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Uterine secretion of prostaglandin $F_{2\alpha}$ in anaesthetized pigs during the oestrous cycle and early pregnancy

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Summary. Uterine blood was sampled by venepuncture or an indwelling catheter in a total of 33 cyclic gilts and 26 mated animals subsequently confirmed to contain embryos ; jugular blood was obtained simultaneously from catheterised animals. Prostaglandin $F_{2\alpha}$ and progesterone were determined by radioimmunoassay of the plasma.

The concentration of $PGF_{2\alpha}$ in uterine venous blood of cyclic animals remained below 1.0 ng/ml until the corpora lutea were 12 days old. Highest $PGF_{2\alpha}$ values were associated with 15-17 day corpora lutea, with a mean of 5.9 ng/ml for six samples on Day 17. Likewise, the $PGF_{2\alpha}$ concentration in the uterine blood of mated animals did not exceed 1.0 ng/ml until the corpora lutea were older than 12 days, and a mean value of 6.0 ng/ml was found by acute sampling with 15-day corpora lutea. The highest mean concentrations of $PGF_{2\alpha}$ in uterine blood from a series of 14 catheterised pregnant animals were 2.8 and 2.3 ng/ml, respectively, with 15- and 16-day corpora lutea. Values for $PGF_{2\alpha}$ on the 17th, 18th and 19th days of pregnancy showed a downward trend. There was considerable day to day variation in the mean uterine and peripheral concentrations of progesterone in mated animals, but there was no sustained depression in response to elevated $PGF_{2\alpha}$ concentrations.

The results suggest that exocrine secretion of $PGF_{2\alpha}$ into the uterine lumen of pigs under the influence of trophoblastic oestrogens does not provide a sufficient explanation for the establishment of the corpora lutea of pregnancy. Further attention should be devoted to the luteotrophic — as distinct from anti-luteolytic — rôle of pig conceptuses at the time of maternal recognition of pregnancy. Circumstantial evidence for luteal sensitivity to chorionic gonadotrophins is included.

Recent studies have strongly suggested that prostaglandin $F_{2\alpha}$ ($PGF_{2\alpha}$) is the principal luteolytic factor secreted by the uterus of unmated (cyclic) pigs to induce the demise of the corpora lutea (Gleeson, Thorburn and Cox, 1974 ; Killian, Davis and Day, 1976 ; Moeljono *et al.*, 1977), thereby paving the way for maturation of a further group of Graafian follicles and a return to oestrus. By contrast, the manner in which luteolysis is prevented in pigs that have successfully mated is incompletely understood, although the corpora lutea of intact or hysterectomised animals can be regressed after approximately Day 12 by systemic injection or intrauterine administration of $PGF_{2\alpha}$ or suitable analogues (Connor, Phillips and Palmer, 1976 ; Guthrie and Polge, 1976 ; Lindloff *et al.*, 1976 ; Moeljono, Bazer and Thatcher, 1976). Prolongation of luteal lifespan and the

concomitant establishment of pregnancy may therefore depend on either (a) reduced titres of uterine $PGF_{2\alpha}$ reaching the corpora lutea or (b) the luteolytic influence of $PGF_{2\alpha}$ being overridden by some source of luteotrophic activity — such as embryonic or pituitary hormones, or both.

Attractive evidence in favour of the former possibility has been presented by Bazer and his colleagues (Bazer and Thatcher, 1977 ; Frank *et al.*, 1977, 1978 ; Moeljono *et al.*, 1977 ; Bazer, Thatcher and Sharp, 1980), their observations indicating a significantly reduced secretion of $PGF_{2\alpha}$ into the utero-ovarian veins of gilts 13-17 days after a successful mating. On the basis of these studies and the related findings of Perry *et al.* (1973, 1976) and Robertson and King (1974) on the ability of elongating pig embryos to synthesize oestrogens, Bazer and Thatcher (1977) proposed that $PGF_{2\alpha}$ is diverted into the lumen of the uterus under a local influence of embryonic (trophoblastic) oestrogens. This hypothesis of exocrine rather than endocrine secretion of the luteolytic hormone is novel and elegant, and received further support from measurements of $PGF_{2\alpha}$ secretion in oestrogen-treated, cyclic gilts (Frank *et al.*, 1977, 1978) and from comparison of $PGF_{2\alpha}$ metabolites in the peripheral circulation of pregnant and cyclic gilts (Martinat-Botté, Terqui and Thatcher, 1980). Nonetheless, exocrine divertion of uterine $PGF_{2\alpha}$ may not provide a full explanation for the means of establishing the corpora lutea of pregnancy in pigs, nor may this route of sequestering the luteolytic hormone always be as effective as suggested in the studies cited.

Because the lifespan of the corpora lutea in unmated pigs may be much extended in response to a systemic injection of PMSG on Day 14 of the oestrous cycle (Hunter 1964, 1979), we have also examined $PGF_{2\alpha}$ secretion into the uterine veins of both cyclic and mated animals. Our observations suggest that further attention should be devoted to examining the luteotrophic — as distinct from anti-luteolytic — rôle of pig conceptuses at the time of maternal recognition of pregnancy.

Materials and methods.

Purebred Large White or Large White × Landrace gilts, aged 7-9 ½ months and weighing 98-140 kg, were checked daily with a mature boar to establish their oestrous cycles. After one or more cycles of 20-22 days duration, the time of ovulation was controlled by a single intramuscular injection of 500 iu HCG (Chorulon, Intervet) given during mid to late pro-oestrus. Ovulation was assumed to occur 40-42 hrs later (Dziuk, Polge and Rowson, 1964 ; Hunter, 1967), enabling the age of the corpora lutea to be described with precision. Blood was sampled at known intervals after ovulation, either during the oestrous cycle or after mating with a fertile boar. Mating was arranged 12-20 hrs before the induced ovulation, and the presence of morphologically normal embryos was subsequently confirmed at autopsy.

Surgery was performed under closed-circuit administration of halothane, nitrous oxide and oxygen, after induction of anaesthesia with intravenous injection of pentobarbitone sodium and subsequent endotracheal intubation. The reproductive tract was exposed through a mid-ventral incision, and blood collected from uterine (*not* utero-ovarian) veins by one of two methods : either (a)

directly following puncture with a 19 g × l'' hypodermic needle, enabling rapid collection of a 10 ml sample and minimal handling of uterine tissues ; or (b) after insertion of a polyvinyl catheter (Portex tubing, ed 1.5 mm, id 0.8 mm) some 6-10 cm into a principal uterine vein and securing it with three silk ligatures in the mesometrium. Right or left uterine horns were selected at random. The reproductive tract was restored to the abdominal cavity, the catheter exteriorized through the sutured body wall, and the animal maintained under 1-2.5 % halothane on a padded operating table. 5-6 ml samples of blood were collected every 15 minutes during a period of 4-6 hours, and the catheter flushed with 1-2 ml heparinized saline (1,000 iu heparin/ml) immediately after each collection. In such catheterised animals, 8 ml blood samples were also taken simultaneously from a jugular catheter inserted via an ear vein. Samples were chilled in ice, centrifuged, and the plasma frozen at − 20 °C until assay for $PGF_{2\alpha}$ and progesterone. All samples were coded.

The concentration of $PGF_{2\alpha}$ was measured by radioimmunoassay (RIA) using an antibody developed and tested in Edinburgh (Dighe *et al.,* 1975) and employing the method of assay described previously (Blatchley and Poyser, 1974). The suitability of this method for pig plasma was determined by assaying peripheral pig plasma to which had been added $PGF_{2\alpha}$ to give a concentration of 2.5 ng/ml. Identical plasma to which $PGF_{2\alpha}$ had not been added was also assayed. 50, 100 and 200 µl aliquots of each plasma were assayed in duplicate, and the mean levels (± s.e.m., n = 6) obtained in the two plasmas were 2.92 ± 0.15 and 0.42 ± 0.01 ng/ml, respectively, giving a difference for the mean amount of $PGF_{2\alpha}$ as 2.5 ng/ml. In addition, the values for each aliquot showed parallelism with the standard curve, thereby indicating that the method assayed pig plasma with accuracy. Uterine venous samples were assayed similarly using aliquots between 50-200 µl of plasma.

Progesterone was also determined by RIA using the antibody developed and tested by Dighe and Hunter (1974), and the method described by Poyser and Horton (1975) for measuring progesterone in guinea-pig plasma. Due to the higher concentration of progesterone in pig plasma, smaller volumes of plasma could be assayed. These ranged from 10-100 µl, but occasionally 10-50 µl of a 1 in 10 dilution had to be used. Parallelism with the standard curve was exhibited when varying volumes of plasma were assayed.

The detection limit for the progesterone assay was 20 pg per tube. The intra-assay coefficient of variation calculated from duplicate results for each sample was 10.9 %, and the inter-assay coefficient 10.5 % using 80 pg (mean ± s.e.m. 79 ± 2 pg, n = 15). The detection limit for the $PGF_{2\alpha}$ assay was 40 pg per tube, the intra-assay coefficient of variation being 13.3 % and the inter-assay coefficient 12.7 % — calculated from a standard of 320 pg (mean ± s.e.m. 329 ± 11 pg, n = 14).

Results.

Non-pregnant (cyclic) animals.

The findings in 32 mature gilts from which blood samples were taken by venepuncture are summarized in table 1 according to the stage of the oestrous

TABLE 1

The concentrations of $PGF_{2\alpha}$ and progesterone in uterine venous plasma obtained by acute sampling of 32 cyclic (unmated) *animals under full anaesthesia*

Age of corpora lutea (days)	No. of animals sampled	No. of samples	Uterine venous $PGF_{2\alpha}$ NG/ML Mean ± s.e.m.	Uterine venous $PGF_{2\alpha}$ NG/ML Range	Uterine venous progesterone NG/ML Mean ± s.e.m.	Uterine venous progesterone NG/ML Range
1	2	4	0.37 ± 0.02	0.35 – 0.38	0.54 ± 0.37	0.13 – 2.03
3	1	1	0.50	—	1.57	—
5	1	2	0.22 ± 0.02	0.20 – 0.24	6.80 ± 0.20	6.6 – 7.0
7	1	2	0.21 ± 0.06	0.14 – 0.27	3.27 ± 0.20	3.07 – 3.48
9	1	2	0.24 ± 0.02	0.22 – 0.25	9.7 ± 0.30	9.4 – 10.0
11	1	2	0.85 ± 0.05	0.80 – 0.90	27.3 ± 1.25	26.0 – 28.5
12	1	2	1.45 ± 0.35	1.1 – 1.8	25.0 ± 2.5	22.5 – 27.5
13	2	3	1.70 ± 1.39	0.28 – 4.5	32.7 ± 2.05	29.5 – 36.5
14	5	9	2.19 ± 0.64	0.78 – 6.6	12.9 ± 3.1	0.68 – 22.2
15	2	4	3.83 ± 1.92	0.60 – 8.7	2.68 ± 1.47	0.60 – 7.0
16	3	5	2.85 ± 0.99	0.75 – 6.2	14.9 ± 8.4	1.1 – 37.3
17	3	6	5.86 ± 2.0	1.27 – 14.0	7.76 ± 2.08	1.60 – 13.2
18	4	7	1.13 ± 0.03	1.03 – 1.2	1.81 ± 0.18	0.95 – 2.4
19	3	3	0.46 ± 0.07	0.33 – 0.56	4.2 ± 0.59	3.1 – 5.1
21	2	4	0.38 ± 0.03	0.35 – 0.42	0.18 ± 0.03	0.13 – 0.25
Immature control	1	1	0.34	—	0.12	—

cycle ; 56 samples were analysed together with one from a prepuberal control animal.

The concentration of $PGF_{2\alpha}$ in uterine venous blood remained below 1.0 ng/ml until the corpora lutea were 12 days old, during which interval the concentration of progesterone showed an overall increase to a mean of 27.3 ng/ml. The concentration of uterine $PGF_{2\alpha}$ then increased significantly, highest mean values being associated with corpora lutea aged 15-17 days. The largest single concentration of $PGF_{2\alpha}$ (14.0 ng/ml) was obtained in the presence of 17-day corpora lutea, whereas the mean value in six samples taken at this time was 5.86 ng/ml. The uterine venous concentrations of $PGF_{2\alpha}$ in the later stages of the cycle (< 0.50 ng/ml) were comparable with those found when corpora lutea were aged less than 11 days. Blood obtained from the prepuberal control had a similarly low figure.

Whilst the mean concentration of plasma progesterone showed an overall increase until the corpora lutea were 11-13 days old, there was considerable variation in the values for individual samples. A decline in the mean progesterone concentration was conspicuous in many samples when corpora lutea were aged 14 days or older, and the downward trend continued, although with seemingly anomalous values for 15- and 19-day corpora lutea (table 1).

Results were also obtained from a catheterised animal with 16-day corpora lutea. The peak and mean values for uterine venous $PGF_{2\alpha}$ in 22 samples from this animal during a period of 5 ½ hours were 3.3 and 1.47 ng/ml, respectively, whilst jugular concentrations of $PGF_{2\alpha}$ did not exceed 0.50 ng/ml.

Mated (pregnant) animals.

The findings in 26 mated animals, subsequently confirmed to contain embryos, are summarised in tables 2 and 3. Once again, the mean concentration of uterine venous $PGF_{2\alpha}$ did not exceed 1.0 ng/ml until the corpora lutea were 13 days old. Peak values after acute sampling were found with 13- and 15-day corpora lutea (9.3 and 10.3 ng/ml $PGF_{2\alpha}$, respectively) and with 15-day sampling in a catheterised animal (11.9 ng/ml $PGF_{2\alpha}$). Values obtained for $PGF_{2\alpha}$ on the 17th, 18th and 19th days showed a downward trend.

The mean concentrations of $PGF_{2\alpha}$ in uterine blood obtained by acute sampling usually exceeded those obtained from catheterised preparations, the only exception being with 16-day corpora lutea (1.09 *vs* 2.3 ng/ml $PGF_{2\alpha}$). On the other hand, within the sequence obtained from 14 catheterised animals (table 3), the peak concentration of $PGF_{2\alpha}$ was only twice recorded in the first two samples after inserting and anchoring the catheter. However, in six gilts having 13-17 day corpora lutea, the peak concentration of uterine $PGF_{2\alpha}$ was recorded within 45 min of placing the catheter a situation not found before the twelfth day.

Comparing the mean concentration of $PGF_{2\alpha}$ in uterine venous and jugular samples, there was little difference when corpora lutea were aged less than 13 days. Thereafter, the uterine venous values were always higher than jugular ones, the difference being at least twofold until the nineteenth day and somewhat greater with 15- and 16-day corpora lutea (table 3).

Mean progesterone values in uterine venous blood obtained by acute sampling showed little evidence of depression with 13-17 day corpora lutea, although the single 17-day value appears low (table 2). In catheterised animals having 13-19 day corpora lutea, there was considerable day to day variation in the mean uterine venous and peripheral concentrations of progesterone, but an overall depression of progesterone values in response to elevated titres of $PGF_{2\alpha}$ was only detectable in two animals and was not sustained.

TABLE 2

The concentrations of $PGF_{2\alpha}$ and progesterone in uterine venous plasma obtained by acute sampling of 12 mated animals under full surgical anaesthesia

Age of corpora lutea (days)	No. of animals sampled	No. of samples	Uterine venous $PGF_{2\alpha}$ NG/ML Mean ± s.e.m.	Uterine venous $PGF_{2\alpha}$ NG/ML Range	Uterine venous progesterone NG/ML Mean ± s.e.m.	Uterine venous progesterone NG/ML Range
12	1	3	0.87 ± 0.02	0.80 – 0.97	66.3 ± 4.1	58.3 – 72.2
13	2	3	6.00 ± 2.25	1.7 – 9.3	27.9 ± 2.6	23.0 – 31.6
14	4	7	1.42 ± 0.17	0.8 – 1.97	35.9 ± 6.2	17.0 – 56.5
15	3	6	5.95 ± 1.53	1.1 – 10.3	34.1 ± 4.5	24.7 – 52.4
16	1	2	1.09 ± 0.41	0.68 – 1.5	31.4 ± 1.9	29.5 – 33.2
17	1	1	1.1	—	18.2	—

TABLE 3

The concentrations of $PGF_{2\alpha}$ and progesterone in uterine venous and jugular blood plasma of 14 mated pigs obtained by sampling from indwelling catheters every 15 minutes (figures expressed as NG/ML)

Age of corpora lutea (days)	Animal number	No. of samples in sequence	Uterine venous				Jugular			
			$PGF_{2\alpha}$ Mean ± s.e.m.	Range	Progesterone Mean ± s.e.m.	Range	$PGF_{2\alpha}$ Mean ± s.e.m.	Range	Progesterone Mean ± s.e.m.	Range
7	B14	23	0.37 ± 0.04	0.11 – 0.59	13.8 ± 0.54	10.0 – 18.7	0.38 ± 0.01	0.24 – 0.50	18.1 ± 0.62	12.8 – 24.2
8	B31	21	0.33 ± 0.01	0.25 – 0.48	30.4 ± 0.81	23.0 – 36.6	0.31 ± 0.01	0.21 – 0.42	33.8 ± 0.79	24.9 – 39.7
9	A32	15	0.65 ± 0.04	0.46 – 0.90	21.4 ± 1.19	13.8 – 27.0	0.59 ± 0.04	0.30 – 0.80	22.8 ± 1.52	13.8 – 33.5
11	B21	10	0.50 ± 0.08	0.30 – 1.00	26.6 ± 1.69	19.8 – 33.0	0.37 ± 0.05	0.21 – 0.73	37.0 ± 1.37	28.8 – 44.4
12	C15	21	0.29 ± 0.01	0.19 – 0.39	25.4 ± 1.31	15.0 – 35.4	0.27 ± 0.01	0.14 – 0.36	24.6 ± 1.06	16.0 – 33.1
13	B35	24	1.07 ± 0.06	0.69 – 1.64	24.9 ± 1.27	15.3 – 36.2	0.59 ± 0.03	0.31 – 0.80	30.0 ± 1.35	19.8 – 43.4
14	B44	21	0.67 ± 0.06	0.39 – 1.26	24.4 ± 1.04	13.9 – 31.8	0.31 ± 0.01	0.22 – 0.43	21.4 ± 0.86	14.8 – 26.8
15	H11	21	0.90 ± 0.18	0.38 – 3.5	9.0 ± 0.27	7.0 – 11.7	0.38 ± 0.01	0.32 – 0.50	10.8 ± 0.26	9.0 – 13.2
15	H52	22	2.8 ± 0.49	0.81 – 11.9	32.2 ± 0.65	26.1 – 37.2	0.63 ± 0.03	0.42 – 0.99	32.6 ± 0.77	25.6 – 37.6
16	K53	23	2.3 ± 0.18	1.1 – 4.2	25.3 ± 1.43	13.8 – 40.5	0.64 ± 0.06	0.27 – 1.2	18.3 ± 2.70	3.0 – 41.8
17	K54	21	1.04 ± 0.07	0.70 – 2.1	31.9 ± 1.8	19.2 – 52.6	0.58 ± 0.02	0.40 – 0.79	27.1 ± 1.42	17.7 – 41.5
18	L21	22	1.6 ± 0.21	0.82 – 4.3	13.1 ± 0.59	9.0 – 19.3	0.46 ± 0.02	0.37 – 0.72	15.5 ± 0.74	10.1 – 21.7
19	L25	10	1.29 ± 0.11	0.89 – 2.09	29.3 ± 1.56	23.2 – 38.9	0.47 ± 0.03	0.34 – 0.65	31.4 ± 1.30	23.5 – 38.5
19	L22	20	0.72 ± 0.04	0.46 – 1.3	25.1 ± 0.77	18.0 – 33.7	0.43 ± 0.03	0.28 – 0.70	21.8 ± 0.65	13.6 – 25.8

Discussion.

The results of this study suggest that increasing secretion of $PGF_{2\alpha}$ into the uterine veins of cyclic pigs towards the end of the luteal phase is associated with the process of luteolysis, thereby endorsing the findings of Gleeson and Thorburn (1973), Gleeson *et al.* (1974) and Moeljono *et al.* (1977). The concentrations of $PGF_{2\alpha}$ obtained by acute sampling accord well with the earlier reports, as does the onset of enhanced $PGF_{2\alpha}$ secretion when corpora lutea are aged 12-13 days ; this is precisely the stage at which full luteal regression can first be effected by exogenous prostaglandins or their analogues (Guthrie and Polge, 1976 ; Lindloff *et al.,* 1976). The variation in $PGF_{2\alpha}$ concentrations noted by acute sampling during the 12th-18th days suggests considerable fluctuation in $PGF_{2\alpha}$ release, again endorsing the pulsatile mode of secretion portrayed in the studies of Gleeson *et al.* (1974) and Moeljono *et al.* (1977). Despite this corroboration of earlier work, the manner in which elevated titres of uterine $PGF_{2\alpha}$ bring about luteolysis remains to be clarified, although a local transfer of $PGF_{2\alpha}$ from the uterine veins to the ovary has been demonstrated in pigs (Kotwica, 1980), possibly involving a lymphatic route rather than a counter-current vascular transfer as in sheep (Goding *et al.,* 1972 ; McCracken *et al.,* 1972).

Turning to the situation in early pregnancy, our measurements of $PGF_{2\alpha}$ concentrations are not in close agreement with those of Moeljono *et al.* (1977), even though we do record a relative reduction in mean concentrations of $PGF_{2\alpha}$ secretion in mated animals during the stage at which luteolysis occurs in cyclic animals. But Moeljono *et al.* report overall mean concentrations for $PGF_{2\alpha}$ in the plasma of cyclic pigs as being 260 % higher than for pregnant pigs. Before attempting to reconcile these two sets of results, it should be noted that Moeljono *et al.* sampled *utero-ovarian* blood whereas the site of catheter placement in the present study favoured collection of *uterine* blood ; thus relatively higher concentrations of $PGF_{2\alpha}$ would be expected from the latter approach, even though neither study took account of the critical influence on hormone concentrations of blood flow (see Ford and Christenson, 1979). It is also worth recalling that we obtained elevated $PGF_{2\alpha}$ titres from both acute and catheterised sampling of mated animals, and that in both experimental preparations $PGF_{2\alpha}$ titres were diminishing by the time the corpora lutea were aged 17 days or more, thereby suggesting that sampling under anaesthesia did not distort the pattern of secretion.

As noted in the introduction, Bazer and Thatcher (1977) and Moeljono *et al.* (1977) concluded that $PGF_{2\alpha}$ was largely sequestered by an exocrine route into the uterine lumen of pigs 13-17 days after mating, this diversion away from the vascular bed of the uterus being promoted by a local influence of oestrogen synthesis by the conceptuses. This proposal fitted with the observation that the lifespan of pig corpora lutea could be prolonged by systemic injection of oestrogens (Kidder, Casida and Grummer, 1955 ; Nishikawa and Waide, 1958 ; Gardner, First and Casida, 1963). Furthermore, Frank *et al.* (1977, 1978) were able to mimic the putative influence of conceptuses in diverting $PGF_{2\alpha}$ into the uterine lumen by treating gilts with oestradiol valerate, although substantial oedema

would have been involved in this experimental model. The evidence for reduced $PGF_{2\alpha}$ metabolites in the circulation of pregnant pigs (Kindahl, Lindell and Edqvist, 1980 ; Martinat-Botté, Terqui and Thatcher, 1980 ; Guthrie and Rexroad, 1981) further strengthens their case, even though the concentrations of the 13, 14-dihydro-15-keto metabolite do not fully account for the uterine venous concentration of $PGF_{2\alpha}$ reported by Moeljono *et al.* (1977) nor is the ultimate fate of $PGF_{2\alpha}$ diverted into the uterine lumen explained. Nonetheless, the hypothesis proposed by Bazer and Thatcher (1977) still seems to require modification, especially since peripheral progesterone concentrations in our study were not reduced significantly in the face of the highest mean titres of $PGF_{2\alpha}$ with 15- and 16-day corpora lutea.

The most meaningful interpretation of the data is that there is indeed endocrine secretion of uterine $PGF_{2\alpha}$ in mated animals during the period when peaks are found in cyclic animals, but that there are also luteotrophic factors emanating from the conceptuses which act directly and/or via the hypothalamus and hypophysis to override the influence of $PGF_{2\alpha}$ and prevent luteolysis during the critical period from Days 13-17 after mating (see Hunter, 1977, 1980 ; Cook and Hunter, 1978). Such luteotrophic factors might consist of a gonadotrophin-like substance from the blastocyst, for which there is tentative evidence in pigs (Flint *et al.*, 1980 ; Saunders, Ziecik and Flint, 1980 ; Flint, 1981). Extension of the oestrous cycle to 26-28 days in gilts injected systemically with PMSG on Day 14 (Hunter, 1964) appears relevant, possibly indicating sensitivity of the corpora lutea to chorionic gonadotrophins in the late luteal phase although an oestrogenic effect from stimulated follicles cannot be excluded (Hunter, 1979). There may also be an enhanced output of hypophyseal hormones (*ie* LH and prolactin) in response to embryonic secretion of oestrogens. This interpretation of a dynamic interplay between luteotrophic and luteolytic factors during the critical phase of pregnancy establishment does not, in fact, contradict the results of Moeljono *et al.* (1977), for exocrine secretion of uterine $PGF_{2\alpha}$ was by no means the exclusive route of disposal in their studies.

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Résumé. *Sécrétion utérine de prostaglandine $F_{2\alpha}$ pendant le cycle oestral et les stades précoces de gestation chez des truies anesthésiées.*

Des échantillons de sang utérin sont recueillis par ponction veineuse directe ou par l'intermédiaire d'un cathéter à demeure, chez des jeunes truies dont 33 sont en cycle et dont 26 ont été accouplées ; celles-ci sont reconnues gravides ultérieurement. Chez les

animaux cathétérisés, du sang est prélevé simultanément à la jugulaire. La prostaglandine $F_{2\alpha}$ et la progestérone sont dosées par radioimmunoessai dans le plasma.

Chez les animaux en cycle, la concentration de $PGF_{2\alpha}$ dans le sang de la veine utérine reste inférieure à 1 ng/ml jusqu'au 12e jour. Les concentrations les plus élevées de $PGF_{2\alpha}$ sont détectées lorsque les corps jaunes sont âgés de 15 à 17 jours, la concentration moyenne de 6 échantillons au 17e jour étant de 5,9 ng/ml.

De même, la concentration de $PGF_{2\alpha}$ dans le sang utérin des animaux accouplés ne dépasse pas 1 ng/ml avant le 12e jour de gestation. La valeur moyenne obtenue à partir d'un échantillonnage ponctuel pratiqué au 15e jour est de 6 ng/ml. Les concentrations moyennes les plus élevées obtenues à partir d'un ensemble de 14 animaux gestants sont respectivement de 2,8 et 2,3 ng/ml aux 15e et 16e jours. Aux 17e et 18e jours les concentrations en $PGF_{2\alpha}$ ont tendance à s'abaisser.

Les concentrations moyennes de progestérone dans les sangs utérin et périphérique des animaux accouplés subissent des variations journalières très importantes, mais ne sont pas abaissées de manière durable lorsque les taux de $PGF_{2\alpha}$ sont élevés.

Ces résultats suggèrent que la sécrétion exocrine de $PGF_{2\alpha}$ dans la lumière utérine des truies sous l'influence des oestrogènes trophoblastiques ne peut expliquer à elle seule l'établissement des corps jaunes gestatifs. Il faut également tenir compte du rôle lutéotrophique — distinct du rôle antilutéolytique — du conceptus de porc au moment de la reconnaissance de l'état gestatif par l'organisme maternel.

Ce travail apporte une preuve indirecte de la sensibilité du corps jaune aux gonadotrophines chorioniques.

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