed by ANOVA using Completely Randomized Design with factorial arrangement of time and treatments (Steel and Torrie, 1986). All analyses were performed by SPSS program.

3. Results and Discussion

3.1. Egg production and pause days

Egg productions and pause days of different groups of hens are presented in Table 1.The study revealed that the combined treatment significantly ($p \leq .0.05$) affects the egg production. The Egg production also increased either in single bromocriptine treated or serum treated group (Table 1), indicating that the individiual treatment was effective enough to promote the egg production. The results in this study are in agreement with those findings of Reddy *et al.* (2001) and David *et al.* (2003).

Pause days were lowest in group of hens treated with both Bromocriptine and serum from egg laying hen. The combined treatment significantly ($p \leq .0.05$) affect the pause days. Pause days also decreased due to single Bromocriptine or serum therapy, indicating that the treatment was effective enough to reduced the pause days. The present results are agreed with other results (Reddy *et al*., 2006).

3.2. Prolactin level

Prolactin levels of different groups of hens are presented in Table 2. All treated groups showed a lowered prolactin concentration than non treated control group. The level of plasma prolactin decreased from 479.3±

14.89 ng/ml to 147.9±5.07ng/ml during experimental period. The hen treated with antiprolactin drug plus serum (Group D) have reduced prolactin level among the other groups and it is significant at 5% ($p<0.05$) level. Similar findings observed by Reddy *et al.* (2006), Chen *et al*. (1997), El-Halawani *et al*. (1995) and Youngren *et al.* (1991).

3.3. External and internal egg quality

The mean values like width of the egg (mm), length of the egg (mm, height of the thick albumin (mm), width of the yolk (mm), shell thickness (mm), fresh yolk wt (gm), shell dry wt (gm) of the different groups of hens showed no significant difference ($P<0.05$) either treated with Bromocriptine or serum treatment (Table 3). These results indicate that treated with Bromocriptine or serum from egg laying hen had no adverse effect on external and internal qualities of eggs.

3.4. Hematological parameter

The results of various blood parameters are summarized in Table 4. TEC, Hb content, PCV and ESR values of all treated groups and control group were almost similar and the values were within the normal range. Although these values showed a little fluctuation in different groups but they were not statistically significant ($p>0.05$).

3.5. Postmortem examination

There was no significant pathological change observed in any internal organs of the deshi chicken of treated groups. In addition, increased the number of follicles were observed in ovaries of those treated groups.

Table 1. Effect of bromocriptine and serum from egg laying hen on egg production and pause day.

Group	Egg/Clutch	Pause day	Total egg production	Total pause day
A	10.00^{a}±0.71	35.00^{a} ± 1.78	18.00^{c} ±1.08	62.00^{a} ± 2.48
B	12.00^{a}±1.83	9.00^{bc} ± 0.41	47.00^{a} ± 2.48	36.00^{bc} ± 2.16
C	10.00^{a}±0.71	12.00^{b} ±1.08	38.00^{b} ± 1.87	42.00^{b} ± 2.45
D	11.00^{a}± 0.92	8.000^{c} ± 0.41	48.00^{a} ± 1.41	32.00^{c} ± 1.47

Values with the different superscripts in the same column are statistically significant ($P<0.05$).

Table 2. Effect of bromocriptine and serum from egg laying hen on prolactin levels.

Group	Mean ± Standard Error of mean Hormonal level of prolactin ng/ml
A	479.3^{a} ± 14.89
B	178.8^{c} ± 3.02
C	245.3^{b} ± 3.82
D	147.9^{d} ±5.07

Values with the different superscripts in the same column are statistically significant ($P<0.05$).

Table 3. Effect of bromocriptine and serum from egg laying hen on egg quality parameters.

Parameter	A	B	C	D
Weight of the egg (gm)	38.23^{a} ± 1.08	27.82^{b}± 1.78	37.00^{a}± 1.08	39.20^{a} ±1.78
Width of the egg (mm)	37.35^{a} ± 1.64	37.05^{a}± 1.41	35.40^{a}± 2.55	32.90^{a} ± 2.48
Length of the egg (mm)	49.85^{a} ± 2.16	43.80^{a} ± 1.08	44.10^{a}±1.78	46.75^{a} ± 3.89
Height of the thick albumin (mm)	3.55^{a} ± 0.40	3.61^{a} ± 0.41	4.10^{a}± 0.70	3.90^{a} ± 0.41
Diameter of the albumin (mm)	85.00^{a} ± 3.63	73.85^{b} ± 1.08	76.10^{b} ± 2.16	70.10^{b} ± 3.56
Height of the yolk (mm)	12.72^{a} ± .82	12.65^{a} ± 1.08	11.35^{a} ± 1.08	12.75^{a} ± 1.08
Width of the yolk (mm)	43.10^{a}± 2.55	43.50^{a} ± 2.16	36.75^{a} ± 3.19	42.45^{a} ± 1.44
Shell thickness (mm)	0.30^{a} ± 0.02	0.28^{a} ± 0.03	0.25^{a}± 0.02	0.33^{a}± 0.04
Fresh yolk wt (gm)	13.86^{a} ± 1.08	12.30^{a} ± 1.08	12.75^{a}± 0.71	13.65^{a} ± 1.08
Fresh albumin wt (gm	18.74^{a} ± 1.48	16.67^{a} ± 0.71	16.95^{a}± 1.47	17.02^{a} ± 1.48
Shell dry wt (gm)	5.63^{a} ± 0.71	5.85^{a} ± 0.57	5.50^{a} ± 0.41	6.02^{a} ± 0.71

Values with the different superscripts in the same column are statistically significant ($P<0.05$).

Table 4. Effect of bromocriptine and serum from egg laying hen on hematological parameters.

Groups	TEC (million/mm^3) (Mean ± SEM)	Hb (gm/dl) (Mean ± SEM)	PCV (%) (Mean) ± SEM)	ESR (mm/1st hour) (Mean ± SEM)
A	3.045^a ± 0.600	10.30^a ± 0.686	30.55^a ± 0.125	5.235^a ± 0.34 5
B	2.997^a ± 0.400	10.68^a ± 0.674	30.37^a ± 0.928	5.839^a ± 0.110
C	2.994^a ± 0.59	10.63^a ± 0.642	30.30^a ± 0.515	5.894^a ± 0.200
D	2.935^a ± 0.089	10.07^a ± 0.686	30.40^a ± 0.110	5.975^a ± 0.534

Values with the different superscripts in the same column are statistically significant (P<0.05).

4. Conclusions

This research work was carried out to study the effects of antiprolactin drug (Bromocriptine), and serum from laying hen on egg production, pause days, prolactin level, egg quality, hematological values in indigenous chickens. It is concluded that both Bromocriptine and serum of laying hen caused significant increase in egg production and decrease in pause days and prolactin level. No significant (p>0.05) differences were observed in hematological values and internal and external qualities of eggs in birds of either treated groups and non-treated control group. From the present study, it can be concluded that combined supplementation of Bromocriptine and serum of laying hen per day per birds is highly beneficial for enhanced egg production without making any potential hazards of indigenous chickens and our formulations could be used as an egg enhancer of our indigenous chicken.

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Conflict to interest

None to declare

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