THYROID GLAND ACTIVITY AND ENERGY UTILIZATION IN BROILER CHICKENS

By

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B. Sc. Agric. Sc. (Animal Production), Cairo University, 2001

M. Sc. Agric. Sc. (Poultry Physiology), Ain Shams University, 2007

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Approval Sheet

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ABSTRACT

NAFISA AHMED ABD EL-AZEEM SHABAN: Thyroid Gland Activity and Energy Utilization in Broiler Chickens. Unpublished Ph.D. Dissertation, Department of Poultry Production, Faculty of Agriculture, Ain Shams University, 2010.

An experiment was conducted to investigate the effect of controlled thyroid gland activity (Hyper or hypothyroidism) on energy utilization in broiler chickens. Two hundred and forty, one-day old, Cobb broiler chicks were distributed into three dietary metabolizable energy (ME) treatment groups (80 chicks each). The first group (E0) was fed the basal diet and considered a control group, the second group (E1) was fed low ME diet (minus 150 kcal/ kg diet) with different thyroidal treatments and the third group (E2) was fed very low ME diet (minus 300 kcal/ kg diet) with thyroidal treatments. Thyroidal treatments were applied at the beginning of the 2^{nd} week, where T0 was a control treatment; two hyperthyroidism groups induced by administration of eltroxin (T1) or calcium iodide (T2), and hypothyroidism group induced by carbimazole administration (T3).

Results showed that administration of calcium iodide could improve the productive performance of broiler chicks under low dietary energy stress conditions. Average body weight, feed intake and feed conversion ratio were significantly improved in hyperthyroidism groups. Thyroidal hormones (T_3, T_4) and their ratio T_3/ T_4 showed considerable changes related to thyroidal treatments. Carbimazole administration significantly decreased total antibodies production. Plasma insulin level and I/ G ratio was significantly decreased in response to low energy diets, however carbimazole administration had the lowest plasma insulin level and I/ G ratio. Calcium iodide administration to E1, E2 chicks groups significantly decreased glucagon level. Moreover, calcium iodide significantly increased ATP, TA and PP while carbimazole significantly decreased ADP, AMP and plasma glucose level. Low and very low

energy diets with thyroidal treatment significantly affected plasma proteins, total lipids, cholesterol, HDL, LDL and triglycerides. Histological examination of thyroid gland, liver and pancreas sections support the productive performance results and reflect the beneficial use of CaI as a safe additive without hazards effect on organs histology. Economical efficiency was enhanced by hyperthyroidal treatments. The present results suggest using of calcium iodide to maximize the utilization of low energy diets, via its modulating action of thyroid gland activity.
Key words: Thyroid activity, energy metabolism, insulin, glucagon, blood metabolites, broiler chicks.

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LIST OF ABBREVIATIONS

A	:	Alpha islets
ac	:	Pancreatic acini
A/G	:	Albumin to Globulin ratio
ADP	:	Adenosine diphosphate
AEC	:	Adenylate Energy Charge
AMP	:	Adenosine monophosphate
ATP	:	Adenosine triphosphate
b	:	Bile duct
B	:	Beta islets
BMR	:	Basal metabolic rate
Bv	:	Blood vessels
BWG	:	Body weight gain
c	:	Colloid
°C	:	The degree Celsius (Centigrade)
CaI	:	Calcium iodide
CP	:	Crude Protein
ct	:	Connective tissue
cv	:	Central vein
d	:	day
e	:	Epithelial linning
E0	:	Control diet
E1	:	Low ME level (minus 150 kcal/ kg diet)
E2	:	Very low ME level (minus 300 kcal/ kg diet)
EE	:	Ether extract
EI	:	Energy intake
f	:	Thyroid follicles
fa	:	Fatty cirrhosis area
FCR	:	Feed conversion ratio
FI	:	Feed intake
Fig	:	Figure