

# SEMEN QUALITY CHARACTERISTICS OF PEARL GUINEA FOWLS RAISED UNDER CAGE SYSTEM

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## ABSTRACT

*The low fertility percentage is one of the major constraints for the commercial exploitation of Guinea fowl. Semen quality is one of the major determinants of fertility. Therefore, the study was carried out to screen the seminal parameters of pearl Guinea fowls as a way to analyze the possibility of artificial insemination in the above species. Twenty two male Guinea fowls were initially caged and trained for semen collection by abdominal massage technique. Semen was collected and the seminal parameters like semen volume, colour, consistency, pH, spermatozoa concentration ( $10^6/ml$ ), spermatozoa motility (%), live spermatozoa (%) and abnormal spermatozoa (%) from individual birds were studied. Further, pooled semen from superior males selected based on the above seminal parameters were also analyzed. Based on the results it is recommended that culling of males with poor seminal attributes may have a positive impact on fertility either through artificial insemination or by natural mating thus paving way for faster genetic improvement in Guinea fowls.*

**Key words:** Semen quality, Guinea fowls, Fertility

## INTRODUCTION

Guinea fowls are semi-domesticated birds in which the fertility percentage is less compared to other poultry species. This may be due to narrow sex ratio, poor sexual dimorphism, seasonality of breeding, monogamous behavior and probable inbreeding. In addition, the male gonads in Guinea fowl are small and semen volume is scanty. Therefore, in order to improve the fertility and to fasten up the genetic gain an assisted reproductive technology of artificial insemination may be implemented. The first step of artificial insemination is collection of semen and analysis of its quality parameters. Hence, the current study was carried out to access the basic seminal parameters of Guinea fowl thus analyzing further possibilities of improving fertility in the above species.

## MATERIALS AND METHODS

Twenty two male Guinea fowls of pearl variety, aged one year were housed in individual

cages providing a floor space allowance of 1.5 sqft/ bird. The birds were maintained under standard managerial conditions and were trained for semen collection by abdominal massage technique. Semen was collected during early hours of the day, twice a week as per the procedures described by Burrows and Quinn (1937). The pearly white drop of ejaculate coming out of the papillae was directly aspirated into a sterile glass tuberculin syringe without any contaminants and then transferred into the sterile eppendorf tubes. The tubes were then kept in a water bath at 18°C to 20°C for further semen quality evaluation. The semen was analyzed for its volume, colour, consistency, pH, spermatozoa concentration, spermatozoa motility, live spermatozoa and abnormal spermatozoa. Pooled seminal attributes from sixteen birds selected based on its superiority in individual seminal parameters were also analyzed.

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The volume of semen collected was measured directly in the graduated tuberculin syringe with 0.01 ml accuracy. The semen color was noted as grayish, pearly white or dirty and the consistency as thick, moderate or watery. The pH of the freshly collected semen samples were assessed by placing a drop on a strip of limited range pH paper (Merck India 6.5-9.0) with an accuracy of 0.5 and the color developed was compared with standards given. The motility of spermatozoa in individual and pooled semen samples were assessed by placing a small drop of semen in the middle of clean grease free glass slide, which was covered with a cover slip and examined under microscope. The overall spermatozoa motility was assessed and expressed as described by Parker et al. (1942). The spermatozoa concentration in individual and pooled diluted semen samples was determined using NEUBAUER type haemocytometer and the final concentration of spermatozoa was expressed as millions/ml according to the procedure of Allen and Champion (1955). The spermatozoa viability was determined in fresh and diluted semen by eosin - nigrosin staining procedure as described by Bakst and Cicil (1997). The same slides stained for the assessment of live and dead spermatozoa were used for abnormal spermatozoa and a maximum of 200 spermatozoa were counted and expressed in percentage.

## RESULTS AND DISCUSSION

The semen characteristics of 22 numbers of trained individual Guinea fowl males and pooled raw semen from selected males were presented in table: 1 and 2 respectively.

The mean semen volume observed in this study was in accordance with the previous studies by Mohan et al. (2013) in pearl Guinea fowls and Keerthy (2014) in white breasted (0.041±0.005) Guinea fowls. The volume observed in this study was higher than those reported by Keerthy (2014) in pearl Guinea fowls (0.027±0.002). Most of the birds yielded pearly white semen with thick consistency.

The mean semen pHs observed in this study were 7.23±0.03 and 7.19±0.01 in trained individual males and pooled semen samples from selected males, respectively. Moderately lower (7.15±0.01) and higher (8.10±0.03) values were observed by Mohan et al. (2013) and Keerthy (2014) respectively in pearl Guinea fowls.

The mean per cent spermatozoa motility of trained individual and pooled semen from selected males observed in this study were 74.28±3.09 and 81.47±1.52 respectively. The values were higher than the value (37.1±0.1) reported by Nwakalor et al. (1988) in Golden Sovereign Guinea fowl and lower than the values reported by Mohan et al. (2013) and Keerthy (2014) in pearl variety Guinea fowls.

The mean spermatozoa concentration of trained individual and pooled semen from selected males observed in this study was 1309.50±229.52 and 1408.75±83.21×10<sup>6</sup> respectively. The values obtained was lower than the earlier reports by Hess et al. (1986), Nwakalor et al. (1988), Singh (1989) and Mohan et al. (2013) with corresponding values of 3.087±0.398×10<sup>9</sup>, 2.62±0.01×10<sup>9</sup>, 3.18×10<sup>9</sup> and 3.27±0.14×10<sup>9</sup> in eight months old Guinea fowl, Golden Sovereign Guinea fowl and indigenous Guinea fowl respectively. However, Keerthy (2014) obtained comparable spermatozoa concentration of 1780.56±61.30×10<sup>6</sup>cells/ml in pearl Guinea fowl as observed in this study. The difference observed in this study may be due to seasonality of breeding as reported by Singh (1989), variation in climate as reported by Ayorinde et al. (1989), place of the study, time and frequency of semen collection and difference in genetic makeup of the birds.

The mean per cent live spermatozoa observed in this study was 87.01±1.58 and 87.73±0.56, in trained individual and pooled semen respectively. The values obtained were in accordance with the earlier findings of Mohan et al. (2013) and Keerthy (2014) in pearl Guinea fowls. In contrast, noticeable lower percentage of live spermatozoa was reported by Blesbois et al. (2005) and Seigneurin and Blesbois (2005) with

corresponding values of 64% and 55% respectively in Guinea fowls. Higher per cent live spermatozoa is vital attribute having strong bearing with fertility parameters indicating the superiority of semen samples obtained in the study.

The mean per cent abnormal spermatozoa observed in this study was  $12.45 \pm 1.03$  and  $12.05 \pm 0.24$  in trained individual males and pooled semen from selected males respectively. The values observed were in accordance with the earlier works by Keerthy (2014) and higher than that reported by Mohan et al. (2013) in pearl Guinea fowls. The lower abnormal spermatozoa found in this study may be due to ideal age of the breeder males used for this study.

In conclusion, individual male screening coupled with culling of males with poor seminal attributes may have positive impact of fertility by either by natural mating or artificial insemination in Guinea fowls. Further, the seminal attributes in pooled semen was found to be optimum for further semen dilution and artificial insemination in Guinea fowls.

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**Table: 1**  
**Semen quality parameters of trained individual males (Mean± SE) n=6**

Bird No.	Colour	Consistency	Volume (ml)	pH	Motility (%)	Concentration (10 <sup>6</sup> /ml)	Live Spermatozoa (%)	Abnormal Spermatozoa (%)
1	Pearly White	Thick	0.04±0.009	7.17±0.02	79.17±1.56	3350.00±267.90	90.91±1.12	7.95±0.85
2	Pearly White	Thick	0.02±0.004	7.20±0.03	76.67±3.56	1322.16±212.20	80.30±2.63	12.43±1.84
3	Pearly White	Thick	0.05±0.009	7.28±0.02	80.83±3.53	1627.88±387.40	86.76±1.76	13.68±0.71
4	Pearly White	Thick	0.03±0.007	7.28±0.04	61.67±2.38	1428.83±267.00	88.72±1.89	12.24±1.22
5	Pearly White	Thick	0.03±0.003	7.23±0.03	76.67±4.21	1664.73±264.88	88.53±1.43	13.96±2.50
6	Pearly White	Thick	0.05±0.012	7.34±0.03	77.00±2.12	1317.50±251.82	87.88±1.56	11.00±0.56
7	Pearly White	Thick	0.04±0.007	7.15±0.03	78.33±3.42	1693.33±262.16	86.21±1.94	13.69±0.31
8	Pearly White	Thick	0.04±0.005	7.20±0.03	72.50±2.60	1163.33±235.26	84.97±1.73	14.08±0.30
9	Pearly White	Thick	0.05±0.009	7.28±0.02	72.50±3.57	1060.73±192.47	86.53±1.67	15.72±1.24
10*			-	-	-	-	-	-
11	Pearly White	Moderate	0.08±0.007	7.15±0.02	75.83±2.33	1063.75±166.44	90.43±1.45	13.22±1.62
12	Pearly White	Thick	0.04±0.006	7.27±0.03	75.83±2.10	1347.78±282.26	90.00±0.86	16.03±0.96
13	Pearly White	Thick	0.03±0.008	7.25±0.04	69.17±4.52	1501.37±375.66	91.36±0.77	13.07±1.43
14*	Pearly White	Thick	0.02±0.003	7.27±0.03	75.83±3.53	605.83±132.44	85.60±1.61	11.42±0.60
15*			-	-	-	-	-	-
16	Pearly White	Thick	0.03±0.004	7.30±0.03	70.83±2.90	1112.92±251.62	83.84±1.89	12.66±1.20
17*			-	-	-	-	-	-
18*	Pearly White	Thick	0.03±0.005	7.22±0.03	64.17±4.41	762.92±137.20	83.39±2.38	10.12±0.60
19*			-	-	-	-	-	-
20	Pearly White	Moderate	0.10±0.007	7.27±0.04	77.50±3.28	764.17±127.94	89.26±1.35	9.25±0.86
21	Pearly White	Thick	0.04±0.008	7.13±0.02	69.17±2.33	803.33±108.00	84.53±1.01	11.86±0.59
22	Pearly White	Moderate	0.08±0.008	7.13±0.02	83.33±3.27	980.42±208.65	87.04±1.39	11.69±1.16
<b>Overall Mean</b>			<b>0.04±0.01</b>	<b>7.23±0.03</b>	<b>74.28±3.09</b>	<b>1309.50±229.52</b>	<b>87.01±1.58</b>	<b>12.45±1.03</b>

\* - Birds Rejected due to no semen/ poor semen quality.

**Table: 2****Semen quality parameters of pooled raw semen from selected males (Mean± SE)  
n=10**

Sample No.	pH	Motility (%)	Concentration (10 <sup>6</sup> /ml)	Live Spermatozoa (%)	Abnormal Spermatozoa (%)
1	7.2	75	1059	89.75	12.67
2	7.2	80	1213	90.05	11.1
3	7.2	85	1340	86.50	11.3
4	7.2	80	2016	85.55	11.87
5	7.2	75	1407	86.00	12.85
6	7.2	80	1528	86.52	13.04
7	7.2	80	1203	88.83	12.05
8	7.1	85	1311	89.79	10.92
9	7.2	90	1553	88.15	12.73
10	7.1	85	1457	86.11	11.97
<b>Overall Mean</b>	<b>7.19±0.01</b>	<b>81.47±1.52</b>	<b>1408.75±83.21</b>	<b>87.73±0.56</b>	<b>12.05±0.24</b>