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STUDIES ON SOME PHYSIOLOGICAL RESPONSES OF MALE AND FEMALE LOCAL CHICKS TO THE ANTIOESTROGENIC DRUG TAMOXIFEN

EL- HABBAK[1] M.M., NEAMAT A. BADAWY[1], HANNA M. KHALIL[1], MAYSA M. HANAFY[2]

1 Faculty of Agriculture, Tanta University, Kaf El-Sheikh, Egypt

2 Animal Production Research Institute, Agricultural Research Centre Ministry of Agriculture, Giza, Egypt

Abstract

A total of 1528 Gimmizah chicks were used in the present study and divided into four main groups: A, B, C and D according to age to investigate the response of birds to tamoxifen (TAM) injection at doses of 0,0.5,5.0 and 10.0 mg/kg.Bw. Group A started receiving TAM injections at the age of one week, meanwhile, the other three groups B,C and D started TAM injections at the age of 5,9 and 13 weeks consequently. Injections were applied intraperitoneally once each three days for six successive weeks.

Experimental results indicated that testes and oviduct relative weights were significantly increased due to TAM injections at doses of 0.5 mg, and 10 mg respectively, in group (A), but ovarian relative weights were not significantly affected with TAM injections.

No significant differences in plasma total lipids could be detected due to doses or sex of birds at the age of one week, but, TAM injection significantly increased plasma total lipids in group (C) and TAM 5 mg in group (B). In all groups plasma cholesterol and total lipids levels in females were higher than males.

TAM injection at any dose had not significant effect on estradiol levels. Plasma testosterone was significantly by reduced due to TAM 0.5 mg in groups (A and B), but, all TAM doses significantly increased plasma testosterone levels in group (D). TAM doses applied had not significantly affected spermatogensis in males, while, viability in TAM doses were significantly lower than control in group (A). Moreover, vitality was increased significantly due to TAM5 mg in group (D). Chicks weight at hatch was the only trait that significantly by varied in groups (A and C), but, no significant differences among treatment could be detected for fertility, hatchability, pipped, late dead and early dead percentages.

INTRODUCTION

Tamoxifen (TAM) trans is the isomer of a triphenylethylene that has a wide spectrum of activity in animals, and differs from species to species ranging from pure antag-

onist activity to full oestrogen agonist (Patterson, 1981).

In the chicken oviduct, TAM was characterized by a pure antioestrogen when given at a dose ranging from 1 to 10 mg/kg.B.W. (Sutherland, 1981). Administration of TAM to two-week old WL females at doses of 0.1 and 10 mg/Kg.B.W. caused a precocious increase in plasma oestrogen and androgen, and suppressed adiposity in a dose-related manner. Low doses of TAM enhanced gonadotropic activity and egg laying, but, the antioestrogenic effect depressed development of the gonadal system, suppressing egg production when high doses were administered (Jaccoby *et al.*, 1992). In Juvenile male broiler chicks, TAM given at doses of 1 or 10 mg/kg increased the weight of the testes, and advanced spermatogenesis and the response was dose-dependent (Rozenboim *et al.*, 1986). In White Leghorn (WL) male chicks TAM induced the production of semen that yielded normal offspring as early as 9 wks of age (Rozenboim *et al.*, 1988). However, while administration of low doses of TAM to WL male chicks enhanced testes growth, increased plasma testosterone concentration and caused precocious semen production and sexual activity, high doses of TAM produced contrary results (Rozenboim *et al.*, 1989).. Based on these findings it was suggested that TAM has both anti-oestrogenic and oestrogenic effects on WL male, depending on the dose administered (Rozenboim *et al.*, 1989).

In the light of this contradiction, experiments reported herein were mainly designed to investigate thoroughly the different responses of both male and female chicks to *in vivo* TAM injections when given in different doses at different ages.

MATERIALS AND METHODS

A total of 1528 day-old Gimmizah chicks were used in the present study to investigate the response of birds to TAM intraperitoneal injection in different doses at different ages. Birds were divided into four main groups; the first group (A) started receiving TAM injections at the age of one week, meanwhile, the second (B), the third (C) and the fourth (D) groups started TAM injections at the age of 5,9 and 13 wks, respectively. Within each group, birds were further divided into four subgroups; 1,2,3 and 4, with two replicates each, according to the doses applied. The 1^{st} subgroup served control and received a single 0.2 ml corn-oil injection (TAM0), while, the 2^{nd}, 3^{rd} and 4^{th} subgroups received 0.2 ml. Corn-oil injections containing 0.5 mg TAM/kg B.W (TAM0.5), 5.0 mg TAM/kg B.W. (TAM5) and 10 mg TAM/kg. B.W. (TAM10), respectively. Injections were applied intraperitoneally, once each three days for six successive weeks. Number of birds was 50 chicks for the first three groups and 41 chicks for the

fourth one. All chicks were reared in floor pens under the same hygienic and managerial conditions and fed on commercial rations throughout the different stages where a starter ration containing 18.15% CP and 2855 Kcal/kg ME was offered from hatch to 10 wks of age, a grower ration containing 14.64% CP and 2783 Kcal/kg ME from 10-20 wks of age and a layer ration of 15.77% CP and 2714 Kcal ME thereafter. At the end of six weeks of TAM injections, six birds (3 males and 3 females) from each dose were randomly chosen and slaughtered, then, testes, ovaries and oviducts were carefully removed and weighed. Blood samples were collected individually in heparinized tubes, and plasma separated to determine total lipids (Frings *et al.*, 1972) and cholesterol (Richmont, (1973), while, plasma testosterone and estradiol were determined using radioimmunoassay technique (Diagnostic Products Corp., USA).

During the period from 19 to 29 wks of age, semen was collected from five males/dose by the abdominal massage technique (Burrows and Quinn, 1937) to study the effect of TAM treatments on semen quality (ejaculate volume, concentration of spermatozoa, vitality and viability).

At the age of 40 wks, a representative sample of eggs were collected from each treatment to investigate the effect of TAM doses on hatching traits.

Data obtained were statistically analyzed according to SAS (1985). The significant differences between mean values were determined by using Duncan's Multiple Range test (Duncan, 1955).

RESULTS AND DISCUSSION

1. Testes relative weight

Results regarding the effect of TAM at different ages on testes relative weight as percentage of live body weight are shown in Table 1. After six wks of TAM administration since the age of one week, testes relative weight was significantly increased due to TAM injections at doses of 0.5 mg. Groups received the larger doses did not differ significantly from the control.

When TAM treatments were applied during the period from 5 to 11 weeks of age, testes relative weight increased from 8-folds to 11-folds. However, due to the fact that, only three birds per group were examined besides the great standard error resulting from great variation within each group, the apparent differences observed were not significant. In group C, where TAM treatments started at the age of 9 wk no significant differences due to TAM injections could be observed. However, an apparent

increase in testes relative weight reaching about 22% of control was observed with the middle dose of TAM, 5 mg. The opposite was true with the largest dose, 10 mg, which caused an apparent decrease of about 42.6% of control value.

When TAM treatments were delayed to start at the age of 13 weeks, all doses applied increased testes weight. The effect was greatest for the small doses 0.5 mg and 5 mg in which the increase was about 35% and 36% of control, respectively.

The observed increase in testes weight in the present study agrees with the results obtained by Rozenboin *et al.* (1993) who showed that TAM administration caused precocious maturation of the gonadal-pituitary axis in male chicks. Within a week of TAM administration hypothalamic GnRH-I content increased to a higher value than that of the control birds. This effect of TAM suggests that the hypothalamus is a primary target site for the antioestrogen in the induction of precocious puberty.

2. Ovary and oviduct relative weights

Records of ovarian relative weight as percentage of live body weight as influenced by TAM treatments are presented in Table 2. Application of TAM administration as early as the age of one week did not significantly affect ovarian relative weight (Table 2). However, an apparent increase of about 33% and an equal decrease were observed in case of TAM 10 and TAM 5, respectively. Delaying the onset of TAM treatments to the age of five weeks resulted in decreased ovarian weight specially in case of TAM 10 where ovarian weight was reduced by 50% of control records. However, statistical analysis could not reveal any significance. When TAM injections started at the age of nine weeks, ovarian weight increased to reach about 800%, 500% and 200% of control values due to TAM doses 0.5 mg, 5 mg and 10 mg respectively. However, inspite of these apparent great figures, differences among groups were statistically insignificant. When TAM doses were applied later at the age of 13 weeks, no changes in ovarian weight could be observed.

Results of oviduct relative weight and its length seemed to be significantly affected by TAM treatments as shown in Table 2. After six weeks of TAM injections from one to seven weeks of age (group A), oviduct relative weight was significantly increased due to TAM 0.5 and TAM 10 doses. The oviduct relative weight reached 200% and 400% of control values for the two mentioned doses, respectively. The length of the oviduct was not significantly affected in this group. When TAM treatments were applied from 5 to 11 weeks of age (group B), no significant differences in oviduct weight or length could be detected. In group C where TAM doses were given from 9 to 15

weeks of age, an apparent but insignificant increase in oviduct weight was observed with TAM 0.5. In this case, the oviduct relative weight reached about three-fold its control value, but, the extremely great standard error led to statistical insignificance. The other two doses TAM 5 and TAM 10 were nearly similar to control in this respect. Oviduct length was found to be unaffected by TAM treatments.

Oviduct weight and length were markedly increased, but, insignificantly, due to TAM treatment from 13 to 19 weeks of age (group D).

Thus, it could be observed that the response of female genital organs varied from that of males. Available data in this respect showed wide variations due to difference in sex and age of birds, TAM doses and/or the treatment regiment applied. According to Jaccoby *et al.* (1992), TAM administration to two-week-old WL females on alternate days at doses of 0.1 mg, 1mg, 5 mg and 10 mg/kg BW till the age of 23 wk, enhanced ovarian steraidogenesis and, thus, increased plasma oestrogen and androgen concentrations in a dose-related manner. On the other hand, greater estrogen target tissue activity manifested by increased oviduct weight and elevated plasma total lipids and calcium concentrations, was evident with the dose of 1 mg only. The two highest doses of TAM (5&10 mg) appeared to inhibit the physiological manifestations of the elevated plasma estrogen concentrations and significant depressed oviduct growth. Enhancement of gonadal activation due to TAM was manifested by increase in both ovarian growth and plasma steroid concentration in pullets given 1 mg TAM, while, enhanced steroidogenesis was the only sign in pullets received the higher doses of TAM (5 & 10 mg), but, ovarian growth was suppressed. Authors concluded that, both the increase in steroidogenesis and the suppressed ovarian growth were the result of the antioestrogenic effect of TAM, which on one hand increased gonadotropic activity and thus steroid production, while on the other hand reduced oestrogen effectiveness in peripheral target tissues.

3. Blood biochemical parameters

A. Total lipids

In group (A) received TAM doses at the age of one week, no significant differences could be detected due to dose or sex of birds. In the case of males, plasma total lipids for birds received TAM 10 treatment was significantly greater than those for TAM 5, but, insignificantly higher than TAM0.5 treatment and control group. In case of females, TAM 5 treatment significantly increased plasma total lipids than TAM 0.5, but, insignificant than the others. These results are in agreement with Jaccoby *et al.* (1992)

who reported that the plasma lipids were elevated in White Leghorn females given 1mg TAM/kg BW. In group (B), TAM5 dose significantly increased plasma total lipids as compared with the other doses, while, in group (C), all doses of TAM significantly increased plasma total lipids, but TAM injections up to the age of 13 weeks; showed no effect on plasma total lipids content. In all group plasma total lipids, level in females was higher than males (Tables 3,4,5 and 6).

B. Cholesterol

When TAM was injected at the age of one week, (group A), a sharp decrease in plasma cholesterol was observed in male birds received TAM0.5 doses, but, in females the lowest cholesterol levels were obtained with TAM5 doses and the highest with TAM10 doses. No significant effects were obtained in groups (B) or (D), meanwhile, doses TAM0.5 and TAM5 significantly increased plasma cholesterol in group (C). In all groups, females tended to have higher plasma cholesterol levels than males (Tables 3, 4, 5 and 6).

C. Estradiol

Results obtained indicated that, using TAM at any dose showed no significant effect on estradiol levels. Besides, no significant differences between males and females with respect to plasma estradiol values were observed, except for group (B) where records for females were significantly higher than those for males. These results are in contrast with Jaccoby *et al.* (1992) who reported that plasma oestrogen was elevated by TAM 5 and TAM 10. On the other hand, Patterson (1981) suggested that TAM has both antioestrogenic and oestrogenic effects on chicks depending on the dose administered.

D. Testosterone

Results obtained from Tables 3, 4, 5 and 6 showed that, in group (A), plasma testosterone was reduced due to TAM injection and the effect was significant with TAM 0.5 and TAM 10. In group (B), only TAM 0.5 significantly reduced plasma testosterone level, while, TAM 5 and TAM 10 showed no effect. No significant effect was observed in group (C). Interesting, were the results of group (D) where all TAM doses significantly increased blood testosterone. These results are in agreement with Jaccoby *et al.* (1992) who reported that plasma androgen was elevated by TAM 5 and TAM 10.

4. Semen quality

Results of bi-weekly examination of semen samples during the period from 19-29 weeks of age for quality characteristics influenced by TAM doses generally, indicated that TAM doses applied did not significantly affect spermatogenesis in males since, neither the volume of semen nor concentration of spermatozoa were significantly affected. Moreover, vitality of sperms was not significantly influenced almost in all cases. The only two exceptions observed were, first in group (A) at the age of 21 weeks where viability for samples ejaculated from treated males were significantly lower than control, second in group (D) at the age of 25 weeks where vitality for TAM 5 was significantly higher than control and TAM 10 groups. These results are in contrast with several previous studies which claimed that TAM treatments probably reduced that ability of the sex steroids to activate negative feedback on gonadotropin secretion in the hypothalamus and the pituitary glands and, thus, increased gonadotropin release and enhanced gonadal activity leading to precocious sexual puberty and higher ejaculate's sperm count and fertilization capacity (Rozenboim *et al.*, 1986, 1988, 1989).

5. Hatching traits

During the last week of the first three months of egg production, eggs laid were collected and incubated to show whether hatching traits may be influenced by TAM treatment or not. Statistical analysis of results obtained revealed that no significant differences among treatments could be detected for fertility, hatchability, pipped, late dead and early dead percentages. These results are in agreement with Coco *et al.* (1992) who found that in ovo administration of tamoxifen (200 mg per egg) on the 1st day of incubation, led to no differences in percentage hatch of tamoxifen treated chicks as compared with control.

Table 1. Relative weight of testes (X±SE) of Gimmizah chicks as influenced by TAM administration at different ages.

Traits	TAM 0	TAM 0.5	TAM 5	TAM 10
TAM injections for 6 wk since the age of one week. (group A)	0.03±0.01^{b}	0.21±0.08^{a}	0.06±0.01^{b}	0.05±0.01^{b}
TAM injections for 6 wk since the age of 5 weeks. (group B)	0.06±0.01	0.50±0.17	0.52±0.20	0.69±0.23
TAM injections for 6 wk since the age of 9 weeks. (group C)	0.73±0.10	0.69±0.13	0.89±0.16	0.42±0.18
TAM injections for 6 wk since the age of 13 weeks. (group D)	0.97±0.18	1.31±0.50	1.32±0.22	1.06±0.50

a, b Means within a row with no common superscripts differ significantly P≤0.05 based on Duncan's separation of means.

Table 2. Ovary and oviduct relative weight (%) and oviduct length (cm.) of Gimmizah chicks as influenced by TAM administration for six weeks at different ages (X±SE).

Treatment	Traits	TAM 0	TAM 0.5	TAM 5	TAM 10
TAM injection for 6 wk since the age of one week (group A)	Ovary (%)	0.03±0.01	0.03±0.01	0.02±0.01	0.04±0.01
	Oviduct (%)	0.02±0.01^{b}	0.04±0.02^{ab}	0.02±0.01^{b}	0.08±0.01^{a}
	Oviduct length (cm)	4.90±0.38	3.97±0.38	4.67±0.27	5.47±0.84
TAM injection for 6 wk since the age of 5 weeks (group B)	Ovary (%)	0.06±0.01	0.06±0.01	0.05±0.01	0.03±0.02
	Oviduct (%)	0.04±0.01	0.03±0.01	0.02±0.01	0.03±0.01
	Oviduct length (cm)	7.13±1.09	7.70±0.86	5.43±0.65	4.40±1.07
TAM injection for 6 wk since the age of 9 weeks (group C)	Ovary (%)	0.03±0.01	0.25±0.22	0.15±0.05	0.06±0.03
	Oviduct (%)	0.13±0.01	0.40±0.34	0.09±0.01	0.10±0.01
	Oviduct length (cm)	9.67±1.33	10.33±0.33	10.00±0.58	9.67±0.33
TAM injection for 6 wk since the age of 13 weeks (group D)	Ovary (%)	0.09±0.04	0.09±0.01	0.11±0.04	0.08±0.01
	Oviduct (%)	0.32±0.29	0.30±0.25	1.15±0.36	0.93±0.48
	Oviduct length (cm)	15.83±6.33	12.33±1.45	29.00±4.04	24.27±9.95

a, b Means within a row under each age with no common superscripts differ significantly at P≤0.05 based on Duncan's separation of means.

Table 3. Plasma concentrations of total lipids, cholesterol, estradiol and testosterone (X±SE) of Gimmizah chicks after six weeks of TAM administration since the age of one week (group A).

Parameters	Sex	TAM 0	TAM 0.5	TAM 5	TAM 10	Overall mean
Total lipids g/L	Male	3.00 ± 0.40^{abc}	2.44 ± 0.35^{bc}	1.79 ± 0.09^{c}	3.26 ± 0.53^{ab}	2.62±0.23
	Female	3.29 ± 0.64^{ab}	2.36 ± 0.15^{bc}	3.71 ± 0.25^{a}	2.82 ± 0.32^{abc}	3.04±0.22
	Overall mean	3.14±0.34	2.40±0.17	2.75±0.45	3.04±0.29	
Cholesterol mg/100 ml	Male	47.56 ± 2.10^{bcd}	27.15 ± 2.21^{e}	42.61 ± 5.73^{cde}	63.06 ± 3.63^{ab}	45.10 ± 4.18^{B}
	Female	55.87 ± 2.88^{bcd}	58.05 ± 6.38^{bc}	39.70 ± 5.15^{de}	77.42 ± 10.00^{a}	57.76 ± 4.92^{A}
	Overall mean	51.72 ± 2.45^{b}	42.60 ± 7.53^{b}	41.16 ± 3.51^{b}	70.24 ± 5.74^{a}	
Estradiol pg/ml	Male	76.00±1.73	68.33±4.26	71.00±2.31	69.33±3.84	71.17±1.63
	Female	75.00±2.08	70.67±2.33	72.33±1.45	74.00±2.08	73.00±0.99
	Overall mean	75.50±1.23	69.50±2.23	71.67±1.26	71.67±2.22	
Testosterone (ng/ml)	Male	0.40±0.01	0.29±0.02	0.35±0.02	0.32±0.04	0.34±0.02
	Female	0.35±0.01	0.27±0.01	0.32±0.03	0.31±0.03	0.31±0.01
	Overall mean	0.38 ± 0.01^{a}	0.28 ± 0.01^{b}	0.33 ± 0.02^{ab}	0.32 ± 0.02^{b}	

a, b, c, d, e Means within a row under each age with no common superscripts differ significantly at $P\leq 0.05$ based on Duncan's separation of means.

A,B Different capital letters within columns under each age refere to significant difference between sexes ($P\leq0.05$).

Table 4. Plasma concentrations of total lipids, cholesterol, estradiol and testosterone (X±SE) of Gimmizah chicks after six weeks of TAM administration since the age of 5 weeks (group B).

Parameters	Sex	TAM 0	TAM 0.5	TAM 5	TAM 10	Overall mean
Total lipids	Male	3.42±0.64	3.82±0.73	4.19±0.19	2.09±0.12	3.38 ± 0.32^{B}
g/ L	Female	3.68±0.51	3.61±0.47	5.90±1.06	4.26±0.70	4.36 ± 0.41^{A}
	Overall mean	3.55 ± 0.37^{b}	3.72 ± 0.39^{b}	5.04 ± 0.61^{a}	3.18 ± 0.58^{b}	
Cholesterol mg/100 ml	Male	69.85±1.46	54.30±11.35	54.87±13.30	58.24±4.66	63.53±5.22
	Female	74.34±7.05	79.03±6.99	66.11±6.44	75.09±11.20	69.43±3.62
	Overall mean	72.10±3.37	66.67±8.13	60.49±7.07	66.67±6.60	
Estradiol	Male	83.67±2.03	84.67±1.45	85.00±0.58	82.33±1.86	83.92 ± 0.74^{B}
pg/ml	Female	85.33±2.67	87.67±0.88	86.67±0.67	86.33±0.88	86.50 ± 0.69^{A}
	Overall mean	84.50±1.54	86.17±1.01	85.83±0.54	84.33±1.28	
Testosterone (ng/ml)	Male	0.54 ± 0.02^{a}	0.35 ± 0.01^{d}	0.49 ± 0.04^{a}	0.48 ± 0.02^{ab}	0.47 ± 0.02^{A}
	Female	0.41 ± 0.01^{c}	0.32 ± 0.01^{d}	0.42 ± 0.01^{bc}	0.48 ± 0.03^{ab}	0.41 ± 0.02^{B}
	Overall mean	0.48 ± 0.03^{a}	0.34 ± 0.01^{b}	0.46 ± 0.02^{a}	0.48 ± 0.02^{a}	

a, b, c,d Means within a row under each age with no common superscripts differ significantly at $P\leq0.05$ based on Duncan's separation of means.

A,B Different capital letters within columns under each age refere to significant difference between sexes ($P\leq0.05$).

Table 5. Plasma concentrations of total lipids, cholesterol, estradiol and testosterone (X±SE) of Gimmizah chicks after six weeks of TAM administration since the age of 9 weeks (group C).

Parameters	Sex	TAM 0	TAM 0.5	TAM 5	TAM 10	Overall mean
Total lipids g/ L	Male	1.76±0.24^{d}	3.93±0.10^{ab}	1.78±0.31^{d}	3.48±0.26^{bc}	2.74±0.31^{B}
	Female	2.42±0.44^{cd}	3.03±0.48^{bc}	4.75±0.25^{a}	3.29±0.58^{bc}	3.37±0.32^{A}
	Overall mean	2.09±0.27^{b}	3.48±0.30^{a}	3.26±0.69^{a}	3.39±0.29^{a}	
Cholesterol mg/100 ml	Male	60.30±8.05	108.80±11.53	66.08±7.71	60.30±0.94	73.87±17.17
	Female	66.10±10.91	101.50±23.67	109.36±6.17	47.75±1.97	81.18±9.53
	Overall mean	63.20±6.20^{b}	105.15±11.89^{a}	87.72±10.64^{a}	54.03±4.27^{b}	
Estradiol pg/ml	Male	169.67±10.53	171.00±9.17	186.33±3.28	180.33±2.33	176.83±3.72
	Female	182.00±4.73	185.00±4.00	190.67±1.67	181.00±2.08	184.67±1.83
	Overall mean	175.83±5.85	178.00±5.46	188.50±1.91	180.67±1.41	
Testosterone (ng/ml)	Male	1.33±0.22	0.95±0.04	1.20±0.04	1.45±0.05	1.23±0.08
	Female	0.97±0.16	0.84±0.02	1.24±0.31	1.03±0.08	1.02±0.09
	Overall mean	1.15±0.15	0.89±0.03	1.22±0.14	1.24±0.10	

a, b, c, d Means within a row under each age with no common superscripts differ significantly at P≤0.05 based on Duncan's separation of means.

A,B Different capital letters within columns under each age refere to significant difference between sexes (P≤0.05).

Table 6. Plasma concentrations of total lipids, cholesterol, estradiol and testosterone (X±SE) of Gimmizah chicks after six weeks of TAM administration since the age of 13 weeks (group D).

Parameters	Sex	TAM 0	TAM 0.5	TAM 5	TAM 10	Overall mean
Total lipids	Male	2.50±0.24	2.81±0.32	2.17±0.03	2.64±0.28	2.53±0.13^{B}
g/ L	Female	2.86±0.49	3.29±0.08	3.48±0.32	3.61±0.52	3.31±0.19^{A}
	Overall mean	2.68±0.26	3.05±0.18	2.82±0.33	3.12±0.34	
Cholesterol	Male	78.13±6.34	75.84±17.98	75.10±2.70	80.52±4.41	77.40±4.26^{B}
mg/100 ml	Female	88.92±5.03	115.17±9.10	105.20±11.71	88.58±9.71	99.47±5.20^{A}
	Overall mean	83.52±4.35	95.51±12.59	90.15±8.61	84.55±5.10	
Estradiol	Male	252.67±14.89	263.33±4.81	244.00±11.02	260.33±4.81	255.08±4.77
pg/ml	Female	278.00±20.82	278.00±11.36	282.67±32.13	269.33±4.06	277.00±8.69
	Overall mean	265.33±12.77	270.67±6.42	263.33±17.48	264.83±3.46	
Testosterone	Male	2.90±0.09	3.78±0.35	3.99±0.43	4.14±0.22	3.70±0.19^{A}
(ng/ml)	Female	2.21±0.34	3.70±0.10	3.10±0.06	3.71±0.18	3.18±0.20^{B}
	Overall mean	2.55±0.22^{b}	3.73±0.16^{a}	3.54±0.28^{a}	3.93±0.16^{a}	

a, b Means within a row under each age with no common superscripts differ significantly at P≤0.05 based on Duncan's separation of means.

A,B Different capital letters within columns under each age refere to significant difference between sexes (P≤0.05).

Table 7. Effect of TAM administration for six weeks since the age of one week (group A) on some semen quality traits (X±S.E) of Gimmizah cockerels from 19 to 29 weeks of age.

Treatment	19	21	23	25	27	29
	Concentration (million/ml)					
TAM0	1253.00±78.54	1590.00±113.76	1640.00±95.72	1622.40±103.30	1418.20±166.60	1466.00±135.85
TAM0.5	1345.20±173.85	1487.6±283.23	1927.40±244.91	1973.80±338.76	1917.60±272.63	1976.00±228.94
TAM5	1361.00±25.02	1538.00±77.24	1529.40±95.20	2023.80±466.50	2395.00±468.80	2423.00±468.14
TAM10	1294.00±91.85	1528.00±82.91	1651.40±77.70	1790.40±59.47	1986.00±93.79	2100.00±114.02
	Livability (%)					
TAM0	70.4±1.75	72.0±1.26	74.4±0.75	75.0±1.82	74.8±1.59	75.2±1.88
TAM0.5	71.0±1.70	71.6±1.86	73.8±1.02	78.8±0.97	78.4±1.40	79.4±1.83
TAM5	70.8±1.24	73.0±0.84	75.6±1.63	77.2±0.92	77.6±1.03	780.07±1.64
TAM10	72.6±1.03	75.6±0.93	76.0±0.89	77.2±2.08	80.6±1.57	79.8±2.44
	Volume (ml)					
TAM0	0.14±0.02	0.24±0.05	0.30±0.05	0.18±0.04	0.18±0.04	0.30±0.03
TAM0.5	0.16±0.02	0.16±0.04	0.18±0.04	0.16±0.04	0.20±0.03	0.26±0.05
TAM5	0.16±0.04	0.18±0.02	0.22±0.07	0.18±0.04	0.22±0.04	0.20±0.03
TAM10	0.14±0.02	0.14±0.02	0.22±0.07	0.18±0.04	0.22±0.04	0.24±0.02
	Viability (%)					
TAM0	82±3.39	92±1.22[a]	90±3.16	84±4.30	87±2.00	92±1.22
TAM0.5	83±2.55	85±2.24[b]	89±2.45	91±1.87	89±2.45	91±1.87
TAM5	81±3.32	84±1.87[b]	87±2.00	86±4.30	88±2.55	89±1.87
TAM10	80±1.58	85±1.58[b]	84±1.00	88±2.55	90±2.74	91±1.87

a, b Means within a row under each age with no common superscripts differ significantly at $P \leq 0.05$ based on Duncan's separation of means.

Table 8. Effect of TAM administration for six weeks since the age of 5 weeks (group B) on some semen quality traits (X±S.E) of Gimmizah cockerels from 19 to 29 weeks of age.

Treatment	19	21	23	25	27	29
	Concentration (million/ml)					
TAM0	1531.80±350.25	1613.40±99.24	1980.00±90.28	1787.40±173.96	1659.80±104.72	1746.00±112.77
TAM0.5	1960.20±655.69	1507.20±137.52	1575.00±137.39	1517.60±105.88	1640.20±195.00	1840.00±165.38
TAM5	1074.80±169.54	1278.00±139.59	1395.00±148.07	1943.60±577.72	2017.60±505.21	2020.00±509.02
TAM10	1238.80±43.37	1679.80±285.43	1771.00±101.89	1987.00±231.37	2043.40±290.79	2142.00±261.66
	Livability (%)					
TAM0	72.4±1.03	74.6±1.29	77.2±1.02	79.8±1.28	80.4±2.09	81.2±2.35
TAM0.5	71.8±1.46	73.2±1.46	75.0±1.30	76.4±2.42	78.8±2.35	77.2±2.56
TAM5	70.4±1.63	72.6±2.16	77.4±2.29	78.4±2.34	79.6±2.73	80.6±2.40
TAM10	72.2±0.86	75.4±0.93	77.2±1.36	78.8±0.92	82.4±0.68	83.0±1.41
	Volume (ml)					
TAM0	0.16±0.04	0.14±0.02	0.12±0.02	0.16±0.02	0.16±0.02	0.28±0.04
TAM0.5	0.16±0.02	0.14±0.02	0.16±0.04	0.22±0.04	0.12±0.02	0.20±0.03
TAM5	0.12±0.02	0.14±0.04	0.16±004	0.14±0.02	0.18±0.02	0.20±0.03
TAM10	0.12±0.02	0.18±0.04	0.18±0.04	0.18±0.04	0.16±0.02	0.22±0.04
	Viability (%)					
TAM0	80±4.18	82±2.55	83±2.00	89±1.87	90±2.24	92±2.00
TAM0.5	84±4.58	79±4.00	85±3.16	84±1.00	83±4.36	93±1.22
TAM5	86±2.92	89±1.87	88±2.00	90±1.58	91±1.87	90±2.24
TAM10	85±3.16	85±4.74	86±6.60	90±3.16	91±1.00	94±1.00

Table 9. Effect of TAM administration for six weeks since the age of 9 weeks (group C) on some semen quality traits (X±S.E) of Gimmizah cockerels from 19 to 29 weeks of age.

Treatment	19	21	23	25	27	29
	Concentration (million/ml)					
TAM0	1138.80±54.23	1227.20±81.57	1659.40±96.57	1676.40±116.51	2001.00±193.37	2108.00±185.08
TAM0.5	1255.00±84.56	1445.50±143.77	1629.00±148.12	1628.40±95.20	1725.00±103.03	1887.00±128.31
TAM5	1315.00±91.69	1472.40±170.34	1778.00±216.61	2231.40±454.86	2122.80±507.62	1959.00±271.00
TAM10	1382.00±138.29	1539.80±127.28	1801.00±137.81	1686.40±73.75	1900.20±144.58	2059.00±115.26
	Vitality					
TAM0	70.2±1.39	76.2±1.56	76.0±1.10	79.4±1.21	79.6±1.57	81.4±1.63
TAM0.5	69.8±1.62	72.8±2.50	78.2±1.24	77.2±1.59	79.0±1.30	79.4±1.94
TAM5	72.4±1.03	75.6±0.68	79.0±1.38	78.4±1.57	78.2±2.28	79.4±2.09
TAM10	73.0±0.71	77.4±0.68	79.0±2.10	81.2±1.20	81.0±0.71	82.4±1.12
	Volume (ml)					
TAM0	0.12±0.02	0.12±0.02	0.12±0.02	0.14±0.02	0.16±0.02	0.20±0.03
TAM0.5	0.14±0.02	0.14±0.02	0.20±0.03	0.18±0.04	0.14±0.02	0.24±0.02
TAM5	0.14±0.02	0.12±0.02	0.14±0.04	0.16±0.02	0.20±0.04	0.22±0.04
TAM10	0.12±0.02	0.12±0.02	0.26±0.07	0.16±0.02	0.14±0.02	0.16±0.02
	Viability (%)					
TAM0	82±6.63	92±3.00	86±2.92	91±2.45	91±1.00	92±1.22
TAM0.5	75±3.87	80±1.58	83±2.55	88±2.55	89±2.92	92±1.22
TAM5	76±4.30	83±6.44	91±1.00	92±1.22	90±3.16	93±1.22
TAM10	76±5.79	83±2.00	84±2.45	83±3.74	91±1.00	88±2.55

Table 10. Effect of TAM administration for six weeks since the age of 13 weeks (group D) on some semen quality traits (X±S.E) of Gimmizah cockerels from 19 to 29 weeks of age.

Treatment	19	21	23	25	27	29
	Concentration (million/ml)					
TAM0	883.60±92.92	1469.80±498.51	1725.40±202.15	1357.20±172.27	1732.60±147.80	1740.20±91.09
TAM0.5	1601.60±233.06	1484.00±134.62	1573.00±75.69	1638.80±91.95	1697.40±77.91	1795.00±172.90
TAM5	2287.40±616.21	2282.40±627.87	1760.00±138.43	1740.40±168.74	2032.60±141.27	2079.20±131.91
TAM10	1292.20±293.22	1827.60±343.12	1512.00±70.22	1827.40±121.49	1780.20±176.00	1964.00±128.71
	Vitality (%)					
TAM0	68.8±1.46	71.6±0.45	73.0±1.22	74.4±1.29^{bc}	78.4±2.32	79.2±2.44
TAM0.5	72.0±0.95	74.4±0.40	76.8±0.97	77.8±1.39^{ab}	77.0±2.00	78.2±1.88
TAM5	72.0±0.32	75.4±0.45	77.6±1.63	80.8±1.43^{a}	81.2±0.86	83.2±1.16
TAM10	72.0±0.55	74.0±0.84	74.4±0.93	77.0±0.45^{bc}	77.4±0.44	75.2±2.11
	Volume (ml)					
TAM0	0.12±0.02	0.14±0.02	0.20±0.03	0.16±.04	0.20±0.04	0.26±0.04
TAM0.5	0.14±0.02	0.14±0.02	0.14±0.02	0.14±0.02	0.14±0.02	0.22±0.04
TAM5	0.18±0.04	0.14±0.02	0.12±0.02	0.22±0.02	0.20±0.01	0.20±0.03
TAM10	0.16±0.04	0.12±0.02	0.16±0.04	0.16±0.02	0.20±0.03	0.18±0.04
	Viability (%)					
TAM0	79±5.57	81±5.10	91±1.87	92±2.00	85±4.47	93±1.22
TAM0.5	87±3.39	88±2.55	83±3.00	76±6.96	90±2.74	86±4.30
TAM5	89±2.92	92±2.00	92±2.00	90±2.24	91±1.00	92±2.00
TAM10	80±4.18	81±1.00	83±4.06	82±3.39	91±1.87	90±2.24

a, b, c Means within a row under each age with no common superscripts differ significantly at $P \leq 0.05$ based on Duncan's separation of means.

Table 11. TAM administration for six weeks since the age of the one week (group A) on some hatching traits (X±S.E) of Gimmizah strain.

Traits	TAM0	TAM 0.5	TAM 5	TAM 10
Chick hatching weight (g)	33.98±0.29^{a}	33.35±0.31^{ab}	32.99±0.28^{bc}	32.31±0.34^{c}
Fertility (%)	92.20±2.90	87.47±5.39	91.50±2.65	89.10±3.26
Hatched (%)	83.23±1.25	83.57±2.13	89.33±5.06	81.73±9.66
Pipped (%)	2.73±1.37	3.67±1.87	2.30±2.3	8.30±6.45
Late dead (%)	9.73±0.47	7.37±2.71	6.45±1.92	8.67±3.60
Early dead (%)	4.30±2.54	5.40±5.40	1.93±1.03	1.30±1.30

a, b, c Means within a row under each age with no common superscripts differ significantly at P≤0.05 based on Duncan's separation of means.

Table 12. TAM administration for six weeks since the age of the 5 weeks (group B) on some hatching traits (X±S.E) of Gimmizah strain.

Traits	TAM0	TAM 0.5	TAM 5	TAM 10
Chick hatching weight (g)	33.27±0.20	33.00±0.47	34.06±0.38	33.42±0.30
Fertility (%)	87.40±2.93	91.13±1.50	87.60±3.91	87.43±4.45
Hatched (%)	89.37±2.55	86.70±2.17	77.67±5.48	89.13±3.96
Pipped (%)	1.73±1.73	3.87±0.57	6.07±2.58	2.10±2.10
Late dead (%)	5.47±3.89	6.20±2.16	9.67±2.58	1.70±0.91
Early dead (%)	3.43±1.49	3.87±0.57	6.60±0.49	7.07±1.12

Table 13. TAM administration for six weeks since the age of the 9 weeks (group C) on some hatching traits (X±S.E) of Gimmizah strain.

Traits	TAM0	TAM 0.5	TAM 5	TAM 10
Chick hatching weight (g)	33.18±0.27^{b}	33.37±0.27^{b}	34.16±0.33^{a}	33.00±0.35^{b}
Fertility (%)	93.20±2.47	92.80±1.61	94.17±2.08	93.53±1.84
Hatched (%)	82.60±3.40	79.03±5.06	79.60±4.30	75.90±6.74
Pipped (%)	0.80±0.80	0.63±0.63	3.00±2.12	2.50±1.61
Late dead (%)	12.70±4.32	17.17±6.42	13.73±4.23	12.47±3.28
Early dead (%)	3.90±0.52	3.17±2.20	3.67±0.75	9.13±5.74

a, b Means within a row under each age with no common superscripts differ significantly at P≤0.05 based on Duncan's separation of means.

Table 14. TAM administration for six weeks since the age of the 13 weeks (group D) on some hatching traits (X±S.E) of Gimmizah strain.

Traits	TAM0	TAM 0.5	TAM 5	TAM 10
Chick hatching weight (g)	32.91±0.30	32.67±0.28	32.44±0.32	32.85±0.27
Fertility (%)	94.40±2.20	92.33±2.64	86.97±3.04	91.27±1.52
Hatched (%)	76.50±6.08	81.97±1.63	69.63±8.03	83.20±7.63
Pipped (%)	78.0±1.80	3.10±1.69	3.43±1.72	6.10±1.85
Late dead (%)	12.90±2.48	10.63±1.92	16.50±5.26	13.90±5.87
Early dead (%)	2.80±2.01	4.30±1.21	10.43±5.02	6.80±1.70

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دراسات على بعض الإستجابات الفسيولوجية لإناث وذكور الكتاكيت المحلية للعقار المضاد للإستروجين التاموكسيفين

محمد مصطفى الحباك [١] ، نعمت عبد الغنى بدوى [١] ، هناء محمد خليل [١] ، مايسة مصطفى حنفى [٢]

١ *كلية الزراعة - جامعة طنطا - كفر الشيخ*
٢- *معهد بحوث الإنتاج الحيوانى - مركز البحوث الزراعية - وزارة الزراعة - الجيزة - مصر*

قسمت ١٥٢٨ كتكوت من سلالة الجيزة الى أربعة مجاميع هى : (أ) ، (ب) ، (ج) ، (د) تبعاً لعمر الطائر لدراسة تأثير الحقن بالتاموكسيفين بأربع جرعات وهى صفر ٠,٠٥ ، ١٠٠٥ ملجم /كجم من وزن الجسم لكل من المجاميع الأربعة حيث تم حقن المجموعة إبتداءاً من عمر زسبوع بينما للمجاميع الأخرى ب ، ج ، د تم حقنها من عمر ١٣,٩,٥ أسبوعاً على التوالى . وقد تم الحقن كل ٣ زيام فى الغشاء البريتونى لمدة ٦ أسابيع متتالية . وقد أوضحت النتائج أن الوزن النسبى للخصية وقناة البيض قد زادت معنوياً نتيجة الحقن بمستوى ٠,٠٥ ملج والمستوى ١٠ ملج على التوالى فى المجموعة (أ) بينما الوزن النسبى للمبيض لم يتأثر بالحقن بالمستويات المختلفة من التاموكسفين فى المجاميع المختلفة ولم يلاحظ إختلاف معنوى فى مستوى الدهون الكلية للبلازما بالنسبة للجنس أو الجرعة نتيجة الحقن بجرعات مختلفة من التاموكسفين وذلك فى المجموعة (أ) بينما أدى الحقن بالتاموكسفين الى زيادة معنوية فى الدهون الكلية للبلازما فى المجموعة (ج) والمستوى ٥ ملجم فى المجموعة (ب) . وفى كل المجاميع وجد أن الإناث أعلى معنوياً عن الذكور فى كل من الكوليسترول والدهون الكلية . ولم يؤثر الحقن بالتاموكسفين فى المجاميع المختلفة على مستوى الستراديول فى البلازما بينما أدى الحقن بمستوى ٠,٠٥ ملج فى المجاميع (أ) ، (ب) الى إنخفاض معنوى فى مستوى التستستيرون ولكن باقى المستويات أدت الى زيادة معنوية فى مستوى التستستيرون فى البلازما فى المجموعة (د) . ولم يؤثر التاموكسيفين على الحيوانات فى الذكور بينما الحيوية كانت أقل من الكنترول فى المجموعة (ز) بالاضافة الى ذلك زادت نسبة الحيوانات المنوية الحية معنوياً بإستخدام التاموكسيفين بالمستوى ٥ ملجم فى المجموعة (د) . وزن الكتاكيت عند الفقس كان الصفة الوحيدة التى تأثرت بالحقن بالتاموكسفين وخاصة فى المجموعة (أ) ، (ج) بينما لم يؤثر الحقن بالاموكسيفين على أي من نسبة الخصوبة والفقس والبيض الناقر والميت الأول والميت الثانى .