EFFECT OF CRYSTALLINE PROGESTERONE LEVELS ON INTERNAL EGG QUALITY PARAMETERS OF LOHMANN BROWN HENS AT BAYERO UNIVERSITY KANO

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Abstract

The experiment was conducted to determine the effect of crystalline progesterone on external egg quality parameters of eighteen Lohmann Brown hens. A single factor completely randomized design was used with each treatment replicated three times. Six different doses (0, 5, 10, 15, 20 and 25 mg/bird) of crystalline progesterone were administered intramuscularly via the keel muscle twice a week for a total period of six weeks. Data obtained were analyzed using GraphPad InStat® Eighteen Lohmann Brown layers were completely randomized into six treatment groups; each group comprised three replicates. The groups were gave different levels of crystalline progesterone at 0, 0.2, 0.4, 0.6, 0.8 and 1 mg/bird designated as treatment A, B, C, D, E and F, respectively. The objective is to evaluate internal egg quality parameters in Lohmann Brown layers across crystalline progesterone treatment groups. Table 1 shows statistically significant differences across Kruskal-Wallis Test used. All median values of table 1 and 2 on internal egg quality parameters were significantly increased by crystalline progesterone administration. In conclusion, crystalline progesterone affected ovulation rate, yolk and albumen volume in Lohmann Brown hens.

Key word: Exogenous, Progesterone, Internal Egg Quality, Lohmann Brown, Hens

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Introduction

Poultry plays an important role in human nutrition, employment and income generation (3). Poultry account for more than 30% of all animal protein consumption (10). Among the numerous animals found in Nigeria, poultry birds such as chickens, turkeys, ducks, guinea fowls and pigeons provide economic means of sustenance to the populace (2). Chickens are very important and have been recognized as an important animal resource among the avian species (8).

Egg production in laying hens is a process that takes around 24 to 27 hours (9).The Lohmann Brown strain of chicken is an early maturing hybrid bird which is among the best egg producers with good quality eggs and excellent feed conversion rate (5). Egg production rate can be highly affected by crystalline progesterone administration in turkey and Japanese quail (1). Hens lay eggs in sequence, the length of which varies with the age of the hen across various types of chickens (4). Egg quality is significant in protection of the embryo from the detrimental effects of various environmental elements, regulation of gas and moisture exchange (11). Few experiments in which birds have been treated with exogenous reproductive hormones have been designed specifically to stimulate ovarian development and increase reproductive output (1). However, in the current study, progesterone surge was mimicked by exogenously supplying the hormone to actively laying Lohmann Brown hens in order to evaluate its effect on internal eggs quality parameters. It is, therefore, hypothesized that, depending on the dose administered, chronic exogenous supply of crystalline progesterone to actively laying Lohmann Brown birds might exacerbate the prevailing progesterone surge to a point where a negative feedback response is mounted at the level of the hypothalamus and anterior pituitary. The consequences of this response on parameters mentioned above constitute the mainstay of the present work. Also, the chronicity of crystalline progesterone administration during the experiment gave no room for recovery as twice weekly injections were given thereby sustaining serum levels of the exogenously supplied hormone (1). The objective of the study is to determine the effects of progesterone administration on internal egg quality of Lohmann brown hens at different levels.

MATERIALS AND METHODS

Experimental Location

The study was conducted at the Poultry Unit of the Teaching and Research Farm of the Faculty of Agriculture, Bayero University Kano (GPS coordinates: N11.97643˚, E008.42995˚) for a duration of six weeks.

Experimental animals

Eighteen Lohmann Brown hens were used in the experiment. This sample size was derived using the resource equation of (6). The eighteen hens were randomized and then allocated to different treatment groups.

Experimental Design

Eighteen Lohmann Brown layers were completely randomized into six treatment groups; each group comprised three replicates. The groups were gave different levels of crystalline progesterone at 0, 0.2, 0.4, 0.6, 0.8 and 1 mg/bird designated as treatment A, B, C, D, E and F, respectively.

Experimental Feeds

Experimental birds were fed Sovet Layer Mash® containing 16.0 % crude protein, 5.0 % fat, 6.0 % fibre, 3.5 % calcium, 0.4 % phosphorus, and 2600 kcal/kg energy. The birds were fed *ad libitum* and supplied with clean water throughout the experimental period.

Internal Egg Quality Parameters

Yolk Volume

After breaking each egg, its yolk was separated from the albumen using a stainless table spoon and the volume of the yolk in ml was determined using a measuring cylinder.

Albumen Volume

Albumen that was separated from the yolk was collected in a measuring cylinder and its volume measured and recorded in ml.

Statistical Analysis

To determine the effect of crystalline progesterone on external egg quality parameters, Kruskal-Wallis Test was used. Where significant effects exist, mean rank differences were compared using Dunn's Multiple Comparisons Test. Graphpad Instat package (Graphpad InStat®, version 3.05, 32 bit for Win 95/NT, Graphpad Software Inc., 2000) was used for the statistical analysis.

Result and discussion

Testosterone regulates the production of albumen by the oviduct (1). Since progesterone serves as a precursor for androgens and estrogens (4), the low level of endogenously produced progesterone, in the present study, could interfere with regulation of the production of albumen by the oviduct. This translates into a gradual decrease in albumen volume in eggs from hens treated with 5 mg crystalline progesterone to hens treated with 25 mg crystalline progesterone. Therefore, crystallinely supplied exogenous progesterone in chronic doses is capable of eliciting a negative feedback response that eventually gives rise to a decrease in preovulatory LH surge which may hinder ovulation. However, interpretation of internal egg quality parameters in this study should be done cautiously to avoid confounding effect of cessation of egg laying predominantly observed in the 25 mg crystalline progesterone-treated hens (1). The result revealed that a significance difference was observed in yolk and albumin of the experimental animals.

Conclusion

Intramuscular administration of crystalline progesterone to actively laying Lohmann Brown hens affected ovulation rate, egg laying, albumin and egg yolk volume.

Recommendations

To guard against complete cessation of egg laying, doses of crystalline progesterone beyond 5 mg should not be used in actively laying Lohmann Brown hens.

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Table 1: Summary Statistics, KW Statistic and Selected Pairs Dunn's Multiple Comparisons Test for Albumen Volume across Crystalline Progesterone Treatments in Lohmann Brown Hens

Crystalline Progesterone (mg)	N	Median	Minimum	Maximum	Sum of Ranks	Mean of Ranks	Kruskal-Wallis (KW) Statistic, corrected for ties
0	3	37.43	36.83	39.06	40	13.333	
5	3	38.18	36.90	38.25	41	13.667	
10	3	27.80	27.00	33.17	18	6.000	12.059*
15	2	31.59	27.93	35.25	16	8.000	
20	3	30.50	29.00	73.00	32	10.667	
25	3	0.00	0.00	0.00	6	2.000	

Comparison	Mean Rank Difference	Level of Significance
0 mg *vs*. 25 mg	11.333	*
5 mg *vs*. 25 mg	11.667	*
20 mg *vs*. 25 mg	8.667	*

*P<00

Table 2: Summary Statistics, KW Statistic and Selected Pairs Dunn's Multiple Comparisons Test for Yolk Volume across Crystalline Progesterone Treatments in Lohmann Brown Hens

Crystalline Progesterone (mg)	n	Median	Minimum	Maximum	Sum of Ranks	Mean of Ranks	Kruskal-Wallis (KW) Statistic, corrected for ties
0	3	13.80	13.43	14.55	18	6.000	
5	3	14.90	13.88	15.94	26	8.667	
10	3	17.83	13.60	22.50	35	11.667	11.882*
15	2	18.215	17.50	18.93	27	13.500	

20	3	17.800	17.00	24.50	41	13.667
25	3	0.000	0.00	0.00	6	2.000

Comparison	Mean Rank Difference	Level of Significance
15mg *vs*. 25 mg	11.500	*
20 mg *vs*. 25 mg	11.667	**

**P<0.001; *P<0.05