BRIEF COMMUNICATION

INTRA-UTERINE FOREIGN BODY AND PREGNANCY
IN PIGS*

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Experimental control of fertility has been accomplished by inserting foreign objects in the uterus. Doyle & Margolis (1963) found that a suture in the uterine lumen of the rat prevented implantation of blastocysts. This was soon followed by similar studies on the rabbit (Adams & Eckstein, 1964), cow (Hawk, Conley, Brinsfield & Righter, 1965) and ewe (Hawk, 1965). A local inhibitory effect on luteal function has been demonstrated by inserting plastic coils in an anterior portion of a uterine horn in the ewe (Ginther, Pope & Casida, 1966) and heifer (Ginther, Woody, Janakiraman & Casida, 1966). Uterine distention does not alter oestrous cycles in the pig (Anderson, 1962); however, a local uterine luteolytic effect has been observed during pregnancy (du Buisson, 1961). This investigation concerns the effect of an intra-uterine foreign body on the occurrence of pregnancy in the pig.

The intra-uterine foreign body (IUFB) consisted of an open end vinyl tube (2·23 mm O.D., Clay-Adams, Inc.), which was silicone-treated and sterilized. It was inserted into one uterine horn of the pig during the luteal phase (Days 8 to 12) of the oestrous cycle. Under halothane–oxygen anaesthesia, incisions (1 to 2 cm length) were made in the uterine wall about 10 cm posterior to the utero-tubal junction and either in the mid-portion or about 5 cm from the bifurcation of the horns. The IUFB (50 to 60 or 100 to 120 cm in length) was inserted into the uterine lumen, either into the anterior half (five animals) or into the entire horn (five animals). It was attached at each end by a loose loop of nylon (size 3). Both incisions were closed with silk (size 4-0). Ten pigs were used as unoperated controls.

The pigs were checked daily for signs of oestrus and were mated each day of oestrus. Those animals which returned to oestrus after service were mated for a maximum of four post-operative oestrous periods.

Oestrous cycles after insertion of IUFB (including cycles of those animals that failed to remain pregnant) were $19\cdot7\pm0\cdot3$ days (mean and SE) and those of control animals before mating were $19\cdot7\pm0\cdot5$ days. Results in the two experimental groups were similar and therefore were combined. There was

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no evidence of lengthened cycles except in one animal which had not returned to oestrus 25 days after mating (Table 1). The corpora lutea were regressing and pre-ovulatory follicles were present. No degenerating embryonic tissue was found. In the ten animals having an IUFB in one uterine horn, only four of eighteen matings resulted in pregnancies lasting more than 24 days (Table 1). The functional state of corpora lutea was assessed by determining their progesterone concentration. In two pregnant animals the corpora lutea ipsilateral to the IUFB had regressed completely and in a third were regressing. Corpora lutea were functional in the fourth animal at the 55th day. Pregnancy occurred in nine of ten matings in the control animals, and there was no evidence of luteal regression. Procedures for analysis of progesterone in luteal tissue were described by Masuda, Anderson, Henricks & Melampy (1967).

TABLE 1
PROGESTERONE CONCENTRATION OF CORPORA LUTEA IN PIGS WITH AN IUFB

	No. of animals	Days after mating	Progesterone ($\mu\text{g/g}$)	
			C.L. ipsilateral to IUFB	C.L. contralateral to IUFB
Treated	3*	2	—	—
	1*	15 (No blastocysts)	54	58
	1*	16†	24	43
	1	24†	11	78
	1	25†	Regressed	81
	1	25 (Not pregnant)	Regressed	Regressed
	1	26†	Regressed	117
	1	55†	118	108
Control	1*	2	—	—
	9	24–26	114	114

* Animals which conceived but failed to remain pregnant from previous matings.

† Blastocysts or embryos were found in uterine horn contralateral to IUFB.

No blastocysts were found in one pig killed 15 days after mating. The concentration of progesterone was similar in corpora lutea of both ovaries, whereas results from one animal killed 16 days after mating indicated a local luteolytic action of the horn containing the IUFB. Corpora lutea in both ovaries were similar in weight, but the progesterone concentration in corpora lutea ipsilateral to the IUFB was approximately half that found in contralateral corpora lutea. Blastocysts were found in the horn contralateral to the IUFB. The uterine luteolytic effect has been demonstrated at this stage of pregnancy in the pig (du Buisson, 1961; Anderson, Rathmacher & Melampy, 1966).

Three pigs with IUFB that had conceived but failed to remain pregnant from previous matings were killed 50 hr after mating. Ova were recovered in two of the three animals. In one of these animals spermatozoa were found in the zona pellucida of four of the six ova recovered from the oviduct ipsilateral to the IUFB. One ovum was fertilized as indicated by the presence of two polar bodies. Three ova were recovered from the contralateral oviduct. Spermatozoa were found in the zona pellucida of the three ova. One ovum was fertilized as indicated by the presence of two polar bodies. In another pig, eight ova

were recovered in the oviduct contralateral to the IUFB and none was found in the ipsilateral oviduct. Only one ovulation point was present in this ovary. Seven of the eight ova in the contralateral oviduct were fertilized as indicated by the presence of two polar bodies in each ovum. Spermatozoa were found in the zona pellucida of the eight ova recovered.

A small accumulation of leucocytes was observed near the IUFB in animals killed either soon after or within 24 days after mating.

These results indicate that an IUFB (vinyl tube) in either the entire length or anterior half of one uterine horn of the pig prevented pregnancy in that horn. No embryos or blastocysts were found in the uterine horn with the IUFB. Corpora lutea regressed in the ovary ipsilateral to the IUFB in three of four animals that remained pregnant beyond 24 days. Spermatozoa ascended the uterine horn containing the IUFB as shown by the recovery of one fertilized ovum in the oviduct. Pregnancy failure in pigs having an IUFB in one uterine horn may be caused by mechanical interference with processes of implantation or by uterine luteolytic action.

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