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GROWTH PERFORMANCE OF GROWING JAPANESE QUAIL BIRDS FED DIETS CONTAINING GRADED LEVELS OF GINGER WASTE MEAL AS A REPLACEMENT FOR MAIZE

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Abstracts
The experiment was carried out to investigate the effects of diets containing graded levels of ginger waste meal on the growth performance of Japanese quails. The experiment lasted for four (4) weeks and a total of two hundred and eighty-eight (288) Japanese quails of two (2) weeks old of mixed sexes were used. The birds were randomly allocated into four (4) dietary treatments with four (4) replicates. T1: (diet contained 0 % ginger waste meal), T2: (diet contained 35% ginger waste meal), T3: (diet contained 40 % ginger waste meal) and T4: (diet contained 45 % ginger waste meal). Data collected were subjected to analysis of variance. The highest average final body weight was observed on Japanese quail birds fed 35 % ginger waste meal-based diet (128.63 g), followed by those fed 0 % ginger waste meal-based diet (120.95 g) and the least value was obtained on Japanese quail fed 45 % ginger waste meal-based diet (117.68 g). Japanese quails fed 35 % ginger waste meal-based diet recorded the highest total feed consumed (280.64 g) this was closely followed by those fed the control diet (280.14 g) and the least value was recorded on those fed 45 % ginger waste meal-based diet. In conclusion, ginger waste meal could be used to replace maize by up to 40 % in the diets of growing Japanese quails without any negative effect on growth performance.

Keywords: Japanese quail, ginger waste meal, growth performance

Introduction

The shortage of animal protein for human consumption, especially in developing countries, may be attributed to the declining animal protein production occasioned by high cost of livestock production. Unfortunately, the level of animal protein intake is absolutely low at 4.5 g/day per capital (USDA, 2013). This level of animal protein intake is not befitting of a nation that is the largest economy in Africa and the 26th in the world. Development of the micro-livestock subsector, more especially rabbits, has been identified as one of the key ways of mitigating the problem of low dietary protein intake in developing countries such as Nigeria (Oloruntola *et al*., 2015).Japanese quail (*Coturnix coturnix japonica*) is among such micro-livestock which was described as an excellent and cheap source of animal protein for Nigerians (Babangida and Ubosi, 2006). Japanese quail are hardy birds that thrive in small cages and are inexpensive to keep. Japanese quail has high prolific tendencies; short generation interval, fast growth rate and can survive in small cages (Odunsi *et al*., 2007). However, high cost of conventional energy feed ingredients such as maize, has been a mitigating factor. The need to explore the use of alternative energy source therefore becomes necessary.

Feed cost for intensive poultry production is said to be the highest between (60 - 80 %) of the total production cost (Oruseibio and Smile, 2001). The increasing cost of feed ingredients in livestock production have been identified as a serious constraint to meeting the demand for animal protein especially in developing countries (Adejinmi *et al*., 2010). The competition between human beings and livestock for available cereal has resulted in high cost of feed production, and consequently higher cost of

such livestock. It has therefore become necessary to search for cheaper but equally effective means of making such feed. Ginger is a plant rich in many phenolic compounds hence the spicy aroma, taste, fragrance. In the root of rhizomes are naturally high plant-based chemicals known as phytochemicals believed to possess antibacterial and anti-viral properties that protect the plant from natural flora. The rhizome gingers is a plant extensively cultivated in Nigeria and many other countries of the world which is processed into various products for human consumption. The by-product is referred to as ginger waste meal (Onimisi *et al.*, 2006).

MATERIALS AND METHODS

Experimental Site

The research work was conducted at the Quail unit of the old Teaching and Research Farm of the Department of Animal Production, Federal University of Technology, Bosso Campus, Minna, Niger State, Nigeria. Minna lies between latitude 9° 28' N and 9° 37' N and longitude 6° 23' E and 6° 33' E with annual rainfall of 1000 - 1500 mm, and temperature range of 28 °C – 42 °C. The vegetation is Southern Guinea Savanna. (Climate-data.org, 2019).

Experimental Materials

The materials and ingredients used for the experiment includes deep litter pen, wooden hutches, feeders and drinkers, charcoal, rechargeable lamps, clean water, weighing balance, Japanese quails, Ginger waste meal, Soybean, maize offal, fish meal, bone meal, limestone, premix salt, synthetic methionine, lysine and vitalyte ®.

Source of Experimental Birds and Other Ingredients

Two hundred and eighty-eight (288) two weeks old Japanese quails were purchased from National Veterinary Research Institute, Vom Plateau State Nigeria for the purpose of this study. All the ingredients used for the diet formulation were purchased locally from Gwadabe Market, along Western by-pass, Minna. Groundnut cake, vitamin mineral premix, lysine, methionine, fish meal and bone meal were purchased at Farida shop in Gidan Matasa, Bosso, Minna while ginger waste meal were purchased from Belphines Nigeria Limited, Kafanchan in Giwa Local Government Area of Kaduna State.

Preparation of Experimental Diets

A previous experiment has been carried out to determine the effect of ginger waste meal as a replacement for maize on quail performance and the highest inclusion level was 30 %. As a continuation of the previous work, the experimental diets for this experiment were prepared using ginger waste meal at 35%, 40% and 45% inclusion level as shown below. The feed ingredients were be weighed and ground to the bird's particle size requirement and mixed for proper circulation of micro and macro nutrients. Four diets were formulated as designated below;

Diet 1: (control) formulated feed without ginger waste meal (T1)
Diet 2: contained feed with 35 % ginger waste meal (T2).
Diet 3: contained feed with 40 % ginger waste meal (T3).
Diet 4: contained feed with 45 % ginger waste meal (T4).

Management of Experimental birds

Two hundred and eighty-eight (288) Japanese quails of two (2) weeks old of mixed sexes were used. The birds were randomly allocated into four (4) dietary treatments with four (4) replicates. T_1: (diet contained 0 % ginger waste meal), T_2: (diet contained 35% ginger waste meal), T_3: (diet contained 40 % ginger waste meal) and T_4: (diet contained 45 % ginger waste meal) in a Completely Randomized Design (CRD). The experimental birds were be reared in hutches. Rechargeable lamps were used as source of lighting. Feed and water were supplied *ad-libitum.* Feeders and drinkers were washed clean every morning.

Appropriate medications were given in due time. Routine observation of bird's behaviour and cleaning of the pen, drinkers, feeders, provision of fresh clean drinking water and feed were carried out daily to prevent any form of infection. Anti-stress (Vitalite®) was administered in drinking water throughout the experiment due to weather changes. At two weeks of age, antibiotic was administered (Tetracycline) for 5 days through drinking water as prevention against bacterial infection.

Data Analysis

Data collected on growth performance were analyzed using one-way ANOVA (analysis of variance) and Statistical assessment of result was carried out using SSPS software 15 version, and means were separated using the Duncan multiple range test, where there were statistically significant differences ($P<0.05$).

RESULTS AND DISCUSSIONS

The proximate composition of the experimental diets fed to growing Japanese quail birds is presented in table 1.

TABLE 1: Proximate composition of the experimental diets fed to growing Japanese quails.

	Levels of ginger waste meal inclusion (%)			
Parameters	**T1 (0)**	**T2 (35)**	**T3 (40)**	**T4 (45)**
Dry matter (%)	88.35	88.67	90.58	88.52
Crude protein (%)	23.19	23.17	22.75	23.63
Crude fibre (%)	06.59	09.50	13.03	15.55
Ether extract (%)	04.17	04.27	04.01	03.78
Ash (%)	07.02	08.69	09.75	10.74
NFE (%)	59.03	54.37	50.46	46.30

NFE = Nitrogen Free Extract

Table 2 shows the growth performance of Japanese quails fed diets containing graded levels of ginger waste meal. The result showed that there were no significant differences ($P>0.05$) in the values obtained for average initial body weight (AIBW) and feed conversion ratio (FCR). However, there were significant ($P<0.05$) differences in the values obtained for average final body weight (AFBW), average body weight gain (ABWG), average daily weight gain (ADWG), total feed consumed (TFC) and average daily feed consumed (ADFC). The highest average final body weight was observed on Japanese quails fed 35 % ginger waste meal-based diet (128.63 g), followed by those fed 0 % (control) ginger waste meal-based diet (120.95 g) and the least value was obtained on Japanese quail fed 45 % ginger waste meal-based diet (117.68 g). Japanese quails fed 35 % ginger waste meal-based diet had the highest total feed consumed (280.64 g) this was closely followed by those fed the control diet (280.14 g) and the least value was recorded on those fed 45 % ginger waste meal-based diet (265.92 g). Feed conversion ratio were not significant across the four dietary treatments, however, Japanese quails fed 35 % ginger waste meal-based diet had the best feed conversion ratio (03.16 g), this was followed by those fed 45 % ginger waste meal-based diet (03.38), 40 % ginger waste meal-based diet (03.41) and the least value was recorded on those fed the control diet (03.44). Reduction in the total feed intake observed on Japanese quail fed diets containing 40 and 45 % ginger waste meal may be due to higher inclusion level which may not be too tolerable by the birds due to its high fibre content. Reduced feed intake may be responsible for lower average final body weights observed in Japanese quails fed 40 and 45 % ginger waste meal-based diets. The findings of this research negate that of Danladi (2021), who noticed a non-significant ($P>0.05$) differences on average final body weights and average weekly feed intake when he fed diets containing ginger waste meal as replacement for maize to Japanese quails. The variation obtained may be due to higher inclusion level of ginger waste meal adopted in this study. However, the researcher also reported a

non-significant difference on feed conversion ratio. Similar to the findings of this research, Muhammad *et al* (2017), recorded significant ($p<0.05$) difference in daily weight gain when Japanese quail's birds were fed diets with varying inclusion levels of ginger root.

Table 2: Growth performance of Japanese quail birds fed diets containing graded levels of ginger waste meal

Parameter	Levels of ginger waste meal inclusion (%)				SEM	P-value
	T_1 (0)	T_2 (35)	T_3 (40)	T_4(45)		
AIBW (g/bird)	39.30	39.06	39.25	39.02	00.19	0.96
AFBW (g/bird)	120.95^{b}	128.63^{a}	120.01^{b}	117.68^{b}	01.41	0.01
ABWG (g/bird)	81.66^{b}	89.59^{a}	80.76^{b}	78.66^{ab}	01.44	0.01
ADWG (g/bird)	02.92^{b}	03.20^{a}	02.88^{b}	02.81^{b}	00.15	0.01
TFC (g/bird)	280.14^{ab}	280.64^{a}	275.12^{ab}	265.92^{b}	02.76	0.05
ADFC (g/bird)	10.01^{ab}	10.09^{a}	09.83^{ab}	09.50^{b}	00.10	0.05
FCR	03.44	03.16	03.41	03.38	00.06	0.35

$^{abc;}$ Means on the same row with different superscript are significantly ($p<0.05$) different, SEM = Standard Error of Means.

CONCLUSION

From this study it can be concluded that ginger waste meal can be included in Quails diet without any adverse effect. However, birds fed with diet containing 35 % ginger waste meal inclusion level were found to have performed better in terms of all growth parameters observed compared to other ginger waste meal inclusion levels (0 %, 40 % and 45 %). It is therefore recommended that, ginger waste meal should not be included in growing Japanese quail diets more than 40 % replacement for maize.

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