

EFFECTS OF MANAGEMENT SYSTEMS ON SEMEN CHARACTERISTICS OF INDIGENOUS AND EXOTIC LAYER TYPE COCKS

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Target Audience: Animal scientists and poultry breeders.

ABSTRACT

Sixteen adult layer type cocks comprising local and exotic genotypes were used to determine the effect of management systems on semen characteristics. Ejaculates from cocks of the different treatments were evaluated for semen volume, sperm concentration, sperm vigour, semen colour and consistency; and percentage live and dead sperm cells. Result showed significant ($P<0.01$) effects of genotype and treatment on semen volume and progressive motility. Treatment effect within genotype (interaction) was significant ($P<0.05$) for parameters like concentration and percentage live and dead sperm. Mean values for sperm concentrations, semen volume, sperm vigour, progressive motility and percentage live and dead sperm cells were higher ($P<0.01$) in cocks reared in confinement. Effect of treatment on percentage live and dead sperm cells was more significant ($P<0.01$) than the genotype effect ($P<0.05$). Mean values for aforementioned parameters were significantly ($P<0.01$) higher in the local than exotic cocks. This study indicates that free range system of management has negative effects on semen qualities of cocks especially the exotic cocks.

Key words : Management systems, semen characteristics , indigenous and exotic cocks.

DESCRIPTION OF PROBLEM

Poultry remains an important source of animal protein and industrial products. The profitability of any poultry enterprise just like that of livestock depends on quite a good number of factors including fertility. Male fertility on the other hand depends on semen quality. Various workers (1, 2, 3, 4) have reported direct or indirect effect of light and temperature on semen characteristics. Other reports (5, 6, 7) prove that genotype has important effects on semen production and quality. This suggests that semen quality may be inherited. The effects of season on semen quality with concomitant effects on fertility in birds have also been reported (8). Clark and Sarakoon (2) observed high significant decrease in semen volume with advancing age. This is contrary to the report by Wilson *et al.* (9) who reported no detrimental effect of age on semen quality. While nutritional deficiency and starvation may have a marked reduction in semen quality, feed restriction may not have any effect on the productive performance of breeder males.

Practically, chickens are reared in Nigeria under two husbandry systems viz : confined and free range. These systems differ in so many ways with respect to management. The difference in genotype and rearing system as well as their interaction may have effects on the reproductive ability of the male birds. It is on this expectation that this work was designed so as to determine the best rearing condition for local and exotic cocks.

MATERIALS AND METHODS

Experimental Birds

Sixteen cocks comprised of 8 exotic (Anak) and 8 local layer type cocks were used for the study. The exotic cocks were sourced from the Poultry Breeding Unit of the Department of Animal Science, Ebonyi State University, Abakaliki, Nigeria while the local cocks were sourced from the residential quarters of the same University. The local and exotic cocks were within the age range of 8 - 9 months. Half each of the exotic and local cocks were reared under confinement while the remaining half of each genotype were reared on free range.

Semen Collection

Cocks on free range were driven into poultry house at night before semen collection and semen was collected from each of them early in the morning of the following day before releasing them. Semen collection was also effected from the confined groups the same morning. Semen collection was done weekly for all cocks for a period of 4 weeks. The procedure for all semen collection was as described by Hafez. (10).

Semen Evaluation

Each ejaculate was evaluated for semen characteristics as volume, colour, sperm motility, vigour, concentration and percentage live and dead sperm cells. This involved visual or gross evaluation for some parameters. Colour was evaluated using the criteria by Omeje and Marire (7) which was based on semen appearing creamy white, milky, watery and contaminated. Progressive sperm motility was determined using the procedure (11) which involved putting a drop of semen on a clean slide and viewing under a microscope at x 100 magnification. Semen concentration was determined by means of a haemocytometer, and number of sperm cells per sample was calculated according to Ekpenyong (12). The percentage live and dead sperm cells were evaluated using the eosin-migrosin vital staining technique in which sperm cells with stain (to any degree) were considered dead while those without stain were considered to be alive.

Statistical Analysis

Variance of all the semen characteristics was tested by F-ratio (13). The significantly different mean values of the treatment groups for each semen trait were separated using the Duncan Multiple range test (14).

RESULTS AND DISCUSSION

Table 1 shows that there is highly significant ($P < 0.01$) difference in semen volume

(local = 0.2ml; Exotic = 0.01ml) and sperm concentration (local = 5.84×10^6 cells/ejaculate, Exotic = 1.98×10^6 cells/ejaculate) of the local and exotic cocks.

Table 1. Mean effects of genotypes on semen characteristics.

Parameter	Genotype treatment (Means \pm SE)	
	Local	Exotic
Semen volume (ml)	0.21 ^a \pm 0.07	0.01 ^b \pm 0.04
Semen concentration ($\times 10^6$ cells/ejaculate)	5.84 ^a \pm 0.2.04	1.98 ^b \pm 0.41
Sperm vigour (scores)	3.86 ^a \pm 0.53	3.03 ^b \pm 0.76
Progressive motility %	64.42 ^a \pm 6.96	59.71 ^b \pm 6.0
% dead sperm	20.07 ^a \pm 10.78	16.62 ^b \pm 4.63
% live sperm	82.23 ^a \pm 2.43	65.14 ^b \pm 10.6

The sperm vigour, progressive motility and percentage live sperm show a significant ($P < 0.05$) difference in the two genotypes. It implies that the local cocks are superior to the exotic in most of the parameters under natural breeding condition. This conforms with the findings (7) that sperm quality is an inherited trait. There is no significant difference in sperm colour.

As shown in Table 2, there were highly significant ($P < 0.01$) differences in sperm volume, concentration, vigour, percentage dead and live sperm cells of confined and free range cocks. Rearing system also had significant ($P < 0.05$) influence on percentage progressive motility of sperm cells. These demonstrate the superiority of the confined over the free range system of poultry production vis-a-vis semen quality. Similar findings have been reported (6,15) which stated that good feeding and management practices associated with confined rearing system may be responsible for the better semen quality in confined cocks. No significant difference was observed in semen colour and consistency in the different genotypes and rearing conditions.

Table 2. Mean effects of management system on semen characteristics

Parameter	Treatment (Means \pm SE)	
	Confined	Free range
Semen Volume (ml)	0.25 ^a \pm 0.04	0.04 ^b \pm 0.01
Semen concentration ($\times 10^6$ cells/ejaculate)	5.56 ^a \pm 1.85	3.76 ^b \pm 0.97
Sperm vigour (scores)	4.51 ^a \pm 0.23	2.16 ^b \pm 0.43
Progressive motility %	67.33 ^a \pm 4.22	56.57 ^b \pm 7.21
% dead sperm	16.28 ^a \pm 3.54	38.92 ^b \pm 11.1
% live sperm	83.76 ^a \pm 3.50	60.96 ^b \pm 10.9

CONCLUSION AND APPLICATION

It can be concluded from this study that the best condition for rearing breeding cocks is the confined system with better results when local cocks are used.

REFERENCES

1. **Kosin, I. L.** 1968. Reproduction of poultry. In: *Reproduction in farm animals*. 2nd edition. Hafez, E.S.E. Lea and Febiger, Philadelphia . Pp 301 - 1319.
2. **Clark, C.E. and Sarakoon, K.** 1967. Influence of ambient temperature on reproductive traits of male and female chickens. *Poultry Science* 46: 1093 - 1104.
3. **Huston, T.M.** 1969 .The influence of environmental temperature on spermatogenesis and fertility of domestic fowl. *Poultry Science* . 48: 1825 - 1833.
4. **Onuora, G.I.** 1982. Seasonal variation in semen quality in the Guinea fowls. *Nig. Vet. J.* 11 : 8 - 15.
5. **Marini, P.J. and Goodman, B.L.** 1969. Semen characteristics as influenced by selection for divergent growth rate in chickens. *Poultry Science* 48 : 859 - 865.
6. **Saeid, J.M. and Alsoudi, K.A.** 1975. Seasonal variation on semen characteristics of White Leghorn, New Hampshire and indigenous chickens in Iraq. *Poult. Sci* 16: 97 - 102.
7. **Omeje S.I. and Marire, B.N.** 1990. Evaluation of the semen characteristics of adult cocks of different genetic backgrounds. *Theriogenology* 34 (6) : 1111 - 1118.
8. **Nayak, N.R. and Misra M.S.** 1991. Relation of environmental factors with some important traits of broiler semen. *Indian J. Poult. Sci.* 26 (2): 117 - 188.
9. **Wilson, H.R., Piesco, N.P., Miller, E.R and Nesbeth, W.G.** 1979. Prediction of the fertility potential of broiler breeder males. *World Poult. Sci.* 35 (2) : 95 - 11.
10. **Hafez, F.S. E.** 1990. Artificial Insemination. In : *reproduction in farm animals*. Ed. Hafez F.S.E. 5th edition Lea and Febiger, Philadelphia. Pp 481 - 497.
11. **Boone, M.A. and Huston, T.M.** 1963. Effect of high temperature on semen production and fertility in the domestic fowl. *Poultry Science* 42: 670 - 676.
12. **Ekpenyong I.J.** 1983 . Semen examination. In: *Manual of Veterinary clinical Laboratory practice* (Unpublished).Pp 34 - 37.
13. **Snedecor, G.W. and Cochran, W.G.** 1978. *Statistical Methods*, 6th ed. The Iowa State University Press, Ames, Iowa.
14. **Duncan, D.B.** 1955. Multiple range and Multiple tests. *Biometrics* 11 : 1 - 42.
15. **Egbunike G.N. and Dede, T.I.** 1980. The influence of short term exposure to tropical sunlight on boar seminal characteristics. *Int. J. Biometrics* 24 (27) : 129 - 135.