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CARCASS CHARACTERISTICS, HAEMATOLOGY AND SERUM BIOCHEMISTRY OF BROILER CHICKENS FED YELLOW MAIZE SUPPLEMENTED WITH GRADED LEVELS OF SYNTHETIC METHIONINE

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Abstract

Eight weeks feeding trials involving 300 (three hundred) broiler chicks was carried out in a completely randomized design. The birds were divided into five (5) groups of 60 birds per treatment, represented as T_1, T_2, T_3, T_4 and T_5 respectively, and replicated into 3 of 20 birds per replicate. Yellow maize was used supplemented with synthetic methionine at 0.1, 0.2, 0.3, 0.4 and 0.5% for T_2, T_3, T_4 and T_5 respectively. Water and feed were given ad-libitum. Carcass yield and internal organs result showed no significant differences ($P>0.05$) except in plucked weight, eviscerated weight, chest and abdominal fat ($P<0.05$). As for haematological indices, there was also no significant ($P>0.05$) difference except in MCV, while the serum biochemical was not significantly ($P>0.05$) affected by the diet for all the parameters measured. Monocytes, lymphocytes and Eosinophil slightly increased with increased levels of methionine. The result revealed that there is slight increased in body weight with increased inclusion of methionine. The result suggests that 5% inclusion of synthetic methionine could be used in broiler feed successfully without deleterious effect.

Key words: Broiler chickens, carcass, haematology, methionine, yellow maize

Introduction

The place of energy requirement in poultry production cannot be over-emphasized in poultry nutrition. Energy is used for the provision of body heat, maintenance, growth and production (Inaku *et al*., 2011). The other dietary nutrients usually vary in relation to dietary energy content of the diet if they are to become deficient with low feed intake or consumed more with lower energy diet. Energy needs, and consequently feed intake also vary considerably with environmental temperature and amount of physical activity. Maize is the most widely used cereal grain in poultry feeding around the world and its regarded as possessing better nutritional attributes than other grains (Ajaja and Aleto, 2011). Although white maize is more popular in most households, few known that yellow maize is more nutritious than white maize. According to Aduku (2004), maize is an excellent and most popular source of energy and that white and yellow maize exist, but yellow maize (which is being considered here) is preferred for animals because it contains cryptoxanthin, which is a precursor of vitamin A, it is low in crude protein (8-9%), crude fibre (2.7%) and calcium. One large cob of boiled yellow maize contain almost 4g of protein, 3.5g of dietary fibre, about 30g of carbohydrates, 1.5g of fat and 3.6g of sugar and 100 grams of water.

Materials and Methods

The study was carried out at the poultry unit of Teaching and Practical Farm of Taraba State College of Agriculture, Jalingo. Three hundred (300) unsexed, day old Anak white broiler chicks were obtained from a reputable hatchery and used for the experimental. Birds were randomly allotted to five (5) experimental diets of 60 birds each on a three (3) replicates of 20 birds each. Five experimental diets were formulated to meet the nutrient requirement of broilers. Yellow maize was supplemented with graded levels of synthetic methionine at 0.1, 0.2, 0.3, 0.4 and 0.5% for the treatments 1, 2, 3, 4 and 5 coded T_1, T_2, T_3, T_4 and T_5 respectively. At the end of the experiment which lasted for 8 weeks, six (6) birds were randomly

selected from each treatment, two (2) per replicate and used for carcass and haematological evaluation. All data generated were subjected to analysis of variance (ANOVA) using the general linear model (15) and significant difference between treatment means were separated using the Duncan's Multiple Range Test (1995).

Results and Discussion

Ingredient composition of broiler starter and finisher diets are shown in Tables 1 and 2.

Table 1: Ingredients Composition of Broiler Starter Diets (1-4 Weeks) Containing yellow maize Supplemented with varying Levels of methionine (%)

	Diets				
Ingredient	**T1 (0.1%)**	**T2 (0.2%)**	**T3 (0.3%)**	**T4 (0.4%)**	**T5 (0.5%)**
Yellow Maize	47.10	46.96	46.82	46.69	46.57
Soya bean	33.60	33.64	33.68	33.71	33.73
Wheat offal	10	10	10	10	10
Methionine	0.1	0.2	0.3	0.4	0.5
Fish Meal	5	5	5	5	5
Bone Meal	2	2	2	2	2
Lime Stone	1.5	1.5	1.5	1.5	1.5
Salt	0.25	0.25	0.25	0.25	0.25
Premix*	0.25	0.25	0.25	0.25	0.25
Lysine	0.2	0.2	0.2	0.2	0.2
Total	**100**	**100**	**100**	**100**	**100**
Calculated analysis					
Crude Protein	23.03	23.00	23.00	23.00	23.00
ME/kcal/kg	2927.09	2921.05	2917.48	2913.95	2910.44
Crude fibre (%)	3.83	3.82	3. 82	3. 82	3. 82
Calcium (%)	1.61	1.61	1.61	1.61	1.61
Phosphorous (%)	0. 82	0. 82	0. 82	0. 82	0. Lysine (%)
1.46	1.49	1.41	1.41	1.47	
Methionine (%)	0.56	0.58	0.56	0.59	0.58

*Vitamin-mineral premix provided per kg; Vit. A 1500 IU; Vit.D_3 3000 IU; Vit.E 30 IU; Vit. K 2.5mg; Thiamine B_1 3mg; Riboflavin B_2 6mg; Pyrodoxine B_6 4mg; Niacin 40 mg; Vit. B_{12} 0.02mg; Pantothenic acid 10mg;Folic acid 1mg; Biotin 0.08mg; Chloride 0.125mg; Mn 0.0956g; Antioxidant 0.125g; Fe 0.024g; Cu 0.006g; 10.0014g; Se 0.24g; Co 0.240g

Table 2: Ingredients Composition of Broiler Finisher Diets (5 - 8 Weeks) Containing yellow maize Supplemented with varying Levels of methionine (%)

	Diets				
Ingredient	**T1 (0.1%)**	**T2 (0.2%)**	**T3 (0.3%)**	**T4 (0.4%)**	**T5 (0.5%)**
Yellow Maize	53.09	52.97	52.82	52.70	52.56
Soya bean	22.61	22.63	22.68	22.70	22.74
Wheat offal	13. 00	13. 00	13. 00	13. 00	13. 00
Methionine	0.1	0.2	0.3	0.4	0.5
Fish Meal	5	5	5	5	5
Palm Oil	2	2	2	2	2
Bone Meal	2	2	2	2	2
Lime Stone	1.5	1.5	1.5	1.5	1.5
Salt	0.25	0.25	0.25	0.25	0.25
Premix*	0.25	0.25	0.25	0.25	0.25
Lysine	0.2	0.2	0.2	0.2	0.2
Total	**100**	**100**	**100**	**100**	**100**
Calculated analysis					
Crude Protein	20.00	20.00	20.00	20.00	20.00
ME/kcal/kg	2990.98	2987.48	2982.33	2980.38	2976.81
Crude fibre (%)	3.42	3.42	3.42	3.41	3.41
Calcium (%)	1.61	1.61	1.61	1.61	1.61
Phosphorous (%)	0.79	0.79	0.74	0.76	0.74
Lysine (%)	1.18	1.18	1.18	1.18	1.18
Methionine (%)	0.55	0.55	0.55	0.55	0.55

*Vitamin-mineral premix provided per kg; Vit. A 1500 IU; Vit.D_3 3000 IU; Vit.E 30 IU; Vit. K 2.5mg; Thiamine B_1 3mg; Riboflavin B_2 6mg; Pyrodoxine B_6 4mg; Niacin 40 mg; Vit. B_{12} 0.02mg; Pantothenic acid 10mg;Folic acid 1mg; Biotin 0.08mg; Chloride 0.125mg; Mn 0.0956g; Antioxidant 0.125g; Fe 0.024g; Cu 0.006g; 10.0014g; Se 0.24g; Co 0.240g

The nutrients requirement such as crude protein, crude fat and energy as recommended by Akimutimi (2011) for straight line diet for effective broiler production in the tropics were met.

Live weight (g)	1823.00	1843.33	1840.00	1893.33	1986.66	29.75^{NS}
Plucked weight (g)	1666.33^{c}	1683.33^{b}	1646.66^{c}	1713.33^{b}	1791.66^{a}	25.33*
Eviscerated weight(g)	1459.66^{c}	1503.33^{b}	1476.66^{c}	1543.33^{b}	1611.667^{a}	27.14*
Carcass weight (g)	1332.33	1363.33	1336.66	1413.33	1471.66	26.34^{NS}
Dressing %	73.04	73.93	72.63	74.61	74.07	0.36^{NS}
% of liveweight						
Back	6.42	5.66	6.10	6.07	5.99	0.12^{NS}
Chest	9.63^{b}	10.22^{a}	9.58^{b}	9.14^{c}	10.18^{a}	0.20*
Wings	15.38	13.69	13.79	14.98	14.49	0.32^{NS}
Thighs	13.70	13.33	12.48	12.90	12.18	0.27^{NS}

Drum sticks	6.05	6.03	5.93	5.46	5.08	0.19 NS
Shanks	2.55	2.47	3.16	2.21	2.38	0.16 NS
Gizzard	0.67	0.45	0.52	0.54	0.53	0.03 NS
Kidney	2.56	2.34	2.16	2.12	2.67	0.10 NS
Liver	0.72	0.71	0.65	0.49	0.71	0.04NS
Lungs	0.14	0.24	0.11	0.14	0.15	0.02 NS
Spleen	0.62	0.62	0.58	0.64	0.59	0.01 NS
Abdominal fat	0.76^{c}	1.03^{a}	0.82^{b}	0.96^{b}	0.87^{ab}	0.05*
Pancrease	0.18	0.19	0.16	0.19	0.20	0.01 NS

Table 3: Carcass Yield and Internal Organs Characteristics of Broiler Chickens fed Yellow Maize Supplemented with Graded Levels of Synthetic Methionine

^{abc}Means with different superscript differed significantly (P<0.05), SEM = standard error of mean

Table 3 represents carcass yield and internal organ characteristics. Most of the parameters measured were not significantly (P>0.05) different across the treatment except the plucked weight, eviscerated weight, wings and abdominal fat that were significantly (P<0.05) different. As it can be observed, liveweight increased slightly with increased inclusion levels of methionine from T1 – T5. This concurred with Krogal and Sell (1985) who reported that increased in methionine intake resulted in a higher body weight, hence the increased liveweight.

Blood parameters were also affected by the dietary treatments. Aletor and Egberongbe (1992) indicated that the blood variables most consistently affected by dietary influences include RBC, PCV, plasma protein and glucose. Haematological and serum biochemical indices were as presented in Tables 4 and 5.

Table 4: Haematological Indices of Broilers Chickens fed Yellow Maize Supplemented with Graded Levels of Synthetic Methionine

	Diets					
Parameters	T1 (0.1)	T2(0.2)	T3(0.3)	T4(0.4)	T5(0.5)	SEM
PCV (%)	27.00	27.00	27.00	28.83	29.33	2.15^{NS}
TWBC (x10^{9}/L)9.27	9.07	8.60	8.77	9.40	0.84^{NS}	
RBC (x10^{12}/L)	4.53	4.50	4.70	4.50 4.90	0.36 ^{NS}	
Hb (g/dl)	8.97	8.97	9.40	9.00 9.77	0.72^{NS}	
MCH (Pg)	19.93	19.61	20.08	20.00	19.53	0.32^{NS}
MCHC (%)	33.21	33.33	33.31	33.33	33.29	0.32^{NS}
MCV (fL)	59.53^{a}	60.03^{b}	60.30^{b}	60.30^{b}	59.87^{ab}	0.15*
WBC Types						
Heterophil (%) 29.16	25.26	24.63	25.26	27.40	1.84NS	
Monocytes (%) 2.63	3.01	2.98	3.41	3.82	2.13 NS	
Lymphocytes (%)	70.00	73.56	79.00	77.36	70.23	3.88NS
Eosinophil (%) 1.67	1.82	1.95	2.33	2.31	0.28NS	

a,b,c = Means with different superscripts on the same row are significantly different; * = Significant (P<0.05); NS=Not significant (P>0.05); SEM=Standard Error of Means; PCV = Packed Cell volume ; RBC = Red Blood cell ; WBC= White blood cell; MCV =Mean Corpusular volume; MCHC = Mean corpuscular Haemoglobin concentration ; MCH =Mean Corpusular Haemoglobin

Table 5: Serum Biochemical Indices of Broilers Chickens fed Yellow Maize Supplemented with Graded Levels of Synthetic Methionine

Parameter	T1	T2	T3	T4	T5	SEM
Total Protein	34.30^{a}	33.07^{a}	30.23^{c}	32.40^{b}	34.23^{a}	0.65
Albumin	20.30^{b}	20.27^{b}	17.07^{c}	20.77^{b}	22.93^{a}	0.52
Globulin	13.67^{a}	12.80^{b}	12.83^{b}	11.63^{c}	11.30^{c}	0.18
Cholesterol	3.70^{a}	3.60^{b}	3.40^{c}	3.70^{a}	3.30^{d}	0.06
Glucose	11.07^{ab}	11.40^{a}	10.47^{b}	10.23^{b}	10.17^{b}	0.31

Urea	0.90[a]	0.87[a]	0.70[b]	0.73[b]	0.80[ab]	0.07
Creatine	12.60[a]	12.83[a]	10.07[b]	10.30[b]	11.30[ab]	0.98

[abc]Means with different superscript differed significantly (P<0.05), SEM = standard error of mean

The serum biochemicals were all significantly (P<0.05) different, which agrees with Pue (2016) and Danladi (2015).

Conclusionand Recommendations

The study showed that dietary inclusion of methionine increased liveweight and carcass weight, also increased immunity status of birds. Thus, farmers can use synthetic methionine to increase body weight and improve immunity of broiler chickens.

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