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ORIGINAL RESEARCH ARTICLE

Nutritional potential of honeybee slum gum waste meal on Japanese quail (*Coturnix coturnix japonica*) chicks

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ABSTRACT

The maize replacement value of honeybee slum gum waste meal (HSWM) was investigated on the growth performance of Japanese quail chicks. Five hundred and forty (540) unsexed Japanese quail chicks were used for the experiment and four diets were formulated. Diet 1 had 0% HSWM while diets 2, 3 and 4 had maize in the control replaced with HSWM at 25, 50 and 75 respectively. After one week of acclimatization on the control diet, the quail chicks were weighed and randomly allocated to four (4) dietary treatments of three replicates each. Each replicate had forty-five (45) quail chicks to make a total of one hundred and thirty five (135) quail chicks per treatment in a complete randomized experimental design (CRD). The response criteria show that quails on 25 and 50% HSWM had comparable final weights, feed: gain and daily weight with the control. Feed cost decreased linearly as the inclusion of HSWM increases while the cost per kg weight gain decreased linearly to 50% beyond which it became higher. It was concluded that HSWM can replace 50% maize in the quail chicks' diet.

Keywords: Chick diet, daily weight gain, feed cost / kg weight gain, final weights, maize

INTRODUCTION

Two important approaches to combating the animal protein shortages in Nigeria are: reducing the cost of feeds which accounts for over 70% of the total cost of production and rearing and production of fast maturing animals- micro-livestock. Among the micro live stocks is the Japanese quail (*Coturnix coturnix japonica*). Japanese quails are endowed with unique characteristics that could motivate their rearing. According to Panda and Singh (1990), the quail is the smallest avian species reared for meat and egg production and is assuming a worldwide importance as a laboratory animal (Baumgartner, 1993)). The unique characteristics of the quail that could attract increasing rearing are rapid growth rate; they weigh between 180-200 grammes at maturity at 6 weeks of age when they can be marketed which coincides with the time egg production is known to commerce (Edache, *et al*., 2005). Quail has short generation interval with short (16-18 days) incubation period (Reddish, *et al.,* 2003)) and can lay up to 280-300 eggs in the first year (Metin, 2007).). They are fairly resistant to most poultry diseases and require little demand for vaccination (Jahadhav, and Siddiqui, 2010)); with shorter reproduction cycle and earlier marketing age, the quail offers quick returns on investment (Harunaet al (1997) and Musa, *et al.,* (2008)). With less feed input (20-25gram/quail/day) and space requirements (8-10 quails can occupy the same space as one chicken (Woodard et al (1973) the commercial quail farming for table egg and meat production can commence with relatively lower capital investment as compared with chicken and duck with almost the sme profit margin (Oluyemi. and Roberts (2007)). As a means for supporting livelihood, 20 quails can keep an average family in eggs and meat all year round (NRC (1991). The meat is lean and both eggs and meat are low in cholesterol (Gardword, and Diehl, (1987) and Shwartz, and Alen,. (1981). With the obvious advantages of the quail over other avian species, encouraging quail production in Nigeria will not only augment the present deficient animal protein

intake but create gainful employment for people. According to Minvielle (2009), annual searches between 2004 and 2007 collected many more papers for chicken-focused papers than for Quail implying that there is still active research on the quail as compared to chicken. Although research into Quail management has received attention of researchers, for instance comparism between cage and deep litter system (Ogbuewu *et al.,* (2014)) stocking density (Olugbemi and Ayeni 2014)), as well as varying dietary energy and protein levels on performance (Akinola, and Sese, (2011), Bawa (2010). Akpan and Nse (2009) suggested that more research into the use of non- conventional ingredients for quail production is needed.

Some non-conventional ingredients that have been used in quail diets are cassava meal (Edache et al 2007), yam peel as replacement for maize (Edache, *et al.,* 2010), Toasted mucuna seed (Tuleun, and Dashe, 2010), Replacement of maize with sweet potato meal (Edache, *et al.,* 2009).); but the potential of honeybee slum gum waste meal (HBSM) as a feed ingredient in Japanese quail has not been explored. HBSM has been described by Ojebiyi *et al.,* (2013). Slum gum is composed of a mixture of deed, bees, cocoons, honey, bee wax and propolis (Tew, 1992). The aim of the present study is to evaluate the nutritional value of HSWM on the growth performance of Japanese quail chicks.

MATERIALS AND METHODS

Experimental site: The experiment was carried out at the Poultry Unit of Teaching and Research Farm, Ladoke Akintola University of Technology, Ogbomoso, Oyo State.

Procurement and Preparation of Test Ingredient: The honey slum gum waste was obtained from the Apiary Unit of Teaching and Research Farm, Ladoke Akintola University of Technology, Ogbomoso, Oyo State. Honey slum gum waste was obtained after melting the honey comb and separating the wax from the mixture using a cheese cloth as described by Ojebiyi *et al.,* (2013).

Formulation of Experimental Diet: Four experimental diets were formulated as follows Diet 1: control diet with maize, Diet 2: 25% inclusion of honey slum gum waste meal as replacement for maize, Diet 3: 50% inclusion of honey slum gum waste as replacement for maize, Diet 4: 75% inclusion of honey slum gum waste as replacement for maize (Table 1)

Experimental Animal and Management*:* Five hundred and forty (540) unsexed Japanese quail chicks were used for the experiment. After one week of acclimatization on the control feeds, birds were randomly allocated to four (4) dietary treatments of three replicates each. Each replicate had forty-five (45) quail chicks to make a total of one hundred and thirty five (135) quail chicks per treatment in a complete randomized experimental design (CRD). Birds were reared intensively on deep litter. Wood shavings were used as litter material. The quails were offered feed and water *ad-libitum* on daily basis throughout the experiment that lasted for four (4) weeks.

Data Collection: Records of feed offered and left overs were kept to calculate the feed intake. The quails were weighed at the commencement of the experiment and weekly thereafter to calculate the weight gain. The data obtained for daily feed intake and body weight gain were used in calculating feed: gain ratio.

Laboratory Analysis: The honey slum gum waste and the experimental diets were analyzed for proximate composition by the method of AOAC (2005).

Data Analysis: All data collected were subjected to one way Analysis of Variance (ANOVA) using the General Linear Model of SAS (2000). Means were separated using Duncan's New Multiple Range Test of the same statistical package.

RESULTS AND DISCUSSION

The proximate composition of the test ingredient (Table 1) shows that it contains 90.6% dry matter, 3.717kcal/g gross Energy, 16.2% crude protein, 2.02% crude fibre, 4.11% ether extract, 5.37% Ash and 62.9% Nitrogen free extract. The proximate composition of the experimental diets indicated that the diets are adequate in nutrient composition to support the growth of quail chicks and it falls

within the values used by Edache *et al.,* (2009) and Tuleun and Dashe (2010). The performance characteristic of the quail chicks as affected by dietary treatments is shown in Table 2. The final weights, daily weight gain and feed: gain ratio are significantly ($p<0.05$) affected. The final weights obtained in treatments 1, 2 and 3 are 105g, 106g and 104g, respectively. These values are similar but significantly higher ($P<0.05$) than treatment 4 with a value of 98.4g. Similar trend was observed for daily weight gain. The values obtained may be an indication of good quality as well as better utilization of the HSWM used. Feed to gain ratio were significantly ($P<0.05$) influenced by the dietary levels of HSWM. Quails chicks on 25%, and 50% inclusion had comparable efficiency as the control in feed utilization. HSWM diets especially those on 25 and 50% consumed comparably lower feeds than the control to gain comparable weights with the control thus attesting to better utilization of the ingredient. While the values obtained for daily feed intake in the control diet was similar to that of Ijaiya *et al.,* (2012) who fed fermented cassava peel to quail, it was higher than the values for the HSWM diets. The feed cost per kg diet decreased linearly as the level of HSWM increased in the diets implying some cost savings effects as a result of using HSWM, a situation that is expected because the only cost involved is the processing of the HSWM. However, the feed cost per kg weight gain decreased linearly with increase inclusion of HSWM to 50% beyond which higher cost was recorded. The successful reduction in the cost of feeding per kg gain agrees with the findings of Ekenyen (2002) who reported that reducing feed cost /kg was only justifiable when production results is comparable with the standard (control).

Table 1: Gross composition of experimental diets

Ingredients	Percentage replacement of maize with HSWM			
	0	25	50	75
Maize	42.4	31.8	21.2	10.6
HSWM	-	10.6	21.2	31.8
*Fixed ingredients	57.6	57.6	57.6	57.6
Total	**100**	**100**	**100**	**100**
Determined nutrients Composition DM basis				
¶Energy(ME/Kcal/kg)	2897	2799	2726	2686
Crude protein (%)	24.9	24.15	24.97	24.28
Crude fat (%)	3.58	3.65	3.61	3.72
Crude fibre (%)	4.56	4.27	4.66	4.22
Ash (%)	6.88	6.93	7.16	7.21
Total cost/kg of feed(N)	103.81	101.65	97.96	95.06

Fixed ingredients (kg): Wheat offal 7.04 Palm kernel cake 6.04, Soybean meal 37.26, Fish meal 3.0, Vegetable oil 1.0, Bone meal 2.75, Premix 0.25, Methionine 0.018, Lysine 0.012, Salt 0.25 ***¶Calculated***

Table 2: Effect of Dietary Treatment on Growth Performance of Japanese quail chicks

Measurements	Percentage replacement of maize with HSWM				SEM	*P-value*
	0	25	50	75		
Initial weight (g)	18.8	20.4	19.9	19.9	0.153	0.06
Final weight(g)	105^{a}	106^{a}	104^{a}	98.4^{b}	0.526	0.01
Daily weight gain(g)	3.08^{a}	3.06^{a}	3.00^{a}	2.80^{b}	0.020	0.01
Daily feed intake, (g	17.8^{a}	14.1^{b}	14.2^{b}	14.3^{b}	0.117	0.02
Feed:gain ratio	4.68^{b}	4.61^{b}	4.73^{b}	5.09^{a}	0.080	0.03
Feed cost/kg (~~N~~)	104^{a}	102^{b}	98.0^{c}	95.1^{d}	0.145	0.01
Cost/weight gain(~~N~~)	486^{a}	469^{b}	449^{c}	499^{a}	4.389	0.02

$^{abcd:}$Mean values along the same row bearing different superscripts differ significantly ($P<0.05$)

CONCLUSION

It can be concluded from this study that honey bee slum gum meal has potential as feed ingredients in the formulation of quail diets. 50% of maize in the diets of quail chicks can be replaced with HSWM to reduce the cost of production and to improve the income of farmers thus encouraging further production. It is less competed for in terms of usage and is relatively easy and cheap to acquire.

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