Forced Ovulation in Gonadotrophin-Treated Fasting Hens. (22477)

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(Introduced by R. M. Fraps.)
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In our earlier experiments(1-3) administration of gonadotrophic hormone (GTH) prevented the decrease of serum vitellin level and the occurrence of follicular atresia in the fasting hen. Follicles treated so were morphologically normal except for their longer stalks (2, Fig. 3). However, it has not been cleared whether these follicles show normal reaction to the ovulatory effect of LH or not. In previous work on ovulation in laying hens(3-7), the intravenous administration of luteinizing hormone (LH) induced premature ovulation of normally maturing follicles. Either first (C_1) or subsequent (C_s) follicles of regularly recurrent clutch sequences were ovulated within about 8 hours following LH injection (7,8). At comparable hours before expected ovulation, the sensitivity of C_1 follicles to the effect of LH was as much as 20 times greater than that of C_s follicles(8,9). However, at equal times from a preceding ovulation in the closed cycle, the reactivity of C_1 and C_s follicles was of the same order(10).

The present experiments were undertaken to elucidate the following 4 items on ovulation in the gonadotrophin-treated fasting hen: 1) Possibility of forced ovulation by LH administration; 2) Minimum dose of LH for the induction of ovulation; 3) Time interval between hormone administration and rupture of follicles; and 4) Possibility of forced ovulation of the immature small follicles (less than 2 cm diameter) by larger doses of LH injection.

Materials and methods. White Leghorn hens used in these experiments were put under fasting conditions similar to those described in a previous paper(1). For the purposes of items 1-3, birds expected from their clutch sequence to lay no eggs on the first 2 days of starvation were treated with follicle stimulating hormone (FSH) prepared by the Armour Laboratories (Lot No. PF-593-12X). Other groups were treated with gonadotrophin from pregnant mares' serum, PMS (Gonadogen, Upjohn, AYE DH 062AH) or LH (Armour, Lot No. 317-115), regardless of clutch sequences. Intramuscular injections were given for a period of 7-8 days. For forced ovulation, 0.5 mg, 0.1 mg and 0.05 mg of the LH preparation were injected into wing veins on the last day of starvation. Details pertaining to item 4 are noted below. The fluctuation of serum vitellin levels of the starved hens treated with GTH was determined by the precipitin reaction(1). Ovulation was first examined by cloacal palpation to determine the presence of an egg in the uterus and finally by postmortem inspection of the ovary for the presence of recently ruptured follicles.

Results. Table I shows the results of forced ovulation by intravenous injection of LH in GTH-treated fasting hens. Untreated fasting hens, as well as those injected with GTH intramuscularly(1-3), seldom lay eggs on the third day of starvation. This means that ovulation rarely occurs on the second day either of fasting or of GTH treatment.

In this experiment, however, on the 7th or 8th day of starvation, all of these treated hens except 3 were induced to ovulate 8 hours after injection of 0.5 mg or of 0.1 mg of LH-preparation, one of them ovulating two follicles. The injection of 0.05 mg of LH was without effect.

Fig. 1 shows a yolk in magnum at 9 hours after LH administration.

There occurred, however, no ovulation in 3 hens. At autopsy one of them (No. 2-214), injected with 0.5 mg of LH, had a large atretic follicle on her gonad, and the other 2, injected with 0.1 mg of LH, carried ovulable follicles similar to those in the birds responding by ovulation.

Thus it can be said that large follicles in GTH-treated fasting hens can be induced to ovulate by LH administration. The dose for

TABLE I. Forced Ovulation by Intravenous Injection of LH to Gonadotrophin-Treated Fasting Hens.

GTH pretreatment: Hormone	Daily dose (mg)	Days	Hen No.	LH inj. (mg)	No. of ovulated follicles	Inj. to ovulation (hr)	Vitellin level (prec. titer)	Ovary wt (g)
FSH	.50	7	2–540	0.5	1	8	640	77.0
"	.25	8	2–526	"	1	7–8	320	38.5
LH	1.00	7	2–214	"	0	—	"	117.4
"	.50	"	3–654	"	1	8	"	89.2
"	.50	"	2–125	"	2	8	"	75.0
PMS	.50	"	2–381	"	1	8	640	54.3
FSH	.25	"	2–530	0.1	1	8	320	33.5
LH	.10	"	004	"	1	8	"	47.8
"	.10	"	002	"	0	—	"	26.0
PMS	.50	"	2–370	"	0	—	640	41.5
PMS	.50	"	2–377	0.05	0	—	640	42.1

TABLE II. Lack of Effect of Intravenously Injected LH on Immature Ovarian Follicles of Gonadotrophin-Treated Fasting Hens. No ovulated follicles in any of 5 hens.

GTH pretreatment: Hormone	Daily dose (mg)	Days	LH inj. (mg)	Vitellin level (prec. titer)	Ovary wt (g)
FSH	.50	9	2.0	640	70.5
"	.25	"	2.0	320	33.5
"	.50	"	1.0	640	41.5
"	"	"	.5	640	32.7
"	"	"	.5	320	58.0

forced ovulation in 83% of injected hens is 0.5 mg/hen, while the minimum dose is of the order of 0.1 mg.

The last experiment was to clarify item 4. All the hens recorded in Table II ovulated on the first 2 days of starvation (in contrast with the FSH treated hens of Table I), but failed to ovulate in response to LH injected even at the 2 mg level on the 9th day of starvation. At autopsy, the ovaries of these hens were found to carry numerous follicles of about 2 cm diameter (Fig. 2) but none of mature size. The effect of FSH in these hens appeared to be similar to the "over-all" action of pituitary gonadotrophin described by Phillips(11) rather than to the action of PMS.

As shown in these results, there occurred no forced ovulation of small immature follicles (about 2 cm in diameter) in the FSH-treated fasting hens by 2 mg of LH.

Summary. 1. Ovulation is induced by intravenous injection of LH preparation in

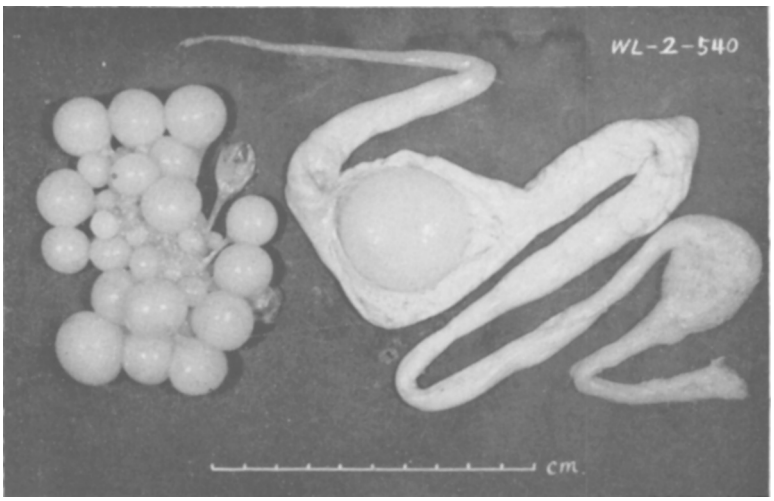

FIG. 1. Ovary and oviduct from FSH-treated fasting hen No. 2–540 (Table I), sacrificed 9 hr following inj. of 0.5 mg LH.

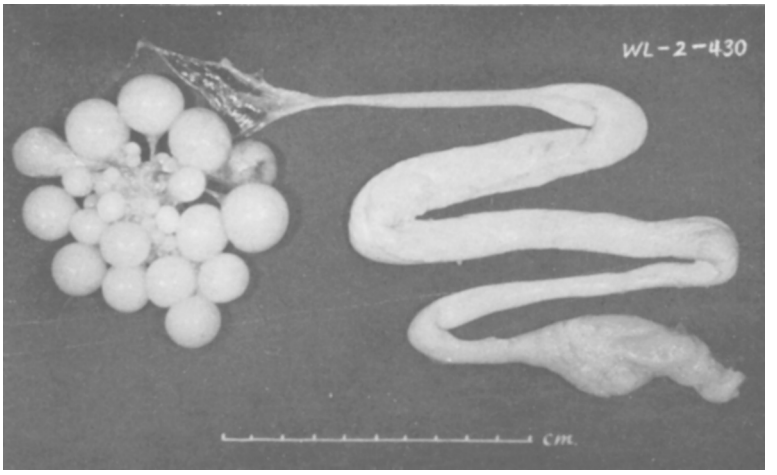

FIG. 2. Ovary and oviduct from FSH-treated fasting hen No. 2–430 (Table II), sacrificed 12 hr following inj. of 2.0 mg LH. Note absence of full-sized follicles.

gonadotrophin-treated 7-day starved hens. 2. 0.1 mg of the LH preparation used in this experiment is asumed to be the minimum dose for forced ovulation. 3. About 8 hours is the time interval between LH administration and rupture of follicles in such treated hens. 4. It was not possible to induce ovulation of small immature follicles by 2 mg of LH.

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Anticortisol Action of 2-Methyl-9(α)-Fluorocortisol.* (22478)

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It has been shown recently that 2-methyl-9(α)-fluorocortisol acetate (Me-F-COLA) possesses extraordinarily intense mineralocorticoid but comparatively slight glucocorticoid activity(1). This raised the question whether this new steroid, like other potent mineralocorticoids, can also block the antiphlogistic, thymolytic, splenolytic and catabolic actions of a glucocorticoid, such as cortisol. It will be recalled that aldosterone, the most active known naturally occurring mineralocorticoid, does possess such anticortisol actions(2). To verify this point, an experiment was performed with Me-F-COL, under essentially the same experimental circumstances under which aldosterone proved to inhibit cortisol.

Materials and methods. Forty female

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