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Effect of breeding season on seminal attributes of Ostrich (*Struthio camelus*) semen in humid tropical climate

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ABSTRACT

A study was conducted for collection and evaluation of Ostrich bird semen. Ten adult male ostrich birds aged 3 to 4 years were selected and housed at TANUVAS, Tamilnadu, India. The male birds were selected based on their readiness in accepting human beings without fear. All the birds were housed properly under standard managemental condition. The selected male emus were trained for semen collection by teaser method. Out of 10 males, only five males responded for semen collection. The semen was collected from individual ostrich bird in two different breeding seasons (early and peak) and evaluated for macroscopical and microscopical seminal attributes. The overall mean values for volume, pH, appearance, per cent motility, concentration, per cent live and abnormal spermatozoa were better in Peak season than early. The maiden attempt of study ensures the possibility of semen collection in ostrich and facilitated further processing or artificial insemination of semen in peak season based on macroscopical and microscopical seminal attributes.

Key words: Ostrich, Semen collection, Evaluation

I. INTRODUCTION

Ostrich is the largest living bird found on earth and is a member of ratite family which includes Emu, Rhea, Cassowary, and Kiwi. Ostrich rearing is gaining popularity worldwide in recent times. Ostrich farming is gaining popularity in many parts of the world for its skin, fat, feathers, meat and eggs. Many challenges are ahead in ostrich farming mainly posed by biology of species and inadequate managemental practices have led to problems such as variable egg production, fertility, hatchability, embryonic mortality, low chick survival and poor growth rate. Moreover, the ostrich industry is still relying on natural reproduction leading to major biological constraints in productivity enhancement. They are polygamous and a male will breed with one major female and two or more secondary females (Sauer and Sauer, 1966; Handford and Mares, 1985), thereby limiting their reproductive performance. As ostrich live in trios i.e one male will have two females. Thus increase the cost of maintaining a large number of males. In natural mating the superior germplasm will go to few female and not for all. Many times the male impotency will be known in later age only. In order to get genetic improvement from an elite male, the alternate choice is Artificial Insemination, for that a successful method of collection and evaluation is must. Hence, this study was conducted to collect the semen in osrtrich bird by teaser

method and evaluate the macroscopic and microscopic semen characteristics in different breeding season.

II. MATERIALS AND METHODS

A. Selection of Ostriches

Ten adult male emu birds aged 3 to 4 years were selected and housed individually with two female for each male (trios) Ostrich unit, Post graduate Research Institute in Animal Science, TANUVAS, Chennai, Tamilnadu, India. The male birds were selected based on their readiness in accepting human beings without fear. An *Isocaloric* and *Isonitrogenous* standard ostrich breeder ration was fed to birds and portable drinking water were made available *ad libitum*. All the birds were housed properly under standard managemental condition. As ostrich breeds between December to June months in tropical climate, the breeding season was divided into early (December to February) and peak (March to June) season.

B. Collection of Semen

The male ostrich was allowed to mate naturally and following the next a teaser bird will be selected, the male was approaching the teaser bird to mate, by the time of mating attempt, the collector kept AC on the ejaculated phallus and collected semen as described by Malecki et al. 1997, Malecki and Martin 2005 and Rybnik et al. 2007 in ostriches. The semen was collected once a week and the bird will respond well in cool hours of a day preferably early morning hours (Plate 1).

C. Evaluation of semen

Immediately after collection, the semen was kept in a water bath at 20ºC and then it was evaluated for its macroscopical seminal attributes namely volume, appearance and pH and microscopical attributes namely per cent motility, concentration, per cent live and abnormal spermatozoa. The appearance of the semen sample was estimated based on a 0 to 5 scale (Allan and Champion, 1955). It was evaluated by placing a drop of fresh semen on clean grease free glass slide and examined under low power objective of microscope, without placing a cover slip. The pH of semen sample was analyzed using pH indicator strips (Qualigens, Glaxo India Ltd., Mumbai).

The motility was assessed by place a drop of diluted semen on grease free glass slide and observed under high power objective of microscope, placing a cover slip. The concentration of spermatozoa in fresh undiluted semen was determined by using a "NEUBAUER" type hemocytometer and the final concentration of spermatozoa expressed as billions ($\times 10^9$) per ml according to the procedure of Allen and Champion (1955). The viability of spermatozoa was determined by Eosin-Nigrosin staining procedure (Bakst and Cecil, 1997). The abnormal spermatozoa were determined by rose bengal staining method.

D. Statistical analysis

All the data recorded in this study were analysed as per Snedecor and Cochran (1994).

III. RESULTS AND DISCUSSION

Seasonal variation on macro and microscopic seminal attributes of ostrich birds are presented in Table 1. Seasonal effect on ostrich semen characteristics observed in this study concurs with findings of Rybnik *et al.* (2008) in ostriches and Malecki and Martin (2000) in emu and the volume of semen had increased steadily from beginning of the season to the peak season and falls, which coincides with earlier findings of Rybnik *et al.* (2008) in ostriches and Malecki and Martin (2000) in emu.

Effect of season on per cent motility observed in this study is less than the observations found by Rybnik *et al.* (2008) in ostriches. It may be due to the geographical difference or may be environmental factors which are playing their role. The concentration of spermatozoa had increased from the beginning of the breeding season to the peak coincided with the observations by Rybnik *et al.* (2008) in ostriches and Malecki and Martin (2000) in emu. Live spermatozoa per cent was less in peak than early season, which coincides with observations of Rybnik *et al.* (2008) in ostriches and Malecki and Martin (2000) in emu.

The per cent abnormal spermatozoa were also affected by season wherein less abnormal spermatozoa was observed during peak breeding season. These results are concurring with the observations of Irons *et al*. (1996) and Rozenboim *et al.* (2003) in ostriches. However, Soley (1996) observed no correlation between abnormal sperm cell numbers to reproductive season.

IV. CONCLUSION

Collection of semen from ostrich is the maiden attempt in India. Worldwide ostrich industry lack structured breeding programme that would guarantee rapid genetic improvement. The ostrich industry is still relying on natural reproduction leading to major biological constraints in productivity enhancement, thereby limiting their reproductive performance. Artificial insemination is the best tool for accelerating genetic progress in ostrich. The basic pre-requisite for artificial insemination is successful collection of quality semen from males, developing optimal processing, extension and evaluation methods to ensure fertilizing ability of collected spermatozoa. Hence keeping these constraints in mind this study was designed in ostriches to develop a suitable method of semen collection. The semen collected was also evaluated for qualitative and quantitative semen attributes as raw semen. This study paves a path for possibility of collection of semen by teaser method and will help in further processing of semen like artificial insemination and storage of semen.

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Table – 1 Effect of breeding season semen characteristics of ostrich

Season	Volume (ml)	pH	Appearance	Motility (%)	Sperm concentration (X 10^9/ml)	Live sperm (%)	Abnormal sperm (%)
Early season (Dec-Feb)	0.42^{b} ±0.05	7.02 ±0.07	2.54^{b} ±0.14	78.61^{b} ±0.13	3.11^{b} ±0.07	78.61^{b} ±0.02	19.70^{b} ±0.00
Peak season (Mar-Jun)	0.71^{a} ±0.08	7.06 ±0.06	4.00^{a} ±0.15	88.19^{a} ±0.04	3.90^{a} ±0.09	88.82^{a} ±0.01	14.45^{a} ±0.01
't' value	2.68^{*}	0.68^{NS}	6.69^{**}	3.11^{**}	6.4^{**}	7.69^{**}	4.73^{**}

Values with different superscripts within a column differ significantly.
* Significant ($P \leq 0.05$),
** Highly significant ($P \leq 0.01$),
^{NS} Not significant

Plate 1. semen collection in ostrich bird

(A)

A = The male is mounting the female spreading and waving his wings while the AC is prepared to intercept the phallus

(B)

B = Collected fresh Semen

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