NSAP 47th Annual Conference (JOS 2022) CONFERENCE PROCEEDINGS
THEME: SECURING ANIMAL AGRICULTURE AMIDST GLOBAL CHALLENGES

GROWTH PERFORMANCE OF WEANER RABBITS FED GARLIC AND GINGER SUPPLEMENTED BASAL DIETS

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Abstract
This study was carried out to investigate the growth performance of rabbits fed diets supplemented with garlic and ginger. Thirty-six (36) female Dutch weaner rabbits were randomly allotted into four dietary treatments of 9 rabbits and three replicates with three (3) rabbits per in a completely randomized design. The dietary treatments were designated as follows; control containing 0 g garlic and ginger (T1), 100 g garlic per 100 kg feed (T2), 100 g ginger per 100 kg feed (T3) and 50 g garlic + 50 g ginger per 100 kg feed (T4). Data obtained were subjected to analysis of variance and significant differences were separated using Duncan Multiple Range Test. The result showed that there were no significant differences ($P>0.05$) in the values obtained for average initial body weights. However, there were significant ($P<0.05$) differences in the values obtained for average final body weights, average body weight gains and feed conversion ratio. The highest average final body weight was observed on rabbits in T4 (1403.70 g), follow by T3 (1374.00 g) while the least value was observed on rabbits in T1 (1314.30 g). Rabbits in T4 had the highest daily feed consumed (53.29 g) while the least value was observed on rabbits in T1 (50.69 g). The best feed conversion ratio was recorded on rabbit in T4 (03.84), while the least value was observed on rabbits in T1 (04.25). In conclusion, garlic and ginger could be used up to 0.1 % inclusion in rabbit diets without any adverse effect on growth performance.

Keywords: Growth performance, weaner rabbit, ginger, garlic.

Introduction

Livestock agriculture apart from providing animal protein to man, has also played an important role in the standard of living of humans (Bettencourt *et al.,* 2015). Animal protein is an important necessity in human nutrition due to its balanced amino acid profile (Jon, 2018). In Nigeria, the production and availability of meat produced by some conventional sources like, cattle, poultry, sheep and goat to meet the growing demand for animal protein is insufficient for the growing population. Hence the use of recognized micro herbivores and unconventional species of livestock such as rabbit (*Oryctolagus cuniculus*) may be a promising source of animal protein to mitigate protein shortage due to high cost of chicken, beef and pork for the growing population in Nigeria (Mohammed *et al.,* 2018), thus making it emerge as a viable livestock species. In previous years, much attention has been given to rabbit farming in order to facilitate the increase of productions without adversely affecting meat quality and animal wellness. Antibiotics were the most common feed additives used in time past, however, the use of synthetic antibiotics is being regulated because of the development of resistant microorganisms and their effect on human health (Joseph *et al*., 2015).This has prompted the need for new initiatives in the livestock and pharmaceutical industries to seek and promote the use of alternative materials that combine the effects of nutritional and medicinal properties, simultaneously (Esiegwu *et al*., 2014) and to carry out studies on the addition of natural antioxidants as nutritional supplements in animal feeding to improve health, performance, meat quality and shelf-life of raw or cooked meat products (Jiang and Xiong, 2016). Safe supplements such as garlic and ginger which are natural growth promoters can be used as potential alternatives for common artificial growth promoters like antibiotics (Demir *et al.,* 2003). Garlic and ginger powder and their extracts have been studied for their antioxidant and antimicrobial properties both in dietary supplementation and in food preservation (Zomrawi *et al.,* 2012). These natural antioxidants have been recognized to be better than synthetic antioxidants due to their lower cytotoxicity and tissue residue (Sen *et al*., 2010), ability to mitigate or

prevent generation of free radicals or reactive oxygen species (Ali *et al*., 2008). Hence, garlic and ginger could play an important role in rabbit feeding strategy. Therefore,

Materials and methods

Experimental site

The experiment was conducted at the Rabbit Research Unit of the Department of Animal Production, Teaching and Research Farm, School of Agriculture and Agricultural Technology of the Federal University of Technology Minna, Niger State, Nigeria. Minna is located within latitude $9^0$30' and 6^0 45' North and longitude 6^0 30' N and 6^0 45' East of the equator. It falls within the Southern Guinea Savanna agro-ecological zone of Nigeria. It is characterized by a mean annual temperature which lies between 21^0C and 35^0C and mean annual rainfall varying from 1100 to 1600 mm (Federal Metrological Station, 2015).

Sources and Processing of Feed Ingredients.

Methionine, Lysine, Fish meal, Vitamin premix, Salt, Bone meal, Limestone, Soybean meal and Wheat offal were purchased from Animal care retailer shop Gidan Matasa, Okada Road, Minna, Niger State, dried ginger and garlic were purchased from Kure Ultra-Modern Market, Minna, Niger State,while Maize was purchased from Garatu market, Niger State. Dried garlic and ginger were ground into powder and incorporated into rabbit diets.

Experimental Diets

The feed ingredients were weighed and ground to rabbit's particle size and mixed for proper circulation of micro and macro nutrients. Four diets were formulated and designated as follows;Treatment 1 = diet without garlic and ginger supplement, Treatment 2 = diet containing 100 g garlic supplement per 100 kg feed, Treatment 3 = diet containing 100 g ginger supplement per 100 kg feed and Treatment 4 = diet containing 50 g garlic and 50 g ginger supplement per 100 kg feed.

Experimental Animals and Management

Thirty-six (36) female Dutch weaner rabbits were used for the experiment. Before the arrival of the rabbits, the experimental house and rabbit hutches were properly washed and fully disinfected. The rabbits were randomly shared into four (4) nutritional treatments in a Completely Randomized Design (CRD). Each treatment had three replicates with three (3) rabbits per replicate. Rabbits were reared in hutches measuring 0.6 m × 0.5 m × 0.4 m, for 42 days. Medications were given as at when due. Rabbits were fed with 5 % of their body weight experimental diets in the morning and forage (groundnut haulms) in the evening and water was given *ad-libitum*.

Data collection and analysis?

Table 1: Gross and chemical composition of the experimental diets (%)

	Dietary treatments (kg)			
Ingredients	T1 (control)	T2 (100 g garlic)	T3 (100 g ginger)	T4 (50 g garlic+ 50 g ginger)
Maize	49.00	49.00	49.00	49.00
Groundnut cake	12.00	12.00	12.00	12.00
Fishmeal	03.00	03.00	03.00	03.00
Rice bran	18.00	17.90	17.90	17.90
Wheat offal	14.00	14.00	14.00	14.00
Limestone	01.00	01.00	01.00	01.00
Garlic	-	00.10	-	-
Ginger	-	-	00.10	-
Garlic + ginger	-	-	-	00.10
Bonemeal	02.00	02.00	02.00	02.00

Salt	00.25	00.25	00.25	00.25
Lysine	00.25	00.25	00.25	00.25
Methionine	00.25	00.25	00.25	00.25
Vitamin premix	00.25	00.25	00.25	00.25
Total	100.00	100.00	100.00	100.00
Calculated analysis				
Crude protein (%)	16.08	16.11	16.10	16.10
ME (kcal/kg)	2526.10	2526.05	2526.08	2526.07

Premix supplied per Kg of diet: Vit. A, 10,000iu; Vit D3, 2000iu; Vit E, 23mg; Vit. K, 2mg; Vit, B1, 1.8mg; Vit B2, 5.5mg; pantothenic acid, 7.5mg; Vit. B12, 0.015mg; Folic acid, 0.75mg; Biotin, 0.06mg; Choline chloride, 300mg; Cobalt, 0.2mg; Copper,3mg; Iodine, 1mg; Iron, 20mg; Manganese, 40mg; Zinc, 30mg; Antioxidant, 1.25mg.

Results and discussions

Table 2 shows the growth performance of rabbits fed diets containing garlic and ginger supplementation. The result showed that there were no significant differences (P>0.05) in the values obtained for average initial body weight (AIBW). 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), average daily feed consumed (ADFC) and feed conversion ratio (FCR). The highest average final body weight was observed in rabbits fed diet containing 50 g garlic + 50 g ginger (1403.70 g), followed by those fed diet with 50 g/100kg of ginger (1374.00 g) while the least value was observed on rabbits fed control diet (1314.30 g). Rabbits fed diet containing 50 g garlic + 50 g ginger had the highest daily feed consumed (53.29 g), followed by those fed diets containing 50 g of ginger (52.94 g) and 50 g of garlic (52.50 g) while the least value was observed on rabbits fed the control diet (50.69 g). Better feed conversion ratio was recorded on rabbit groups fed diet containing 50 g garlic + 50 g ginger (03.84), this was followed by those fed 50 g ginger (03.94) and 50 g garlic (04.02), while the least value was observed on rabbits fed the control diet (04.25). The result of these findings negates that of Karangiya *et al* (2021), who noticed a significant reduction in the feed consumed when broiler diet was supplemented with 1% ginger, garlic with ginger and garlic mixture. However, their feed conversion ratio was in line with the one obtained in this study. The variation could be due to higher inclusion level used by the researcher. The final body weight recorded in this study is similar to that of Emmanuel and Ochefu (2020), however without a significant difference as compared to the findings of this study.

Table 2: Growth performance of rabbits fed diets containing garlic and ginger supplementation

Parameters	T1	T2	T3	T4	SEM	P-value
AIBW (g)	728.67	730.60	714.33	722.00	05.64	00.81
AFBW (g)	1314.30^{c}	1371.00^{b}	1374.00^{b}	1403.70^{a}	10.24	00.01
ABWG (g)	585.67^{b}	640.33^{ab}	659.67^{a}	681.67^{a}	13.09	00.03
ADWG (g)	11.94^{b}	13.07^{ab}	13.46^{a}	13.91^{a}	00.27	00.03
ADFC (g)	50.69^{b}	52.50^{ab}	52.94^{a}	53.29^{a}	00.41	00.05
FCR (g)	04.25^{b}	04.02^{ab}	03.94^{ab}	03.84^{a}	00.06	00.05

^{a,b,c},; Means in the same row with different superscript are significantly different (p<0.05), AIBW= average initial body weight, ABWG= average body weight gain, AFBW= average final body weight, ADWG= average daily weight gain, ADFC= average daily feed consumed, FCR= feed conversion ratio, g= gram, %= percentage, SEM= standard error of mean.

Conclusion and application

It can be concluded from the results obtained that the inclusion of garlic and ginger supplementation in the diet of rabbits up to the level of 0.1 % can be tolerated by rabbits and does not pose any negative effect on rabbits in terms of their performance. This was established from the results obtained in the final body weight, body weight

gain and feed conversion ratio. Thus, garlic and ginger supplemented up to 0.1 % inclusion levels can be incorporated into the diet of rabbits.

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