REPRODUCTIVE BIOLOGY AND BREEDING HISTORY OF THE INDIAN WILD DOG (*Cuon alpinus*) AT ARIGNAR ANNA ZOOLOGICAL PARK

M. Jagannadha Rao *, A. Manimozhi ** and P. Asaithambi **

INTRODUCTION

Listed vulnerable in the IUCN Red Data Book and cited in Appendix II of the CITES (Ginsberg and Macdonald, 1990) the Indian wild dog or dhole (*Cuon alpinus*) is threatend by habitat destruction and decline in prey base.

Although capative breeding of dholes is reported to be difficult (Gewalt, 1978) the Arignar Anna Zoological Park (AAZP) has been breeding these animals successfully (Paulraj *et al.*, 1992). Only little information is available on the reproductive biology of Indian wild dogs because of their highly secretive nature in the wild (Nowak and Paradiso, 1983). A brief account of the breeding history of this species in Arignar Anna Zoological Park from 1986 to 1994 is described in this paper.

BREEDING HISTORY

During Feburary 1985, two males and one female were obtained from the wild at 5 weeks of age and were hand reared for the next six months. (Gopalakrishnan *et al.*, 1988). They [Gopal (M) Krishna (M) and Anu (F)] were displayed in a large chain link enclousre of 8x4.8x2.2m dimensions. They were separated by night and housed in individual night shelters each measuring 2.3x2.2x2.1m. One of these wild caught males (Krishna) died of hepatitis.

The incidences of mating, births and survival of dholes at AAZP from 1986 to 1994 are given in Table I. Though the wild caught female whelped a litter in each of the three years from 1986 to 1989, only one pair [Surgesh (M) and Radha (F)] survived in 1987. The young ones were seperated from the dam and were transfered to another display yard of 7.5x3.3x2.3m dimension and were housed in individual shelters (1.2x1.1x1.5m) at 6 months of age. Another pair born to Gopal and Anu during 1989 was sent to Nehru Zoological Park, Hyderabad. Of the three pups born during 1990, only one male (Shanker) survived.

The sibling pair Suresh and Radha did show some courtship behaviour in 1988 but did not copulate. However during 1990, Radha after mating with Suresh delivered 3 pups all of which died immediately. Radha was mated with her father Gopal and Suresh with his mother in 1991. While Radha delivered 3 pups which survived only for ten days, Anu gave birth to two female pups (Sheela and Shilpa) and raised them successfully. Gopal and Anu were mated again in 1992 and Anu gave birth to three young ones. Two (1:1) of them died the next day and the remaining one died after a month. Sankar and Radha mated during the same year and Radha delivered 3 pups (2:1) after a gestation period of 63 days but all of them were neglected by her. During 1993 Radha and Suresh mated again and Radha delivered 5 pups but mother neglected all of them. Despite the best efforts of the zoo management none of them could be hand raised. Shilpa born during 1991 came to heat for the first time and mated with Suresh (her father who has also mated Radha in the same year) and delivered 3 pups after a gestation of 46 days. (Shortest period recorded). All the pups died immediately due to maternal neglect.

In the same year Gopal and Anu, the wild caught pair mated again and Anu gave birth for the seventh time to 5 young ones, of which one was still born and another male was born with deformed legs and died soon. Of the three surviving male pups (Subbu, Sekar and Rathnam) the last one developed bowed legs, as ossification did not take place in one leg and was transfered to Veterinary Hospital for treatment. Unfortunately during 1994, Anu which successfully sired 10 young ones and contributed maximum number of individuals to the population of wild dogs at AAZP, died on 23.8.94

Later, on 10.11.94 Radha also died at Veterinary Hospital after prolonged treatment for deep thorasic wound inflicted by one of the cage mates. AAZP now has Gopal, Sekar, Subbu and Shilpa in the breeding enclosure (Large one); Suresh, Shankar and Sheela in the display enclosure (Smaller one). While Rathnam is undergoing treatment at Veterinary Hospital for dermatitis, Gopal and Shilpa mated during Sept. '94 and Shilpa gave birth to 3 young ones but all of them were neglected by her. At the same time Shankar and Sheela mated in the dispaly enclosure where Sheela delivered five pups but none of them survived.

REPRODUCTIVE BIOLOGY

Period of mating (oestrus) ranged from 14 to 39 days over the 15 mating seasons observed. The larger periods of mating were observed mostly when the female was mating for the first time. During oestrus, both male and female showed increased vocalization, urination and scent marking. This was followed by the mutual inspection of the genitalia and vaginal licking by the male. They exhibited the copulatory tie and back to back mating posture that is typical of the canids. The mean oesturs period appeared to be 61.83 +/- 3.90 days (n=15).

The gestation period was calculated as the number of days from the last mating to parturition (Table I). The eight years of data indicate a gestation ranging from 46 days to 67 days.

It is interesting to note that in case where the gestation period was less than 60 days, the pups died very early or the mother neglected them resulting in unsuccessful breeding.

* Deputy Director, ** Research Biologists,
Arigar Anna Zoological Park, Vandalur, Madras - 48.

MATING AND BIRTH SEASON

The observation on breeding for eight years at AAZP indicate that mating is confined to only 3 months of the year i.e., August, September and October rarely extending to November. The highest number of matings were observed during the month of September. Correspondingly all the births were observed only during the months of November, December and January with the months November and December contributing to 93.3% of the births (Table II).

LITTER SIZE AND SEX RATIO

Litter size varied from two to seven with an average of 3.66 (n=15). The eight year data also indicate that the sex ratio was slightly in favour of the males (1.93:1.73) (n=15).

SURVIVAL RATE OF PUPS

Anu has bred regularly once in a year for eight years. During this period, none of the pups surivived during three years. When the data for the 8 years for all the pairs is taken into consideration, the percentage of pup survival was only 18.2 (20.7% for males and 15.4% for females). Three (5.4%) were killed by the mother immediately after birth. 15 (27.3%) were neglected by the mother and the remaining 37 (67.3%) died during various stages of development.

SEXUAL MATURITY

The captive born female pups attained sexual maturity at different ages. The youngest to attain maturity was at age 1 year 10 months and 20 days. However in the other two females it was about 2 years 9 months. (Table III).

INTER PARTURITION INTERVAL

The whelping intervals for the female Anu observed for 8 years indicate that this period varied from 331 days to 406 days with an average of 368.85 days (n=7).

DISCUSSION

The determination of reproductive behaviour patterns, the duration of oestrus, and the length of the oestrus cycle as well as the optimum time for successful mating are necessary pre-requisites for the establishment of controlled breeding programmes.

The breeding behaviour of dholes in captivity has been well described by Gewalt (1978), Cohen (1985), Sosnovskii (1987), and Paulraj et al (1992). Our findings indicate that breeding habits of dholes do not change as a result of captivity. According to Davidar (1972) and Johnsingh (1982),holes breed during September to December. Our results also indicate that the Indian wild dog has a specific breeding season, with the oestrus between August and October and whelping occuring between November and January.

Similarly the litter size in the wild is reported to be around 8" (Johnsingh, 1982). Our observations indicate the average litter size is 3.66 +/- (n=15) (Range :2-7). As observed by Johnsingh (1982), the male pups have a better survival rate than females. When compared to the oestrus of other canids described by Kleiman (1968), dholes have a long oestrus especially when they are mating for the first time. Data on 15 litters of dholes born at AAZP from 1986 to 1994 indicate a gestation period of 46 to 67 days with an average of 61.83 +/- 3.91 days (n=15). The mating behaviour, parturition and parental care observed is very similar to that described by Paulraj *et al* (1992). However it may be mentioned that the pups when allowed to move on hard surface (concrete floor) developed leg deformities during early stages. Osteoporosis, pneumonia and change of diet from liquid to solid were observed to be the main reasons for high morality besides maternal neglect.

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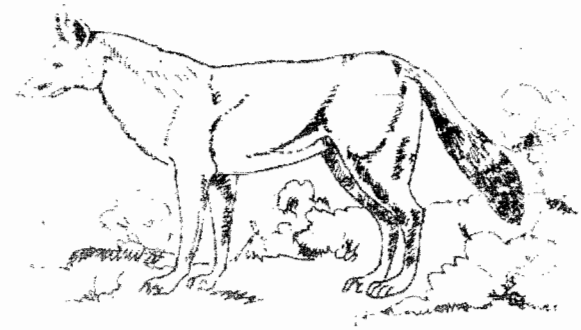

Table - 1. Incidences of mating, births and survival in dholes at AAZP, Madras.

Sl. NO.	Sire & Dam	First mating	Last mating	Whelping date	Gestation period (days)	Litter size	Survival	Survival %	Remarks
I 1.	Gopal X Anu	1.9.86	5.10.86	23.11.86	49*	2:1	-	0	Killed by mother.
2.	"	9.9.87	23.9.87	23.12.87	61	2:1	1:1	66(Suresh & Radha)	
3.	"	10.8.88	18.9.88	24.11.88	67	3:4	-	-	3 Pups died at 5 days of age & 4 pups died after 60 days.
4.	"	26.9.89	15.10.89	14.12.89	60	1:1	1:1	100	Sent to Hyderabad Zoo
5.	"	5.9.90	25.9.90	24.11.90	60	2:1	1:0 (Shankar)	33	Two died after 7 days
6.	"	18.8.92	20.9.92	24.11.92	65	2:1	-	-	Two (1:1) died next day and one died after a month.
7.	"	15.10.93	31.10.93	3.1.94	64	4:1	3:0(Subramani, Sekar & Rathinam)	60	
II 8.	Suresh X Radha (s) (d)	28.9.90	16.11.90	26.12.90	51*	2:1	-	-	Mother neglected
9.	"	12.8.93	20.9.93	16.11.93	57	3:2	-	-	"
III 10.	Gopal X Radha (f) (d)	12.8.91	31.8.91	2.11.91	65	1:2	-	-	Survived for 10 days
11.	Sankar X Radha	12.9.92	9.10.92	11.12.92	63	2:1	-	-	Mother neglected
IV 12.	Suresh X Anu (s) (m)	21.8.91	10.9.91	15.11.91	67	0:4 (Sheela& Shilpa)	0:2	50	Mother neglected
13.	Suresh X Shilpa	5.10.93	18.11.93	15.12.93	46	1:2	-	-	Not survived
V 14.	Sankar X Sheela	8.9.94	10.9.94	4.12.94	56	2:3	-	-	-
VI 15.	Gopal X Shilpa	15.9.94	15.10.94	11.12.94	57	2:1	-	-	Mother neglected
					61.83 +/- 3.90	1.93:1.73 +/- 0.96: +/-1.09			

* included in calculation.

Table - 2. *Mating and whelping seasons in wild dog.* (Cuon alpinus)

Sl.No.	Name of the animal	Mating					Whelping			
		Aug.	Sept.	Oct.	Nov.	Total	Nov.	Dec.	Jan.	Total
1.	Anu	3	7	4	-	14	5	12	1	3
2.	Radha	2	3	2	-	7	2	2	0	4
3.	Sheela	-	1	-	-	1	0	1	0	1
4.	Shilpa	-	1	2	1	4	0	2	0	2
		5	12	8	1	26	7	7	1	25
	%	19.23	46.15	30.77	3.85		46.67	46.67	6.67	

Table - 3. Age at sexual maturity in wild dogs (Cuon alpinus)

Sl.No.	Name of the animal	Date of birth	First oestrus/ mating observed	Sexual maturity
1.	Shilpa	15.11.91	5.10.93	1 Year 10 months 20 days
2.	Sheela	15.11.91	8.9.94	2 Year 9 months 23 days
3.	Radha	23.12.87	29.9.90	2 Year 9 months 7 days
			Mean	2 Years 6 months 6.6 days

TABLE - 4. Inter-Parturition intervals in wild dog (Cuon alpinus)

Name of the animal	Date of last parturition	Date of subsequent parturition	Interparturition Intervals
Anu	23.11.86	23.12.87	1 Year 1 month
	23.12.87	24.11.88	0 " 11 " 1 day
	24.11.88	14.12.89	1 " - 21 days
	14.12.89	24.11.90	0 " 11 " 28 days
	24.11.90	15.11.91	0 " 11 " 22 days
	15.11.91	24.11.92	1 " - 9 days
	24.11.92	03.01.94	1 " 1 " 11 days
Shilpa	26.12.90	02.11.91	0 " 11 " 7 days
Radha	02.11.91	11.12.92	1 " - 9 days
	11.12.92	16.11.93	0 " 11 " 6 days
		Mean	1 Year - 3 days