

SEMEN CHARACTERISTICS OF DIFFERENT BREEDS OF CHICKEN

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(Received: November 30, 1988)

Due to ever increasing selection pressure on cocks for development of superior progeny, artificial insemination is gaining popularity in poultry breeding. In addition to genotypic and phenotypic traits, semen characteristics also play a major role in selection of cocks. The semen characteristics are influenced by breed (Hafez, 1968 and Kamar *et al.*, 1984), strain (Khan, 1976), age (Petrovska *et al.*, 1987), body weight (Ramamurthy *et al.*, 1986) and frequency of collection (Burke, 1977).

In this study an attempt has been made to compare the relative semen quality characteristics of New Hampshire, Rhode Island Red and White Leghorn roosters.

Materials and Methods

Five cockerels, each from New Hampshire, Rhode Island Red and White Leghorn breeds, about 20 weeks of age were utilised in this study. The cockerels were housed in individual cages and were trained for artificial collection of semen, using the technique of Burrows and Quinn (1937).

After training, weekly semen collections were made from individual roosters and evaluated immediately. A total of 15 collections were made from each rooster.

The semen characteristics studied were, semen volume, pH, motility, sperm concentration, live and abnormal spermatozoa and biometry of the spermatozoa. The data were subjected to statistical analysis according to Snedecor and Cochran (1967).

Results and Discussion

The semen characteristics in different breeds of chicken are presented in Table I. Except pH, live sperm count and sperm head width, other semen quality characteristics varied significantly ($P < 0.05$) between breeds. The semen volume was significantly lower in White Leghorn roosters than in New Hampshire and Rhode Island breeds. The semen volume was comparable in the later two breeds. Hafez (1968) also observed lower semen volume in White Leghorn breed than in heavier

breeds. The sperm motility in New Hampshire chicken was significantly ($P < 0.05$) higher than in White Leghorns. The semen from Rhode Island Red roosters recorded intermediate rate of motility. The motility rate recorded in the study in different breeds falls within the range reported by Ramamurthy (1983).

Unlike the earlier work of Kamar *et al.* (1984), no breed variation was noticed in the pH of semen. The pH values recorded in this study were in accordance with the values of Wheeler and Andrews (1943), but lower than the values reported by Ramamurthy (1983) and Stephens (1986).

Contrary to the semen volume, the sperm concentration, was in favour of the White Leghorn breed. In the remaining two breeds the sperm concentration was comparable, but significantly ($P < 0.05$) lower than in White Leghorn breed. The sperm concentration was found to be inversely proportional to the volume of semen. The semen concentration reported in various breeds of chicken in this study was within the range of sperm concentration reported by Lake and Stewart (1978).

The percentage of live spermatozoa did not vary significantly between breeds and was in agreement with the values reported by Ramamurthy (1983) and Stephens (1986), whereas Singh *et al.* (1987) and Omprakash (1988) observed higher percentage of live spermatozoa. These variations might be due to frequency of collection, semen holding temperature, method of handling and time interval between collection and evaluation of semen.

Table 1
Semen characteristics of different breeds of chicken

Semen characteristics	New Hampshire	Rhode Island Red	White Leghorn
Volume (ml)**	0.52 ^a ± 0.018	0.48 ^a ± 0.026	0.35 ^b ± 0.012
Motility (%)*	74.68 ^a ± 1.28	72.31 ^{ab} ± 2.32	68.56 ^b ± 1.31
pH ^{NS}	6.80 ± 0.03	6.60 ± 0.05	6.40 ± 0.46
Sperm concentration ($\times 10^6/\text{mm}^3$)*	3.34 ^a ± 0.38	3.54 ^a ± 0.51	4.25 ^b ± 0.21
Live spermatozoa (%) ^{NS}	75.63 ± 2.46	73.28 ± 3.21	74.46 ± 4.39
Abnormal spermatozoa (%)*	11.97 ^a ± 2.77	8.32 ^{ab} ± 2.46	6.83 ^b ± 2.61
Bio-metry of sper- matozoa:			
Head length (μ)*	16.31 ^a ± 0.31	14.46 ^b ± 0.56	13.93 ^b ± 0.62
Head width (μ) ^{NS}	0.55 ± 0.26	0.48 ± 0.33	0.51 ± 0.48

Means within a row bearing atleast one common superscript do not differ significantly.

** Highly significant ($P < 0.01$); * Significant ($P < 0.05$); NS: Not significant

The percentage of abnormal spermatozoa was significantly lower ($P < 0.05$) in White Leghorn breed than in New Hampshire and it was intermediate in Rhode Island Red. Kamar *et al.* (1984) noticed significant variations in the percentages of abnormal spermatozoa between breeds. However, Sevine *et al.* (1985) observed no significant variations in the percentage of abnormal spermatozoa in White Leghorn and New Hampshire breeds.

The sperm head width did not show significant variations between breeds but the sperm head length was significantly ($P \leq 0.05$) longer in New Hampshire breed than in Rhode Island Red or White Leghorn. Sharma and Sidhu (1971) noticed significant variation in the sperm head length of different breeds of chicken but Sinha (1971) reported comparable sperm head length in different breeds of chicken.

Summary

The semen volume and motility, sperm concentration, percentage of abnormal spermatozoa, and sperm head length showed significant variations between New Hampshire, Rhode Island Red and White Leghorn breeds of chicken while the semen pH, percentage of live spermatozoa, and the sperm head width did not show variations between breeds.

Acknowledgement

The authors are thankful to the Tamil Nadu Agricultural University, Coimbatore, for providing necessary facilities to carry out this study.

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