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Effect of Amino Acids Supplementation to Marginally Deficient Local Broiler Chick Diets

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ABSTRACT: One hundred day-old unsexed broiler chicks (Ross 308) were used. Five experimental diets (A, B, C, D and E), based on cereal grains were formulated. Diet A (basal diet used) was found deficient in lysine , methionine and phosphorus according to the recommended levels by NRC (1994) ,diet B was supplemented with phosphorus only ,diet C with methionine , diet D with lysine only and diet E with both lysine and methionine .All diets were isonitrogenous (22%) and isocaloric (3200 kcal ME).

Chicks fed on diets E and D showed significant ($p<0.05$) increase in average live body weight and body weight gain throughout the feeding period .Chicks in group C showed significant ($p<0.05$) more compared with control group A during the 3[th] and 5[th] weeks .Feed intake for group A showed significant ($p<0.05$) low compared to other group .

The tested groups did not differ significant ($p>0.05$) on hot and cold carcass dressing percentages, commercial cuts, meat percentage of those selected cuts, non-carcass body components (liver, heart, head and gizzard) and average subjective meat quality scores, colour, tenderness, flavour and juiciness.

The objective of this experiment is: to determine the deficiency of amino acids lysine and/or methionine in our locally used diet for broiler chicks.

KEYWORDS: carcass dressing percentages, isonitrogenous, isocaloric, broiler chicks.

INTRODUCTION

Most of the broiler diets used were deficient in essential amino acids, namely lysine and methionine, as the grains and plant protein sources (which were both qualitatively and quantitatively deficient in essential amino acids) are considered the main components of these diets .The deficiency or unavailability of amino acids lead to growth depression (Squibb and Brahman, 1955).

May and Vardaman (1972) stated that the most essential amino acids that are likely to be deficient in poultry diets were lysine, methionine and cystine. Labadan *et al*. (2001) determined lysine requirements for broilers up to two weeks of age to be 1.32% compared to 1 .10% recommended (NRC, 1994).Some researchers suggest that the lysine requirement has increased over time (Si, *et al*., 2001), (Salbery *et al*,(1971)) examined the effect of feeding a diet marginally deficient in methionine to chicks ,compared to methionine supplemented diets . They reported that methionine deficient diets increased feed intake, decreased feed conversion efficiency, decreased nitrogen retention and increased uric acid excretion .Skinner *et al*. (1991) reported that broiler feed consumption increased and feed conversion ratio decreased as amino acids level of the diet decreased.

The objective of this experiment is to determine whether lysine, methionine or both essential amino acids are required to supplement the marginally deficient locally formulated broiler diets. .

MATERIALS AND METHODS

One hundred day-old unsexed broiler chicks, Ross 308, vaccinated against Gumboro disease 12 days of age, were used. All chicks were individually weighed, banded, with different colors, and randomly allocated to five treatments. Each treatment was further subdivided into four replicates with five chicks each.

Five experimental diets A, B, C, D and E were formulated .The percent inclusion rate, caculated and analysed chemical composition of the experimental diets are shown in Table1.Diet A (control) was the basal diet used . Diets B, C, D and E were the basal diet supplemented with phosphorus, phosphorus plus methionine and phosphorus plus both methionine and lysine respectively up to recommended levels by NRC (1994). Chicks of each replicate were individually weighed weekly and feed consumption was determined weekly.

At the end of the feeding period (7 weeks) four (one/replicate) randomly selected from each treatment, individually weighed after an overnight fast, except for watere,slaughtered, scalded and washed. After evisceration, the hot carcass, head, legs, liver, heart, and gizzard, were separately weighed, and then the carcass was frozen at 4c° for 24 hours before further preparation.

The cold carcass was weighed and divided into two halves. The left half was separated into commercial cuts, thigh, drumstick and breast. Each cut was weighed separately and deboned. Meat samples each

cut were subjected to organoleptic tests and chemical analyses (A.O.A.C., 1975).
The completely randomized design (CRD) was used. Data collected were subjected to analysis of variance (One-way ANOVA), and the averages were compared using Duncan's multiple range tests (Duncan, 1955).

Table (1): Percent formula(fresh basis), calculated and analysed chemical composition (dry matter basis) of experimental diets:

	A	B	C	D	E
Dura	65.75	65.00	65.00	65.00	64.95
Ground nut meal	13.00	13.00	13.00	13.00	13.00
Sesame meal	15.00	15.00	15.00	15.00	15.00
Super concentrate*	5.00	5.00	5.00	5.00	5.00
Oyster shell	1.00	0.41	0.38	0.36	0.38
Salt	0.25	0.25	0.25	0.25	0.25
Bone meal	-	1.34	1.34	1.34	1.34
DL-met.98%	-	-	0.32	-	0.32
L-lys.99%	-	-	-	0.05	0.05
Total	100	100	100	100	100
Component chemical composition					
ME	3133.11	3125.64	3125.64	3125.64	3123.92
Lysine	1.148	1.146	1.146	1.196	1.195
Methionine	0.47	0.47	0.50	0.47	0.50
Calcium	1.18	1.34	1.34	1.34	1.34
Phosphorus.	0.65	0.79	0.79	0.79	0.79
Crude protein	22.6	22.85	22.85	22.85	22.84
Analyzed chemical composition					
Dry matter	93.61	93.67	93.7	93.98	93.6
Ash	11.8	10.6	11.01	10.74	9.28
CP	22.0	21.9	20.9	19.9	19.6
Ether extract	3.2	3.4	3.3	3.5	3.1

***Supper concentrate (LNB): CP 40%.: "ME 2000kcal/kg, Ca=8- Lysine=12% -Methionine=3% -Phos. total=8%Vit 12500iu –VitD3 2500iu- Vit E 25mg/kg- Vit C 4000 mg/kg- VitB1 20 mg/kg- VitB2 100 mg/kg - VitB12 300 mcg/kg –Vit .k3 60 mg/kg –Iron 800 mg/kg-Folic acid 30 mg/kg-Choline 10000 mcg/kg- VitB640 mg/kg –Biotine Mcg/kg**

RESULTS AND DISCUSSION

The local diet used for broilers was found marginally deficient in amino acids despite the addition of the 5% imported broiler super concentrate (Table 1). The supplementation of the synthetic lysine and metionine with or without the super concentrate supported the performance of broiler chicks (Table 2). The addition of both synthetic amino acids resulted in a significant improvement ($p<0.05$) in final body weight and weight gain compared to the control diet. Chicks fed on diet E grew more rapidly and gained more compared to other test groups. For feed conversion ratio group D recorded the best significant ($p<0.05$) value compared to other test groups.

Table (2): Average performance values of experimental broiler

Item	A	B	C	D	E	SEM^{+-}
Final body (wt. g/bird)	1932.9^{a}	2126.8^{ab}	2164.6^{ab}	2235.4^{b}	2241.3^{b}	40.58
Feed intake (g/bird)	3520.8^{a}	3647.5^{a}	3757.9^{b}	3789.6^{a}	3863.3^{a}	86.5
Body wt. gain (g/bird)	1802.2^{a}	2014.6^{b}	2035.8^{b}	2122.3^{a}	2127.1^{b}	61.78
FCR	2.1^{a}	1.84^{b}	1.87^{b}	1.83^{b}	1.84^{b}	0.04

Averages not bearing the same letter designation differ significantly ($p<0.05$).

These performance results were inline with findings of Lubna and Elzubeir (1995).

The completion of lysine and/or methionine did not affect significantly ($p>0.05$) meat yield value from the commercial cuts (Table 3).Results meat yield of these selected carcass cuts was higher (p>0.05) in groups D and E compared to the control.

Table 3: Average percent values of carcass cuts and tissues percent values of each cut of experimental broiler chicks All averages are similar (p>0.05).

	A	B	C	D	E	SEM+-	F-value
Hot carcass weight (kg)	1352.5	1487.5	1455.0	1487.5	1427.5 [a]	720.85	0.94
Breast %	27.48	28.47	28.45	29.54	30.37 [a]	1.54	0.52
Meat%	88.99	85.7	88.22	89.82	90.78	1.13	2.82
Bone %	11.01	14.3	12.88	10.18	9.21	1.14	2.81
Drumstick	12.64	12.47	13.9	12.21	13.16 [a]	0.73	0.34
Meat%	71.35	72.94	72.27	75.39	74.67	3.42	0.22
Bone %	22.58	27.06	17.18	24.62	25.33	1.98	0.9
Thigh	14.78	14.[4]	13.91	13.8	13.46 a	1.02	0.26
Meat%	82.4	78.7	81.07	84.15	84.2	2.9	0.64
Bone %	17.6	21.1	18.93	15.85	15.8	2.99	0.56

Results also were in agreement with the findings of John (2004), who reported that the breast meat yield was little affected by diet composition .Also Virtanen and Rosi (1995) found that DL-methionine did not affect positively on breast meat.

No significant (p>0.05) difference was found between treatments on non-carcass components (liver, heart, head, and gizzard) table 4.The percentage of commercial cuts (thigh, drumstick and breast) and the hot were not significant (p>0.05). These results were inline with the findings of Elsnhoori (2004), who reported that these parameters were not affected by the diet contents.

Table (4): Effect of different dietary treatments on non-carcass components expressed as percentage final body weight

Components	Heart	Liver	Gizzard	Head	Legs
Diet A	0.71	3.16	3.83	3.64	4.78
Diet B	0.73	3.31	3.63	3.76	4.95
Diet C	0.68	2.79	3.45	3.74	5.62
Diet D	0.68	3.22	4.17	3.87	4.93
Diet E	0.75	3.17	4.23	3.77	5.08
SEM+-	0.16	0.18	0.35	0.14	0.48
F-value	0.44	1.23	0.98	0.38	0.46

All averages are similar (p>0.05).

Table 5 showed the carcass meat chemical composition values. There were no significant differences (p>0.05) between treatments in carcass crude protein.

Table 5: Proximate perc ent composition of total lean of experimental broiler chicks.

Component	A	B	C	D	E
Dry matter	26.13	31.5	26.59	27.79	25.96
Ash	0.75	1.10	0.60	1.05	1.10
Crude protein	19.1	18.5	18.26	17.4	18.25
Ether extract	1.05	1.15	1.30	1.05	1.10
N-free extract	05.23	10.75	6.43	8.29	5.51

All averages chemical components were similar (p>0.05).

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