Reaction of Thyroxin, Hematocrit, Haemoglobin on Reducing Feedstuff and Drinking Water

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Abstract

The objective of the research was to study the effect of reducing feedstuff and dringking water on the level of thyroxin and the alteration of the hematocrit, haemoglobin values and erythrocyte count. The research was used 180 medium types chicken, strain Dekalb Warren, 84 weeks old. The research applied 2x2x2 factors and used complete randomized design in 5 times replications with 4 chickens for each repetition. The first factor was water supplying and without water supply was every second day. The second factor was the duration of no feeding for 10 and 5 days. The third factor was the amount of feed given during recovery period that was 50% and 25% of the normal consumption, respectively. The total of the treatment of force molting program applied were 9 treatments. Thus, the research was used 160 chickens (8x5x4=160 chickens) and 20 chickens for control (1x5x4=20 chickens). The data obtained were analysed using analysis of variance (Anova), orthogonal comparison test. The result showed that stress could increase the level of thyroxin significantly $p < 0.05$ at day 5, and at day 10 ($p<0.01$) compared with the control group. The result also showed that stress could increase hematocrit and haemoglobin value significantly ($p < 0.01$) at day 2, 5, 10 after treatment, respectively.

Key words: Thyroxin, Hematocrit, Haemoglobin, Force molting

Introduction

Molting is usually occurred in chicken naturally during about four months (Walbert, 2004). Induced molting process can be happened about 5 to 9 weeks (Berry, 2003). The increase of egg production will be occurred after molting, this circumstance can be caused ovarium function recovery by newly cells (*Barua et al.*, 2001). Egg production quickly increased post molting (Berry, 2003). Yi Soe *et al.*, (2008) and Yardimci *et al.*, (2008) reported that force molting can increase egg production. Because the presence of benefit of molting, so that somebody performe force molting by reducing feedstuff. Principally, force molting is to treat reducing feedstuff and dringking water on chicken until depluming level condition. Force molting can increase corticosteron and to decrease antibody production (Ombamlar and Erol, 2007). Force molting significantly decrease concentration of oestradiol-17 β and plasma progesterone (Braw-Tal *et al.*, 2004). Stopping feedstuff in force molting is very closely with the metabolism changes process. Thyroxin is hormone that regulates general metabolism and every the change of metabolism process will elicit temperature changes; erythrocytes have function to distribute body temperature. Thyroxin is necessary seen it's concentration for observing reducing feedstuff and dringking water to influence metabolism; meanwhile erythrocytes are measured to observe the influence reducing feedstuff and dringking water on it formation. Reaction of thyroxin and erythrocyte on reducing feedstuff and dringking water are not investigated yet. The aims of the present study were to know the influence reducing feedstuff and drinking water on performance of thyroxin, hematocrit dan haemoglobin.

Materials and Methods

The study was composed of 3 treatments, the first treatment was administration of feedstuff and dringking water with 1 day interval. The second treatment was 10 days and 5 days of feedstuff fasting, respectively. The third treatment was the administration of the number of feedstuff in recovery, 50% and 25% feedstuff of normal need from day 6 to 30 for 5 days of feedstuff fasting and from day 11 to 30 for 10 days feedstuff fasting. The study used three factorials,

2x2x2 of complete random design with 5 replications and each replication consisted of 4 chickens. Briefly, the number of used chicken was 8x5x4 equal 160 chickens, in addition 1x5x4 equal 20 chickens of control group. Thus, totally number of used chicken was 180 chickens. The description of each treatment as follows: A= the first 10 days of feedstuff fasting, no dringking water fasting, day 11 to 30 in 50% feedstuff. B= the first 10 days of feedstuff fasting, no dringking water fasting, day 11 to 30 in 25% feedstuff. C = the first 10 days of feedstuff fasting, dringking water fasting, day 11 to 30 in 50% feedstuff. D = the first 10 days of feedstuff fasting, dringking water fasting with 1 day interval, day 11 to 30 in 25% feedstuff. E= the first 5 days of feedstuff fasting, no dringking water fasting, day 6 to 30 in 50% feedstuff. F = the first 5 days of feedstuff fasting, no drinking water fasting, day 6 to 30 in 25% feedstuff. G = the first 5 days of feedstuff fasting, drinking water fasting with 1 day interval, day 6 to 30 in 50% feedstuff. H = the first 5 days of feedstuff fasting, dringking water fasting with 1 day interval, day 6 to 30 in 25% of feedstuff. I = control = normal feedstuff and drinking water

The variables of the study: the concentration of thyroxin, hematocrit and haemoglobin. Data analysis was examined using orthogonal contras test, that test was test between control group and all treatment combination (ABCDEFGH); treatment combination of 10 days (ABCD) and 5 days of fasting (EFGH); treatment combination of 50% feedstuff (ACEG) and 25% feedstuff (BDFH); treatment combination of 10 days of feedstuff fasting and normal dringking water supply (AB), 10 days of feedstuff fasting and dringking water fasting with 1 day interval (CD); treatment combination of 5 days of feedstuff fasting and normal dringking water supply (EF), 5 days of feedstuff fasting and dringking water fasting with 1 day interval (GH); and interaction (Steel and Torrie, 1995; Myers and Milton, 2000).

The study was performed in Balai Penelitian Ternak Ciawi and Physiology and Pharmacology Laboratory, Faculty of Veterinary Medicine, Bogor Agriculture University. The experimental animal was medium of Dekalb Warren, 84 weeks old. Blood collection was needed for examination of concentration of thyroxin, hematocrit and haemoglobin that was taken before treatment and day 2, 5, 10, 50 post treatments. Thyroxin was measured using radio immunoassay (RIA), the concentration of haemoglobin by Sahli method and hematocrit concentration by microcapiler.

Results and Discussion

The influence of temporary stopping feedstuff and dringking water on concentration of thyroxin. The means of thyroxin concentration before treatment of all animals of treatment groups (ABCDEFGH) was 5.7 ng/ml and not significantly different compared with control group (I), 5.6 ng/ml. Two days post treatment, the means of concentration of thyroxin of all animals of treatment groups decreased that was 4.6 ng/ml and not significantly different compared with control group (I), 5.8 ng/ml ($p>0.05$). This circumstance could be occurred by there was no feedstuff so those metabolisms decrease to economize energy as the result of homeostasis. On day 5 post treatment, the increase of the means of concentration of thyroxin of all animals of treatment groups (ABCDEFGH) was happened, 7.1 ng/ml, which not significantly differrent compared with control group (I), 4.6 ng/ml ($p<0.05$). This circumstance could be occurred by long time no feedstuff so that the mechanism of homeostasis was not going on to serves need of energy and finally deposit of carbohydrate and lipid was used. For this need of this use, thyroxin production was increased (as one of the role of thyroxin is carbohydrate and lipid metabolism process) that caused the decrease of body weight of all animals of treatment. On day 10 post treatment was occurred the increase of the mean of concentration of thyroxin of all animals of treatment groups (ABCDEFGH), 7.5 ng/ml higher significantly than control group, 4.4 ng/ml ($p<0.01$). Continuing no feedstuff became metabolism of carbohydrate and lipid persists so that thyroxin production increased. On day 50 in normal feedstuff, the mean of concentration of thyroxin of all animals of treatment groups (ABCDEFGH), 5.2 ng/ml and not significantly different compared with control group, 5.3 ng/ml ($p>0.05$). The presence of feedstuff was source of energy so that metabolism carbohydrate and lipid deposit was not needed therefore thyroxin production to be normal. Thyroxin concentration of the other every treatment combined was not significantly different before a well as day 2, 5, 10, 50 of treatment ($p>0.05$). The result of this study conformity with Kuenzel report (2003) that was molting is influenced by the change of concentration of thyroid hormone, even the mechanism is not clearly known yet (Quinn *et al.*, 2005). Based on this study result, so molting mechanism in force molting was when chicken was fasted to elicit the rest of production so that there was the change of metabolism pattern which caused the increase of thyroxin production and to increase body temperature. The increase of body temperature influenced radical root and finally it caused molting.

The influence of seizing on hematocrit concentration: before treatment, the mean of hematocrit concentration of all treatments combination (ABCDE FGH) was 19.1% and not significantly different with control group (I), 20.0% ($p>0.05$). On day 2 post

treatment, there was the increase of the mean of hematocrit concentration of all treatments combination (ABCDEFGH), 29.2% and significantly different compared with control group (I), 21.3% ($p<0.01$). On day 5 post treatment, there was the increase of the mean of hematocrit concentration of all treatments combination, 31.5% and very significantly different compared with control group 23.1% ($p<0.01$). On day 10 post treatment, there was the increase of the mean of hematocrit concentration of all treatments combination (ABCDEFGH) was 31.6% and significantly different compared with control group, 24.7% ($p<0.01$). On day 50 post treatment (normal feedstuff), the mean of hematocrit concentration of all treatments combination was 24.7% and not significantly different compared with control group, 25.7 ($p>0.05$). Statistical analysis of hematocrit concentration between treatment combinations one another were not significantly different at before as well as at day 2, 5, 10, 50 post treatment. Description of these study results were when chicken in feedstuff fasting caused the decrease of weight ovarium and number of follicle and ovarium function (Braw-Tal *et al.*, 2004). Yi Soe *et al.*, (2008) also reported that force molting caused significantly decrease of weight of ovarium and oviduct. Ovarium is organ of estrogen production. Braw-Tal *et al.*, (2004) reported that force molting caused clearly the decrease of estrogen concentration. Causey (2002) reported that the low of estrogen concentration in chicken circulation can cause the increase of erythrocyte of chicken body. The influence of treatment on haemoglobin concentration: the mean of haemoglobin concentration at before treatment of all treatments combination (ABCDEFGH) was 7.3 g% and not significantly different compared with control group (I) 7.4 g%. On day 2 post treatment, elevation of the mean of haemoglobin concentration was happened in all treatments combination, 8.1 g% and very significantly different with control group 6.8 g% ($p<0.01$). On day 5 post treatment, elevation of the

Table 1. The Effect Reducing Feedstuff and Drinking Water on Concentration of Thyroxin

Treatment	T4 (ng/ml)				
	I	II	III	IV	V
A	5.4	4.9	6.3	6.5	5.4
B	6.9	4.4	6.6	9.9	5.4
C	6.0	5.5	7.6	7.8	5.3
D	5.8	4.6	5.7	7.3	5.3
E	5.3	4.0	6.5	5.3	4.9
F	5.9	3.9	7.6	7.1	5.9
G	5.0	4.6	7.3	7.0	4.8
H	5.3	5.0	9.1	8.8	4.6
Means	5.7^{a}	4.6^{a}	7.1^{a}	7.5^{A}	5.2^{a}
I	5.6^{a}	5.8^{a}	4.6^{b}	4.4^{B}	5.3^{a}

Notes: I =Before treatment ; II =Day 2 of treatment; III =Day 5 of treatment; IV =Day 10 of treatment; V =After treatment; T4 = thyroxin; = different small letter in the same column was significantly different ($p<0.05$); = different capital letter in the same column was very significantly different ($p<0.01$).

Table 2. The Effect of Stopping Feedstuff and Dringking Water on Concentration of Hematocrit and Haemoglobin

Treatment	Haemoglobin					Hematocrit				
	I	II	III	IV	V	I	II	III	IV	V
			(g %)			(%)				
A	7.5	8.1	9.8	9.6	7.0	19.1	28.7	32.7	30.5	24.4
B	7.3	8.0	8.9	9.5	8.1	18.0	29.1	31.0	33.4	25.2
C	7.0	8.3	8.6	10.5	7.2	18.6	28.4	29.8	29.5	23.6
D	7.1	8.1	9.3	9.6	7.4	20.4	30.1	31.3	33.1	25.5
E	7.4	8.0	9.1	9.1	7.3	19.1	29.3	30.9	29.5	24.8
F	7.2	8.2	9.1	9.7	7.7	19.3	29.0	30.1	30.3	24.6
G	7.3	7.9	9.3	9.0	7.1	19.0	28.5	30.8	30.8	23.5
H	7.4	8.1	9.1	9.6	8.0	19.0	30.4	31.5	33.9	25.6
Means	7.3^{a}	8.1^{A}	9.3^{A}	9.6^{A}	7.4^{a}	19.1^{a}	29.2^{A}	31.5^{A}	31.6^{A}	24.7^{a}
I	7.4^{a}	6.8^{B}	6.5^{B}	7.6^{B}	7.5^{a}	20.0^{a}	21.3^{B}	23.1^{B}	24.7^{B}	25.7^{a}

Notes: I =Before treatment ; II =Day 2 of treatment; III =Day 5 of treatment; IV =Day 10 of treatment; V =After treatment; T4 = thyroxin; = different small letter in the same column was significantly different ($p<0.05$); = different capital letter in the same column was very significantly different ($p<0.01$).

mean of haemoglobin concentration was happened in all animals of treatment combination (ABCDEFGH), 9.34 g% and significantly different compared with control group (I), 6.5 g% ($p<0.01$). On day 10 post treatment, elevation of the mean of haemoglobin concentration was happened in all animals of treatment combination, 9,6 g% and significantly different compared with control group, 7.6 g% ($p<0.01$). On day 50 (normal feedstuff), the means of heamoglobin of all treatment combination was 7.4 g% and not significantly different compared with control group, 7.5 g% ($p>0.05$). Statistical analysis of haemoglobin concentration of each treatment combination one another were not significantly different between before as well as at day 2, 5, 10, 50 post treatment. Description of these study results were that feedstuff fasting caused the decrease of ovarium weight, the number follicle and ovarium function (Braw-Tal *et al.*, 2004). Yi Soe *et al.*, (2008) also reported that force molting caused significantly the decrease of weight of ovarium and oviduct, ovarium is organ of estrogen production. Braw-Tal *et al.*, (2004) reported that force molting caused significantly the decrease of estrogen concentration. Causey (2002) reported that the low of estrogen concentration in chicken circulation can cause the increase of number of erythrocyte in chicken body.

Conclusions

Stopping feedstuff and dringking water during two days were not significantly decreased concentration of thyroxin; when stopping feedstuff and dringking water were continued until day 5, so concentration of thyroxin would significantly increased. When stopping feedstuff and dringking water were continued until day until day 10 would significantly increased concentration of thyroxin. Whereas stopping feedstuff and dringking water were decreased gradually until day 30 (25% and 50% of feedstuffs), and then stopping feedstuff and dringking water were stopped so concentration of thyroxin already reached normal level at day 50 of treatment.

Stopping feedstuff and dringking water during two days were significantly increased concentration of haemoglobin and hematocrit directly. Meanwhile stopping feedstuff and dringking water were continued until day 5, concentration of haemoglobin and hematocrit would significantly increased and persist high level until day 10. When stopping feedstuff and dringking water were gradually decreased until day 30 (25% and 50% of feedstuffs) and then stopping feedstuff and dringking water were stopped so concentration of haemoglobin and hematokrit already reached normal level at day 50 of treatment.

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