Egypt. J. Anim. Prod. 19, No. 1, pp. 73-79 (1979)

The Role of Iodine and Thyroid Gland on Reproduction and Production of Chickens III-Semen Characteristics

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THE EFFECT of desiccated thyroid gland and potassium iodide on Fayoumi chicks were investigated .Chicks were fed thyroactive substances when they were 18 weeks old on two levels : 200g or 100g desiccated thyroid/100kg diet and 39 g or 19.6 potassium odide/100kg diet. Growth rate were of three categories : fast, medium and slow.

The treatment increased both of semen volume and sperm concentration in rapid and medium growing cocks with no effect in the slow growing birds. Sperm motility decreased in the collecting semen of the three rates of growth. The treatments decrease the semen abnormalities in the medium growth rate.

Treatment of cocks aged two years old, with 0.11% and 0.17% thyroprotein showed the highest improvement in all semen characteristics during the 2*nd* month of treatment (Kamar, 1961). Huston and Wheeler (1949) found higher sperm concentration in semen of cockerels treated with 0.02% thyroprotein yet the difference was not statistically significant. Whereas, the treated males yielded smaller volumes with highly significant differences. However, Wilwerth *et al.* (1954) found very low level of thyroprotein 0.01%, 0.02% and 0.04% caused significant increase in semen volume of R.I.R. cockerels and that 0.04% thyroprotein increased sperm concentration with no effect semen volume. On the other hand, higher levels of 0.08 and 0.16% thyroprotein significantly decreased both semen volume and concentration.

Feeding a diet containing 0.02% thyroprotein to R.I.R. cockerels from hatching to 15 months of age, reduced semen volume while sperm concentration was increased. Meanwhile, the number of total sperms per ejaculated and the fertilizing capacity of treated group were not affected. Thyroprotein feeding did not prevent the seasonal decline in semen production (Huston and Wheeler, 1949) or in fertility (Hays, 1948). Shaffner (1948) concluded that feeding thyroprotein of 10g/100lbs caused significant reduction in fertility. The treatment appeared to have little or no effect on the production of spermatozoa as measured by concentration and volume of semen.

Feeding of 0.14 thioracil to R.I.R. cockerels, caused a small but statistically significant trend towards lower semen volume and concentration (Wilwerth *et al.* 1954). Also, 0.2 and, 0.5% thioracil when fed to males for 18 weeks caused the production of a greater volume of semen in the non - treated males than the treated ones. Neither sperm concentration or total number of spermatozoa were markedly affected, while initial rodility of spermatozoa were considerably lowered in males fed 0.5% thiouracil (Shaffner and Andrews, 1947).

Material and Methods

Four hundreds and fifty Fayoumi chicks hatched in December were fed, the experimental ration shown in Table 1, Egyptian clover was supplied as green fodder. The chicks were broaded, reared and managed alike, body weight was recorded biweekly till the 18*th* week of age. Then body weight was recorded monthly, sexing was carried out at 13*th* week of age. Each sex was divided into three groups according to body weight, high medium and low. At the 18*th* week of age birds were divided into 21 groups, of treatments 5 groups from medium weight birds. The specific treatment in every group are shown in Table 2. All the applied treatments continued for two months up till 26*th* week of age. At this time, semen production was tested for two cockerels during two successive weeks. The different semen characteristics including semen volume, sperm concentration, motility, dead live percentage, head abnormalities and tail abnormalities were tested. Analysis of variance for the all observations was done.

TABLE 1. Experimental ration.

Ingredient	Percentage
Corn	50
Ricebran	14
Wheat bran	10
Correcated cotton seed meal	20
Fish meal	3
Calcium carbonate	2
Salt	0.5
Mineral mixture	0.5
Total	100.0
Total protein	18.5
Crude fiber	10.0
TDN	27.0

TABLE 2. The different treatments used in the study.

Growth rate	No. of treatment	Treatment substance level and time
		A. Treatments used in the three levels of growth.
	I	Desiccated thyroid high level for 2 months, 200g/100 kg diet.
High medium and low	II	Desiccated thyroid low level for 2 months, 100g/ 100kg diet.
	III	Potassium iodide high level for 2 months, 39,213/100kg diet containing 30gfl
	IV	Potassium iodide low level for two months. 19.60 g/100kg dite containing 15g I. controls.
	V	B. Additional treatments used in the medium level of growth only.
	VI	Desiccated thyroid high level after sulfa-treatment of low level for a month, 100g/100kg diet.
	VII	Potassium iodide high level after sulfa-treatment of low level for a month, 100g/100kg of diet.
Medium	VIII	Desicated thyroid high level after sulfa-treatment of high level for a month, 300g/100kg of diet.
	IX	Potassium iodide high level after sulfa-treatment of high level for a month.
	X	Desiccated thyroid high level after reving as a control for a month.
	XI	Potassium iodide high level after serving as a control for a month.

Results and Discussion

1. *Group of high growth rate*

All the treated groups produced more semen volumes than the controls. The group fed high level of I, gave the least semen volume while that fed the low level of iodine produced the highest volume (Table 3). Differences between all treatments in semen volume were statistically significant (Table 4).

The treatments decreased sperm motility in relation to the control (Table 3) and the differences between all teatments in sperm motility were significant (Table 4).

The treatments increased sperm concentration than the controls (Table 3), the highest concentrations were produced by the group fed low level of KI. However, differences of the sperm concentration between all treatments were insignificant (Table 4).

The group which was fed low level of KI gave the highest percentage of live percent (Table 3), with insignificant differences (Table 4).

The lowest head abnormalities were observed in groups fed low levels of thyroid and iodide. Other groups were nearly similar to the control group (Table 3). Both the differences of head and tail abnormalities between all treatments were insignificant (Table 4).

TABLE 3. **The effect of different treatments on semen characteristics of cocks of different growth rates.**

G.R.	Treat.	Volume	Motility	Conc.	Live%	Head abnor. %	Tail abnor. %
High	I	0.075	5.0	21.0	84.0	17.	13 0
	II	0.075	5.0	22.5	79.	14.	18.0
	III	0.030	3.0	27.0	85.	18.	20.0
	IV	0.140	6.0	31.5	61.	13.	19.0
	V *	0.045	6.0	14 0	87.	17.	19.0
Medium	I	0.025	3.5	19.0	92.0	11.0	15.0
	II	0.055	5.0	16.0	87.0	20.5	21.0
	III	0.125	7.5	25.5	86.5	12.0	15.0
	IV	0.085	6.5	27.0	93.0	14.5	18.0
	V *	0.045	4 5	12.0	84.5	20.0	22.0
Low	I	0.085	5.0	22.5	86.0	26.0	17.0
	II	0.035	4.0	13.5	87.5	15.0	29.0
	III	0 040	3.5	17.5	88.0	17.0	17.0
	IV	0 050	6 0	11.5	87.5	18.0	15.0
	V *	0.065	6.0	16.5	86.5	18.0	19.0

* Control groups.

2. *Groups of medium growth rate*

All treated groups produced more semen volumes than the controls, except the group which was fed high level of thyroid (Table 3). The group fed level of KI ,however, produced the great volume of semen in relation to other five groups. Differences of semen volume between all treatments were significant (Table 4).

The two levels of thyroid treatments showed almost the same motility like the controls. Those of iodine were the higher groups in sperm motility (Table 3). However, differences of sperms motility between all treatments were insignificant (Table 4). The treatments increased sperm concentration than the controls. The highest concentration was observed in groups fed iodide (Table 3). However, differences of sperm concentration between all treatments were insignificant (Table 4). Although all treatments were higher than the control in the percentage of live sperms in the semen (Table 3), yet these differences were statistically insignificant (Table 4).

The treatments decreased both head and tail abnormalities of semen than the controls (Table 3). However, these differences were insignificant (Table4).

3. *Group of low growth rate*

Groups which were fed the two levels of iodide and the low level of thyroid gave semen volume less than that produced by controls. Whereas the group which was fed the high level of thyroid produced more semen volume than the controls (Table 3). However, these differences were statistically insignificant (Table 4).

The treatments decreased sperm motility in relation to control. However, the group which was fed low level of iodide showed sperm motility like the control (Table 3). These differences were found to be insignificant (Table 4). High levels of thyroid and iodide treatments increased sperm concentration, whereas the low levels decreased it in relation to control (Table 3). These differences, however, were insignificant (Table 4).

The group which was fed high level of thyroid showed the highest head abnormalities, whereas, that fed the low level of thyroid gave the highest tail abnormalities. Other treatments showed less percentage of both tail and head abnormalities than the controls (Table 3). These differences were insignificant between all treatment used (Table 4).

In general, the treatments increased both semen volume and sperm concentration. These results were more obvious in the high and medium growth rates groups than the low ones. In similar studies, it was found that thyroprotein feeding caused significant increase in semen volume (Wilwerth *et al.*, 1954 and Kamar, 1961) and sperm concentration (Huston and Wheeler, 1948 and

Kamar, 1961). However, the treatments decreased semen qualities such as motility live sperms percentage and abnormalities. It seems that most of the improvement induced by the treatments adopted here is in semen quantities and not in semen quantities.

TABLE 4. **Analysis of variance for different semen characteristics as effected by different treatments and different growth rates.**

G.R.	Items	Degree of freedom		Mean square	
		Error	Treat.	Error	Treat.
High	Volume	5	4	5.00	33.15 *
	Motility	5	4	1.60	3.00
	Conc.	5	4	188.60	55.15
	Live %	5	4	18.09	27.76
	Head abnor.	5	4	6.36	5.23
	Tail abnor.	5	4	23.17	8.30
Medium	Volume	5	4	2.10	30.40 **
	Mobility	5	4	3.60	5.10
	Conc.	5	4	32.90	80.10
	Live %	5	4	10.00	22.66
	Head abnor.	5	4	5.53	24.82
	Tail abnor.	5	4	5.38	13.98
Low	Volume	5	4	3.10	8.25
	Motility	5	4	2.10	2.60
	Conc.	5	4	19.70	35.40
	Live %	5	4	23.85	1.62
	Head abnor.	5	4	5.71	17.01
	Tail abnor.	5	4	10.57	30.84

* = Significant at 5% level of probability.
** = Highly significant at 1% level of probability.

References

Blays, F.A. (1948) Thyroxine and artificial lights as activators in the spermato genosis of male. *Poult. Sci.* 27,84.

Huston, T.M. and Wheeler, R.S. (1949) Effect of synthetic thyroprotein in seasonal variation in volume and concentration of cock semen. *Poult. Sci.* **28**, 262.

Kamar, G.A.R. (1961) Hyper-thyrodism on gonads and endocrines of cocks.I-Morphological studies, II-Histological intergation. U.A.R.*J. Anim Prod.* **1**, 83.

Shaffner, C.S. (1948) The influence thyroprotein-feeding on semen quality. *Poult Sci.* 27,527.

Shaffner, C.S. and Andrews, F.N. (1947) The influence of thiouracil on semen quality of the fowl. *Poul. Sci.* 27, 91

Wilwerth, A.M., Martinez-Campons, C. and Reineke, E.C. (1954) Influence of the thyroid status on volume and concentration of cock semen. *Poult. Sci.* 33, 789.

تأثير اليود والغدة الدرقيـة على الانتاج والتناسـل فى الدجاج ، الجزء الثالث : صـفات السائل المنـوى

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أعطيت الكتاكيت فى سن ١٨ أسبوع جرعات من الغدة الدرقية واليود بنسب مختلفة وقد أدى ذلك فى الديوك البالغة الى زيادة فى حجم السائل المنوى وتركيز السبيرمات وتقليل حركتها والى تجعيد التشوهات فيها ٠