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The Role of Iodine and Thyroid Gland on Reproduction and Production of Chickens. IV. Egg Production

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80 Fayoumi hens aged six months were used to study the effect of desiccated thyroid gland and potassium iodide on this breed. Hens were classified intc three groups : high, medium and low rate of laving eggs according to egg laving of eggs laid. Every group included 25 hens which were devided into 5 sub-groups Two were fed desiccated thyroid as 200g or 100g/of diet, and two were fed potassium iodide as 39.2 g or 20/g/100kg of diet, the fifth one was served as control. The treatments continued for a month and the results were :- Egg number, egg mass, and percentage were increased and the highest icrease was observed during treating per iod rather after treating period.

Egg weight decreased during treatment, but this was corrected after treating period then the hens improved the weight of their eggs afterwards

The highest increase egg production pararameter was observed by low levels rather than the high ones.

Thyroxine administration subcutaneously within the range of 1 to 90 µg, satisfactorily maintained egg production . Excessive levels of 243µg/100 g of body weight, caused pullets to stop laying and start a rapid moult (Miller *et al.* 1962).

Thuilie *et al.* (1961) found that the administration of thyroxine to one year old hens in gradually increasing doses of 1 to 3.5 g over an eight weeks period resulted in a reduction of both egg weight and yolk size. Thyroxine secretion rate may play a part in determining length of cycle. The secretion rate in females of 4-egg cycle group was higher than those of 2-egg cycle group (Booker and Shurkie, 1950). Feeding thyroprotein to pullets at a level of 10g / 100 lbs maintained a higher level of egg production (Turner, 1948b). The administration of 0.013 to 0.023 g of iodocassein daily to R.I.R. pullets for 86 days, increased the monthly egg production whereas, there was no significant difference in egg weight (Schmidt *et al.*, 1953). Turner *et al.* (1948 a, 1948 b and 1947) studied the effect of feeding thyroprotein to W.L. hens in their 2nd, 3rd. and 4th. year of production. They used 5,10 and20 g/ 100 lbs of feed in the first study, and only 10 g in the others. Egg production increased in all experimental birds. Thyroprotein also fed to W.L. hens in their 5 th laying year as 0.022% of diet, resulted in a mild degree of hyperthyroidism which decreased the rate of senescence as measured by egg production

(Turner and Kempster, 1948). It was also concluded that egg production increased significantly by feeding thyroprotein at the level of 0.027 % to 2 years old hens whereas, the same level did not affect egg production of pullets aged 8 months (Boose *et al.*, 1957). McClymont *et al.* (1951) fed 20g / 100 lbs of ration from thyroprotein and they found a slight increase in egg production and egg weight. Oloufa, (1954) showed that feeding Egyptian hen swith 5 g of thyroprotein produced 13% more than the controls. Turner (1948a) found that the continued feeding of thyroprotein at the rate of 10 g/100 lbs of feed would be effective in sustaining summer egg production. Milcu *et al.* (1955) and Popesscu *et al.* (1958) administered 0.5g of iodocasein on 3 days per week for birds of 3 years and 9 months age respectively. Both treatments increased egg production.

On the other hand, feeding thyroprotein at 0.33% level reduced egg production in W.L. hens (Berg and Berse, 1948). Hoffman and Wheeler (1948), administered thyroprotein as 10g /100 lbs of feed to R.I.R. pullets and found that the thyroprotein fed groups laid at significantly lower rate. Also, the continuous feeding of 0.02% thyroprotein to the same pullets resulted in the reduction of the average number of eggs produced per bird per week during the period from 20-28 weeks of age, (Wheeler and Hoffman, 1948). Oloufa (1953b), fed thyroprotein at 10g /100 lbs of ration from July to september in the Egyptian environmental conditions and he found a significant decrease in egg production. Turner and Kempster, (1945). found that when feeding thyroprotein (10g/a100 lbs of feed) to W.L. hens of seven years old egg production was reduced.

Egg production was not adversely affected by the administration of 1% potassium iodide. Hens fed 1 % sea-weed meal appeared to have a short moulting period and a more rapid increase in egg production following moulting (Romijn and Lochorst 1953).

Maletto *et al.* (1963) fed thiouracil for 60 days period to N.H. pullets, and they found that egg production was increased more in the treated orally than the injected group. Whereas, it was found that feeding thiouracil to W.L. pullets as 0.1% of ration decreased egg production (Berg and Berse, 1948, and Himeno and Tanab, 1957). Avano and Simidz (1958), treated P.R hens with thiouracil at 0.012 % of ration and they found that treated group laid more eggs than their controls.

Material and Methods

Eighty Fayoumi pullets aged about 6 months were reared in open pens under the natural conditions and fed the ration show in Table 1 Starting at the begining of January egg weight and egg number were recorded daily for every pullet.

At the beginning of May, hens were divided according to the data of eggs, that laid per hen during four months, into three groups of egg number: high, medium and low. The three group laid on the average 16, 13 and 12 eggs per month respectively. Every group icluded 25 hens, which were divided afterwads into5 treatments. The specific treatment in every group are shown in Table 2.

All these feed treatments were applied during one month (May). The observations of egg production , however , continued for another month (June) after treatment, egg production results were related to control according to during and after treating period. Those included egg number, percentage of egg production, egg weight and egg mass.

TABLE 1. **Experimental ration.**

Ingredient	Percentage
Corn	50
Ricebrane	14
Wheat brane	10
Cortecated cottonseed meal	20
Fish meal	3
Calcium carbonate	2
Salt	0.5
Mineral mixture	0.5
Total	100
Total protein	18.5
crude fibre	10.0
TDN	27.0

TABLE 2. **The different treatments used in the study.**

No. of treat.	Treatment substance and level
I	Desiccated thyroid high level 0.431*g* of powder of the preparation which was filled in empty gelaten capsules and administered by mouth as 3 capsules/hen/week. (0.185*g*/hen/day)
II	desiccated thyroid low level 0.63*g* of tablets were given to hens by mouth as one tablet/hen/week (0.09*g*/hen/day).
III	Potassium iodide high level, 39.213g/100*kg* diet containing 30*g* 1.
IV	Potassium iodide low level. 19.60*g*/100kg diet containing 15g 1.
V	Controls.

TABLE 3 Egg number per month during and after treatment of hens.

Treatment	Before(1)	During (2)				After (3)			
		Egg No.	Change	Diff.%	% to control	Egg No	Change	Diff.%	Diff. to % cont
C.	13.85	14.50	0.65	4.69	100	18.18	4.33	31.26	100
I	13.25	18.20	4.95	37.36	796	17.78	4.53	34.19	109
II	13.07	17.15	4.08	31.22	666	18.27	5.20	39.78	127
III	13.92	17.08	3.16	22.70	484	18.25	4.33	31.11	99
IV	13.54	17.70	4.16	30.72	655	19.62	6.08	44.90	143

C. : control group
(1) Before : average six months
(2) During: for one month
(3) After : for one month.

TABLE 4. Average egg production on percentage during and after treatment of hens*.

Treatment	Before(1)	During (2)				After (3)			
		Egg %	Change	Diff.%	% to control	Egg%	Change	Diff.%	Diff. %to control
C.	47.13	48.33	1.20	5.55	100	58.65	11.52	24.44	100
I	45.58	60.67	15.09	33.11	596	57.35	11.77	25.82	106
II	42.87	57.18	14.31	33.38	601	58.95	16.08	37.51	153
III	46.73	56.94	10.21	21.85	394	58.87	12.14	25.98	106
IV	45.10	59.00	13.90	30.82	555	63.31	18.21	40.38	165

C- : control group
(1) Before average six months
(2) During for one month
(3) After for one month

* Percentage production = $\frac{\text{Egg number}}{\text{Laying period in days}} \times 100$

TABLE 5 Average egg weight per month during and after treatment of hens.

Treeat-ment	Before(1)	During(2)				After(3)			
		Egg wt.	Change	Diff. %	% to cont.	Egg mass	Change	Diff. %	Diff. %to cont.
C°	40.86	44.22	3.36	8.22	100	40.40	0.46	1.12	-100
I	39.34	38.09	-1.25	-3.18	-39	40.27	0.93	2.36	211
II	40.79	42.18	1.39	3.41	41	41.69	0.90	2.21	197
III	39.28	39.44	0.16	0.41	5	39.90	0.62	1.58	141
IV	39.38	40.35	0.97	2.46	30	36.93	-2.45	-6.22	-555

C° : control group
(1) Before : average six months
(2) During : for one month
(3) After : for one month

TABLE 6. Average egg mass per monh during and after treatment of hens.

Treat-ment	Before(1)	During(2)				After(3)			
		Egg mass	Change	Diff.%	% to count.	Egg mass	Change	Diff. %	Diff. % to cont.
C°	572.83	595.18	22.35	3.90	100	729.77	156.94	27.40	100
I	537.36	689.66	152.30	28.34	727	718.35	180.99	33.68	123
II	532.50	725.33	192.83	36.21	928	746.11	213.61	40.11	146
III	544.93	683.19	138.26	25.37	650	725.00	180.07	33.04	120
IV	533.09	714.95	181.86	34.11	875	708.73	175.64	32.95	120

Results and Discussions

1. *Egg number*

All the treatments icreased egg number per month per hen during or after the treatment (Table 3). Groups which were fed thyroid gave more eggs than any other treatment during the period of study. During the treatment, the group which received the high level of thyroid showed the highest number of eggs than that of low level. Meanwhile, after the treatment, the birds fed the low level laid higher egg number than those fed the high level of thyroid. Feeding low level of KI caused the pullets to lay more eggs than those pullets fed high level of the same substance, during and after the treatment. In general, the low level of thyroid and KI increased the total egg number over the high levels and the control groups.

2. *Percentage of egg production*

The trends previously discussed between the different treatments and control can be also clearly observed in percentage of egg production (Table 4). The results showed that low levels of either thyroid or iodine increased egg production during and after treatment. Whereas, high levels increased egg production during the reatment only, and they showed the same percentage of egg production like the controls after the treatments.

The high doses of thyroid and iodine increased metabolic rate rapidly which in its turn increase egg production in these high levels than the low levels or controls. The prolonged administration of these high levels induce hyperthyroidism which cause the decrease in thyroid gland activity (Sturkie, 1958) which in its turn reduce egg production in the second month after the treatment. Meanwhile, the low doses of thyroid or iodine induce its hyper function in a slow state which is not achieved during the treatment, but it is achieved afterward resulting in giving the highest number of eggs after the treatment.

The small doses given in this study were similar to thyroxine doses given by Himeno and Tanab (1957) when they found that the small doses of thyroxine injection increased egg production. Meanwhile, Romijn and Lockorst (1953) found that potassium iodide did not increase egg production, whereas, it increased by thyroprotein feeding (Turner *et al.*, 1948 a and b; Turner and Kempester, 1947; Turner 1948b).

3. *Egg weight*

The control hens laid heavier eggs than any other treatment during the treatment period (Table 5). After the treatment period the weight of eggs laid by most of the treated hens increased over that of the control. Egg weight decreased after than during treatment only in the groups which were fed low level of iodine and the control group.

It is suggested that during the months of Spring when the birds were given the thyroid or iodine, no effects were observed due to the intrinsic high level of thyroxine. Meanwhile, when thyroxine secretion rate was lowered during the hot months of summer, the latent effect of thyroid and iodine may induce mild hyperthyroidism which may be the cause of increase egg weight during these months.

* Both of these two kinds were prepared by the Nile Parm. Comp., *i.e*, there was no difference between these two kinds used here.

Contradicting results were observed in thyroprotein feeding by Hoffman and Wheeler(1949). They found that egg number decreases when egg weight increases due to thyroprotein feeding. They also observed the increase in egg fweight after ceasing thyroprotein treatment. Egg weight was increased when thyroprotein was fed to hens aged 9months either in summer (Nilcu *et al.*, 1955) or in winter months (McClymont, 1951).

4. Egg mass

Egg mass was calculated by multiplying egg number and average egg weight. The treatments increased egg mass during the treating period.The hugest increase of egg mass was observed within low levels of either thyroid or iodide andlower increase of egg mass occurred by high levels. Also, the treatments increased egg mass after the treating period (Table 6).

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تأثير اليود والغده الدرقية على الانتاج والتناسل فى الدجاج
٤ ـ انتاج البيض

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أعطيت نسب مختلفة من اليود والغدة الدرقية الى مجموعة من الدجاج الفيومى وأدى ذلك الى الزيادة فى صفات انتاج البيض ، عدد البيض وكتلة البيض والنسبة المئوية له قد زادت خلال مدة المعاملة أكثر من تلك التى لوحظت فيما بعد انتهاء المعاملة بشهر ٠ أما وزن البيض فقد قل خلال مدة المعاملة وتحسن فى الفترة التى بعد المعاملة ٠

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