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EFFECT OF PROTEIN, LYSINE AND TOTAL SULFUR AMINO ACIDS LEVELS ON THE PERFORMANCE OF MUSCOVY DUCKLINGS DURING THE STARTING PERIOD

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ABSTRACT: An experiment was performed in a 2 x 2x 2 factorial design to assess the effects of dietary protein, lysine and total sulfur amino acids in the starting diets for growing Muscovy ducks (1 to 35 days of age). The corn-soy bean meal based experimental diets contained either 22 or 20% crude protein; 1.2 or 1.1% lysine and 0.93 or 0.83% sulfur amino acids. The influence of supplemental amino acids was studied at each protein level.

The results show that ducklings fed lower protein (20%) diets had significantly ($P < 0.05$) higher body weight, weight gain, feed intake and improved feed conversion. Lower lysine (1.10%) caused a significant ($P < 0.05$) improvement in body weight, weight gain, feed conversion and feed cost/ kg. gain. Lower TSAA (0.83%) had significantly ($P < 0.05$) increased body weight, weight gain and feed intake. Ducklings fed on diet contained lower protein (20%) with lower lysine (1.10%) and higher TSAA (0.93%) had significantly ($P < 0.05$) the lowest feed cost kg. gain with highest margin at 1-21 and 1-28 days of age. It could be recommended to use diet containing 20% crude protein, 1.10% lysine and 0.93% TSAA. for muscovy ducklings at 1-21 and 1-28 days. of age. However, from 28-35 days of age it could be recommended to use diet containing either 22% protein, 1.10% lysine and 0.83% TSAA.; or 20% protein, 1.2% lysine and 0.83% TSAA for feeding muscovy ducklings.

Key words: Ducklings, protein, lysine and methionine.

INTRDUCTION

The protein cost is considered mainly the most expensive item in ducks production. Animal protein sources are considerd expensive as compared to plant protein sources, but; the later are nutritonally imbalanced, therefore some essential amino acids should be supplemented. Methionine and lysine are generally first and second limiting amino acids in corn-soybean meal diets (D'Mello, 1994). Protein requirement may be reduced in corn-soybean meal-type diets by supplementation with methionine and lysine (Waibel *et al.*, 1995). So, using the optimum level of crude protein and supplementing corn soybean meal diets with the essential amino acids would cause an increase in the net profit.

The present work aimed to study the effect of protein level, lysine and methionine supplementation on the growth performance of Muscovy ducklings.

MATERIALS AND METHODS

The experimental work of the present study was carried out at Ras Seder Research station (Desert Research Center) in Southern Sinai Governorate. The filed work started on 3rd September 2003 and terminated 35 days later.

Three hundreds and twenty one day old Muscovy ducks of genotype ST_{14} were randomly divided into eight experimental treatment groups, in a factorial desigen 2 x 2x 2. Each treatment group divided into two subgroups, which contained two dietary protein levels, higher protein diet (22%) or lower protein diet (20%). Within each protein level; ducklings were divided into two groups that fed diets supplemented with higher lysine level (1.20%) or lower lysine level (1.10%). Within each lysine level; ducklings were divided into two subgroup which contained either higher total sulfur amino acids (TSAA) being 0.93% or lower TSAA being 0.83%, Table 1. Each main group contained 40 birds and was allocated into two replicates (20 birds).

Feed and water were offered adlibitum during the whole experimental period. Body weight and feed consumption (total consumed feed (g) / duckling number) were recorded at different ages (1, 21, 28 and 35 days of age). Feed conversion was calculated as g feed/g gain. Final margin was calculated as return from body weight gain – feed cost.

Table 1: Composition of experimental diets for starter ration (1-35 days)

Ingredient %	Different treatments							
	1	2	3	4	5	6	7	8
Yellow corn	58.71	58.81	57.50	57.50	63.00	63.00	63.00	63.00
Soy bean meal (44%)	35.50	35.50	30.34	30.44	31.60	31.80	31.70	31.80
Corn gluten (60%)	2.00	2.00	5.00	5.00	-	-	-	-
Wheat bran	-	-	3.40	3.40	1.40	1.30	1.40	1.40
Di –calcium phosphate	1.90	1.90	1.80	1.80	1.90	1.90	1.90	1.90
Limestone	1.10	1.10	1.20	1.20	1.10	1.10	1.10	1.10
Sodium chlorid	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Vitamin, Mineral premix*	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Dl-Methionine	0.19	0.09	0.16	0.06	0.28	0.18	0.28	0.18
Lysine	-	-	-	-	0.12	0.12	0.02	0.02
Total	100	100	100	100	100	100	100	100
Chemical composition**								
Crude protein (%)	22	22	22	22	20	20	20	20
Crude fiber %	4.04	4.04	4.07	4.08	3.97	3.98	3.98	3.99
Kcal (ME)/kg feed	2840	2840	2839	2836	2838	2847	2835	2838
calorie/protein (ratio)	129	129	129	129	142	142	142	142
lysine	1.20	1.20	1.10	1.10	1.20	1.20	1.10	1.10
Methionine %	0.57	0.47	0.57	0.39	0.62	0.52	0.62	0.52
Methionine + cystine %	0.93	0.83	0.93	0.83	0.93	0.83	0.93	0.83
Calcium %	1	1	1	1	0.99	0.94	0.94	0.94
Total phosphorus	0.74	0.74	0.74	0.74	0.74	0.76	0.76	0.76
Avilable phosphorus	0.50	0.50	0.48	0.48	0.49	0.49	0.49	0.49
Cost/kg diet (PT)	113.0	111.0	113.0	111.0	113.0	111.0	111.0	109.0

* Vitamins and Minerals premix 0.30 of the diet supplies the following per kg of the diets vit. A 12000 IU. vit. D 2500 IU, vit . E. 10 mg, vit K. 3 mg, vit B1. 1mg, vit. B2 . 4mg , panthothenic acid 10 mg , folic acid 1 mg, niacine 40 mg vit. B6 3 mg, vit B12 20 Mcg, Mn. 62 mg, Fe 44 mg, Zn. 56 mg, Cu 5 mg and Se 100 Mcg.

** Calculated according to NRC (1994). Price of 1kg. gain = 10 LE.

Statistical analysis was carried out according to Snedecor and Cochran (1982).The statistical modle which used was as follows:

$$Y_{ijkl} = U + P_i + L_j + M_k + PL_{ij} + PM_{ik} + LM_{jk} + PLM_{ijk} + e_{ijkl}$$

Where:

Y_{ijkl} = An observation.

U = The overall mean.

P_i = Effect of the protein level in diets (i = 1 and 2).

L_j =effect of the lysine level in diets (j = 1 and 2).

M_k =effect of the TSAA. level in diets (K = 1 and 2).

PL_{ij} = The interaction between protein and lysine level.

PM_{ik} = The interaction between protein and TSAA. level.

LM_{jk} = The interaction between lysine and TSAA. level.

PLM_{ijk} = The interaction between protein, lysine and TSAA. level.

e_{ijkl} = Experimental random error.

Duncan's new multiple range test (Duncan, 1955) was used for comparison among significant means.

RESULTS AND DISCUSSION

Live Body Weight

The effect of dietary protein, lysine and methionine levels on body weight are illustrated in Table 2. Ducklings fed lower protein diet (20%) had significantly ($P< 0.01$) higher body weight (499.7 g) as compared with those (456.8) fed higher protein diet (22%) at 21 days of age. However, protein level had no significant effect on body weight at 28 and 35 days of age. Lysine levels had no significant effects on body weight. Throughout the starting period (1 - 35 days.). Ducklings fed lower TSAA level (0.83%) showed higher significant ($P< 0.05$) on body weight (490.8) as compared to those fed on (0.93%) TSAA being (465.8g) at 21 days of age. Effects of interaction between protein, lysine and TSAA levels on body weight are presented in Table 3. Ducklings fed on diet containing lower protein (20%), lower lysine level (1.10%) and higher TSAA level (0.93%) had significantly ($P < 0.05$) the highest body weight at 21 days of age, it may be due to that free amino acid supplements are absorbed more rabidly than protein pound amino acids resulting in an imbalanced supply of amino acids, imbalanced diets

Table 2: Effects of protein , Lysine and TSAA (methionine + cystine) levels on average body weight (g) weight gain (g), feed intake (g) and feed conversion ($\bar{X}$ ± SE) of ducklings during the starting period (1-35 days)

Periods (days)	Protein level		Lysine level		TSAA level	
	22%	20%	1.20%	1.10%	0.93 %	0.83%
			Body weight			
1	48.8 ± 0.4	48.8 ± 0.3	49.3 ± 0.4	48.3 ± 0.3	49.1 ± 0.4	48.5± 0.3
21	456.7 ± 8.9^{b}	499.7 ± 7.5^{a}	470.9± 8.7	485.5 ± 8.0	465.7± 9.0^{b}	490.7± 6.7^{a}
28	800.1 ± 15.1	829.9 ± 12.2	814.3± 14.0	815.8± 13.4	499.0 ± 14.4	831.0± 13.0
35	1172.5 ± 20.5	1180.4± 16.0	1165.8± 17.1	1187.2± 19.6	1157.0± 18.9	1195.8± 17.6
			Weight gain			
(1-21)	408.0± 8.5^{b}	450.9 ± 7.2^{a}	421.7 ± 8.4	437.2± 7.7	416.6± 8.7^{b}	442.2± 7.3^{a}
(1-28)	745.4± 16.7^{b}	793.1 ± 11.9^{a}	765.1 ± 13.7	773.6± 15.4	750.5± 14.2	788.5 14.8
(1-35)	1124.4± 20.3	1131.5± 16.0	1116.7± 17.0	1139.3± 19.4	1107.8± 18.8	1148.0± 17.6
			Feed intake			
(1-21)	734.7± 15.7	744.1± 26.5	767.3± 16.9^{a}	711.6± 21.1^{b}	967.3 ± 17.9^{b}	781.6± 11.1^{a}
(1-28)	994.5± 19.3	1068.3± 40.1	1084.3± 37.9^{a}	978.5 ± 11.6^{b}	1005.2 ± 19.6	1057.6 ± 42.3
(1-35)	2719.3± 78.6	2681.6± 70.8	2778.1± 75.2	2622.8± 62.6	2647.4± 78.6	2753.5 ± 65.7
			Feed conversion			
(1-21)	1.8 ± 0.02^{a}	1.6 ± 0.1^{b}	1.8± 0.03^{a}	1.6± 0.1^{b}	1.7± 0.1	1.7 ± 0.1
(1-28)	1.3 ± 0.03	1.4 ± 0.1	1.4± 0.04^{a}	1.3 ± 0.03^{b}	1.4± 0.1	1.3 ± 0.1
(1-35)	2.4 ± 0.1	2.4± 0.1	2.5 ± 0.1	2.3± 0.1	2.4± 0.1	2.4± 0.1

a, b means in the same row with different superscripts within each treatment differ significantly ($p< 0.05$).

Table 3: Effects of interaction between dietary protein, Lysine and TSAA (methionine + cystine) levels on average body weight and weight gain ($\bar{X}$ ± SE) of duckling during the starting period (1-35 days)

Periods (days)	Higher protein				Lower protein			
	Higher lysine		Lower lysine		Higher lysine		Lower lysine	
	Higher TSAA	Lower TSAA	Higher TSAA	Lower TSAA	Higher TSAA.	Lower TSAA	Higher TSAA	Lower TSAA
				Body weight				
1	79.1 ± 0.7	49.30± 0.70	48.7± 0.8	48.0± 0.6	49.9± 0.9	84.9± 0.7	48.7± 0.5	47.9± 0.5
21	433.2± 18.7^{d}	470.60 ± 16.90^{c}	427.9±19.1^{d}	495.5± 14.1^{b}	479.9± 16.3^{bc}	500.4± 16.4^{b}	522.1± 13.9^{a}	496.6± 12.8^{b}
28	788.0 ± 29.8^{de}	811.51 ± 31.64^{cd}	763.4 ± 36.2^{ef}	836.7± 21.2^{bc}	781.4± 23.2^{c}	876.6± 25.1^{a}	862.6± 22.5^{ab}	799.2 ± 23.7^{de}
35	1142.5± 33.9	1120.90± 39.60	1152.6 ± 53.0	1273.7± 32.0	1185.3± 30.7	1214.6± 30.8	1147.6± 31.4	1174.0± 34.8
				Weight gain				
(1-21)	384.0± 18.1^{d}	421.3± 16.2^{c}	379.1 ± 18.3^{d}	447.5± 13.5^{b}	430.0 ± 15.5^{bc}	451.4± 15.6^{b}	473.4± 13.4^{a}	448.7± 12.3^{b}
(1-28)	738.9± 29.2	762.2± 31.0	715.0 ± 36.2	764.8 ± 37.1	731.5± 22.6	827.7± 24.4	813.9 ± 22.0	799.2 ± 23.7
(1-35)	1093.4± 33.4	1072.4± 39.3	1103.4± 52.2	1227.8 ± 31.8	1135.4± 30.9	1165.7±30.8	1098.9± 31.4	1126.1± 34.8

a, b means in the same row with different superscripts within each treatment differ significantly (P< 0.05).

depressed feed intake followed by a retardation of growth. (D'Mello, 1994) Similar results were obtained by Dean and Shen (1981) who fed pekin ducklings on corn-soy diets provided with generous level of lysine and found that growth didn't improve by increasing lysine level to 1.20%. Wang *et al.* (2004) found that methionine supplementation to ducks diets; significantly improved the body weight at 21 days of age.

At 35 days of age, the highest body weight was obtained by group fed on diet contained 22% protein with 1.1% lysine and 0.83% TSAA

Body Weight Gain

Ducklings fed lower protein diet (20%) had significantly (P< 0.05) higher body weight gain as compared to those fed higher protein (22%) diet during the periods (1-21) and (1-28) days of age.

Dietary lysine level had no significant effects on body weight gain. However, lower TSAA level (0.83%) showed significant, (P < 0.05) increase (442.2g) weight gain, as compared to (416.6g) higher TSAA level (0.93%) at (1-21) days of age, (Table 2). Interaction between protein, lysine and TSAA are presented in Table 3. Ducklings fed on diet containing (20%) protein with (1.10%) lysine and (0.93%) methionine had significantly (P< 0.01) the highest weight gain (473.4 g) as compared to other experimental groups at (1-21) days of age, similar results were obtained by Lai-MingKueipolasek *et al.* (2003) who found that highest weight gain of pekin ducklinhgs was obtained when ducks fed lower protein diet supplemented with lysine and methionine at 1 to 21 days of age. That single amino acid supplementation of a low-protein diet is more effective in improving the amino acid balance than the supplementation of high-protein diets, resulting in a further decrease in requirements, (Hurwitz *et al.*, 1998).

Feed Intake

Dietary protein level had no significant effect on average feed intake of ducklings through out the starting period (1-35 days). Ducklings fed higher lysine diet (1.2%) were significantly (P< 0.05 or 0.01) more than those fed lower lysine level (1.10%) at (1-21 and 1-28) days of age, respectively. Ducklings fed lower TSAA (0.83%) diet had significantly (P< 0.05) higher (781.6g) feed intake as compared (697.2g) to those fed

higher TSAA diet (0.93%), as illustrated in Table 2. Interaction between protein, lysine and methionine are presented in Table 4.

Ducklings fed diet containing lower protein (20%) with higher lysine (1.20%) and lower TSAA (0.83%) had significantly ($P < 0.01$) the highest value at (1-21) and (1-28) days of age (Table 5). Similar results were obtained by Dean (1985) who reported that feed intake of meat type ducks was increased as the protein level decreased during the starting period.

Feed Conversion

Lower protein (20%) level caused a significant ($P< 0.01$) improvement in feed conversions (1.62 g diet/g gain) of ducks as compared to higher protein level (1.81) during the period (1-21) days of age. Also, lower lysine level (1.10%) caused significant ($P< 0.01$) improvement in feed conversions at (1-21) and (1-28) days of age. However, TSAA level had no significant effect on feed conversion throughout the experimental periods (Table 2).

Interaction between protein, lysine and TSAA levels are presented in Table 5. Feeding ducklings diet contained low protein (20%) with low lysine (1.10%) and higher TSAA; showed significant ($P < 0.01$) improvement in feed conversions at (1-21) and (1-28) days of age However, at (1-35) days. of age, ducklings fed diet contained (22%) protein with lower lysine (1.10%) and lower TSAA (0.83%) had significantly ($P < 0.01$) the lowest feed conversion value (Table 4). It's may reflect how imbalanced diets depressed feed intake followed by a retardation of growth.

Protein Efficiency Ratio (PER)

Results showed that PER of ducklings was increased significantly ($P<0.05$) as the protein level decreased during the starting period. Lower lysine level (1.10%) had significantly ($P < 0.01$) increased the PER of ducklings at (1-28) days of age. However, TSAA level had no significant effect on PER of ducklings during the starting period (Table 5). Ducklings fed diet containing lower protein (20%) with lower lysine (1.10%) and higher TSAA (0.93%) had significantly ($P < 0.01$) the highest value of PER at 1-35 days of age (Table 6). Similar results were obtained by Sonbol *et al.* (2001)

Table 4: Effects of interaction between dietary protein, lysine and TSAA (methionine + cystine) levels on average feed intake and feed conversions ($\bar{X}$ ± SE) of duckling during the starting period (1-35 days)

Periods (days)	Higher protein				Lower protein			
	Higher lysine		Lower lysine		Higher lysine		Lower lysine	
	Higher TSAA	Lower TSAA	Higher TSAA	Lower TSAA	Higher TSAA	Lower TSAA	Higher TSAA	Lower TSAA.
				Feed intake				
(1-21)	702.0± 0.8^{f}	771.9 ± 0.9^{c}	685.6±0.6^{g}	779.4 ± 2.0 b	767.1± 2.0^{d}	828.1 ± 1.5^{a}	634.4 ± 1.1^{h}	746.9± 1.1^{e}
(1-28)	945.6 ± 1.5^{f}	1080.1 ± 1.1^{b}	969.5 ± 2.1^{e}	981.9 ± 1.9d	1080.4± 0.4^{b}	1229.9± 1.4^{a}	1024.1 ± 1.5^{c}	938.6± 1.1^{g}
(1-35)	2445 5 ± 25.5^{e}	2949.5 ± 9.5^{a}	2886.8± 26.1^{b}	2595.5± 20.5 d	2817.7± 17.1^{c}	2899.5± 30.1^{b}	2439.6± 31.6^{e}	2569.9±30.4^{d}
				Feed conversion				
(1-21)	1.8 ± 0.1^{a}	1.8± 0.1^{a}	1.8 ± 0.1^{a}	1.8 ± 0.1^{b}	1.8± 0.1^{ab}	1.6± 0.1^{a}	1.3 ± 0.1^{d}	1.5±0.1^{c}
(1-28)	1.3± 0.1^{d}	1.4 ± 0.1^{c}	1.4 ± 0.1^{c}	1.3 ± 0.1^{d}	1.6± 0.1^{a}	1.5 ± 0.1^{b}	1.3 ± 0.1^{d}	1.2±0.1^{e}
(1-35)	2.2± 0.1^{d}	2.8 ± 0.1^{a}	2.6 ± 0.1^{b}	2.1 ± 0.1^{c}	2.5± 0.1^{c}	2.5 ± 0.1^{c}	2.2 ± 0.1^{d}	2.3 ± 0.1^{d}

a, b means in the same row with different superscripts within each treatment differ significantly (P< 0.05).

Table 5: Effects of protein, lysine and TSAA (methionine + cystine) levels on protein efficiency ratio (PER) ($\overline{X} \pm SE$), feed cost/kg. gain and final Margin of ducklings during the starting period (1-35 days)

periods	Protein level		Lysine level		TSAA Level	
(days)	22%	20%	1.20%	1.10%	0.93 %	0.83%
			PER			
(1-21)	1.26± 0.02^{b}	1.47 ± 0.09^{a}	1.32± 0.03	1.42 ± 0.10	1.34± 0.08	1.39± 0.07
(1-28)	1.72± 0.03^{b}	1.85± 0.08^{a}	1.67 ± 0.03^{b}	1.90 ± 0.07^{a}	1.76 ± 0.06	1.81 ± 0.08
(1-35)	1.89 ± 0.08^{b}	2.12 ± 0.04^{a}	1.93 ± 0.06	2.08 ± 0.08	2.01 ± 0.07	2.00± 0.08
			Feed cost/ kg gain			
(1-21)	1.48± 0.03^{a}	1.35 ± 0.11^{b}	1.57 ± 0.04^{a}	1.27 ± 0.08^{b}	1.34 ± 0.09	1.50 ± 0.06
(1-28)	1.48± 0.05^{b}	1.64 ± 0.13^{a}	1.75 ± 0.10^{a}	1.37 ± 0.04^{b}	1.55 ± 0.08	1.57 ± 0.12
(1-35)	7.45 ± 0.51	7.07 ± 0.34	7.77±0.38	6.75 ± 0.40	7.15 ± 0.42	7.37 ± 0.45
			Margin			
(1-21)	2.59 ± 0.10^{b}	3.27 ± 0.20^{a}	2.65 ± 0.10^{b}	3.22 ± 0.22^{a}	2.83 ± 0.22	3.04 ± 0.18
(1-28)	6.03± 0.13	6.20± 0.29	5.80± 0.20^{b}	6.42 ± 0.19^{a}	5.85 ± 0.23	6.37 ± 0.17
(1-35)	3.08 ± 0.64	4.25± 0.27	3.39 ± 0.41	4.64 ± 0.53	3.92 ± 0.41	4.11± 0.63

a, b means in the same row with different superscripts within each treatment differ significantly ($P < 0.05$).

Table 6: Effects of interaction between dietary protein, Lysine and TSAA (methionine + cystine) levels on protein efficiency ratio (PER) ($\bar{X}$ ± SE), feed cost /kg. gain and final Margin of duckling during the starting period (1-35 days)

Periods (days)	Higher protein				Lower protein			
	Higher lysine		Lower lysine		Higher lysine		Lower lysine	
	Higher TSAA	Lower TSAA	Higher TSAA.	Lower TSAA	Higher TSAA	Lower TSAA	Higher TSAA.	Lower TSAA.
				PER				
(1-21)	1.25± 0.05	1.25 ± 0.05	1.25 ± 0.05	1.30± 0.01	1.40± 0.01	1.37 ± 0.09	1.47 ± 0.38	1.66 ± 0.03
(1-28)	1.78 ± 0.01^{c}	1.61 ± 0.01^{d}	1.68 ± 0.06^{d}	1.83 ± 0.01^{c}	1.61 ± 0.02^{d}	1.68 ± 0.09^{d}	1.99± 0.03^{b}	2.13 ± 0.06^{a}
(1-35)	2.03 ± 0.01^{d}	1.65 ± 0.02^{f}	1.74± 0.08^{e}	2.15 ± 0.03^{c}	2.02 ± 0.01^{d}	2.01 ± 0.01^{d}	2.25 ± 0.01^{a}	2.19 ± 0.03^{b}
				Feed cost /kg gain				
(1-21)	1.45 ± 0.03^{cd}	1.57± 0.03b	1.40± 0.04^{d}	1..51 ± 0.01^{bc}	1..55± 0.01^{b}	1.70 ± 0.11^{a}	0.94± 0.01f	1.22 ± 0.03^{e}
(1-28)	1.38± 0.01^{e}	1.70 ± 0.02^{c}	1.49 ± 0.05^{d}	1.36± 0.01^{e}	1.90± 0.02^{b}	2.03 ± 0.11^{a}	1.43 ±0.03 de	1.20± 0.04^{f}
(1-35)	6.19 ± 0.11^{d}	9.01± 0.71^{a}	8.53 ± 0.45^{b}	6.08± 0.02^{d}	7.89± 0.02^{c}	8.01 ± 0.12^{c}	6.01 ± 0.06 e	6.37 ± 0.71^{d}
				Final margin				
(1-21)	2.39 ± 0.10^{d}	2.64 ± 0.12^{cd}	2.39 ± 0.16^{d}	2.96 ± 0.06^{b}	2.75 ± 0.02^{b}	2.82 ± 0.40^{bc}	3.79 ± 0.05 a	3.74 ± 0.14^{a}
(1-28)	6.01± 0.01^{cd}	5.92 ± 0.01^{cd}	5.66± 0.25^{d}	6.53 ± 0.03^{ab}	5.04 ± 0.09^{e}	6.25 ± 0.55^{bc}	6.71 ± 0.12 a	6.80± 0.26^{a}
(1-35)	4.74 ±0.06^{b}	1.72± 0.22^{e}	2.51 ± 0.84^{d}	6.19 ± 0.28^{a}	3.47 ± 0.17^{c}	3.65 ± 0.06^{c}	4..98 ± 0.14^{b}	4..90 ± 0.30^{b}

a, b means in the same row with different superscripts within each treatment differ significantly (P< 0.05).

who reported that ducklings fed lower protein diet had significantly high PER during the starting period.

Economical Efficiency

Feed cost/kg gain was increased significantly ($P < 0.05$) with increasing protein level and also with increasing lysine level to (1.20%). However, TSAA level had no significant effect on feed cost during the starting period (Table 5).

Final margin increased when ducklings fed low protein diet (20%). Also, the final margin increased with decreasing lysine level to (1.10%). While TSAA level had no significant effect on final margin during the starting period (Table 5).

The lowest feed cost /kg gain and the highest margin were recorded for the group fed diet contained lower protein (20%) with lower lysine (1.10%) and higher TSAA (0.93%) during the period from 1-21 and 1-28 days of age. However, during the period 1-35 days of age; the highest margin was recorded for group fed on diet contained higher protein (22%) with lower lysine (1.10%) and lower TSAA (0.83%) (Table 6). Similar results were obtained by Torkia (2002) who reported that feed cost significantly increased in hens fed diets contained high protein level with high lysine and methionine supplementation as compared with those fed high protein diet with low level of lysine and methionine.

Conclusion

It could be concluded that; feeding Muscovy ducklings diet contained either (20%) crude protein with (1.20%) lysine and (0.83%) TSAA or 22% protein, 1.10% lysine and 0.83% TSAA; may improve body weight, weight gain and feed efficiency during the starting period.

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تأثير مستوى البروتين، الليسين والأحماض الأمينية الكبريتية على معدل أداء البط المسكوفى خلال مرحلة البادئ

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أجريت هذه الدراسة على ٣٢٠ كتكوت بط مسكوفى عمر يوم ولمدة ٣٥يوم حيث قسمت الطيور عشوائيا إلى ٨ مجاميع تجريبية فى تصميم احصائى ٢×٢×٢ (بكل مجموعة ٤٠ طائر قسمت إلى مكررين بكل مكرر ٢٠ طائر).

اشتملت المجاميع على مستويين رئيسيين من البروتين المستوى الاعلى (٢٢%) أو المستوى الاقل (٢٠%). كل مستوى من البروتين تم تقسيمه إلى مجموعتين فرعيتين إما مستوىالليسين الاعلى (١,٢٠%) أوالليسين الاقل (١,١%) ثم قسمت مجاميع الليسين إلى مجموعتين إما المستوى الاعلى من الميثونين+السستين (٠,٩٣%) أو المستوى الاقل من مثيونين+سستين (٠,٨٠%).

ويمكن إيجاز أهم النتائج فى النقاط التالية:

- سجلت المجاميع المغذاة على البروتين الاقل (٢٠%) زيادة معنوية (P<0.05) فى الوزن الحى – تحسن فى معدل تحويل الغذاء – أعلى كفاءة استفادة من البروتين – أقل تكلفة للغذاء وأعلى عائد اقتصادى.
- سجلت المجاميع المغذاة على الليسين الاقل (١,١٠%) تحسن معنوى (P<0.05) فى الوزن الحى وأعلى زيادة وزنية – أقل مأكول – تحسن فى معدل تحويل الغذاء – أعلى استفادة من بروتين الغذاء – أقل تكلفة للغذاء مع تحقيق أعلى عائد اقتصادى.
- سجلت المجاميع المغذاة على الميثونين+السستين الاقل زيادة معنوية (P<0.05) فى الوزن الحى – أعلى زيادة وزنية وأعلى قيمة للمأكول من الغذاء ولم يظهر مستوى الميثونين+السستين أى تأثيرات معنوية على باقى المقاييس التجريبية.

مما سبق يمكن التوصية بعمل توليفة لتغذية البط المسكوفى خلال مرحلة البادئ (١-٣٥ يوم) تحتوى إما على مستوى بروتين ٢٠% مع مستوى ١,٢٠% من الليسين و٠,٨٣% من الميثيونين+السستين أو تحتوى على مستوى بروتين ٢٢% مع مستوى ١,١% ليسين و ٠,٨٣% من الميثيونين+السستين.