

GROWTH PERFORMANCE AND CARCASS CHARACTERISTICS OF GROWING RABBITS FED DIETS CONTAINING MAGGOT MEAL AS REPLACEMENT FOR SOYBEAN MEAL.

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ABSTRACT

The growth performance and carcass characteristics of growing rabbits fed diet containing maggot meal as replacement for soybean meal was investigated in a 56days feeding trials. Thirty unsexed mixed breeds (New Zealand white x California) rabbits were allotted on weight equalization basis into five dietary treatments where a standard basal diet (soybean based without maggot meal) served as control (Diet 1) while diets 2, 3, 4 and 5 had soybean meal replaced with maggot meal at 25, 50, 75 and 100% levels respectively. Six rabbits were used per treatment having three replicates of two rabbits each. The feeding trial was conducted for 56days while feed and water were offered to the rabbits unrestrictedly. Performance parameters were collected weekly and carcass measurement was done at day 56. The growth parameter depicts significant difference ($p \leq 0.05$) in the total feed intake (TFI) and daily feed intake (DFI), total weight gain (TWG), daily weight gain (DWG) and feed conversion ratio (FCR). The best FCR was noticed on diet 5. Meanwhile, all parameters except the heart and spleen were significantly ($p \leq 0.05$). The highest value 0.85% of the lungs was observed on diet 4 but this does not depict any detrimental effect of the dietary composition. The highest dressing percentage (71.01%) was observed in treatment 5 while the least 56.06% was seen in the control (diet 1). No mortality were recorded across all the treatments.

Keywords: – Cervical thoracic region, Lumbar sacral region, Gastro intestinal tract, Rabbit, Maggot meal

INTRODUCTION

The reduction in food production that may result into nutritional deficiencies in humans requires an urgent intervention (Amaduruonye *et al.*, 2018). Attention have therefore shifted to production of micro-livestock as alternative. Rabbit has short gestation period and are highly prolific (Mafimidiwo *et al.*, 2022). Rabbit meat is low in cholesterol which had been implicated in arteriosclerosis and other vascular diseases (Fortes *et al.*, 2020). The demand for conventional feedstuff such as soybean had drastically become escalated (Ebenebe *et al.*, 2018). Soybean which have served as conventional protein feedstuff is no longer available and un-affordable to feed millers (Samuel and Idris, 2021). Soybean meal contains 45-54% crude protein (Baker *et al.*, 2011). The quest for cheaper and available alternative for soybean have necessitated investigation into the use of suitable alternatives such as maggot meal. Maggot meal is made from the larvae of black flies and it contains 55% crude protein, 27.65% ether extract, 8.33% ash, 3.37% crude fibre and 2.14 nitrogen free extract, 3955kcal/kg metabolizable energy (Ahmad and Sayed, 2022) that made it a potential alternative for soybean meal. Whilst soybean had trypsin inhibitor as anti-nutritional factor, no such have been identified with maggot meal (Makinde, 2015). Maggot meal had been used in fish and poultry (Hwangbo *et al.*, 2009), however there are paucity of information on its incorporation in rabbit's diets. Therefore this study investigated the growth performance and carcass characteristics of rabbits fed diets containing varying levels of maggot meal as a replacement for soybean meal.

MATERIALS AND METHODS

Thirty mixed (unsexed) breed (New Zealand x California) rabbits weighing about 750-758 grams were procured from a reliable farm in Ibadan and were acclimatized for seven days at the Teaching and Research farm of the Department of Agricultural Technology, Yaba College of Technology, Epe Lagos on latitude 3. 58° E and longitude 6. 47°N (Google Earth, 2022). They were offered feed and water ad-libitum and all pre-experimental medication were strictly adhere to.

The maggot meal was procured from a processing company at Epe, Lagos while other feed ingredients were purchased from a reliable feed mill at Epe. The rabbits were randomly allotted into five experimental diets on weight equalization basis. The diets comprises of a control diet (Diet 1) (soybean based without maggot meal) while diets 2, 3, 4 and had the soybean meal replaced with

maggot meal at 25, 50, 75 and 100% levels respectively (Table 1). Six rabbits were used per treatment having three replicates of two rabbits each. The feeding trial was conducted for 56 days while feed were offered to the rabbits unrestrictedly.

Data collection and Analysis

Performance parameters were collected weekly and carcass measurement was done at day 56. Initial weight was taken at the commencement of the experiment, total weight gain, final weight, daily feed intake, daily weight gain, feed conversion ratio and mortality records were taken. At the end of the feeding trial, a rabbit per replicate were randomly selected for carcass evaluation. They were fasted for twelve hours before slaughtering. Records of the slaughtered weight, defurred weight, hot carcass weight, eviscerated weight, gastrointestinal tract (GIT), cut parts and internal organs weight were collected. All data collected were subjected to one way analysis of variance and the mean were separated using Duncan multiple range test (Duncan, 1955) and the level of significance was at 5%

RESULT AND DISCUSSION.

Table 1: Showing the Gross composition of experimental diets

Ingredients (Kg)	Diet 1	Diet 2	Diet 3	Diet 4	Diet 5
Maize	30.00	30.00	30.00	30.00	30.00
Maggot meal	0.00	6.25	12.50	18.75	25.00
Soybean meal	25.00	18.75	12.50	6.25	0.00
Wheat offal	20.00	20.00	20.00	20.00	20.00
Fish (72%)	1.00	1.00	1.00	1.00	1.00
Bone meal	2.00	2.00	2.00	2.00	2.00
Limestone	2.00	2.00	2.00	2.00	2.00
Premix	0.05	0.05	0.05	0.05	0.05
Salt (NaCl)	0.35	0.35	0.35	0.35	0.35
Lysine	0.05	0.05	0.05	0.05	0.05
Methionine	0.05	0.05	0.05	0.05	0.05
Molasses	5.00	5.00	5.00	5.00	5.00
Palm Kernel Cake	14.50	14.50	14.50	14.50	14.50
Total	100	100	100	100	100
Calculated analysis					
Metabolizable Energy (kg/kcal)	2538	2553	2570	2584	2596
Crude protein (%)	20.92	20.83	20.74	20.66	20.57
Crude fibre (%)	4.66	4.95	5.27	5.57	5.88

The result of the feeding trial reveals that the replacement of soybean with maggot meal improves the dressed weight and dressing percentage (1352.74 and 71% respectively) as well as positively affecting the DWG, DFI and FCR of the rabbits as the level of replacement increases. This was in contrast with the findings of Awoniyi *et al* (2003) who observed that weight gain, feed consumption and feed efficiency reduces as maggot meal inclusion increases in the diets of broiler chicken. However, the increased liver and lungs reported in this work was in tandem with Mafimidiwo *et al* (2022) who observed similar increases in liver and kidney when urea-molasses treated maize cob was used to replace wheat offal in growing rabbit's diets. The higher 3.96% weight of the liver may not necessarily be a result of any detrimental effect of the component of the diet but a response to microbial activities in the gastro-intestinal tract of the rabbits. The zero mortality percentage observed in this work is an indication of no possibility of disease transmission from the maggot meal to the rabbits (Hwangbo *et al.*, 2009).

Table 2: Showing the Performances of growing rabbit fed diets containing maggot meal as replacement for soybean meal.

Parameters	T1	T2	T3	T4	T5	SEM
Initial weight (g/rabbit)	753.33	751.70	750.00	758.33	756.70	0.22
Final weight (g/rabbit)	1850.00 ^{bc}	1675.00 ^c	1825.00 ^b	1825.00 ^b	1925.00 ^a	0.26

TWG (g/rabbit)	1096.67 ^b	923.30 ^c	1075.00 ^{bc}	1066.67 ^{bc}	1168.30 ^a	1.32
DWG(g/rabbit)	19.58 ^b	16.49 ^c	19.20 ^{bc}	19.05 ^{bc}	20.86 ^a	0.68
DFI (g/rabbit)	56.90 ^a	51.33 ^c	52.29 ^b	51.57 ^c	51.19 ^c	0.33
TFI (g/rabbit)	3185.95 ^a	2874.21 ^{bc}	2928.02 ^b	2887.86 ^{bc}	2866.34 ^c	15.43
FCR	2.91 ^a	3.11 ^a	2.72 ^{ab}	2.71 ^{ab}	2.45 ^b	0.14
Mortality (%)	0	0	0	0	0	0.00

TWG - Total weight gain; DWG – Daily weight gain; TFI – Total feed intake; DFI – Daily feed intake; FCR – Feed conversion ratio ^{abc} Means on the same row with different superscript are significantly different (P<0.05) SEM: Pooled standard error of mean

Table 3: Showing the Carcass characteristics of growing rabbits fed diets containing maggot meal as replacement for Soybean meal

Parameters	Diet 1 (0%)	Diet 2 (25%)	Diet 3 (50%)	Diet 4 (75%)	Diet 5 (100%)	SEM
Average Live weight (g)	1650 ^b	1650 ^b	1800 ^{ab}	1815 ^{ab}	1905 ^a	9.57
Dressed weight (g)	925 ^c	1150 ^b	1255 ^{ab}	1269 ^{ab}	1352.74 ^a	13.02
Dressing (%)	56.06 ^c	69.70 ^b	69.72 ^b	69.92 ^{ab}	71.01 ^a	5.06
Retail cut parts						
Fore Limbs (%)	9.38 ^c	9.68 ^b	10.48 ^a	9.78 ^{ab}	10.45 ^a	2.23
Hind Limb (%)	16.35 ^c	17.42 ^a	16.89 ^b	16.00 ^c	18.07 ^a	0.44
CTR (%)	10.15 ^b	12.27 ^a	12.21 ^a	9.19 ^c	10.89 ^{ab}	1.02
LSR (%)	15.70 ^b	15.86 ^{ab}	15.03 ^c	18.54 ^a	17.11 ^a	0.87
Loin (%)	4.58 ^a	3.84 ^{ab}	3.51 ^{ab}	2.92 ^b	4.43 ^a	0.03
Carcass by-products						
Head (%)	9.73 ^{bc}	5.59 ^c	10.92 ^a	10.32 ^b	11.15 ^a	0.04
Trotters	2.34 ^{bc}	2.17 ^c	2.53 ^b	3.12 ^{ab}	3.28 ^a	0.03
Organ weight						
Total GIT	22.23 ^{ab}	20.97 ^b	19.22 ^c	19.89 ^{bc}	26.38 ^a	1.10
Heart (%)	0.23	0.28	0.21	0.30	0.34	0.02
Lungs (%)	0.74 ^a	0.55 ^b	0.69 ^{ab}	0.85 ^a	0.78 ^a	0.02
Liver/ Gall bladder (%)	2.74 ^c	3.13 ^b	3.14 ^{ab}	3.67 ^{ab}	3.96 ^a	0.03
Spleen (%)	0.07	0.06	0.06	0.05	0.07	0.01

CTR – Cervical Thoracic Region; LSR – Lumbar Sacral Region; GIT - Gastro Intestinal Tract

^{abc} Means on the same row with different superscript are significantly different (P<0.05)

SEM: Pooled standard error of mean

CONCLUSION AND RECOMMENDATION

From the result of this experiment, it could be inferred that maggot meal can successfully be used to replace soybean meal up to 100% level without any adverse effect on the weight gain, dressing percentage and health of growing rabbits. It is therefore recommended that soybean meal could be substituted with maggot meal in the diet of growing rabbit's diet.

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