Plasma progesterone levels in the roe deer, *Capreolus capreolus*

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Delayed implantation was first discovered in the roe deer by Bischoff (1854). In this species the blastocysts exist in a state of diapause from August until the end of December when the trophoblast elongates rapidly. Embryonic elongation is followed by the initiation of placental attachment in late January or February and a subsequent period of normal gestation until parturition in May or June.

Although the roe deer is the only artiodactyl known to exhibit delayed implantation, this phenomenon is found among the representatives of several other mammalian orders, e.g. Marsupialia, Carnivora, Chiroptera, Insectivora and Edentata (Canivenc, 1960; Sadleir, 1969). In most species the delay phase is associated with a period of luteal inactivity which persists until just before the initiation of implantation when full luteal function is acquired (Canivenc & Bonnin-Laffargue, 1963; Canivenc, Short & Bonnin-Laffargue, 1966; Mead & Eik-Nes, 1969; Møller, 1973). In contrast, the corpus luteum of the roe deer appears to be fully active during diapause, judging from its size, histological appearance and progesterone content (Short & Hay, 1966; Aitken, 1974). Measurement of plasma progesterone levels in the roe deer, using a competitive protein binding assay (Aitken, 1974), revealed a mean concentration of 2.60 ± 0.66 ng/ml (S.D.) during delayed implantation. During the preattachment phase of embryonic elongation this value increased to 3.90 ± 1.85 ng/ml, a value which was not significantly different from that during diapause (Aitken, 1974). The purpose of the present study was to determine the plasma concentration of progesterone in roe deer during the periods of embryonic diapause, elongation and attachment using a highly specific radioimmunoassay for progesterone.

Blood samples were collected in heparinized tubes from the anterior femoral vein of roe deer captured between October 1975 and February 1976. The plasma was isolated within 1 h by centrifugation and stored at -20°C until analysis. The progesterone determinations were carried out using the radioimmunoassay procedure defined by Scaramuzzi, Corker, Young & Baird (1974) with a well characterized sheep anti-progesterone serum which was highly specific for progesterone. This antiserum produced 100% cross-reaction with progesterone and only 0.3% with 20α -dihydroprogesterone. The sensitivity was high (15% of binding with 5 ng and 60% of binding 5 pg standard progesterone) and readings on the curve could be taken between 70 pg and 1 ng for 200 μl plasma. The samples were tested in duplicate and recovery was 68.71 ± 0.83 (S.E.M.)%.

The results are presented in Table 1. Progesterone levels were very low or undetectable in the male, the ovariectomized female and in young females. In the adult females, there was a mean $\pm$ S.E.M. level of 2.28 ± 0.2 ng progesterone/ml during the presumed period of diapause (October to December), confirming the results obtained by Aitken (1974). During the presumed period of embryonic elongation and placental attachment (January and February), however, a significant ($P < 0.01$) increase in plasma progesterone levels was observed (3.98 ± 0.32 ng/ml).

In view of the results obtained by Aitken (1974) it is probable that this increase in plasma progesterone concentration is a consequence rather than a cause of embryonic growth. Our current research programme is to determine whether this progesterone is of ovarian, placental or embryonic origin.

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Table 1. Plasma progesterone concentrations (ng/ml) in roe deer at different times of the year

During delayed implantation			After blastocyst elongation		
Animal	Date	Progesterone conc.	Animal	Date	Progesterone conc.
1	4 Oct. 1975	2.88	28	6 Jan. 1976	3.32
2	10 Oct. 1975	1.25	29		2.98
3		2.23	30		3.23
4		2.26	31		4.09
5*	15 Oct. 1975	0.72	32	15 Jan. 1976	4.19
6		1.62	33		2.94
7		2.85	34		0.61
8		2.61	35	28 Jan. 1976	4.66
9	22 Oct. 1975	1.44	36	3 Feb. 1976	8.4
10		1.68	37		5.21
11		2.31	38		4.21
12		2.46	39*		Undetectable
13*	22 Nov. 1975	0.70	40	11 Feb. 1976	5.04
14		1.66	41		5.23
15		3.00	42		2.18
16		2.27	43		4.76
17*	27 Nov. 1975	Undetectable	44		2.08
18		1.19	45		4.82
19		5.23	46		3.69
20		2.15	47		3.95
21	15 Dec. 1975	2.85	48		2.69
22†		0.87	49		3.57
23‡		Undetectable			
24	22 Dec. 1975	1.78			
25		1.46			
26		2.96			
27*		0.56			

* Female kids, 4–7 months old.

† Adult male.

‡ Ovariectomized doe.

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