Effect of crude buck testicular extract on performance characteristics and testicular weights of cockerels

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Citation: Alabi, O. M., Aleshinloye, I. A., & Ayoola, M. O. (2019). Effect of crude buck testicular extract on performance characteristics and testicular weights of cockerels. *Zhivotnovadni Nauki*, *56*(3), 10-14.

Abstract

In view of the need to ensure continuous supply of animal protein for human consumption, cockerel production has been receiving encouragement of recent and any move to improve their growth rate to meet the production target is highly welcomed. Gonadal hormones are known to be growth enhancer in livestock production, but the use of synthetic products is on the decline globally, hence the need to exploit natural products with hormonal effect. An experiment was carried out to investigate the effect of crude buck testicular extract (CBTE), on some performance characteristics of cockerels. Two hundred and seventy (270) 10 weeks old Harco cockerels were randomly allotted to three (3) groups and replicated thrice, each with thirty birds. The first group (Cx_1) served as control with no exogenous hormone, (Cx_2) was the group injected with crude testicular buck extract, while (Cx_3) was the group injected with synthetic male gonadal hormone (testosterone propionate). The experiment lasted for seven (7) weeks during which data were collected on daily feed intake, total body weight gain, while FCR and feed efficiency were calculated. At 7th week of trial, six (6) birds were selected from each treatment group and slaughtered to access the testicles. Data collected were subjected to one-way analysis of variance. The results revealed that birds on Cx_2 and Cx_3 consumed more feed, improved weight gain significantly ($p < 0.05$) than Cx_1 birds, and with better FCR and feed efficiency ($p < 0.05$). Cx_2 birds had the highest value for testis weight in relative to body weight to as compared to other treatments. No mortality was recorded during the experiment. CBTE can therefore be used to enhance the growth rate of cockerels without negative effect on the health.

Key words: Buck testicular extract, performance characteristics, health, and hormone.

Introduction

Poultry production is the fastest growing component of global animal protein, consumption, and trade, with developing and transition economies playing a leading role in the expansion (Branckaert, 1999). Poultry production (eggs and meat) are preferred choice of animal protein because they are relatively cheap and widely available with no cultural or religious taboos against its consumption (Ojo, 2003). Moreover, rising poultry production spurs growth in global import demand for feeds and other inputs and generates up- and downstream investment opportunities.

Advancements in poultry production have led to the involvement of two important lines in its husbandry; the egg-type and meat-type chicken production. Poultry meat can be readily obtained from broilers and turkey, but recently,

Cockerel, the egg type male chicks production is an indispensable component of poultry production (Gueye, 2000). As a layer-strains, production of cockerel is rare in developed countries, where they are destroyed in the hatchery through different ways (Gueye, 2000, Ayodele, 2012). Utilization of these male chicks as a meat type chickens received high demand compared to broiler, based on consumer taste and cost of production in developing countries (Aromolaran et al., 2013). Although, they take a longer period to reach maturity, their meat contains less fat as compared to broilers (Ayodele, 2012). Nevertheless, their growth rate can be enhanced to meet up with market demand and reduce cost of production through the use of synthetic antibiotics and hormone administration (Sonaiya, 2007).

The use of synthetic antibiotic and hormone growth promoter in agricultural animal production has been practiced over several decades. Early indications of a beneficial effect on production efficiency in poultry and swine were reported by Ho et al. (2006). Gonadal hormones such as estrogen, progesterone and testosterone have been reported to have positive influence on cell multiplication and tissue development. Hormone use in meat type animals appears prevalent. Almost 90% heifers weighing over 700 pounds and almost 86% weighing less than 70% were implanted at least once in their lifetime with synthetic or natural hormones (FAO, 2003). Hormone administration has led to improved feed utilization, growth and reproductive efficiency (Henare et al., 2011).

However, bans on the use of these synthetic products as growth promoters in livestock production has necessitated enormous research into exploitation of natural products in this direction. To the best of our knowledge, the use of gonadal secretion such as testosterone, naturally extruded as growth promoter is rare in livestock production. Testosterone belongs to the androgenic gonadal hormone. It is steroid in nature and responsible for the development of secondary sexual characteristics, maintenance of secondary sexual organ, stimulation of spermatogenesis, manifestation of sex drive and anabolic effect (Hafez, 1992).

Therefore, this study aimed to investigate the effect of exogenous administration of crude buck testicular extract (CBTE) on production performance, and testicular weight of cockerel. The testes being the site of spermatogenesis, hence the liquid extract obtainable from buck testicles is envisaged to be rich in testosterone.

Materials and method

Location of the experiment

The experiment was conducted at the Teaching and Research Farms of Bowen University – Iwo, Nigeria, a typical humid tropic environment. Environmental temperature range of 15–28 °C and mean annual rainfall of 1400 mm, subject to climate change.

Preparation of crude buck testicular extract (CBTE)

Intact testes (in pair) inside the scrotal sac of a matured buck of Red Sokoto breed with a live weight of 20 kg, of about 18 months of month, was freshly harvested at Iwo Abattoir immediately after slaughter using a procedure as earlier described by Akpa et al. (2008). The testes harvested were rinsed off with distilled water, and promptly taken down to the laboratory for further processing.

At the laboratory, the testes were weighed and grinded using a laboratory blender for about 7 min till it became a thick pulp like solution. The solution was collected and centrifuge for about 15 min at 2500 rpm. Resulted supernatant was collected, and sieved using a filter paper into a clean beaker. Residue was disposed, and supernatant solution tagged as the crude buck testicular extract was kept at room temperature for use within 24 h.

Experimental procedure and birds' management

Two hundred and seventy (270) 10 weeks old cockerel birds were used for this experiment. Birds were randomly allotted to three (3) treatments of: no testosterone (NTE), conventional testosterone (CTE), and crude buck testicular

extract (CBTE), each treatment was replicated thrice with 10 birds per replicate.

The experimental birds were allowed to adjust for a week. At 11th week of age, each bird of the CTE and CBTE treatment was injected intramuscularly via the thigh muscle with 0.2 ml of respective treatment hormone as recommended by Alabi (2009). The experiment lasted for 7 weeks, during which feed and water were provided *ad libitum*. The birds were placed on grower mash with calculated values of Metabolizable energy and crude protein being 2215.14 kcal/kg) 16.52% respectively. All standard routine management practices, medication and vaccination were strictly observed.

Data collection

Daily feed intake (FI) and weekly body weight (BW) and mortality rate of the birds were recorded. Total body weight gain, Feed Conversion Ratio (FCR) and Feed Conversion Efficiency (FCE) were calculated. At the end of 7th week, ten (10) birds were randomly selected from each replicate, testes were collected and weighed.

Statistical analysis

Data obtained were subjected to one way Analysis of variance (ANOVA) software (SAS, 2006). Means with significant difference among the treatments were separated using the Duncan's option of the same software.

Result and Discussion

The performance characteristics of experimental birds as shown in Table 1, revealed that hormone treatment had significant ($P < 0.05$) effect on all parameters and no mortality was recorded during the experiment. Birds treated with CBTE had highest value for final body weight (2.24), total body weight (1.13), feed conversion ratio (FCR) and better feed efficiency significantly ($P < 0.05$) as compared to other treatments. The birds treated with CTE had highest daily feed intake (135g), which differ significantly ($P < 0.05$) as compared to other treatments. The result of this study is in agreement with Bviasin et al. (1996), which stated that steroids hormones increased body weight and lean body mass. Growth hormone (GH) is an important regulator of body composition, stimulating fat oxidation and enhancing lean body mass by stimulating protein accretion. The emergence of differences in body composition between the sexes during puberty suggests sex steroids modulate the action of GH (Ho et al., 2006). According to Henare et al. (2011), by supplementing with testosterone we increase protein synthesis, thereby increasing the level and rate in which we build muscle tissue or protect it in a calorie restricted diet. These reports confirm that the use of exogenous hormones will bring an increase in body mass and improve feed utilization in animals.

Table 1: Performance Characteristics of experimental birds

	Treatments			
Parameters	1	2	3	SEM
Initial body weight (kg)	1.09^{b}	1.01^{c}	1.11^{a}	0.01
Final body weight (kg)	2.06^{c}	2.12^{b}	2.24^{a}	0.05
Total body weight gain (kg)	0.97^{c}	1.11^{b}	1.13^{a}	0.01
Daily feed intake/birds(g)	133.00^{c}	135.00^{a}	134.00^{b}	0.80
FCR	12.22^{c}	13.55^{b}	14.96^{a}	0.25
Feed efficiency	0.07	0.07	0.08	0.01
Mortality (%)	0.00	0.00	0.00	-

^{abc} means along the same row with different superscripts are significantly ($P < 0.05$) different using Duncan's test as post hoc analysis.

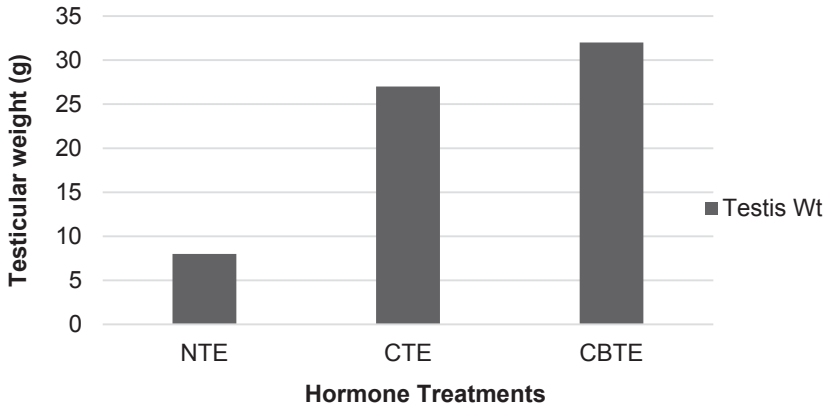

Fig. 1

However, the birds on CBTE giving best results compared to other treatments can be attributed to high concentration of testosterone hormone in the CBTE which are able to maintain a higher level of protein storage in part due to an increase in nitrogen production (Meinhardt and Ho, 2006).

As shown in fig. 1, the total testicular weight varied with hormonal treatments. CBTE had the highest value, while the control group (NTE) had the least value for the testicular weight respectively. Testosterone is a cholesterol derivative hormone, with anabolic effect on muscle tissue (Deschenes et al., 1991). The result of this study corrobates (Poulin and Morand, 2000, Tyler and Gous, 2009, and Vatsalya and Kasmiri, 2012) who reported that strong relationship exist between testes weight and body weight of animals. Birds treated with CBTE and those on control (NTE) had the highest and lowest values for final body weight and testicular weight respectively. The weight of testes enhanced the volume of semen produced, which is desirable for reproduction activities (Tyler and Gous, 2009).

Conclusion

It can be concluded from the result of this experiment that crude buck testicular extract (CBTE) can be injected as exogenous hormone in cockerel birds with no adverse effect on production performance, and testicular weight. Hence it compared better with conventional testosterone hormone (CTE), further study should be designed to investigate cost implications with CBTE application.

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