J. Agric. Sci. Mansoura Univ., 27 (7) 4451 - 4462, 2002

THE EFFECT OF FEED RESTRICTION DURING THE REARING PERIOD ON CARCASS TRAITS AND PLASMA BIOCHEMICAL CONSTITUENTS FOR TWO LOCAL BREEDS OF CHICKENS

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ABSTRACT

Two hundred and sixty four, four weeks old Gimmizah (G) and Golden Montazah (GM) males were divided randomly into two equal groups (treatments). The control group was fed *ad-libitum* from 4-16 wks of age. While the second group was quantitatively restricted, (by skip-a-day) from 4-12 wks of age, qualitative restriction was applied from 12-16 wks. Where birds were fed a diet containing 12 % protein, comparing the control group which was fed a diet containing 16.86 % protein. Birds of the two groups were fed a diet containing 15.45 % protein from 16 to 20 wks of age *ad-libitum*. Data concerning live body weight, carcass traits, chemical carcass analysis and some blood constituent were recorded. Regardless of feeding program, live body and carcass weights for G chicks were significantly heavier than those of GM at either studied ages. Regardless of chickens, the control group was significantly heavier than the quantitatively or the qualitatively restricted groups

The percentages of G meat yield and edible parts at 16 wks of age were significantly higher than GM during the entire experimental period. However, after refeeding period, the adverse effect of restriction disappeared. Percentage of abdominal fat of GM was significantly higher than that of G one. Furthermore, RG showed decreased percentage of abdominal fat than control one at 20 wks of age. The G consumed significantly more protein and energy than GM at 16 and 20 wks of age. Control birds consumed significantly more protein and energy than RG group at 16 and 20 wks of age.

Chemical analysis of legs and breast meat at 16 and 20 wks of age were insignificantly affected S or T. The dry matter (DM), ether extract (EE) and crude ash percentages of legs were significantly higher than those of breast contents, but the opposite was true for crude protein (CP) content. At 20 wks of age, strain (S) had insignificant effect on DM and ash percentages. While CP percentage of G surpassed that of GM, the opposite was true for EE percentage. Generally, feeding treatments were insignificantly effective on the carcass chemical analysis. Percentages of DM, EE and crude ash for legs were significantly higher than those of breast, while, the opposite was true for CP.

Averages of plasma albumin (PA), total protein and glucose levels for G were significantly higher than GM at 16 wks of age. Plasma glubulin (PG) and PA/PG ratio were insignificantly affected by S. Feeding treatments, however insignificantly affected PG, PA/PG and total protein levels. The level of PA for control birds was significantly higher than RG birds while the opposite was found for glucose level. Level of glutamic purovic oxaloacetic transaminase (GPT) was insignificantly affected by S, but glutamic oxaloacetic transaminase (GOT) level for GM was higher than G. Moreover, the levels of GPT and GOT for RG birds were significantly higher than those for control birds. At 20 weeks of age, S insignificantly affected all previously blood constituents, only the glucose level was higher for G than GM. While The PG level was higher for

control birds compared to RG. the opposite was found for that of PA/PG. Generally, treatments insignificantly affected the other investigated blood constituent.
Keywords: feed restriction, growth, carcass, carcass analysis and blood constituent.

INTRODUCTION

Rising poultry feed prices encourage using the feeding restriction program to decrease production costs. On attempt to reduce the feed cost as a major cost factor for raising broilers. Several methods of quantitative feed restriction have been studied as skip-a-day feeding (Abou El-Ella, 1994, Abou El-Ella *et al.,* 2002), also, qualitative restriction as diets with low levels in protein, amino acids or energy levels (Nestor *et al.*, 1981; Vaughters *et al.,* 1987), high fiber diets and a combination of these methods (Nestor *et al.,* 1981). Feeding regime significantly affected breast weight (Nir *et al.*, 1987; Katanbaf *et al.,* 1989; Plavnik and Balanove 1992; Palo *et al.,* 1995 and Pope and Emmert 2001). Plavink and Hurwtiz (1991) reported that broiler chickens and turkey poults meat yields were improved by early-age feed restriction. Restricted feeding reduced relative weights of abdominal fat pad (Katanbaf *et al.,* 1989; Newcomb *et. al.*, 1992; Plavnik and Balanove 1992 and Liu *et. al.,* 1995). Carcass composition were significantly affected by restricted feeding program (Miles and Leeson 1990; Fontana *et al.,* 1993; Abou El-Ella, 1994; palo *et al.,* 1995 and Kwakkel *et al.,* 1995). Feed restriction significantly affected plasma total protein (Katanbaf *et al.,* 1989). On the other hand, El-Wardany and Mohamed (1995) reported that transaminases level is known to be an indicator for hepatocyte destruction. Abd-El-Moty (1992) observed that restriction of feed ducks increased significant serum cholesterol, glutamic oxaloacetic transaminase and glutamic purovic oxaloacetic transaminase. Also El-Gendi *et al.* (2000) indicated that the changes in the serum transaminases level may depend on the rate of protein metabolism.

Due to raising both male and female chicks up to certain age, meat quality of the surplus cockerels has to be investigated. The main objective of the present study is to determine the effect of early feed restriction on Gimmizah and Golden Montazah body weight, carcass traits and composition, and biochemical analysis of plasma.

MATERIALS AND METHODS

The current trial was conducted at El-Sabahiah Research Station, Animal Production Research Institute, Agriculture Research Center at 2001. Two hundred and sixty four Gimmizah (G) and Golden Montazah (GM) males at 4 weeks of age were kept on floor pens and fed a grower diet (Table 1). Birds of each strain were randomly assigned to two treatments (3 replicates of about 22 chicks each). The first treatment was provided feed *ad-libitum* (control) at 4-20 wks of age (diet had 16.86 % crude protein and 2864 ME kcal/kg of diet at 4-16 wks of age and 15.88% crude protein and 2815 ME kcal/kg of diet at 16-20 wks of age), (Table1), and the second treatment was restricted in feeding (skip-a-day), whereas skip-a-day chicks were given feed

for *ad-libitum* at first day and not fed on the next day from 4-12 wks of age (quantitative restriction) where diet had 16.86 % crude protein and 2864 ME kcal/kg of diet at 4-12 wks of age, then birds of this treatment fed diet contained 12% crude protein and 2864 ME kcal/kg of diet from 12 to 16 wks of age *ad-libitum* (qualitative restriction), then birds fed diets contained 15.88% crude protein and 2815 ME kcal/kg of diet *ad-libitum* till 20 wks of age (refeeding period).

Table (1): Composition and calculated analysis of the experimental diet

Ingredient %	Starter	Grower			
	0-4 wk	4-12 wk	12-16 wk C *	12-16 wk RG*	16-20
Yellow corn	625.0	675.0	675.0	24.0	667.0
Soybean meal (44% CP)	345.0	231.0	231.0	80.0	195.0
Wheat bran	-	55.0	55.0	53.4	100.0
Dicalcium phosphate	13.0	22.0	22.0	20.0	20.0
Limestone,ground	10.0	10.2	10.2	15.0	11.2
Sidium chloride	3.0	3.1	3.1	3.0	3.2
Vitamins-Minirals premix	3.0	3.0	3.0	3.0	3.0
Methionine	1.0	0.7	0.7	0.6	0.6
Lysine	-	-	-	1.0	-
Total	1000.0	1000.0	1000.0	1000.0	1000.0
Chemical analysis:					
Crude protein %	20.60	16.86	16.86	2.12	15.88
Ether extract	2.75	2.93	2.93	3.64	3.18
Crude fiber	3.32	2.38	2.38	4.36	3.50
ME (Kcal/Kg of diet)	2879	2864	2864	2818	2815
Calorie/protein ratio	139.8	170	170	232	177
Ca%	0.76	0.95	0.95	1.02	0.93
Avail. Phosphorus	0.50	0.51	0.51	0.51	0.52
Lysine % of C.P	5.40	4.94	4.94	4.57	4.72
Methionine % of C.P	2.12	2.08	2.12	2.21	2.17
Cystine % of C.P	1.67	1.71	1.71	1.77	1.71

[1]Vitamin-mineral premix supplied per 1Kg. of diet: Vit.A, 12000 IU; Vit. D3, 2200 ICU; Vit. E,10 mg;Vit. K3, 2mg; Vit. B1,1 mg; Vit. B2,4mg; Vit. B6, 1.5 mg; Vit. B12, 10 Ug; Nicotinic acid, 20 mg; Folic acid, 1mg; Pantothenic acid,10 mg; Biotin 50 Ug; Choline chloride, 500 mg; Copper, 10 mg; Iron 30 mg; Manganese, 55mg; Zink, 50 mg; Iodine, 1mg; Selenium, 0.1 mg.

***C: control. * RG: restricted group.**

Measurements and observations: Body weight (BW) was recorded and both protein and energy intake were estimated at 16 and 20 wks of age. At 16 and 20 wks of age, ten males from each group were slaughtered for carcass evaluation. Carcass was eviscerated and the head and shank were removed. Abdominal fat pad (only at 20 wks of age), giblets was dissected from the viscera and weighed. The carcass, legs (behind part of carcass without shank), breast (front part of carcass with neck), carcass meat yield (deboned carcass) and edible parts (carcass meat yield + giblets) were determined as described by Chambers (1990). Each portion was expressed as a percentage of the live body weight. Samples of legs and breast meat were chemically analyzed for dry matter (DM), crude protein (CP), ether extract (EE) and

crude ash according to A.O.A.C. (1990) the values were expressed on a dry matter basis. At the same ages, blood samples were drawn from each birds to determine (on individual bases) some biochemical analysis, plasma total protein (Armstrong and Carr, 1964), albumin (Doumas *et al.*, 1977), glucose (Matten and Heimer, 1970) and glutamic oxaloacetic transaminase (GOT) and glutamic purovic oxaloacetic transaminase (GPT) (Reitman and Frankel, 1957). The globulin values were obtained by subtracting the values of albumin from the corresponding values of total protein and the PA/PG ratio also were estimated.

Data were analyzed by general linear model, two-way analysis of variances for differences among strain (S), treatment (T) and replicates. Also, data of chemical analysis of legs and breast meat were analyzed in three-way ANOVA for differences among S, T, and parts of carcass (P) SAS (1989). Significant differences among means were partitioned using Duncan' Multiple Range Test (Duncan, 1955). While, mixed analysis ($?^2$ and F test) were used for blood constituents as described by Senedecor and Chochran (1970).

RESULTS AND DISCUSSION

Body weight and carcass traits: Results in Tables (2) indicated that G body and carcass weights which fed control or restricted diets were significantly heavier than GM at 16 and 20 wks of age. The percentages of G carcass at 16 wks of ages was surpassed than GM without insignificant differences. While at 20 wks of age the percentages of G carcass was significantly higher than GM one. Recently Pope and Emmert (2001) found that lowering amino acid requirement by 10% in broiler diets had no significant differences in carcass weights. On the other hand, Nir *et al.* (1987) and Palo *et al.* (1995) reported that body weights of restricted group were significantly less than that of control.

Carcass meat yield and edible parts percentages of G were surpassed significantly GM at 16 wks of age, regardless of T. On the other hand, birds fed restricted diets had higher percentage of mansion traits before, regardless of strain. While, the corresponding results at 20 wks of age were disappear after refeeding period. Similar results were found by Plavnik and Hurwiz (1991) who reported that early-age feed restriction improved meat yield. Giblet percentage not effected by strain or feed treatments at both of ages. On the other hand S and T were insignificantly effective on breast and legs percentages at 20 wks of age. Similar results were found by Katanbaf *et al.* (1989), Plavnik and Balanove (1992) and Palo *et al.* (1995) who reported that breast meat yield was not affected by feeding regimen. Also, lowering amino acid requirement by 10% in broiler diet had no significant differences in carcass, breast, or leg yields (Pope and Emmert 2001). In contrast of our results, Nir *et al.* (1987) reported that feeding regime depressed breast weight at 20 wks of age.

Table (2): Means ± standard deviation of live body weight, some carcass traits, protein intake, PER, energy intake, EER at 16 and 20 weeks of age.

Parameters	16 weeks					
	Strain			Feed Treatment		
	Gimmizah	Golden Montazah	Significant	Control	Restricted Group	Significant
Body Weight g.	1805.0±169.3^{a}	1625.0± 134.7^{b}	*	1646.3± 160.5	1783.8 ±169.6	NS
Carcass Weight g.	1165.6±120.2^{a}	1013.6 88.4^{b}	*	1041.1±126.7	1138.1± 118.4	NS
Carcass %	64.6 ± 2.2	62.4 ±3.0	NS	63.1± 2.0	63.8 ± 3.5	NS
Giblets %	5.0 ± 0.3	5.4 ±0.5	NS	5.1± 0.6	5.3 ± 0.3	NS
Edible Parts %	55.0 ±4.3^{a}	44.2 ±6.9^{b}	***	46.5± 9.2^{b}	52.7 ± 5.1^{a}	*
Meat Yield %	50.1± 4.4^{a}	39.4±6.2^{b}	***	42.0 ± 8.8^{b}	47.5± 5.3^{a}	*
Protein Intake g.	848 ± 0.1	771± 0.1	**	892± 0.1^{a}	743 ± 0.0^{b}	***
PER	1.5± 0.1	1.4 ±0.2	NS	1.9± 0.1	1.1 ± 0.1	NS
Energy Intake Kcal.	15178.5± 784^{a}	13816.3 ±582^{b}	**	15130.6± 955^{a}	14136.6 ± 778^{b}	*
EER	0.08± 0.01	0.08± .00	NS	0.07± 0.01	0.06 ± 0.01	NS
			20 WEEKS			
Body Weight g.	2306.3 ± 254.0^{a}	2002.5 ± 173.0^{b}	*	2156.0 ± 210.5	2153.8 ±301.6	NS
Carcass Weight g.	1542.2± 1.7^{a}	1309.6 ± 92.0^{b}	**	1442.0 ± 165.6	1409.7 ± 210.2	NS
Carcass %	66.9 ± 1.7^{a}	65.1± 1.1^{b}	*	66.6 ± 1.5	65.4 ± 1.7	NS
Meat Yield %	61.2 ± 3.7	60.4 ± 2.9	NS	60.7 ± 3.0	60.8 ± 3.7	NS
Edible Parts %	65.6 ± 3.9	64.8 ± 3.1	NS	65.1 ± 3.3	65.3 ± 3.8	NS
Breast %	47.6 ± 1.0	47.3 ± 1.4	NS	47.3 ± 0.9	47.6 ± 1.5	NS
Legs %	52.2 ± 1.5	52.8± 1.5	NS	52.6 ± 1.0	51.8 ± 1.8	NS
Abdominal Fat %	0.39 ± 0.2^{b}	0.48 ± 0.1^{a}	*	0.50 ± 0.1^{a}	0.30 ± 0.1^{b}	***
Giblets %	3.9 ± 0.2	3.9 ± 0.2	NS	3.9± 0.2	3.9 ± 0.2	NS
Protein Intake g.	1242± 0.1^{a}	1133 ± 0.8^{b}	*	1269± 0.1^{a}	1128 ± 0.1^{b}	**
PER	1.39 ± 0.1	1.5 ± 0.1	NS	1.15 ± 0.0	1.17 ± 0.1	NS
Energy Intake Kcal.	22162 ± 1095^{a}	20419 ± 710^{b}	*	21970 ± 1186	20960 ± 1156	NS
EER	0.8 ± 0.0	0.08 ± 0.01	NS	0.07 ± 0.01	0.07± 0.01	NS

* significantly < 0.05, ** significantly < 0.01, *** significantly < 0.001, NS: non significant

Means with the same letter for each column are not significantly different of each trait and each factor..

تأثير تحديد الغذاء خلال فترة الرعاية على صفات الذبيحة وبعض مكونات البلازما البيوكيميائية لسلالتين من الكتاكيت المحسنة

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تم تقسيم ٢٦٤ ديك عمر ٤ أسابيع من سلالتى الجميزة والمنتزه الذهبى عشوائيا الى مجموعتين حيث غذيت مجموعة المقارنة من عمر ٤-١٦ أسبوع تغذيه حره أما المجموعة الثانية استخدم معها نظام تحديد الغذاء المقدم لها تحديدا كميا (يوم بعد يوم) وذلك من عمر ٤-١٢ أسبوع ثم تلى ذلك استخدام التحديد الكيفى للعلف بأن قدم علف لها يحتوى على نسبة بروتين ١٢% من عمر ١٢-١٦ أسبوع ، ثم تم تغذية طيور كلا المجموعتين بنظام التغذية الحرة على علف يحتوى على ١٥,٤٥% بروتين خلال الفترة من ١٦-٢٠ أسبوع. تم دراسة ومقارنة صفات وزن الجسم – وزن الذبيحة – جودة وصفات الذبيحة – التحليل الكيمائى للحم الذبيحة وبعض الصفات البيوكيمائية بالدم لكلا المجموعتين عند عمر ١٦ وعمر ٢٠ أسبوع. وقد أوضحت النتائج ما يلى:

- حققت طيور الجميزة زيادة معنوية فى وزن الجسم الحى عن سلالة المنتزه الذهبى ، كذلك طيور مجموعة المقارنة أوضحت زيادة جوهرية فى وزن الجسم عن الطيور التى تم تحديد العلف لها عند كلا العمرين.
- لم يؤثر كلا من السلالة والمعاملة الغذائية على النسبة المئوية للذبيحة عند ١٦ أسبوع بينما تفوقت النسبة المئوية لذبائح سلالة الجميزة عن سلالة المنتزه الذهبى عند عمر ٢٠ أسبوع.
- تفوقت سلالة الجميزة معنويا فى النسبة المئوية لكمية اللحم وكذلك الأجزاء المأكولة عن سلالة المنتزه الذهبى عند عمر ١٦ أسبوع بينما عند عمر ٢٠ أسبوع لم يلاحظ أى فرق جوهرى بينهما، كما أظهرت النسبة المئوية للحلويات والصدر والأرجل فروقا جوهرية عند كلا العمرين ، كذلك ارتفعت النسبة المئوية للدهن الحشوى فى ذبائح المنتزه الذهبى عن الجميزه عن عمر ٢٠ أسبوع.
- استهلكت مجموعة المقارنة مقدارا أكبر من البروتين والطاقة عند عمر ١٦، ٢٠ أسبوع أما كفائة استخدام الطاقة والبروتين فانهما لم يظهرا أى فروق جوهرية.
- أظهر التحليل الكيمائى لأجزاء الذبيحة وجود فروق معنوية نتيجة لتأثير كلا من الطاقة ونظام التغذية المتبع عند عمر ١٦، ٢٠ أسبوع .
- ارتفعت النسبة المئوية للمادة الجافة والدهن والرماد فى الأفخاذ عن نسبته فى الصدر أما نسبة البروتين فكان تأثيرها عكسيا عن النسبة السابقة عند عمر ٢٠ أسبوع. لم يكن للسلالة تأثيرامعنويا على نسبة المادة الجافة و الطاقة أو الرماد بينما نسبة البروتين فى لحم سلالة الجميزة كانت أعلى عنها فى ذبائح المنتزه الذهبى والعكس صحيح لنسبة الدهن. وبشكل عامة فإن نظام التغذية لم يكن له تأثيرا معنويا على مكونات الذبيحة وكانت نسبة المادة الجافة والرماد بالأفخاذ أعلى عن الصدر بينما أظهرت نتائج التحليل الإحصائى عكس ذلك بالنسبة للبروتين.
- وجد زيادة معنوية فى تركيزات بلازما الدم من الالبيومين والبروتين والجلوكوز فى سلالة الجميزه أعلى معنويا عن التركيزات فى ذكور المنتزه الذهبى عند عمر ١٦ أسبوع ولم تظهر السلالة تأثيرا معنويا لكل من الجلوبيولين والنسبة بين الالبيومين إلى الجلوبيولين. كذلك لم تظهر المعاملة الغذائية تأثيرا معنويا لكل من تركيز الجلوبيولين ، النسبة بين الالبيومين إلى الجلوبيولين والبروتين. كما ارتفع مستوى الالبيومين لطيور المجموعة المقارنة جوهريا عن الطيور المعاملة بينما أظهر مستوى الجلوكوز عكس ذلك.
- لم تؤثر السلالة معنويا على تركيز انزيم GPT بينما كان انزيم GOT أعلى فى بلازما المنتزه الذهبى عن الجميزه ، كذلك فإن الطيور التى تعرضت للمعاملة الغذائية ارتفع بها تركيز انزيمات GOT ، GPT عن المجموعة المقارنة عند عمر ٢٠ أسبوع ولم يكن للسلالة تأثيرا معنويا على صفات الدم إلا أن مستوى الجلوكوز كان أعلى فى بلازما الدم لسلالة الجميزه عن المنتزه الذهبى بينما وجد أن تركيز الجلوبيولين كان اعلى فى مجموعة طيور المقارنة عن المجموعة الثانية بينما أظهر الالبيومين عكس ذلك ، إذ لم يظهر أى تأثيرات جوهرية على صفات الدم المقدرة الأخرى.