EFFECT OF ALOE VERA GEL ON SEMEN PRODUCTION AND QUALITY CHARACTERISTICS OF NOILER COCKS

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ABSTRACT
A total of twelve (12) healthy Noiler cocks, with an average weight 4.3kg were randomly allotted to three experiment groups in complete randomized design. Treatment one (T1) was provided with aloe vera free water while treatments two (T2) and three (T3) were provided with 10% and 20% aloe vera gel per litre of drinking water respectively. The cocks were housed individually and were fed with commercial grower diet. Feed and water were offered *adlibitum* throughout the two months experiment period. Data collected from the study included semen colour, ejaculate volume, motility, semen concentration and live sperm cells percentage. The data obtained were subjected to statistical analysis. The result showed that semen color were similar for all groups. There was significant ($P<0.05$) impact of the aloe vera gel on ejaculate volume, motility, sperm concentration and live sperm cells percentage. Ejaculate volume was higher ($P<0.05$) for cock on 20% aloe vera gel compared to the control and 10% inclusion. It was concluded from the study that 20% aloe gel had better semen quality than 10% and control, hence based on this aloe gel can enhance semen characteristics in adults Noiler cocks at 20% inclusion level.
Key words: Aloe vera gel, Noiler, Semen production, Semen quality.

INTRODUCTION
Local chickens are important in overall food production systems in developing economies mostly because of their adaptation to the tropical environment. They may appear to produce less than highly specialized commercial breeds; however, they possess attributes that make their sustainability on available local resources more ecological and economical in the long term. Incorporation of the Nigerian local chicken as a parent breed stock in the nation's breeding programme is important to meet the increase in poultry product demand by the citizenry (Adeoye *et al*., 2017). Noiler is an improved breed of chicken that have some adaptive features of local chicken. It however, grows faster and bigger. They are dual purpose hardy breed. They require low technology inputs and are becoming popular among back yard farmers (Olurundare, 2015).
Resistance of pathogenic microorganism to drugs frequently as feed additive on poultry production has made scientist to focus on medicinal plants (aloe vera, neem, mulberry leaves etc.) to improve nutritional and health status of poultry (Babak *et al*., 2011). The consumption and demand for medicinal plants in poultry production have been adopted in many countries because of its low cost, availability, affordability for a common farmer, good antimicrobial nature, reduced diseases associated risks, lowering blood cholesterol level and diversified functions in improving performance in birds. *Aloe vera* is a wild plant, however its application in the domestic society cannot be over emphasized (Darabighane and Nahashon, 2014). The most important part of *Aloe vera* is its leaf which is composed of two main sections: latex and gel. The gel composed of about 98.5% to 99.5% water, Polysaccharides (glucomannan and acemannan) Others are carboxypeptidase, magnesium, zinc, calcium, glucose, cholesterol, salicylic acid, prostaglandin precursors (gammalinolenic acid [GLA]), vitamins A, C, E, lignins, saponins, plant sterols and amino acids (Sharrif and Sandeep, 2011).
Modaresi and Khodadadi (2014) reported that aloe vera extract in Mice affected spermatogenesis directly via stimulating activity of germinal cells and cell division and also indirectly via stimulating leydig cells and increasing testosterone. The assessment of semen quality characteristics of poultry birds gives an excellent indicator of their reproductive potential (Hani *et al*., 2016).

The aim of this study was to determine the effect of aloe vera gel on the semen characteristics of Noiler cocks.

MATERIALS AND METHOD

Location

The study was conducted at the teaching and research farm of Federal Polytechnic Bauchi, Nigeria. Bauchi is on latitude 10^{0C} 27'North, 9^{0c}49' East at an altitude of 690.2 meters above sea level (Zaharaddeen *et al*., 2005).

Experimental Birds and Management

A total of twelve apparently healthy Noilers cocks, with an average weight of 4.3kg were used for the present study. The cocks were obtained from back yard poultry farmers in Bauchi metropolis. They were individually housed single in a well-ventilated cage. They were fed a commercial grower diet. Fresh water was given, medical care such as deworming and broad spectrum anti-biotic were provided during the adjustment period. The twelve cocks were weighed and randomly divided into three treatments (i.e. four cocks per treatment).The control group (T1) were provided with plain water while treatment T2 and T3 were provided with 10 and 20ml aloe-Vera gel per litre of water respectively.

Preparation of Aloe Vera Gel Infusion

Aloe Vera gel infusion was prepared according to method of Durrani *et al*., (2008). Fresh aloe Vera was collected from garden for extraction of the gel. The extraction from the leaf was done manually by making a cut, using a small knife. Latex of the leaf was remove and gel was collected in a beaker. The 10% and 20% concentration infusion were prepared by mixing 100g and 200g of fresh gel in a glass bottle and one litre of boiled water at room temperature was shaked for 5-7 minutes to ensure through mixing and was then kept for 6-8 hours at room temperature prior to usage.

Semen Collection and Evaluation

Prior to the collection of the semen, the birds were subjected to preliminary training for two weeks to enable them produce enough semen during actual semen collection exercise. Semen was collected twice a week using abdominal massage methods (Quinn and Burrow, 1936). Semen colour was obtained by visual appraisal of the sample. Volume was determined using a calibrated pipette. Motility of cells were obtained by placing a drop of the sample on a glass slide and observed with a microscope using low power at X10 and X40 magnification respectively. The results were graded from 1 to 5 (Tarif *et al*., 2013). To determine concentration, the sample was diluted with normal saline at 1:400. Hemocytometer was filled with the diluted semen by capillary action. The hemocytometer was then mounted and the sperm cells were counted and expressed as billion per ml. Eosin was used to determine the live sperm percentage. The stain was prepared by dissolving 1.67g of eosin, and 2.9g sodium citrate with two molecules of water in 100ml distilled water. The stain was filtered before use. Briefly, a 10µl drop of fresh semen was mixed with 200µl of eosin stain on a glass slide followed by making a thin smear of it. The spermatozoa were examined at 400x magnification under a phase contrast microscope. At least 100 spermatozoa were counted to determine the percentage of live sperm spermatozoa. The spermatozoa which appeared pink (stained with eosin) were regarded as dead while those not stained (no penetration of eosin stain) were regarded as live (Tarif *et al*., 2013).

Statistical analysis

The data were were subjected to analysis of variance in a completely randomized design using SPSS software (ver.20.0 for windows, IBM SPSS) Means were compared for significance of differences by Duncan multiple range test (Duncan, 1955).

RESULTS AND DISCUSSION

Table below showed that the ejaculate volume varies ($P<0.05$) at 20% percent level of aloe gel from control and 10% inclusion. The semen volume obtained in this study was within the range (0.2 to 0.8ml) for red and white Shika brown as recorded by Rwaan *et al.* (2009). The motility of the semen was significant at 10% ($P<0.05$), followed by 20% level of aloe vera gel and the least ($P<0.05$) in control

group. The values for motility in this study were within the range of 61.22 to 83.00 recorded by Adeoye *et al*. (2017). The motility of the sperm cells suggests the number of sperms assumed to be capable of advancing from the point where semen is deposited in the course of insemination to the sperm storage tubules in the hen (Adeoye *et al*., 2017). Semen concentration was highest at 20% aloe vera gel and least at 0% (control group). The semen concentrations in the present study were similar to range 1.58 to 2.78 billion cells reported Saleh *et al*. (2018) for FUNAAB-alpha cocks but lower than values 8.6 to 9.5/ml obtained in different lines of cocks as recorded by Tariff *et al*. (2013) in Bangladesh.

The proportion of live sperm varies from 68.4 to 74.4% in the present study. Live sperm were highest ($P<0.05$) at 20% aloe gel compared to 10% and control. This is within the range of 45 to 80 as recorded by Rwaan *et al*. (2009) for White Shika brown challenged with New castle disease and those administered vaccine.

Table 1: Semen quality characteristics of Noiler Cocks fed Aloe vera Gel

Treatments	**Ejaculate Volume(ml)**	**Semen Color**	**Motility (%)**	**Semen Concentration X 10^9**	**Live Sperm (%)**
Control (0%)	0.40^{b} ±0.00	Milky	60.00 ± 0.00^{c}	2.07 ± 0.21^{c}	68.40 ± 0.51^{b}
10% Aloe Gel	0.41^{b} ±0.02	Milky	70.52 ± 0.18^{a}	2.56 ± 0.20^{b}	69.40 ± 0.93^{b}
20% Aloe Gel	0.50^{a} ±0.00	Milky	66.20 ± 0.81^{b}	4.31 ± 0.19^{a}	74.40 ± 1.03^{a}

^{a,b,c,}……means within each column with different superscript differ significantly at $P < 0.05$

CONCLUSION

It was concluded that 200g of *aloe vera* gel per litre (20%) of improves semen quality of noiler cocks drinking water can have influence on semen parameters at 20% inclusion level of adult Noiler cocks. However, further studies should examine its effect on morphology of spermatozoa as well as testicular morphology and histology.

REFERENCES

Adeoye, G.O., Oleforuh-Okoleh, V.U. and Chukwuemeka, U.M. (2017) Influence of Breed Type and Age on Spermatological Traits of Nigerian Local Chickens.*Journal of Tropical Agriculture, Food, Environment and Extension***16 (**1): 11 – 16.

Babak D., Abolfaz, Z., Ahmad Z. S. and Ali, M. (2011) Effects of different levels of *Aloe vera* gel as an alternative to antibiotic on performance and ileum morphology in broilers, *Italian Journal of Animal Science*, **1**:189-194

Darabighane, B. and Nahashon, S.N. (2014). A Review on Effects of Aloe Vera as a Feed Additive in Broiler Chicken Diets *Annals Animal Science.***14** (3): 491–500.

Duncan, D. B. 1955 Multiple Range and Multiple F-Test. *Biometrics***11**:1-42.

Durrani F. R., Sanaullah, N., Chand, Z. and Akhtar, S. (2008). Using of aqueous extract of aloe gel as anticoccidial and immune stimulant agent in broiler production. *Sarhad Journal of Agriculture*.**24**: 666-670.

Frydrychova, S., L Opletal, K Maca´ kova, A Lustykova´ , M Rozkot and J Lipensky´(2010) Effects of Herbal Preparation on Libido and Semen Quality in Boars *Reproduction in Domestic Animals* **1**:1-5

Hani N. H., Ahmed S. S., Basheer M.A., Hasafa, T. R. Al-Khatib Sardar Y. S. and Jamil S. T. (2016) Evaluation Semen Characterization of Roosters Resulted from Different Local Lines and Their Crosses with ISA Brown. *International Journal of Agricultural Science.* **1:**7-14

Modaresi, M., and Khodadadi A. (2014) The Effects of Aloe vera Extract on Reproductive Parameters in Mice. International Conference on Biological, Environment and Food Engineering (BEFE-2014) August 4-5, 2014 Bali (Indonesia).

Olurundare, O. S. (2015) Bauchi Workshop on Amo-Noiler Breed. R and D product of the year. Amo Farm Sierberer Hatchery Limited. 2nd September 2015.

Quinn, J. P. and W. H. Burrows, (1936). Artificial Insemination in fowl. *Journal of Heredity*, **27**: 31-37.

Rwaan, J. S., Rewot, P. A., abdu, L.O., Eduvie and J. A. Obidi (2009) Semen Characteristics of Vaccinated Shika Brown Cocks Challenged with a Velogenie Newcastle Disease Virus. *International Journal of Poultry Science***8** (9): 896-901.

Saleh, B., Duwa, H., Mohammed, A. A., and Raymond, J. B. (2018) Semen Quality of FUNAAR- alpha Cocks in a Sudano-Sahelian Region of Nigeria. In: Proceeding of 7th ASAN-NIAS Joint Annual Meeting, Ilorin 9th – 13th September, 2018 Pp. 150-153.

Sharrif, M. M. and Sandeep K. V. (2011) Aloe vera their chemicals composition and applications: A review. *International Journal of Biological & Medical Research***2** (1): 466-471

Tarif, A. M. M., Bhuiyan, M. M. U., Ferdousy, R. N., Juyena, N. S. and Mollah M. B. R. (2013) Evaluation of semen quality among four chicken lines. *IOSR Journal of Agriculture and Veterinary Science* **6** (5):07-13

Zahraddeen, D., Butswat, I.S.R., Kalla, D. J. U. Sir, S.M. and Bukar, M.T. (2005) Effect of Frequency of Ejaculation on Semen Characteristics in Two Breeds of Turkeys (*Meleagris gallopavo*) raised in a Tropical Environment. *International Journal of Poultry Science* **4** (4): 217-221