

Maternal Behavior in the Rabbit: Critical Period for Nest Building Following Castration During Pregnancy.* (27846)

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The corpus luteum is a principal source of progesterone and is essential for regulation of the sex cycle, implantation and maintenance of pregnancy. The minimum length of time that the corpora lutea must be present to maintain gestation varies in different species, but these structures are essential throughout all or most of pregnancy in the rabbit(1). Castration in the pregnant rabbit results in interruption of pregnancy, while administration of luteal extract or progesterone maintains gestation up to the full term(2-6). Termination of pregnancy by castration or by removal of corpus luteum during the latter half of pregnancy also induces maternal-nest building which normally occurs at or about the time of parturition and frequently at the end of pseudopregnancy(7,8). The occurrence of maternal-nest building following castration during pregnancy offered a tool for determining whether a critical or minimum period existed for the action of hormones which may be necessary for the arousal of maternal-nest building. The present study was designed to determine the minimum length of pregnancy required for castration to lead to maternal-nest building.

Materials and methods. Rabbits of the Dutch-belted strain, bred in our laboratories, were used. The animals were provided with a wooden nest box; timothy hay was always available for use in nest building. The nest construction involves carrying the hay to the nest box and shaping it in the form of a nest by hollowing it. This is followed by plucking of hair from the body which is used to line and cover the nest. The presence of this hair-incorporated "maternal nest" was used as the end point(9).

The day of mating was defined as day 1 of pregnancy. Rabbits were castrated on various days between days 13 and 17 of

pregnancy and were kept under observation for the occurrence of nest building. Castration was performed through separate dorso-lateral incisions under Nembutal anesthesia. Post-operative care consisted of treatment with 300,000 units of procaine penicillin G intramuscularly and maintenance in a warm room overnight.

Results and discussion. Table I shows the incidence of maternal-nest building following castration on different days during pregnancy and the percentage of animals building nests. Rabbits castrated prior to day 14 of pregnancy failed to build maternal nests; 25% of the animals castrated on day 14 built maternal nests. Thereafter the percentage progressively increased to 100% if castration was performed on day 17 of pregnancy (Table I).

A chi-square test comparing the proportion of animals building nests on different days yielded a value of 22.62 ($df = 4$, $P < .01$) showing that the probability of nest building varies significantly as a function of gestation age. The relationship, graphed in Fig. 1, tends to be ogival.

It is known that castration, abortion or conceptus removal resulting in termination of pregnancy is promptly followed by maternal-nest building(8). Although castration during the latter half of pregnancy induces maternal-nest building, the same is not true for castration during the earlier stages of gestation, *i.e.*, prior to day 14 of pregnancy.

TABLE I. Incidence of Maternal-Nest Building Following Castration During Pregnancy.

Day of pregnancy when castrated	No. of rabbits	Maternal-nest	
		No. built	% built
13	8	0	.00
14	8	2	25.00
15	9	5	56.00
16	8	7	87.50
17	8	8	100.00

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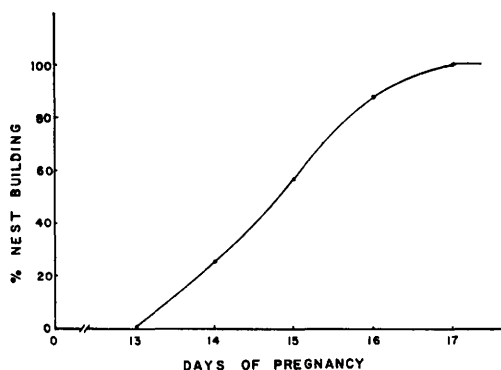


FIG. 1. Percentage of rabbits that built a maternal-nest when castrated between days 13 to 17 of gestation.

This is indicative of the existence of a critical or minimum period for the action of the hormones involved. This finding offers a useful technic for designing treatment schedules in an attempt experimentally to induce maternal-nest building in the castrated female rabbit with various combinations of ovarian steroids and other hormones.

Summary. A critical period of exposure

to certain hormones appears to be necessary for maternal-nest building since no nest building occurs in animals castrated before day 14 of gestation. It appears that ovarian steroids must act for a period of 16 or 17 days for the occurrence of maternal-nest building.

1. Corner, G. W., *J.A.M.A.*, 1941, v116, 591.
2. Allen, W. M., Corner, G. W., *Am. J. Physiol.*, 1929, v88, 340.
3. ———, *PROC. SOC. EXP. BIOL. AND MED.*, 1930, v27, 403.
4. Allen, W. M., Heckel, G. P., *Am. J. Physiol.*, 1939, v125, 31.
5. Courrier, R., Kehl, R., *Compt. rend. Soc. biol.*, 1938, v127, 529.
6. ———, *ibid.*, 1938, v128, 188.
7. Klein, M., in *L'Instinct dans le Comportement des Animaux et de l'Homme*, P.-P. Grasse, ed., Masson & Cie, Paris, 1956.
8. Zarrow, M. X., Sawin, P. B., Ross, S., Denenberg, V. H., Crary, D., Wilson, E. D., Farooq, A., *J. Reprod. Fertil.*, 1961, v2, 152.
9. Zarrow, M. X., Sawin, P. B., Ross, S., Denenberg, V. H., in *Roots of Behavior*, E. L. Bliss, ed., Harper, New York, 1962.

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Conversion of Lecithin to Lysolecithin as a Source of Fatty Acids in Incubated Plasma or Serum. (27847)

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Gurd(1) has pointed out the variable results reported for phospholipid breakdown on incubation of plasma. Dole(2) found that the extractable acidity increased at a rate of 35 μ eq per liter per hour upon incubation of plasma at 37°C, "presumably by enzymatic hydrolysis of esterified fatty acids." We have observed that this rate of release of fatty acids is adequately accounted for by the conversion of lecithin to lysolecithin. Our evidence is presented here.

Methods. The conversion of lecithin to lysolecithin in plasma or serum upon incubation at 38°C was measured by quantitative silicic acid paper chromatography as previ-

ously reported(3). Lipid extracts (Bloor) of plasma or serum kept at 38°C were made after 10 minutes (zero time reference), 4 hours and 20 hours. Values reported are those of single aliquots of lipid extracts applied to the paper chromatograms. The initial lysolecithin values for the normal serums are not reported as true normal values since the serums had been kept frozen for a variable period before being utilized in this experiment(3). The normal serums of section B of the Table are approximately 4 μ g higher in lysolecithin P content than when originally analyzed.

Results. Section A of the table records