Performance and Economics of Production of Broiler Chicks Fed on Diets with Different Levels of Protein

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ABSTRACT

A five-week trial was conducted to evaluate the growth and economic performance of day old broiler chicks (n=240) on 4 diet with different dietary levels of crude protein,(20,22,24,26%cp), represented a treatment with 60 chick of 3 replicate. Data collected were analyzed in a complete randomized design using (ANOVA), significant differences among means were separated using Ducan Multiple range test. Diets adopted were 180 isocaloric (3000Kcal/kg ME) at varied cp levels, with resultant significant ($P<0.05$) improvement in average weekly feed intake, weight gain and feed to gain ratio as the level of dietary CP increased protein efficiency reduced ($P<0.05$) from 1.49 at 20% cp to 1.32 at 26% cp FEK showed comparable ($P<0.05$) value at 20-24%cp. The highest and comparable profits were obtained at 20 to 22%. Farmers are advice to raise broiler chicks at 22% cp and 3000Kcal/kg ME.

(Keywords: protein, profitability, growth, broiler chicks)

INTRODUCTION

Broiler and egg production are the fastest means of accelerating protein production in order to salvage humans from the present predicament of poor nutrition (Oluyemi and Robert, 2000). Protein consumption in Nigeria, like other developing countries, fell short of the 35g/caput/day recommended by the WHO (Kehinde, 2009). Human capital index rating is now used to rate human wellbeing of people diseases and poverty. (Afolayan, et al., 2009).

In the case of Nigeria, the federal government has taken a pragmatic step to commence school feeding program, for pupils in the lower classes (primary school) as a means of reducing infant mortality, improve school enrolment and learning, by adopting the inclusion of animal protein sources like meat and eggs in the diets of students. This has influenced the animal production value chain, by enhancing the economy of poultry farmers, egg sellers and feed millers.

The poultry industry growth can only be accelerated, if there is cheap feed, is quality day old chicks, good medication and vaccination scheme (Onimisi, 2004). Many nutritionists have implicated cost of animal feeding as the major culprits of the poultry industry; they have computed and ascertained that the cost of feeding accounts for 60-80% of the total cost of animal production (Aguihe, et al., 2014). An efficient manipulation of the feeding strategies will promote good performance and greatly improve profitability of poultry production (Alter, et al., 2000 and Sterling, et al., 2005).

Broiler production has become well popularized in Nigeria, as an aggressive means of meeting the protein need of her ever increasing human population, by exploring its fast maturity (8 weeks) for fast growers (14 weeks) for the slow growing strains. Farmers in their aggression are adopting different levels of crude protein in broilers nutrition to promote growth and reduce cost. It is common to experience air pollution, due massive nitrogen excretion where poultry is located. High level of crude protein in poultry ration beyond the optimal has led to nitrogen pollution (Afolayan, et al., 2009, Farce, et al., 2005).

Nutritionists have discovered that increasing the protein level of broiler chicks may not adequately promote growth, feed conversion ratio and carcass quality, except it is balanced in amino

acids, other nutrients and metabolizable energy (Bawa, et al., 2012). Broilers have been found to perform well, at low dietary crude protein with supplementation of limiting amino acid (Kaur, et al., 2006). There is need to improve broiler feed quality to meet the changing environmental parameters and climate change, which has promoted carbon emission and high environmental temperature. There is dearth of information on the economy of broiler chick production in the tropics under elevated temperature. There is a need to carefully use crude protein to promote growth in broiler chicks to prevent heat burden, air pollution and high cost of production (Faica, et al,. 2005).

This trial adopted isocoloric diets (3000kcal/kg ME) and varied dietary crude protein (20,22,24 and 26%) and assess their effects on the performance of broiler chicks (1-28 days) because this is the most critical phase and has consequential effect on maturity profitability and survival broiler chicks. It will also provide information for poultry farmers on the appropriate protein requirement by broiler chicks.

MATERIALS AND METHODS

Experimental Site

The trial was carried out at the poultry unit of the teaching and research farm of the Federal College of Wildlife, New Bussa in Niger State, Nigeria.

Experimental Birds and Design

Two hundred and forty (240) day old chicks were used for this trial. The birds were allocated to four experimental treatments at 60 chicks pen treatment, while each treatment was replicated thrice at 20 chicks per replicate in a complete randomized design. Four dietary levels (20, 22, 24, and 26%) of crude protein used, represented the treatments.

Experimental Birds and Treatments

Two hundred and forty day old chicks used for the feeding trial were sourced from a reputable hatchery with recent history of good performance. The birds on arrival were randomly allotted to four experimental treatment diets, with four level of crude protein (20,22,24 and 26%)And all the diets were caloric (3000kcal/kg ME) and the diets contained different levels of crude protein (CP).

Determination of Chick's Performance in the Treatments

Feed intake was determined by weighing feed offered and feed leftover, the difference between them was the feed intake. Feed conversion ratio was obtained as a fraction of feed intake and weight gain, while the efficiency of feed utilization was determined by dividing the weight gain by feed intake. These values can be used to predict feed quality and acceptability.

Economy of Production of Broiler Chicks Fed Diets Containing Different Level of Crude Protein.

This provides information on the cost of feed in each treatment, which was based on the present market prices of the feed ingredients, the cost of day old chicks, labor, water, heat generation, medication, vaccination and fixed assets. All were used to determine profitability.

Chemical Analysis of Experimental Diets

Diets were analyzed to determine their proximate composition, using the method of (A.O.A.C, 2008).

Statistical Analysis

All data generated were subjected to analysis of variance (ANOVA) as described by SAS (2008) and treatment means were compared by the method of Duncan (1995).

RESULTS

Table 1 shows the gross composition of experimental diets with different level of crude protein (20,22,24and 26%) fed to broiler chicks the essence of this was to ascertain the best level of crude protein required by broilers in wet humid tropics. The diets were isocaloric (3000kca/kg ME). The diets of the broiler chicks were formulated to meet their physiological need. The Palm oil was added to supplement the level of energy.

Table 1: Gross Composition of Diets with Different Levels of Crude Protein (20, 22, 24, and 26%) Fed to Broiler Chicks.

TREAMENTS				
Ingredients	**CP (20%)**	**CP(22%)**	**CP (24%)**	**CP (26%)**
Maize	45.45	45.45	45.45	45.45
Wheat bran	12.00	12.00	12.00	12.00
Palm kernel cake	9.00	6.00	6.00	6.00
Groundnut cake	11.40	15.10	15.10	15.10
Soya bean meal	9.00	9.00	9.00	9.00
Fish meal	4.00	6.00	7.00	8.00
Salt	0.25	0.25	0.25	0.25
Methionine	0.10	0.10	0.10	0.10
Broiler starter premix	0.25	0.25	0.25	0.25
Lysine	0.10	0.10	0.10	0.10
Bone meal	7.50	7.50	7.50	7.50
Palm kernel oil	0.05	0.45	0.40	0.40
Determined Nutrient				
Crude protein %	20.00	22.01	24.00	26.00
Metabolizable energy	3000	3000	3000	3000
Energy protein ratio	150	136	125	115

Table 2: Proximate Composition of Experimental Diets Fed to Broiler Chicks with Different Levels (20, 22, 24 & 26%) of Protein

TREATMENTS				
Parameter	**CP (20%)**	**CP(22%)**	**CP (24%)**	**CP (26%)**
Dry matter	90.00	91.00	92.00	92.00
Crude protein	19.80	21.85	03,70	25.90
Crude fiber	3.7	3.85	4.00	4.01
Ether extract	3.70	3.80	3.80	4.00
Ash	7.00	6.90	7.01	6.95
NFE	55.80	55.10	53.49	51.64
Metabolizable energy	3000.2	3001	2950	2988

The proximate composition of the diets was on the Table 2. This shows the component crude protein (19.80-25.90%), crude fiber (3.70-4.10), either extract (3.70-4.00%), Ash (6.90-7.017%) and NFE (57.64-55.80%).

Table 3 elicited the growth performance characteristics of broiler chick such as weight gain, feed intake , efficiency of feed utilization feed to gain ratio and protein efficiency. Average initial body weight varied ($P<0.05$), chicks fed 24 and 26% dietary crude protein compared and had better average initial body weight, while the value of 20%cp (130.0g) and 22%cp (132.0g) also compared. The average final weight varied ($P<0.05$) linearly, with the least value (667.00g) in diets with 20% cp, followed by 22%cp (697.00g), 24%cp (713.50g). average weight gain (537.60 – 610.00g) was least ($P<0.005$) 20%cp and highest ($P<0.005$) in diets with 26%cp.

Table 3: Performance Characteristics of Broiler Chicks Fed Diets with Different Levels of Crude Protein.

Treatment and levels of protein					
Performance characteristics	**Cp 20%**	**Cp 22%**	**Cp 24%**	**Cp 26%**	**SEM±**
Average initial body weight	130.00[b]	132.00[b]	140.00[a]	140.00[a]	3.00
Average final body weight	667.00[d]	697.00[c]	713.50 [b]	75000[a]	5.00
Average weight gain	537.00[d]	565.00[c]	573.50[b]	610.00[a]	2.00
Average weekly weight gain	107.40[b]	113.00[b]	114.70[b]	122.00[a]	6.00
Average weekly feed intake	195.47[c]	213.57[b]	214.49[b]	259.80[a]	4.00
Efficiency of feed utilization	0.54	0.53	0.53	0.47	0.10
Feed to gain ratio	1.82[b]	1.89[b]	1.87[b]	2.10[a]	0.12
Protein efficiency	1.49[a]	1.39[b]	1.32[c]	1.32[c]	0.05
Energy protein ratio	150	136	125	115	

Table 4: Composition of the Economy of Producing Experimental Chicks Fed Diets with Different Levels of Crude Protein.

Treatments				
	Cp 20%	**Cp 22%**	**Cp 24%**	**Cp 26%**
cost heads(₦)				
Total fixed coct	40000	40000	40000	40000
Total variable cost	32,040	36,030	36,840	45,960
total revenue	66,000	66,000	66,000	70,000
Profit	2,996(45.3%)	29,970(45.40%)	25,150(38.10%)	20,040(28.63%)
Cost/25kgbag of feed	3,218	3,900	4,205	5,330.20
Cost/kg of feed	128.74	159.22	168.22	213.22

Unit of Nigeria currency Exchange are 360/us dollar, 420/Bri pound and 400/Euro
Cp. Dietary Crude Protein

Feed intake also followed the same trend as the weight gain values. Best utilized diet hall 20%cp and performance diminished as the level of protein increased, this aligned with best protein efficiency of 20%cp and this reduced as level of protein increased in the diets.

Table 4 revealed the cost benefit analysis of raising broiler chicks at (20, 22, 24, and 26%cp). In order to accurately compute the economics of broiler production under different levels of crude protein.

The different head taken into consideration were fixed cost, variable or running cost, such as cost of day old chicks, feed vaccination, medication, water and electricity expended on the trial, the chicks were disposed in the market at a competitive price and the profit was computed as the difference between total cost and total revenue, where total cost was the summation of total fixed cost and total variable cost.

The table showed the total fixed cost (N40,000) each was the same in all he treatments. Total variable cost increased from #32,040 of 20%cp to #45,960 of 26%cp, total revenue was highest (#70,000) at (26%cp). Highest profitability was recorded at 20% dietary cp and least at 26% cp.

DISCUSSION

Tables 1 and 2 revealed the gross and proximate of experimental feeds that were fed to broiler chicks, which were adopted to evaluate the performance and economic returns. The diets were formulated to conform 20, 22, 24, and 26% crude protein and is caloric energy level (3000kcal/kg ME). The for each treatment. The diets were adequate in nutrients to meet the physiological needs of the chicks. The baseline crude protein of 20% and metabolizable energy adopted were recommended by Oluyemi and Robert (2000) and Atteh (2004)

The proximate constituents values confirmed the adequacy of the diets to meet the physiological needs of the broiler chicks, which is a confirmation that the diets completion could support growth and production of the chicks.

Table 3 had the growth performance assessment of broiler chicks fed experimental diets. It revealed a positive influence of dietary protein level increase on the average weight gain, average weekly weight gain and average weekly feed intake. Theses parameters increased with increased levels of dietary crude protein, feed to gain ratio, efficiency of feed utilization, protein efficiency and energy protein ratio reduced as the level of dietary crude protein increased: Kaur, et al. (2006), reported significant improvement in feed intake, growth and feed conversion ratio, in broiler chicks fed with different levels (18,20,22,24,26 and 28%). Fosanya and ijaiya (2002) laid more importance on the quality of dietary crude protein, based on its components amino acid; they also obtained linear increase in growth performance of broiler chicks fed diets on high levels of crude protein. They however reported reduce impute of the increased crude protein content of the diet beyond the optimal, it is then important to determine the actual protein level to optimize broiler chicks performance based on the micro climatic condition of the area of production.

The efficiency of feed utilization in all the treatment compared ($p<0.005$), while the best feed to gain ratio was obtained at 20% cp, the least (P,0.05) 2.10 was recorded at 26% cp, this showed that efficiency of feed conversion to body weight reduced from 20%cp to 26%cp. One of for broiler chicks production is guaranteed good economic returns on investment, in the determination of profitability, various heads considered were total fixed cost, total variable cost and total revenue and all these were used to compute profitability. Profitability increased at diminishing rate as the dietary cp increased, highest profit was obtained at 20% cp, and 22%cp, profitability values were 45.39% (20%), 45.40% (22%), 38.10 (24%), and 28.63% (26%).

CONCLUSION AND RECOMMENDATION

The trial revealed that increased level of dietary crude protein (20, 22, 24, and 26%), with is caloric metabolizable energy led to linear increscent in feed intake, weight gain and improved protein efficiency feed to gain ratio. Profitability reduced as the level of dietary crude protein increased. It is advisable that farmers adopt 20-22% crude protein chicks at the starter phase.

RECOMMENDATION

Poultry farmers should embrace 20-22% crude protein at 3000kcal/kg ME for the feed of broiler chicks of their starter phase.

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