International Journal of Multidisciplinary Research and Growth Evaluation.

Growth performance and carcass characteristics of growing Keets fed different protein sources

Rafiu TA [1], Olayeni TB [2*], Fawole OO [3], Babalola A [4], Adeola BO [5]
[1-5] Department of Animal Production and Health, Ladoke Akintola University of Technology, Ogbomoso, Oyo State, Nigeria

* Corresponding Author: **Olayeni TB**

Article Info

ISSN (online): 2582-7138
Volume: 03
Issue: 05
September-October 2022
Received: 09-07-2022
Accepted: 10-08-2022
Page No: 167-170

Abstract
A 10-week feeding trial was conducted to investigate the effect of different combinations of three protein sources (Fish meal, Soybean Meal and Groundnut Cake) on the growth performance of guinea fowl using thirty-two 12- week old growing keets on their growth performance and carcass yields. The birds were randomly distributed in a completely randomized design into four dietary treatments (eight keets per treatment). The proteins were combined as fish meal, soybean meal and groundnut cake (control), fish meal and soybean meal, fish meal and groundnut cake, groundnut cake and soybean meal in treatments 1, 2, 3 and 4 respectively. Parameters measured were total feed intake, average weight gain, and feed conversion ratio. At the end of 10 weeks, 2 birds per treatment were randomly selected, weighed and slaughtered for carcass assessment. Results showed that treatment significantly influenced ($p<0.05$) the average weight gain, total feed intake and feed conversion ratio. No significant difference ($p>0.05$) in final weight though T_2 had the highest final weight (1152.11g). Total feed intake was significantly different ($p<0.05$) with least value 1113.83g recorded from T_1, The *lowest* or the best feed conversion ratio was recorded from T_2 (2.28) and the result is statistically ($p<0.05$) different. The breast muscle and abdominal fat were statistically different ($p<0.05$) with T_2 having the highest percentage of breast muscle (29.98%) and also had the lowest percentage of abdominal fat (0.63%). The results showed that the birds performed best on diet T_2- (soybean meal and fish meal) than every other diets. The use of fish meal and soybean meal combination could therefore be recommended for guinea fowl diet formulation especially for the growing keets.

Keywords: Growth performance, growing keets, protein source

Introduction

The helmeted guinea fowl (*Numida meleagris*) is gradually increasing in popularity (Jacob and Pescatore, 2013) [7]. It is an important domestic bird in Africa. The bird is raised for eggs and white meat (Yildirim, 2012) [7] under mostly smallholder arrangements. Their bones to muscle ratio are relatively small making the carcass to contain a relatively large amount of flesh. Scientific tests had found guinea fowl meat and egg to be nutritionally superior to chicken products (Ayeni, 1980; Moreki and Seabo, 2012; Teye and Adam, 2000) [1, 11, 20]. The manifold socio-economic benefits of the guinea fowl ranging from its role in marriage ceremonies and other social ceremonies to its critical role in poverty alleviation in rural areas have been well documented by Dei and Karbo (2004) [4], Naazie *et al.,* (2007) [13], Teye *et al.,* (2008) [21] and Mwale *et al.,* (2008) [12].

Birds are allowed to scavenge for most of their food around the village and it is a known fact that most guinea fowl keepers did not practice any rationale feeding system for their birds (Dahouda *et al.,* 2017) [3]. Gono *et al.,* (2012) [6] observed that in addition to scavenging most of the farmers provided small amounts of supplementary feed to their birds. Kusina *et al.,* (2012) [8] noted that feed was given to birds in an haphazard manner. Lack of information about feed requirements contributed to early keet mortality, besides, a large percentage of farmers were compelled to keep the birds on free range because they did not know their nutrient requirements.

Moreki and Seabo (2012) [11] observed that because there were no formulated rations for domesticated guinea fowl, farmers resorted to feeding their guinea fowls with commercial broiler chicken and layer chicken diets, with cereal grains and green vegetables as supplementary feeds. Inadequate feed supplies give rise to poor growth rates, low egg production and increased mortalities.

This trial was therefore conducted to evaluate the effect of three protein sources (Fish Meal, Soya Bean Meal, Groundnut Cake) on the performance characteristics of growing keets.

Materials and Methods

Experimental Site

The experiment was carried out at Faculty of Agricultural Sciences Teaching and Research Farm, LadokeAkintola University of Technology, Ogbomoso, Oyo State, Nigeria.

Purchase of the Feed Ingredient

The feed ingredients were bought from a reputable feed mill in Ogbomoso, Oyo State, Nigeria.

Preparation of Experimental Diets

Four diets were formulated based on the protein sources and their combinations as shown in Table 1. Feed and water were given *ad libitum* throughout the experimental period. The feed were approximately isonitrogenous and isocaloric. The protein combination is as follows:

Treatment 1: Fish meal + Soybean meal + Groundnut cake (**Control)**
Treatment 2: Fish meal + Soybean meal
Treatment 3: Fish meal + Groundnut cake
Treatment 4: Soybean meal + Groundnut cake

Table 1: Experimental Diet of Growing Keets Fed Different Protein Sources

Ingredient (%)	Treatment 1	Treatment 2	Treatment 3	Treatment 4
Maize	47	47	47	47
Fish meal	3	3	3	0
Soybean meal	8	17	0	11
Groundnut cake	8	0	15	11
Wheat Offal	25	24	26	22
Fixed ingredients	9	9	9	9
Total	100	100	100	100
Crude protein (%)	18.07	18.1	18.05	18.13
Energy (Kcal/kg)	2610	2626	2600	2632

Fixed ingredients: bone meal, 3.1; Oyster shell, 3; Methionine, 0.2; Lysine, 0.2; salt, 0.25; premix, 0.25.

Experimental Birds

Thirty two-12 weeks growing keets were used for the experiment. The experimental birds were divided into four different dietary treatments of eight keets per treatment and four keets per replicate. The experiment lasted for a period of 10 weeks.

Data Collection

Feed intake: The feed intake per bird was estimated as the difference between feed offered and leftover feed after 24 hours of feeding.

Live weight gain: The birds were weighed on weekly basis using a digital weighing scale. The weight gain was determined as the difference between the previous weight and the weight in the current week.

Feed conversion ratio (FCR): Feed Conversion Ratio (kg feed/kg gain) was calculated by dividing feed intake with body weight gain.

Slaughtering and dressing of birds: At the end of the tenth week, 2 birds from each replicate group were randomly chosen, weighed with an electronic weighing scale after 12-hour feed withdrawal with availability of abundant water, they were tagged to distinguish them. The birds were then restrained to sever the jugular veins and carotid arteries with a sharp knife, and were allowed to bleed for about 60 seconds; feathers were plucked out without scalding. The head and shanks were then removed, after which an incision was made around the vents to remove the viscera. The carcasses were then weighed. The primal cuts (back, breast, drumsticks, and thigh muscles) were made from the carcasses, and each was weighed.

Dressing percentage: The dressing percentage was calculated as the ratio of carcass to the live weight of the birds:

Statistical Analysis

All the data obtained were subjected to the analysis of variance (ANOVA) using SAS 2000 software package. Means with significant differences were also separated using Duncan multiple range test of the same software.

$$\text{Dressing Percentage (\%)} = \frac{\text{Carcass weight x 100}}{\text{Live weight}}$$

Results and Discussion

Growth Performance

Table 2 revealed that the average weight gain, total feed intake and feed conversion ratio were significantly ($P<0.05$) influenced by the source of the dietary protein. Treatment 2 (diet with fishmeal and soyabean meal protein sources) had the best average weight gain and best feed conversion ratio (FCR), followed by T_1 while T_3 and T_4 had higher FCR. Nsoso *et al.*, (2008) [16] explained that increase in body weight represents growth and development of farm animals. Superior performance of birds in T_1 and T_2 were due to the high content of lysine and methionine in the protein sources used and was in close agreement with the findings of Ghadge *et al.*, (2009) [5] who reported superior performance of broilers fed soybean meal over those fed groundnut cake while T_3 and T_4 where soyabean meal was partially or totally deficient, lower body weight gain was attained. This may also be traced to the presence of high crude fibre in groundnut cake and also the deficient of lysine in groundnut cake (Aziz *et al.*, 2001) [2]. These findings are in close agreement with Singh and Prasad (1979) [19].

Higher FCR (3.03) recorded from guinea fowl fed T_3 in this study could be attributed to higher feed intake with low weight gain due to the deficient of lysine and methionine in

groundnut cake; which was the dietary protein source dominating T_3. The FCR values in this study are lower to those of Bell and Smith (2006) who reported that guinea fowl have a FCR of 4.0 to 4.5. Seabo *et al.*, (2011) [18] reported higher FCR of 6.37 to 6.71 when feeding commercial a grower diet from 6 to 12 weeks of age under intensive system. The differences in FCR value could be due to age, different diets fed, management regime and also environmental factors. Mwale *et al.*, (2008) [12] noted that decreasing FCR with age could be due to increasing feed quantities needed for growth. Nwagu and Alawa (1995) [17] noted that the wildly behaviour of guinea fowl; the characteristic timid but very active, flighty and noisy temperament contributed to poor FCR through high energy deceptions to these outputs.

Table 2: Growth Performance of Growing Keets Fed Different Protein Sources

Parameters	T_1	T_2	T_3	T_4	Sem
Initial weight(g)	662.78	632.5	657.67	672.83	23.89
Final weight(g)	1142.28	1152.111	1102.50	1084.56	34.60
Average weight gain(g)	479.50^{ab}	519.61^{a}	444.83^{ab}	411.72^{b}	17.27
Total feed intake(g)	1113.83^{d}	1181.50^{c}	1262.50^{a}	1214.50^{a}	12.11
Feed Conversion Ratio	2.37^{b}	2.28^{b}	3.03^{a}	2.97^{a}	0.12

^{abc}means with different superscript along the same row are significantly different (p<0.05)
T_1: Fishmeal+ soyabean meal+ Groundnut cake
T_2: Fishmeal+ Soyabean meal
T_3: Fishmeal+ Groundnut cake meal
T_4: Soyabean meal +Groundnut cake meal

Carcass Characteristics

The carcass proportion of guinea fowl birds fed different dietary sources were presented in Table 3. All the primal cut parts (breast, drumsticks, wings and thigh muscles) were significantly (p<0.05) different with T_2 having the highest proportion of breast, thigh and drumstick muscles, followed by T_1, with highest carcass percentage. Breast muscle is an important parameter for assessing the carcass quality of birds because it has the highest muscle to bone ratio followed by the thigh, drumstick and probably wings. T_2 had the highest percentage of breast muscle (29.98%) which showed that T_2 not only had the highest body weight gain but also performed best in carcass assessment. The proportion of breast meat obtained from this study (29.98, 29.48, 28.04 and 27.60%) were well above the proportions (23.4%) reported by Laudadio *et al.*, (2012) [10] who fed birds with soybean meal based diet and 23.7% recorded for bird fed pigeon pea based diet (Nahashon *et al.*, 2005) [14], indicating that animal protein source in the diet enhances the meat production process of guinea fowl.

Thigh and drumstick are the next important parameters in assessing carcass quality; the four treatments were also statistically different (p< 0.05) with T_2 still taken the lead while drumstick was statistically (P>0.05) similar for other treatments. T_4 had the highest percentage (p<0.05) of wings (17.31%), while the other treatments were similar (p<0.05). T_4 not only had the lowest average weight gain but also had a poor carcass assessment which may also be attributed to the low level of lysine and methionine in groundnut cake with total replacement of fish meal. The dietary inadequacy and balance of amino acids is known to be the reason of diminished content of the primary cuts in carcasses of poultry (Nasr, 2011) [15]. The optimum performance of birds fed fish meal and soybean meal (T_2) is attributed to a well-balanced amino acid profile coupled with the supplementation with lysine and methionine.

Treatment 2 had the least percentage of abdominal fat while the highest value (2.19%) was recorded from T_4, it is an indication that the highest final weight of T_2 is not due to abdominal fat build up. The result obtained in this experiment is lower than that of of 1.89 and 1.49% except T_4 which had 2.19%. It is also lower than that obtained in broiler chickens (Laudadio and Tufarelli, 2010) [9]. This report and other report studies had demonstrated that the guinea fowl broiler tends to deposit less abdominal fat and have leaner carcasses than broiler chickens (Nahashon *et al.*, 2005, Laudadio and Tufarelli, 2010, and Laudadio *et al.*, 2012) [14, 9, 10], which was also assisted by the dietary protein source, as indicated that plant protein sources used encourage the rate of fat deposition than the fish meal or Animal protein used.

Table 3: Carcass Characteristics of Growing Keets Fed Different Protein Sources

Parameters	T_1	T_2	T_3	T_4	sem
Final Life weight (g)	1388.00^{a}	1297.67^{a}	1383.50^{a}	1060.00^{b}	44.70
Bleed weight (g)	1320.00^{a}	1136.50^{b}	1323.50^{a}	1027.00^{b}	37.61
Defeathered weight (g)	1241.05^{a}	1054.40^{b}	1223.30^{a}	950.85^{b}	36.62
Dressing (%)	67.24^{a}	67.26^{a}	67.09^{a}	63.28^{b}	26.92
Neck (%)	6.17^{b}	6.85^{a}	6.66^{a}	6.90^{a}	0.07
Wing (%)	13.81^{b}	14.42^{b}	13.85^{b}	17.31^{a}	0.37
Breast (%)	29.48^{a}	29.98^{a}	28.04^{b}	27.60^{b}	0.30
Back (%)	25.66^{a}	23.06^{b}	23.39^{b}	21.63^{c}	0.35
Thigh (%)	16.97^{a}	16.76^{a}	15.77^{b}	15.86^{b}	0.27
Drumstick (%)	13.11^{b}	14.38^{a}	13.13^{b}	13.34^{b}	0.23
Abdominal fat (%)	0.70^{b}	0.63^{b}	1.51^{ab}	2.19^{a}	0.20

^{abc}means with different superscript along the same row are significantly different (p<0.05)
T_1: Fishmeal+ soyabean meal+ Groundnut cake
T_2: Fishmeal+ Soyabean meal
T_3: Fishmeal+ Groundnut cake meal
T_4: Soyabean meal+ Groundnut cake meal

Conclusion

This experiment showed that even though the birds were given similar percentage crude protein diets, the feed intake, average weight gain, feed conversion ratio, carcass proportion parameters differed as a result of different combination of three dietary protein sources. It can be observed that guinea fowl performed best when placed on diet containing only soybean meal and fish meal as dietary protein sources. Even T_1 that contained the three protein sources and T_3 (fish meal and groundnut cake) were less in their performance while T_4 that had no animal protein source but only had the two plant proteins sources (soybean and groundnut cake meals) performed least.

Recommendation

The use of fish meal and soybean meal combination could be recommended for guinea fowl diet formulation especially for the growing keets.

References

1. Ayeni JSO. The biology and utilization of the helmeted guinea fowl (*Numida meleagris* galeata Pallas) in Nigeria [PhD thesis]. University of Ibadan, Nigeria; c1980.
2. Aziz MA, Khandakar ZA, Islam M. Effect of replacing protein fish meal, soybean on the performance of broiler

chicken. Indian Journal of Nutrition. 2001;1891:23-28.
3. Dahouda M, Toleba SS, Youssao AKI, Kogui SB, Aboubakari SY. Guinea fowl rearing constraints and flock composition under traditional management in Borgu. Family Poultry. 2017;17(1):3-13.
4. Dei HK, Karbo N. Improving smallholder guinea fowl production in Ghana. A training manual. Cyber Systems, Tamale, Ghana; c2004. p. 1-27.
5. Ghadge VN, Upase BT, Patil PV. Effect of replacing groundnut cake by soybean meal on performance of broilers. Veterinary World. 2009;2(5):183-184.
6. Gono RK, Svinurai W, Muzvondiwa JV. Constraints and opportunities to guinea fowl production in Zimbabwe: A case study of the Midlands Province, Zimbabwe. International Journal of Science and Research. 2012;2(3):236-239.
7. Jacob J, Pescatore T. Raising guinea fowl. University of Kentucky College of Agriculture, Food and Environment, Lexington, KY; c2013. p. 1-5.
8. Kusina NT, Saina H, Kusina JF, Lebel S. An insight into guinea fowl rearing practices and productivity by guinea fowl keepers in Zimbabwe. African Journal of Agricultural Research. 2012;7(25):3621-3625.
9. Laudadio V, Tufarelli V. Growth performance and carcass and meat quality of broiler chickens fed diets containing micronized-dehulled peas (*Pisum sativum* cv. Spirale) as a substitute of soybean meal. Poultry Science. 2010;89:1537-1543.
10. Laudadio V, Nahashon SN, Tufarelli V. Growth performance and carcass characteristics of guinea fowl fed micronized-dehulled pea (*Pisum sativum* L.) as a substitute for soybean meal. Poultry Science. 2012;91:2988-2996.
11. Moreki JC, Seabo D. Guinea fowl production in Botswana. Journal of World's Poultry Research. 2012;2(1):1-4.
12. Mwale M, Mupangwa JF, Mapiye C, Saina H, Chimvuramahwe J. Growth performance of guinea fowl keets fed graded levels of baobab seed cake diets. International Journal of Poultry Science. 2008;7(5):429-432.
13. Naazie A, Canacoo EA, Mwinbong C. Guinea fowl production practices and marketing in Northern Ghana. Ghanaian Journal of Animal Science. 2007;2-3(1):35-44.
14. Nahashon SN, Adefope NA, Amenyenu A, Wright D. Effects of dietary metabolizable energy and crude protein concentrations on growth performance and carcass characteristics of French guinea broilers. Poultry Science. 2005;84(2):337-344.
15. Nasr J. Effect of different levels of amino acids on carcass composition and yield in broilers. Animal Production Science. 2011;51(12):1123-1126.
16. Nsoso SJ, Mareko MHD, Manyanda S, Legodimo PP. The effect of housing type on body parameters, feed intake and feed conversion ratio of guinea fowl (*Numida meleagris*) keets and chemical composition of their meat during growth and development in Botswana. Journal of Animal Science. 2008;2(2):36-40.
17. Nwagu BI, Alawa CBI. Guinea fowl production in Nigeria. World Poultry Science Journal. 1995;51(3):261-270.
18. Seabo D, Moreki JC, Bagwasi N, Nthoiwa GP. Performance of guinea fowl (*Numida meleagris*) fed varying protein levels. Online Journal of Animal Feed Resources. 2011;1(6):255-258.
19. Singh KS, Prasad CM. Feeding value of sunflower and groundnut cakes for broilers. Animal Feed Science and Technology Journal. 1979;4(2):143-159.
20. Teye GA, Adam M. Constraints to guinea fowl production in northern Ghana: A case study of the Damongo area. Ghana Journal of Agricultural Science. 2000;33(2):153-157.
21. Teye GA, Karbo N, Avornyo FK. A comprehensive manual for guinea fowl production in Ghana. Manual produced in collaboration with Market Oriented Agriculture Programme (MOAP) of German Technical Co-operation (GTZ); c2008. p. 4-5.
22. Yildirim A. Nutrition of guinea fowl breeders: A review. Journal of Animal Science Advances. 2012;2(2):188-193.