

Oviductal Response to Different Substances

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THE OBJECT of this investigation is to study the responsiveness of the oviduct to different hormones, vitamins, antibiotics and anthelmintic drugs.

All vitamins examined in this investigation, i.e. B₆, B₁₂ and C inhibited the oviductal motility when used in doses of 1, 3 and 5 mg for B₆ and C and of 0.8, 0.9 and 1.0 mg for vit. B₁₂.

When adrenaline was used in doses of 1×10^{-8} - 1×10^{-3} g (*In Vitro*), it produced stimulation of all portions in all doses, and that the response depended on the dose used.

When acetylcholine was added in doses of 0.1×10^{-6} - 1.5×10^{-6} g, it stimulated the oviductal motility of the three portions to a great extent.

Doses of 10-60 mg of oxytetracycline stimulated the oviductal motility to a variable degree of potency.

When piperazine was used in the form of the veterinary preparation Dido-zal, at levels of 16-80 mg, it markedly inhibited the motility of the three regions.

Although the oviduct is of particular importance in poultry production, yet its response to various drugs is not thoroughly investigated. This encouraged the author to study the responsiveness of the oviduct to various drugs which are commonly used during the course of rearing or production in chickens, either for medication or for the increase of production. Some of these drugs are hormones, vitamins, antibiotics, anthelmintic compounds. McKenney *et al.* (1932) showed that when adrenaline was added to the perfusing fluid, maximal contractions of both isthmus and magnum occurred immediately, while uterus responded by relaxation. On the other hand, the addition of acetylcholine to the perfusing fluid was followed by a motor activity of all segments of the oviduct. Sykes (1955) observed that the circular and longitudinal muscles of the uterus were equally inhibited by adrenaline at a threshold concentration of 10^{-8} .

Material and Methods

White Baladi hens used in this study were taken at random from the flock bred by the Poultry Research Centre Animal Science Department, Faculty of Agriculture, Cairo University, to study the effect of the different drugs used on the spontaneous motility of the oviduct (*in vitro*) using the glass jar bath apparatus described by El Habbak (1975). After hens were sacrificed, the

oviduct was carefully removed and immersed in a dish filled with Dale's solution. A strip of about one inch long from the magnum, isthmus and uterus was suspended in the oxygenated physiological solution of the inner bath. Then the lever was left to record the normal motility on a smoked kymographic drum paper slowly moving and drugs were added to the inner bath in different doses. The responsiveness of the magnum, isthmus and uterus to these drugs were recorded.

Solutions investigated and experiments

1. Dale's solution

This solution was prepared by dissolving 90 g sodium chloride, 4.2 g potassium chloride, 2.4 g calcium chloride, and 0.05 g magnesium chloride in 1 l of distilled water. A 200 ml of this solution was completed to 2 l and 1 g of each of glucose and sodium bicarbonate was then added.

2. Vitamins

- (a) Vitamin B₆ was added to the physiological solution in the inner bath in doses of 1, 3 and 5 mg.
- (b) Vitamin B₁₂ was tested in doses of 0.8, 0.9 and 1.0 mg.
- (c) Vitamin C was added in doses of 1, 3 and 5 mg.

3. Other drugs

- (a) Adrenaline was added in doses of 1×10^{-8} , 1×10^{-6} , 1×10^{-4} and 1×10^{-2} g.
- (b) A cetylcholine was added in doses of 0.1×10^{-5} , 0.5×10^{-5} , 1.0×10^{-5} and 1.5×10^{-5} g.
- (c) Terramycin (Oxytetracycline HCL) was added to the inner bath at levels of 10, 20, 30 and 60 mg.
- (d) Piperazine (Dido-Zal) was used at levels of 16, 48 and 80 mg.

Results and Discussion

1. Oviductal motility as affected by vitamins (*in vitro*)

(a) Vitamin B₆

Vitamin B₆ inhibited the three portions in all doses used. It is observed that all segments showed slight inhibition with the dose of 1 mg but on the other hand, complete inhibition of the oviductal motility was obtained at the level of 5 mg in all segments (Table I).

(b) Vitamin B₁₂

It is clear from Table I that vitamin B₁₂ inhibited the motility of the three portions of the hen's oviduct when the egg is in uterus. It is also noticed that the effect of the vitamin depends on the concentration used, being slight for small doses and strongest for high ones.

(c) *Vitamin C*

It is markedly noticed that vitamin C inhibited the motility of the three regions of the tract in all doses used and that the response increased with the increased doses (Table 1).

TABLE 1. Oviductal motility as affected by vitamins.

Vitamin	Doses mg	Dilution used	Effect on		
			Magnum	Isthmus	Uterus
B ₆	1	1:50000	SLI	SLI	SLI
	3	3:50000	SI	SI	SI
	5	5:50000	CI	CI	CI
B ₁₂	0.8	1:62500	SLI	SLI	SLI
	0.9	1:55555	SI	SI	SI
	1.0	1:50000	VSI	VSI	VSI
C	1	1:50000	SLI	SLI	SLI
	3	1:16666	SI	SI	SI
	5	1:10000	VSI	VSI	VSI

SLI : Slight Inhibition
 SI : Strong Inhibition
 VSI : Very Strong Inhibition
 CI : Complete Inhibition.

Ascorbic acid cyanocobalamine and pyrodoxine when examined in this study showed consistent inhibition of the oviductal motility, when used in various concentrations. It is possible therefore that this delayed oviductal motility may be a factor for improving shell quality. This results may also confirm those obtained by Holmes and Kramer (1965) and Griffith *et al.* (1969) who claimed that vitamin B₁₂ improved egg shell thickness and those of Thornton and Moring (1958 and 1959) who reported that vitamin C improved shell quality.

2. *Oviductal motility as affected by hormones (in vitro)*

(a) *Adrenaline*

As it shown from the results compared in Table 2 adrenaline produced stimulation of all portions in all doses added. It is also observed that the response depended on the dose used.

(b) *Acetylcholine*

Acetylcholine produced apparent gradient stimulation depending on the doses used, being minimum in the small doses and increasing with the increased doses (Table 2). It was also observed that segments from isthmus region were more sensitive to the drug than of the magnum and uterus.

TABLE 2. Effect of drugs on the oviducal motility (*in vitro*).

Drugs	Doses	Dilution	Effect on		
			Magnum	Isthmus	Uterus
Adrenaline	10 ⁻⁸ g	1:5000 milion	S	S	S
	10 ⁻⁶ g	1:50 milion	SS	SS	SS
	10 ⁻⁴ g	1:50000	VSS	VSS	VSS
	10 ⁻² g	1:5000	VSS	VSS	VSS
Acetylcholine	0.1 × 10 ⁻⁵ g	1:50 milion	S	S	S
	0.5 × 10 ⁻⁵ g	5:50 milion	SS	SS	SS
	1.0 × 10 ⁻⁵ g	10:50 milion	SS	SS	VSS
	1.5 × 10 ⁻⁵ g	15:50 milion	VSS	VSS	VSS
Terramycin	10 mg	1:5000	SS	SS	SS
	20 mg	1:2500	SS	SS	SS
	30 mg	1:1666	SS	VSS	VSS
	60 mg	1:833	VSS	VSS	VSS
Piperazine	16 mg	1:3333	I	SI	SI
	48 mg	1:1111	SI	VSI	VSI
	80 mg	1:666	VSI	VSI	VSI

S = Stimulation, SS = Strong Stimulation, VSS = Very Strong Stimulation
I = Inhibition, SI = Strong Inhibition, VSI = Very Strong Inhibition

It is very interesting to notice that both adrenaline and acetylcholine produce stimulation of the motility of the three regions, magnum, isthmus and uterus, *in vitro* when used at various concentrations. The consistent stimulation of the oviduct produced by both neurocrines adrenaline and acetylcholine denotes the possible presence of sympathetic and parasympa-

thetic nerves innervating the oviduct. Results obtained in the present study confirm those obtained by MCKenney *et al.* (1932) who reported that the addition of adrenaline or acetylcholine to the perfusing fluid was followed by a motor activity of the oviduct. He moreover added that atropine completely inhibited the action of acetylcholine on the oviduct. In this respect Chen and Hawes (1967) noticed that adrenaline caused a positive response in longitudinal uterine muscles. This response to be increased with age and following estrogen treatment of live birds. This finding of Chen and Hawes is in agreement with that obtained in this present study since it has proved that adrenaline produced positive effects on the three portions of the tract of birds in an active reproductive phase, *i.e.* of high estrogen levels.

3. Oviductal motility as affected by other drugs

(a) Terramycin

The responsiveness of the three regions to the difference doses was determined, as recorded in Table 2. It is noticed that terramycin seems to be a very strong drug, since it stimulated the three regions of the tract in all doses used to a great extent. The effect depended on the concentration of the drug used.

Oxytetracycline was selected to be studied in this present work, since, it is one of the most widely used antibiotics in poultry practice. It is usually given for treatment of different infections and moreover, utilized for increasing egg production. When tested on the oviductal motility oxytetracycline HCl proved to be of motor activity to the oviductal motility. This increased motility together with efficiency of feed utilization and increased rate of ovulation may be possible factors for increasing egg production. Carlson (1959), in this respect, obtained an improvement in egg production and feed efficiency with oxytetracycline administration to pullets.

(b) Piperazine (Dido-Zal)

Results obtained are compared in Table 2. It will be seen that piperazine HCl, when added to the inner bath at levels of 16, 48 and 80 mg / resulted in an inhibitory effect on the three portions of the oviduct. It was noticed that at levels of 16 and 48 mg the magnum was less sensitive to the drug than isthms and uterus.

Piperazine was also selected to study its effect on the oviduct, since it is the drug of choice for treating poultry parasites particularly for the removal of ascarides in birds. It is widely used in poultry practice as it is proved to be non-toxic and possesses a wide margin of safety without any adverse effects on poultry production. Piperazine when examined *in vitro* on the oviductal motility produced inhibition at all dose levels. It seems possible therefore that it could be utilized safely without interfering with egg production, but on the other hand, its anthelmintic effect may improve the general health and consequently poultry production may also be improved.

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تأثير قناة البيض بالمواد المختلفة

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درس مدى تأثير حركة قناة البيض في الدجاج لمختلف الهرمونات والفيتامينات والمضادات الحيوية ومضادات الديدان المستعملة في غذاء الدواجن ووجد أن جميع اليفتامينات التي استخدمت أبطأت من حركة قناة البيض بجميع تركيزاتها ، ونبيه الادرينالين حركة قناة البيض وكذلك مادة الالاسيتابل كولين ومادة الالوكسى تترانسكيلين . والمادة المستخدمة كطارد للديدان أبطأت من حركة قناة البيض .