EFFECT OF SEASON ON REPRODUCTIVE PERFORMANCE OF OSTRICH (*Struthio Camelus*)

C.Pandian[1], S.T Selvan[2], R.Venkataramanan[2] and H.Gopi[2]
Department of Poultry Science, Madras Veterinary College
Tamil Nadu Veterinary and Animal Sciences University, Chennai-600 007.

Effect of season on reproductive performance of ostrich was carried out at the Post Graduate Research Institute in Animal Sciences, Tamil Nadu Veterinary and Animal Sciences University, Kattupakkam, Kanchipuram district in Tamil Nadu during 2014 - 2015. *A total of 860 eggs were utilized for this study. The influence of season on reproductive performances viz., fertility, hatchability and embryonic mortality were studied.* Season had a highly significant ($P \leq 0.01$) influence on fertility performance in Ostrich and higher percentage of fertility were observed during northeast monsoon (34.18 ± 4.80) and winter (30.76 ± 5.51) than summer (12.78 ± 1.86) and southwest monsoon (10.13 ± 1.43) seasons. Similarly, higher total hatchability percentage was observed during northeast monsoon (12.29 ± 2.14) and winter (8.48 ± 1.44) followed by summer (4.85 ± 1.02) and southeast monsoon (3.69 ± 0.69). However, no significant difference was observed for fertile hatchability and embryonic mortality among different seasons. Study concluded that the reproductive performances in ostrich are seasonal dependent in tropical climate.

Ostrich is the largest living bird found on earth and is a member of ratite family which includes Emu, Rhea, Cassowary and Kiwi. Nowadays Ostrich is becoming fundamentally attractive for production of leather, meat, oil and feather (Malecki *et al.* 2008). They are polygamous and a male will breed with one major female and two or more secondary females thereby limiting their reproductive performance. In addition Ostrich are seasonal breeders and primarily breed between December and June in tropical climate. Average annual egg production in farm-raised Ostrich vary between 30 and 50 eggs per hen (Deeming, 1999) or even less (More, 1996). Although some females are capable of producing 60 eggs or more per breeding period, variation between individual hens is large. This indicates that egg production performance can still be improved in Ostrich. Unpredictable egg production, unstable fertility, poor hatchability, embryonic mortality, poor chick survival are some of the major constraints in viable Ostrich farming. Further, hatching performance

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[1]Department of Poultry Science, MVC, Chennai-07.

[2]PGRIAS, TANUVAS, Kattupakkam- 603 203.

of Ostrich is influenced by many factors such as breed, age, egg qualities, storage time and environmental conditions. In this study the effects of seasonal variations on reproductive performance of ostrich have been studied and this research will be fruitful in planning the breeding programme of Ostrich.

The effect of season on reproductive performance of ostrich was carried out at the Post Graduate Research Institute in Animal Sciences, Tamil Nadu Veterinary and Animal Sciences University, Kattupakkam, Kanchipuram district in Tamil Nadu during 2014 - 2015. The station is situated approximately at 12.5°N latitude and 80° to 81°E longitudes and at the height of 48 meter above mean sea level. Being nearer to East coast of India it enjoys a tropical maritime monsoon climate. During this study period, the average high and low temperature, relative humidity and the annual rainfall were recorded as 34.2°C, 23.2°C, 87.3 per cent and 1391 mm, respectively. This station gets most of its seasonal rainfall from the northeast monsoon i.e. during October to December. To study the seasonal effect, the year was divided in to four seasons namely, winter (January and February), summer (March, April and May), southwest monsoon (June, July, August and September) and northeast monsoon (October, November and December (Indian Metrological Department, Pune). A total of 860 eggs were utilized for this study. Eggs were collected immediately after laying and fumigated with 3 X concentrations. Eggs were set in incubator with constant temperature of 97.9°F and relative humidity of 30-40 per cent for 38 days. The eggs were turned once in four hours by automatic turner at 90° angle up to 38 days. The eggs were transferred to hatcher on the 39th day for hatching into the hatcher. After hatching, the remaining unhatched eggs were broke opened to record infertile eggs and embryonic mortalities if any. Fertility was calculated after deducting infertile eggs from the total number of eggs set. Hatchability on total eggs set and on fertile eggs set was calculated. Embryonic mortalities were calculated based on fertile eggs set. All the fertility parameters were expressed in percentage. The data were analyzed by One-way ANOVA as per the procedure of Duncan's multiple comparison test (Duncan, 1955) after arc-sine transformation.

Influence of season on reproductive performance of ostrich is presented in table 1.

The season had a highly significant ($P \leq 0.01$) influence on fertility performance in ostrich, and higher percentage of fertility was observed during northeast monsoon (34.18) and winter (30.76) than summer (12.78) and southwest monsoon (10.13). The mean per cent fertility observed in this study (22.07) is accordance with Hariharan (2013) in seven year-old ostrich. Similarly, Ipek and Umran (2006), Dzama (2009), Dzama (2010), Elobied *et al.* (2010) and Kontecka *et al.* (2011) observed fertility ranged from 50 to 80 per cent in ostrich. Further, seasonal effects on fertility parameter have not been studied adequately in ratites for discussion. However, similar studies were carried out in other avian

species by Pruthi and Aggarwal (1987) in ducks, Prabakaran *et al.* (1992) in Japanese quails, Hossain *et al.* (2002) in broiler and Mahiye *et al.* (2005) in turkeys and they observed good fertility in monsoon and winter season than summer season.

The effect of season on per cent total hatchability varied significantly ($P \leq 0.01$) with an overall mean value of 7.47. Significantly ($P \leq 0.01$) higher total hatchability percentage was observed during northeast monsoon (12.29) and winter (8.48) followed by summer (4.85) and southeast monsoon (3.69). However, no significant difference was observed for fertile hatchability among different seasons. Earlier study on effect of season on total and fertile hatchability in ostrich was not traceable for comparison. However, Sundaresan (2014) observed comparable percentage of total and fertile hatchability in emu during artificial insemination. Similarly, higher percentage of fertile hatchability than our present study was reported by Malecki *et al.* (1995) in emu, Hariharan (2013) and Dzama (2010) in ostrich observed wide range of hatchability percentage (30-70 per cent) in ostrich.

The per cent dead germ, dead in shell and total embryonic mortality of ostrich hatching eggs among different seasons showed no significant difference. The overall mean per cent dead germ, dead in shell and total embryonic mortality among different seasons were 41.80, 24.00 and 65.80 respectively. Comparatively lower percentage of embryonic mortality were reported by Cloete *et al.* (1998), Majewska (2001), Sahan (2003) and Kontecka *et al.* (2011) in ostrich. However, Brand *et al.* (2007) and Hariharan (2013) have observed higher embryonic mortality in ostrich. From the above results, it becomes clearly evident that the reproductive performances, mainly fertility and hatchability are seasonal dependent in ostrich and it might be due to hormonal effects.

The above study concluded that the seasonal influence was more pronounced in reproductive performance of ostrich and considered as a seasonal breeder in tropical climate, which is evident from that significantly better fertility and hatchability were observed during northeast monsoon and winter than summer and southeast monsoon seasons.

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Table 1 Influence of season on reproductive performance of ostrich (Mean ± SE)

Parameters	Fertility **	Hatchability		Dead germ^{NS}	Dead in shell ^{NS}	Total embryonic mortality^{NS}
		Total egg set**	Fertile egg set^{NS}			
Winter (Jan-Feb) (n= 189)	30.76^{a} ± 5.51	8.48^{a} ± 1.44	28.36 ± 2.36	37.46 ± 3.60	34.16 ± 3.70	71.63 ± 2.36
Summer (March-May) (n= 191)	12.78^{b} ± 1.86	4.85^{ab} ± 1.02	35.00 ± 7.16	51.66 ± 9.82	13.33 ± 5.95	65.00 ± 7.16
Southwest monsoon (June-Sep) (n= 263)	10.13^{b} ± 1.43	3.69^{b} ± 0.69	35.00 ± 6.30	35.83 ± 3.67	29.16 ± 6.94	65.00 ± 6.30
Northeast monsoon (Oct-Dec) (n= 217)	34.18^{a} ± 4.80	12.29^{a} ± 2.14	37.06 ± 5.24	42.30 ± 7.12	20.62 ± 4.89	62.93 ± 5.24
Overall mean (n=860)	22.07 ± 2.54	7.47 ± 0.92	34.20 ± 2.79	41.80 ± 4.55	24.00 ± 2.98	65.80 ± 2.79
F value	10.67	7.16	0.40	0.57	2.47	0.40

n=No. of egg set / season; Means bearing different superscripts within the same column differ significantly; **Highly significant (P≤ 0.01); NS-Not significant.