

Effect of cinnamon powder on growth performance characteristics of cockerel chickens

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ABSTRACT

The goal of the study was to look at the growth characteristics of cockerel chicks given different amounts of cinnamon powder. The study used a total of 150 day old Isa Brown strain birds, which were randomly assigned to five treatments of 30 birds each, with three replicates of 10 birds per replica. T1, T2, T3, T4, and T5. Dietary treatments included 0g, 2.5g, 3.0g, 3.5g, and 4.0g cinnamon powder supplementation in 4 litres of water. The experiment lasted for 16 weeks and data were collected on body weight, feed intake, weight gain, feed conversion ratio, and mortality rate. The result revealed that cinnamon supplementation affected the body weight, feed consumption, weight increase, feed conversion ratio, and mortality rate significantly ($p < 0.05$). In conclusion, it can be deduced that chickens on T₅ (4.0g of cinnamon in water) had an improved body weight (935.9g), weight gain (83.35g), feed intake (331.10g), feed conversion ratio (10.99g) and zero mortality compared with other dietary treatments.

Keywords: cinnamon powder; dietary supplementation; cockerel chickens

1. INTRODUCTION

The demand for chicken meat has resulted in the involvement of various persons in poultry production due to its high protein content (Bessei, 2006). To boost their development performance and nutritional value, numerous operations in the production of these poultry birds are required, including feeding, lighting, vaccination, and others. However, previous research has revealed that using synthetic drugs and vaccines in the poultry diets is not economically viable, increasing manufacturing costs and diminishing profit margins (Oluyemi and Roberts, 2000). It has also been known to be hazardous to the health of both birds and humans (Ali *et al.*, 2021; Mahfuz *et al.*, 2021; Sah *et al.*, 2021).

As a result, there has been a desire for alternate vaccination methods that can protect birds from dangerous bacteria while also boosting their growth performance and nutritional value. In poultry farms, birds like the cockerel are common. A rooster is a male gallinaceous bird that is also known as a cockerel or cock. A cockerel is a younger male chicken, while a rooster is an adult male (*Gallus domesticus*). With the rapidly rising trends of commercial layer farming in Nigeria, cockerel, the egg type male chick's production is an essential component

of family poultry development (Aboki *et al.*, 2013). Consumers like cockerel as much as they like native chicken, and they think it tastes better than broiler meat (Huque *et al.*, 2013).

Several earlier studies have used natural compounds like cinnamon as an alternative to synthetic antibiotics in broiler feeds (Ali *et al.*, 2021; Alagbe *et al.*, 2020; Olafadehan *et al.*, 2020a; Olafadehan *et al.*, 2020b), plants phenolic compounds (Mahfuz *et al.*, 2021), Moringa (Mahfuz *et al.*, 2019), and several others which are directed towards improving the broiler production without any side effects. Cinnamon powder has been used by various cultures around the world for hundreds of years. *Cinnamomum zeylanicum* (CZ) and *Cinnamomum cassia* (CC) (also known as *Cinnamomum aromaticum* / Chinese cinnamon) are the two most common varieties of the genus *Cinnamomum*, a tropical evergreen plant with two primary variants.. Cinnamon is used as a cure for respiratory, digestive, and gynecological disorders in Ayurvedic medicine, in addition to its culinary usage (Park, 2008). Cinnamon's bark, leaves, flowers, fruits, and roots all have medicinal and culinary benefits. In chickens, it also aids in their growth. Cinnamaldehyde (bark), eugenol (leaf), and camphor, among other primary components, are present in various levels throughout the plant (root). As a result, cinnamon comes in a variety of oils and powders, each with its own set of qualities that determine its worth in various businesses. For example, unlike the leaf and bark, the root, which contains camphor as its principal constituent, has little commercial value, and the powdered form of cinnamon can be added to the nutrition of hens to improve their growth. (Ebrahimi *et al.*, 2013). This study was therefore carried out to determine the effects of cinnamon powder on the growth performance characteristics of cockerel chickens.

2. MATERIALS AND METHODS

Experimental Site

The experiment was carried out at the poultry unit of the Teaching and Research Farm of the Ladoko Akintola University of Technology, Ogbomoso, Oyo State, Nigeria. Ogbomoso is a derived savannah zone, which is found on longitude 4° 10' East of Greenwich meridians and latitude 8° 10', North of the equator. The latitude ranges from 300m and 600m above sea level while mean temperature and annual rainfall are 27°C and 1247mm (Google Earth Map, 2022).

Experimental Animal and Management

A total bird of 150 day old ISA BROWN strain cockerel was procured from CHI Farm at Lagos- Ibadan express way Nigeria. The birds were weighed prior to commencement of the experiment and were randomly distributed into five dietary treatment groups of three replicates each, with each replicate having ten birds in a completely randomized design. The birds were managed intensively on deep litter system in pens having natural ventilation via all sides, with each cell measuring (125cm x 150cm x 160cm). The pen was cleaned, disinfected, fumigated and cover with wood shaving prior to the arrival of the chicks. Adequate temperature was maintained in the brooding house, clean drinking water and commercial starter mash were provided *ad-libitum*. Where necessary prophylaxis and vaccination were administered on the control group.

Experimental Diet

A chick mash meal containing 19 % Crude Protein, 2650Kcal/Kg of metabolizable energy for 8 weeks, followed by grower diet containing Crude Protein of 17%, Metabolizable Energy of 2500Kcal/Kg was fed to the birds *ad libitum*.

Test Ingredient and Diet Formulation

The test ingredient used was cinnamon. It contains 92g per bottle. It was procured in BAYONNE, NJ 07002, U.S.A. It was added to their drinking water. Certain measured quantity of cinnamon powder will be dissolved into 4litters of water per treatment and replicates respectively. The layout goes thus:

T1: 0g cinnamon/4litres of water

T2: 2.5g cinnamon/4litres of water

T3: 3.0 g cinnamon/4litres of water

T4: 3.5g cinnamon/4litres of water

T5: 4.0g cinnamon/4litters of water

It should be mentioned that this formation was employed from the beginning of the trial to the end.

Data Collection

Data which were collected on the growth performance characteristics from day old – 16th week on a weekly basis are: Feed intake, weight gain, feed conversion ratio, and mortality rate.

Body weight (g)

This was first observed on the first day (day old) and then consequently on a weekly basis by placing the birds on an electronic scale (Sartorius CP 245S).

Feed intake (g)

Weighed quantities of feed served to the birds and the leftover were used to determine the feed intake of the experimental birds.

Feed intake (g/birds) = feed served – left over.

Weight gain (g)

Weight gain was measured by subtracting the bird's initial weight from the final weight.

Feed conversion ratio

This was taken by dividing the feed intake by the weight gain.

Mortality rate (%)

This was recorded per treatments and was gotten by multiplying the actual number of birds in a treatment by the death percentage in that treatment.

Statistical analysis

The data was analyzed using SAS (2009)'s General Linear Model's one-way ANOVA, and the means were compared using the same statistical package's Duncan's Multiple Range Test.

Table 1: Effect of cinnamon powder on growth performance of cockerel chickens

Parameters	Diets					SEM
	T ₁ (0.0g)	T ₂ (2.5g)	T ₃ (3.0g)	T ₄ (3.5g)	T ₅ (4.0g)	
ABW(g)	919.8 ^b	909.0 ^c	924.9 ^b	912.5 ^b	935.9 ^a	74.78
WG(g)	79.74 ^c	77.74 ^c	82.32 ^b	79.00 ^c	83.35 ^a	7.33
FI(g)	313.99 ^c	313.61 ^c	322.60 ^b	322.32 ^b	331.10 ^a	107.08
FCR(g)	9.02 ^d	9.13 ^c	9.82 ^b	10.78 ^a	10.99 ^a	0.35

^{abcd} Means with different superscripts along the same row differ considerably (p<0.05). ABW = Average body weight, WG = Weight gain, FI = Feed intake, FCR = Feed conversion ratio. T₁ = 0.0g also of cinnamon, also called Control. T₂ = 2.5g of cinnamon, T₃ = 3.0g of cinnamon, T₄ = 3.5g of cinnamon, T₅ = 4.0g. SEM = Standard error of mean.

2. RESULT AND DISCUSSION

The influence of cinnamon powder on the growth performance of cockerel chickens was indicated in Table 1. Between the dietary regimens and the parameters examined, there were significant variations (p<0.05). Cockerel chicks fed diet T₅ (4.0g cinnamon in water) had the highest average body weight (935.9g), while birds fed diet T₂ had the lowest average body weight (909.0g) (2.5g of cinnamon powder in water). The highest weight gain (83.35g) was recorded for cockerels fed diet T₅, whereas the lowest weight gain was recorded for hens fed diet T₂ (77.74g). Chickens fed diet T₅ had the highest feed consumption (331.10g), while cockerels fed diet T₂ (2.5g of cinnamon in water) and T₁ (control) (313.61g) and (313.99g) had the lowest feed intake correspondingly. Diet T₅ had the highest feed conversion ratio (10.99g), followed by (10.78g) for cockerels fed with 3.5g of cinnamon in water (T₄), and diet T₁ had the lowest feed consumption (9.02g). In addition, compared to control and other tested inclusion levels, chickens fed diet T₅ (4.0g cinnamon powder in water) had a higher body weight. The findings were consistent with those of Talib *et al.*, (2015), who found that broiler hens given cinnamon powder had considerably greater live body weight than those given a control. This also

supported the findings of Shirzadegan (2014) that adding cinnamon powder to broiler diets had a substantial impact on ultimate body weight. The recent findings corroborated those of Ebrahim *et al.*, (2013), who discovered that using cinnamon on broilers improved body weight considerably.

However, this study's findings contradicted those of Sampath and Atapattu (2013), Homseng *et al.*, (2019), and George *et al.*, (2004). These authors reported that Cinnamon powder has a non-significant effect on body weight. On broiler chicks, the effects of dietary cinnamon (*Cinnamomum zeylanicum*) bark powder were not found by Sampath and Atapattu (2013). Also, Homseng *et al.*, (2019) found no significant variations in body weight of broiler chickens fed cinnamon powder as a dietary supplement. Also, broiler hens fed diets supplemented with various quantities of cinnamon (*Cinnamomum zeylanicum*) oil supplementation had no significant influence on body weight, according to George *et al.*, (2004).

In comparison to control and other tested inclusion levels, birds fed diet T5 gained more weight. This conclusion was consistent with the findings of Homseng *et al.*, (2018), who discovered that adding cinnamon to broiler chicken diets improved body weight gain. According to Ciftci *et al.*, (2009), broiler diets with cinnamon oil had the highest average daily weight gain. This supported Shirzadegan's (2014) findings that adding cinnamon powder to a broiler's meal had significant effect on body weight gain. Homseng *et al.*, (2019) reported that broilers fed cinnamon powder showed no significant increase in weight gain. Broiler chickens fed diets supplemented with varying quantities of cinnamon powder had no significant influence on weight increase (Safa, 2014).

In addition, it was discovered in this study that chickens fed diet T5 had higher feed intake than control and other examined inclusion levels. This observation corroborated the findings of Homseng *et al.* (2018), who found that adding cinnamon to the diet of broiler chickens increased feed intake. This was also in line with Safa's (2014) findings, which showed that cinnamon powder as a natural feed additive had a substantial impact on broiler chick feed intake, performance, and carcass quality. Shirzadegan (2014) also found that adding cinnamon powder to broiler chicken diets increased feed intake. This supported Sampath and Atapattu's (2013) findings that adding cinnamon bark powder to broiler chicken diets increases feed consumption. The improved feed intake features seen in this study, however, contradicted Ali *et al.*, (2018), Mehdi *et al.*, (2011), George *et al.*, (2004), and Homseng *et al.*, (2019). These authors reported that cinnamon powder has no effect on the feed intake of poultry birds. Ali *et al.*, (2018) found no difference in feed intake, physiological reactions, or productivity in broiler chicks fed a diet enriched with varying doses of cinnamon powder.

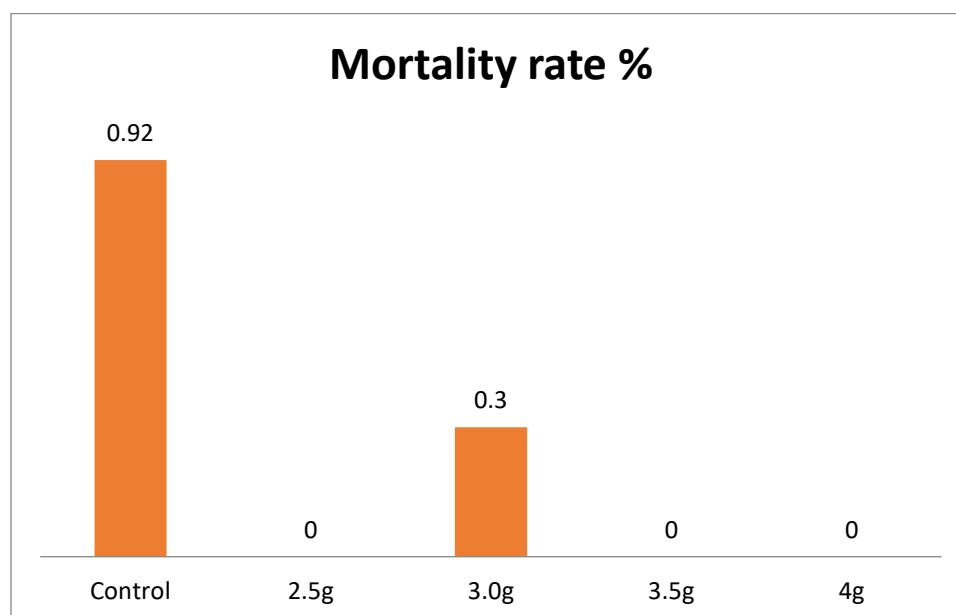


Figure 1: Percentage Mortality rate

The results of this study also showed that chickens given diet T5 had a higher feed conversion ratio than chickens fed control or other tested inclusion levels. This discovery corroborated the findings of Singh *et al.*, (2014) that the use of cinnamon powder in broiler diets resulted in the highest feed conversion ratio. This was also in agreement with Sampath and Atapattu (2013) findings that adding cinnamon bark powder to broiler chicken diets increases feed conversion ratio.

Shirzadegan (2014) found that adding cinnamon powder to the diet of broiler chickens has a substantial impact on feed conversion ratio. The improved feed conversion ratio discovered in this study, however, contrasted the findings of George *et al.*, (2004) and Talib *et al.*, (2015) respectively. According to these authors, cinnamon powder did not improve feed conversion ratio significantly. In addition, George *et al.*, (2004) found that feeding cinnamon (*Cinnamomum zeylanicum*) oil to broiler chickens had no effect on feed conversion ratio, growth performance, carcass features, or meat quality attributes. In broiler hens, Talib *et al.*, (2015) found no difference in feed conversion ratio between cinnamon powder-fed groups and control groups.

The percentage mortality rate of cockerel chicks fed varied doses of cinnamon powder in water was shown in Figure 1. Cockerel chickens fed 0.0g cinnamon powder (control diet) had the highest mortality rate (0.92%), followed by chickens fed diet 3 (3.0g cinnamon powder in water) (0.3%), and diets T2 (2.5g cinnamon powder in water), T4 (3.5g cinnamon powder in water), and T5 (4g cinnamon powder in water) had the lowest mortality rate (0%).

The use of cinnamon powder had a substantial effect on mortality rates, according to this study. Except for T3, which showed a lower mortality rate than the control, no death was documented for cockerels fed cinnamon powder. This finding was in line with that of Homseng *et al.*, (2019), who discovered that adding cinnamon powder to the diet of broiler chickens had no adverse effects. However, Safa (2014) found no significant effect of cinnamon powder in broiler diet on mortality rate. The influence of cinnamon, red pepper, ginger, and cumin on broiler performance was also discovered by Ebrahim *et al.*, (2013), who found that the mortality % did not differ across the treatments.

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Conflicts of interests

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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