Original Research Article

ASSESSMENT OF GROWTH, CARCASS QUALITY, AND ECONOMIC CHARACTERISTICS OF GUINEA FOWL KEETS FED VARIOUS PERCENTAGES OF RAW JACKFRUIT SEEDMEAL (*Artocarpus heterophyllus*)

ABSTRACT

It is crucial to develop strategies for achieving food security and sustainable agriculture because as the global population expands, so does the demand for protein intake. A seven weeks research study was conducted using raw Jackfruit (JSM) to examine its economic benefits and carcass qualities following its application to substitute soybean in the diet of one hundred and twenty guinea fowl keets. All relevant indicators exhibited a reasonable progressive fall pattern when the level of raw JSM grew, according to the proximate analysis of JSM. Compared to other experimental diets, treatment four, which had a 20% inclusion level of JSM, performed better in terms of the birds' final weight (745g) and the daily weight gain (15g). The examination of carcass features revealed gizzard as the most important parameter, with treatment four recording the most significant value (3.95%), while the control diet recorded the least significant value (2.83%). Diets containing 15% and 20% JSM had the least significant outcomes for feed cost per weight gain, whereas the diet containing 20% JSM had the highest gross margin and revenue. Therefore, it is strongly advised that including 20% JSM in the diet of guinea fowl, keets will increase productivity and utilization.

Keywords: Alternative feedstuff, carcass analysis, nutrition, poultry, by-product, farmers.

INTRODUCTION

In terms of animal protein intake, guinea fowl production has enormous potential for achieving food security. The human population in affluent countries is stable, however, the population in underdeveloped countries such as Nigeria continues to grow fast. Thus, it is crucial to identify alternative protein sources to meet the need of the growing population. (Mailafia et al., 2010). Economic indicators show that as the population grows, more people will need to be fed. Agricultural outputs must be boosted rather than food imports into such countries (Allen, 1993). Due to their widespread availability and cheap market price, guinea fowl have recently emerged as a significant source of animal protein (Obike et al., 2011). The primary function of guinea fowl is as a source of eggs. The bird may lay up to 190 eggs in a single season, which is a rather large output that might sustain the population for up to three years (Gwaza and Elkanah, 2017). While laying qualities can vary by breed (Onunkwo and Okoro, 2015), guinea fowl eggs stand out due to their thick shell, large amount of yolk, high vitamin, and mineral content, and extended shelf life when compared to chicken eggs (Ayorinde, 1991). Eggs have many applications, including both culinary and industrial uses (Agbolosu et al., 2014). Meat from guinea fowl is known for its distinctive flavor and darker color. Its appropriate texture is due to the white muscular fibers, which are similar in number to chicken muscles but larger in size than geese muscles (Bernacki et al., 2012a). Compared to other poultry, guinea fowl have a better slaughter performance (Ebegbulem and Asuquo, 2018), a decent ratio of essential portions in the carcass, and acceptable sensory features (Kyere et al., 2020). Nutritionally, guinea fowl flesh stands out from other types of poultry due to its greater protein and lower fat composition (Ayorinde, 1991). The amount and quality of guinea fowl meat produced are affected by several factors. The genotype (variety) and sex of guinea fowl are essential factors in determining the quality of the meat, as was noted by Baeza et al. (2001). Also, age and husbandry conditions are highlighted as crucial factors in assessing the quality of meat obtained in guinea fowls as observed by Yamek et al., 2018. Yet, the quality and nutritional richness of the meal continuously influence the output outcomes of these birds. Guinea fowl can adapt to different sources of protein and energy because they consume a wide variety of plant and animal foods in the wild. Some feeding criteria are adopted in nations where guinea fowl are a common meat-type poultry species (Yildirim, 2012), normalizing compound feed. Although often grown on small-scale farms, in many countries these birds are viewed as an attraction and potentially employed to collect eggs primarily for self-supply of the farm (Batkowska J et al., (2021). To enhance food production and protein needs, alternative livestock species and non-conventional feedstuff that have not yet had a huge impact on Nigerian animal production need to be explored and adopted. Fast-growing birds, such as guinea fowl, have several advantages that may be explored in smallholder subsistence farms. Jackfruit seedmeal (JSM) is a promising alternative feedstuff for poultry. It is a by-product of jackfruit intake in which the fleshy half of the fruit is consumed but the seeds are discarded as garbage (Odukwe et al., 2017). The seeds of the jackfruit tree are high in both fiber (3.19%) and starch (22%) by Hettiaratchi et al., (2011). Even though some people roast and consume the seeds from jackfruits, there is not much demand from humans or livestock for the seeds themselves. Akinmutimi et al. (2006) and Ravindran (1996) have both confirmed the presence of antinutrients in Jackfruit seed, however, studies looking at methods for eliminating these compounds are still in their infancy. The jackfruit un-used feed resources both the leaves as fodder and pulp are available for livestock feeding. Regardless of the availability of Jackfruit seed and its anti-nutritional components, minimal or no research work has been carried out to include the seed meal in poultry diets. Hence, the optimal amount of processed and raw Jackfruit seedmeal inclusion in poultry diets has not been well investigated. More unconventional feedstuff must be assessed to close the gap between the high cost of feed components and the lack of non-conventional feedstuff availability, as well as to promote food security and sustainable farming. El-Saadany et al. (2022) conducted a study on the use of pumpkin (PK) and garden cress (GC) seed oil in poultry diets, and they discovered that adding PK and GC seed oils to the diets of laying birds as natural feed additives, either independently (0.5%) or in combination (0.25%+0.25%), improved several physiological functions and productive traits of birds. Further study into the use of non-conventional feedstuff in livestock and poultry nutrition and production is essential, both to lessen competition between poultry and people for conventional feedstuff and for economic purposes. Consequently, the purpose of this study was to ascertain the impact of raw Jackfruit seed meal on the growth performance of the birds, the carcass features, the internal organs of the birds, and the economics of production of feeding guinea fowl keets using Jackfruit.

2. 0 MATERIALS AND METHODS

2.1. LOCATION OF THE EXPERIMENT

The research was conducted at the poultry unit of the teaching and research farm of Michael Okpara University of Agriculture, Umudike, Umuahia, Abia state, Nigeria. Umudike is located within latitude $5^{0}29^{1}$ North and longitude $7^{0}32^{1}$ East in the tropical rainforest zone of Umuahia, Abia state, which is characterized by an annual rainfall of about 2169.8mm in 155-228 raindrops and lies at an altitude of 122meters above sea level and has an as the ambient temperature of 26 with a maximum of 36^{0}C and minimum of 27^{0}C with a relative humidity of 57 to 91^{0}C (N.C.R.I, 2018).

2.2. MATERIALS

2.2.1 Jackfruit

Jack fruit seeds were obtained in southern Nigeria, namely Ogidi in Idemili North Local Government of Anambra State, where they could be easily picked, processed, distributed, and purchased. After drying, the seeds were dehusked and winnowed with a tray and a filter before being processed to the correct proportion with a local hammer mill. The Jack fruit seeds were introduced to the formulated meals at 10%, 15%, and 20% concentrations, respectively.

Figure 2: Dehusking of the dried jackfruit seeds for milling

Figure 1: Milling of the jackfruit seeds

2.2.2 Experimental Birds and Equipment

In Northern Nigeria (Kaduna), where there is a large distribution and procurement of the bird, 206-day-old pearl (dual-type: egg and meat) guinea fowl keets were bought as shown in Figure four. Before the chicks arrived, the brooder chamber was cleaned and dried out. The keets were then stocked in the chamber for three weeks of brooding. During the brooding phase, two drinking troughs and four feeding trays were utilized and during the experiment, 12 feeding troughs and 12 drinking troughs as shown in Fig 3 were purchased and used for the experiment. Vaccinations and medications used throughout the experiment from brooding till the end of the experiment were purchased at National Root and Crop Research Institutes (NCRI), Umudike, and Animal World, Bende Road, Umuahia, Nigeria.

Figure 3: Brooding facilities used for the Guinea fowl keets

Figure 4: Day Old Guinea fowl keets

2.3. Management of the keets

Although no approval number was assigned, this experiment was reviewed and approved by the Department of Animal Welfare Committee, Michael Okpara University of Agriculture, Umudike, Nigeria. To preserve heat, the pen was covered in black nylon, and wood shaving was utilized as bedding material in the brooder's pen. A kerosene burner and a 400-watt electric bulb were used to provide heat. As soon as they arrived at the farm, the birds received an anti-stress injection of glucose and an I/O vaccine against Newcastle disease. The birds were fed commercial feed for three weeks before the experiment commenced and were subjected to the same vaccination schedule as broiler chickens. Water and food were freely available during brooding. Also, regular poultry operations such as deworming, cleaning, etc. were done on a daily and weekly basis. The study involved one hundred and twenty (120) unsexed guinea fowl keets. At the end of the three weeks of brooding (21^{st} day), these birds were selected and weighed at random and divided into four treatments with each treatment replicated three times. Each replicate had ten guinea fowl keets contained in them with a total of one hundred and twenty (120) guinea fowls used for the experiment. The treatments (2, 3, and 4) containing the jackfruit seed meals had 10, 15, and 20% of JSM in their diets, respectively. Treatment one served as the control and received a diet free of JSM. Before the commencement of the research, the birds were starved for 24 hours with water available to clear their guts before the introduction of the experimental diets and collection of samples. This research lasted for seven weeks (51 days) excluding the weeks of brooding. SPSS software was used in analyzing the daily feed intake, feed conversion ratio, and production economics of the guinea fowl keets at the end of the experiment.

2.4 EXPERIMENTAL DESIGN

A completely randomized design was used in the designing of the experiment with the model;

$Y_{ij} = \mu + T_i + e_{ij}$

Where;

Y_{ij}= Single Observation; the j^{th} observation in the i^{th} treatment

μ= Overall mean

T_i= Effect of treatment

e_{ij}= Random error;. iind$\mathbf{0}, \boldsymbol{\sigma}^{\mathbf{2}}$(**I**ndependently, **I**dentically, Normally, Distributed with Zero mean and Constant Variance).

2.5 EXPERIMENTAL DIET AND ANALYSIS

Crude protein served as the foundation for diet plans. Each diet had a crude protein content of 24% and metabolizable energy densities (ME Kcal/kg) ranging from 2,749 to 2,797. The designed diets contained milled jackfruit seeds at various amounts of 0%, 10%, 15%, and 20% supplied to various treatments. The proximate analysis of the diet was conducted using the A.O.A.C (2005) method.

2.6 DATA COLLECTION AND PARAMETERS

Data were collected every week for growth performance, and measurement of daily feed was done daily, whereas, carcass evaluation parameters were measured at the end of the experiment.

2.6.1 GROWTH PERFORMANCE PARAMETERS

The following data were collected weekly:

- **Final weight:** This is to be obtained from the final weight of the keets in the last week of the experiment. It is measured using a 5kg manual weighing scale.
- **Daily weight gain:** This would be obtained using the formulae

$$DWG = \frac{\text{Final weight} - \text{initial weight}}{\text{Number of birds x number of days}}$$

- **Daily feed intake (DFI):** This would be gotten using

$$DFI = \frac{\text{Quantity of feed given} - \text{leftover}}{\text{Number of birds x number of days}}$$

- **Feed conversion ratio:** This would be computed as the ratio of daily feed intake to daily weight gain.

$$FRC = \frac{\text{Quantity of feed consumed (g)}}{\text{Weight gain}}$$

2.6.2 Carcass Evaluation and Parameters Measured

Twelve guinea hens were randomly selected from all of the treatments after the experiment, one from each replication, for carcass evaluation. After the feeding trial, the birds were slaughtered individually to ascertain the carcass features. The birds were fasted for 24 hours before getting slaughtered to eliminate the contents of their gastrointestinal tracts, but water was readily available at all times. The birds were then slaughtered by making a clean cut across their jugular vein and allowing them to bleed for at least two minutes. We measured the weight of the birds both before and after slaughter.

Each bird was submerged for about a minute in $60^{0}C$ hot water. The birds' weights were measured after de-feathering. The carcass was divided into several pieces using the techniques Ojewola and Longe specified (1999). Carcass cut sections, including the neck, thighs, wings, and other body parts, was weighed and expressed as a percentage of the dress weight.

$$\textbf{Carcass evaluation} = \frac{\text{Cut parts}}{\text{Dressed weight}} \times 100$$

2.7 Economics parameters

Economic analysis was evaluated using the following parameters:

- **Cost per kg feed (₦)**

  This was obtained by dividing the total cost of a 100 kg diet by 100.

- **Cost of feed consumed (₦/bird)**

  This was obtained by multiplying total feed intake by cost/kg feed.

- **Feed cost per kg weight gain (₦/bird)**

  This was obtained by multiplying the feed conversion ratio by cost/kg feed.

- **Cost of production (₦/bird)**

  This was computed as a summation of the cost of feed consumed and other costs.

- **Price per kg (₦/bird)**

  This arbitrarily arrived based on the prevailing price of a bird on a per kg basis.

- **Revenue (₦/bird)**

  This was computed by multiplying price/kg live weight by mean weight per guinea fowl.

- **Gross margin (₦/bird)**

  This was computed by deducting feed per kg weight gain from revenue.

2.8 STATISTICAL ANALYSIS

Data collected were analyzed using a completely randomized design and subjected to analysis of variance (ANOVA) according to Stell et al., (1980). Significant differences among treatments were separated using Duncan's Multiple Range Test (Duncan, 1955).

3.1 RESULTS AND DISCUSSION

3.1. Proximate Analysis of Jackfruit Seedmeal

Table 1 shows the proximate composition of raw jackfruit seed meal-containing diets. Significant differences ($P<0.05$) were observed in crude protein, ether extract, ash, and metabolizable energy. No significant difference ($P>0.05$) was observed in dry matter, moisture content, crude fiber, and nitrogen-free extract which implies that the variable inclusion levels of raw jackfruit seedmeal did not influence these parameters. T_1 recorded the most significant ($P<0.05$) values in crude protein, ether extract, and ash. T_2 also recorded the most significant ($P<0.05$) values in crude protein and metabolizable energy. All the significant parameters reasonably showed a gradually declining trend as the level of raw jackfruit seedmeal increased. The anti-nutritional composition of raw jackfruit seed is well established. These anti-nutritional factors may be responsible for the gradual reduction in the values of useful nutrients. It could be deduced that higher protein, higher fat content (ether extract), and higher mineral matter (ash) values are available in diets with lower levels of raw jackfruit seedmeal. Metabolizable energy was significantly improved in T_2 containing 10% raw JSM above that of the control diet. A reduction in metabolizable energy becomes more apparent at T_4 which contains 20% raw JSM. For the crude protein, diets T1 and T2 (24.50 % and 24.50%) are higher ($p>0.05$) than that of T3 and T4 diets (21.50 and 21.88). Dei and Karbo (2004) suggest the following nutritional profile for keets between the ages of 0 and 3 weeks: energy between 2900 and 3000 kcal/kg, crude protein between 23% and 24%, calcium 1.1%, phosphorus 0.6%, and vitamin/trace mineral premix of 0.50%. For keets between the ages of 4 and 8 weeks, they suggested feeding them a diet consisting of 2700-2800 kcal/kg of crude protein, 38-1.1% of calcium, 0.5% of phosphorus, and 0.5% of a vitamin/trace mineral premix. This recommendation aligns with the crude protein and metabolizable energy used for this research. Odukwe *et al.,* 2010 reported a crude protein value of 22.60% raw Jackfruit seedmeal which is lower than the value obtained in this study. Ocloo *et al.*, (2010) obtained a crude protein of 13.50% in raw Jackfruit seedmeal which is equally lower than the values obtained in this study. Furthermore, it was obtained by Bobbio *et. al* (1978) crude protein values of 31.90% in the raw Jackfruit seedmeal which is higher than the values obtained in this study. JSM's protein content in this study was higher than Tulyathan's 11% assessment (2002). Jackfruit seedmeal has a greater protein content than other non-traditional feedstuffs in this study, including bakery cracker residue (9.41%), cassava husk (2.90%), and sweet potato (4.37%). The crude protein in this study even outperformed cooled sword bean, cooked Bambara groundnut, and cooked lima bean, which were reported by Omoikhoje and Arijeniwa (2004) to have protein contents of 19.50%, 18.85%, and 21.50%, respectively. Its ether extract, which is 2.70 %, is greater than the value of 4.0 % provided by Odukwe et al (2010). Ocloo et al. (2010) reported 1.27% less fat content than the figures found in this study. Moreover, the control diet has more ash content than the other diets that contain JSM. As the amount of JSM in the diet increased, the ash content trended upward. The ash contents acquired from this investigation are greater than the ash contents (2.70%) and (4%, respectively) obtained by Ocloo et al. (2010) and Akinmutimi, respectively (2006). Even though the crude fiber in this study is not statistically significant, it did demonstrate a trend toward decreasing from T4 to the control high, making T4 the group with the greatest fiber content. According to data from Akinmutimi (2006), raw Jackfruit seedmeal contains crude fiber levels of 4.03% and 3.19%, respectively, which are lower than the levels found in this study. Odukwe et al., (2010) got a crude fiber value of (13.88%), which is higher than the value obtained in this study (12.10%). The discrepancies between this investigation and prior works could be attributed to variances in other materials utilized in compounding diets, processing methods used, and the maturation stage of the Jackfruit seedmeal (young, ripe).

3.2 Growth performance of guinea fowl keets fed raw jackfruit seedmeal (JSM)

Shown in Table 2 is the growth performance of guinea fowl keets fed raw jackfruit seed meal. Although it was expected, no significant variation was seen in the keets' initial weights. However, significant differences ($P<0.05$) were seen in final weight, daily weight gain, daily feed consumption, and feed conversion ratio. As the amount of raw JSM in the dietary treatments progressed, there was a substantial ($P<0.05$) increase in final weight and daily weight gain. The highest final weight (745g) and daily weight increase were therefore obtained with T4 containing 20% raw JSM (15g). Daily feed consumption for the JSM-containing diets (T2, T3, and T4) was comparable to the Control diet (T1) and was higher ($P<0.05$), suggesting that the raw JSM enhanced feed intake. When solely comparing the JSM-containing diets, it could be concluded that the varied levels of the raw JSM did not have a significant impact on intake. The Feed Conversion Ratio (FCR) value in T1 (3.57) was substantially lower ($P > 0.05$), indicating that the guinea fowl keets fed the control diet were more efficient at turning feed into meat. When the amount of raw JSM in the diets increased, the FCR values of the JSM-containing diets declined. In spite of the fact that raw JSM has anti-nutritional, diet T4 with a larger percentage of raw JSM (20%) had a better feed conversion than diet T2 with 10% raw JSM. Given the better final weight, daily weight gain, and increased intake when compared to the control diet, the results indicated that performance was obviously improved at the 20% level of inclusion of raw JSM in guinea fowl keets. As the proportion of raw Jackfruit seed meal in the dietary treatments increased, both the final weight and the daily weight gain increased significantly (P>0.05). Hence, T4 with 20% raw Jackfruit seed meal achieved the highest significant final weight (745.00g) and daily weight gain (15g). This indicates that the JSM intake improved at inclusion levels of 10%, 15%, and 20%. The daily feed intake for the JSM-containing diets (T2, T3, and T4) was comparably higher (P>0.05) than the control diet, revealing that raw JSM didn't have any variable effects on the daily feed intake of the birds, and this in cooperation with Odukwe *et al.*, (2016) where 10% inclusion level didn't show any effect on the daily feed intake of the birds used in the author's study. The FCR in this study was significantly least (P>0.05) in T1 (3.57%) which shows that feed was better converted to meat by the keets fed the control diet. The lower the FCR, the better the meat produced. The FCR values of diets containing JSM decreased as the level of raw Jackfruit seed meal increased in the dietary treatments. The poor FCR of the diets containing JSM suggested possible effects of anti-nutritional factors such as trypsin inhibitors. This demonstrates that raw JSM had no essential impacts on the daily feed intake of the birds, which is in agreement with Odukwe et al., (2016), who found that a 10% inclusion level did not influence the daily feed intake of the birds. The FCR in this study was substantially lower (P>0.05) in T1 (3.57%), indicating that feed was better converted to meat by the keets fed the control diet. This may be due to the presence of other anti-nutritional factors such as lectins, Oxalates, Phytates, and alkaloids even after processing techniques have been used to remove them (Akinmutimi, 2006, Ravindran et al., 1996). Another probable reason for a low FCR is feed waste by the keets. Although processing reduced the tannins and oxalates in raw jackfruit seedmeal by over 85% as demonstrated by Ndyomugyenyi and Ebong (2006) in broiler research fed increasing amounts of processed jackfruit seedmeal, there was decreased growth and feed conversion. Furthermore, Ndyomugyenyi et al., 2006 stated that soaking, boiling, and fermenting treatments don't seem to be successful in boosting the nutritional content of jackfruit seeds for broiler chickens. Also, Akinmutim et al (2006) found boiling, roasting, soaking, or fermentation to decrease the protein content and raised the carbohydrate content of jackfruit seeds. Hence, jackfruit seed meal can be used as a source of energy. Anti-nutritional variables in diets made up of unconventional feedstuffs (Jackfruit) have been associated with detrimental consequences in chicken, including reduced feed intake, poor nutrient utilization, and growth depression (Akimutimi et al., 2006). Odukwe et al (2010)'s high feed conversion ratio at 10% JSM inclusion in their diets was at variance with the findings of this study. Despite the anti-nutritional elements in the raw Jackfruit seedmeal, the T4 diet had a higher FCR value than the T2 diet, which had 10%.

3.3 Carcass characteristics of guinea fowl keets fed raw jackfruit seedmeal (JSM)

Table 3 entails carcass characteristics of guinea fowl keets fed raw jackfruit seed meal. Except for the relative gizzard weight, no significant difference (P>0.05) was seen in any of the other parameters. Comparing the JSM-containing diets with the control diet, the test diets' gizzard weights showed great improvement with raw JSM. T4 with 20% raw JSM recorded the highest significant value (3.95%), while the control diet had the lowest significant value (2.83%). Given the statistical similarities of T2 and T3's gizzard contents, increased gizzard weight in treatment four may be due to its high fiber content. Even with the presence of anti-nutritional factors, their negative impact was not significant considering the similarities in other parameters. Although there was a non-significant incremental trend among the diets including JSM as the level of raw JSM increased, Table 1 did not show any considerable effect on crude fiber. The lack of substantial differences in many carcass parameters indicate, to a big extent, that the control treatment performed similarly to the meals containing JSM. As a result, changes in the raw JSM concentration had little to no impact on the carcass features of guinea fowl keets. A healthy gizzard has been shown to keep harmful bacteria out of the small intestine, lowering the chance of developing coccidiosis and other enteric disorders (Bjerrum et al., 2005). The enhanced rate of gizzard contraction made possible by the presence of JSM may have increased the gizzards' weights at higher JSM levels. When whole grains were incorporated into the diets of poultry, similar results were discovered (Engberg et al., 2004).

3.4 Economics of production of guinea fowl keets fed raw jackfruit seedmeal (JSM)

Table 4 shows the economics of the production of guinea fowl keets fed raw jackfruit seed meal. The price of the bird per kg was the only parameter where significant changes (P<0.05) were not seen as expected. When compared to the control diet, the JSM-containing diets' total feed intake was considerably higher (P<0.05). Comparing the weight gain in this research, the control and T2, T2, and T3 showed considerably greater weight gain (P<0.05). Hence, it could be inferred that higher levels of incorporation of raw JSM led to higher intake and higher weight gain being seen. The considerable change in cost per kg feed reveals that including raw JSM into diets lowers feed costs. This demonstrates that the cost of feed consumed was higher in the JSM-containing diets, and it was highest in T2 than in control diets. The lower concentration of JSM (10%), which is a significantly less expensive source of protein and energy compared to maize and soybean, may be the cause of the higher value of ₦271.55 that was reported in treatment two. The two main indicators for assessing production economics are feed cost per weight gain and gross margin, which measures profit.

Performance is demonstrated by a much lower feed cost per weight increase value. Higher quantities of raw JSM in T3 and T4 produced the least significant (P<0.05) feed cost per weight growth values, ₦527.84 and ₦513.29, respectively. Treatment two had the greatest feed cost per kg gain (₦616.38), making this diet less acceptable for recommendations. Treatment four had the largest gross margin as well as the highest revenue (P<0.05), ₦142.96 and ₦656.25, respectively, followed closely by T3 containing 15% raw JSM. T1 and T2 had the lowest revenues, ₦554.17 and ₦550.00, respectively. T2 -₦66.38 suffered a loss, followed by T1 -₦10.04. Gross margin is regarded as one of the most important economic criteria used in determining profitability and can be used as a major index for determining profitability according to Ojewola et al., 2005. Treatment four yielded the highest profit of any of the dietary treatments. As a result, T4 containing 20% raw Jackfruit seedmeal recorded the greatest record, implying that it may be cheaper and more economical to incorporate 20% raw Jackfruit seedmeal in meals of guinea fowl keets.

4.0 Conclusion and Recommendation

4.1 Conclusion

According to the study's findings, higher levels of raw jackfruit seedmeal inclusion tend to reduce the nutritional content of meals, including crude protein, ether extract, ash, and metabolizable energy. The 20% JSM-containing meal performed better in terms of the highest final weight (745g) and daily weight gain (15g/bird). Except gizzard, raw JSM showed no effect on carcass performance parameters. T4, with 20% raw JSM, produced the maximum profit and the lowest feed cost per weight gain. T4 outperformed the other dietary treatments in all indications, despite its reported higher amount of anti-nutritional components. Consequently, guinea fowl keets can tolerate 20% raw JSM without a negative impact on performance and be comfortable with the high level of fiber in the T4 diet (12.10%). No mortality was observed due to the inclusion of JSM in the keets' diets

4.2 Recommendation

Farmers are advised to utilize a diet containing 20% raw JSM (T4) in guinea fowl keets without compromising performance due to its substantially higher final weight and gross margin, among other variables. Because different poultry species are anticipated to react differently when given raw jackfruit seedmeal, more research into higher JSM inclusion levels can be tried. Furthermore, the impact of feeding processed jackfruit seedmeal versus raw jackfruit seedmeal can be evaluated.

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TABLES

Table 1: EXPERIMENTAL DIETARY COMPOSITION OF FEED FED TO GUINEA FOWL KEETS (4 TO 7 WEEKS).

Ingredients	T_1 (0%)	T_2 (10%)	T_3 (15%)	T_4 (20%)
Yellow maize	45.78	39.80	36.82	33.80
Soya bean	40.42	36.40	34.38	32.40
Jack fruit Meal	-	10	15	20
PKC	10	10	10	10
Bone meal	3.00	3.00	3.00	3.00
Salt	0.25	0.25	0.25	0.25
Lysine	0.10	0.10	0.10	0.10
Methionine	0.20	0.20	0.20	0.20
Premix	0.25	0.25	0.25	0.25
Total	100	100	100	100
Calculated composition				
Crude protein (%)	24.01	24.00	24.00	24.00

ME (Kcal/kg)	2,749.06	2,773.28	2,785.50	2,797.28

***Vitamin/mineral premix (1.2kg) contained: Vitamin A (15,000 i.u); Vit. D3 (3,500,000 i.u); Vit. E (30,000mg); Vit. K3 (3,000mg); Folic acid (1,000mg); Niacin (30,000mg); Calpan (10,000mg); Vit. B2 (8,000mg); Vit. B12 (20mg); Vit. B1 (3,000mg); Vit. B6 (4,000mg); Biotin (30mg); Antioxidant (125,000mg); Cobalt (240mg); Selenium (300mg); Iodine (1,400mg); Iron (46,000mg), Manganese (96,000mg), Copper (6,000mg); Zinc (80,000mg), Choline Chloride (500,000mg).**

Table: 2. Proximate composition of the test ingredient (Jackfruit)

Parameters	**Composition (kg)**
Dry matter	87.70
Moisture	12.30
Ash/mineral	5.00
Crude protein	12.25
Ether extract	0.85
Crude fiber	5.50
Nitrogen free extract	64.10
Metabolizable energy	3,103.23 (kcal/kg)

Table 3. Proximate composition of experimental diets

Parameter	**T_1**	**T_2**	**T_3**	**T_4**	**SEM**
	0%JSM	**10%JSM**	**15%JSM**	**20%JSM**	
Dry matter (%)	90.70	90.10	89.70	89.10	0.76
Moisture content (%)	9.30	9.90	10.30	10.90	0.30
Crude protein (%)	24.50^{a}	24.50^{a}	21.88^{b}	21.00^{b}	0.53

Ether extract (%)	2.96^{a}	2.88^{ab}	2.75^{b}	2.70^{b}	0.04
Crude fibre (%)	10.15	10.90	11.05	12.10	0.32
Ash (%)	10.10^{a}	8.70^{ab}	8.30^{ab}	8.00^{b}	0.35
Nitrogen Free Extract (%)	42.99	43.12	45.72	45.30	0.83
Metabolizable energy (Kcal/kg)	3259.95^{b}	3286.84^{a}	3255.63^{b}	3237.24^{c}	5.40

^{abc} Means within the rows with different superscripts differ significantly (P<0.05); SEM- Standard error of the mean

Table 4 Growth performance of Guinea fowl keets fed raw jackfruit seedmeal (JSM)

Parameter	T_1 0%JSM	T_2 10%JSM	T_3 15%JSM	T_4 20%JSM	SEM
Initial weight (g)	218.33	210.00	210.00	220.00	1.41
Final weight (g)	661.67^{c}	650.00^{d}	703.33^{b}	745.00^{a}	11.29
Daily weight (g/bird)	12.67^{b}	12.57^{b}	14.10^{ab}	15.00^{a}	0.39
Daily feed intake (g/bird)	45.20^{b}	57.36^{a}	58.37^{a}	60.32^{a}	1.94
Feed Conversion Ratio	3.57^{b}	4.56^{a}	4.14^{ab}	4.02^{ab}	0.13

^{abcd} Means within the rows with different superscripts differ significantly (P>0.05); SEM- Standard error of the mean

Table 5: Carcass analysis of Guinea fowl keets fed raw jackfruit seedmeal (JSM)

Parameter	T_1 0%JSM	T_2 10%JSM	T_3 15%JSM	T_4 20%JSM	SEM
Live weight (g)	808.33	716.67	800.00	766.67	29.43
Slaughter weight (g)	788.00	693.33	777.00	743.67	29.40
De-feathered weight (g)	747.00	666.67	750.00	716.67	28.47
Dressed weight (g)	680.33	597.33	682.00	636.00	27.90
CUT-PARTS					
Wings (%)	13.14	13.94	13.52	14.17	0.38
Chest muscle (%)	24.13	22.75	23.85	25.13	0.59
Back cut (%)	16.56	17.19	17.56	18.17	0.63
INTERNAL ORGANS					
Heart (%)	0.46	0.51	0.50	0.61	0.03
Kidney (%)	0.37	0.42	0.38	0.39	0.03
Liver (%)	1.75	2.00	1.94	2.01	0.10
Gizzard (%)	2.83^{b}	3.31^{ab}	2.87^{ab}	3.95^{a}	0.19
OTHERS					
Neck (%)	4.88	5.79	5.25	6.38	0.29

[ab] Means within the rows with different superscripts differ significantly (P>0.05); SEM- Standard error of the mean

Table 6 Economics of production of Guinea fowl keets fed raw jackfruit seedmeal (JSM)

Parameter	T_1 0%JSM	T_2 10%JSM	T_3 15%JSM	T_4 20%JSM	SEM
Total feed intake (kg/bird)	1.58^b	2.01^a	2.04^a	2.11^a	0.07
Weight gain (kg/bird)	0.44^c	0.44^c	0.49^b	0.53^a	0.01
Cost/kg feed (₦)	158.11^a	135.10^b	127.46^b	127.65^b	3.97
Cost of feed consumed (₦/bird)	250.13^c	271.55^a	260.40^b	269.34^{ab}	2.83
Feed cost per weight gain (₦/bird)	564.20^b	616.38^a	527.84^c	513.29^c	12.24
Price of bird ((₦/kg)	1300.00	1300.00	1300.00	1300.00	0.00
Revenue (₦/bird)	554.17^c	550.00^c	616.67^b	656.25^a	13.63
Gross margin (₦/bird)	-10.04^c	-66.38^d	88.83^b	142.96^a	24.69

Means within the rows did not differ significantly (P>0.05); SEM- Standard error of the mean