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## GROWTH PERFORMANCE OF JAPANESE QUAILS FED DIETS CONTAINING GRADED LEVELS OF GINGER WASTE MEAL

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### ABSTRACT

A total of two hundred and eighty eight (288) two-weeks-old Japanese quails (*Coturnix coturnix japonica*) were used to evaluate their growth performance when fed diets containing graded levels of ginger (*Zingiber officinale*) waste meal. They were purchased from National Veterinary Research Institute Vom, in Jos, Plateau State Nigeria. The birds were randomly allotted to four dietary treatments subdivided into four replicates containing 18 quail birds per replicate; and were fed formulated diets containing ginger waste meal at 0 (control), 10, 20 and 30 % respectively (designated as T1, T2, T3 and T4) for four weeks in a completely randomized design model. Parameters measured included initial body weight (g/b), final body weight (g/b), average weekly weight gain (g), average weekly feed intake (g), total feed intake (g) and feed conversion ratio. No significant ( $P > 0.05$ ) differences was observed in the initial body weight, final body weight, average weekly weight gain, and feed conversion ratio among all the treatments. However, there was significant ( $P < 0.05$ ) difference in total feed intake and average weekly feed intake among the treatments with treatment 4 having highest feed intake. It was therefore concluded that the inclusion of ginger waste meal up to 30 % in the diets of Japanese quails aided increase in feed intake which could be attributed to the property of ginger as an appetizer that enhances the activities of gut microflora; and it has no detrimental effect on the growth performance of Japanese quails.

**Keywords:** Growth performance, Japanese quail, ginger waste meal

### Introduction

Poultry production is a vibrant aspect of livestock production and contributes about 37 % of animal protein both in developed and underdeveloped countries of the world (Khatun *et al.*, 2003; Adio, 2019). Management of chickens incur more cost on production as compared to other domesticated birds. Malik (2018) reported that with the increase in population of developing countries, it is germane that other wild poultry birds such as quail, emus, rheas, and pheasant be introduced into the commercial market to meet up the demand of animal protein.

Abu *et al* (2016) reported that there is a need to diversify and commercialise the production of other poultry birds such as quail because chicken and ducks suffered losses due to disease; and quails are suitable species easy to rear with little investment yet they provide more economic returns within a very short period of time.

Quails are small game birds that are suitable for meat and egg production on a commercial scale (Oyewuchi *et al.*, 2013). They have a short incubation period and attain sexual maturity within a short period of time, able to have about four generations in a year (Saidu *et al.*, 2014). They have favourable characteristics such as fast growth rate, high number of egg production of about 300 eggs per annum, early sexual maturity of about 6 weeks, little floor space required to rear them, about 200-250cm<sup>2</sup> in a cage system and about 150-200 cm<sup>2</sup> in a deep litter system of management (Jatoi *et al.*, 2015). They consume only about 20-25 gram of feed per adult per day, have short incubation period, less feed cost and they are not easily brought down by common poultry disease (Aygün *et al.*, 2013). Japanese quail egg is reported to be cheap and delicious, rich in protein containing a good amount of selenium, folate, phosphorus, riboflavin, vitamin B12, pantothenic acid and iron (Kalsum *et al.*, 2012). They also have a tender, nutritious and tasty meat which is similar to that of the chickens but having 3-4 times greater nutritional value (Narinc *et al.*, 2013).



Utilization of antibiotic based growth promoters has witnessed severe criticisms and universal concern because of their dangerous effects which include microbial resistance and their potentially dangerous effects on the health of man (Rahmatnejad *et al.*, 2009). These problems have prompted the investigation of other alternative substances that can reduce these threats (Manesh, 2012). Ginger has been used over centuries for healing purposes in Asia, Middle East, Europe and India to treat diseases such as arthritis, menstrual irregularities, asthma, diabetes and stomach upset (Ali, 2008). Prasad (2014) reported that ginger serves as an anti-inflammatory agent, prevent respiratory tract infections, prevents cough, prevents bronchitis and may be recommended for joint problems. Ginger has constituents that have been found to help as antioxidants, anti-inflammatory, antimutagenic properties and other biological activities. It also helps in the suppression of growths that induce varieties of cancer (Srinivasan, 2014). Hence, the objective of this study was to evaluate the growth performance of Japanese quails fed diets containing graded levels of ginger waste meal.

## Materials and Methods

### Experimental site

This research study was carried out at the Quail Unit of the Department of Animal Production Old Teaching and Research Farm, Federal University of Technology, Bosso Campus Minna, Niger State. Minna is located between latitude 9° 15' and 9° 45' N and between longitude 6° 15' and 6° 45' E of the equator. The average yearly rainfall is about 1000-1500 mm with an average temperature of about 28-42°C. Minna falls within the Southern Guinea Savannah vegetation of Nigeria having two distinct seasons; wet periods from March to October and dry season from November to March (NSADP, 2009).

### Experimental diets and their sources

Ingredients such as maize, soya bean, maize offal, fish meal and salt were purchased at the Kure Ultra Modern Market. Other micro ingredients such as vitamin premix, lysine, methionine, and bone meal were purchased from feed ingredient depots in Minna. Ginger waste was sourced from Kafanchan, Kaduna State. The ginger waste was sun dried for about 3-4 days until it was properly dried to a moisture content of about 10%. It was then milled using attrition mill and stored in plastic containers until it was needed. Experimental birds were purchased from the National Veterinary Research Institute (NVRI) of Nigeria, Vom Plateau State Nigeria. The quails were kept under an intensive system of management in cages.

### Experimental treatments and design

During the growth phase of quails, the experimental diets had crude protein (CP) level set at 24 %. Treatment 1 (T1) contained no ginger waste meal which served as the control; while treatment 2, 3 and 4 (T2, T3 and T4) contained 10, 20 and 30 % inclusion levels of ginger waste meal respectively. Other feed ingredients were kept constant while varying maize and soya bean with ginger simultaneously. This was done to balance fibre content present in maize and soya bean with high level fibre inclusions of ginger waste meal.

Two hundred and eighty eight (288) two weeks old unsexed Japanese quails were used for the first phase (growth phase) of the experiment, which were allocated to four dietary treatments with four replicates of 18 birds per replicate. Data collected from the experiment were subjected to a one-way analysis of variance (ANOVA) at 5% probability level. Significantly different means were separated using Duncan multiple range test. The statistical package for social scientist version 17 (SPSS, 2007) version 17 was used to analyze the data.

Table 1: Proximate composition of Ginger Waste Meal (GWM)

Parameters	GWM %
Crude protein	12.95
Crude fibre	10.00
Ash	5.50
Ether extract	3.60
Dry matter	87.50
Nitrogen free extract	55.45



Table 2: Composition of experimental diets fed to growing Japanese quails

Ingredient	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>
Maize	43.29	38.83	34.54	30.14
Ginger waste meal	0.00	4.32	8.64	12.92
Soybean meal	40.01	40.13	40.12	40.25
Maize bran	10.00	10.00	10.00	10.00
Fish meal	2.00	2.00	2.00	2.00
Bone meal	2.50	2.50	2.50	2.50
Limestone	1.50	1.50	1.50	1.50
Premix	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25
Methionine	0.10	0.10	0.10	0.10
Lysine	0.10	0.10	0.10	0.10
Total	100.00	100.00	100.00	100.00
Calculated analysis				
ME (Kcal/Kg)	2759.92	2657.63	2536.37	2323.14
Crude protein	22.90	23.11	23.78	23.49
Crude fibre	5.14	5.15	5.16	5.17
Lysine	1.39	1.39	1.38	1.37
Methionine	0.45	0.44	0.44	0.43
Calcium	1.20	1.20	1.20	1.20
Phosphorus	0.77	0.76	0.74	0.73

Premix (vitamin x minerals) Vitamins; A=7,500 IU, D=500,000 IU, E=100 IU, B1=325 mg, B2 =125 mg, B3 = 500 mg, B6 = 150 mg, B12 = 2.5 mg, C =10 mg, K = 15 mg and folic acid = 150 mg, Minerals: Ca = 12.5 mg, Cu = 8.0 mg, Fe = 32 mg, I = 0.8 mg, Se = 100 mg, Mg = 0.25 mg, chlorine = 250 mg, pantothenic acid = 14.4 mg, lysine, methionine and terramycine (Broad-spectrum antibiotics and growth promoters).

#### Management of experimental animals

This research lasted for four weeks. The birds were raised using intensive management system throughout the experimental period. Animals were served multivitamin SuperVit Plus (Multivitamin for Poultry) and fresh water was always served *ad libitum*. Parameters such as initial body weight (g/b), final body weight (g/b), average weekly weight gain (g), average weekly feed intake (g), total feed intake (g) and feed conversion ratio were obtained.

#### Result and Discussion

The results showed that graded levels of ginger waste meal in the diets of Japanese quail did not have any significant effect ( $p > 0.05$ ) on the growth performance (Table 2). The inclusion of ginger waste meal increased ( $p < 0.05$ ) feed consumption that may be due to appetite stimulation (Wafaa *et al.*, 2012) as ginger enhances feed taste and digestion. The total feed intake of birds fed T4 was higher than other treatments with could be attributed to the property of ginger as an appetizer that enhances the activities of gut micro flora (Anwarul *et al.*, 2009).

#### Conclusion and Recommendations

This study revealed that feed conversion ratio, initial weight, final weight and average weight gain were not significant except for feed intake, which is significant at 30 % inclusion of ginger waste meal. Hence, ginger waste meal can be used to replace 30% of maize in the diet of quail with no detrimental effect on their performance.



**Table 3: Effects of diets containing ginger waste meal on the growth performance of Japanese quail**

Parameters	T1	T2	T3	T4	SEM	LS
Initial body weight (g/b)	36.39	35.90	36.08	36.42	0.53	NS
Final body weight (g/b)	124.80	124.60	124.74	125.12	2.51	NS
Ave. weekly weight gain (g/b)	22.10	22.18	22.17	22.18	0.09	NS
Ave. weekly feed intake (g/b)	74.52 <sup>a</sup>	76.15 <sup>ab</sup>	74.91 <sup>ab</sup>	79.85 <sup>a</sup>	1.50	*
Total feed intake (g/b)	298.08 <sup>b</sup>	304.61 <sup>ab</sup>	299.62 <sup>ab</sup>	319.38 <sup>a</sup>	2.89	*
Feed conversion ratio	3.37	3.43	3.38	3.60	0.23	NS

\*ab means in the same row with different superscript differ (p<0.05) significantly  
Key;LS= (level of significance), NS=Not Significant,

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