RESULTS AND DISCUSSION

4 - RESULTS AND DISCUSSION

4 . 1 First Experiment

Studying the effect of treating Fayoumi, Dandarawi and Rhode Island Red incubated eggs with either Eltroxin or Neo - Mercazole on some productive and metabolic parameters .

4 . 1 . 1 . Hatchability and Mortality rate

Data tabulated in table (1) show variation obtained in hatchability and embryonic mortality rate for control and treated Fayoumi , Dandarawi and R.I.R. incubated eggs .

It was found that, in control groups, Fayoumi eggs showed the highest hatchability percent (84.21 %) when compared with that of either Dandarawi (81.82 %) or R.I.R. (81.25 %) eggs which showed approximately an equal hatchability percent value. This may be attributed to the lowest embryonic mortality rate obtained in Fayoumi (15.79%) as compared to that of Dandarawi (18.18 %) and R.I.R. (18.75 %) .The mortality rate , on the other hand , tremendously increased during the late stage of the incubation period . Mortality during this stage represented , approximately , 83 , 75 and 67 % of all mortality rate occured during the incubation period .

Treating incubated eggs of Fayoumi , Dandarawi and R.I.R. decreased hatchability rate . The rate of decrease observed was greately higher when incubated eggs were treated with thyroid preparation (Eltroxin) than when treated with goitrogenic material (Neo - Mercazole) . The hatchability percent decreased to 20.26, 28.75 and 27.14 % in Fayoumi , Dandarawi and R.I.R. Eltroxin treated eggs, respectively . While it decreased to 75.61 , 79 and 80 % , respectively in Neo-Mercazole treated eggs (table, 1) . This may be attributed to the disturbance which occured in the rate of oxidative reactions during the period of embryonic development which accelirated or depressed the rate of biological reactions needed to the normal embryonic development . Increasing the rate of oxidation reaction as a result of treating eggs with thyroid hormones may interrupt the continuons supply of energy for various reactions needed to its developement . On the other hand , Neo - Mercazole may

depress this reaction which lead to insufficient energy supply for the developed embryo and increased the embryonic mortality . However , treating incubated eggs with thyroid hormones (Eltroxin) had high adversable effect on hatchability percent .

It was observed that embryonic mortality rate increased when eggs of all breeds applied were treated with either Eltroxin or Neo - Mercazole, with greater rate when incubated eggs were treated with Eltroxin . Embryonic mortality was 5 to 6 times higher in Eltroxin treated eggs than in Neo - Mercazole treated ones (table, 1) . In addition, the rate of embryonic mortality differed in all breeds according to incubation stage within treatment applied . Embryonic mortality was greately higher during the late stage of incubating Neo-Mercazole treated eggs with different magnitudes within the three breeds applied . The embryonic mortality occured during the late stage of incubation period represents approximately 65 , 86 and 96 % of total mortality occured during the all incubation period in Fayoumi , Dandarawi and R.I.R. eggs treated with Neo-Mercazole, respectively . Also, different results were obtained in Eltroxin treated eggs . The rate of embryonic mortality was higher in Fayoumi and R.I.R. Eltroxin treated eggs during the early stage of incubation while it was higher during the late stage in Dandarawi eggs . This may illustrate the different physiological responces to treatment applied during the various stages of the embryonic development which may be attributed to the genetical ability of different breeds applied.

Obtained results agree with those obtained by Ahmed (1990) who reported depression in hatchability percentage as a result of treating incubated eggs with thyroxin . She added that the higher dose of thyroxin (1.0 ug) had the most deterimental effect on depressing hatchability .

Table (1) : Hatchability and Mortality rates for Fayoumi , Dandarawi and RIR incubated eggs treated with eithr Eltroxin or Neo - Mercazole

Breed	Treatment	No. of incubated eggs	Embryonic Mortality				Hatchability	
			Early *	Late **	Total		No.	%
					No.	%		
FF	Control	38	1	5	6	15.79	32	84.21
	Eltroxin	153	66	56	122	79.74	31	20.26
	NeoMercazole	82	7	13	20	24.39	62	75.61
DD	Control	44	2	6	8	18.18	36	81.82
	Eltroxin	160	27	87	114	71.25	46	28.75
	NeoMercazole	100	3	18	21	21.00	79	79.00
RIR	Control	48	3	6	9	18.75	39	81.25
	Eltroxin	140	72	30	102	72.86	38	27.14
	NeoMercazole	125	1	24	25	20.00	100	80.00

FF = Fayoumi

DD = Dandarawi

RIR = Rhode Island Red

* During the first 7 days

** During the rest period of incubation

4 . 1 . 2 . Body weight

Data in table (2) represent average body weight recorded at hatch and at 4 weeks intervals thereafter up to the 20 th week of bird's age of Fayoumi , Dandarawi and R.I.R. male and female chicks hatched from either untreated or treated eggs .

It was observed that, in control group, male and female R.I.R chicks had the highest body weight at hatch averaged 36.23 and 37.00 gms for males and females, respectively . The lowest averages (24.50 gms for males and 22.07 gms for females) were observed for Dandarawi chicks . While male and female Fayoumi chicks had intermediate body weight average (26.40 and 25.73 gm for males and females, respectively) . All over the experimental period , R.I.R. birds mentained their hightest body weight, Dandarawi the lowest while Fayoumi body weight lied in between the two breeds (table, 2) .

Body weight increased by advancing age reaching its maximum average at the 20 th week of bird's age . The rate of increase differed according to breed and sex of birds . Body weight of R.I.R. increased along the 20 weeks of age by 1520.44 and 1301.22 gm for males and females , respectively while the rate of increase recorded 1194.27, 1118.41 gm in Fayoumi and 1082.93 and 951.93 gm in Dandarawi males and females, respectively . This indicates the superiority of male birds of the three breeds applies which may be attributed to the heaviest body weight at hatch for males than females and for R.I.R's. than for either Fayoumi and Dandarawis , which is mainly a function of the breed difference .

Treating incubated R.I.R eggs with either Eltroxin or Neo - Mercazole decreased average body weight of hatched chicks when compared with control . The rate

of decrease was greater in case of treating incubated eggs with Neo - Mercazole than in case of Eltroxin treated eggs . In addition, the rate of decrease was greater in females hatched from eggs treated with either Eltroxin or Neo - Mercazole when compared to males of the corresponding group . Treating either Fayoumi or Dandarawi eggs with Neo - Mercazole increased average body weight at hatch when compared whth control . It was quite true in both males and females . However the rate of increase was greater in females when compared with males (table, 2) . In addition, the rate of increase was higher in Dandarawi birds than in Fayoumi ones (5.83 % and 19.30 % in female Fayoumi and Dandarawi birds respectively and 4.51 % and 7.27 % in males in the same order , respectively) . On the other hand , treating either Fayoumi and Dandarawi eggs with Eltroxin increased the average body weight at hatch of both Fayoumi males and females while it increased female's average body weight and decreased male's average in Dandarawi breed .

The previously mentained results indicate the different response to treatments applied due to either bird's breed or sex in general and the higher response in local breeds than R.I.R. ones and females than males within each breed in particular .

Data in table (1) indicated that treating hatched male chicks of R.I.R breed with either Eltroxin or Neo-Mercazole increased average body weight compared to control at the 20 $\underline{\text{th}}$ week of age with approximately an equal rate . While treating female birds of the same breed decrease their average body weight at the same age with greater effect in case of Eltroxin treatment than in case of Neo - Mercazole (table, 2) .The same trend was found concerning the effect of treating male chicks of both Fayoumi and Dandarawi breeds with Eltroxin or Neo - Mercazole . Their average body weight

increased at the 20 th week of bird's age . The rate of increase was greater in case of treating bird's with Neo -Mercazole . Average body weight of female chicks of both the two local breeds decreased at the 20 th week of age. The rate of decrease was greater in female groups of the two breeds treeted with Eltroxin.

Analysis of variance (ANOVA , table 3) showed significant variation ($p < 0.01$) in average body weight at all ages due to birds breed and sex as well as to treatment applied . Results obtained agree with those obtained by Shoukry (1981), who reported that average of body weight at 8 weeks was 341.18 and 294.38 gms. for males of Fayoumi and Dandarawi chicks , and 285.94 and 240.66 gms. for females, respectively . He add that , average of body weight at 12 weeks was 659.93 and 588.90 gms. for Fayoumi and Dandarawi males and 557.74 and 479.57 gms. for females , respectively .

Significant variation ($p < 0.01$, $p < 0.05$ and $p < 0.01$) was found due to breed x sex interaction at the 4 th , 8 th and 20 th week of bird's age, respectively. Significant variation ($p < 0.05$ and $p < 0.01$) was also found due to treatment x sex interaction at the 16 th and 20 th week of bird's age, respectively . On the other hand breed x treatment interaction showed its significant effect ($p < 0.05$) on average body weight at 8 th week only (ANOVA, table 3) .

Table (2) :Means ± S.E of body weight (gm) at hatch and at 4 wks intervals thereafter for Fayoumi, Dandarawi and R.I.R chicks hatched from untreated eggs and eggs treated with either Thyroid preparation (Eltroxin, T4) , or antithyroid material (NeoMercazole) just before incubation .

Estimation time (week)	Sex	Body weight of chicks hatched from			Interval grand average
		Untreated eggs (controls)	Eggs treated with		
			Thyroid Preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
		Fayoumi			
0	Males	26. 40 ± 1. 11	27.88 ± 0.99	27.59 ± 0.50	26.91
	Females	25. 73 ± 0. 30	26.59 ± 0.57	27.23 ± 0.32	
4	Males	238. 6 ± 6. 50	252.88 ± 8.30	243.15 ± 4.85	230.69
	Females	225. 96 ± 6. 22	208.41± 3.55	215.14 ± 2.84	
8	Males	457. 20 ± 8. 68	457.38 ± 19.86	525.96 ± 11.03	450.90
	Females	426. 55 ± 17. 93	408.05 ± 8.20	430.26 ± 6.89	
12	Males	826.10± 15.32	785.71± 5.83	856.93 ± 24.49	741.47
	Females	697. 23 ± 19.52	610.55 ± 17.84	672.32 ± 10.46	
16	Males	1059.00 ±16.24	872.50 ± 10.96	1065.92 ± 25.77	898.68
	Females	876.00 ± 27.88	718.20 ± 30.35	800.45 ± 14.81	
20	Males	1220.67± 14.31	1243.50 ± 11.85	1259.46 ± 23.80	1135.47
	Females	1144.14± 61.01	937.70 ± 29.79	1007.32 ± 22.77	
		Dandarawi			
0	Males	24.50 ± 0.33	24.13 ± 0.53	26.28 ± 0.41	24.75
	Females	22.07 ± 0.41	25.15 ± 0.53	26.33 ± 0.46	
4	Males	213.91 ± 5.05	201.39 ± 4.36	202.78 ± 2.83	196.94
	Females	193.57 ± 4.95	184.57 ± 4.47	185.41 ± 3.44	
8	Males	449.23 ± 17.49	386.30 ± 12.10	441.28 ± 6.77	397.02
	Females	342.29 ± 10.16	388.19 ± 11.25	374.85 ± 8.05	
12	Males	742.00 ± 24.61	637.26 ± 19.95	729.97 ± 15.00	637.69
	Females	585.43 ± 14.40	528.33 ± 17.62	603.11 ± 11.40	
16	Males	906.71 ± 30.02	770.91± 32.02	920.89 ± 15.06	786.47
	Females	730.25 ± 30.55	655.40 ± 21.64	734.64 ± 16.14	
20	Males	1107.43 ± 32.33	1045.27 ± 32.52	1154.08 ± 16.63	999.81
	Females	974.00 ± 45.86	840.10 ± 23.45	877.98 ± 23.72	
		R.I.R.			
0	Males	36.23 ± 0.89	35.79 ± 1.07	35.35 ± 0.56	35.66
	Females	37.00 ± 0.78	35.27 ± 0.71	34.29 ± 0.48	
4	Males	306.15 ± 8.06	303.43 ± 10.28	281.84 ± 3.36	276.13
	Females	264.91 ± 6.42	247.59 ± 6.32	252.84 ± 4.25	
8	Males	564.92 ± 27.55	601.14 ± 25.35	568.05 ± 12.07	527.19
	Females	503.29 ± 26.97	446.59 ± 20.46	479.13 ± 8.42	
12	Males	972.85 ± 42.35	1009.43 ± 37.73	1007.81 ± 20.94	904.85
	Females	860.38 ± 42.62	756.29 ± 29. 22	822.29 ± 12.78	
16	Males	1104.50 ± 46.99	1125.46 ± 43. 92	1204.97 ± 32.54	1044.87
	Females	1016.67 ± 49.74	867.30 ± 41. 27	950.31 ± 17.96	
20	Males	1556.67 ± 56.79	1687.23 ± 86.86	1686.33 ± 42. 71	1450.09
	Females	1338.22 ± 58.26	1167.80 ± 53.06	1264.27± 22. 61	
Treatment grand average		613.25	570.00	611.02	

4 . 1 . 3 . Relative growth rate

Data concerning relative growth rate in Fayoumi , Dandarawi and R.I.R experimental chicks calculated between two successive 4 weeks from hatching time up to the 20 th week of bird's age was listed in table (4) .

Regardless the effect of treatment and bird's sex , relative growth rate seemed to have different pattern within breeds applied . Fayoumi chicks had the highest relative growth rate during the first and second four weeks (0 - 4 and 4 - 8 weeks of age) . While R.I.R.'S recorded their highest relative growth rate during the third and fifth four weeks (8 - 12 and 16 - 20 weeks of age) . The highest relative growth rate average was observed during the 12 - 16 weeks of Dandarawi's age . Variation in relative growth rate pattern may be due to the different time attributed to attain an optimum functional coordination between somatotrophic hormone and various hormones related to metabolism rate which may result in an optimum metabolic reactions needed to the highest relative growth rate . In addition, it may be a function of genetic - hormonal - neural coordination in biosyntheses of various enzymes controling metabolic prosesses in general and growth rate in particular .

Simelarly , males or females within a given breed seemed to have no characteristic trend in their relative growth rate . I.e it is too diffecult to state what time, throughout male's or femal's age within a certain breed, at which relative growth rate recorded the highest level . This may be attributed to the variation in the time at which functional ability of various control systems reached its optimum development .

Regardless bird's breed or sex birds of control groups had the highest relative growth rate at the first , third and fourth 4 weeks (0 - 4 , 8 - 12 and 12 - 16 weeks) of

age . Those treated with Eltroxin had the highest relative growth rate at the last 4 weeks (16 - 20) . While birds treated with Neo - Mercazole had the highest relative growth rate at the period from 4 to 8 weeks of age . This may lead to suggest that there was a different response to treatment according to bird's age . In addition, it is diffecult to recommend applying a certain treatment to attain better relative growth rate all over the bird's age .

Results obtained agree with those obtained by Marks (1979) who found higher relative growth rate difference , during the first week after hatch , between different broiler lines .

Parker (1943) observed that relative growth rate in R.I.R'S differed significantly according to the dose of thyroactive iodocasein (TI) applied . On the other hand , Sell and Balloun (1959) reported that feeding 6 weeks old cockerels at 20 milligrams Methimazole per pound of ration for 4 weeks decreased body weight gain . They added that feeding day - old cockerels for 4 weeks on 0.075 % thiouracil or 120 milligrams Methimazole per pound reduced significantly growth rate . Gado (1973) observed significant different breed response to the experimental hypothyroidism .

Table (4) : Relative growth rate at 4 wks intervals throughout 20 weeks experimental period of Fayoumi , Dandarawi and R.I.R. chicks hatched from untreated eggs and eggs treated with either Thyroid preparation (Eltroxin,T4) or antithyroid material (NeoMercazole) just before incubation .

Breed	Treatment	Relative Growth Rate									
		Hatch - 4 w		4w - 8w		8w - 12w		12w - 16w		16w - 20w	
		M	F	M	F	M	F	M	F	M	F
FF	Control	160.15	159.10	62.83	61.48	57.49	48.17	24.71	22.73	14.18	26.55
	Eltroxin	160.28	154.74	57.58	64.77	52.82	39.76	10.48	16.20	35.07	26.51
	Neo Mercazole	159.24	155.05	73.54	66.66	47.87	43.91	21.74	17.40	16.65	22.89
DD	Control	158.89	159.06	70.97	55.51	49.15	52.42	19.98	22.01	19.93	28.60
	Eltroxin	158.79	152.11	62.93	58.77	49.04	43.89	18.98	21.47	30.21	24.70
	Neo Mercazole	154.11	150.26	74.06	67.63	49.30	46.68	23.13	19.66	22.48	17.78
R.I.R.	Control	157.67	150.97	59.41	62.06	53.05	52.37	12.67	16.65	33.98	27.31
	Eltroxin	157.80	150.12	65.82	57.33	50.70	51.49	10.87	13.67	39.95	29.53
	Neo Mercazole	155.42	152.23	67.35	61.83	55.81	52.74	17.82	14.44	33.30	28.35

FF = Fayoumi DD = Dandarawi R. I.R. = Rhode Island Red

M = Males F = Females

W = Weeks

4 . 1 . 4 . Body measurements

4 . 1 . 4 . 1 . Breast width

Averages of the breast width (cm) at 8 and 16 weeks of age for Fayoumi , Dandarawi and R.I.R are listed in table (5) .

It was found that the highest breast width averages were recorded at 8 and 16 weeks of age in R.I.R's (23.89 and 28.76 cm, respectively) while the lowest averages were observed in the Dandarawi birds (20.53 and 24.83 cm respectively) . Breast width averaged (22.23 and 26.25 cm respectively) in Fayoumi birds were intermediate in their magnitudes . Generaly , it was observed that male birds within each breed had the highest breast width average than females .

Breast width increased by advancing age with greater rate in R.I.R. than in both Fayoumi and Dandarawi . It increased by 5.19 , 4.24 and 4.09 cm in R.I.R. , Fayoumi and Dandarawi males and by 4.55 , 4.52 and 3.79 cm in the females with the same order , respectively . Variation in breast width due to bird's sex was of significant value ($p < 0.01$) at either 8 and 16 weeks of age (ANOVA, table 6) . These results agree with those obtained by Sabri (1979) who reported that the strain from Fayoumi breed selected for high body weight at 8 weeks of age (males and females) had significantly wider breasts than that from the same breed but selected for high egg number .

It was found that breast width averages of birds hatched from eggs treated with either Eltroxin or Neo - Mercazole were 0.18 % and 4.57 % higher at 8 weeks of age and 2.18 % and 2.79 % higher at 16 weeks, respectively than control . Significant variation ($p < 0.01$) in average breast width at both two ages studied was found due to treatment applied (ANOVA, table 6) .

Table (5) : Means ± S.E of breast width (cm) at the 8 th and 16th weeks of age for Fayoumi , Dandarawi and R.I.R chicks hatched from untreated eggs and eggs treated with Thyroid preparation (Eltroxin,T4) , Antithyroid material (NeoMercazole) just before incubation .

Traits	Sex	Breast width of chicks hatched from			Interval grand average
		Untreated eggs (controls)	Eggs treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
		Fayoumi			
8 - wks breast width	Males	22.65 ± 0.35	21.68 ± 0.35	23.92 ± 0.33	
	Females	21.47 ± 0.49	21.64 ± 0.31	22.02 ± 0.20	22.23
16 - wks breast width	Males	27.33 ± 0.17	25.50 ± 0.45	28.14 ± 0.32	
	Females	26.14 ± 0.30	24.68 ± 0.24	25.68 ± 0.16	26.25
		Dandarawi			
8 - wks breast width	Males	21.41 ± 0.20	20.54 ± 0.24	22.13 ± 0.24	
	Females	18.92 ± 0.28	19.24 ± 0.27	20.92 ± 0.20	20.53
16 - wks breast width	Males	25.38 ± 0.46	24.61 ± 0.31	26.37 ± 0.20	
	Females	24.10 ± 0.35	23.74 ± 0.28	24.80 ± 0.24	24.83
		R.I.R			
8 - wks breast width	Males	23.71 ± 0.45	25.67 ± 0.60	24.86 ± 0.31	
	Females	23.02 ± 0.45	22.69 ± 0.51	23.35 ± 0.25	23.89
16 - wks breast width	Males	28.87 ± 0.58	30.15 ± 0.91	30.81 ± 0.33	
	Females	27.53 ± 0.53	27.18 ± 0.67	28.01 ± 0.23	28.76
Treatment grand average	8 wks	21.87	21.91	22.87	
	16 wks	26.56	25.98	27.30	

Table (6) : Analysis of variance for data presented in table (5)

S. O. V.	d.f	Mean Square	
		at 8 - wk	at 16 - wk
Breed (B)	2	373.656 **	467.9 **
Treatment (T)	2	59.506 **	60.534 **
Sex (S)	1	174.24 **	215.195 **
BT	4	11.758 **	7.161
BS	2	6.452	10.807 *
TS	2	.14	7.056
BTS	4	9.877 **	2.85
Error	431	2.789	3.067

* P < 0.05
** P < 0.01

4 . 1 . 4 . 2 . Keel length

Data for keel length (cm) measured at 8 and 16 weeks of age for Fayoumi, Dandarawi and R.I.R. chicks are tabulated in table (7).

Highest keel length averages at the 8 th and 16 th weeks of age were observed in the R.I.R. birds (8.24 and 10.89 cm, respectively) , the lowest average were recorded in the Dandarawi birds (6.98 and 8.99 cm, respectively) , and medium keel length was found in the Fayoumi birds , being 7.34 and 9.64 cm, respectively .

In addition , male birds within either each breed or age had highest keel length average than females .

Keel length increased by advancing age with greater rate in R.I.R. than in both Fayoumi and Dandarawi birds . It increased by 2.79 , 2.41 and 1.97 cm in males and by 2.50 , 2.19 and 1.94 cm in females of R.I.R., Fayoumi and Dandarawi , respectively during the period from 8 to 16 weeks of age . Significant variation ($p < 0.01$) in keel length was found due to bird's sex at either 8 and 16 weeks of age (ANOVA, table 8).

Obtained results agree with those obtained by Sabri (1979) who reported that the strain from Fayoumi breed selected for high body weight at 8 weeks of age males and females had significantly longer keels than that from the same breed but selected for high egg number .

Treating incubated eggs with Eltroxin decreased keel length of hatched chicks by 1.88 % and 5.24 % at 8 and 16 weeks of age, respectively, while treating them with Neo - Mercazole decreased this parameter by 5.24 % and 2.97 % , respectively as compered with control . Significant variation ($p < 0.01$) in average keel length was found due to treatment applied at both two ages studed (ANOVA, table 8).

Table (7) : Means ± S.E of keel length (cm) at the 8 th and 16 th weeks of age for Fayoumi , Dandarawi and R.I.R chicks hatched from untreated eggs and eggs treated with either Thyroid preparation (Eltroxin , T4) , or antithyroid material (Neo Mercazole) just before incubation .

Traits	Sex	Keel length of chicks hatched from			Interval grand average
		Untreated eggs (controls)	Eggs treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole	
		Fayoumi			
8 - wks keel length	Males	7.20 ± 0.08	7.28 ± 0.19	8.04 ± 0.11	7.34
	Females	7.26 ± 0.11	6.96 ± 0.10	7.30 ± 0.06	
16 - wks keel length	Males	9.57 ± 0.12	10.25 ± 0.11	9.95 ± 0.13	9.64
	Females	9.87 ± 0.21	8.82 ± 0.18	9.38 ± 0.10	
		Dandarawi			
8 - wks keel length	Males	7.41 ± 0.10	6.90 ± 0.08	7.44 ± 0.06	6.98
	Females	6.59 ± 0.06	6.51 ± 0.09	7.00 ± 0.07	
16 - wks keel length	Males	9.36 ± 0.17	8.94 ± 0.10	9.36 ± 0.08	8.93
	Females	8.65 ± 0.18	8.48 ± 0.14	8.80 ± 0.09	
		R.I.R			
8 - wks keel length	Males	8.45 ± 0.19	8.52 ± 0.15	8.91 ± 0.10	8.24
	Females	7.69 ± 0.19	7.58 ± 0.12	8.28 ± 0.08	
16 - wks keel length	Males	10.82 ± 0.22	11.45 ± 0.35	12.00 ± 0.14	10.89
	Females	10.18 ± 0.24	10.17 ± 0.18	10.70 ± 0.10	
Treatment grand average	8 wks	7.44	7.30	7.83	
	16 wks	9.75	9.69	10.04	

Table (8) : Analysis of variance for data presented in table (7)

S. O. V.	d.f	Mean Square	
		at 8 - wk	at 16 - wk
Breed (B)	2	54.031 **	116.285 **
Treatment (T)	2	13.701 **	4.822 **
Sex (S)	1	24.194 **	41.736 **
BT	4	.444	2.527 **
BS	2	1.857 **	2.343 *
TS	2	.012	2.712 **
BTS	4	.779 *	1.762 *
Error	431	.288	.539

* P < 0.05
** P < 0.01

4 . 1 . 4 . 2 . Shank length

Data for shank length (cm) measured at 8 and 16 weeks of age for Fayoumi, Dandarawi and R.I.R. chicks are tabulated in (Table 9) .

Highest shank length averages at 8 th and 16 th weeks of age were observed in the R.I.R. birds (5.19 and 7.42 cm respectively) , the lowest average were recorded in the Dandarawi birds (4.77 and 6.42 cm respectively) , while medium keel length was found in the Fayoumi birds being 5.03 and 6.80 cm, respectively .

Males birds within each breed or age had highest shank length average than females . Shank length average increased by advancing age with greater rate in R.I.R than in both Fayoumi and Dandarawi . It increased by 2.57, 2.18 and 1.83 cm in male R.I.R. , Fayoumi and Dandarawi and by 1.88 , 1.56 and 1.36 cm in females with the same order , respectively . Significant variation ($P < 0.01$) in shank length was found due to bird's sex at either 8 and 16 weeks of age (ANOVA, table 10) .

Similar results were reported by Sabri (1979). He found that the strain from Fayoumi breed selected for high body weight at 8 weeks of age (males and females) had significantly longer shanks than that from the same breed but selected for high egg number .

It was found that treating incubated eggs with Eltroxin decreased shank length in hatched chicks by 0.81 % and 3.33 % , respectively at 8 and 16 weeks of age while treating them with Neo- Mercazole increased their shank length by 4.67 % and 2.61 % , respectively when compered with control . Significant variation ($p < 0.01$) in average shank length was found due to treatment applied at both two ages studed (ANOVA, table 10) .

Table (9) : Means ± S.E of shank length (cm) at the 8 th and 16 th weeks of age for Fayoumi , Dandarawi and R.I.R chicks hatched from untreated eggs and eggs treated with either Thyroid preparation (Eltroxin,T4) , or antithyroid material (NeoMercazole) just before incubation .

Traits	Sex	Shank length of chicks hatched from			Interval grand average
		Untreated eggs (controls)	Eggs treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
		Fayoumi			
8 - wks shank length	Males	4.85 ± 0.03	4.98 ± 0.12	5.50 ± 0.07	
	Females	4.88 ± 0.12	4.97 ± 0.06	4.99 ± 0.05	5.03
16 - wks shank length	Males	7.37 ± 0.10	7.00 ± 0.00	7.51 ± 0.07	
	Females	6.56 ± 0.10	5.99 ± 0.07	6.37 ± 0.05	6.80
		Dandarawi			
8 - wks shank length	Males	5.00 ± 0.11	4.67 ± 0.11	5.09 ± 0.10	
	Females	4.54 ± 0.06	4.29 ± 0.08	4.77 ± 0.06	4.73
16 - wks shank length	Males	6.79 ± 0.17	6.40 ± 0.14	7.07 ± 0.12	
	Females	6.23 ± 0.20	5.80 ± 0.15	6.25 ± 0.08	6.42
		R.I.R			
8 - wks shank length	Males	5.29 ± 0.11	5.51 ± 0.12	5.48 ± 0.06	
	Females	4.93 ± 0.09	4.86 ± 0.08	5.06 ± 0.04	5.19
16 - wks shank length	Males	7.58 ± 0.12	8.09 ± 0.20	8.33 ± 0.07	
	Females	6.84 ± 0.12	6.72 ± 0.14	6.92 ± 0.08	7.42
Treatment grand average	8 wks	4.92	4.88	5.15	
	16 wks	6.90	6.67	7.08	

Table (10) : Analysis of variance for data presented in table (9)

S. O. V.	d.f	Mean Square	
		at 8 - wk	at 16 - wk
Breed (B)	2	7.34 **	29.607 **
Treatment (T)	2	3.672 **	5.48 **
Sex (S)	1	9.632 **	67.047 **
BT	4	.746 **	.998 **
BS	2	.854 **	1.987 **
TS	2	.126	1.128 *
BTS	4	.415 *	.232
Error	431	.168	.285

* P < 0.05
** P < 0.01

4 . 1 . 5 . Carcass characteristics

4 . 1 . 5 . 1 . Killing , dressing and eviscerating losses

Data concerning Killing , dressing and eviscerating losses presented as the absolute and relative weights of blood , feathers and inedible parts of carcass for birds of various breeds and experimental group at sexual maturity are listed in tables (11 and 12) , respectively .

Regardless the effect of treatments applied and bird's sex , it was observed that R. I. R. chicks had the highest absolute weight average of total losses (511.89 gms.) at sexual maturity . Fayoumi and Dandarawi chicks had nearly an equal average being 322.67 and 320.78 gm , respectively . Analysis of variance revealed significant variation ($p < 0.01$) in absolute total losses weight due to bird's breed . However, relative total losses weight showed insignificant variation due to bird's breed . Relative total losses weight mounted 27.61 , 27.66 and 27.32 % in Fayoumi , Dandarawi and R.I.R. bird's , respectively .

Results obtained may lead to conclude that absolute total losses weight was of higher value in R.I.R. due to its higher live body weight (1852.67 gm) when compared to that of Fayoumi and Dandarawi chicks that slightly differed in their live body weight for each other (1177.89 gm for Fayoumi and 1156.28 gm for Dandarawi) . However , the insignificant variation found in the relative weight may be due to the fact that blood and feathers weight represents a certain percent from the bird's live weight . So , the absolute total losses weight increased with the increase of live body weight . This difference in live body weight does not result in simelar difference in various components of total losses weight .

Generaly , it was found that the males within a given breed had heavier absolute and relative total losses weight at sexual maturity than females .

Regardless bird's breed or sex , it was observed that birds hatched from eggs treated with Neo - Mercazole had the highest average of absolute total losses weight at sexual maturity (406.17 gms) when compared to untreated eggs or those treated eggs with Eltroxin which has approximatly an equal average of total losses weight being 375.00 and 374.17 gms. , respectively . However treatment applied showed no significant effect on relative weights of total losses . Relative total losses weight averaged 27.33 , 27.66 and 27.60 % for controls , and those treated with Eltroxin and Neo - Mercazole , respectively .

Significant variation was found in total losses due to breed x sex and breed x treatment x sex interactions only (ANOVA, table 13) .

Regardless the effect of treatment and bird's sex , it was observed that R.I.R chicks had the highest absolute blood weight average (82.23 gm) at sexual maturity . Fayoumi and Dandarawi chicks on the other hand showed no great difference in their blood weight average between them . It mounted 57.00 and 53.89 gm in Fayoumi and Dandarawi chicks , respectively (table, 11) . Analysis of variance revealed significant variation ($p < 0.01$) in absolute blood weight due to bird's breed (table, 13) . However relative weight of blood showed insignificant variation due to bird's breed . Relative blood weight averaged 4.87 , 4.61 and 4.43 % in Fayoumi , Dandarawi and R.I.R bird's , respectively .

Males within a given breed had heavier absolute weight of blood at sexual maturity than females . While females of Fayoumi and RIR chicks within a given breed had heavier relative weight of blood at the same age than males . This may be function of variation found in live body weight in proportion to the absolute weight of blood between the two sexes .

Birds hatched from eggs treated with Neo - Mercazole before incubation had significantly the highest average of absolute blood weight at sexual maturity (70.45 gm) when compared to controls (60.17 gm) or those hatched from Eltroxin treated eggs (62.50 gm) . Analysis of variance for obtained data (ANOVA, table 13) revealed that treatment applied had no significant effect on relative weight of blood . It averaged 4.48 , 4.63 and 4.81 % in controls , Eltroxin and Neo - Mercazole treated birds , respectively .

Significant variation ($p < 0.05$) was found in relative blood weight due to the effect of breed x treatment and breed x sex interactions (ANOVA, table 13) .

Results obtained agree with those obtained by Gado (1973) who found relationship between thyroid activety and absolute and relative blood weight . He attributed this variation to difference that may be existed in the rate of mitabolism in general and oxidative reactions in particular .

R.I.R. chicks had the highest absolute and relative feather weight average 111.45 gm (5.95 %) at sexual maturity when compared to Fayoumi 54.45 gm (4.73 %) and Dandarawi 53.61 gm (4.75 %) chicks .

Analysis of variance (ANOVA, table 13) revealed significant ($p < 0.01$) variation in absolute and relative feather weight due to bird's breed .

Generaly , it was found that the males within a given breed had heavier absolute and relative weight of feather than females at sexual maturity . It was quite true except in Dandarawi in which male and female birds had nearly an equal relative feathers weight.

Birds hatched from eggs treated with Neo - Mercazole before incubation had the highest average of absolute and relative feather weight at sexual maturity (82.00 gm 5.52 %), while those hatched from Eltroxin treated eggs had the lowest average (63.06

gm 4.59 %) when compared with controls (74.45 gm 5.31 %) . Analysis of variance showed significant variation in both absolute ($p < 0.01$) and relative ($p < 0.05$) feathers weight due to treatment applied (ANOVA, table 13) .

Significant variation ($p < 0.01$) in absolute and relative feather weight due to breed x sex interaction effect . While relative feather weight was significantly affected ($p<0.01$)with the interaction between breed x treatment x sex (ANOVA, table 13) .

R.I.R. chicks had the highest absolute weight of inedible parts of the carcass (318.22 gm) at sexual maturity . Fayoumi and Dandarawi chicks had almoust an equal averages of absolute weight of inedible parts of the carcass being 211.22 in Fayoumi and 213.28 gm in Dandarawi (table, 11) . Analysis of variance revealed significant variation ($p < 0.01$) in absolute weight of inedible parts of the carcass due to bird's breed . However, relative weight of inedible parts of the carcass showed insignificant breed variation . Relative weight of inedible meat mounted 18.01 , 18.29 and 16.95 % in Fayoumi , Dandarawi and R.I.R bird's , respectively (table, 12) .

Males within a given breed had heavier absolute and relative weight of inedible parts of the carcass than females .

Birds hatched from eggs treated with Neo - Mercazole before incubation had the highest average of absolute weight of inedible parts of the carcass (253.72 gm) when compared with controls (240.39 gm) and those hatched from eggs treated with Eltroxin (248.61 gm) . However , relative weights of inedible parts of the carcass was not affected with treatment applied (table, 13) . It averaged 17.54 , 18.45 and 17.27 % in controls , Eltroxin and Neo - Mercazole experimental groups of birds , respectively .

Significant variation ($p < 0.01$) was found due to the interaction between breed x treatment x sex only (ANOVA, table 13) .

Table (11) : Means ± S.E of eviscerating losses (gm) at sexual maturity of Fayoumi , Dandarawi and R.I.R chicks hatched from untreated eggs and eggs treated with either Thyroid preparation (Eltroxin, T4), or antithyroid material (Neo Mercazole) just before incubation .

Traits	Sex	carcass characteristics of chicks hatched from			Interval grand average
		Untreated eggs (controls)	Eggs treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
		Fayoumi			
Live weight (gm)	Males Females	1222.67 ± 4.33 1041.67 ± 91.12	1260.00 ± 17.32 1078 ± 78.23	1478.33 ± 47.64 986.67 ± 44.19	1177.89
Eviscerating losses (gm)	Males Females	347.00 ± 1.73 281.00 ± 15.72	349.33 ± 6.06 284.67 ± 22.92	371.00 ± 9.54 303.00 ± 15.95	322.67
Inedible parts (gm)	Males Females	237.00 ± 1.73 186.00 ± 16.64	239.33 ± 6.06 186.33 ± 18.99	242.33 ± 7.54 176.33 ± 22./18	211.22
Blood weight (gm)	Males Females	58.67 ± 0.88 53.33 ± 7.27	60.00 ± 0.00 48.33 ± 1.67	66.67 ± 0.88 55.00 ± 5.00	57.00
Feather weight (gm)	Males Females	51.33 ± 0.88 41.67 ± 1.67	50.00 ± 0.00 50.00 ± 5.77	62.00 ± 1.16 71.67 ± 13.02	54.45
		Dandarawi			
Live weight (gm)	Males Females	1250.00 ± 80.83 893.33 ± 89.27	1395.00 ± 101.04 931.67 ± 43.43	1372.67 ± 73.61 1095.00 ± 99.88	1156.28
Eviscerating losses (gm)	Males Females	340.33 ± 30.60 221.33 ± 18.42	408.33 ± 37.82 275.67 ± 23.31	371.33 ± 41.08 3.7.67 ± 40.18	320.78
Inedible parts (gm)	Males Females	230.33 ± 24.83 131.33 ± 17.82	278.33 ± 26.27 185.67 ± 26.14	231.33 ± 23.82 222.67 ± 44.46	213.28
Blood weight (gm)	Males Females	57.33 ± 4.33 36.67 ± 3.33	75.00 ± 2.89 43.33 ± 3.33	67.67 ± 7.22 43.33 ± 3.33	53.89
Feather weight (gm)	Males Females	52.67 ± 1.45 53.33 ± 4.41	55.00 ± 8.66 46.67 ± 4.41	72.33 ± 10.11 41.67 ± 4.41	53.61
		R.I.R			
Live weight (gm)	Males Females	1945.00 ± 23.09 1818.33 ± 140.25	1930.00 ± 98.15 1546.67 ± 185.86	2357.67 ± 38.97 1518.33 ± 130.84	1852.67
Eviscerating losses (gm)	Males Females	553.33 ± 10.98 507.00 ± 56.80	525.67 ± 24.25 401.33 ± 82.25	702.00 ± 17.62 382.00 ± 29.00	511.89
Inedible parts (gm)	Males Females	315.67 ± 4.91 342.00 ± 67.10	335.67 ± 6.94 266.33 ± 58.46	429.33 ± 4.63 220.33 ± 24.88	318.22
Blood weight (gm)	Males Females	80.00 ± 2.89 75.00 ± 5.00	80.00 ± 5.77 68.33 ± 20.88	115.00 ± 8.66 75.00 ± 2.89	82.23
Feather weight (gm)	Males Females	157.67 ± 12.99 90.00 ± 10.41	110.00 ± 11.55 66.67 ± 9.28	157.67 ± 4.33 86.67 ± 3.33	111.45

Table (12) : Means ± S.E of eviscerating losses (%) at sexual maturity of Fayoumi , Dandarawi and R.I.R chicks hatched from untreated eggs and eggs treated with either Thyroid preparation (Eltroxin, T4) , or antithyroid material (Neo Mercazole) just before incubation .

Traits	Sex	carcass characteristics of chicks hatched from			Grand average
		Untreated eggs (controls)	Eggs treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
			Fayoumi		
Eviscerating losses %	Males	28.38 ± 0.04	27.72 ± 0.10	25.11 ± 0.18	27.61
	Females	27.34 ± 2.48	26.40 ± 1.08	30.70 ± 0.66	
Inedible parts %	Males	19.38 ± 0.07	18.99 ± 0.22	16.39 ± 0.06	18.01
	Females	18.23 ± 2.48	17.22 ± 0.87	17.84 ± 2.07	
Blood %	Males	4.80 ± 0.06	4.76 ± 0.07	4.52 ± 0.09	4.87
	Females	5.07 ± 0.29	4.53 ± 0.37	5.55 ± 0.25	
Feather %	Males	4.20 ± 0.09	3.97 ± 0.06	4.20 ± 0.06	4.73
	Females	4.03 ± 0.23	4.65 ± 0.49	7.30 ± 1.45	
			Dandarawi		
Eviscerating losses %	Males	27.14 ± 0.70	29.18 ± 0.60	26.89 ± 1.54	27.66
	Females	24.88 ± 0.70	29.95 ± 4.01	27.89 ± 1.27	
Inedible parts %	Males	18.32 ± 0.81	19.89 ± 0.45	16.76 ± 0.83	18.29
	Females	14.58 ± 0.60	20.27 ± 3.86	19.93 ± 1.27	
Blood %	Males	4.58 ± 0.05	5.41 ± 0.19	4.90 ± 0.26	4.61
	Females	4.11 ± 0.05	4.65 ± 0.29	4.02 ± 0.45	
Feather %	Males	4.23 ± 0.16	3.89 ± 0.34	5.22 ± 0.46	4.75
	Females	6.19 ± 1.13	5.03 ± 0.48	3.94 ± 0.77	
			R.I.R		
Eviscerating losses %	Males	28.47 ± 0.90	27.25 ± 0.13	29.82 ± 1.24	27.32
	Females	27.74 ± 1.25	25.43 ± 2.36	25.20 ± 0.24	
Inedible parts %	Males	16.23 ± 0.06	17.45 ± 0.53	18.23 ± 0.50	16.95
	Females	18.48 ± 2.43	16.85 ± 2.30	14.45 ± 0.37	
Blood %	Males	4.12 ± 0.20	4.14 ± 0.09	4.89 ± 0.45	4.43
	Females	4.17 ± 0.42	4.26 ± 0.80	4.98 ± 0.27	
Feather %	Males	8.12 = 0.77	5.67 ± 0.31	6.7 ± 0.295	5.95
	Females	5.09 ± 0.93	4.31 ± 0.29	5.77 ± 0.42	

Table (13) : Analysis of variance for data presented in tables (11 and 12) .

S. O. V.	d.f	Mean Square of Eviscerating losses							
		Total losses		Blood		Feather		Inedible parts	
		Weight	%	weight	%	weight	%	weight	%
Breed (B)	2	216996.22 **	.243	4345.85 **	1.69	19783.17 **	14.30**	67399.69 **	5.012
Treatment (T)	2	5988.17	.201	522.57 *	.871	1637.06 **	6.42*	814.52	3.783
Sex (S)	1	168225.85 **	1.622	4374 **	.295	8091.13 **	.001	64549.80 **	2.229
BT	4	6442.97	5.002	266.85	1.547 *	769.22 **	4.13	2668.66	5.001
BS	2	10801.41*	5.664	290.67	2.562 *	4602.80 **	16.15**	859.46	.258
TS	2	6133.91	2.094	253.5	.286	207.24	.78	3221.41	.955
BTS	4	12844.21**	6.007	165.83	.487	332.74	7.71**	10851.16 **	9.629
Error	36	3260.15	2.638	130.13	.567	161.94	1.66	2451.72	4.124

* P < 0.05
** P < 0.01

4 . 1 . 5 . 2 . Edible meat

Data concerning the absolute and relative weights of edible meat (carcass and giblets) for birds of various experimental groups is listed in tables (14 and 15) .

Regardless the effect of treatment and bird's sex , it was observed that R.I.R. chicks had the highest absolute edible meat average (1340.78 gm) at sexual maturity . Fayoumi and Dandarawi chicks had nearly an equal average of absolute edible meat weight being 855.28 gm and 835.50 gm , respectively . Analysis of variance revealed significant variation ($p < 0.01$) due to bird's breed . However , relative weight of the edible meat of carcass showed insignificant variation due to bird's breed (tables, 16) . Relative edible meat mounted 72.39 , 72.35 and 72.69 % in Fayoumi , Dandarawi and R.I.R. bird's , respectively .

Results obtained lead to conclude that higher value of absolute edible meat was of in R.I.R due to its higher live body weight (1852.67 gm) when compared to that of Fayoumi (1177.89 gm) and Dandarawi (1156.28 gm) chicks . However , the insignificant variation found in the relative weight may be due to the fact that carcass and giblets weight represents a certain percent from the bird's live weight . So , the absolute weight of edible meat increased as live body weight increased . In addition, difference in live body weight dose not result in simelar difference in various components of edible meat .

Males within a given breed had heavier absolute weight of edible meat at sexual maturity than females . While , females Dandarawi and R.I.R. only had heavier relative weight of edible meat at the same age than males .

Birds hatched from Neo - Mercazole treated incubated eggs had the highest average of absolute edible meat weight (1061.95 gm) when compared to control (986.84 gm) or those hatched from Eltroxin treated eggs (982.78 gm) . However treatment applied had insignificant effect on absolute and relative edible meat weight (table, 16) .

It averaged 72.68 , 72.35 and 72.40 % in controls , Eltroxin and Neo - Mercazole , respectively .

Significant variation ($p < 0.01$) was found due to treatment x sex interaction effect only (ANOVA, table 16) .

Results obtained agree with those obtained by Selim (1964) who reported that the percentage of edible parts for Fayoumi ranged from 70.07 % to 73.89 % . Goher and El-Sayed (1990) added that males were significantly heavier than females .

Regardless the effect of treatment and bird's sex , it was observed that R.I.R. chicks had the highest absolute carcass weight average (1177.84 gm) when compared with Fayoumi (757.95 gm) and Dandarawi (738.89 gm) chicks which almoust had an equal absolute carcass weight . Analysis of variance revealed significant ($p < 0.01$) variation in absolute carcass weight due to bird's breed . However , relative weight of carcass weight showed insignificant variation due to bird's breed . Relative carcass weight mounted 64.12, 63.93 and 63.88 % in Fayoumi , Dandarawi and R.I.R. bird's , respectively (table,15) .

Generaly , it was a found that male birds within a given breed had heavier absolute weight of carcass weight at sexual maturity than females . It was quite true in all breeds except in R.I.R. in which females had heavier relative weight of carcass weight than males It was observed that bird hatched from eggs treated with Neo - Mercazoles before incubation had the highest average of absolute carcass weight at sexual maturity (937.95 gm) when compared to controls (870.83 gm) or those hatched from eggs (865.89 gm) treated with Eltroxin . However , treatment applied had no significant effect on absolute and relative weights of carcass (table, 16) . Relative carcass weight averaged 64.20 , 63.71 and 64.14 % in controls , and birds hatched from eggs treated with Eltroxin and Neo - Mercazole before incubation , respectively .

Significant variation was found due to the interaction between treatment x sex and breed x treatment x sex respectively for absolute weights of edible meat and carcass (ANOVA, table 16) .

Results obtained agree with those obtained by Kasalaranan and Vlaganathan (1976) who found that dressing percentages in New Hampshire and White Rocks were significantly higher in males than females at 12 weeks of age .

R.I.R chicks had the highest absolute giblets weight average (162.95 gm) when compared with Fayoumi (97.34 gm) and Dandarawi (96.62 gm) (table, 14) . Analysis of variance revealed significant ($p < 0.01$) variation in absolute giblets weight due to bird's breed . However, relative weight of giblets showed significant ($p < 0.05$) variation due to bird's breed . Relative giblets weight mounted 8.28 , 8.42 and 8.86 % in Fayoumi , Dandarawi and R.I.R. bird's , respectively (table, 15) .

Generaly , it was a found that male birds within a given breed had heavier absolute weight of giblets weight at sexual maturity than females . While , the females of birds within given breed had heavier relative weight of giblets at the same age than males .

Regardless bird's breed or sex birds , it was observed that birds hatched from eggs treated with Neo - Mercazole had the highest average of absolute giblets weight at sexual maturity (124.00 gm) when compared to controls (116.00 gm) or those hatched from eggs (116.89 gm) treated with Eltroxin which has approximatly an equal absolute giblets weight average . However , treatment applied had no significant effect on absolute and relative weight of giblets weight . Relative giblets weight averaged 8.48 , 8.70 and 8.38% in controls and birds hatched from eggs treated with Eltroxin and Neo - Mercazole , respectively .

Insignificant variation was found due to interaction between characteristics studies at sexual maturity (ANOVA, table 16) .

Significant variation was found due to the interaction between treatment x sex and breed x treatment x sex respectively for absolute weights of edible meat and carcass (ANOVA, table 16) .

Results obtained agree with those obtained by Kasalaranan and Vlaganathan (1976) who found that dressing percentages in New Hampshire and White Rocks were significantly higher in males than females at 12 weeks of age .

R.I.R chicks had the highest absolute giblets weight average (162.95 gm) when compared with Fayoumi (97.34 gm) and Dandarawi (96.62 gm) (table, 14) . Analysis of variance revealed significant ($p < 0.01$) variation in absolute giblets weight due to bird's breed . However, relative weight of giblets showed significant ($p < 0.05$) variation due to bird's breed . Relative giblets weight mounted 8.28 , 8.42 and 8.86 % in Fayoumi , Dandarawi and R.I.R. bird's , respectively (table, 15) .

Generaly , it was a found that male birds within a given breed had heavier absolute weight of giblets weight at sexual maturity than females . While , the females of birds within given breed had heavier relative weight of giblets at the same age than males .

Regardless bird's breed or sex birds , it was observed that birds hatched from eggs treated with Neo - Mercazole had the highest average of absolute giblets weight at sexual maturity (124.00 gm) when compared to controls (116.00 gm) or those hatched from eggs (116.89 gm) treated with Eltroxin which has approximatly an equal absolute giblets weight average . However , treatment applied had no significant effect on absolute and relative weight of giblets weight . Relative giblets weight averaged 8.48 , 8.70 and 8.38% in controls and birds hatched from eggs treated with Eltroxin and Neo - Mercazole , respectively .

Insignificant variation was found due to interaction between characteristics studies at sexual maturity (ANOVA, table 16) .

Table (14) : Means ± S.E of Edible meat (gm) at sexual maturity of Fayoumi , Dandarawi and R.I.R chicks hatched from untreated eggs and eggs treated with either Thyroid preparation (Eltroxin, T4), or antithyroid material (Neo Mercazole) just before incubation .

Traits	Sex	carcass characteristics of chicks hatched from			Grand average
		Untreated eggs (controls)	Eggs treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
		Fayoumi			
Live weight (gm)	Males Females	1222.67 ± 4.33 1041.67 ± 91.12	1260.00 ± 17.32 1078 ± 78.23	1478.33 ± 47.64 986.67 ± 44.19	1177.89
Edible meat (gm)	Males Females	875.67 ± 2.60 760.67 ± 90.87	910.67 ± 11.26 793.67 ± 59.45	1107.33 ± 38.13 683.67 ± 30.12	855.28
carcass weight (gm)	Males Females	775.00 ± 2.89 680.00 ± 83.27	802.67 ± 10.11 696.67 ± 57.83	990.00 ± 34.64 603.33 ± 24.04	757.95
Giblets weight (gm)	Males Females	100.67 ± 0.33 80.67 ± 7.62	108.00 ± 1.16 97.00 ± 3.06	117.33 ± 3.71 80.33 ± 6.36	97.34
		Dandarawi			
Live weight (gm)	Males Females	1250.00 ± 80.83 893.33 ± 89.27	1395.00 ± 101.04 931.67 ± 43.43	1372.67 ± 73.61 1095.00 ± 99.88	1156.28
Edible meat (gm)	Males Females	909.67 ± 50.23 572.00 ± 71.51	986.67 ± 63.22 656.00 ± 65.64	1001.33 ± 32.74 787.33 ± 60.25	835.50
carcass weight (gm)	Males Females	805.00 ± 43.30 590.00 ± 60.00	885.00 ± 60.62 571.67 ± 55.85	885.00 ± 25.98 696.67 ± 49.78	738.89
Giblets weight (gm)	Males Females	104.67 ± 6.94 82.00 ± 11.53	101.67 ± 2.60 84.33 ± 10.09	116.33 ± 7.22 90.67 ± 10.48	96.62
		R.I.R			
Live weight (gm)	Males Females	1945.00 ± 23.09 1818.33 ± 140.25	1930.00 ± 98.15 1546.67 ± 185.86	2357.67 ± 38.97 1518.33 ± 130.84	1852.67
Edible meat (gm)	Males Females	1391.67 ± 34.07 1311.33 ± 86.21	1404.33 ± 73.90 1145.33 ± 104.78	1655.67 ± 56.58 1136.33 ± 101.84	1340.78
carcass weight (gm)	Males Females	1220.00 ± 34.64 1155.00 ± 75.88	1227.67 ± 53.41 1011.67 ± 98.76	1452.67 ± 41.86 1000.00 ± 85.05	1177.84
Giblets weight (gm)	Males Females	171.67 ± 0.67 156.33 ± 11.29	176.67 ± 20.50 133.67 ± 6.12	203.00 ± 14.73 136.33 ± 16.90	162.95

Table (15) : Means ± S.E of edible meat (%) at sexual maturity of Fayoumi , Dandarawi and R.I.R chicks hatched from untreated eggs and eggs treated with either Thyroid preparation (Eltroxin, T4) , or antithyroid material (Neo Mercazole) just before incubation .

Traits	Sex	carcass characteristics of chicks hatched from			Grand average
		Untreated eggs (controls)	Eggs treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
		Fayoumi			
Edible meat %	Males	71.62 ± 0.04	72.28 ± 0.10	74.89 ± 0.18	72.39
	Females	72.66 ± 2.48	73.60 ± 1.08	69.30 ± 0.66	
Proportional carcass weight	Males	63.38 ± 0.01	63.71 ± 0.07	66.96 ± 0.19	64.12
	Females	64.92 ± 2.40	64.54 ± 1.33	61.19 ± 0.79	
Giblets %	Males	8.23 ± 0.05	8.57 ± 0.03	7.94 ± 0.09	8.28
	Females	7.73 ± 0.09	9.06 ± 0.47	8.12 ± 0.27	
		Dandarawi			
Edible meat %	Males	72.86 ± 0.70	70.82 ± 0.60	73.11 ± 1.54	72.35
	Females	75.12 ± 0.70	70.05 ± 4.01	72.11 ± 1.27	
Proportional carcass weight	Males	64.49 ± 0.71	63.48 ± 0.25	64.64 ± 1.58	63.93
	Females	66.02 ± 0.33	61.06 ± 3.33	63.86 ± 1.43	
Giblets %	Males	8.37 ± 0.03	7.34 ± 0.35	8.47 ± 0.21	8.42
	Females	9.09 ± 0.44	8.99 ± 0.73	8.25 ± 0.20	
		R.I.R			
Edible meat %	Males	71.53 ± 0.90	72.75 ± 0.13	70.18 ± 1.24	72.69
	Females	72.26 ± 1.25	74.57 ± 2.36	74.80 ± 0.24	
Proportional carcass weight	Males	62.70 ± 1.04	63.66 ± 0.47	61.59 ± 0.76	63.88
	Females	63.67 ± 1.31	65.78 ± 1.79	65.87 ± 0.16	
Giblets %	Males	8.83 ± 0.14	9.09 ± 0.61	8.59 ± 0.48	8.86
	Females	8.60 ± 0.15	9.12 ± 0.33	8.93 ± 0.33	

Table (16) : Analysis of variance for data presented in tables (14 and 15) .

S. O. V.	d.f	Mean Square					
		Edible meat		Carcass		Giblets	
		Weight	%	Weight	%	Weight	%
Breed (B)	2	1474221.13 **	.275	1108026.06 **	.101	26116.35 **	1.792 *
Treatment (T)	2	35776.46	.173	29161.06	.408	346.07	.47
Sex (S)	1	879112.96 **	1.779	692240.67 **	.363	11151.41 **	1.144
BT	4	6374.32	4.847	4689.28	2.893	204.10	.86
BS	2	5256.69	5.717	3187.17	5.88	564.57	.68
TS	2	66822.46 **	2.223	53972.72 **	1.814	719.19	.742
BTS	4	29658.77	6.024	25397.06 *	5.219 *	279.60	.562
Error	36	12256.19	2.653	9356.15	1.869	277.09	.359

* P < 0.05
** P < 0.01

4 . 1. 6 . Thyroid gland estimations

4. 1. 6. 1 Absolute and proportional thyroid weights

Data concerning the effect of treating incubated eggs with the thyroid preparation or goitrogenic material applied on the average of absolute and relative weights of thyroid gland of chicks hatched from are shown in tables (17 and 18) . R.I.R chicks had higher absolute weight average of thyroid weight at sexual maturity (177.84 mg) than in both Fayoumi (107.17 mg) and Dandarawi (124.89 mg) birds . Analysis of variance revealed significant ($p < 0.01$) variation in absolute thyroid weight due to bird's breed . However, relative thyroid weight showed insignificant variation due to bird's breed . Relative thyroid weight mounted 9.03 , 11.02 and 9.41 % in Fayoumi , Dandarawi and R.I.R bird's, respectively .

Generaly , it was found that the males within a given breed had heavier absolute (141.22 mg and 245.89 mg) and relative (10.76 % and 11.92 %) thyroid weight at sexual maturity than females (73.11 mg and 109.78 mg for absolute and 7.29 % and 6.89 for relative in Fayoumi and R.I.R, respectively) . On the other hand , Dandarawi females had heavier absolute (125.55 mg) and relative (12.74 %) weights than males (124.22 mg and 9.29 % , respectively) . Analysis of variance revealed significant variation ($p < 0.01$) in absolute thyroid weight and insignificant variation in relative thyroid weight due to bird's sex only (ANOVA, table 19) .

Results obtained agree (Dandarawi) and disagree (R.I.R and Fayoumi) with those obtained by Latimer (1924) on White Leghorn and Shaklee and Knox (1956) on New Hampshires who found that females were have larger thyroids than males .

Regardless bird's breed or sex , it was observed that birds hatched from eggs treated

with both Eltroxin and Neo - Mercazole had lower absolute (135.17 mg and 135.00 mg) and relative (9.48 % and 9.10 %) thyroid weight averages than birds hatched from untreated eggs (139.72 mg 10.88 %) . However , analysis of variance revealed insignificant variation in absolute and relative thyroid weight due to treatment (ANOVA, table 19) .

This may lead to conclude that treating incubated eggs with either thyroid preparation and goitrogenic material applied had no effect on the rate of thyroid development during the incubation period . This may be scientifically logic since thyroid hormone injected into the incubated eggs may affect the rate of oxidative reaction or the rate of anabolic reaction rather than the thyroid emberyonic development . This effect may result in acceleration metabolic and developmental reaction during the incubation stage which may had a particular effect on the length of period needed to the emberyonic development rather than on the thyroid weight .

Significant variation ($p < 0.01$) was found in absolute and relative thyroid weight interaction due to breed x sex only (ANOVA, table 19) .

Table (17) : Means ± S.E of total thyroid weight (mg) at sexual maturity of Fayoumi , Dandarawi and R.I.R chicks hatched from untreated eggs and eggs treated with either Thyroid preparation (Eltroxin, T4) , or antithyroid material (Neo Mercazole) just before incubation .

Breed	Sex	Total thyroid weight (mg) of chicks hatched from			Grand average
		Untreated eggs (controls)	Eggs treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
Fayoumi	Males	143.00 ± 2.31	134.00 ± 0.58	146.67 ± 0.33	107.17
	Females	91.67 ± 3.38	52.00 ± 19.86	75.67 ± 5.78	
Dandarawi	Males	114.33 ± 10.49	113.33 ± 11.84	145.00 ± 5.20	124.89
	Females	171.33 ± 77.34	87.33 ± 12.44	118.00 ± 46.97	
R.I.R	Males	211.33 ± 55.14	298.33 ± 54.27	228.00 ± 86.69	177.84
	Females	106.67 ± 12.44	126.00 ± 6.43	96.67 ± 17.13	
Grand average		139.72	135.17	135.00	

Table (18) : Means ± S.E of thyroid (mg) /100 gm body weight at sexual maturity of Fayoumi , Dandarawi and R.I.R chicks hatched from untreated eggs and eggs treated with either Thyroid preparation (Eltroxin, T4) , or antithyroid material (Neo Mercazole) just before incubation .

Breed	Sex	thyroid (mg) / 100 gm body weight of chicks hatched from			Grand average
		Untreated eggs (controls)	Eggs treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
Fayoumi	Males	11.69 ± 0.15	10.64 ± 0.10	9.94 ± 0.30	
	Females	8.99 ± 1.08	5.13 ± 2.12	7.74 ± 0.85	9.03
Dandarawi	Males	9.20 ± 0.95	8.09 ± 0.27	10.58 ± 0.19	
	Females	18.59 ± 7.25	9.30 ± 0.96	10.34 ± 3.25	11.02
R.I.R	Males	10.94 ± 2.97	15.25 ± 2.05	9.56 ± 3.52	
	Females	5.85 ± 0.39	8.44 ± 1.25	6.39 ± 1.17	9.41
Grand average		10.88	9.48	9.10	

Table (19) : Analysis of variance for data presented in table (17 and 18) .

S. O. V.	d.f	Mean Square	
		Thyroid weight (mg)	Thyroid (mg) / 100 gm body weight
Breed (B)	2	.024 **	20.185
Treatment (T)	2	1.289	15.907
Sex (S)	1	.062 **	38.086
BT	4	.005	31.195
BS	2	.021 **	91.533 **
TS	2	.004	20.293
BTS	4	.001	14.917
Error	36	.004	16.675

** P < 0.01

4 . 1 . 6 . 2 . Histological Structure

Data concerning histological features of the thyroid gland for Fayoumi , Dandarawi and R.I.R. male and female birds hatched from untreated eggs or eggs treated with either thyroid preparation (Eltroxin) or goitrogenic material (Neo - Mercazole) are presented in table (20) .

Results obtained showed that there was significant ($p < 0.01$) breed variation in number of follicles per microscopic field , follicular outer and inner diameters and cell height (ANOVA, table 20) .

Number of glandular follicles per microscopic field was high in birds of Dandarawi breed (56.4) while R.I.R. birds had the lowest average of glandular follicles (33.33) . Fayoumi birds had an intermediate follicular number average (46.9) .

Different results were obtained concerning follicular diameters (outer and inner diameters) . Rhode Island Red birds had the highest averages of two dimentions , and Dandarawi had the lowest average while Fayoumi birds had an intermediates outer and inner follicular diameter . Outer and inner follicular diameters mounted 81.81 u and 77.91 u for Fayoumi birds , 70.48 u and 67.43 u for Dandarawi and 92.86 u and 89.04u for R.I.Rs , respectively .

Follicular epithelial cell height showed its lowest average in Dandarawi birds (1.53 u) when compared with its average in both Fayoumi and R.I.R. birds that had approximately an equal cell height average being 1.95 u and 1.91 u in Fayoumi and R.I.R. birds , respectively . Variation in cell height of the thyroid gland follicle due to breed was significant (ANOVA, table 21) .

Breed difference in the histological features of the thyroid gland reflects the difference in the thyroidal functions that mainly include differences that may exist in the

rate thyroid hormones biosynthesis and secreation to face energy needs for various biological activities . These activities differe according to bird's breed .

Significant variations ($p < 0.01$) in various histological parameters of the thyroid gland were found due to bird's sex except number o f follicles / field (ANOVA, table 21) . Regardless the effect of bird's breed or treatment applied female birds had the higher epithelial cell height 1.96 u than males 1.63 u . However , male birds had the higher outer and inner diameters of glandular follicles 88.91 u and 85.75 u than females 74.41 u and 70.5 u , respectively . Obtained results disagree with those obtained by Mohamed (1988) who reported that the average thyroid epithelial cell hight in male Fayoumi and New Hampshire chicken aged 16 weeks was higher in males than females . However , obtained results agree with those obtained by the sam auther who reported that the average thyroid follicle diameter of male Fayoumi and New Hampshire chicken aged 16 weeks was higher in males than females .

Treating incubated eggs with Eltroxin decreased average number of glandular follicles per field (44.20) while treating them with Neo - Mercazole increased this average (47.24) when compared to controls (45.20) . Outer and inner follicular diameter averages were higher in birds hatched from treated eggs than in controls . In addition , birds hatched from eggs treated with Eltroxin before incubation had the higher averages of follicular dimentions than those hatched from eggs treated with Neo-Mercazole . The outer follicular diameter averaged 79.20 u , 84.78 u and 81.18 u in control , Eltroxin and Neo - Mercazole groups , respectively while the inner diameter averages mounted 75.06 u , 81.07 u and 78.26 u , respectively . Obtained results agree with those obtained by Ahmed (1990) who reported that the outer and inner diameter

of thyroxine injected Hubbard embryoes with the lower dose (0.5) at 12 th day of incubation was higher in thyroxine group than controls .

Cell height , on the other hand , showed different response to treatments applied . Birds of the control group had the highest average of the follicular epithelial cell height (2.07 u) than birds hatched from eggs treated with either Eltroxin (1.86 u) or Neo-Mercazole (1.47 u) before incubation . However , treatment applied showed significant effect ($p < 0.01$) on epithelial cell height (ANOVA, table 21) . These results indicate that treating incubating eggs with either thyroid preparation or goitrogenic material decreased follicular cell height of the hatched chicks at sexual maturity with greater rate in case of goitrogenic material than in case of thyroid preparation . These results indicate that treatment applied decrease thyroid activities by decreasing or inhibiting thyroid hormones biosynthesis which results in decreasing follicular cell height as a result of thyroglobulin accumulation within the glandular follicle . In addition , injecting thyroid hormone may induce a kind of feedback action on either hypothalamus or the adenohypophysis and correspondingly decrease the rate of thyroid hormones biosynthesis . Goitrogenic material applied blocks the rate of iodenation which leads to accumulation of thyroglobuline within the glandular follicle and decreases the epithelial cell height .

Table (20) : Mean ± S. E of thyroid function at sexual maturity for Fayoumi, Dandarawi and R.I.R chicks hatched from untreated eggs and eggs treated with either Thyroid preparation (Eltroxin,T4) , or antithyroid material (Neo Mercazole) just before incubation .

Estimations	Sex	thyroid function of chicks hatched from			Grand average
		Untreated eggs (controls)	Eggs treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
		Fayoumi			
Number of follicles / field	M	41.40 ± 1.887	66.20 ± 2.672	29.20 ± 1.594	
	F	66.20 ± 4.477	37.00 ± 4.050	41.40 ± 6.313	46.90
Outer diameter (u)	M	65.52 ± 10.884	66.02 ± 3.045	123.02 ± 14.692	
	F	66.78 ± 7.998	82.78 ± 15.044	86.76 ± 14.574	81.81
Inner diameter (u)	M	58.20 ± 11.49	62.90 ± 3.13	121.62 ± 14.69	
	F	63.78 ± 8.00	77.18 ± 15.65	83.76 ± 14.57	77.91
Cell height (u)	M	3.66 ± 0.466	1.56 ± 0.060	0.70 ± 0	
	F	1.50 ± 0	2.80 ± 0.429	1.50 ± 0	1.95
		Dandarawi			
Number of follicles / field	M	50.00 ± 3.464	51.40 ± 1.939	61.00 ± 2.933	
	F	68.00 ± 5.805	52.00 ± 2.966	56.00 ± 3.178	56.40
Outer diameter (u)	M	62.78 ± 4.870	82.52 ± 17.390	72.78 ± 10.707	
	F	66.52 ± 8.502	77.78 ± 12.404	60.52 ± 3.017	70.48
Inner diameter (u)	M	59.94 ± 5.02	79.52 ± 17.39	70.38 ± 10.71	
	F	61.96 ± 8.21	74.06 ± 12.53	58.72 ± 3.02	67.43
Cell height (u)	M	1.42 ± 0.080	1.50 ± 0	1.20 ± 0	
	F	2.28 ± 0.235	1.86 ± 0.201	0.90 ± 0	1.53
		R.I.R			
Number of follicles / field	M	9.20 ± 0.735	29.00 ± 3.975	64.80 ± 4.329	
	F	36.40 ± 3.326	29.60 ± 1.72	31.00 ± 2.345	33.33
Outer diameter (u)	M	153.78 ± 12.197	105.28 ± 12.573	69.50 ± 9.334	
	F	59.78 ± 6.240	94.28 ± 17.553	74.51 ± 12.738	92.86
Inner diameter (u)	M	149.82 ± 12.00	103.08 ± 12.57	66.30 ± 9.13	
	F	56.62 ± 6.19	89.68 ± 17.41	68.74 ± 12.74	89.04
Cell height (u)	M	1.98 ± 0.143	1.10 ± 0	1.60 ± 0.155	
	F	1.58 ± 0.08	2.30 ± 0.214	2.90 ± 0	1.91

* The diameter of microsccopc field = 0.40 mm = 400 mic

Table (21) : Analysis of variance for data presented in table (20) .

S. O. V.	d.f	Mean Square			
		Number of follicles / field	Outer diameter (U)	Inner diameter (U)	Cell height (U)
Breed (B)	2	4031.878 **	.004 **	3503.519 **	1.654 **
Treatment (T)	2	71.678	4.396	271.869	2.802 **
Sex (S)	1	65.878	.006 **	5233.419 **	2.336 **
BT	4	1406.478 **	.005 **	4409.626 **	2.859 **
BS	2	84.478	.002	2133.839 *	1.028 **
TS	2	2630.211 **	.001	1368.65	4.653 **
BTS	4	1031.511 **	.004 **	3634.173 **	3.508 **
Error	72	61.417	.001	678.781	1.679

* P < 0.05
** P < 0.01

4 . 1 . 7 Serum blood analysis

4. 1. 7. 1. Glucose level

Data presented in table (22) illustrate serum glucose content as affected by bird's breed, sex and treatment applied .

Serum glucose level (mg / 100 ml) recorded a higher value in R.I.R's (255.91) and a lower value in Dandarawi birds (234.04) . Its average in Fayoumi bird lied in between the two proviously mentioned values (244) . However variation in serum glucose level due to bird's breed was insignificant (ANOVA, table 23) .

It was found that treating incubated eggs with Eltroxin increased serum glucose level , while Neo- Mercazole treatment decreased this level as compared to controls . Average of serum glucose level mounted 245.21 , 254 and 234.75 mg / 100 ml for controls and Eltroxin and Neo-Mercazole treated groups , respectively . However , analysis of variance did not show any significant variation in serum glucose level due to treatment applied . Many hypothesis could be used to explain the obtained results . It could be suggested that doses applied from Eltroxin or Neo-Mercazole may be not sufficunt to illustrate their effect on the process of carbohydrate metabolism . Carbohydrate metabolism was affected by many other hormones, in addition to thyroid activity. Thyroid hormones are conserning with the oxidative reaction of carbohydrate as a main source of energy . While the glucocortical hormones exert their effect on the level of energy metabolism through their effect on non carbohydrate compounds . Serum glucose content dpends mainely on pancreatic - thyroid - cortical hormonal coordination rather than on thyroidal activety only . The higher glucose renal threshold in chicken may be also a reason for insignificant treatment effect . Obtained results agree with those of Bilezikian _et al (1980) who found that the level of serum glucose in turkey was not affected with experimental hyper - or hypothyroidism applied .

Femal birds always showed higher serum glucose average than males . This was quite true in all treatments within different breed . However , analysis of variance did not show any significant variation in this paramater due to bird's sex .

Table (22) : Means ± S.E of serum glucose content (mg / 100 ml) at sexual maturity for Fayoumi , Dandarawi and R.I.R chicks hatched from untreated eggs and eggs treated with either Thyroid preparation (Eltroxin,T4) , or anti-thyroid material (Neo Mercazole) just before incubation .

Breed	Sex	serum glucose content of chicks hatched from			Grand average
		Untreated eggs (controls)	Eggs treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
Fayoumi	Males	222.26 ± .88	234.76 ± 103.15	213.19 ± 12.22	
	Females	264.05 ± 130.61	274.78 ± 122.28	254.97 ± 36.00	244.00
Dandarawi	Males	217.18 ± 15.40	238.50 ± 16.48	207.19 ± 86.85	
	Females	245.96 ± 91.36	257.81 ± 101.33	237.58 ± 59.80	234.04
R.I.R	Males	231.46 ± 30.37	242.53 ± 2.75	234.06 ± 8.00	
	Females	290.32 ± 45.14	275.59 ± 5.26	261.49 ± 17.16	255.91
Grand average		245.21	254.00	234.75	

Table (23) : Analysis of variance for data presented in table (22) .

S. O. V.	d.f	Mean Squares
		Serum glucose content (mg / 100 ml)
Breed (B)	2	2158.101
Treatment (T)	2	1670.961
Sex (S)	1	17219.541
BT	4	150.121
BS	2	310.202
TS	2	192.888
BTS	4	141.968
Error	36	12948.849

4. 1. 7. 2 Total proteins

Data concerning total proteins content in blood serum of experimental groups of birds at sexual maturity are presented in table (24) .

Regardless the effect of treatment applied or bird's sex, serum total protein level (gm / 100 ml.) was higher in R.I.R. birds (5.08) than in either Fayoumi's (3.60) or Dandarawi birds (3.63) which showed approximately an equal average of serum total proteins level . Variation in this parameter due to bird's breed was found to be of significant ($p < 0.01$) value (ANOVA, table 25) .

Inspection of the data also indicated that total proteins content in blood serum was affected by treatment applied , but without any recognizable trend . Applying both thyroid hormone preparation or goitrogenic material decreased the average of total proteins in blood serum of birds hatched from treated eggs as compared with controls . Serum total proteins averaged 4.44 , 3.90 and 3.97 gm / 100 ml. in control , Eltroxin and Neo-Mercazole groups of birds , respectively . Contradictory results were obtained by Bilezikian et al. (1980) . They found that serum total protein level were unchanged among the hyper - and hypothyroid groups of turkey .

Also, it can be observed that Neo - Mercazole had less effect in lowering the average of serum total protein content , since this average was higher in both male and female birds hatched from eggs treated with Neo - Mercazole than those hatched from eggs treated with Eltroxin . This was quite true in either Fayoumi or Dandarawi birds only . However, the average of serum total proteins was slightly higher in female R.I.R'S and lower in males hatched from eggs treated with Neo - Mercazole when compered with those treated with Eltroxin .

Decrease in serum total protein level as a result of treating hatched eggs with thyroid preparation (Eltroxin) may be due to its effect on increasing the oxidative reactions in the bird's organism . While the decrease occured due to Neo - Mercazole treatment may be attributed to its effect on accelerating growth process .

Results obtained revealed that femals within each treatment or within each breed showed higher serum total proteins level than that of the corresponding males . This may be attributed to the physiological sex defference in biological reactions in general and in metablism process in pasticular . Obtained results are in a good agreement with those reported by Sturkie (1965) who stated that total plasma protein level was lower in males than in females , and higher at laying period than before sexual maturity .

No significant interaction effect on serum total proteins level was found between studied factors (ANOVA , table 25) .

Table (24) : Means ± S.E of serum total protein (gm / 100 ml) at sexual maturity for Fayoumi , Dandarawi and R.I.R chicks hatched from untreated eggs and eggs treated with either Thyroid preparation (Eltroxin,T4) , or anti-thyroid material (NeoMercazole) just before incubation .

Breed	Sex	serum total protein of chicks hatched from			Grand average
		Untreated eggs (controls)	Eggs treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
Fayoumi	Males	3.59 ± .30	3.35 ± .45	3.37 ± .17	
	Females	4.06 ± .26	3.52 ± .20	3.72 ± .27	3.60
Dandarawi	Males	3.69 ± .52	3.14 ± .18	3.47 ± .30	
	Females	4.17 ± .54	3.61 ± .43	3.72 ± .02	3.63
R.I.R	Males	5.24 ± .56	4.54 ± .07	4.30 ± .02	
	Females	5.91 ± .75	5.21 ± .19	5.26 ± .04	5.08
Grand average		4.44	3.90	3.97	

Table (25) : Analysis of variance for data presented in table (24) .

S. O. V.	d.f	Mean Squares
		Serum total protein (gm / 100 ml)
Breed (B)	2	12.775 **
Treatment (T)	2	1.572 *
Sex (S)	1	3.36 **
BT	4	.13
BS	2	.242
TS	2	.014
BTS	4	.044
Error	36	.381

* P < 0.05
** P < 0.01

4. 1. 7. 3. Total lipids

The average values of total lipids in blood serum of control and treated male and female Fayoumi , Dandarawi and R.I.R. birds are presented in Table (26) .

Regardless the sex or treatment effects , serum total lipids (mg / 100 ml.) was found to be slightly higher in R.I.R birds (827.30) than in Dandarawi ones (813.22) . While the lowest serum total lipids average (766.22) was found in Fayoumi birds . This may indicate the difference which may exist in the metabolic rate or pathway due to bird's breed .

Results obtained showed that, serum total lipids average differed, obviously, according to treatment applied . Treating incubated eggs with Eltroxin lowered serum total lipids values of hatched chicks . While Neo - Mercazole treatment increased serum total lipids average than controls , being 822.07 , 636.40 and 948.27 mg / 100 ml. for controls, and birds hatched from eggs treated with Eltroxin and Neo - Mercazole, respectively . Analysis of variance (ANOVA, table 27) showed significant variation ($p<0.01$) in serum total lipids content due to treatments applied .

Decrease in average serum total lipids occured as a result of treating incubated eggs with thyroid preparation (Eltroxin) may be attributed to the increase which may occure in oxidative reactions . In contrast Neo - Mercazole may decrease these reactions and leads to a pronounced increase in serum total lipids . This is quite true since fats are involved in the reactions of energy metabolism . Similer results were obtained by Reineke et al. (1946) who found that feeding turkeys goitrogenic material (thiouracil) increased plasma total lipids by 65 to 85 percent . The same results were also obtained by Clegg et al. (1959) in chicken , They found that hypothyroidism was accompanied

with lipimic blood . In addition , Bilezikian et al. (1980) found that hyperthyroidism was always associated with decreased total serum lipids in turkey .

The response to treatments differed according to bird's sexe . Females within each breed and treatment showed the higher average of serum total lipids than males . Significant effect ($p < 0.01$) on serum total lipids content was found due to bird's sex (ANOVA, table 27) .

Significant variation ($p < 0.01$) in this parameter was found due to treatment x sex interaction effect . However , no significant effect was found due to breed x sex interaction .

Table (26) : Means ± S.E of serum total lipids (mg / 100 ml) at sexual maturity for Fayoumi , Dandarawi and R.I.R chicks hatched from untreated eggs and eggs treated with either Thyroid preparation (Eltroxin,T4) , or anti-thyroid material (NeoMercazole) just before incubation .

Breed	Sex	serum total lipids of chicks hatched from			Grand average
		Untreated eggs (controls)	Eggs treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
Fayoumi	Males	645.82 ± 36.95	594.18 ± 52.52	689.09 ± 34.64	
	Females	923.97 ± 8.95	618.18 ± 22.90	1126.08 ± 65.69	766.22
Dandarawi	Males	685.95 ± 50.58	630.38 ± 25.24	766.94 ± 53.44	
	Females	951.07 ± 14.35	754.18 ± 82.41	1090.81 ± 65.81	813.22
R.I.R	Males	743.81 ± 1.91	514.05 ± 10.50	781.89 ± 22.68	
	Females	981.82 ± 53.44	707.44 ± 45.81	1234.78 ± 80.16	827.30
Grand average		822.07	636.40	948.27	

Table (27) : Analysis of variance for data presented in table (26) .

S. O. V.	d.f	Mean Squares
		Serum total lipids (mg / 100 ml)
Breed (B)	2	18413.945
Treatment (T)	2	442974.248 **
Sex (S)	1	909669.556 **
BT	4	10874.936
BS	2	4264.745
TS	2	95171.084 **
BTS	4	7330.641
Error	36	6605.083

** P < 0.01

4. 1. 7. 4. Calcium content

Data for average serum calcium content of control and treated groups of female and male birds of the three breeds applied are tabulated in table (28) .

Results obtained indicated that serum calcium content showed significant ($p<0.01$) variation due to bird's breed (ANOVA, table 27) . R.IR birds had the higher serum calcium content followed by Fayoumi then by Dandarawi ones . Average of serum calcium content mounted 11.49 , 10.57 and 8.64 mg / 100 ml in R.I.R , Fayoumi and Dandarawi birds, respectively .

Birds hatched from treated eggs had lower serum calcium content than controls , being 10.81 . 10.18 and 9.71 mg / 100 ml. for control , Eltroxin and Neo - Mercazole groups , respectively . However, variation in serum calcium content due to treatment applied was not significant (ANOVA table 29) . Results obtained disagree with those reported by Bilezikian et al. (1980) who found that serum calcium level was unchanged among normal , hypo - and hyper - thyroided groups of turkeys . This may be attributed to specie differences in the two cases .

Average of serum calcium content was higher in females than in males . This was quite true in all experimental groups of birds . This may be attributed to the biological estrogenic effects which increase blood calcium level as females started their reproductive life through its effect on either increasing the intestennal calcium uptake or modifying the pathway of calcium mobilization in bone and / or mediating the renal function in the rate of calcium reabsorbtion through the proximal tubules in the kidney .

Analysis of variance showed significant variation ($p < 0.01$) due to bird's sex on serum calcium content . In addition , no interaction effects between studied factors were found on serum calcium content . (ANOVA, table 29) .

Table (28) : Means ± S.E of serum calcium content (mg / 100 ml) at sexual maturity for Fayoumi , Dandarawi and R.I.R chicks hatched from untreated eggs and eggs treated with either Thyroid preparation (Eltroxin,T4) , or anti-thyroid material (NeoMercazole) just before incubation .

Breed	Sex	serum calcium content of chicks hatched from			Grand average
		Untreated eggs (controls)	Eggs treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
Fayoumi	Males	9.45 ± .26	8.50 ± .28	8.62 ± .34	
	Females	13.24 ± .52	12.33 ± .77	11.28 ± .64	10.57
Dandarawi	Males	7.62 ± 2.31	7.24 ± .64	6.87 ± .42	
	Females	10.72 ± 1.63	10.24 ± .74	9.12 ± 1.62	8.64
R.I.R	Males	10.26 ± .25	9.25 ± .07	9.82 ± .01	
	Females	13.55 ± 2.05	13.49 ± .35	12.57 ± .35	11.49
Grand average		10.81	10.18	9.71	

Table (29) : Analysis of variance for data presented in table (28) .

S. O. V.	d.f	Mean Squares
		Serum calcium content (mg / 100 ml)
Breed (B)	2	38.222 **
Treatment (T)	2	5.417
Sex (S)	1	139.33 **
BT	4	.273
BS	2	.622
TS	2	1.562
BTS	4	.138
Error	36	2.968

** P < 0.01

4 . 2 . Second Experiment

Studying the effect of treating Fayoumi and Dandarawi chicks with either Eltroxin or Neo - Mercazole on some productive and metabolic parameters .

4 . 2 . 1 . Body weight

Averages of body weight at hatch and at 4 weeks intervals thereafter for Fayoumi, and Dandarawi male and female chicks treated with either Eltroxin or Neo-Mercazole are represented in table (30) .

It was found that male and female Fayoumi chicks at hatch had higher body weight average of 23.75 and 23.14 gm, respectively than Dandarawi ones which had body weight average of 23.16 and 22.97 gm for males and females, respectively . In addition, Fayoumi birds mentained having higher body weight average than Dandarawi all over the experimental period .

Body weight increased by advancing age reaching its maximum average at the 20 th week of bird's age . The rate of increase differed according to breed and sex of the birds .

Body weight of male and female Fayoumi birds increased by 1245.58 and 843.86 gm, respectively along the 20 weeks of age while the rate of increase recorded in male and female Dandarawi's was 1038.25 and 761.28 gm, respectively . This indicates the superiority of male birds of the two breeds applies . This may be attributed to the heaviest body weight at hatch for males than females and for Fayoumi than Dandarawi chicks (table, 30) .

Significant variation ($p < 0.01$) in body weight average was found due to bird's breed, sex and treatment applied (ANOVA, table 31) . Results obtained agree with those obtained by Shoukry (1981)who reported that average of body weight at the 8 th weeks was 341.18 and 294.38 gm for males of Fayoumi and Dandarawi chicks , and

285.94 and 240.66 gm for females , respectively . He add that , average of body weight at the 12 th weeks was 659.93 and 588.90 gms. for Fayoumi and Dandarawi males and 557.74 and 479.57 gm for females , respectively .

Treating male or female chicks of Fayoumi breed with either Eltroxin or Neo-Mercazole increased average body weight at the 20 th week of age with greater rate in case of Neo-Mercazole than in case of Eltroxin . The same trend was found concerning the effect of treating male or female chicks of Dandarawi breed with either Eltroxin or Neo - Mercazole . Increased average body weight at the 20 th week of age was observed with greater rate in case of Neo - Mercazole than in case of Eltroxin .

Significant variation ($p < 0.01$) was found due to breed x treatment interaction at hatch only . On the other hand , significant variation ($p < 0.01$) was also found due to breed x sex at all ages . However , insignificant variation was found due to either treatment x sex and breed x treatment x sex interactions at all ages (ANOVA, table 31) .

Table (30) : Means ± S.E of body weight (gm) at hatch and at 4 wks intervals thereafter for Fayoumi and Dandarawi chicks untreated and treated with either Thyroid preparation (Eltroxin, T4) , or antithyroid material (NeoMercazole) at two weeks after hatch .

Estimation time (week)	Sex	Body weight of chicks			Interval grand average
		Untreated (controls)	treated with		
			Thyroid Preparation (Eltroxin, T4) *	Antithyroid material (NeoMercazole) *	
			Fayoumi		
0	Males	23.75 ± 0.35	27.30 ± 0.48	26.54 ± 0.42	
	Females	23.14 ± 14	26.72 ± 0.38	26.14 ± 0.46	25.60
4	Males	221.78 ± 2.52	209.27 ± 3.67	217.94 ± 3.80	
	Females	198.62 ± 4.51	181.03 ± 4.33	191.48 ± 3.25	203.36
8	Males	552.53 ± 8.18	529.22 ± 10.06	570.94 ± 12.89	
	Females	464.28 ± 11.02	449.91 ± 9.95	469.52 ± 8.83	506.07
12	Males	841.89 ± 16.63	873.73 ± 17..10	893.49 ± 19.47	
	Females	668.04 ± 16.06	714.65 ± 17.36	721.59 ± 16.62	385.57
16	Males	1132.77 ± 26.60	1193.63 ± 26.72	1222.71± 24.55	
	Females	857.92 ± 23.07	893.79 ± 20.60	927.14 ± 28.23	1038.00
20	Males	1269.33 ± 29.62	1285.63 ± 28.67	1343.44 ± 17.64	
	Females	867.00 ± 28.43	919.22 ± 19.45	963.10 ± 30.84	1107.96
			Dandarawi		
0	Males	23.16 ± 0.37	24.32 ± 0.49	23.27 ± 0.42	
	Females	22.97 ± 0.51	25.02 ± 0.58	25.70 ± 0.53	24.07
4	Males	182.42 ± 3.97	159.48 ± 4.54	178.69 ± 4.20	
	Females	166.93 ± 4.65	154.63 ± 5.99	169.85 ± 6.88	168.67
8	Males	419.18 ± 8.71	424.80 ± 11.40	470.42 ± 13.14	
	Females	369.20 ± 11.05	373.24 ± 13.77	416.42 ± 18.69	412.21
12	Males	659.50 ± 15.72	696.72 ± 16.13	727.69 ± 24.53	
	Females	555.55 ± 18.92	610.78 ± 22.91	641.47 ± 29.62	648.62
16	Males	897.03 ± 20.90	956.81 ± 31.35	1049.71 ± 25.12	
	Females	702.13 ± 31.45	786.86 ± 33.51	872.88 ± 42.42	877.57
20	Males	1061.41 ± 27.34	1138.91 ± 35.03	1203.67 ± 26.05	
	Females	784.25 ± 22.00	859.50 ± 32.53	953.24 ± 38.78	1000.16
Treatment grand average		540.21	563.14	596.13	

* Chicks were treated at 2 weeks of age.
First estimation was carried out after 2 wks of treatments when bird's were 4 weeks age.

Table (31) : Analysis of variance for data presented in table (30) .

S.O.V.	d.f	Mean Square					
		Hatch weight	4 - wk weight	8 - wk weight	12 - wk weight	16 - wk weight	20 - wk weight
Breed (B)	1	227.14**	117591.23**	857867.69**	1776421.25**	1936211.55**	807388.51**
Treatment (T)	2	254.92**	9940.54**	50689.59**	135875.70**	349718.70**	311303.43**
Sex (S)	1	4.94	31101.85**	487576.48**	1604742.91**	4167470.47**	7385512.63**
BT	2	34.38**	485.68	11671.50	4957.33	42092.77	27433.63
BS	1	55.95**	6433.34**	34816.31**	137659.05**	225339.69**	225891.54**
TS	2	16.83	64.83	1263.90	2166.66	15.72	3441.12
BTS	2	12.13	524.41	774.38	541.20	4466.09	3449.24
Error	390	7.26	733.45	4901.82	13271.03	22016.70	21283.48

** P < 0.01

4 . 2 . 2 . Relative growth rate

Relative growth rate in Fayoumi and Dandarawi experimental chicks calculated between two successive 4 weeks from hatching time up to the 20 th weeks of bird's age was listed in table (32) .

Regardless the effect of treatment and bird's sex, Fayoumi birds had the higher relative growth rate during the first and second four weeks (0 - 4 and 4 - 8 weeks of age) . While Dandarawi's had the higher relative growth rate during the third , fourth and fifth four weeks (8 - 12 , 12 - 16 and 16 20 weeks of age) . This may be attributed to the different time needed to attain an optimum functional hormonal coordination for higher metabolic reactions needed for the highest relative growth rate .

Generally, it could be stated that males within each breed had higher relative growth rate average than females . In addition , males as well as females of Fayoumi breed had the higher relative growth rate average than those of Dandarawi breed . This may be attributed to the difference that may exist in the rate of metabolic process which is a function of genetic breed difference .

Regardless bird's breed or sex untreated birds had the highest relative growth rate at the first and fifth 4 weeks (0 - 4 and 16 - 20 weeks of age) . Those treated with Eltroxin had the highest relative growth rate at the second and third 4 weeks (4-8 and 8 - 12 weeks) of age . While birds treated with Neo - Mercazole had the highest relative growth rate at the fourth (12 - 16 weeks) of age . Results obtained by Van Tienhoven et al. (1966) indicated that White Leghorn dwarfs fed on 0.04 % protamone (commercial name of thyroprotein with 0.1 % active thyroxine) had a higher body weight average at four and six weeks of age as compared to controls . This may lead to suggest the different response to treatment according to bird's age . Generally, it is too diffecult to recommend a certain treatment having favourite effect in attaining better relative growth rate all over the bird's age .

Table (32) : Relative growth rate at 4 wks intervals throughout 20 weeks experimental period of Fayoumi and Dandarawi chicks untreated and treated with either Thyroid preparation (Eltroxin,T4) or antithyroid material (NeoMercazole) at two weeks after hatch .

Breed	Treatment	Relative Growth Rate									
		Hatch - 4 w		4w - 8w		8w - 12w		12w - 16w		16w - 20w	
		M	F	M	F	M	F	M	F	M	F
FF	Control	161.31	158.26	85.43	80.15	41.50	35.99	29.46	24.89	11.37	1.05
	Eltroxin	153.84	148.56	86.65	85.23	49.11	45.47	30.95	22.28	7.42	2.81
	NeoMercazole	156.57	151.96	89.49	84.13	44.05	42.33	31.12	24.92	9.41	3.80
DD	Control	154.94	151.62	78.71	75.45	44.56	40.30	30.52	23.31	16.79	11.05
	Eltroxin	147.07	144.29	90.82	82.83	48.49	48.29	31.46	25.20	17.38	8.82
	NeoMercazole	153.92	147.43	89.89	84.11	42.95	42.55	36.23	30.56	16.66	8.80

FF = Fayoumi

DD = Dandarawi

M = Male

F = Female

W = Weeks

4 . 2 . 3 . Body measurements

4 . 2 . 3 . 1 . Breast width

Averages of the breast width (cm) at 8 and 16 weeks of age for Fayoumi and Dandarawi are listed in table (33) .

It was found that Fayoumi birds had higher breast width averages at 8 and 16 weeks of age (22.31 and 27.50 cm respectively) than Dandarawi birds (20.43 and 25.85 cm respectively) .

Generaly , it was observed that male birds within each breed had the highest breast width average than females .

Breast width increased by advancing age with greater rate in Dandarawi than in Fayoumi . It increased by 6.02 and 5.68 cm in Dandarawi and Fayoumi males, respectively and by 4.81 and 4.69 cm in the females, respectively during the period from the 8 th to 16 th weeks of age .

Variation in breast width due to bird's sex was of significant value ($p < 0.01$) at either 8 and 16 weeks of age (ANOVA, table 34) . These results agree with those obtained by Sabri (1979) reported that the strain from Fayoumi breed selected for high body weight at 8 weeks of age (males and females) had significantly wider breasts than that from the same breed but selected for high egg number . Also, Awad (1978) reported that breast width at 8 wk body weight in Cornish fowl could be improved by individual selection .

It was found that regardles the breed and sex effect treating birds with Eltroxin lowered breast width at the 8 th week of age by 3.74 %, while treating them with Neo-Mercazole increased breast width by 0.05 % at the same age . Different results were obtained at the 16 th weeks where treating birds with either Eltroxin or Neo-Mercazole increased breast width by 1.49 % and 4.16 % , respectively when compered with control .

Significant variation ($P < 0.01$) in average breast width at both two ages studied was found due to treatment applied (ANOVA, table 34) .

Table (33) : Means ± S.E of breast width (cm) at the 8 th and 16 th weeks of age for Fayoumi and Dandarawi chicks untreated and treated with Thyroid preparation (Eltroxin,T4), Antithyroid material (NeoMercazole) at two weeks after hatch .

Traits	Sex	Breast width of chicks			Interval grand average
		Untreated (controls)	treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
		Fayoumi			
8 - wks breast width	Males	23.23 ± 0.21	22.44 ± 0.20	23.20 ± 0.20	22.31
	Females	22.22 ± 0.25	21.18 ± 0.21	21.59 ± 0.21	
16 - wks breast width	Males	28.30 ± 0.28	28.66 ± 0.26	28.95 ± 0.19	27.50
	Females	26.17 ± 0.27	26.12 ± 0.28	26.76 ± 0.23	
		Dandarawi			
8 - wks breast width	Males	21.23 ± 0.24	20.22 ± 0.27	21.27 ± 0.22	20.43
	Females	19.86 ± 0.28	19.46 ± 0.25	20.52 ± 0.34	
16 - wks breast width	Males	26.11 ± 0.27	26.82 ± 0.31	27.87 ± 0.27	25.85
	Females	24.11 ± 0.41	24.67 ± 0.31	25.50 ± 0.37	
Treatment grand average	8 wks	21.64	20.83	21.65	
	16 wks	26.18	26.57	27.27	

Table (34) : Analysis of variance for data presented in table (33)

S.O.V.	d.f	Mean Square	
		at 8 - wk	at 16 - wk
Breed (B)	1	345.744 **	194.181 **
Treatment (T)	2	28.614 **	27.243 **
Sex (S)	1	123.163 **	356.413 **
BT	2	3.955	5.102
BS	1	2.717	.226
TS	2	.342	.547
BTS	2	3.156	.467
Error	388	2.017	2.218

** P < 0.01

4 . 2 . 3 . 2 . Keel length

Data for keel length (cm) measured at 8 and 16 weeks of age for Fayoumi and Dandarawi chicks are tabulated in table (35) .

It was found that the highest keel length averages at the 8 th and 16 th weeks of age were recorded in Fayoumi's (7.59 and 10.54 cm, respectively) when compared to Dandarawi birds (6.87 and 9.54 cm, respectively) .

Keel length increased by advancing age with greater rate in Fayoumi than Dandarawi . It increased by 3.08 and 2.83 cm in males and by 2.82 and 2.51 cm in females of Fayoumi and Dandarawi , respectively during the period from the 8 th to 16th weeks of age .

Males birds within either each breed or age had highest keel length average than females . Significant variation ($p < 0.01$) in keel length was found due to bird's sex at either 8 and 16 weeks of age (ANOVA, table 36) .

Obtained results agree with those of by Sabri (1979) who reported that the strain from Fayoumi breed selected for high body weight at 8 weeks of age (males and females) had significantly longer keels than that from the same breed but selected for high egg number . Awad (1978) also reported that keel length at 8 wk body weight in Cornish fowl could be improved by individual selection .

Treating birds with either Eltroxin or Neo - Mercazole increased keel length by 3.88 % and 7.61 % , respectively at 8 weeks of age and by 5.39 % and 6.95 % at 16 weeks of age , respectively when compered with control . Significant variation ($p<0.01$) in average keel length was found due to treatment applied at both two ages studied (ANOVA, table 36) .

Table (35) : Means ± S.E of keel length (cm) at the 8 th and 16 th weeks of age for Fayoumi andDandarawi and R.I.R chicks untreated and treated with either Thyroid preparation (Eltroxin,T4), or antithyroid material (Neo - Mercazole) at two weeks after hatch .

Traits	Sex	Keel length of chicks			Interval grand average
		Untreated (controls)	treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole	
		Fayoumi			
8 - wks keel length	Males	7.73 ± 0.08	7.81 ± 0.08	8.09 ± 0.08	7.59
	Females	7.08 ± 0.09	7.30 ± 0.08	7.48 ± 0.07	
16 - wks keel length	Males	10.64 ± 0.10	11.10 ± 0.12	11.14 ± 0.09	10.54
	Females	9.77 ± 0.14	10.32 ± 0.12	10.23 ± 0.13	
		Dandarawi			
8 - wks keel length	Males	6.73 ± 0.09	7.10 ± 0.09	7.32 ± 0.09	6.87
	Females	6.29 ± 0.12	6.69 ± 0.12	7.06 ± 0.15	
16 - wks keel length	Males	9.47 ± 0.11	10.02 ± 0.14	10.15 ± 0.15	9.54
	Females	8.67 ± 0.20	9.20 ± 0.15	9.71 ± 0.23	
Treatment grand average	8 wks	6.96	7.23	7.49	
	16 wks	9.64	10.16	10.31	

Table (36) : Analysis of variance for data presented in table (35)

S.O.V.	d.f	Mean Square	
		at 8 - wk	at 16 - wk
Breed (B)	1	50.126 **	71.182 **
Treatment (T)	2	9.231 **	11.845 **
Sex (S)	1	22.436 **	42.761 **
BT	2	.824	.939
BS	1	1.146	.468
TS	2	.102	.155
BTS	2	.124	.388
Error	388	.343	.503

** P < 0.01

4 . 2 . 3 . 3 . Shank length

Data for shank length (cm) measured at 8 and 16 weeks of age for Fayoumi and Dandarawi chicks are tabulated in table (37) .

Highest shank length average at the 8 th and 16 th weeks of age was observed in Fayoumi birds (5.36 and 6.90 cm respectively) than Dandarawi birds (4.91 and 6.60 cm, respectively) .

Shank length increased by advancing age with greater rate in Dandarawi than Fayoumi . It increased by 2.01 and 1.95 cm in male and by 1.37 and 1.13 cm in females during the period from the 8 th to 16 th weeks of age for Dandarawi and Fayoumi birds, respectively .

Male birds within each breed or age had higher shank length average than females. Significant variation ($p < 0.01$) in shank length was found due to bird's sex at either 8 and 16 weeks of age (ANOVA, table 38) .

Similar results were reported by Sabri (1979) who found that the strain from Fayoumi breed selected for high body weight at 8 weeks of age (males and females) had significantly longer shanks than that from the same breed but selected for high egg number . Awad (1978) reported that shank length at 8 wk body weight in Cornish fowl could be improved by individual selection .

It was found that treating birds with either Eltroxin or Neo - Mercazole increased shank length at the 8 th weeks of age by 1.19 % and 5.17 % , respectively and by 3.50 % and 4.10 %, respectively at the 16 th weeks of age when compered with control .

Significant variation ($p < 0.01$) in average shank length was found due to treatment applied at both two ages (ANOVA, table 38) .

Table (37) : Means ± S.E of shank length (cm) at the 8 th and 16 th weeks of age for Fayoumi and Dandarawi chicks untreated and treated with either Thyroid preparation (Eltroxin,T4) , or antithyroid material (NeoMercazole) at two weeks after hatch

Traits	Sex	Shank length of chicks			Interval grand average
		Untreated (controls)	treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
		Fayoumi			
8 - wks shank length	Males	5.54 ± 0.07	5.47 ± 0.06	5.65 ± 0.06	5.36
	Females	5.05 ± 0.07	5.15 ± 0.07	5.29 ± 0.06	
16 - wks shank length	Males	7.44 ± 0.10	7.50 ± 0.07	7.56 ± 0.06	6.90
	Females	6.24 ± 0.06	6.35 ± 0.06	6.27 ± 0.07	
		Dandarawi			
8 - wks shank length	Males	4.95 ± 0.06	4.98 ± 0.08	5.33 ± 0.10	4.91
	Females	4.57 ± 0.09	4.72 ± 0.07	4.88 ± 0.10	
16 - wks shank length	Males	6.85 ± 0.07	7.14 ± 0.10	7.31 ± 0.10	6.60
	Females	5.78 ± 0.12	6.25 ± 0.07	6.24 ± 0.11	
Treatment grand average	8 wks	5.03	5.09	5.29	
	16 wks	6.58	6.81	6.85	

Table (38) : Analysis of variance for data presented in table (37)

S.O.V.	d.f	Mean Square	
		at 8 - wk	at 16 - wk
Breed (B)	1	19.952 **	6.39 **
Treatment (T)	2	2.391 **	2.091 **
Sex (S)	1	13.899 **	88.676 **
BT	2	.228	1.004 **
BS	1	.018	.671 *
TS	2	.209	.172
BTS	2	.081	.035
Error	388	.18	.172

* P < 0.05
** P < 0.01

4 . 2 . 4 . Carcass characteristics

4 . 2 . 4 . 1 . Killing , dressing and eviscerating losses

Data concerning Killing , dressing and eviscerating losses presented as the absolute and relative weight of blood , feathers and inedible parts of carcass at sexual maturity for Fayoumi and Dandarawi birds are listed in table (39) for absolute and in table (40) for relative weights .

Regardless the effect of treatments applied and bird's sex , it was observed that Fayoumi chicks had higher absolute total losses weight average (390.55 gm) than Dandarawi chicks (331.95 gm). Analysis of variance revealed significant ($p < 0.01$) variation in this trait due to bird's breed . However relative total losses weight showed insignificant variation due to bird's breed (table, 41). Relative total losses weight mounted 27.71 and 28.52 % in Fayoumi and Dandarawi bird's , respectively .

Results obtained may lead to conclude that absolute total losses weight was of higher value in Fayoumi birds due to their higher live body weight (1405.84 gm) when compared to Dandarawi chicks that had live body weight averaged 1173.89 gm .

On the other hand , the insignificant variation found in the relative weight may be due to the fact that blood and feathers weight represents a certain constant percent from the bird's total live weight . So , the absolute total losses weight increased with the increase of live body weight . However, difference in live body weight does not certainly result in simelar difference in the proportional weights of various components of eviscerating losses .

Generaly , it was a found that males Fayoumi had heavier absolute total losses weight than females . While females Dandarawi had heavier relative total losses weight than males .

Regardless bird's breed or sex , it was observed that Neo - Mercazole treated birds had the highest average of absolute total losses weight at sexual maturity (372.09 gm) when compared to untreated ones (348.00 gm) or those treated with Eltroxin (363.17 gm) . However treatment applied had no significant effect on relative weights of total losses . Relative total losses weight averaged 27.97 , 27.35 and 29.02 % for controls , and birds treated with Eltroxin and Neo - Mercazole, respectively .

Significant variation ($p < 0.01$) was found in absolute total losses due to the interaction between breed and sex . While significant variation was found in relative total losses weight due to interaction between treatment and sex ($p < 0.01$) and breed x treatment x sex ($p < 0.05$) (ANOVA, table 41) .

Significant variation ($P < 0.01$) in absolute blood weight was found due to bird's breed . Fayoumi chicks had higher absolute blood weight average 73.89 gm than Dandarawi ones (56.67 gm) . However, relative blood weight showed insignificant variation due to bird's breed . It mounted 5.31 % and 4.98 % in Fayoumi and Dandarawi bird's , respectively .

Male Fayoumis and female Dandarawis had heavier absolute weight of blood at sexual maturity . On the other hands , females within a given breed had heavier relative blood weights at sexual maturity than males .

Regardless bird's breed or sex , it was observed that Eltroxin treated birds had the highest average of absolute blood weight at sexual maturity (70.84 gm) when compared to untreated (61.25 gm) or those treated with Neo - Mercazole (63.75 gm) . Relative blood weight average 4.94 , 5.43 and 5.07 % for controls , and those treated

with Eltroxin and Neo - Mercazole , respectively . However treatment applied showed no significant effect on relative weights of blood .

Results obtained agree with those obtained by Campbell (1959) who found that sex and thyroid hormones had pronounced effecct on absolute blood weight .

Insignificant variation was found in absolute & relative blood weight due to all interaction between factors studied (ANOVA, table 41) .

Absolute and relative feather weights averaged 71.39 gm (5.11 %) in Fayoumi and 62.50 gm (5.27 %) in Dandarawi chicks . Analysis of variance showed insignificant variation due to bird's breed (ANOVA, table 41)

Generaly , it was a found that males within a given breed had heavier absolute feathers weight at sexual maturity than females . It mounted 85.00 and 76.11 gm in males and 57.78 and 48.89 gm in females Fayoumi and Dandarawi birds , respectively . Analysis of variance revealed highly significant variation due to sexes breed . While relative feathers weight in male and female Fayoumis was of approximately equal value being 5.00 and 5.21 % in males and females , respectively . Quite different results were found in Dandarawi . Whearas male birds had heavier relative feathers weight (5.76 %) than females (4.77 %) . However no significant variation due to sexes breed was found .

Treatment applied showed no significant effect on feathers absolute and relative weight . These weights averaged 62.51 gm (5.01 %) , 67.09 gm (5.14 %) and 71.25 gm (5.41 %) for controls , and those treated with Eltroxin and Neo - Mercazole , respectively .

Insignificant variation was found in absolute and relative feathers weight due to all interactions between factors studied (ANOVA, table 41) .

Fayoumi chicks had the higher absolute inedible meat weight average (245.28 gm) than Dandarawi chicks (212.28 gm) . Analysis of variance revealed significant ($p<0.05$) variation in absolute inedible parts weight due to bird's breed . However relative weight showed insignificant variation due to bird's breed . It averaged 17.29 and 18.28 % in Fayoumi and Dandarawi bird's , respectively .

Generaly , it was found that the males within a given breed had heavier absolute inedible parts weight being 309.00 gm in Fayoumi and 226.89 gm in Dandarawi than females that mounted 181.56 gm and 197.67 gm , respectively . Simelar results were obtained concerning the relative inedible meat weight in Fayoumi birds . However, female Dandarawis had heavier (19.08 %) relative inedible parts weights at the same age than males (17.48 %) .

Treatment applied showed no significant effect on absolute and relative weight of inedible parts of carcass being 224.76 gm (18.03 %) , 224.50 gm (16.79 %) and 237.09 gm (18.56 %) for controls , and those treated with Eltroxin and Neo-Mercazole, respectively .

Significant variation ($p < 0.01$) was found in absolute weight of inedible parts of carcass due to breed x sex interaction and in relative weight due to treatment x sex ($p < 0.01$) and breed x treatment x sex ($p < 0.05$) interaction (ANOVA, table 41) .

Table (39) : Means ± S.E of Eviscerating losses (gm) at sexual maturity of Fayoumi and Dandarawi chicks untreated and treated with either Thyroid preparation (Eltroxin, T4), or antithyroid material (NeoMercazole) at two weeks after hatch .

Traits	Sex	carcass characteristics of chicks			Grand average
		Untreated (controls)	treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
		Fayoumi			
Live weight (gm)	Males	1601.67 ± 20.88	1786.67 ± 90.25	1720.00 ± 88.88	1405.84
	Females	1080.00 ± 49.33	1116.67 ± 17.64	1130.00 ± 66.58	
Eviscerating losses (gm)	Males	456.33 ± 21.40	505.00 ± 13.58	477.33 ± 22.67	390.55
	Females	296.33 ± 36.27	265.33 ± 13.93	343.00 ± 19.55	
Inedible parts (gm)	Males	294.67 ± 26.77	331.67 ± 10.75	300.67 ± 17.05	245.28
	Females	179.67 ± 18.50	152.00 ± 8.54	213.00 ± 10.12	
Blood weight (gm)	Males	81.67 ± 7.27	96.67 ± 6.67	78.33 ± 1.67	73.89
	Females	60.00 ± 15.28	63.33 ± 3.33	63.33 ± 3.33	
Feather weight (gm)	Males	80.00 ± 15.28	76.67 ± 3.33	98.33 ± 13.64	71.39
	Females	56.67 ± 6.67	50.00 ± 5.77	66.67 ± 12.02	
		Dandarawi			
Live weight (gm)	Males	1203.33 ± 73.33	1331.67 ± 186.87	1396.67 ± 129.79	1173.89
	Females	1086.67 ± 71.26	1058.33 ± 86.14	966.67 ± 40.55	
Eviscerating losses (gm)	Males	361.67 ± 4.67	363.33 ± 49.87	352.00 ± 39.07	331.95
	Females	279.67 ± 21.99	319.00 ± 31.39	316.00 ± 18.82	
Inedible parts (gm)	Males	251.67 ± 15.76	210.33 ± 33.78	218.67 ± 39.25	212.28
	Females	173.00 ± 18.68	204.00± 34.21	216.00 ± 21.93	
Blood weight (gm)	Males	43.33 ± 3.33	65.00 ± 2.89	56.67 ± 3.33	56.67
	Females	60.00 ± 0.00	58.33 ± 4.41	56.67 ± 3.33	
Feather weight (gm)	Males	66.67 ± 8.82	85.00 ± 18.03	76.67 ± 17.64	62.50
	Females	46.67 ± 3.33	56.67 ± 6.67	43.33 ± 3.33	

Table (40) : Means ± S.E of eviscerating losses (%) at sexual maturity of Fayoumi and Dandarawi chicks untreated and treated with either Thyroid preparation (Eltroxin, T4) , or antithyroid material (NeoMercazole) at two weeks after hatch .

Traits	Sex	carcass characteristics of chicks			Grand average
		Untreated (controls)	treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
		Fayoumi			
Eviscerating losses %	Males	28.49 ± 1.18	28.34 ± 0.72	27.77 ± 0.44	27.71
	Females	27.38 ± 2.68	23.79 ± 1.45	30.46 ± 1.65	
Inedible parts %	Males	18.40 ± 1.62	18.60 ± 0.35	17.51 ± 0.77	17.29
	Females	16.69 ± 1.78	13.64 ± 0.95	18.91 ± 0.76	
Blood %	Males	5.10 ± 0.44	5.41 ± 0.22	4.59 ± 0.32	5.31
	Females	5.46 ± 1.16	5.68 ± 0.33	5.62 ± 0.26	
Feather %	Males	4.99 ± 0.93	4.33 ± 0.38	5.68 ± 0.54	5.11
	Females	5.22 ± 0.43	4.48 ± 0.51	5.93 ± 1.04	
		Dandarawi			
Eviscerating losses %	Males	30.29 ± 1.96	27.11 ± 1.40	25.11 ± 0.65	28.52
	Females	25.69 ± 0.49	30.15 ± 1.99	32.74 ± 1.91	
Inedible parts %	Males	21.18 ± 2.35	15.78 ± 1.34	15.48 ± 1.97	18.28
	Females	15.83 ± 0.76	19.11 ± 2.35	22.31 ± 1.95	
Blood %	Males	3.59 ± 0.05	5.06 ± 0.69	4.15 ± 0.55	4.98
	Females	5.57 ± 0.39	5.56 ± 0.53	5.91 ± 0.56	
Feather %	Males	5.51 ± 0.55	6.27 ± 0.51	5.49 ± 1.05	5.27
	Females	4.29 ± 0.09	5.48 ± 0.95	4.53 ± 0.53	

Table (41) : Analysis of variance for data presented in tables (39 and 40) .

S.O.V.	d.f	Mean Square of Eviscerating losses							
		Total losses		Blood		Feather		Inedible parts	
		weight	%	weight	%	weight	%	weight	%
Breed (B)	1	30917.36 **	2.215	2669.44 **	3.198	711.11	.374	9801 *	4.06
Treatment (T)	2	1701.58	3.498	296.53	2.592	229.86	.783	621.03	5.55
Sex (S)	1	121220.03 **	.795	900 **	17.57 **	6669.44 **	2.012	55225 **	.114
BT	2	795.53	3.003	21.53	.499	692.36	6.835	167.58	.32
BS	1	34534.03 **	8.811	1600	2.449	0.00	5.191	21707.11 **	15.275
TS	2	2477.53	20.933 **	243.75	.744	88.19	.036	2486.08	24.804 **
BTS	2	2948.69	10.263 *	102.08	1.394	6.25	.104	3617.53	16.145 *
Error	24	2226.69	2.844	104.17	1.41	358.33	2.291	1642.61	4.065

* P < 0.05
** P < 0.01

4 . 2 . 4 . 2 . Edible meat

Data concerning the absolute and relative weights of edible meat (carcass and giblets) for birds of various experimental groups is listed in tables (42 and 43) .

Regardless the effect of treatment and bird's sex , it was observed that Fayoumi chicks had the higher absolute edible meat average (1015.28 gm) at sexual maturity than Dandarawi ones (842.45 gm) . The higher absolute edible meat found in Fayoumi birds may be attributed to their higher live body weight (1405.84 gm) when compared to that of Dandarawi chicks (1173.89 gm) . However , the insignificant variation found in the relative weight may be due to the fact that carcass and giblets weight represents a certain constant percent from the bird's live weight . So , the absolute weight of edible meat increases as live body weight increases . In addition, difference in live body weight dose not result in a simelar difference in various components of edible meat .

Males within a given breed had heavier absolute weight of edible meat at sexual maturity than females . It averaged 1223.22 gm in Fayoumi and 952.56 gm in Dandarawi males and 807.33 gm and 732.33 gm in female Fayoumi and Dandarawi birds , respectively . On the other hand, female Fayoumis had heavier relative weight of edible meat at the same age than males . This may be attributed to the variation found in live body weight that resulted in variation in the proportion edible meat weight between the two sexes . Analysis of variance revealed significant variation ($p < 0.01$) in absolute edible meat due to bird's sex . While no significant effect on relative edible meat weight (ANOVA, table 44) .

Eltroxin treated birds had the highest average of absolute edible meat weight (960.92 gm) when compared to untreated birds (864.42 gm) or those treated with Neo-Mercazole (931.26 gm) . However, treatment applied had no significant effect on

absolute and relative edible meat weight . Proportion of weight of edible meat averaged 72.04 , 72.66 and 70.98 % in control birds and those treated with , Eltroxin and Neo-Mercazole , respectively .

Significant variation ($p < 0.05$) was found in absolute weight of edible meat due to breed x sex interaction only . While significant variation was found in the relative edible meat interaction due to treatment x sex ($p < 0.01$) and breed x treatment x sex ($p < 0.05$) interactions (ANOVA, table 44) .

Regardless the effect of treatment and bird's sex , it was observed that Fayoumi chicks had the higher absolute carcass weight average (900.84 gm) at sexual maturity than Dandarawi chicks (739.78 gm) . Analysis of variance revealed significant ($p < 0.01$) variation in absolute carcass weight due to bird's breed . However , relative carcass weight showed insignificant variation due to bird's breed . Relative carcass weight mounted 63.85 % in Fayoumi and 62.71 % in Dandarawi .

Males within a given breed had heavier absolute weight of carcass at sexual maturity than females . It averaged 1083.89 gm in Fayoumi and 840.11 gm in Dandarawi males and 717.78 gm and 639.45 gm in females , respectively . On the other hand , female Fayoumis had heavier(64.71 %)relative weight of carcass than males (63.60 %). Analysis of variance revealed highly significant variation in absolute carcass weight due to bird's sex . However , relative carcass weight showed insignificant variation due to bird's sex (ANOVA , table 44) .

Eltroxin treated birds had the highest average of absolute 850.92 gm and relative (64.30 %) carcass weight when compared to untreated birds (785.84 gm and 63.24 %)

or those treated with Neo - Mercazole (824.17 gm and 62.78 %) . Analysis of variance revealed insignificant variation in absolute and relative carcass weight due to treatment (ANOVA , table 44) .

Significant variation ($p < 0.05$) was found in absolute carcass weight due to the interaction between breed and sex . While significant variation ($p < 0.01$) was found in relative carcass weight due to treatment x sex interaction (ANOVA, table 44) .

Fayoumi chicks had the higher absolute (table 42) and relative giblets (table 43) weight average (114.45 gm - 8.14 %) at sexual maturity than Dandarawi chicks (102.67 gm - 8.77 %). Analysis of variance revealed significant variation in absolute and relative weight due to bird's breed (ANOVA , table 44) .

Males within a given breed had heavier absolute weight of giblets at sexual maturity (139.33 gm in Fayoumi and 112.44 gm in Dandarawi) than females (89.56 gm and 92.89 gmin Fayoumi and Dandarawi , respectively) . While , female Dandarawis only had heavier relative weight of giblets (8.91 %) than males (8.63%). Analysis of variance revealed significant variation ($p < 0.01$) in absolute giblets weight due to bird's sex . However , relative giblets weight showed insignificant variation due to bird's sex (ANOVA , table 44) .

Treatment applied had no significant effect on absolute and relative weight of giblets . They averaged 108.59 gm (8.81 %), 110.01 gm (8.37 %) and 107.09 gm (8.21 %) for controls , Eltroxin and Neo - Mercazole treated , respectively .

Significant variation was found in absolute giblets weight due to breed x sex ($p< 0.01$) and treatment x sex ($p < 0.05$) interactions . While insignificant variation was found in relative giblets weight due to all interactions between factors studied (ANOVA, table 44) .

Table (42) : Means ± S.E of Edible meat (gm) at sexual maturity of Fayoumi and Dandarawi chicks untreated and treated with either Thyroid preparation (Eltroxin, T4), or antithyroid material (NeoMercazole) at two weeks after hatch .

Traits	Sex	carcass characteristics of chicks			Grand average
		Untreated (controls)	treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
			Fayoumi		
Live weight (gm)	Males	1601.67 ± 20.88	1786.67 ± 90.25	1720.00 ± 88.88	1405.84
	Females	1080.00 ± 49.33	1116.67 ± 17.64	1130.00 ± 66.58	
Edible meat (gm)	Males	1145.33 ± 21.37	1281.67 ± 76.89	1242.67 ± 67.76	1015.28
	Females	783.67 ± 39.31	851.33 ± 27.09	787.00 ± 58.90	
carcass weight (gm)	Males	1010.00 ± 20.00	1140.00 ± 66.58	1101.67 ± 68.46	900.84
	Females	690.00 ± 37.86	763.33 ± 24.04	700.00 ± 51.96	
Giblets weight (gm)	Males	135.33 ± 1.76	141.67 ± 11.92	141.00 ± 1.16	114.45
	Females	93.67 ± 1.45	88.00 ± 4.04	87.00 ± 7.00	
			Dandarawi		
Live weight (gm)	Males	1203.33 ± 73.33	1331.67 ± 186.87	1396.67 ± 129.79	1173.89
	Females	1086.67 ± 71.26	1058.33 ± 86.14	966.67 ± 40.55	
Edible meat (gm)	Males	841.67 ± 75.78	971.33 ± 140.16	1044.67 ± 91.31	842.45
	Females	807.00 ± 49.72	739.33 ± 64.41	650.67 ± 38.19	
carcass weight (gm)	Males	741.67 ± 79.36	855.33 ± 127.97	923.33 ± 81.92	739.78
	Females	701.67 ± 42.07	645.00 ± 53.46	571.67 ± 34.20	
Giblets weight (gm)	Males	100.00 ± 3.79	116.00 ± 12.90	121.33 ± 9.53	102.67
	Females	105.33 ± 8.17	94.33 ± 11.10	79.00 ± 4.00	

Table (43) : Means ± S.E of edible meat (%) at sexual maturity of Fayoumi and Dandarawi chicks untreated and treated with either Thyroid preparation (Eltroxin, T4) , or antithyroid material (NeoMercazole) at two weeks after hatch .

Traits	Sex	carcass characteristics of chicks			Grand average
		Untreated (controls)	treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
		Fayoumi			
Edible meat %	Males	71.51 ± 1.18	71.66 ± 0.72	72.23 ± 0.44	72.30
	Females	72.63 ± 2.68	76.21 ± 1.45	69.54 ± 1.65	
Proportional carcass weight	Males	63.06 ± 1.14	63.76 ± 0.53	63.98 ± 0.75	63.85
	Females	63.93 ± 2.53	68.34 ± 1.37	61.86 ± 1.48	
Giblets %	Males	8.45 ± 0.04	7.91 ± 0.39	8.25 ± 0.50	8.14
	Females	8.70 ± 0.32	7.87 ± 0.24	7.68 ± 0.19	
		Dandarawi			
Edible meat %	Males	69.71 ± 1.96	72.89 ± 1.40	74.89 ± 0.65	71.49
	Females	74.31 ± 0.49	69.85 ± 1.99	67.26 ± 1.91	
Proportional carcass weight	Males	61.31 ± 2.72	64.11 ± 1.67	66.17 ± 0.42	62.71
	Females	64.63 ± 0.69	60.97 ± 1.49	59.09 ± 1.74	
Giblets %	Males	8.40 ± 0.77	8.78 ± 0.33	8.72 ± 0.23	8.77
	Females	9.68 ± 0.21	8.88 ± 0.53	8.17 ± 0.18	

Table (44) : Analysis of variance for data presented in table (42 and 44) .

S.O.V.	d.f	Mean Square					
		Edible meat		carcass		Giblets	
		weight	%	weight	%	weight	%
Breed (B)	1	268842.25 **	2.31	233450.03 **	6.502	1248.44 *	3.802 **
Treatment (T)	2	13318.11	3.568	12841.69	2.65	25.53	1.287
Sex (S)	1	910434.03 **	.816	722783.36 **	1.11	10816 **	.059
BT	2	3853	3.064	4149.19	3.51	13.03	.271
BS	1	86142.25 *	8.742	61586.69 *	9.589	2055.11 **	.393
TS	2	38920.11	20.943 **	29238.36	13.114 **	695.25 *	1.377
BTS	2	13204.33	10.106 *	9919.19	7.367	235.86	.258
Error	24	14627.61	2.827	12352.86	2.543	172.83	.459

* P < 0.05
** P < 0.01

4 . 2. 5 . Thyroid gland estimations

4 . 2 . 5 . 1. Absolute and proportional thyroid weight

Data concerning the effect of treating male and female birds with the thyroid preparation (Eltroxin) or goitrogenic material (Neo- Mercazole) applied on the average absolute and relative weights of thyroid gland are shown in tables (45 and 46) .

Regardless the effect of treatments applied and bird's sex , it was observed that Fayoumi chicks had slightly higher average of thyroid absolute weight (113.17 mg) at sexual maturity than Dandarawi ones (107.06 mg) . On the other hand Dandarawi chicks had slightly higher relative thyroid weight average (9.04 %) at the same age than Fayoumi ones (8.08 %) . However , analysis of variance revealed no significant variation in both absolute and relative thyroid weight due to bird's breed (ANOVA, table 47).

Males within a given breed had heavier absolute and relative thyroid weight at sexual maturity than females . Absolute thyroid weight mounted 145.22 mg and 126 mg in males and 81.11 mg and 88.11 mg in females Fayoumi and Dandarawi breeds , respectively . While relative thyroid weight mounted 8.82 % and 9.66 % in males and 7.33 % and 8.41 % in females of Fayoumi and Dandarawi breeds , respectively . Analysis of variance revealed significant variation in absolute ($p < 0.01$) and in relative ($p < 0.05$) thyroid weight due to bird's sex (ANOVA, table 47) .

Results obtained disagree with those obtained by Latimer (1924) on White Leghorn and Shaklee and Knox (1956) on New Hampshires who found that females had higher thyroids than males .

Results obtained are scientifically logic since metabolic activity in general and thyroid activity in particular depends on the physiological status of an organism which

is greatlly different between male and female birds . Obtained result are in a good agreement with those obtained by Bradbury (1973) who stated that thyroid activity varies according to bird's sex .

Regardless bird's breed or sex , it was observed that treating birds with Eltroxin . slightly increased absolute thyroid weight while approximately no effect occured in untreated birds as in result of treating birds with Neo - Mercazole . Absolute thyroid weight averaged 115.34 mg , 107.75 mg and 107.26 mg for Eltroxin , Neo - Mercazole and control birds , respectively . On the other hand, treating birds with Neo - Mercazole slightly lowered the relative thyroid weight while approximately no effect was found in controls or as result of treating birds with Eltroxin . Relative thyroid weight averaged 8.01 % , 8.80 % and 8.87 % for Neo - Mercazole , Eltroxin and control birds, respectively . Analysis of variance revealed insignificant variation in absolute and relative thyroid weight due to treatment applied (ANOVA , table 47) .

Significant variation ($P < 0.05$) was found in absolute thyroid weight due to the interaction between treatment and sex only (ANOVA , table 47) .

Table (45) : Means ± S.E of total thyroid weight (mg) estimated at sexual maturity of Fayoumi and Dandarawi chicks untreated and treated with either Thyroid preparation (Eltroxin, T4) , or antithyroid material (NeoMercazole) at two weeks after hatch .

Breed	Sex	Total thyroid weight (gm) of chicks			Grand average
		Untreated (controls)	treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
Fayoumi	Males	132.67 ± 3.18	141.67 ± 11.26	161.33 ± 9.26	113.17
	Females	81.00 ± 4.73	97.00 ± 15.50	65.33 ± 12.01	
Dandarawi	Males	115.00 ± 7.23	130.00 ± 22.72	133.00 ± 10.79	107.06
	Females	100.33 ± 7.13	92.67 ± 17.85	71.33 ± 8.67	
Grand average		107.26	115.34	107.75	

Table (46) : Means ± S.E of thyroid (mg) /100 gm body weight at sexual maturity of Fayoumi and Dandarawi chicks untreated and treated with either Thyroid preparation (Eltroxin, T4) , or antithyroid material (NeoMercazole) at two weeks after hatch .

Breed	Sex	thyroid (mg) / 100 gm body weight of chicks			Grand average
		Untreated (controls)	treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
Fayoumi	Males	9.05 ± 0.64	8.04 ± 1.05	9.38 ± 0.16	8.08
	Females	7.55 ± 0.68	8.71 ± 1.48	5.72 ± 0.79	
Dandarawi	Males	9.63 ± 0.87	9.79 ± 1.29	9.56 ± 0.33	9.04
	Females	9.24 ± 0.29	8.63 ± 1.02	7.37 ± 0.77	
Grand average		8.87	8.80	8.01	

Table (47) : Analysis of variance for data presented in tables (45 and 46) .

S.O.V.	d.f	Mean Square	
		Thyroid weight (mg)	Thyroid (mg) / 100 gm body weight
Breed (B)	1	336.111	8.294
Treatment (T)	2	246.194	2.723
Sex (S)	1	23409 **	16.892 *
BT	2	116.028	.072
BS	1	1547.111	.13
TS	2	1789.083 *	5.796
BTS	2	202.028	2.458
Error	24	439.694	2.263

* P < 0.05
** P < 0.01

4 . 2 . 5 . 2 . Histological Structure

Data concerning histological features of the thyroid gland for Fayoumi and Dandarawi male and female birds untreated or treated with either thyroid preparation Eltroxin or goitrogenic material Neo - Mercazole are presented in table (48) .

Results obtained showe d significant breed variation in follicular epithelial cell height only ($p < 0.01$) (ANOVA, table 49) .

Follicular epithelial cell height showed its higher average in Fayoumi birds(2.80u) than in Dandarawi ones (2.14 u) .

Significant variations ($p < 0.01$) were found in number of follicles per microscopic field and follicular cell height only due to bird's sex (ANOVA, table 49) . Regardiess the effect of bird's breed or treatment applied female birds had the higher number of glandular follicles per microscopic field (52.93) than males (44.1) . On the other hand , male birds had the higher follicular epithelial cell height 2.73 u than females 2.21 u . This may be a result of sexual defference in biological reqerment .

Obtained results agree with those obtained by Mohamed (1988) who reported that the average thyroid epithelial cell hight in male Fayoumi and New Hampshire chicken aged 16 weeks was higher in males than females .

Treatment applied showed significant effect ($p < 0.01$) on follicular epithelial cell height only (ANOVA table 49) . Control groups of birds had the highest average of the follicular epithelial cell height (3.26 u) than birds treated with either Eltroxin (2.29 u) or Neo - Mercazole (1.86 u) i . e birds with either thyroid preparation or goitrogenic material decreased follicular cell height of the birds at sexual maturity with greater rate in case of goitrogenic material than in case of thyroid preparation . These results indicate that treatment applied decrease thyroid activities by decreasing or inhibiting thyroid hormones biosynthesis .

Obtained results agree with those obtained by Ahmed (1990) reported that the outer and inner diameter of thyroxin injected Hubbard embryoes with the lower dose (0.5 ug) at 12 th day of incubation was higher than controls .

Table (48) : Mean ± S. E of thyroid function at sexual maturity for Fayoumi and Dandarawi chicks untreated and treated with either Thyroid preparation (Eltroxin,T4) , or antithyroid material (NeoMercazole) at two weeks after hatch .

Estimations	Sex	thyroid function of chicks			Grand average
		Untreated (controls)	treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
		Fayoumi			
Number of follicles / field	M	54.40 ± 3.56	35.00 ± 2.10	41.80 ± 9.90	45.73
	F	38.60 ± 2.11	54.60 ± 8.88	50.00 ± 4.99	
Outer diameter (u)	M	74.78 ± 8.88	78.52 ± 6.61	108.78 ± 23.49	81.73
	F	77.02 ± 10.94	77.76 ± 15.63	73.52 ± 6.98	
Inner diameter (u)	M	68.54 ± 8.52	71.24 ± 6.38	105.22 ± 23.42	76.15
	F	68.54 ± 10.63	73.64 ± 15.86	69.68 ± 6.89	
Cell height (u)	M	3.12 ± 0.40	3.64 ± 0.34	1.78 ± 0.28	2.80
	F	4.24 ± 0.73	2.06 ± 0.34	1.92 ± 0.28	
		Dandarawi			
Number of follicles / field	M	47.00 ± 4.76	27.60 ± 2.04	58.80 ± 5.26	51.30
	F	55.60 ± 1.17	60.40 ± 4.26	58.40 ± 1.83	
Outer diameter (u)	M	66.28 ± 6.06	126.78 ± 19.55	67.26 ± 4.56	80.44
	F	78.78 ± 7.23	76.28 ± 6.46	67.26 ± 4.15	
Inner diameter (u)	M	59.08 ± 6.62	122.90 ± 19.87	62.70 ± 5.24	74.84
	F	74.66 ± 8.01	65.28 ± 6.76	64.38 ± 4.17	
Cell height (u)	M	3.60 ± 0.45	1.94 ± 0.27	2.28 ± 0.51	2.14
	F	2..06 ± 0.41	1.50 ± 0	1.44 ± 0.06	

* The diameter of microsccopc field = 0.40 mm = 400 mic

Table (49) : Analysis of variance for data presented in table (48) .

S.O.V.	d.f	Mean Square			
		Number of follicles / field	Outer diameter (U)	Iuter diameter (U)	Cell height (U)
Breed (B)	1	464.817	24.962	25.742	6.468 **
Treatment (T)	2	310.317	1272.938	1210.569	10.286 **
Sex (S)	1	1170.417 **	2146.82	2250.938	4.108 *
BT	2	230.017	2810.472 *	2595.128 *	1.765
BS	1	350.417	7.42	21.72	2.604
TS	2	1201.317 **	1481.667	1648.584	.913
BTS	2	352.017	2385.417 *	3258.181 *	4.533 **
Error	48	125.25	682.402	694.544	.742

* P < 0.05
** P < 0.01

4 . 2 . 6 Serum blood analysis

4. 2. 6. 1. Glucose level

Data presented in table (50) illustrate serum glucose content as affected by bird's breed and sex and treatment applied .

Serum glucose level (mg / 100 ml.) was found to be of a higher value in Fayoumi's (248.00) than in Dandarawi's (230.93) . However, variation in serum glucose level due to bird's breed was of insignificant value (ANOVA, table 51) .

Treating hatched chicks with Eltroxin increased serum glucose level , while Neo-Mercazole treatment decreased this level when compared to controls . Average serum glucose level mounted 236.14 , 251.13 and 231.14 mg / 100 ml. for controls and Eltroxin and Neo-Mercazole treated groups of birds , respectively . However , analysis of variance did not show any significant variation in serum glucose level due to treatment applied (ANOVA, table 51) . It could be suggested that doses applied from Eltroxin or Neo- Mercazole may not be suffitiont to illustrate their effect on the process of carbohydrate metabolism and, carbohydrate metabolism is a function of coordination between hormones involved rather than thyroid activity only . Thyroid hormones are conserned with the oxidative reaction of various feed compounds only , while pancreatic, cortical and gastrointestinal hormones exert their effects on energy metabolism in general and metabolic pathway of various nutrients towards either anabolic or catabolic direction . In addition, the higher glucose renal threshold may be also a reason for insignificant treatment effect .

Femal birds always showed higher serum glucose average than males . This was quite true in all treatments within different breed . Analysis of variance show significant variation ($p < 0.05$) in this paramater due to bird's sex(ANOVA, table 51).

Results of this study disagree with those reported by Bilezikian et al. (1980) who found that the level of serum glucose in turkey was not affected with experimental hyper - or hypo - thyroidism .

Table (50) : Means ± S.E of serum glucose content (mg / 100 ml) at sexual maturity for Fayoumi and Dandarawi chicks untreated and treated with either Thyroid preparation (Eltroxin,T4) , or antithyroid material (NeoMercazole) at two weeks after hatch .

Breed	Sex	serum glucose content of chicks			Grand average
		Untreated (controls)	treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
Fayoumi	Males	227.56 ± 10.57	243.72 ± 5.67	220.45 ± 10.38	248.00
	Females	266.48 ± 49.96	274.61 ± 10.77	255.15 ± 20.49	
Dandarawi	Males	218.79 ± 34.87	231.55 ± 21.27	211.38 ± 8.10	230.93
	Females	231.70 ± 8.67	254.63 ± 34.15	237.55 ± 4.52	
Grand average		236.14	251.13	231.14	

Table (51) : Analysis of variance for data presented in table (50) .

S.O.V.	d.f	Mean Square
		Serum glucose content (mg / 100 ml)
Breed (B)	1	1907.651
Treatment (T)	2	1205.992
Sex (S)	1	8251.906 *
BT	2	5.818
BS	1	186.596
TS	2	31.158
BTS	2	2.085
Error	24	1569.588

* $P < 0.05$

4. 2. 6. 2 Total proteins

Data concerning total proteins content in blood serum of treatment groups of birds at sexual maturity are presented in table (52) .

Regardless the effect of treatment applied or bird's sex, serum total proteins level (gm / 100 ml.) was slightly higher in Fayoumi birds (3.79) than Dandarawi birds (3.74) Variation in this parameter due to bird's breed was found to be of insignificant value (ANOVA, table 53) .

Inspection of the data also indicated that total proteins content in blood serum was affected by treatment applied , but without any recognizable trend . Applying both thyroid hormone preparation (Eltroxin) or goitrogenic material (Neo-Mercazole) resulted in decreasing the average of total proteins in blood serum of treating birds as compared with control . Serum total proteins averaged 4.06 , 3.47 and 3.76 gm / 100 ml. in control , Eltroxin and Neo - Mercazole groups of birds , respectively . Generally , it could be concluded that Neo - Mercazole had less effect in lowering the average of serum total proteins content , since this average was higher in both male and female birds treated with Neo - Mercazole than those in treated with Eltroxin . This was quite true in either Fayoumi or Dandarawi birds only . But there are no significant effect of treatments on total serum proteins (ANOVA, table 53) . Obtained results agree with those of Bilezikian et al. (1980) . They found that serum total protein level were unchanged among the hyper - and hypo - thyroid groups of turkey .

Decrease observed in serum total protein level as a result of treating birds with thyroid preparation may be due to its effect on increasing the oxidative reactions in the bird's organism . While decrease due to Neo - Mercazole treatment may be attributed to its effect on accelerating growth process .

No significant interaction effect on serum total proteins level was found between studied factors (ANOVA , table 53) .

Results obtained revealed that femal birds within both each treatment or breed showed higher serum total proteins level than the corresponding male birds . This may be attributed to the physiological sex defference in biological reactions in general and in metablism process in pasticular . Obtained results are in a good agreement with those reported by Sturkie (1965) who stated that total plasma protein level was lower in males than in females , and higher at laying period than before sexual maturity .

Table (52) : Means ± S.E of serum total protein (gm / 100 ml) at sexual maturity for Fayoumi and Dandarawi chicks untreated and treated with either Thyroid preparation (Eltroxin,T4) , or antithyroid material (Neo-Mercazole) at two weeks after hatch .

Breed	Sex	serum total protein of chicks			Grand average
		Untreated (controls)	treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
Fayoumi	Males	3.80 ± .03	3.26 ± .01	3.57 ± .33	3.79
	Females	4.38 ± .53	3.69 ± .04	4.01 ± .64	
Dandarawi	Males	3.71 ± .64	3.22 ± .34	3.50 ± .08	3.74
	Females	4.34 ± .07	3.70 ± .07	3.95 ± .25	
Grand average		4.06	3.47	3.76	

Table (53) : Analysis of variance for data presented in table (52) .

S.O.V.	d.f	Mean Square
		Serum total protein (gm / 100 ml)
Breed (B)	1	.02
Treatment (T)	2	1.041
Sex (S)	1	2.25 *
BT	2	.002
BS	1	.003
TS	2	.026
BTS	2	.001
Error	24	.352

* P < 0.05

4. 2. 6. 3. Total lipids

The average values of total lipids in blood serum of controls and treated male and female Fayoumi and Dandarawi birds are presented in table (54) .

In spite of the slight higer serum total lipids (mg / 100 ml.) found in Dandarawi birds (835.61) than that found in Fayoumi ones (809.61) , analysis of variance showed insignificant breed difference in this parameter (ANOVA, table 55) .

Result s obtained showed that serum total lipids average differed , obviously , according to treatment applied . Treating birds with Eltroxin lowered serum total lipids values . While Neo - Mercazole treating birds showed higher serum total lipids average than controls . Serum total lipid content averaged 827.22, 656.78 and 983.83 mg / 100 ml. for controls , and Eltroxin and Neo - Mercazole treated groups of birds, respectively. Analysis of variance (ANOVA, table 55) showed significant variation ($p < 0.01$) in serum total lipids content due to treatments applied .

Decrease in average serum total lipids occured as a result of treating birds with thyroid preparation (Eltroxin) may be attributed to the increament that may occure in oxidative reactions . In contrast, Neo - Mercazole may decrease these reactions and leads to a pronounced increase in serum total lipids . This is quite true since fats are involved in the energy metabolism reactions . Similer results were obtained by Reineke et al. (1946) who found that feeding turkeys goitrogenic material (thiouracil) increased plasma total lipids by 65 to 85 percent . The same results were also obtained by Clegg et al. (1959) in chicken , they all found that hypothyroidism was always accompanied with lipimic blood . In addition , Bilezikian et al. (1980) found that hyperthyroidism was always associated with decreased total serum lipids in turkey .

The response to treatments applied differed according to bird's sexe . Females within each breed and treatment showed the higher average of serum total lipids than males . Significant variation ($p < 0.01$) on serum total lipids content was also found due to bird's sex (ANOVA, table 55) . This may be attributed to the effect of female sexual hormones in fat mobilization between blood serum and adipose tissues .

Significant variation ($p < 0.05$) in this parameter was found due to treatment x sex interaction effect . However , no significant effect was found due to breed x sex interaction (ANOVA, table 55) .

Table (54) : Means ± S.E of serum total lipids (mg / 100 ml) at sexual maturity for Fayoumi and Dandarawi chicks untreated and treated with either Thyroid preparation (Eltroxin,T4) , or antithyroid material (NeoMercazole) at two weeks after hatch .

Breed	Sex	serum total lipids of chicks			Grand average
		Untreated (controls)	treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
Fayoumi	Males	664.15 ± 26.14	599.25 ± 2.61	796.75 ± 8.23	809.61
	Females	967.25 ± 6.28	666.08 ± 23.42	1164.15 ± 127.45	
Dandarawi	Males	682.27 ± 19.80	618.87 ± 26.32	843.40 ± 51.20	835.61
	Females	995.20 ± 36.03	742.90 ± 36.45	1130.99 ± 122.57	
Grand average		827.22	656.78	983.83	

Table (55) : Analysis of variance for data presented in table (54) .

S.O.V.	d.f	Mean Square
		Serum total lipids (mg / 100 ml)
Breed (B)	1	6082.96
Treatment (T)	2	321073.29 **
Sex (S)	1	534283.03 **
BT	2	1310.008
BS	1	40.79
TS	2	49711.107 *
BTS	2	3630.877
Error	24	9736.254

* P < 0.05
** P < 0.01

4. 2. 6. 4 Calcium content

Data for average serum calcium content of control and treated groups of female and male birds of the two breeds applied are tabulated in table (56) .

Results obtained indicated that serum calcium content showed significant variation ($p < 0.01$) due to bird's breed (ANOVA, table 57) . Dandarawi birds had the higher serum calcium content than Fayoumi . Average serum calcium content mounted 8.61 and 7.39 mg / 100 ml. in Dandarawi and Fayoumi birds , respectively . This may be a result of breed difference in hormonal activity related to calcium haemostasis .

Birds treated had either equal or lower serum calcium content compared to controls, being 8.21 , 8.22 and 7.59 mg / 100 ml. for control , Eltroxi n and Neo-Mercazole groups , respectively . However, variation in serum calcium content due to treatment applied was not significant (ANOVA, table 57) . Results obtained disagree with those reported by Bilezikian et al. (1980) who found that serum calcium level was unchanged among normal and hyper - and hypo - thyroided groups of turkeys. This may be attributed to specie differences in the two cases .

Average serum calcium content was higher in females than in males . Which was quite true in all experimental groups of birds . This may be attributed to the biological estrogenic effect which increases blood calcium level in females during reproductive life . Analysis of variance showed significant variation ($p < 0.01$) on serum calcium content due to bird's sex (ANOVA, table 57) .

In addition, no interaction effects between studied factors were found on serum calcium content .

Table (56) : Means ± S.E of serum calcium content (mg / 100 ml) at sexual maturity for Fayoumi and Dandarawi chicks untreated and treated with either Thyroid preparation (Eltroxin,T4) , or antithyroid material (NeoMercazole) at two weeks after hatch .

Breed	Sex	serum calcium content of chicks			Grand average
		Untreated (controls)	treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
Fayoumi	Males	6.80 ± .06	6.58 ± .10	6.61 ± .23	7.39
	Females	8.12 ± 1.25	8.79 ± .17	7.45 ± 1.36	
Dandarawi	Males	7.42 ± .97	7.19 ± .56	7.33 ± .40	8.61
	Females	10.48 ± .36	10.31 ± .49	8.94 ± .38	
Grand average		8.21	8.22	7.59	

Table (57) : Analysis of variance for data presented in table (56) .

S.O.V.	d.f	Mean Square
		Serum calcium content (mg / 100 ml)
Breed (B)	1	13.383 **
Treatment (T)	2	1.571
Sex (S)	1	37.027 **
BT	2	.168
BS	1	2.941
TS	2	1.608
BTS	2	.206
Error	24	1.359

** P < 0.01

4 . 3 . Third Experiment

Studying the effect of treating Fayoumi and Rhode Island Red chicks hatched from eggs previousley treated with either thyroid preparation or goitrogenic material .

4 . 3 . 1 . Hatchability and Mortality rate

Data listed in table (58) show hatchability percent and embryonic mortality rate for Fayoumi and R.I.R. eggs as affected with treatments applied .

Fayoumi eggs showed the highest hatchability percent (84.09 %) when compared with R.I.R. (81.06 %) ones . This may be attributed to the lowest mortality rate obtained in Fayoumi (15.91%) than that of R.I.R. (18.94 %) .

The embryonic mortality rate for untreated eggs and those treated with Neo-Mercazole tremendously increased during the late stage of the incubation period . The rate of increase was greater in Fayoumi than in R.I.R. Its magnitude represented approximately 81 and 61 % in Fayoumi untreated eggs and those treated with Neo-Mercazole , respectively and 68 and 66 % in R.I.R. eggs with the same order, respectively of the total mortality rate along incubation period .

On the other hand , the rate of the emberyonic mortality was greater during the early stage of incubating Eltroxin treating eggs . This was quite true in both the two breeds applied . It represented , approximately , 67 and 94 % of the total emperyonic mortality occured along the incubation period . Results obtianed indicated that embryonic mortality was 3 to 4 times higher in Eltroxin treated eggs than in Neo-Mercazole treated ones . In addition, the rate of embryonic mortality differed in all breeds according to incubation stage within treatment applied . Embryonic mortality was greately higher during the late stage of incubating Neo - Mercazole treated eggs with different magnitudes within the two breeds applied . This may illustrate the different physiological responces to treatment applied during the various stages of the embryonic development which may be attributed to the genetical ability of different breeds applied.

Treating incubated eggs of Fayoumi and R.I.R. decreased hatchability rate when compared to untreated ones . The rate of decrease observed was greately higher when incubated eggs were treated with thyroid preparation (Eltroxin) than when treated with goitrogenic material (Neo - Mercazole) . The hatchability percent decreased to 20.08 and 24.24 % in Fayoumi and R.I.R. Eltroxin treated eggs . while it decreased to 77.65 and 76.52 % , respectively in Neo - Mercazole treated ones . This may be attributed to the changes that may occure in the rate of energy metabolism during the embryonic development which may affect , by different magnitude , the rate of biological reactions needed to developed embryoes . This correspondingly may affect the continuous energy supply and resulted in a pronounced decrease in the rate of embryonic development and dependently the hatchability percent .

Obtained results agree with those obtained by Ahmed (1990) who found depression in hatchability percentage as a result of treating incubated eggs with thyroxin hormone . She added that the higher dose of thyroxin (1.0 ug) had the most deterimental effect on depressing hatchability .

Table (58) : Hatchability and Mortality rates for Fayoumi and R.I.R. incubated eggs treated with either Eltroxin or Neo - Mercazole

Breed	Treatment	No. of incubated eggs	Embryonic Mortality				Hatchability	
			Early *	Late **	Total		No.	%
					No.	%		
FF	Control	132	4	17	21	15.91	111	84.09
	Eltroxin	264	141	70	211	79.92	53	20.08
	Neo-Mercazole	264	23	36	59	22.35	205	77.65
RIR	Control	132	8	17	25	18.94	107	81.06
	Eltroxin	264	187	13	200	75.76	64	24.24
	Neo-Mercazole	264	21	41	62	23.48	202	76.52

FF = Fayoumi
RIR = Rhode Island Red

* During the first 7 days
** During the rest period of incubation

4 . 3. 2 . Body weight

Averages of body weight at hatch and at 4 weeks intervals for Fayoumi and R.I.R . male and female chicks of the different experimental groups are presented in table (59) .

It was observed that R.I.R. chicks had the higher body weight average at hatch (36.84 gms) than Fayoumi ones (30.20 gms) . In addition , R.I.R. birds mentained having higher body weight average all over the experimental period than Fayoumi .

Body weight increased by advancing age reaching its maximum average at the 20th week of bird's age . The rate of increase differed according to breed and sex of the birds . Body weight of R.I.R. increased by 2109.31 and 1521.76 gm for males and females, respectively , while the rate of increase mounted 1241.80 and 943.32 gm in Fayoumi males and females, respectively . This indicates the superiority of male birds of the two breeds applies .

Treating R.I.R. incubated eggs and hatched chicks from it with either Eltroxin or Neo-Mercazole increased average body weight of chicks at hatch . The rate of increase was approximately equal and mounted 1.47 % .While, treating Fayoumi eggs and chicks hatched from with either Eltroxin or Neo-Mercazole decreased average body weight at hatch . The rate of decrease was greater in case of Neo- Mercazole treatment than in Eltroxin ones .

Analysis of variance (ANOVA, table 60) showed significant variation ($p < 0.01$) in average body weight at all ages due to bird's breed and sex as well as to treatment applied . Results obtained by Ezzeldin (1970) indicated that body weight of Fayoumi chicks averaged 28.5 gm for both sexes at hatch . It averaged 129 and 119 gm at the 4 th weeks , 309 and 280 gm at the 8th and 547 and 483 gm at 12 th weeks for males and females , respectively .

Significant variation in body weight was found at hatch ($p < 0.01$) and at the 8^{th} week ($p < 0.05$) due to breed x treatment interaction . Breed x sex interaction had significant effect ($p < 0.01$) on average body weight at 12^{th} , 16^{th} and 20^{th} weeks . In addition , significant variation was also found due to treatment x sex at 8^{th} ($p < 0.05$) and 16^{th} weeks ($p < 0.01$) . However, insignificant variation was found due to breed x treatment x sex at all ages (ANOVA, table 60) .

Table (59) : Means ± S.E of body weight (gm) at hatch and at 4 wks intervals thereafter for Fayoumi and R.I.R chicks hatched from untreated eggs and eggstreated with either Thyroid preparation (Eltroxin, T4) , or antithyroid material (Neo-Mercazole) just before incubation & weekly interval till 20 weeks .

Estimation time (week)	Sex	Body weight of chicks hatched from			Interval grand average
		Untreated eggs (controls)	Eggs treated with		
			Thyroid Preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
			Fayoumi		
0	Males Females	30.20 ± 0.23	28.77 ± 0.51	28.60 ± 0.17	29.19
4	Males Females	220.40 ± 3.34	218.90 ± 5.28	228.70 ± 3.43	222.67
8	Males Females	712.23 ± 12.31 592.56 ± 9.60	768.31 ± 13.48 568.21 ± 9.51	606.94 ± 10.86 504.05 ± 6.05	625.39
12	Males Females	1169.63 ± 16.98 928.52 ± 14.61	1293.75 ± 31.63 877.50 ± 16.37	1128.39 ± 19.50 858.38 ±13.47	1042.70
16	Males Females	1183.33 ± 19.39 933.52 ± 18.66	1442.33 ± 32.99 976.43 ± 27.71	1206.94 ± 22.67 932.82 ± 14.97	1112.56
20	Males Females	1272.00 ± 25.88 973.52 ± 15.73	1665.36 ± 56.15 1156.43 ± 31.12	1284.31 ± 24.43 966.03 ± 18.63	1219.61
			R.I.R.		
0	Males Females	36.84 ± 0.41	37.38 ± 0.59	37.38 ± 0.25	37.20
4	Males Females	216.59 ± 4.739	218.94 ± 6.58	237.39 ± 2.98	224.31
8	Males Females	748.46 ± 21.72 668.92 ± 16.60	821.00 ± 40.54 647.44 ± 17.60	729.03 ± 11.57 6.9.91 ± 8.69	704.13
12	Males Females	1558.08 ± 33.19 1163.40 ± 22.19	1627.14 ± 53.75 1223.89 ± 28.29	1554.53 ± 29.54 1167.26 ± 17.10	1382.39
16	Males Females	1817.31 ± 43.27 1341.20 ± 30.93	2050.71 ± 45.51 1443.89 ± 38.02	1786.21 ± 41.20 1360.71 ± 22.80	1633.34
20	Males Females	2146.15 ± 39.33 1558.60 ± 31.94	2325.00 ± 126.09 1761.67 ± 52.42	2030.19 ± 49.58 1475.00 ± 24.99	1882.77
Treatment grand average	unsexed	125.30	123.84	128.65	
	sexed	1172.96	1290.57	1137.55	

Table (60) : Analysis of variance for data presented in table (59) .

S.O.V.	d.f	Mean Square					
		Un sexed		Sexed			
		Hatch weight	4 - wk weight	8 - wk weight	12 - wk weight	16 - wk weight	20 - wk weight
Breed (B)	1	4601.03**	178.64	433529.94**	6400168.76**	14858790.13**	23657045.14**
Treatment (T)	2	18.97	11968.75**	305047.28**	101880.57**	436464.00**	1294768.38**
Sex (S)	1	.....	.....	1156348.54**	6876215.23**	9498447.57**	11991996.16**
BT	2	78.95**	2032.51	21423.26*	23948.42	5380.16	83212.90
BS	1	.....	.....	314.16	102416.21**	409286.56**	502311.89**
TS	2	.....	.....	25462.62*	33413.22	144254.24**	40419.36
BTS	2	.....	.....	2664.56	26065.24	12638.32	50322.19
Error	64	9.26	1295.99	5925.42	13538.30	21294.66	28046.07

* P < 0.05
** P < 0.01

4 . 3 . 3 . Relative growth rate

Data concerning the relative growth rate for Fayoumi and R.I.R. experimental chicks calculated between two successive 4 weeks from hatching time up to the 20 th weeks of bird's age was listed in table (61) .

Regardless the effect of treatment and bird's sex, relative growth rate of Fayoumi chicks was higher than that of R.I.R. ones during the first and second four weeks of age (0 - 4 and 4 - 8 weeks) . On the other hand , R.I.R had the highest relative growth rate during the third , fourth and fifth four weeks (8 - 12 , 12 - 16 and 16 - 20 weeks) of age when compared to Fayoumi ones . Simelarly males or females of R.I.R breed had the higher relative growth rate than the corresponding sex of Fayoumi breed . In addition, males within a given breed had the higher relative growth rate than females of the same breed . This may be attributed to genetic and physiological different capacities between breed and sexes within breeds.

Regardless bird's breed or sex , birds of Neo - Mercazole group had the highest relative growth rate at the first , second and third 4 weeks (0 - 4 , 4 - 8 and 8 - 12 weeks) of age . Those treated with Eltroxin had the highest relative growth rate at the fourth and fifth 4 weeks (12 - 16 and 16 - 20 weeks) of age . While untreated birds had almost the lowest relative growth rate all over the experimental periods . This may lead to suggest the different response to treatment according to bird's age . In addition, it is diffecult to recommend a certain thyroid treatment to attain better relative growth rate throughout bird's age.

Results obtained by Gado (1973) reported that feeding Katman - 63 and Cornish chicks ammonium trichloride (used as goitrogen) at a level of 100 mg / kg diet daily increased average body weight along the experimental period . Gado et al. (1980) also found highly significant increase in average body weight of Dokki - 4 chicks treated with ammonium trichloride at the same dose .

Table (61) : Relative growth rate at 4 wks intervals throughout 20 weeks experimental period of Fayoumi and R.I.R. chicks hatched from untreated eggs and eggs treated with either Thyroid preparation (Eltroxin,T4) or antithyroid material (NeoMercazole) just before incubation & weekly interval till 20 weeks .

Breed	Treatment	Relative Growth Rate						
		Hatch - 8 w	8w - 12w		12w - 16w		16w - 20w	
		Un sexed	M	F	M	F	M	F
FF	Control	151.80	48.61	44.17	1.16	.0.54	7.22	4.19
	Eltroxin	153.54	50.96	42.79	10.86	10.67	14.35	16.88
	NeoMercazole	155.54	60.10	52.01	6.73	8.31	6.21	3.50
RIR	Control	141.85	66.05	53.97	15.36	14.20	16.59	14.99
	Eltroxin	141.67	65.86	61.61	23.03	16.49	12.54	19.83
	NeoMercazole	145.58	72.24	62.72	13.87	15.30	12.79	8.06

FF = Fayoumi

RIR = Rhode Island Red

W = Weeks

4 . 3 . 4 . Carcass characteristics

4 . 3 . 4 . 1 . Killing , dressing and eviscerating total losses

Data concerning Killing , dressing and eviscerating losses (absolute and relative weights of blood , feathers and inedible parts) for the experimental groups of Fayoumi and R.I.R. birds are listed in tables (62 and 63) .

It was observed that R.I.R. chicks had higher absolute total losses weight average (552.33 gm) than Fayoumi ones (370.38 gm) . Analysis of variance reveald significant variation ($p < 0.01$) in this trait due to bird's breed (ANOVA , table 64) .

On the other hand , relative total losses weight showed insignificant variation due to bird's breed . It mounted 24.94 and 25.67 % for R.I.R. and Fayoumi bird's, respectively .

The higher absolute total losses weight observed in R.I.R. than in Fayoumi may be attributed to its higher live body weight (2254.58 gm) when compared to Fayoumi chicks (1523.59 gm) . In addition , the insignificant variation found in the relative weight, may be due to the fact that blood and feathers weight as well as internal viscera and legs represents a certain constant percent from the bird's total live weight (ANOVA, table 64) . So , the absolute total losses weight increased as live body weight increases . However, difference in live body weight may not certainly result in simelar difference in the proportional weight of various components of eviscerating losses .

Male birds within a given breed had heavier absolute total losses weight (610.83 gm in R.I.R. and 400.83 gm in Fayoumi) than females (493.83 gm in RIR and 339.92 gm in Fayoumi) . Different results were obtained concerning relative total losses weight . Female birds had heavier average (27.23 % in R.I.R.and 26.63 % in Fayoumi) than males (22.65 % and 24.71 % in R.I.R. and Fayoumi , respectively) .

Treatment applied showed no significant effect on both absolute and relative weight of total losses . It averaged 449.76 gm (24.55 %) in controls, 483.38 gm (24.26 %) in Eltroxin and 450.94 gm (26.76 %) in Neo - Mercazole groups .

Results obtained agree with those obtained by Sell and Balloun (1959) who observed no significant effect of feeding 6 - weeks old cockerels 20 milligrams

methimazole per pound ration on eviscerated carcass composition .

Insignificant variation was found in absolute and relative total losses due to all interactions between factors studied (ANOVA, table 64) .

Significant variation ($p < 0.01$) in absolute blood weight was found due to bird's breed (ANOVA, table 64) . R.I.R. chicks had higher absolute blood weight average (80.21 gm) than Fayoumi ones (55.59 gm) . However, relative blood weight showed insignificant variation due to bird's breed . It mounted 3.52 % and 3.64 % in R.I.R. and Fayoumi bird's , respectively .

Generaly , it was a found that males within a given breed had heavier absolute and relative blood weight at sexual maturity than females . It mounted 99.50 gm (3.70 %) and 68.00 gm (3.83 %) for males and 60.92 gm (3.34 %) and 43.17 gm (3.45 %) for females of R.I.R. and Fayoumi breeds , respectively . Analysis of variance showed significant variation ($p < 0.01$) in absolute blood weight due to bird's sex (ANOVA, table 64) .

Blood absolute and relative weights averaged 67.13 gm (3.57 %) for controls, 72.07 gm (3.67 %) for Eltroxin and 64.51 gm (3.52 %) for Neo-Mercazole treated groups, respectively . However, treatment applied showed no significant effect of both absolute and relative blood weight . Also, insignificant variation was found in absolute and relative blood weight due to all interactions between factors studied (ANOVA, table 64) .

Significant variation ($p < 0.01$) in absolute feathers weight was found due to bird's breed (ANOVA, table 64) . R.I.R. chicks had higher absolute feathers weight average (134.34 gm) than Fayoumi ones (85.29 gm) . However, relative feathers weight showed insignificant variation due to bird's breed . It mounted 5.90 % and 5.59% in R.I.R. and Fayoumi bird's , respectively .

Male birds within a given breed had heavier absolute and relative feathers weight at sexual maturity than females . It mounted 168.75 gm (6.28 %) and 102.50 gm (5.76 %) in males and 99.92 gm (5.52 %) and 68.08 gm (5.42 %) in females of R.I.R. and Fayoumi birds , respectively . Analysis of variance revealed significant ($p < 0.01$) variation due to absolute bird's sex . While no significant sex difference was found in feathers relative weight (ANOVA, table 64) .

Treatment applied showed no significant effect on feathers absolute and relative weight . It averaged 112.32 gm (6.02 %) , 116.13 gm (5.80 %) and 101.00 gm (5.43 %) for controls , and birds treated with Eltroxin and Neo-Mercazole , respectively .

Insignificant variation was found in both absolute and relative feathers weight due to all interactions studied (ANOVA, table 64) .

Significant variation ($p < 0.01$) in absolute weight of inedible parts of carcass was found due to bird's breed (ANOVA, table 64) . R.I.R chicks had higher absolute inedible parts weight average (337.79 gm) than Fayoumi ones (227.42 gm) . However, relative weight of inedible meat showed insignificant variation due to bird's breed . It mounted 15.53 % and 15.44 % in R.I.R. and Fayoumi bird's , respectively .

Generaly , it was found that males within a given breed had heavier absolute total inedible parts of carcass (342.58 gm in R.I.R. and 230.33 gm in Fayoumi) and lighter relative weight (12.67 % and 13.12 % , respectively) . While females had lighter absolute total inedible parts (333.00 gm in R.I.R. and 224.50 gm in Fayoumi) and heavier relative weight (18.38 % and 17.75 % , respectively) .

Treatment applied showed no significant effect on either absolute or relative weight of inedible parts of carcass that mounted 270.32 gm (14.98 %) , 292.07 gm (15.15 %) and 285.44 gm (16.32 %) for control birds , and those treated with Eltroxin and Neo-Mercazole , respectively .

Similarly , insignificant vatiation was found in either absolute or relative inedible parts due to all interactions studied (ANOVA, table 64) .

Table (62) : Means ± S.E of Eviscerating losses (gm) at sexual maturity of Fayoumi and R.I.R chicks hatched from untreated eggs and eggs treated with either thyroid preparation (Eltroxin, T4), or antithyroid material (NeoMercazole) just before incubation & weekly interval till 20 weeks .

Traits	Sex	carcass characteristics of chicks hatched from			Grand average
		Untreated eggs (controls)	Eggs treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
		Fayoumi			
Live weight (gm)	Males	1686.25 ± 36.92	2033.75 ± 158.64	1635.00 ± 100.28	1523.59
	Females	1180.25 ± 42.03	1243.25 ± 23.54	1363.00 ± 111.32	
Eviscerating losses (gm)	Males	379.75 ± 3.92	441.50 ± 25.93	381.25 ± 19.11	370.38
	Females	309.25 ± 33.38	342.00 ± 24.10	368.50 ± 38.58	
Inedible parts (gm)	Males	211.75 ± 8.03	244.75 ± 27.08	234.50 ± 14.46	227.42
	Females	202.25 ± 37.85	210.25 ± 32.20	261.00 ± 37.62	
Blood weight (gm)	Males	72.00 ± 12.70	73.50 ± 3.95	58.50 ± 2.33	55.59
	Females	35.75 ± 4.70	50.50 ± 3.43	43.25 ± 6.16	
Feather weight (gm)	Males	96.00 ± 8.65	123.25 ± 8.62	88.25 ± 6.42	85.29
	Females	71.25 ± 7.99	68.75 ± 4.94	64.25 ± 8.88	
		R.I.R			
Live weight (gm)	Males	2729.75 ± 41.97	2778.25 ± 109.69	2566.00 ± 170.09	2254.58
	Females	1826.75 ± 75.63	1911.50 ± 85.38	1715.25 ± 38.39	
Eviscerating losses (gm)	Males	627.50 ± 16.81	649.50 ± 9.02	555.50 ± 58.83	552.33
	Females	482.50 ± 26.31	500.50 ± 31.86	498.50 ± 21.88	
Inedible parts (gm)	Males	353.00 ± 11.80	375.75 ± 16.03	299.00 ± 40.52	337.79
	Females	314.25 ± 33.94	337.50 ± 35.31	347.25 ± 23.76	
Blood weight (gm)	Males	100.00 ± 6.26	101.25 ± 5.11	97.25 ± 9.50	80.21
	Females	60.75 ± 8.83	63.00 ± 6.80	59.00 ± 10.86	
Feather weight (gm)	Males	174.50 ± 11.24	172.50 ± 6.91	159.25 ± 11.84	134.34
	Females	107.50 ± 32.47	100.00 ± 4.24	92.25 ± 4.07	

Table (63) : Means ± S.E of Eviscerating losses (%) at sexual maturity of Fayoumi and R.I.R chicks hatched from untreated eggs and eggs treated with either thyroid preparation (Eltroxin, T4), or antithyroid material (NeoMerazole) just before incubation & weekly interval till 20 weeks .

Traits	Sex	carcass characteristics of chicks hatched from			Grand average
		Untreated eggs (controls)	Eggs treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
		Fayoumi			
Eviscerating losses %	Males	22.57 ± 0.69	22.18 ± 2.54	29.38 ± 0.46	25.67
	Females	26.20 ± 2.59	26.63 ± 3.08	27.05 ± 1.52	
Inedible parts %	Males	12.60 ± 0.71	12.39 ± 2.14	14.36 ± 0.36	15.44
	Females	17.10 ± 3.02	17.02 ± 2.79	19.14 ± 1.99	
Blood %	Males	4.24 ± 0.67	3.65 ± 0.22	3.61 ± 0.22	3.64
	Females	3.06 ± 0.46	4.08 ± 0.36	3.22 ± 0.52	
Feather %	Males	5.73 ± 0.60	6.14 ± 0.50	5.41 ± 0.28	5.59
	Females	6.04 ± 0.62	5.53 ± 0.37	4.69 ± 0.45	
		R.I.R			
Eviscerating losses %	Males	23.01 ± 0.70	23.46 ± 0.72	21.49 ± 1.05	24.94
	Females	26.42 ± 0.97	26.18 ± 1.23	29.10 ± 1.44	
Inedible parts %	Males	12.95 ± 0.53	13.56 ± 0.63	11.50 ± 0.87	15.53
	Females	17.24 ± 1.77	17.62 ± 1.61	20.28 ± 1.53	
Blood %	Males	3.67 ± 0.24	3.65 ± 0.17	3.79 ± 0.29	3.52
	Females	3.29 ± 0.39	3.29 ± 0.32	3.43 ± 0.61	
Feather %	Males	6.39 ± 0.38	6.25 ± 0.39	6.20 ± 0.20	5.90
	Females	5.90 ± 1.74	5.27 ± 0.36	5.40 ± 0.33	

Table (64) : Analysis of variance for data presented in table (62 and 63) .

S.O.V.	d.f	Mean Square of Eviscerating							
		Total losses		Blood		Feather		Inedible parts	
		weight	%	weight	%	weight	%	weight	%
Breed (B)	1	397306.02**	.548	7276.69**	.35	28861.02**	.169	146191.69**	.261
Treatment (T)	2	5824.65	1.06	235.90	.456	990.06	4.299	1988.58	5.632
Sex (S)	1	94963.02**	93.61 **	12065.02**	4.201	31981.69**	.878	713.02	196.59**
BT	2	3412.65	.15	61.31	.995	293.90	3.727	3681.25	2.61
BS	1	9436.02	.69	567.19	.01	3553.52	7.076	42.19	2.76
TS	2	9047.27	2.55	124.52	1.7	423.19	1.923	6247.58	5.09
BTS	2	261.27	3.75	101.69	1.592	202.27	1.815	650.25	4.94
Error	36	3415.73	4.74	217.08	1.551	586.73	3.986	3297.26	7.56

** P < 0.01

4 . 3 . 4 . 2 . Edible meat

Data concerning the absolute and relative weight of edible meat (carcass and giblets) for birds of various experimental groups was listed in tables (65 and 66) .

Regardless the effect of treatment and bird's sex , it was observed that R.I.R. chicks had the higher absolute edible meat average (1702.25 gm) at sexual maturity than Fayoumi ones (1155.30 gm) . This may be attributed to that R.I.R. birds had higher live body weight at sexual maturity (2254.58 gm) when compared to that of Fayoumi ones (1523.59 gm) . Relative weight averaged of edible meat 75.06 % in R.I.R. and 75.34 % in Fayoumi . However, no significant effect was found due to bird's breed (ANOVA, table 67) . It may be attributed to that carcass and giblets weight represents a certain constant percent from the bird's live weight. So, the absolute weight of edible meat increased as live body weight increased and difference in live body weight did not result in a simelar difference in various components of edible meat . Analysis of variance revealed Significant variation ($p < 0.01$) in absolute edible meat due to bird's breed (ANOVA, table 67) .

Results obtained agree with those obtained by Tosovsky et al. (1976) who reported that, slaughter, carcass, dressed carcass and giblets weights were insignificantly higher in Hypro male and female birds than in Ross ones aged 56 days .

Males within a given breed had heavier absolute and relative weight of edible meat at sexual maturity than females . It mounted 2080.50 gm (77.35 %) and 1384.17 gm (77.29 %) in R.I.R. and Fayoumi males, while it averaged 1324.00 gm (72.77 %) and 926.42 gm (73.38 %) in R.I.R. and Fayoumi females, respectively . Analysis of variance revealed significant variation ($p < 0.01$) in absolute and relative edible meat due to bird's sex (ANOVA, table 67) .

Treatment applied had no significant effect on both absolute and relative weight of edible meat . They averaged 1406.01 gm (75.46 %) , 1511.44 gm (75.40 %) and 1368.88 gm (74.75 %) for controls , Eltroxin and Neo-Mercazole groups, respectively.

Significant variation ($p < 0.01$) was found in absolute weight of edible meat due to breed x sex interaction effect only (ANOVA, table 67) .

Regardless the effect of treatment and bird's sex , it was observed that R.I.R. chicks had the higher absolute carcass weight average (1515.54 gm) at sexual maturity than Fayoumi chicks (1028.67 gm) . Analysis of variance revealed significant variation ($p < 0.01$) in absolute carcass weight due to bird's breed . However , relative carcass weight showed insignificant variation due to bird's breed (ANOVA, table 67) . Relative carcass weight averaged 66.71 % in R.I.R. and 67.00 % in Fayoumi birds .

Males within a given breed had heavier absolute and relative weight of carcass at sexual maturity . It averaged 1865.75 gm , 1239.33 gm for absolute weight and 69.35 %, 69.19 % for relative weight of R.I.R. and Fayoumi chicks , respectively . While it mounted 1165.33 gm , 818.00 gm for absolute weight and 64.06 % 64.80 % for relative weight of female R.I.R. and Fayoumi chicks , respectively . Analysis of variance revealed significant variation ($p < 0.01$) in absolute and relative carcass weight due to bird's sex (ANOVA, table 67) .

Treatment applied had no significant effect on either absolute or relative weight of carcass . They averaged 1255.94 gm (67.27 %) , 1344.57 gm (67.01 %) and 1215.82 gm (66.28 %) for controls , Eltroxin and Neo - Mercazole groups , respectively .

The results obtained are in disagreement with those of Andrews and Shnetzler (1946) , Kumaran and Turner (1949) , Sell and Balloun (1959) , Miner et al. (1959) and Roberson et al. (1975) who all reported that thiouracil and methimazole increased proportional carcass weight , but thyroprotein resulted in decreasing it .

Significant variation ($p < 0.01$) was found in absolute weight of carcass due to breed x sex interaction only (ANOVA, table 67) .

Data in table 65 revealed that, absolute giblets weight average was higher in R.I.R. chicks (186.71 gm) at sexual maturity than in Fayoumi ones (126.63 gm) . Analysis of variance revealed significant ($p < 0.01$) variation in absolute weight of giblets due to bird's breed . However , relative giblets weight of carcass showed insignificant variation due to bird's breed (ANOVA, table 67) . Relative giblets weight averaged 8.36 % in R.I.R. and 8.34 % in Fayoumi birds .

Males within a given breed had heavier absolute weight of giblets , being 214.75 gm in R.I.R. and 144.83 gm in Fayoumi , and lighter relative weight of giblets , being 8.00 % in R.I.R. and 8.11 % in Fayoumi while females had heavier relative weight of giblets (8.71 % in R.I.R. and 8.57 % in Fayoumi) and lighter absolute weight (158.67 gm in R.I.R. and 108.42 gm in Fayoumi) . Analysis of variance revealed significant variation in absolute and relative giblets weight due to bird's sex (ANOVA, table 67) .

Treatment applied had no significant effect on absolute and relative weight of giblets. They averaged 150.07 gm (8.20 %) , 166.88 gm (8.39 %) and 153.07 gm (8.47 %) for controls , Eltroxin and Neo - Mercazole groups , respectively .

The results obtained are in disagreement with Roberson et al. (1975) who reported that thiouracil treatment resulted in increased grams of fat per total liver weight , percent of liver fat and heart weight . On the other hand , thyroprotein treatment resulted in decreasing the abdominal fat , liver weight and liver fat .

Insignificant variation was found in absolute and relative weight of giblets interaction due to all interactions between factors studied (ANOVA, table 67) .

Table (65) : Means ± S.E of Edible meat (gm) at sexual maturity of Fayoumi and R.I.R chicks hatched from untreated eggs and eggs treated with either thyroid preparation (Eltroxin, T4), or antithyroid material (NeoMercazole) just before incubation & weekly interval till 20 weeks .

Traits	Sex	carcass characteristics of chicks hatched from			Grand average
		Untreated eggs (controls)	Eggs treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
		Fayoumi			
Live weight (gm)	Males	1686.25 ± 36.92	2033.75 ± 158.64	1635.00 ± 100.28	1523.59
	Females	1180.25 ± 42.03	1243.25 ± 23.54	1363.00 ± 111.32	
Edible meat (gm)	Males	1306.50 ± 40.58	1592.25 ± 164.18	1253.75 ± 82.29	1155.30
	Females	871.00 ± 44.52	913.75 ± 51.61	994.50 ± 82.25	
carcass weight (gm)	Males	1175.00 ± 32.65	1427.25 ± 152.25	1115.75 ± 73.25	1028.67
	Females	766.25 ± 40.97	810.25 ± 53.37	877.50 ± 68.08	
Giblets weight (gm)	Males	131.50 ± 8.15	165.00 ± 12.19	138.00 ± 9.31	126.63
	Females	104.75 ± 4.52	103.50 ± 4.79	117.00 ± 15.43	
		R.I.R			
Live weight (gm)	Males	2729.75 ± 41.97	2778.25 ± 109.69	2566.00 ± 170.09	2254.58
	Females	1826.75 ± 75.63	1911.50 ± 85.38	1715.25 ± 38.39	
Edible meat (gm)	Males	2102.25 ± 44.33	2128.75 ± 103.42	2010.50 ± 114.78	1702.25
	Females	1344.25 ± 60.01	1411.00 ± 66.51	1216.75 ± 43.84	
carcass weight (gm)	Males	1889.75 ± 40.47	1899.50 ± 102.89	1808.00 ± 106.88	1515.54
	Females	1192.75 ± 50.53	1241.25 ± 51.88	1062.00 ± 44.95	
Giblets weight (gm)	Males	212.50 ± 4.13	229.25 ± 13.14	202.50 ± 8.93	186.71
	Females	151.50 ± 9.61	169.75 ± 18.21	154.75 ± 8.50	

Table (66) : Means ± S.E of Edible meat (%) at sexual maturity of Fayoumi and R.I.R chicks hatched from untreated eggs and eggs treated with either thyroid preparation (Eltroxin, T4) , or antithyroid material (NeoMerazole) just before incubation & weekly interval till 20 weeks .

Traits	Sex	carcass characteristics of chicks hatched from			Grand average
		Untreated eggs (controls)	Eggs treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
		Fayoumi			
Edible meat %	Males	77.43 ± 0.69	77.82 ± 2.54	76.63 ± 0.46	75.34
	Females	73.81 ± 2.59	73.37 ± 3.08	72.96 ± 1.52	
Proportional carcass weight	Males	69.66 ± 0.41	69.70 ± 2.46	68.20 ± 0.51	67.00
	Females	64.90 ± 2.23	65.04 ± 3.40	64.47 ± 1.62	
Giblets %	Males	7.78 ± 0.31	8.12 ± 0.21	8.43 ± 0.11	8.34
	Females	8.91 ± 0.47	8.33 ± 0.38	8.48 ± 0.43	
		R.I.R			
Edible meat %	Males	77.00 ± 0.70	76.55 ± 0.72	78.51 ± 1.05	75.06
	Females	73.58 ± 0.97	73.82 ± 1.23	70.90 ± 1.44	
Proportional carcass weight	Males	69.22 ± 0.68	68.26 ± 1.17	70.58 ± 0.99	66.71
	Females	65.30 ± 0.75	65.01 ± 1.51	61.87 ± 1.70	
Giblets %	Males	7.79 ± 0.04	8.29 ± 0.56	7.93 ± 0.21	8.36
	Females	8.28 ± 0.26	8.81 ± 0.55	9.03 ± 0.52	

Table (67) : Analysis of variance for data presented in table (65 and 66) .

S.O.V.	d.f	Mean Square					
		Edible meat		Carcass		Giblets	
		weight	%	weight	%	weight	%
Breed (B)	1	3589961.02**	.521	2844567.19**	.42	43320.08**	.008
Treatment (T)	2	87518.40	1.09	69442.58	1.51	1286.52	.33
Sex (S)	1	4423209.19**	94.36**	3774969.19**	103.22**	25668.75**	4.07*
BT	2	23740.02	.152	21217.75	.301	242.65	.342
BS	1	267754.69**	.686	233662.52**	.966	1160.33	.17
TS	2	29778.06	2.535	21362.25	2.11	699.44	.22
BTS	2	61741.19	3.824	54468.58	4.59	366.15	.75
Error	36	27521.62	4.736	23228.76	4.199	449.67	.593

* P < 0.05
** P < 0.01

4 . 3 . 5 . Thyroid gland estimations

4 . 3 . 5 . 1 . Absolute and proportional thyroid weight

Data concerning the effect of treating incubated eggs and hatched chicks thereafter at weekly interval up to the till 20 $\underline{th}$ weeks of age with the thyroid preparation (Eltroxin) or goitrogenic material (Neo Mercazole) applied on the average of absolute and relative weights of thyroid gland are presented in tables (68 and 69) .

Regardless the effect of treatments applied and bird's sex , it was observed that R.I.R. chicks had higher absolute (255.17 mg) and relative (10.62 %) thyroid weights at sexual maturity than Fayoumi ones, mounted that 123.42 mg for absolute and 7.98 % for relative weights , respectively . Analysis of variance revealed significant variation ($p<0.01$) in absolute and in relative ($p < 0.05$) thyroid weight due to bird's breed (ANOVA, table 70).

Males within a certain breed had greately heavier absolute and relative thyroid weight at sexual maturity than females . Absolute thyroid weight averaged 152.58 mg and 94.25 mg for male and female Fayoumi and 380.00 mg and 130.33 mg for R.I.R.'s with the same order , respectively . While relative thyroid weight mounted 8.60 % and 7.35 % for male and female Fayoumis and 14.07 % and 7.16 % for male and female R.I.R.'s, respectively . Analysis of variance revealed significant variation ($p < 0.01$) in both absolute and relative thyroid weight due to bird's sex (ANOVA, table 70) .

Results obtained disagree with those obtained by Latimer (1924) on White Leghorn and Shaklee and Knox (1956) on New Hampshires who found that females had higher thyroids weight than males .

Regardless bird's breed or sex , it was observed that birds treated with Eltroxin had higher absolute and relative thyroid weight (208.63 mg and 9.53 % , respectively) than both Neo - Mercazole (171.38 mg and 9.11 %) and control (187.88 mg and 9.25 %) groups of birds . However , analysis of variance revealed no significant variation in both absolute and relative thyroid weight due to treatment applied (ANOVA, table 70) .

Significant variation ($p < 0.01$) was found in absolute and relative thyroid weight due to the interaction between breed and sex only (ANOVA , table 70) .

Table (68) : Means ± S.E of total thyroid weight (mg) at sexual maturity of Fayoumi and R.I.R chicks hatched from untreated eggs and eggs treated with either Thyroid preparation (Eltroxin, T4) , or antithyroid material (NeoMercazole) just before incubation & weekly interval till 20 weeks . .

Breed	Sex	Total thyroid weight (mg) of chicks hatched from			Grand average
		Untreated eggs (controls)	Eggs treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
Fayoumi	Males	147.25 ± 13.29	165.50 ± 18.31	145.00 ± 16.68	123.42
	Females	83.25 ± 4.48	87.75 ± 13.29	111.75 ± 22.83	
R.I.R	Males	401.25 ± 79.23	457.25 ± 114.97	281.50 ± 28.02	255.17
	Females	119.75 ± 29.85	124.00 ± 36.02	147.25 ± 13.74	
Grand average		187.88	208.63	171.38	

Table (69) : Means ± S.E of thyroid (mg) /100 gm body weight at sexual maturity of Fayoumi and R.I.R chicks hatched from untreated eggs and eggs treated with either Thyroid preparation (Eltroxin, T4) , or antithyroid material (NeoMercazole) just before incubation & weekly interval till 20 weeks .

Breed	Sex	thyroid (mg) / 100 gm body weight of chicks hatched from			Grand average
		Untreated eggs (controls)	Eggs treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
Fayoumi	Males	8.70 ± 0.63	8.16 ± 0.82	8.93 ± 1.04	7.98
	Females	7.10 ± 0.53	7.02 ± 0.99	7.94 ± 1.11	
R.I.R	Males	14.70 ± 2.87	16.58 ± 4.40	10.93 ± 0.61	10.62
	Females	6.50 ± 1.49	6.36 ± 1.70	8.61 ± 0.87	
Grand average		9.25	9.53	9.11	

Table (70) : Analysis of variance for data presented in table (68 and 69) .

S.O.V.	d.f	Mean Square	
		Thyroid weight (mg)	Thyroid (mg) / 100 gm body weight
Breed (B)	1	208296.75 **	83.767 *
Treatment (T)	2	5574.333	.751
Sex (S)	1	284592 **	199.634 **
BT	2	6630.75	6.507
BS	1	109825.333 **	96.418 **
TS	2	15877.75	18.259
BTS	2	6481.083	15.629
Error	36	8054.944	12.809

* P < 0.05
** P < 0.01

4 . 3 . 5 . 2 . Histological Structure

Data concerning histological features of the thyroid gland for various experimental groups of Fayoumi and R.I.R. male and female birds are presented in table (71) .

Results obtained showed that there was significant ($p < 0.01$) breed variation in follicular outer and inner diameters and number of follicles per microscopic field (ANOVA, table 72) . Number of glandular follicles per microscopic field was higher in birds of Fayoumi breed (36.37) than R.I.R. birds (24.47) . Different results were obtained concerning follicular diameters (outer and inner diameters) . Rhode Island Red birds had the highest averages of the two dimentions than Fayoumi birds . Outer and inner follicular diameters mounted 86.28 u and 79.10 u for Fayoumi birds , 113.01 u and 106.48 u for R.I.R's , respectivel y . On the other hand , follicular epithelial cell height showed insignificant variation due to bird's breed (ANOVA, table 72) . It lowest average way observed in R.I.R. birds (3.27 u) when compared with its average in Fayoumi birds (3.59 u) .

Simelar significant ($p < 0.01$) variations were found in studying the effect of bird's sex number on glandular follicles per microscopic field and diameters of glandular follicles (ANOVA, table 72) . Regardless the effect of bird's breed or treatment applied female birds had the higher number of glandular follicles per microscopic field (34.6) than males (26.23) . However , male birds had the higher outer and inner diameters of glandular follicles 114.19 u and 107.24 u than females 85.1 u and 78.34 u , respectively .

Obtained results agree with those obtained by Mohamed (1988) who reported that the average thyroid follicle diameter of male Fayoumi and New Hampshire chicken aged 16 weeks was higher than females .

Table (71) : Mean ± S. E of thyroid function at sexual maturity for Fayoumi and R.I.R chicks hatched from untreated eggs and eggs treated with either Thyroid preparation (Eltroxin,T4) , or antithyroid material (NeoMercazole) just before incubation & weekly interval till 20 weeks .

Estimations	Sex	thyroid function of chicks hatched from:			Grand average
		Untreated eggs (controls)	Eggs treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
		Fayoumi			
Number of follicles / field	M	34.00 ± 2.17	21.60 ± 3.03	32.40 ± 4.49	36.37
	F	37.60 ± 2.02	51.60 ± 6.41	41.00 ± 4.94	
Outer diameter (u)	M	99.04 ± 7.73	134.78 ± 15.38	87.28 ± 10.71	86.28
	F	70.78 ± 5.51	65.26 ± 11.35	60.54 ± 8.47	
Inner diameter (u)	M	88.96 ± 7.76	128.90 ± 15.70	79.40 ± 10.90	79.10
	F	64.38 ± 5.32	59.86 ± 11.45	53.06 ± 8.44	
Cell height (u)	M	5.04 ± 0.31	2.94 ± 0.61	3.94 ± 0.44	3.59
	F	3.2 ± 0.30	2.70 ± 0.14	3.74 ± 0.35	
		R.I.R			
Number of follicles / field	M	11.60 ± 1.29	27.00 ± 2.41	30.80 ± 2.85	24.47
	F	24.80 ± 0.74	28.6 ± 3.95	24.00 ± 2.12	
Inner diameter (u)	M	161.78 ± 22.98	98.52 ± 14.97	103.76 ± 9.89	113.01
	F	107.00 ± 7.39	102.26 ± 11.41	104.76 ± 6.83	
Outer diameter (u)	M	158.78 ± 22.98	91.08 ± 16.09	96.28 ± 9.80	106.48
	F	100.80 ± 7.13	93.74 ± 11.37	98.20 ± 6.64	
Cell height (u)	M	1.50 ± 0.00	3.72 ± 0.61	3.74 ± 0.35	3.27
	F	3.10 ± 0.49	4.26 ± 0.46	3.28 ± 0.25	

* The diameter of microsccopc field = 0.40 mm = 400 mic

Table (72) : Analysis of variance for data presented in table (71) .

S.O.V.	d.f	Mean Square			
		Number of follicles / field	Outer diameter (U)	Innter diameter (U)	Cell height (U)
Breed (B)	1	2124.15 **	10720.067 **	11250.443 **	1.601
Treatment (T)	2	175.217	2119.272	2315.726	1.091
Sex (S)	1	1050.017 **	12696.331 **	12522.371 **	.15
BT	2	122.15	3063.791 *	3842.867 **	11.175 **
BS	1	487.35 **	2311.363	1845.931	6.534 **
TS	2	277.517 *	1080.083	1125.561	.289
BTS	2	466.25 **	3119.222 *	3486.458 *	4.551 **
Error	48	58.225	718.166	734.557	.792

* P < 0.05
** P < 0.01

4 . 3 . 6 Serum blood analysis

4. 3. 6. 1. Glucose level

Data presented in table (73) illustrate serum glucose content as affected by bird's breed , sex and treatment applied .

Serum glucose level (mg / 100 ml) was of higher value in R.I.R. birds (265.30) than in Fayoumi ones (240.63) . However, variation in serum glucose level due to bird's breed was of insignificant magnitude (ANOVA, table 74) .

It was found that treating eggs with Eltroxin increased serum glucose level , while Neo- Mercazole treatment decreased this level when compared to controls . Average serum glucose level mounted 250.58 , 266.32 and 242.01 mg / 100 ml. for controls, Eltroxin and Neo-Mercazole groups , respectively . However , analysis of variance did not show any significant variation in serum glucose level due to treatment applied . It could be suggested that doses applied from Eltroxin or Neo- Mercazole may be not sufficunt to illustrate their effect on the process of carbohydrate metabolism . Also, Carbohydrate metabolism is affected by many other hormones in addition to thyroid activity which is involved in the oxidative reaction of carbohydrate only while the cortical hormones exert their effect on energy metabolism through their effect on non carbohydrate compounds . In addition, serum glucose content depends mainely on pancreatic , thyroidcortical and gastro intestinal hormonal coordination rather than thyroidal activety only . The results of the present study agree with those of Bilezikian _et al_. (1980) found that serum glucose level in turkey was not affected with experimental hyper - or hypo - thyroidism applied .

Femal birds always showed significant higher serum glucose average than males . This was quite true within all treatments and breeds . Analysis of variance showed significant ($p < 0.05$) variation in this paramater due to bird's sex (ANOVA, table 74).

Table (73) : Means ± S.E of serum glucose content (mg / 100 ml) at sexual maturity for Fayoumi and R.I.R chicks hatched from untreated eggs and eggs treated with either Thyroid preparation (Eltroxin,T4) , or antithyroid material (NeoMercazole) just before incubation & weekly interval till 20 weeks .

Breed	Sex	serum glucose content of chicks hatched from			Grand average
		Untreated eggs (controls)	Eggs treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
Fayoumi	Males	221.77 ± 22.85	235.81 ± 20.84	214.88 ± 24.27	240.63
	Females	257.21 ± 19.28	266.99 ± 37.28	247.13 ± 31.18	
R.I.R	Males	245.00 ± 00.52	264.43 ± 38.42	233.47 ± 7.64	265.30
	Females	278.32 ± 20.19	298.03 ± 28.64	272.53 ± 32.00	
Grand average		250.58	266.32	242.01	

Table (74) : Analysis of variance for data presented in table (73) .

S.O.V.	d.f	Mean Square
		Serum glucose content (mg / 100 ml)
Breed (B)	1	7302.32
Treatment (T)	2	2433.036
Sex (S)	1	13987.158 *
BT	2	80.073
BS	1	16.898
TS	2	10.832
BTS	2	19.905
Error	36	2688.52

* $P < 0.05$

4. 3. 6. 2 Total proteins

Data concerning the total proteins content in blood serum of treatment groups of birds at sexual maturity are presented in table (75) .

Regardless the effect of treatment applied or bird's sex, serum total proteins level (gm / 100 ml.) was higher in R.I.R. birds (5.15) than in Fayoumi ones (3.58). Variation in this parameter due to bird's breed was found to be of significant value ($p < 0.01$) (ANOVA, table 76) .

Data also indicated that , total proteins content in blood serum was affected by treatment applied , but without any recognizable trend . Applying both thyroid hormone preparation or goitrogenic material resulted in decreasing the average of total proteins in blood serum of treating birds as compared with controls . Serum total proteins averaged 4.75 , 4.15 and 4.21 grams / 100 ml. in control, Eltroxin and Neo-Mercazole groups of birds , respectively . Decrease in serum total protein level as a result of treating birds with thyroid preparation may be due to its effect on increasing the oxidative reactions in the bird's organism . While decrease due to Neo - Mercazole treatment may be attributed to its effect on accelerating growth process . However , contradictory results were obtained by Bilezikian et al. (1980) . They found that serum total protein level were unchanged among the hyper - and hypo-thyroid groups of turkey .

Generally , it could be concluded that Neo-Mercazole had less effect in lowering the average of serum total protein content in Fayoumi birds , since this average was higher in both male and female birds treated with Neo-Mercazole than in those treated with Eltroxin . However, the average of serum total protein was slightly higher in

R.I.R. females and lower in males treated with Neo-Mercazole when compered with those treated with Eltroxin .Obtained results revealed that femals within each treatment or within each breed showed higher serum total proteins level than males . This may be attributed to the physiological sex defference in biological reactions in general and in metablism process in pasticular . Obtained results are in a good agreement with those reported by Sturkie (1965) who stated that total plasma protein level was lower in males than females , and higher at laying period than before sexual maturity .

No significant effect on serum total proteins level was found between due to the interaction between various studied factors (ANOVA , table 76) .

Table (75) : Means ± S.E of serum total protein (gm / 100 ml) at sexual maturity for Fayoumi and R.I.R chicks hatched from untreated eggs and eggs treated with either Thyroid preparation (Eltroxin,T4) , or antithyroid material(NeoMercazole) just before incubation & weekly interval till 20 weeks .

Breed	Sex	serum total protein of chicks hatched from			Grand average
		Untreated eggs (controls)	Eggs treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
Fayoumi	Males	3.56 ± .37	3.18 ± .05	3.39 ± .29	3.58
	Females	4.20 ± .56	3.50 ± .93	3.64 ± .29	
R.I.R	Males	5.24 ± .07	4.69 ± .66	4.45 ± .59	5.15
	Females	5.99 ± 1.04	5.22 ± .11	5.33 ± .14	
Grand average		4.75	4.15	4.21	

Table (76) : Analysis of variance for data presented in table (75) .

S.O.V.	d.f	Mean Square
		Serum total protein (gm / 100 ml)
Breed (B)	1	29.642 **
Treatment (T)	2	1.757
Sex (S)	1	3.797 *
BT	2	.135
BS	1	.31
TS	2	.071
BTS	2	.077
Error	36	1.134

* P < 0.05
** P < 0.01

4. 3. 6. 3. Total lipids

The average values of serum total lipids levels in control and treated male and female Fayoumi and R.I.R. birds are presented in table (77) .

It was found that , serum total lipids average (mg / 100 ml.) was significantly higher in Fayoumis 806.88 than in R.I.Rs 675.9 . This may reflect the breed difference existed in either metabolic rate or pathway of fats mobilization . Analysis of variance assured this results showing significant variation ($p < 0.01$) in serum total lipids level due to bird's breed (ANOVA, table 78) .

Results obtained showed that serum total lipids average differed, obviously, according to treatment applied . Treating birds with Eltroxin lowered serum total lipids level . While Neo - Mercazole treatment increased this level . Serum total lipids level averaged 752.07 , 597.86 and 874.37 mg / 100 ml. for controls, and Eltroxin and Neo-Mercazole groups of birds , respectively . Analysis of variance (ANOVA, table 78) showed significant ($p < 0.01$) variation in serum total lipids content due to treatment s applied .

Changes in serum total lipids concentrations occured as a result of modifying thyroid activety when applying either thyroid preparation (Eltroxin) or Neo-Mercazole as a goitrogenic material may be a function of modifying the rate of energy metabolism and / or the rate of fats mobilization to and from the various adipose tissues in the birds organism . Total lipids level may be elivated when fates are shifted from adipose tissues and or when they extensively oxidized to face the body needs from energy and vise versa in case of lowering the fate levels in blood serum .

Similer results were obtained by Reineke et al. (1946) found that feeding turkeys goitrogenic material (thiouracil) increased plasma total lipids by 65 to 85 percent . The same results were also obtained by Clegg et al. (1959) in chickens , they

found that hypothyroidism was always accompanied with lipimic blood . Bilezikian et al. (1980), on the other hand , stated that hyperthyroidism was associated with a pronouneed decreas in total serum lipids in turkey .

The response to treatments differed according to bird's sexe . Females within each breed and treatment showed higher average of serum total lipids than males . Significant variation ($p < 0.01$) in serum total lipids content was also found due to bird's sex (ANOVA, table 78) .

In addition , significant variation ($p < 0.01$) in this parameter was found due to treatment x sex interaction effect . However , no significant effect was found due to breed x sex interaction (ANOVA, table 78) .

Table (77) : Means ± S.E of serum total lipids (mg / 100 ml) at sexual maturity for Fayoumi and R.I.R chicks hatched from untreated eggs and eggs treated with either Thyroid preparation (Eltroxin,T4) , or antithyroid material (Neo-Mercazole) just before incubation & weekly interval till 20 weeks ..

Breed	Sex	serum total lipids of chicks hatched from			Grand average
		Untreated eggs (controls)	Eggs treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
Fayoumi	Males	684.60 ± 20.78	644.53 ± 63.02	744.79 ± 68.75	806.88
	Females	954.58 ± 87.32	647.18 ± 17.01	1165.59 ± 33.53	
R.I.R	Males	644.53 ± .62	505.00 ± 12.43	681.32 ± 33.46	675.98
	Females	724.53 ± 66.59	594.72 ± 9.14	905.75 ± 29.97	
Grand average		752.07	597.86	874.37	

Table (78) : Analysis of variance for data presented in table (77) .

S.O.V.	d.f	Mean Square
		Serum total lipids (mg / 100 ml)
Breed (B)	1	205629.501 **
Treatment (T)	2	307180.755 **
Sex (S)	1	394282.19 **
BT	2	4362.77
BS	1	29855.674
TS	2	76529.583 **
BTS	2	26188.345
Error	36	8285.736

** P < 0.01

4. 3. 6. 4 Calcium content

Data for average serum calcium content of control and treated groups of female and male birds of the two breeds applied are tabulated in table (79) .

Results obtained indicated that serum calcium content showed significant variation ($p < 0.01$) due to bird's breed , (ANOVA, table 80) . R.IR. birds had the higher serum calcium content than Fayoumi ones . Average serum calcium content mounted 9.49, and 7.94 mg / 100 ml. in R.I.R and Fayoumi birds , respectively .

Birds from treated eggs had lower serum calcium content than controls , being 9.05 mg / 100 ml. for controls and 8.91 and 8.20 mg / 100 ml. in birds hatched from eggs treated with Eltroxin and Neo - Mercazole before incubation , respectively . However variation in serum calcium content due to treatment applied was of no significant magnitude (ANOVA, table 80) . Results obtained agree with those reported by Bilezikian et al. (1980) found that serum calcium level was unchanged among normal, hyper - and hypo - thyroided turkeys . This may be attributed to species differences in the two cases .

Average of serum calcium content was higher in females than in males . This was quite true in all experimental groups of birds . This may be attributed to the biological estrogenic effect which may modify the pattern of thyroid - parathyroid - vit. D_3 and its metabolites (1, 25 (O H) $_2$ D_3 and / or 24 , 25 (O H) $_2$ D_3) coordination in mantaining calcium haemostasis .

Analysis of variance showed significant variation ($p < 0.01$) due to bird's sex on serum calcium content (ANOVA, table 74) .

In addition , no interaction effects between studied factors were found on serum calcium content except that found between breed x sex which showed significant ($p < o.o1$) effect (ANOVA, table 80) .

Table (79) : Means ± S.E of serum calcium content (mg / 100 ml) at sexual maturity for Fayoumi and R.I.R chicks hatched from untreated eggs and eggs treated with either Thyroid preparation (Eltroxin,T4) , or antithyroid material (NeoMercazole) just before incubation & weekly interval till 20 weeks .

Breed	Sex	serum calcium content of chicks hatched from			Grand average
		Untreated eggs (controls)	Eggs treated with		
			Thyroid preparation (Eltroxin, T4)	Antithyroid material (NeoMercazole)	
Fayoumi	Males	7.80 ± .46	7.45 ± .17	7.62 ± .29	7.94
	Females	8.50 ± .62	8.90 ± .34	7.34 ± .56	
R.I.R	Males	8.29 ± .28	7.55 ± .86	8.23 ± .80	9.49
	Females	11.57 ± 1.45	11.71 ± .51	9.59 ± .34	
Grand average		9.05	8.91	8.20	

Table (80) : Analysis of variance for data presented in table (79) .

S.O.V.	d.f	Mean Square
		Serum calcium content (mg / 100 ml)
Breed (B)	1	29.016 **
Treatment (T)	2	3.298
Sex (S)	1	37.95 **
BT	2	.157
BS	1	16.031 **
TS	2	5.252
BTS	2	.327
Error	36	1.683

** P < 0.01