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PERFORMANCE OF GOLDEN MONTAZAH MALE CHICKS RAISED FOR MEAT PRODUCTION WHEN FED DIFFERENT DIETARY LEVELS OF PROTEIN AND SULFUR AMINO ACIDS

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SUMMARY

An experiment was conducted to study the performance of Golden Montazah[1] male chicks raised for meat production when fed different dietary levels of protein and sulfur amino acids. In this experiment, 450 male chicks, 4-week-old, were used. The chicks were fed a corn-soy starter diet containing 22% CP and 3000 Kcal ME/Kg for four weeks posthatching. A 5 x 2 factorial design of treatments was used to test five graded levels of protein (20, 19, 18, 17, and 16% CP for the growing diet and 18, 17, 16, 15 and 14% CP for the finishing diet) with two sulfur amino acid levels (0.72 and 0.67%; 0.60 and 0.55% for the growing and finishing diets, respectively). The growing diets were fed from four to eight weeks of age whereas the finishing diets were fed from eight to 12 weeks of age.

During the growing period, reducing protein level from 20 to 16% CP and sulfur amino acids from 0.72 to 0.67% significantly decreased body weight and feed conversion. Neither dietary protein nor sulfur amino acid level had a significant effect on body weight, feed intake, feed conversion or mortality rate during the finishing period. Carcass characteristics were not affected by dietary protein or sulfur amino acids. Dietary protein x sulfur amino acid interaction was not significant on any variable measured. The highest economical efficiency was obtained from chicks receiving the diet containing 18% CP with 0.72% sulfur amino acids in the growing period and 15% CP with 0.55% sulfur amino acids in the finishing period. In general, to maximize performance and profit, the males of Golden Montazah chicks raised for meat production can be fed diets containing 19 to 18% CP with 0.72% sulfur amino

[1] Egyptian local strain developed in Animal Production Research Institute, 1974.

acids from 4 to 8 weeks of age and 16 to 15% CP with 0.55% sulfur amino acids from 8 to 12 weeks, respectively.

Keywords: Golden Montazah performance, protein requirement, carcass characteristics

INTRODUCTION

Golden Montazah chicken is an Egyptian local strain developed in Animal Production Research Institute by Mahmoud *et al.*, (1974a). They indicated that mature hens weigh between 1610 and 1980 gm and consume from 119 to 145 gm feed/bird/day during 9 to 14 months of age whereas egg production ranges between 58.7 and 43.3% during the same period of time. Extensive research on using this strain and other local strains for egg production has been documented (Kosba *et al.*, 1981a, Shawer *et al.*, 1981; and b; El-Dakroury and Mahmoud, 1982; Saleh *et al.*, 1994; Abd El-Ghani, 1997); however, little research has been conducted on using these strains for meat production. Mahmoud *et al.* (1974 b) fed Golden Montazah chicks diets containing 22 and 20% CP from hatch to 12 weeks of age and observed an improvement in body weight of chicks fed 22% CP.

In Egypt, there is a growing concern to raise the Egyptian local strains in a commercial scale for meat production. Although these strains have lower performance and dressing percentage compared with commercial broiler chicks, they are more viable, tolerant to high temperature, resistant to prevailing diseases, adapted to poor management prevalent in the Egyptian villages and preferable to consumer. Protein and amino acid requirements are the most important nutrients for chicks to grow and reach their maximum genetic growth rate when optimum level of energy and other nutrients are covered in the diet. Considerable research has been conducted to study the requirements of protein and sulfur amino acids (SAA) for broiler chicks (Boomgaardt and Baker, 1973; Pesti and Fletcher, 1983; Mendonca and Jensen, 1989; Schutte and Pack, 1995; Baker *et al.*, 1996). Most of these studies advocated feeding broiler chicks on a starter diet containing 24-22% CP with 0.93-0.85% SAA and a finisher diet containing 20-18% CP with 0.80-0.60% SAA. National Research Council (1994) recommended three diets for broilers, a starter diet (0-3 weeks of age) containing 23% CP with 0.90% SAA, a grower diet containing 20% CP with 0.72% SAA and a finisher diet containing 18% CP with 0.60% SAA. However, research on the requirements of the local strain chicks raised for meat production is limited.

This experiment was conducted to study the performance of Golden Montazah male chicks raised for meat production when fed different dietary levels of protein and SAA.

MATERIALS AND METHODS

Birds and Housing

An experiment was carried out at Al-Kanater Al-Khairia Poultry Farm, Horticulture Service Unit, Agricultural Research Center, Ministry of Agriculture, Egypt. Four hundreds and fifty one-day-old males of Golden Montazah chicks were reared in a floor pen for 28 days. They were fed a corn-soy starter diet containing 22% CP with 3000 Kcal ME/Kg and supplied with other nutrients recommended by NRC, 1994 for starter broiler diet. On Day 28th, the chicks were weighed, wing-banded and randomly assigned to experimental diets and battery pens in a manner that ensured that each pen would have almost the same average body weight and weight range. Each dietary treatment included three pens of 15 chicks and fed the growing and finishing experimental diets (Table 1 and 2). Feed and water were provided *ad libitum*, and a 24 hour constant artificial light was maintained

Experimental Design

A 5 x 2 experimental design of treatments was used in this experiment. Five step-down levels of protein were used (20, 19, 18, 17, and 16% CP; 18, 17, 16, 15 and 14% CP in the growing and finishing diets, respectively) with two SAA levels (0.72 and 0.67%; 0.60 and 0.55% in the growing and finishing diets, respectively). All diets were isocaloric containing 3000 and 3100 Kcal ME/ Kg of growing and finishing diets, respectively. The growing diets were fed from 4 to 8 weeks of age whereas the finishing diets were fed from 8 to 12 weeks of age.

Carcass Characteristics

At the end of 12th week of age, one bird per pen which represented the group mean was chosen, weighed, slaughtered, plucked, eviscerated, and weighed to determine the carcass yield. Giblets (heart, liver, and gizzard) and abdominal fat was also weighed. The data were presented as percentage of live body weight.

Statistical Analysis

Data were subjected to the ANOVA using procedure of the General Linear Models (GLM) of SAS® Software (SAS Institute, 1990). A 5 x 2 factorial design of treatments was used in the experiment using the following model:

$$Yijk=\mu+Ti+Pj+(TP)ij+eijk$$

where;

Yijk= individual observation; μ = over all mean; Ti = the effect of protein levels; Pj = the effect of SAA levels; (TP)ij = the effect of interaction between protein and SAA; eijk = the random error term. Differences with probability of < 0.05 were considered significant. Means were separated by Duncan's multiple range test (Duncan, 1955).

Table 1. Composition of the growing diets (4-8 weeks of age)

	Sulfur amino acids = 0.72%					Sulfur amino acids = 0.67%					Price/Ton
Protein levels	20%	19%	18%	17%	16%	20%	19%	18%	17%	16%	
Yellow corn	61.00	64.57	68.36	72.16	75.58	60.95	64.51	68.36	72.13	75.58	530
Soy bean meal 44%	33.58	30.55	27.29	24.03	20.85	33.65	30.63	27.34	24.10	20.90	1180
Bone meal	1.58	1.62	1.66	1.70	1.75	1.58	1.62	1.66	1.70	1.75	600
Limestone	0.84	0.83	0.82	0.81	0.80	0.84	0.83	0.82	0.81	0.80	50
Palm oil	2.33	1.72	1.05	0.38	-----	2.36	1.75	1.05	0.38	-----	2350
Salt	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	100
Premix 1	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	8000
D.L Methionine	0.07	0.10	0.13	0.15	0.18	0.02	0.05	0.08	0.10	0.13	18000
L. Lysine HCL	-----	0.01	0.09	0.17	0.25	------	0.01	0.09	0.17	0.25	18500
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	-----
Price/Ton (L.E) 2	821.46	797.42	783.73	768.29	760.40	813.36	789.75	775.32	760.19	756.54	-----
Determined; CP%	20.30	19.23	18.25	17.17	16.20	20.22	19.09	19.20	17.25	16.07	
Calculated; CP%	20.00	19.00	18.00	17.00	16.00	20.00	19.00	18.00	17.00	16.00	----
ME, Kcal/Kg	3000	3000	3000	3000	3015	3000	3000	3000	3000	3017	----
E E%	2.59	2.70	2.82	2.93	3.04	2.59	2.70	2.82	2.93	3.04	----
C F%	3.69	3.65	3.41	3.27	3.12	3.69	3.56	3.41	3.27	3.12	----
Ca%	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	----
Available P%	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	----
Met%	0.39	0.41	0.42	0.43	0.44	0.34	0.36	0.37	0.38	0.39	----
Met + Cys%	0.72	0.72	0.72	0.72	0.72	0.67	0.67	0.67	0.67	0.67	----
Lys%	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	----

1 Provided per Kg of diet; Vit. A, 12,000 IU; Vit. D3, 2,000 IU; Vit. E, 40 mg; Vit. K3,, 4 mg; Vit. B1, 3 mg; Vit. B 2, 6 mg; Vit. B6, 4 mg; Vit. B12, 30 micro g; Niacin, 30 mg; Folic Acid, 1.5 mg; Biotin, 80 micro g; Pantothenic Acid, 13.2 mg; Choline Choride, 700 mg; Iron, 40 mg; Copper, 10 mg; Zinc, 70 mg; Selenium, 0.2 mg; Iodine, 1.5 mg, Cobalt, 0.25 mg.

2 According to Egyptian market, March, 1998 where 1$ = 3.40 L. E.

Table 2. Composition of the finishing diets (8-12 weeks of age)

	Sulfur amino acids = 0.60%					Sulfur amino acids = 0.55%					Price/Ton
Protein levels	18%	17%	16%	15%	14%	18%	17%	16%	15%	14%	
Yellow corn	66.31	69.83	73.60	77.40	81.19	66.31	69.85	73.65	77.40	81.19	530
Soy bean meal 44%	28.10	25.11	21.88	18.62	15.36	28.10	25.12	21.88	18.68	15.41	1180
Bone meal	1.26	1.30	1.34	1.38	1.42	1.26	1.30	1.34	1.38	1.42	600
Limestone	0.87	0.86	0.85	0.84	0.83	0.87	0.86	0.85	0.83	0.83	50
Palm oil	2.86	2.27	1.60	0.93	0.26	2.86	2.27	1.60	0.93	0.26	2350
Salt	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	100
Premix 1	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	8000
D.L Methionine	-----	0.03	0.06	0.08	0.11	----	----	0.01	0.03	0.06	18000
L. Lysine HCL	-----	----	0.07	0.15	0.23	----	----	0.07	0.15	0.23	18500
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	-----
Price/Ton (L.E) 2	782.20	756.81	742.38	711.61	714.78	782.20	752.50	729.90	718.76	703.27	-----
Determined; CP%	18.22	17.18	16.11	15.20	14.30	18.19	17.21	16.14	15.20	14.17	----
Calculated; CP%	18.00	17.00	16.00	15.00	14.00	18.00	17.00	16.00	15.00	14.00	----
ME, Kcal/Kg	3100	3100	3100	3100	3100	3100	3100	3100	3100	3100	----
E E%	2.75	2.86	2.97	3.10	3.20	2.75	2.86	2.97	3.10	3.20	----
C F%	3.43	3.29	3.15	3.00	2.86	3.43	3.29	3.15	3.00	2.86	----
Ca%	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	----
Available P%	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	----
Met.%	0.30	0.31	0.33	0.34	0.35	0.30	0.28	0.32	0.29	0.30	----
Met.+Cys.%	0.60	0.60	0.60	0.60	0.60	0.60	0.55	0.55	0.55	0.55	----
Lys%	0.93	0.85	0.85	0.85	0.85	0.93	0.86	0.85	0.85	0.85	----

1 Provided per Kg of diets; Vit. A, 12,000 IU; Vit. D3 , 2,000 IU; Vit. E, 40 mg; Vit. K3, 4 mg; Vit. B1, 3 mg; Vit. B2, 6 mg; Vit. B6, 4 mg; Vit. B12 ,30 micro g; Niacin, 30 mg; Folic Acid, 1.5 mg; Biotin, 80 micro g; Pantothenic Acid, 13.2 mg; Choline Choride, 700 mg; Iron, 40 mg; Copper, 10 mg; Zinc, 70 mg; Selenium, 0.2 mg; Iodine, 1.5 mg, Cobalt, 0.25 mg. 2 According to Egyptian market, March, 1998 where 1 $=3.40 L.E.

RESULTS AND DISCUSSION

Chick Performance

Live body weight and body weight gain are presented in Table 3. Initial body weights of different treatments at 4 weeks of age were nearly similar (303±5 gm). Live body weight at 8 weeks of age and body weight gain (4-8 weeks of age) of chicks were significantly reduced with decreasing protein level from 20 to 16% CP. Also, a significant decrease in body weight gain (4-8 weeks of age) was found with decreasing SAA level from 0.72 to 0.67% but not with 17% CP. Baker *et al.* (1996) found that broiler chicks, 3 to 6 weeks of age, need 0.72% SAA in their diet that contained 20% CP and 3200 Kcal ME/Kg. In the present experiment, all diets were isocaloric containing 3000 and 3100 Kcal ME/Kg of the growing and finishing diets, respectively. Live body weight at 12 weeks of age and body weight gains (8-12 weeks of age) were not significantly affected by reducing either protein or SAA levels in the diets. Body weight gain (4-12 weeks of age) revealed a significant decrease with chicks fed 16% CP, whereas the obtained decrease in body weight gain was not significant when SAA level was decreased from 0.72 to 0.67%. The interaction between dietary protein and SAA for live body weight and body weight gain was not significant. In general, the values of body weight of Golden Montazah chicks at different ages were higher than those recorded by Mahmoud *et al.* (1974b) and Kosba *et al.* (1981b). This is mainly due to the genetic improvement conducted on this breed over the past years. The significant decrease in body weight gain with reducing protein level in the growing but in the finishing diets seems logic because chicks in their early life eat less and grow faster; therefore, protein content in their diets must be higher. This is in accordance with the results of Salmon *et al.* (1983) who found that reducing the crude protein level from 24.2 to 20.2% reduced body weight gains significantly in the starter broiler diet (0-4 weeks of age). However, reducing protein level from 22 t0 16.6% in the finisher diet (4 to 8 weeks of age) had no significant impact on body weight gains.

Feed intake was not significantly affected by reducing either protein or SAA levels in both growing and finishing periods (Table 4). During the growing period, feed conversion was significantly improved when chicks fed 18% CP than that of chicks fed 16% CP. Also, it was significantly improved with increasing SAA in the diets from 0.67 to 0.72%. During the finishing period, feed intake and feed conversion were not significantly affected when protein or SAA levels were reduced in the finishing diets. Cumulative feed conversion (4-12 weeks of age) revealed a significant improvement with chicks fed diets containing 18% CP and a numerical improvement when SAA level was increased in the diets from 0.67 to 0.72%. Dietary protein x SAA interaction for feed intake and feed conversion was not significant at any of the experimental periods.

Table 3. Live body weight and body weight gain of growing Golden Montazah males fed different dietary levels of protein and sulfur amino acids (SAA)

SAA in the growing diets1	Protein levels in the growing diets 2 20%	19%	18%	17%	16%	Mean	SEM
	eigh Initial live body weight at 4-weeks of age						
0.72%	304	303	302	303	305	303	3
0.67%	305	306	303	305	301	304	3
Mean	305	305	303	304	303		
SEM	6	5	5	5	5		
	Live body weight at 8-weeks of age						
0.72%	841	827	820	796	767	810	10
0.67%	802	808	786	806	766	793	8
Mean	822a	818a	802ab	803ab	767b		
SEM	16	14	14	13	14		
	Live body weight at 12-weeks of age						
0.72%	1366	1347	1329	1302	1283	1326	16
0.67%	1323	1342	1306	1321	1237	1306	15
Mean	1345a	1345a	1318ab	1312ab	1260b		
SEM	28	23	24	25	20		
	Body weight gain (4-8 weeks of age)						
0.72%	537	534	517	491	462	508A	9
0.67%	496	502	472	500	465	487B	7
Mean	517a	518a	495ab	496ab	464b		
SEM	11	13	12	11	7		
	Body weight gain (8-12 weeks of age)						
0.72	525	488	509	511	517	510	12
0.67	521	533	531	516	472	515	13
Mean	523	511	520	514	495		
SEM	4	26	14	24	23		
	Body weight gain (4-12 weeks of age)						
0.72%	1062	1022	1026	1002	978	1018	17
0.67%	1017	1035	1003	1016	936	1001	13
Mean	1040a	1029a	1015ab	1009ab	957b		
SEM	11	20	14	35	22		

1 SAA in the finishing diets (8-12 weeks of age) were 0.60 and 0.55% , respectively.
2 Protein levels in the finishing diets (8-12 weeks of age) were 18, 17, 16, 15, and 14%, respectively. a,b Values with no common superscript letters within the same row are significantly different ($P< 0.05$) A,B Values with no common superscript letters within the same column are significantly different ($P< 0.05$).
* Protein x SAA interaction was not significant for any variable measured.

Table 4. Feed intake and feed conversion of growing Golden Montazah males fed different dietary levels of protein and sulfur amino acids (SAA)

SAA in the growing diets1	Protein levels in the growing diets 2 20%	19%	18%	17%	16%	Mean	SEM
	Feed intake during 4-8 weeks of age						
0.72%	1677	1668	1565	1588	1534	1606	21
0.67%	1552	1604	1565	1637	1575	1587	19
Mean	1615	1636	1565	1613	1555		
SEM	27	44	31	32	15		
	Feed intake during 8-12 weeks of age						
0.72%	2060	1911	1967	1991	2083	2013	33
0.67%	2023	2038	2061	1962	1926	2002	27
Mean	2042	1975	2014	1977	2005		
SEM	25	50	38	41	74		
	Feed intake during 4-12 weeks of age						
0.72%	3737	3579	3532	3579	3617	3609	38
0.67%	3575	3641	3626	3599	3501	3588	29
Mean	3656	3610	3579	3589	3559		
SEM	37	61	42	62	67		
	Feed conversion during 4-8 weeks of age						
0.72%	3.12	3.13	3.03	3.23	3.32	3.17A	.04
0.67%	3.13	3.19	3.31	3.27	3.39	3.26B	.03
Mean	3.13a	3.16a	3.17ab	3.25ab	3.36b		
SEM	11	13	12	11	7		
	Feed conversion during 8-12 weeks of age						
0.72%	3.93	3.93	3.87	3.95	4.05	3.95	0.06
0.67%	3.88	3.86	3.88	3.80	4.10	3.90	0.06
Mean	3.91	3.90	3.88	3.88	4.08		
SEM	0.05	0.12	0.06	0.13	0.07		
	Feed conversion during 4-12 weeks of age						
0.72%	3.52	3.50	3.44	3.59	3.70	3.55	0.04
0.67%	3.52	3.52	3.62	3.54	3.74	3.59	0.03
Mean	3.52a	3.51a	3.53a	3.57ab	3.72b		
SEM	0.03	0.05	0.03	0.07	0.04		

1 SAA levels in the finishing diets (8-12 weeks of age) were 0.60 and 0.55%, respectively. 2 Protein levels in the finishing diets (8-12 weeks of age) were 18, 17, 16, 15, and 14%, respectively. a,b Values with no common superscript letters within the same row are significantly different ($P < 0.05$). A,B Values with no common superscript letters within the same column are significantly different ($P < 0.05$).

* Protein x sulfur amino acid interaction was not significant for any variable measured.

Generally speaking, the Golden Montazah chicks maximized their live weight gain at 19% CP in the growing period and 16% CP in the finishing period. This protein requirement is somewhat close to the protein requirement of meat-type chicks despite the big differences in the growth rate and feed conversion. This may partially agree with the results of Morris and Njuru (1990) who offered broiler male chicks and the males of egg-type stock different dietary of protein ranged from 25 to 17% CP for the 21 days posthatching. Even though they found that broiler chicks could maximize their live weight gain at 25% CP and egg-type chicks maximized their body weight gain at 18.8% CP, the efficiency of protein utilization above maintenance was the same for both types of chicks (0.47 g protein gain /g protein consumed).

Mortality rate during 4 to 12 weeks of age was not influenced by either dietary protein or SAA levels (Table 5). Percentage of mortality rate during the whole experiment from 4 to 12 weeks of age did not exceed 0.1 or 5/450 chicks. This reflects the ability of these chicks for survival and resistance to unfavorable environmental conditions when compared with chicks of the same age of foreign breeds.

Table 5. Percentage of mortality rate of growing Golden Montazah males fed different dietary levels of protein and sulfur amino acids (SAA)

SAA in the growing diets1	Protein levels in the growing diets 2					
	20%	19%	18%	17%	16%	Mean
	% mortality rate during 4-12 weeks of age					
0.72%	0.00	0.00	0.00	0.00	0.04	0.01
	0/45	0/45	0/45	0/45	2/45	2/225
067%	0.02	0.02	0.00	0.02	0.00	0.01
	1/45	1/45	0/45	1/45	0/45	3/225
Mean	0.02	0.02	0.00	0.01	0.00	0.01
	1/90	1/90	0/90	1/90	0/90	5/450

1- Sulfur amino acid levels in the finishing diets (8-12 weeks of age) were 0.60 and 0.55%, respectively. 2- Protein levels in the finishing diets (8-12 weeks of age) were 18, 17, 16, 15, and 14%, respectively.

Carcass Characteristics

Dressing weight, giblets (heart, liver and gizzard) and abdominal fat as percentage of live weight are shown in Table 6. Neither dietary protein nor SAA levels had a significant impact on carcass traits. Percentage of dressing weight (carcass weight without giblets or abdominal fat) ranged between 66.29 and 64.53% whereas abdominal fat ranged from 1.09 to 2.29%. These values were lower than those obtained from broiler chicks, of the same age (Soliman *et. al., 1996)*. However, lower abdominal fat is preferable to

consumer. There was no significant interaction between dietary protein and SAA for any variable measured.

Table 6. Carcass characteristics (as percentage of live body weight) of Golden Montazah males at 12 weeks of age fed different dietary levels of protein and sulfur amino acids (SAA)

SAA in the growing diets1	Protein levels in the growing diets 2						
	20%	19%	18%	17%	16%	Mean	SEM
	Dressing weight %						
0.72%	65.88	65.57	66.29	64.92	64.92	65.52	0.41
0.67%	65.51	64.69	64.69	64.53	65.89	65.06	0.41
Mean	65.70	65.13	65.49	65.73	65.41		
SEM	0.78	0.41	0.80	0.85	0.67		
	Heart %						
0.72%	0.59	0.69	0.74	0.67	0.68	0.68	0.04
0.67%	0.62	0.72	0.75	0.75	0.67	0.70	0.03
Mean	0.61	0.71	0.75	0.71	0.68		
SEM	0.02	0.07	0.07	0.05	0.04		
	Liver %						
0.72%	1.86	1.75	2.00	1.91	1.89	1.89	0.05
0.67%	1.92	1.83	1.83	1.86	1.92	1.93	0.06
Mean	1.89	1.79	1.92	1.89	1.91		
SEM	0.08	0.05	0.15	0.09	0.05		
	Gizzard %						
0.72%	1.71	1.77	1.97	1.76	1.90	1.82	0.06
0.67%	1.92	1.87	1.87	1.84	1.85	1.87	0.07
Mean	1.82	1.82	1.92	1.80	1.88		
SEM	0.09	0.11	0.06	0.11	0.14		
	Abdominal fat %						
0.72	2.06	1.11	1.21	2.29	1.50	1.63	0.20
0.67	1.13	1.09	1.09	1.70	1.75	1.35	0.30
Mean	1.60	1.10	1.15	2.00	1.63		
SEM	0.49	0.26	0.43	0.49	0.35		

1 Sulfur amino acids in the finishing diets (8-12 weeks of age) were 0.60 and 0.55%, respectively. 2 Protein levels in the finishing diets (8-12 weeks of age) were 18, 17, 16, 15, and 14%, respectively. * Protein x sulfur amino acid interaction was not significant for any variable measured.

Economical Evaluation

Table 7 summarizes the economical evaluation of Golden Montazah chicks fed dietary protein and SAA. During the period from 4 to 8 weeks of age, chicks fed a diet containing 18% CP with 0.72% SAA recorded the highest economical efficiency whereas the lowest economical efficiency was recorded

Table 7. Economic evaluation of Golden Montazah males fed different dietary levels of protein and sulfur amino acids

Item	Sulfur amino acids = 0.72%					Sulfur amino acids = 0.60%				
Protein level in the diets	20%	19%	18%	17%	16%	20%	19%	18%	17%	16%
	Growing period (4-8 weeks of age)									
Weight gain/ bird (gm)	537	534	517	491	462	496	502	472	500	465
Feed intake/ bird (Kg)	1.677	1.668	1.565	1.588	1.534	1.552	1.604	1.565	1.637	1.575
Price of Kg feed (L. E)1	0.822	0.797	0.784	0.768	0.760	0.813	0.780	0.775	0.760	0.757
Cost of feed intake/bird (L. E)2	1.379	1.329	1.227	1.220	1.166	1.262	1.251	1.213	1.244	1.192
Financial return/ bird (L. E) 3	2.954	2.937	2.844	2.701	2.541	2.728	2.761	2.596	2.750	2.558
Net revenue/ bird (L. E)4	1.575	1.608	1.617	1.481	1.375	1.466	1.510	1.383	1.506	1.366
Economic efficiency % 5	100	102	103	94	87	93	96	88	96	88
	Finishing period (8-12 weeks of age)									
	Sulfur amino acids = 0.60%					Sulfur amino acids = 0.55				
	18%	17%	16%	15%	14%	18%	17%	16%	15%	14%
Weight gain/ bird (Kg)	525	488	509	511	517	521	533	531	516	472
Feed intakel bird (Kg)	2.060	1.911	1.967	1.991	2.083	2.023	2.038	2.061	1.962	1.926
Price of Kg feed (L. E)1	0.782	0.757	0.742	0.712	0.715	0.782	0.753	0.730	0.719	0.703
Cost of feed intake/bird (L. E)2	1.611	1.447	1.460	1.418	1.489	1.582	1.535	1.505	1.411	1.354
Financial return/ bird (L. E) 3	2.888	2.684	2.800	2.811	2.844	2.866	2.932	2.921	2.838	2.596
Net revenue/ bird (L. E)4	1.277	1.237	1.340	1.393	1.355	1.284	1.397	1.416	1.427	1.242
Economic efficiency % 6	100	97	105	109	106	101	109	111	112	97

1- According to Egyptian market, March 1998, as shown in Table 1 and 2. 2- Price/Kg feed x feed intake/bird.

3- Weight gain/ bird (Kg) x price of Kg live weight where the price of Kg live weight = 5.50 L. E

4- Return per bird - cost of feed intake / bird. 5- Relative to the diet containing 20% CP with 0.72% SAA.

6- Relative to the diet containing 18% CP with 0.60% SAA.

by chicks fed a 16% CP diet with 0.72% SAA. During the period from 8 to 12 weeks of age, the highest economical efficiency was achieved from chicks fed a diet containing 15% CP with 0.55% SAA.

In summary, during 4 to 8 weeks of age, a diet containing 19% CP with 0.72% SAA is needed to maximize body weight gain of Golden Montazah chicks; however, the maximal economical return could be obtained by using a diet containing only 18% CP with 0.72% SAA. Similarly, the maximum body weight gain during 8 to 12 weeks of age was obtained by feeding chicks on a diet containing 16% CP with 0.55% SAA for maximum weight gain while only 15% CP with 0.55% SAA in the diet was needed to reach maximum economical return. It could be noticed that birds sometimes need higher nutrient level in the diets to maximize body weight gain.; however, the maximum economical return could be achieved by using lower level from that nutrient. In this case, determination of the requirement of this nutrient should be made on economical not biological basis (Pesti and Fletcher, 1983).

In conclusion, males of Golden Montazah chicks can be fed a growing diet containing 19 to 18% CP with 0.72% SAA from 4 to 8 weeks of age and a finishing diet containing 16 to 15% CP with 0.55% SAA from 8 to 12 weeks of age to maximize performance and profit.

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الاداء الانتاجى لذكور كتاكيت المنتزة الذهبى المرباه لانتاج اللحم عندما تغذى على علائق مختلفة فى نسب البروتين و الاحماض الامينية الكبريتية

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تم تصميم تجربة لدراسة الأداء الإنتاجى لذكور كتاكيت المنتزة الذهبى المرباه لإنتاج اللحم عندما تغذى على علائق مختلفة فى نسب البروتين و الاحماض الامينية الكبريتية. استخدم فى هذه التجربة اربعمائة و خمسون من الذكور عند عمر ٤ اسابيع. و لقد غذيت الكتاكيت من عمر يوم حتى الاسبوع الرابع على عليقة بادىء تحتوى على ٢٢٪ بروتين خام و ٣٠٠٠ كيلو كالورى طاقة ممثلة/ كجم عليقة. صممت التجربة على نظام احصائى(٥ × ٢)، واستخدم خمس مستويات من البروتين الخام (٢٠، ١٩، ١٨، ١٧، ١٦٪ بروتين خام فى فترة النامى ثم ١٨، ١٧، ١٦، ١٥، ١٤٪ بروتين خام فى فترة الناهى) مع مستويين من الاحماض الامينية الكبريتية (٠,٧٢ و ٠,٦٧ ٪ فى فترة النامى و ٠,٦٠ و ٠,٥٥٪ فى فترة الناهى). و كانت فترة النامى من ٤ الى ٨ اسابيع بينما امتدت فترة الناهى من ٨ الى ١٢ اسبوع من العمر على التوالى. أظهرت النتائج ان تقليل مستوى البروتين الخام فى العليقة من ٢٠ الى ١٦٪ اثناء فترة النامى أدى الى نقص ملحوظ فى وزن الجسم و الكفاءة التحويلية للغذاء. ايضا نقص الاحماض الامينية الكبريتية من ٠,٧٢ الى ٠,٦٧٪ من العليقة ادى الى نقص ملحوظ فى وزن الجسم و الكفاءة التحويلية. بينما لم يكن هناك اى تاثير ملحوظ لنقص اى من نسبة البروتين او الاحماض الامينية الكبريتية على وزن الجسم و الكفاءة التحويلية اثناء فترة الناهى. لم تتاثر مواصفات الذبيحة باى من العلائق المحتوية على نسبة مختلفة من البروتين و الاحماض الامينية الكبريتية. أو ضحت الدراسة الاقتصادية ان اعلى كفاءة اقتصادية تم الحصول عليها من الكتاكيت المغذاه على عليقة تحتوى على ١٨٪ بروتين خام مع ٠,٧٢٪ احماض امينية كبريتية فى فترة النامى و العليقة المحتوية على ١٥٪ بروتين خام مع ٠,٥٥٪ احماض امينية كبريتية فى فترة الناهى. يستخلص من نتائج التجربة ان ذكور كتاكيت المنتزة الذهبى المرباة لانتاج اللحم يمكن تغذيتها على عليقة نامى تحتوى على ١٨ - ١٩٪ بروتين خام مع ٠,٧٢٪ احماض امينية كبريتية فى الفترة من ٤ الى ٨ أسابيع من العمر، و عليقة ناهى تحتوى على ١٥ - ١٦٪ مع ٠,٥٥٪ أحماض أمينية كبريتية فى الفترة من ٨ الى ١٢ اسبوع من العمر و ذلك للحصول على اعلى معدل أداء انتاجى وأعلى ربحية.