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THE EFFECTS OF DIFFERENT DIETARY CRUDE PROTEIN AND METABOLIZABLE ENERGY LEVELS ON THE PERFORMANCE OF NOILER BIRDS

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Abstract

Noiler chickens are becoming increasingly popular, yet detailed information about their specific nutritional needs remains limited. This study examined the effects of different crude protein (CP) levels, metabolizable energy (ME), and their combination on the performance and nutrient utilization of Noiler chickens. A total of 144-day-old Noiler birds were randomly assigned to a 2 × 4 factorial design with two energy levels (2700 and 2900 kcal ME/kg DM) and four CP levels (15, 17, 19, and 21%). Eighteen chicks were assigned to each diet, with three replicate groups of six chicks. The initial weights of the chicks in each pen were recorded before starting the experiment. Feed and water were provided freely throughout the study. All data were analyzed using analysis of variance (ANOVA) in a completely randomized design with a 2×4 factorial arrangement, and the means were separated using Tukey's HSD test in SAS. Results showed no significant differences ($P<0.05$) in dietary energy levels at final weight, feed intake, FCR, or energy × CP interactions at different levels. Noiler chicks fed with 15% CP are recommended because they exhibited better final weight, body weight gain, and FCR.

Keywords: Noiler Broiler, Metabolizable energy, Crude protein levels, Dietary formulation, Growth performance

Description of Problem

There is increasing interest in sustainable poultry production in developing economies (1). This growing interest is important because the demand for more animal meat is rising as the human population expands. In Nigeria, local chickens are commonly found in rural areas, where residents keep them mainly as sources of protein and income (2). The productivity of these local chickens is lower compared to a commercial breed of chicken. Noilers are a crossbreed of broiler chickens and local Nigerian chickens. They are a dual-purpose breed developed by Amo Farm Sieberer Hatchery Limited. It was created mainly for smallholder farmers to help reduce food insecurity and is suitable for rural, semi-intensive, and moderate-input production systems (3). They are widely recognized for their high disease resistance, adaptability, and efficiency in producing both meat and eggs.

According to (4), different classes of poultry have varied dietary protein and energy needs depending on their environment. However, even though Noiler chickens are becoming more popular, detailed information about their specific nutritional requirements remains limited. Unlike commercial broilers, which have well-established feeding standards, Noilers are often fed based on general assumptions or broiler-based formulas that may not match their genetic makeup or growth rate. Therefore, this study investigates how different levels of dietary crude protein and metabolizable energy affect the performance of Noiler birds.

Materials and Methods

This experiment was conducted at the poultry unit of the University Teaching and Research Farms, Faculty of Agriculture and Agricultural Technology, Benson Idahosa University, Benin City, Edo State.

Preparation of Diets

One hundred forty-four (144) healthy, unsexed, day-old Noiler chicks were used for the experiment. The brooder house and the 24 pens were cleaned, disinfected, and lined with fresh litter (wood shavings) 0.04 m deep. The chicks were brooded for four weeks using incandescent

bulbs at a temperature of 35°C during the first week, with the temperature gradually decreasing each week until the birds were fully feathered. After week four, the Noiler chicks were randomly assigned to their respective pens. The experimental design was a factorial setup arranged randomly, with two energy levels and four protein levels. Eighteen chicks (18) were assigned to each diet, with three replicate groups of six chicks each. The initial weights of the chicks in each pen were recorded before starting the experiment. Feed and water were provided freely throughout the study.

Data Collection

Daily feed intake was calculated as the difference between the feed offered and the leftover in the pen. This was accumulated to determine the total feed consumed per week. The birds were weighed at the start of the experiment to record the initial weight and again at the end of each week. The body weight gain was then calculated as Body weight gain (kg) = Final weight – Initial weight. All data obtained were subjected to analysis of variance (ANOVA) in a completely randomized design with a 2×4 factorial arrangement, and the means were separated using Tukey's HSD test in SAS (2012).

Table 1: Gross Composition of Experimental Noiler Growers' Diets (5-8 Weeks)

	2700kcal/kg ME				2900kcal/kg ME			
	15%CP	17%CP	19%CP	21%CP	15%CP	17%CP	19%CP	21%CP
INGREDIENTS	T1	T2	T3	T4	T5	T6	T7	T8
Maize	65.00	60.00	57.00	54.00	71.20	68.00	65.00	61.00
SBM	5.00	10.00	16.50	22.50	4.00	10.00	15.15	22.00
Fish Meal	3.00	4.00	4.00	4.00	4.00	4.00	5.00	5.00
Wheat Bran	23.65	22.65	19.15	16.15	17.45	14.65	11.50	8.65
Limestone	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Bonemeal	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Vit. Premix	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Lysine	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Methonine	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
TiO2	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
CP (%)	15.15	17.35	19.38	21.27	15.03	16.93	19.07	21.25
Ether Extract (%)	4.52	4.52	4.31	4.12	4.69	4.50	4.49	4.28
Crude Fibre (%)	4.08	4.03	3.78	3.57	3.50	3.31	3.07	2.88
ME (kcal/kg)	2709.94	2682.34	2707.01	2724.50	2852.39	2865.30	2885.60	2892.41
Ca (%)	0.21	0.28	0.29	0.31	0.26	0.27	0.34	0.35
P (%)	0.52	0.57	0.58	0.58	0.51	0.52	0.55	0.57

[1]*Composition of vitamin premix per kg of diet: vitamin A, 12500 I.U; vitamin E, 40mg; vitamin K, 2mg; vitamin B1, 3mg; vitamin B2, 5.5mg; niacin, 5.5mg; calcium pantothenate, 11.5mg; vitamin B6, 5mg; vitamin B12, 0.025mg; choline chloride, 500mg, folic acid,1mg; biotin, 0.08mg; manganese, 120mg; iron 100mg; zinc, 80mg; copper, 8.5mg; iodine, 1.5mg; cobalt, 0.3mg; selenium, 0.12mg, anti-oxidant, 120mg,*

Results and Discussion

Table 2 shows significant (P<0.05) differences in the dietary energy levels at initial weight, as well as different CP levels at initial and final weight. However, there were no significant differences (P<0.05) in dietary energy levels at final weight, feed intake, FCR, or energy x CP interactions at different levels.

Feeds are chemical substances given to animals for nutrition, hunger relief, and growth. They mainly consist of proteins and energy to support specific bodily functions (5). The results of this

experiment contradict the research of (6), who found no significant (P>0.05) difference in the initial weight of Noiler birds fed graded levels of maize. The findings also conflict with the results of (7), who observed no significant (P>0.05) differences in initial weight gain among Noiler birds fed different treatment levels (2600 ME / 21 CP, 2700 ME / 22 CP, 2800 ME / 23 CP, 2900 ME / 24 CP). The reasons for these differences could be attributed to the starter diet provided. It is worth noting that there was no significant interaction effect between dietary energy and protein (P > 0.05) on both initial and final body weights. This indicates that although individual effects of energy and protein were evident, their combined influence did not significantly change the outcome in terms of body weight gain. This supports the idea that each component independently affects growth, but they do not necessarily enhance or suppress each other's effects when combined. The result obtained from our experiment agrees with the results of (8) and (9), who studied the effect of dietary protein levels, particularly on broiler chicks. As the CP level increases, the final weight decreases, likely because when protein levels are too high, excess amino acids undergo deamination, a process that consumes energy. According to (10), protein-rich diets raise heat stress, which reduces bird performance.

Table 2: Main and Interaction Effects of Dietary Energy (E) and Crude Protein (CP) on the Growth Performance of Noiler Chickens

Factor	Levels	Initial wt (g)	Final (g)	BWG (g)	Feed Intake (g)	FCR
E (kcal/kg)	2700	213.89^{a}	563.61	349.73	395.83	0.88
	2900	193.61^{b}	552.78	359.17	415.97	0.86
CP (%)	15	206.94^{a}	627.22^{a}	420.28^{a}	425.00	0.99
	17	212.22^{b}	559.72^{b}	347.51^{b}	393.06	0.89
	19	201.39^{ab}	554.17^{b}	352.78^{b}	419.45	0.84
	21	194.44^{ab}	491.67^{c}	297.22^{c}	386.11	0.78
E × CP	2700 × 15	219.44	637.78	418.33	433.33	0.97
	2700 × 17	222.21	558.33	336.12	375.00	0.90
	2700 × 19	211.11	558.33	347.22	405.56	0.86
	2700 × 21	202.78	500.00	297.22	369.44	0.81
	2900 × 15	194.44	616.67	422.22	416.67	1.01
	2900 × 17	202.22	561.11	358.89	411.11	0.87
	2900 × 19	191.67	550.00	358.33	433.33	0.83
	2900 × 21	186.11	483.33	297.22	402.78	0.74

Means within the same column and factor with different superscripts (a–c) differ significantly - SEM = Standard error of means based on pooled residual variance from ANOVA. Pooled SEM: Initial wt = 5.80; Final wt = 18.01, BWG = 15.16; Feed Intake = 19.94, FCR = 0.39.

Conclusion and Application

This research confirms previous findings that different levels of dietary crude protein and metabolizable energy significantly affect chickens, especially Noiler chickens. Specifically, Noiler chicks fed with 15% CP exhibited better final weight, body weight gain, and FCR compared to those fed with 21% CP. The interaction between energy and protein highlights that energy and protein act independently, with no synergistic or antagonistic effects. Therefore, adjusting energy levels did not influence the response to different protein levels, and vice versa.

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