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The Effect of Feeding Increasing Levels of Synthetic Lysine and Methionine in Broiler Chicks

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Abstract: Four hundred day-old unsexed broiler chicks were used in the second experiment to determine the optimum level of lysine and methionine in broiler diet under Sudan condition. Chicks were randomly distributed to five treatments with eight replicates with ten chicks per each. Five isocaloric (3100kcal), isonitrogenous (22%) diets were formulated. Diet A (1.2% lysine + 0.49meth) without broiler supper concentrate, used as control, diet (B) similar to diet (A) but with broiler supper concentrate, diet C (1.3 lysine+ 0.56 meth), diet (D) (1.4 lysine + 0.6 %meth) and diet (E) (1.5% lysine + 0.63%meth). Results obtained revealed that group (E) positively significant ($P<0.05$) with other tested groups in feed intake and group (D) was significant ($P<0.05$) with group (A) and groups E, D and C showed significant increase compared with group A. The slaughter data showed that as the level of lysine and methionineincreased, eviscerated carcass weight, hot and cold dressing percentages and the yield of commercial cuts (breast, drumstick and thigh) increased significantly ($P<0.05$) compared to the control diet. The average meat yield from the commercial cuts increased significantly ($P<0.05$) with the increase of the synthetic lysine and methionine levels. The carcass chemical composition showed no significant difference ($P>0.05$). The marginal profit obtained from chicks fed on-diet (E) recorded the highest value followed by group D and diet A as the lowest marginal profit.

Key words:

INTRODUCTION

It is generally belived that the provision of amino acids, either free or, much more usually, in the form of protein, accounts for approximately aquarter of the cost of practical diets for poultry. The ideal diets should exactly satisfy the requirements of the target species for amino acids, to achieve the maximum economic return. All amino acids supplied by the dietary protein become available to the animal during digestion and metabolism. At the present time,depending on the nature of the ingredients, the only acknowledgement that is made to the availability of amino acids in commercial diet formulation is to increase their specifications by a small percentage.. It is more economically efficient to use lysine and DL-methionine as pure supplements in producing mixed feed for broiler production, rather than as components of intact protein. Anderson and Dobson[1] observed that addition of L-lysine to diets limited in this amino acid, not only improved growth but also appeared to participate in the chicks requirement for arginine. May and Vardaman[8], stated that the most essential amino acids that are likely to be deficient in poultry diets were lysine, methionine and cystine.. Many studies citing a positive correlation between dietary lysine level and breast muscle growth have compared diets deficient in protein and/ or lysine to adequate[3,12].

Quentin *et al.*,[9]. They concluded that a more concentrated starter diet persistently stimulated growth and breast development but might reduce the resistance of broilers to stresses. Hai and Blaha[5] reported that the decrease in dietary crude protein level had no negative effects on dressing percentage, muscle proportion in live weight and carcass proteins.

MATERIALS AND METHODS

Four hundred day-old unsexed (Ross308) broiler chicks were were randomly distributed to five treatments with 80 chicks per each, then each treatment was furtherly divided into eight replicates with ten (10) chicks per. Chicks were vaccinated against gumboro.

Five iso-caloric (3100kcal), iso-nitrogenous (22%CP) were formulated as follows:

Diet A (1.2% lysine+ 0.49meth) without broiler supper concentrate. Graded level of lysine and methionine were added to diets B,C,D,and E with supper concentrate (1.2% lysine +0.49% methionine), (1.3 lysine+ 0.56meth), (1.4 lysine + 0.6%meth) and

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Table 1: Composition,calculated and chemical of dietary ingredients used in experiment

Treatments	(A)	(B)	(C)	(D)	(E)
Ingredients					
Dura	64	64.573	64.431	64.289	64.142
Groundnut cake	17.3	11.0	11.0.	12.0	14.0
Sesame cake	14.63	18.0	18.0	17.0	15.0
Oyster shell	1.0	0.487	0.487	0.487	0.487
Super conc.	0.00	5.0	5.0	5.0	5.0
Salt	0.25	0.25	0.25	0.25	0.25
Bone meal	2.05	0.618	0.618	0.618	0.618
DL-Meth.97%	0.164	0.031	.072	0.113	0.159
L- Lysine 99%	0.606	0.041	0.142	0.243	0.344
Total	100	100	100	100	100
Calculated and chemical composition (%)of diets used					
ME	3108.47	3129.62	3124.74	3119.47	3113.66
Lysine	1.2	1.2	1.3	1.4	1.5
Methionine	0.49	0.52	0.56	0.597	0.63
Calcium (ca)	1.38	1.22	1.22	1.2	1.17
Phosphorus	0.66	.0.73	0.73	0.72	0.72
Chemical composition of experimental diets					
Dry mater	95.29	94. 7	94.7	94.00	95.3
Ash	6.4	6.0	6.1	6.1	4.3
Crude protein	22.04	221.9	22.01	22.5	22.53
Ether extract	6.2	6.2	6.4	5.0	3.8

(1.5% lysine +0.63% meth) respectively. Components, calculated and chemical composition of experimental diets was shown in Table (1).

Feed intake, live body weight, body weight gain,feed conversion ratio and mortalities were recorded weekly.

At the end of the experimental period, 8 chicks from each treatment were randomly chosen, weighed individually, slaughtered and processed to determine dressing percentage and carcass yield.

The carcasses were frozen at 4°C for 24 hours, reweighed then divided into commercial cuts which were deboned, then samples of skinless-boneless (breast, thigh and drumstick) meat were chemically analysed.The meat were cut into small pieces, minced twice in manual, then electric meat mincer, thoroughly hand mixed. The samples were stored for 24 hours in a refrigerator and duplicate samples were proximately analysed according to the A.O.A.C.[2].

RESULTS AND DISCUSSIONS

The increasing level of inclusion of lysine and methionine from 53%and 36% as it was shown in the control diet of experiment to 78% and 61% (Table 2) for lysine and methionine respectively in diet (E) result in asignificant increase in feed intake, body weight gain and feed conversion

From the results of the present study it can be concluded that adding increasing levels of L-lysine and DL-methionine to deficient diet in both essential amino acids caused a sequential growth response in broiler chicks performance (Table 3).

Table 2: % of the stander level of both amino acids in each of texperiment diet.

	B		C		D		E	
Ingredints								
Contribution	*Lysine%*	Meth.%	Lysine%	Meth.%	Lysine%	Meth.%	Lysine%	Meth.%
Dura	11.84	15.50	11.81	15.46	11.79	15.43	11.76	15.39
Ground N.cake	14.67	9.90	14.67	9.90	16.00	10.80	18.67	12.60
Sesame cake	19.50	43.20	19.50	43.20	18.42	40.80	16.25	36.00
Super conc.	50.0	30.00	50.00	30.00	50.00	30.00	50.00	30.00
Methionine	0.00	6.14	0.00	14.26	0.00	22.37	0.00	31.48
Lysine	3.35	0.00	11.60	0.00	19.85	0.00	28.09	0.00
Total	99.35	104.74	107.58	112.82	116.05	119.40	124.77	125.48
Plant protein	46.01	68.6	45.98	68.56	46.20	67.03	46.68	63.99
Conc.+synth.aa	53.35	36.14	61.6	44.26	69.85	52.37	78.09	61.48

Table 3: Effect of feeding on an increasing levels of synthetic lysine and methionine on the performance of broiler chicks.

Week Treatment	A	B	C	D	E	SE+
Initial weight (g/bird)	44.3	45.0	45.1	44.0	45.4	0.52
Final body weight (g/bird)	1080.76[a]	1806.75[b]	1828.31[b]	1834.93[b]	1940.0[b]	42.8
Av. body wt. Gain (g/bird)	1036.46[a]	1761.75[b]	1783.21[b]	1790.93[b]	1894.6[c]	25.79
Av. Feed intake (g/bird)	2401.83[a]	3497.02[b]	3539.52[b]	3460.54[b]	3848.15[c]	76.78
Feed conversion	2.32[a]	1.97 [b]	1.95 [b]	1.94[b]	1.93[b]	0.07
Mortality (%)	2.5	2.75	3.25	2.0	2.0	-

Table 4: Effect of feeding on increasing levels of synthetic lysine and methionine on yield of meat and bone from commercial cuts (as a percentage of its cuts)

Treatment Item	A	B	C	D	E	SEM+
Drumstick:						
Meat (%)	72.17[a]	76.54[a]	81.76[b]	78.67[a]	82.35[b]	1.43
Bone (%)	23.73[a]	23.46[a]	17.18 [b]	20.1 [b]	17.21 [b]	1.53
Breast:						
Meat (%)	77.01[a]	80.33[a]	85.84 [b]	86.55 [ab]	86.89[b]	1.46
Bone (%)	18.31[a]	18.23[a]	12.88 [b]	13.03[b]	12.36[b]	1.0
Thigh:						
Meat (%)	78.36[a]	78.95[a]	78.39[a]	81.32[b]	82.07[b]	0.88
Bone (%)	18.76[a]	17.07[a]	16.85[a]	14.7[b]	13.41[c]	0.67

Means in a raw followed by the same letter not differ significantly

Table 5: Chemical composition (%) of carcass meat analysis of broiler chicks fed on increasing levels of synthetic lysine and methionine.

Treatments *Ingredients*	(A)	(B)	(C)	(D)	(E)
Dry matter	31.9	29.8	31.6	30.3	30.0
Ash	0.65	0,70	0.6	0.50	0.55
Crude protein	20.13	22.34	21.04	21.44	21.34
Ether extract	8.99	8.66	8.99	8.17	7.66

The increase in the level of synthetic amino acids in broiler diets resulted in an increase in meat yields from breast, drumstick and thigh, so the birds which were fed on diets E, D and C, were significantly more ($P<0.05$) for meat of commercial cuts (Table 4),. the level of synthetic amino acids did not affect in carcass chemical composition Table (5).

The marginal profit obtained from chicks fed on diet (E) recorded the highest value, followed by diet (D) and diet (A) as the lowest marginal profit.

Discussion: Data obtained from the experiment revealed that, chicks fed the diet contained 1.5% lysine + methionine 0.63% (E) recorded the highest values for feed intake, average live body weight and body weight gain, this may be due to high digestibility and more availability of synthetic lysine and methionine. These findings were in line with those of Velu *et al.*, [13]; and El Amin and El zubeir[4]. Who reported that increasing the dietary level of lysine or its consumption caused a progressive and significant increase ($P<0.05$) in weight gain and the daily feed intake. The results obtained showed that the breast meat yield was affected positively significant ($P<0.05$) with the increasing of synthetic lysine and methionine in the diet Table (4). These findings were in line with those of Rezaei *et al.*[10] and Schutte *et al.*, [11], They reported that addition of DL-methionine at 0.05% to the basal diets caused a significantly higher percentage of breast meat yields in broiler. Mack *et al.*[6], found that the coefficient of variation for body weight and breast meat weight decreased with increasing dietary methionine level.

It is economically efficient to use lysine and methionine as pure supplements in producing mixed feed for broiler production. From the above data it can be concluded that with the increasing the level of synthetic amino acids in the broiler diet, chicks performance approved also it was apparent that amino acids could be effective replacer of concentrate in broiler diets.

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