APRW -72

Effect of Unfertilized Breeder'sEggs and Ginger as Feed Supplement on Semen Quality and Fertility of Broiler Breeder Chickens

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Abstract
Seventy eight cocks (4.50 - 5.50 kg live weight) and 130 hens(3.0–3.5 kg live weight) aged 40 weeks, of Marshall R breed were used to study to determine the effect of supplementing the breeder diets with unfertilized eggs and ginger on semen quality and fertility of broiler breeder chickens. The experimental birds were housed in battery cages and were divided into thirteen treatments of 6 cocks and 10 hens. Birds were fed commercial layers diet which was supplemented with egg and ginger at 1% and 1.5% once and twice per week for 8 weeks. Semen samples were collected between 6.30 - 7.30 am and analyzed for fertility parameters. Semen motility, semen viability, semen concentration, morphology of sperm cells and fertility all shows superior result in ginger supplemented groups T6, T8, T9, respectively while semen volume was higher in egg supplemented group T5. At the end of the experiment all groups except for the control group shows a better performance in terms of semen quality and fertility with ginger supplemented group showing a better semen quality and fertility than the egg supplemented groups.

Keyword: Egg, ginger, semen quality, chicken

Introduction

One of the major challenges on poultry breeding farms is infertility, and approximately 30% of the problems is attributed to the male (Khaki *et al.,* 2009). The reproductive potentials of male bird (cocks) are determined largely by the quality of the semen it produces (Glori and Isaendoi, 2015). Over the years, maintenance of fertile cocks in most poultry breeding farms has been difficult in hot humid tropical environments. Cocks with high semen producing capacity are often few and they degenerate due to changes in factors such as age, poor nutrition, unfavorable climatic conditions, and poor management. For good results in the artificial insemination of chickens, the quality of semen should be ensured (Alkan *et al.,* 2002). In Nigeria, many breeder farms often experience low fertility rate which could possibility result from the poor quality of the semen produced by the cock. This has led farmers to seek for ways to improve the semen quality and fertility rate of their birds. In a quest to solve the problem of low fertility and poor semen quality, many approaches has been suggested and or tried such as; the use of plant extracts, addition of antioxidants in animal diet , use of synthetic hormones as stimulators of reproductive performance and the use of agro industrial by-products like unfertilized eggs from the hatchery. The practice of feeding of unfertilized (boiled) eggs and ginger (singly and jointly) to boost cocks semen quality parameters have not been properly investigated and documented. In addition, this practice is been done without any standardization in terms of quantity that should be used and the frequency of use. This study focuses on the evaluation of semen quality of broiler breeder cocks when supplemented with varying levels of boiled egg and ginger at varying intervals with the ultimate aim of improving their reproduction efficiency.

Materials and Methods

The experiment was conducted at Adesina Farms, Kajola, Ogun State and Animal Reproduction Laboratory, Department of Animal Physiology, Federal University of Agriculture, Abeokuta, Ogun State. Nigeria. The experiment lasted for 10 weeks. Unfertilized eggs used for this study were obtained from Foresight Hatchery after candling operation while ginger rhizomes were obtained from a commercial market. Ginger was chopped into smaller pieces and air dried before grinding into powder. A total of 78 cocks(4.50 - 5.50 kg live weight) and 130 hens(3.0-3.5 kg live weight) aged 40 weeks were randomly divided into thirteen treatments groups (T_1,T_2,T_3,.....$T_{13.}$) of six cocks and ten hens each. Birds in treatment 2, 3, 4 and 5 were supplemented with boiled eggs alone at 1.0 and 1.5% once and twice in a week respectively. Birds in treatment 6, 7, 8 and 9 were supplemented with ginger

alone at 1.0 and 1.5% once and twice in a week respectively while treatments 10, 11, 12 and 13 were co-supplemented with egg and ginger.

The birds were housed in battery cages. Semen were collected through abdominal massage techniques which involved massaging the cloacal region to achieve phallic tumescence, followed by a cloacal stroke and a squeeze of the region surrounding the sides of the cloaca to express the semen. Each cock was massaged at the back and stroked close to its tail while slight pressure was applied around the cloaca, causing the tail to flatten towards the back of the bird and causing the phallus to protrude from the cloaca. Eggs were collected were appropriately tagged and were taken to Foresight Hatchery unit at Oluyole, Ibadan, Oyo State. Candling operations were carried out between day 7 and day 10 after setting. Eggs were incubated at a temperature of 37.8°C with 55%relative humidity (RH) for 14 days and then transferred to hatcher trays maintained at 37.2°C and 75% RH until hatching.

Semen was collected from all the cocks in each replicate using abdominal massage technique (Lake, 1957) and evaluated for semen quality characteristics. The collection was made once every week for three collections, between 7.00 h and 8.00 h. Semen volume was measured using graduated collection tube and was maintained between 38 - 42°C, until microscopically evaluated for semen quality. The semen concentration was measured using the direct cell count method. Live and dead percentage was determined using eosin-nigrosin staining method. Sperm motility was accessed using Celestron Penta View microscope (LCD–44348 by RoHS, China) at 400x magnification. Also, semen morphology to check the percentage of normal and abnormal cells of the spermatozoa was examined under microscope at 400 magnifications.

Results and Discussion

Effect of unfertilized breeder's eggs and ginger as feed supplement on semen quality and fertility of broiler breeder chickens are presented in table 1. Semen concentration, sperm motility, viability and morphology of ginger supplemented group shows superior quality than egg supplemented groups and groups that were co-supplemented with egg and ginger. While egg supplemented treatments shows better result in terms of volume than other groups. This study reported high motility rate in ginger supplemented group than others including the control group. This result agreed with the findings of Khaki *et al.* (2009) who reported a significant increase in sperm motility and viability in rat treated with 50 mg/kg and 100 mg/kg of ginger for twenty consecutive days. This is also supported by Aikten *et al.* (1995) who reported that conventional basic semen characteristics other than motility are not obviously influenced by the oxidative state of the semen. Increase in sperm concentration in ginger groups was in agreement with the finding of Essat *et al*. (2017) who reported an increase in sperm concentration of aged cocks when treated with ginger powder. Increase in sperm concentration could result in the protective effects of ginger powder. This protective effect could be reflected by the decrease of melonaldehyde level and total antioxidant capacity.

Table 1.Effect of unfertilized breeder'seggs and ginger as feed supplement on semen quality and fertility of broiler breeder chickens

Parameters	CTL	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	SEM	p-value
Viability	70.66^{g}	74.33^{bcde}	71.33^{fg}	71.33^{fg}	74b^{cd}	76.33^{abc}	72.00^{efg}	78.78a	78.67ab	74.00^{bcde}	74.33^{bcde}	73.33def	74.66a	0.45	<.0001
Semen vol (ml)	0.35^{f}	0.41^{cd}	0.45^{ab}	0.42^{bc}	0.47a	0.36ef	0.38^{def}	0.39^{cde}	0.39^{cde}	0.38^{def}	0.38^{def}	0.38def	0.37def	0.0058	<.0001
Morphology (%)	69.67^{i}	72.00^{h}	74.33^{g}	7.33^{efg}	75.67^{fg}	70.33^{cd}	80.33^{bc}	82.67a	82.69ab	76.67ef	78.00^{de}	77.33def	76.33efg	0.6	<.0001
Sperm motility (%)	69.67^{b}	76.00^{a}	76.00^{a}	75.00^{ab}	75.67^{a}	77.67a	78.67a	80.00a	80.00a	76.33a	76.00a	75.33a	74.00ab	0.58	0.0634
Sperm Conc (x10^{9})	3.53^{e}	3.75^{d}	3.96^{c}	4.07^{c}	4.03^{c}	4.29b	4.35ab	4.40^{ab}	4.47a	4.10c	3.98c	4.03c	4.09c	0.042	<.0001
Fertility	90.00^{d}	90.17^{cd}	93.00^{ab}	94.67^{a}	94.67a	93.00^{ab}	95.00a	95.00a	93.33^{ab}	93.33ab	93.7ab	92.00bc	0.36	<.0001	<.0001

^{bcdefgh} Means within each rows with different are significantly different ($p<0.05$); T2 = Egg at 1 g/kg once a week; T3 = egg at 1.5 g/kg once a week; T4 = egg at 1 g/kg twice a week, T5 = egg at 1.5 g/kg twice a week,T6 = Ginger at 1 g/kg once a week; T7 = Ginger at 1.5 g/kg once a week; T8 = Ginger at 1 g/kg twice a week, T9 = Ginger at 1.5 g/kg twice a week,T10 = Egg and Ginger at 1 g/kg once a week; T11 = Egg and Ginger at 1.5g/kg once a week; T12 = Egg and Ginger at 1 g/kg twice a week, T13 = Egg and Ginger at 1.5g/kg twice a week,

Decrease in number of abnormal cell in ginger treated group was supported by Essat *et al.* (2017) who reported that sperm abnormality was significantly lower in aged Egyptian cocks treated with dried ginger rhizome. This was also supported by Akhalaghi *et al.* (2014). The anti-apoptotic antilipidemic properties of ginger could also result in decrease in number of abnormal cell as reported by (Khaki *et al.,* 2017). The result obtained on semen volume shows that there was significant increase in semen volume in all groups with egg supplemented group having more volume. This could possibly be due to the presence of vitamins in egg albumen and egg yolk. This agreed with the result of Zanini *et al.* (2003) who reported an increase in semen volume in WL–Roosters after being fed with vitamin E dietary additive. Increase in semen viability of ginger supplemented group could possibly be due to improved spermatogenesis as a result of the ginger components which is believed to have biological active agents including androgenic, antioxidant and antimicrobial effects (Ghayur and Gilani, 2005). Increase in sperm concentration in ginger groups was in agreement with the finding of Essat *et al*. (2017) who reported an increase in sperm concentration of aged cocks when treated with dried Ginger powder. Increase in sperm concentration could result from the protective effect of ginger powder.

Conclusion

It can be concluded that the supplementation of ginger in broiler breeder operation has a positive effect on semen parameters.

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