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Effect of Management Systems on Semen Quality of Muscovy Drakes

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Abstract: Semen quality of muscovy drakes was studied in a randomized complete block design (RCBD) under semi-intensive management system (SI), intensive system with wallow (IW) and intensive system without wallow (IO) using 12 active drakes in plot containing 60 female Ducklings. Semen collected by manual massage method 3 times at 5 days intervals beginning from week 33 showed that semen volume, sperm motility and sperm count were significantly higher ($P<0.05$) in SI and IW than IO. Semen volume of the drakes under the three management systems ranged from 0.20mls to 0.30mls with IW and IO being the highest (0.30mls) and least (0.20mls) respectively. Drakes reared under IO produced significantly least percent sperm motility (68.58), whereas, those reared under SI (75.42) and IW (76.67) produced significantly higher percent sperm motility. Drakes reared under IO gave the least (95.58 per ml. of ejaculate) sperm count. This is closely followed by drakes reared under IW (107.83) and SI (109.17) respectively. There were no significant differences ($P>0.05$) in the proportion of normal sperm and semen pH that could be attributed to management systems adopted; but sperm concentration of drakes in the 3 management systems varied significantly ($P<0.05$) being 1761.67 x 10^6/ml (SI), 1801.67 x 10^6/m (IW) and 1700.00 x 10^6/ml (IO). In conclusion, availability of Swimming water in the range and wallow contributes positively to the semen quality of Drakes.

Key words: Management systems, muscovy drakes, semen quality

Introduction

Good breeding programmes require "active" males. In the extensive system of duck management, drakes mate ducks at random, and genetic combinations are not controlled. In confined and semi-confined systems, selected drakes are allowed to run with ducks, and as such, the chances of obtaining expected results of breeding are enhanced. The inclusion or non-inclusion of drakes in a flock is dependent upon the purpose of production. If table eggs only are desired, no drake is necessary since fertilized eggs spoil sooner due to embryonic development. Where fertile eggs are desired, drakes are essential. The number of drakes that will produce optimum fertility in a flock forms what is referred to as mating ratio. For instance, Mopate *et al.* (1997) observed 3.4 ducks per drake in Chad, while Ola (2000) used 10 females to 2 drakes with Nigerian native muscovy ducks. Nickolova (2004) used 1:6 drakes to ducks where 99.27% egg fertility was obtained. But housing method influences the quality of semen produced by drakes, hence fertility of flock considering earlier report (Setioko and Hetzel, 1984). Season (Ezekwe and Machebe, 2004; Nickolova, 2004), as well as age (Gerzilov *et al.*, 2004) are the other factors noted to have effect on semen quality of avians. This experiment was thus set up to investigate the effect of management systems on semen quality of Nigerian native muscovy drakes.

Table 1: Composition of Experimental Diets

Nutrients (%) DM basis)	Diet A	Diet B	Diet C
Crude protein %	17	16	16
Crude fat %	3.81	4.05	4.80
Crude fibre %	8.60	6.11	8.89
Calcium	0.64	1.01	2.98
Phosphorus	0.70	0.49	0.42
Dry matter	84.81	84.61	82.46
Metabolizable energy (Kcal/kg)	2848.90	2607.98	2713.44

Materials and Methods

This experiment was conducted at the poultry unit of Akwa Ibom State College of Agriculture, Obio Akpa, Nigeria. In a plot containing 60 female ducklings, twelve male ducklings were introduced all at the same age of four weeks. These were divided randomly into three treatments (semi-intensive SI, intensive system with wallow IW, and intensive system without wallow (IO) and further sub-divided into 2 replicates each containing 2 males and 10 females. Ducklings were fed diet A, containing 17% CP and 2848.90 Kcal/kg energy for four weeks, followed with diet B, containing 16% CP and 2607.98 Kcal/kg energy till about 30 weeks of age. From thence onward, they were fed diet C, containing 16% CP and 2713.44 Kcal/kg energy (Table 1).

Ducklings under intensive systems were fed *ad libitum* while those in semi intensive were fed twice daily with experimental diets and were allowed to scavenge in

Table 2: Semen characteristics of Muscovy drakes under three management systems

Parameters		SI	IW	IO
Semen volume (mls)	Week 33	0.28^{a}±0.03	0.29^{a}±0.01	0.21^{b}±0.01
	Week 38	0.24^{b}.±0.02	0.30^{a}±0.01	0.19c±0.01
	Week 43	0.29^{a}±0.01	0.30^{a}±0.01	0.19^{b}±0.01
	Mean	0.27^{b}±0.01	0.30^{a}±0.01	0.20c±0.01
Sperm concentration	Week 33	1737.50±34.73	1772.50±45.1	1697.50±24.62
(X 106 /ml)	Week 38	1750.00^{a}±14.72	1792.50^{a}±11.09	1692.50^{b} ±17.50
	Week 43	1797.50^{a}±13.77	1840.00^{a}±33.91	1710.00^{b}±14.72
	Mean	1761.67^{b}±14.42	1801.67^{a}±19.36	1700.00c±10.38
Sperm motility (%)	Week 33	74.75^{a}±2.18	77.00^{a}±0.71	68.50^{b}±1.44
	Week 38	76.00^{a}±0.71	75.25^{a}±2.14	67.50^{b}±1.50
	Week 43	75.50^{a}±0.96	77.75^{a}±0.25	69.75^{b}±1.70
	Mean	75.42^{a}±0.76	76.67^{a}±0.75	68.58^{b}±0.86
Sperm count (per ml of ejaculate)	Week 33	108.00^{a}±1.23	105.00^{a}±1.96	92.00^{b}±3.62
	Week 38	109.00±0.71	107.75±3.45	100.25±1.89
	Week 43	110.50^{a}±1.32	110.75^{a}±0.75	94.50^{b}±3.75
	Mean	109.17^{a}±0.66	107.83^{a}±1.41	95.58^{b}±1.88
Percentage normal sperm	Week 33	78.25±1.11	79.25±1.55	81.50±0.50
	Week 38	81.25±0.25	82.00±0.82	80.50±0.87
	Week 43	81.00±0.58	80.92±0.69	81.33±0.42
	Mean	80.17±0.58	80.92±0.69	81.33±0.42
PH of semen	Week 33	7.40±0.05	7.48±0.03	7.48±0.03
	Week 38	7.50±0.04	7.48±0.05	7.53±0.03
	Week 43	7.48±0.03	7.50±0.00	7.48±0.06
Mean		7.47±0.02	7.48±0.02	7.49±0.02

abc Treatment means with similar superscripts along the same row are not significantly different (P>0.05)

addition. All ducklings were on deep litter in cement-walled and asbestos-roofed house.

At the age of 32 weeks, ducks were trained daily on semen collection using manual massage method while actual collection for analysis started on week 33. Drakes were transported carefully between 0600 hours and 0800 hours to the laboratory of National Veterinary Research Institute, Umudike centre where semen culture and analysis were carried out. Anti-stress was administered in water on arrival and drakes were well fed too. Semen extracted from drakes was submitted instantly for analysis.

Similar procedures were repeated at weeks 38 and 43; and data obtained during the three trials were analysed by two-way analysis of variance according to Steel and Torrie (1980) while significantly different means were separated with Least Significant Difference (LSD) as described by Snedecor and Cochran (1996). All semen collection was carried out during the rainy season between the months of June-August.

Results and Discussion

Effect of management systems on semen quality of muscovy drakes are presented in Table 2. There was no significant difference (P>0.05) between SI and IW in respect of semen volume produced; but drakes in both treatment produced significantly more (P<0.05) semen than those under IO during first and third ejaculation trials. Semen volume of drakes in the three groups varied significantly (P<0.05) during the second collection (week 38); and mean volume of the three collections also varied significantly too.

Gerzilov *et al.* (2004) noted that age did not exert an effect on ejaculate volume of muscovy drakes. Sperm concentrations of drakes in the three groups also varied significantly (P<0.05) being 1761.67 million/ml (SI), 1801.67 million/ml (IW) and 1700 million/ml (IO); although there was no treatment effect during week 33. Drakes under intensive system without wallow produced sperms with significantly (P<0.05) least percentage motility (68.58%), whereas there was no significant difference (P>0.05) between percentage motility of sperms from drakes under SI and IW (75.42% and 76.67% respectively).

Similarly, SI and IW did not differ significantly (P>0.05) considering sperm count (109.17, 107.83), but both groups differed significantly (P<0.05) from IO (95.58). The highest count was 110.75 from drakes under intensive system with wallow during week 43, while the least count (92) was obtained from drakes under intensive without wallow during week 33.

Semen volume in this experiment were lower than earlier report (Gerzilov *et al.*, 2004); and the disparities in volume agrees with report of Setioko and Hetzel (1984) who stated that housing system affect semen volume of drakes. The use of manual massage method for semen collection may also be the reason for lower semen volume in this experiment. Setioko and Hetzel

(1984) had earlier averred that artificial vagina method produced more semen than the manual massage. However, sperm motility observed in this study were similar to earlier reports (Kachava *et al.,* 2004 and Gerzilov *et al*., 2004).

The availability of swimming water in the range and wallow in this experiment may have had effect on these semen parameters considering the fact that drakes in Sl and IW with access to swimming water tend to do better as per the semen characteristics than drakes without access to wallow. However, results of percentage normal sperm in the three management systems did not show any significant (P>0.05) treatment effect being 80.17% (Sl), 80.92% (IW) and 81.33% (IO) on the average. Semen pH averaged 7.47, 7.48 and 7.49 respectively but did not show any significant treatment effect (P>0.05) too.

Conclusion: Semen from drakes with access to swimming water whether in confinement or semi-confinement were more in volume, had better sperm concentration, higher sperm counts and higher motility than semen from drakes without access to swimming water. Wallow is, therefore, necessary for breeding drakes considering the fact that these parameters are essential for maintaining good level of fertility in breeding stock.

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