SEMEN QUALITYOF FUNAAB ALPHA COCKS FED DIET SUPPLEMENTED WITH TURMERIC AND GINGER POWDER

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ABSTRACT

The semen quality of fifty-four (54) FUNAAB Alpha cocks with an average age and weight of 14months and 2.8±1.23kg respectively was investigated for 10 weeks in a completely randomly design feeding trial comprising 3 dietary treatments, replicated thrice with 6 cocks per replicate. Three experimental diets were formulated; diet 1 (T1) contained neither turmeric nor ginger; diets 2 (T2) and 3 (T3) contained 15g/kg of turmeric and ginger powder respectively. Semen samples were collected weekly using abdominal massage technique and evaluated for semen volume, Colour, pH, sperm motility, sperm morphological defect and sperm counts. The results showed that all the parameters investigated except the colour and pH were significantly (P<0.05) influenced by Turmeric / ginger supplementation. All the semen were creamy in colour; semen volume was highest in T1, (0.90ml) followed by T3 (0.70ml) and least in T2 (0.53ml). The highest sperm motility and count (57%, 7.94) were observed in cocks fed the control diet followed by those fed turmeric supplemented diet (50%, 7.32) and least in cocks fed ginger diet (44.17%, 6.80) respectively. The highest sperm with normal morphology and active motility were observed in T2 and T3 respectively. Hence, turmeric and ginger improved the viability of FUNAAB Alpha cock semen.

Keywords: *Ginger, Turmeric, FUNAAB Alpha Cock, Semen Quality*

INTRODUCTION

Phytogenic and herbal products have received awareness as natural additives due to their active substances that have impact on gut micro-floral, nutrient digestibility and intestinal morphology (Cross *et al*., 2016). Turmeric and ginger are rhizomes belonging to the family Zingiberaceae (Thangavel and Dhivya, 2019). Both are widely available and used as spices, flavouring agents, local

delicacy and native medicine. Turmeric is rich in curcuminoids, a polyphenolic compound with bioactive components that exhibit a wide range natural antioxidant and can act as an anti-inflammatory, antiapoptotic, antitoxic, and anticancer agent (Singh *et al*., 2011; Kebede *et al*., 2021). Antioxidants are one of the most important components to having healthy fertility and help to protect the sperm from free radical damage that have ability to damage sperm cell. The medicinal effects of turmeric can be associated to the antioxidants which are known to repress the formation of reactive oxygen and important for protection from various sources of oxidative damage and a variety of diseases. Ginger is the rhizome of the plant *Zingiber officinale*, consumed as a delicacy, medicine, or spice. Research conducted *in-vitro* shows that ginger extract might control the quantity of free radicals and the peroxidation of lipids. Also, preliminary research by Al-Amin *et al*. (2006) indicated that phenolic compounds found in ginger may bind to serotonin receptors and may influence gastrointestinal function. Ginger contains many bioactive components such as gingerol, which appears to be the major constituent in fresh ginger and shogaol in dried ginger. The spicy aroma and pungent ingredient in ginger are due to the presence of gingerol (Bode & Dong, 2011). Gingerols and shogaolsare responsible for various pharmacological activities (Zhao *et al*., 2011). Both turmeric and ginger have antioxidant property. Studies have shown that antioxidant improves sperm quality, suppress the formation of reactive oxygen species (ROS) and protect the spermatozoa against ROS (Aitken *et al*., 2012**;** Mortazavi *et al*., 2014). Ginger and turmeric have been added to animal feed in researches and results have shown enhanced digestion, immunity, feed efficiency and improved growth rate (Agbalaya *et al*., 2020; Thuy, 2019; Kafi *et al*., 2017). However, there is dearth of information on the effect of prolonged feeding of either turmeric or ginger on the semen quality of farm animals. Therefore, the semen indices of improved indigenous FUNAAB Alpha cocks fed diets supplemented with turmeric and ginger was investigated.

MATERIALS AND METHODS

This research was carried out at the Poultry Unit of the Teaching and Research Farm of Animal Production Technology, School of Agriculture, Lagos State Polytechnic, Ikorodu. A total of fifty-four (54) FUNAAB Alpha cocks, of average age and weight of 14 months and 2.8±1.23kg kg respectively were obtained from Animal Production Technology Department and used for the experiment. The turmeric and ginger were purchased from the local market. The rhizomes were thoroughly cleaned with water, shade dried, thinly cut, then sun dried to 14% moisture content, thereafter milled into powdery form and stored for later use as supplement in the experimental diets. The cocks were reared in individual cage measuring 0.52cm x 0.52cm x 0.50cm. They were randomly allotted to three (3) dietary treatments having three (3) replicates each with six (6) cocks per replicate in a Completely Randomized Design feeding trial.

Diet 1 had neither turmeric nor ginger 0% (0g/kg), Diet 2 had turmeric inclusion at15g/ kg of feed and Diet 3 had ginger inclusion at 15g/kg of feed. The diets were formulated to contain 17 % CP and 2795 kcal/kg metabolisable energy. Feed and water was provided *ad libitum* and all necessary management practice were strictly observed throughout the 10 weeks of the feeding trial.

Table1: Composition of experimental diets

Ingredient	Kg
Maize	48
GNC	9
Wheat Offal	36
Soya	4
Fish meal	1
Bone meal	1
Limestone	0.4
Salt	0.25
Premix	0.25
Toxiroak	0.1
Total	100
Crude protein (%)	16.89
Metabolizable energy (kcal/kg)	2795.14

Semen samples were collected from the experimental cocks, using abdominal massage technique as described by Girndt *et al*., (2017). The semen indices were determined using the methods outlined by World Health Organization (1992). Data collected included semen volume, Colour, pH, sperm motility, sperm morphological defect and sperm count.

Data were subjected to analysis of variance using Statistical Package for Social Science IBM® SPSS statistics Version 25. All significantly different means were separated using Duncan multiple Range test of the same software.

RESULTS AND DISCUSSION

The effects of turmeric and ginger on semen characteristics of FUNAAB Alpha cocks are presented in Table 2. There were significant ($P< 0.05$) differences among the treatments. The cocks fed the control diet had highest semen volume of 0.90ml while birds on T_2 diet had the least semen volume (0.53ml). The result of this study showed that the semen volume is within the normal range as reported in literatures for chickens (Urom *et al*., 2016; Ochai *et al*., 2018). Ochai *et al*. (2018) reported 0.73ml semen volume for FUNAAB Alpha chicken. The lowest semen volume observed in T_2 might be attributed to the curmin content of turmeric. This finding corroborate the result of Kazemizadeh *et al*., (2019) that recorded a decrease in semen volume in broilers fed dietary curcuim. The range of semen pH (6.81- 7.70) obtained in this study fall outside the range (7.10-7.40) reported by Peter *et al*. (2008). The lowest value of abnormal sperm cells (7.83%) was observed in T_2 while the highest value (11.00%) was recorded

in T_1. The lowest sperm counts of cocks fed with ginger supplemented diet may probably be due to imbalance between reactive oxygen species (ROS) production and the antioxidant activity (Olukunle *et al*., 2015).

Table 2: Changes in semen quality of FUNAAB Alpha fed diets supplemented with turmeric and ginger

Parameters	**T_1**	**T_2**	**T_3**	SEM
Colour	creamy	creamy	creamy	-
pH	7.70	7.68	6.81	0.29
Volume (ml)	0.90^{a}	0.53^{b}	0.70^{ab}	0.11
Motility (%)	57.00^{a}	50.00^{ab}	44.17^{b}	3.71
Sluggish (%)	13.00^{b}	15.00^{a}	14.17^{ab}	0.58
Pus cell/HPF	4.9^{a}	4.00^{b}	4.42^{b}	0.26
Normal Morphology (%)	89.00^{b}	92.17^{a}	89.33^{ab}	0.93
Abnormal cells (%)	11.00^{a}	7.83^{b}	10.67^{ab}	1.01
Epithehal cell	2.20^{b}	2.00^{b}	4.67^{a}	0.86
Active motile (%)	30.00^{b}	35.00^{ab}	37.33^{a}	2.16
Sperm Count $\times 10^6$/ml	7.94^{a}	7.32^{ab}	6.80^{b}	0.33

The results of this research revealed that ginger and turmeric decrease sperm motility indicating disruption in sperm cellular mobility. This confirmed the assertion of Ekaluo *et al*. (2009) that some medicinal plants decrease sperm motility. The highest sperm motility (57%) observed in cocks fed the control diet is similar to the studies of Urom *et al., (*2016). The authors noted that 57 % sperm motility for indigenous cocks. However, the value was lower than 79.82% reported by Ochai *et al*. (2018) for FUNAAB Alpha chicken. The percentage of morphologically normal spermatozoa in the cocks fed turmeric diet was highest (92.17%) followed by the cocks fed with ginger diet (89.33%) and least in the control (89.00%). These observations were similar to the findings of Ayodele *et al.* (2021) but defer from the reports of Ochai *et al*. (2018). The highest sperm abnormality value was observed in T_1 (11.00%) followed by T_3 (10.67%) and the lowest in T_2 (7.83%). These observations were not in line with the findings of Balogun *et al.* (2016).

CONCLUSION

The supplementation of the feed of FUNAAB Alpha cock with turmeric and ginger powder significantly reduced the number of abnormal sperm cells; increases number of physiologically normal sperm cells; and increases the percentage of active motile sperm cell in their semen. Hence, turmeric and ginger were found to enhance the viability of indigenous FUNAAB Alpha cocks' semen.

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