THE IMPACT OF KITCHEN WASTE AND SOME SELECTED VEGETABLE LEAVES ON THE PERFORMANCE OF CROSSBRED RABBITS

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ABSTRACT
This study focused on determining the effect of selelcted vegetable leaves on the performance crossbred rabbits. The leaves of seven vegetables: pawpaw (Carica papaya) carrot (Daucus carota), garden egg (Solanum macrocarpon), tomato (Solanum lycopersicum) were harvested, dried and milled to produce pawpaw leaf meal (MLM), carrot leaf meal (OLM), garden egg leaf meal (GELM) and tomato leaf meal (TLM). Remnants of food that remain after cooking, such as fruit and vegetable scraps, bread, eggshell/, broken grains and leftovers on plates was supplemented as kitchen scraps. Sixty four (64) weanling male rabbits weighed about 800 grams were divided into four groups, each consisting of 16 rabbits which were replicated 4 times in a completely randomized design. They were fed different combinations of kitchen scraps and the dry leaves as follows: kitchen scraps+pawpaw leaf meal (CONTROL), kitchen scraps+carrot leaf meal (KCLM), kitchen scraps+garden egg leaf meal (KGLM) and kitchen scraps+tomato leaf meal (KTLM). The respective treatments and water were supplied ad libitum for a 12th week experimental period. The results showed that rabbits fed KCLM had a significantly (P<0.05) higher weight gain compared to those in the control group. On the other hand, rabbits fed KGLM and KTLM had lower weight gains than the control group. Feed intake was significantly (P<0.05) higher in rabbits fed KGLM and KTLM compared to the control group, while rabbits fed KCLM had similar feed intake to the control group. Feed conversion ratio was similar between the control group and rabbits fed KCLM, but poorer in rabbits fed KGLM and KTLM. Dressed weight was significantly (P<0.05) higher in rabbits fed KCLM than in the control group, while it was lower in rabbits fed KGLM and KTLM. However, dressing percentage was similar between the control group and rabbits fed KCLM, but lower in rabbits fed KGLM and KTLM. In conclusion, carrot leaf was found to enhance the performance of rabbits when supplemented with kitchen scraps, compared to garden egg leaf and tomato leaf.
Keywords: Rabbits, kitchen scraps, vegetable leaves, performance and carcass weight.

INTRODUCTION

Rabbits are herbivores that rely on high fiber diets more than pig and poultry (Jiwuba, 2018) due to its enlarged caecum which enables a unique type of digestion known as ceacotrophy or coprophagy (bacteria digestion) (Jiwuba, 2018). They are able to produce a significant amount of meat quickly using inexpensive forages and food by-products. However, many people are hesitant to raise rabbits because they are unsure of what types of forages rabbits can consume. While there are many plants that have been proven to be excellent forages for rabbits, they are often seasonal or already eaten by humans, any feed material that has increasing demand by man and animals has high price (Iwegbu *et al*., 2023). Additionally, some forage can be expensive; searching of inexpensive forage can ameliorate the cost of production (Iwegbu *et al*., 2023). Certain vegetables, such as Pawpaw *(Carioca papaya), carrot (Daucus carota), garden egg (Solanum macrocarpon), and tomato (Solanum lycopersicum),* are grown year-round and their leaves are typically wasted despite their high content of essential nutrients (Patil *et al*., 2014). This study aims to determine the nutritional potential of these leaves as forage materials for rabbits. It is important to note that a highly concentrated diet can lead to digestive disorders in rabbits, but forages are not enough to meet their nutritional needs, so in this study, kitchen scraps were given alongside forages. The goal of this study is to examine the effect of pawpaw, carrot, garden egg, and tomato leaves on the performance of crossbred rabbits.

MATERIALS AND METHODS

The study was conducted at the Rabbitry Unit of the Teaching and Research Farms of the Federal University in Gashua, Yobe State, Nigeria. Remnants of food that remain after cooking, such as fruit

and vegetable scraps, bread, eggshell, broken grains and leftovers on plates was supplemented as kitchen scraps. The kitchen scraps were sun dried before being stored. The leaves of garden egg, carrot, tomato, and pawpaw were bought from the Gashua market and cleaned. They were then heated until they turned golden brown. Sixty-four weanling rabbits weighing around 800g were purchased from a reputable farm in Potiskum and randomly divided into four treatment groups based on their weight. Each group contained 16 rabbits and was divided into four replicates. The rabbits were given a mixture of kitchen scraps and dry vegetable leaf as follows: *kitchen scraps+pawpaw leaf meal* (control), *kitchen scraps+carrot leaf meal (KCLM*), *kitchen scraps+garden egg leaf meal (K*GLM) and *kitchen scraps+tomato leaf meal (K*TLM). Pawpaw has been tested recommended it to rabbits due to its high in antioxidants; vitamins A, B, C, E. pantothenic acid and folate, magnesium, potassium and fiber (Aravind *et al*., 2013; Jiwuba, 2018). Jiwuba (2018) emphasized that diets containing pawpaw leaf increases growth rate. The rabbits were given these treatments and water *ad libitum* for a 12-week experimental period. Their weights were recorded weekly, and the difference between the previous week's weight and the current week's weight was calculated as body weight gain. The cumulative weekly weight gain divided by 84 days gave the daily weight gain. The rabbits were given known quantities of their corresponding diets daily, and the differences between the supply and what was left over were recorded as feed intake. The cumulative daily feed intake gave the total feed intake, which was then divided by 84 to give the daily feed intake. The ratio of daily feed intake to daily weight gain gave the feed conversion ratio.

On the 84th day of the experiment, two rabbits were randomly chosen from each group and slaughtered. The carcass, body parts, and internal organs were weighed and expressed as a percentage of live weight. The data obtained were analyzed using one-way analysis of variance (ANOVA) with the means that were significantly different separated using Duncan Multiple range test (DMRT).

RESULTS

Table 1 displayed the growth rate and feed conversion ratio of rabbits that were fed a mixture of kitchen scraps and various vegetable leaves. Rabbits fed KCLM showed statistically ($p<0.05$) higher live weight, total weight gain, and daily weight gain compared to those fed the control treatment. On the other hand, rabbits fed KGLM and KTLM had lower values than the control group. In terms of feed intake, rabbits fed KGLM and KTLM had significantly ($p<0.05$) higher values, followed by PLM, while the control group had lower values. The feed conversion ratio was ($p<0.05$) better in rabbits fed KCLM compared to those in the control group, whereas it was poor in rabbits fed KGLM and KTLM.

Table 2 presents the carcasses and cut parts of rabbits fed kitchen mixed with different vegetable leaves. The pre-slaughter weight and dressed weight were significantly ($p<0.05$) higher in rabbits fed KCLM, followed by the control treatment. Conversely, rabbits fed KGLM and KTLM had lower values. The dressed percentage was similar between rabbits in the control group and those fed KCLM, but lower in rabbits fed KGLM and KTLM. There were no significant differences in the cut parts.

Table 1: Growth rate and feed conversion of rabbits fed kitchen mixed with varied vegetable leaves

Parameters	CONTR.	KGLM	KCLM	KTLM	±SEM	p-value
Initial body weight (g)	839.78	844.61	842.58	841.07	2.08	0.600
Final body weight (g)	3490.71^{ab}	2990.43^{b}	3672.55^{a}	3013.85^{b}	342.84	0.003
Total body weight gain (g)	2650.93^{ab}	2145.82^{b}	2829.97^{a}	2172.78^{b}	343.57	0.016
Daily body weight gain (g)	31.56^{ab}	25.55^{b}	33.69^{a}	25.87^{b}	4.09	0.048
Total feed intake (g)	7410.53^{c}	8034.07^{a}	7510.82^{b}	8190.16^{a}	383.66	0.011
Daily feed intake (g)	88.22^{c}	95.64^{a}	89.41^{b}	97.50^{a}	4.57	0.000
Feed conversion ratio	2.80^{b}	3.74^{a}	2.65^{b}	3.77^{a}	0.60	0.030

CONTR = *scraps+pawpaw leaf meal, KCLM = kitchen scraps+carrot leaf meal, K*GLM = *kitchen scraps+garden egg leaf meal, K*TLM = *kitchen scraps+tomato leaf meal*

Values with different superscripts are significantly different ($p<0.05$).

Table 2: **Carcasses and cut parts of rabbits fed kitchen scraps mixed with varied vegetable leaves**

Parameters	CONTR.	KGLM	KCLM	KTLM	±SEM	p-value
Pre-Slaughter Weight (kg)	3490.71^{ab}	2990.43^{b}	3672.55^{a}	3013.85^{b}	342.84	0.010
Dressed weight (g)	2350.93^{ab}	1845.82^{b}	2529.97^{a}	1872.78^{b}	343.57	0.003
Shoulder (%)	6.24	6.44	6.01	6.17	0.18	0.912
Rib (%)	9.33	8.17	10.12	8.14	0.96	0.888
Loin (%)	13.17	12.01	14.22	12.52	0.95	0.419
Rump (%)	11.65	11.77	11.54	11.27	0.21	0.363
Dressed percentage	67.35^{a}	61.72^{b}	68.89^{a}	62.14^{b}	3.63	0.001

CONTR = *scraps+pawpaw leaf meal, KCLM = kitchen scraps+carrot leaf meal, K*GLM = *kitchen scraps+garden egg leaf meal, K*TLM = *kitchen scraps+tomato leaf meal*

Values with different superscripts are significantly different ($p<0.05$).

Table 3 illustrates the weight of internal organs of rabbits fed kitchen scraps mixed with various vegetable leaves. The weights of internal organs were similar across all treatments.

Table 3: Weight of internal organs of rabbits fed kitchen scraps mixed with varied vegetable leaves

Parameters	CONTR.	KGLM	KCLM	KTLM	±SEM	p-value
Liver (%)	0.74	0.83	0.63	0.80	0.09	0.574
Lungs (%)	0.22	0.23	0.17	0.20	0.03	0.818
Kidneys (%)	0.23	0.25	0.19	0.24	0.02	0.676
Heart (%)	0.11	0.07	0.05	0.07	0.02	0.242
Stomach (%)	2.27	2.18	1.67	2.12	0.27	0.521
Intestine (%)	4.61	3.95	3.02	3.88	0.65	0.423

CONTR = *scraps+pawpaw leaf meal, KCLM = kitchen scraps+carrot leaf meal, K*GLM = *kitchen scraps+garden egg leaf meal, K*TLM = *kitchen scraps+tomato leaf meal*.

DISCUSSION

The rabbits that were given KCLM had better growth and feed conversion ratio than the control group, suggesting that carrot leaf can be a suitable substitute for pawpaw leaf in rabbit diets. The higher intake of KTLM and KGLM may be due to their higher fiber content as stated by (Aduku and Olukosi, 1990; Agbede, 2000,; Agbede and Aletor, 2004). The fact that the dressing percentage was similar between the control group and KCLM further supports the nutritional potential of KCLM. There were no significant differences in the weight of internal organs, indicating that consuming kitchen scraps with a mixture of carrot, garden egg, tomato, and pawpaw leaves would not have a negative impact on the body organs. Sokol *et al*. (2014) also found that plant leaf contents enhance growth in monogastric species. Therefore, these leaves should be recognized as valuable feed resources and should not be allowed to litter the environment.

CONCLUSION

The results showed that rabbits fed a diet of kitchen scraps along with dry carrot leaf had comparable growth and carcass performance to those fed a diet of kitchen scraps along with dry pawpaw leaf. Moreover, feeding rabbits with kitchen scraps along with any of the dry garden egg leaf, carrot leaf, roselle leaf, and pawpaw leaf did not have a detrimental effect on the internal body organs.

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