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GROWTH PERFORMANCE CHARACTERISTICS OF WEANER RABBITS (*Oryctolagus cuniculus*) FED HONEY COMB PULP-BASED DIETS

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ABSTRACT

The growth performance characteristics of crossbred weaner rabbits fed varying dietary levels of dried Honey Comb Pulp (HCP) in hutches placed under mature rubber plantation were investigated. A total of 48, 8-week-old weaner rabbits were randomly allotted, 2 per cell of 6-celled rabbit hutch, with 4 replicates per diet or treatment in a completely randomized design to 4 HCP-based diets containing 16% dietary protein. The HCP was included at 10, 20 and 30% levels in diets 2, 3, and 4 respectively, while diet 1 without HCP (0%) served as the control. Feed and water were served ad libitum for 8 weeks. The daily feed intake (46.89 – 53.82g/rabbit/day/8wks), final body weight (1193.33 – 1300 g/rabbit), feed conversion ratio (4.32 – 4.77), efficiency of feed utilization (0.21 – 0.23), cost of feed per kg body weight gain (₦237.77 – 294.83) and cost of feed intake per rabbit (₦151.04 – 175.73) were similar ($p > 0.05$) across diets. The daily weight gain (10.09 – 12.20g/rabbit/day/8wks) varied significantly ($p < 0.05$). The highest daily weight gain (12.20g/rabbit/day/8wks) was obtained for rabbits fed 10% HCP-based diets. The least cost of feed intake per kg body weight gain (₦237.77) was obtained for rabbits fed 10% HCP-based diet. Honey comb pulp can be included in rabbit diet without any deleterious effect on their growth performance characteristics. Inclusion of honey comb pulp at 10% level in weaner rabbits' diet enhanced better feed utilization and is cost effective.

Key words: Performance, Weaner Rabbits, Honey comb pulp, Weight gain

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INTRODUCTION

Animal protein intake is quite low in developing than in developed countries. The FAO recommends a minimum of 70g of protein daily per caput, out of which at least 35g (50%) should come from animal proteins, but the average Nigerian consumes less than 10g of protein with only 3.2g of this amount from animal protein (Abu et al., 2008). Between 1995 and 2020, about 97.5 percent of the global population increase will be in developing countries, by which time 84 percent of the world's people (an estimated 6.3 billion) will be living in developing nations (FAO, 2004). Meat demand in the developing world will therefore double by 2020. Between the mid-1970s and 1995, meat consumption in the developing world rose from 11 kg to 23 kg per person. Two major contributors to this demand were China and Brazil. With China and Brazil excluded, the increase per person was from 11 kg to 15 kg per caput. Global demand for poultry meat will increase by up to 85 percent, beef by 80 percent and pig meat by 45 percent by 2020 (FAO, 2004). It is unlikely that poultry, beef and pork production will meet the demand especially

in sub-Saharan Africa and particularly in Nigeria. The use of other livestock species especially mini or micro-livestock like rabbits, grasscutter, snails, guinea pigs, insects and their larvae, edible rodent, quails, pigeon, giant snails, frogs, and similar animals (Hardouin and Stievenart, 1993) as sources of protein to man had been advocated. Rabbits can be raised at backyards or in an integrated farm and they are prolific, have short gestation period, quiet, docile, resistant to infections and can efficiently convert vegetation to meat (Afolabi *et al*., 2019; 2020).

Honey comb pulp is a product from honey production after the honey might have been extracted from the comb (Awah, 2000). The pulp is processed into wax for making candle, but in Nigeria these products are most of the time thrown away as waste. This study therefore aimed at determining the growth performance characteristics of weaner rabbits fed honey comb pulp-based diets.

MATERIALS AND METHODS

Bee hives were harvested from hives installed under Rubber plantation and the honey extracted. The residue or pulp referred to as Honey Comb Pulp (HCP) was collected and sundried for two weeks and then incorporated into the diets of growing rabbits. The HCP contained (%) 63.90, dry matter; 11.8, Crude protein; 44.0, Ether extract; 3.0, ash, 22.0, Crude fibre, and 19.2 Nitrogen free extracts (AOAC, 1990) and 2,543.90 kcal/kg estimated (Ekanayake *et al*., 1999) Metabolizable energy.

A total of 48, 8-week old crossbred weaner rabbits were randomly allotted, 2 per cell of 6-celled rabbit hutch, with 4 replicates per diet or treatment in a completely randomized design to 4 CRSM-based diets containing 16% dietary protein. The HCP was included at 10, 20 and 30% levels in diets 2, 3 and 4 respectively. Diet 1 without HCP (0%) served as the control as shown in table 1. Feed and water were served *ad libitum* in clean feed and water troughs for 8 weeks. Parameters measured include initial and final body live weights; feed intake, weight gain, Efficiency of Feed Utilization (EFU), Feed Conversion Ratio (FCR), cost of total feed intake per rabbit; cost of feed intake per kg body weight gain. Data obtained were subjected to statistical Analysis of Variance (ANOVA) using the procedure of GENSTAT (2008) and the means were separated by Duncan option of the software. The composition of experimental diet is as shown in Table 1.

RESULTS AND DISCUSSION

The performance traits of weaner Rabbits fed dried honey comb pulp-based diets is as shown in Table 2. The daily feed intake (46.89 – 53.82g/rabbit/day/8wks), final body weight (1193.33 – 1300 g/rabbit), feed conversion ratio (4.32 – 4.77), efficiency of feed utilization (0.21 – 0.23), cost of feed per kg body weight gain (₦237.77 – 294.83) and cost of feed intake per rabbit (₦151.04 – 175.73) were similar ($p > 0.05$) across board or diets.

The daily weight gain (10.09 – 12.20g/rabbit/day/8wks) varied significantly ($p < 0.05$). The least daily weight gain was obtained in rabbits fed 20% HCP which was also similar to what obtained in rabbits fed control diet (0%) and 30% HCP-based diets. The significantly ($p < 0.05$) highest value for daily weight gain was obtained for rabbits fed 10% HCP-based diet. This shows that rabbit fed diets with HCP showed a comparable performance to those on control diet. The daily weight gain of rabbits fed 20-30% HCP-based diets (10.09 - 10.65g/day) were within the range of values (9.15 -

10.99g/day) reported by Afolabi et al., (2019) for weaner rabbits fed diets with 0.1 - 0.4% Cameroon pepper fruit meal.

Table 1: Composition (%) of the experimental diets with varying levels of Honey comb pulp

Diets/Treatments	**1**	**2**	**3**	**4**
Levels of HCP	**0**	**10**	**20**	**30**
Feed Ingredients (%)				
Corn	25.00	29.70	34.00	40.00
Full fat Soya meal	8.50	10.80	13.25	16.30
Palm kernel cake	25.50	22.00	16.50	5.00
Wheat offal	20.00	11.5	5.00	3.00
Rice bran	17.00	12.00	7.00	1.70
HCP	**-**	**10.0**	**20.0**	**30.0**
Bone meal	2.00	2.00	2.00	2.00
Limestone	1.00	1.00	1.00	1.00
Grower premix*	0.30	0.30	0.30	0.30
Table salt	0.50	0.50	0.50	0.50
L-Lysine	0.10	0.10	0.20	0.20
DL-Methionine	0.10	0.10	0.10	0.10
TOTAL	**100**	**100**	**100**	**100**
Calculated values:				
Crude protein (%)	16.10	16.04	16.09	16.00
ME (kcal/kg)	2502.83	2602.64	2701.52	2790.34
Crude fibre	7.95	8.61	9.26	0.54
Calcium	0.52	1.18	1.16	1.14
Phosphorus	0.55	0.51	0.49	0.46

HCP = Honey comb pulp; ME = Metabolizable energy.

*Supplied per kg diet: Vit. A, 8 x 10^6 ; Vit. D3, 1.2 x 10^6 I.U; Vit.E, 7 x 10^3 mg; Vit. K3, 1.5 x 10^3 mg; Vit. B1, 2,000 mg; Vit. B2, 2.5 mg; Niacin, 15g; Pantothenic acid, 5.5 g; Vit. B6, 2g; Vit. B12, 10mg; Folic acid, 500mg; Biotin H2, 500 mg; Choline chloride, 175 g; Cobalt, 200 mg; Copper, 3 g; Iodine, 1 g; Iron, 21 g; Manganese, 40 g; Selenium, 200 mg; Zinc, 31 g; Anti-oxidant, 1.25 g.

As the level of HCP in the diets increased beyond 10% level of inclusion, the feed intake of weaner rabbits decreased. This might be attributed to the bulkiness of the feed as the feed nutrient density decreases with increase in the fibre and fat content of the feed. This might have led to the decreasing efficiency of feed utilization (0.232 to 0.213). The FCR also increased numerically. Values obtained for performance characteristics of rabbits in this study were similar to the values (48.61 – 51.37g daily feed intake/rabbits; 973.5 – 1334.8g final body weight/rabbit; ₦254.73 – 345.66 cost of feed per kg body weight gain of weaner rabbits) previously reported (Afolabi *et al*. 2014).

The costs of feed/kg body wt gain were similar which showed that the cost of HCP-based diets compared favourably with the control diet. Numerically the least cost of feed /kg wt. gain (₦237.77) was obtained for those fed 10% HCP-based diet which is more economically utilized than the control diets. It is possible that rabbits fed HCP-based diets will be healthier with higher resistance to diseases than those on control diet based on the beneficial property of the

residual honey, pollen and propolis that might be present in the HCP. Honey has been reported (Patterson, 2015) to have antibiotic property, improve healthy gut bacteria. A unique characteristic of raw honey is its ability to feed good gut bacteria and fight off bad bacteria (Patterson, 2015). Good bacteria are essential for overall health and wellness, and forms a main defense against outside threats, and raw honey is an impressive antimicrobial agent against a broad spectrum of bacteria and other infectious organisms. It also serves as anti-oxidant. In a farm or area where honey is being produced the use of HCP will be beneficial and it will reduce the cost of feed ingredients.

Table 2: The performance traits of weaner Rabbits fed dried honey comb pulp-based diets

Treatments	**1**	**2**	**3**	**4**	
HCP Levels (%)	**0**	**10**	**20**	**30**	**SEM**
Initial BW/Rabbit(g)	625.0	616.7	628.3	633.3	129.2
FI/Rabbit/8wks (g)	3014	2942	2626	2843	229.7
Daily FI/Rabbit/8wks (g)	53.80	52.50	46.90	50.80	4.10
WG/Rabbit/8wks (g)	675.0^{ab}	683.3^{a}	565.0^{b}	596.7^{ab}	32.6*
Daily WG/Rabbit/8wks (g)	12.05^{ab}	12.20^{a}	10.09^{b}	10.65^{ab}	0.58*
Final BW/Rabbit (g)	1300	1300	1193	1230	134.9
FCR/Rabbit/8wks	4.48	4.32	4.68	4.77	0.38
EFU/Rabbit/8wks	0.229	0.232	0.216	0.213	0.02
Cost of FI/Rabbit (₦)	160.40	161.93	151.04	175.73	13.62
Cost of feed/kg BWG (₦)	238.6	237.77	269.19	294.83	22.10
Cost of feed (₦)/kg	53.23	55.04	57.52	61.81	-

*^{ab}Mean values along the same row are significantly ($p < 0.05$) different. HCP = Honey comb pulp; BW = Body weight; FI = Feed intake; WG = Weight gain; FCR = Feed conversion ratio; EFU =Efficiency of feed utilization. * = P ≤ 0.05.

CONCLUSION

- Honey comb pulp can be included in rabbit diet without any deleterious effect on their performance characteristics.
- Inclusion of honey comb pulp at 10% level in grower rabbits' diet enhanced better feed utilization and is cost effective.

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