# EFFECT OF CASSAVA LEAF MEAL ON PROXIMATE AND SENSORY QUALITY OF GROWER RABBIT MEAT

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## ABSTRACT

The effect of cassava leaf meal on proximate composition and sensory qualities of rabbit meat was evaluated. A total of Eighteen (18) 4-5 weeks old female rabbits of mixed breeds were used in an 8 weeks feeding trial. The animals were randomly selected and assigned to three treatments each with six rabbits and had three replicates of two rabbits per replicate using Completely Randomized Design (CRD). The cassava leaf meal was analyzed by the method described by AOAC (2006). Data on sensory quality were collected and proximate composition of rabbit fed 10 and 20% graded level of cassava leaf meal was analyzed using AOAC (2006). Data collected were analyzed using ANOVA and the means were separated using LSD. The results obtained showed that cassava leaf meal (CLM) had a moisture content of 8.90%, crude protein, 32.10, crude fibre 11.20%, ash, 6.70%, ether extract 7.02% and nitrogen free extract of 33.90%. The results of the proximate composition and panel sensory quality of the rabbit fed 10 and 20% CLM showed no significant difference across the treatment. Higher crude protein and ash content were found in the rabbit fed 10 and 20% CLM and higher fat content was found in the rabbit fed 10% CLM. More so, Rabbit fed 10% CLM had higher sensory hedonic rating compare to other treatments. This implies that good nutritional and sensory meat quality can be obtained when soybean meal is replaced with 10 and 20% of cassava leaf meal in the diet of rabbit growers.

**Key words**: Rabbit; Meat; Cassava; Proximate; Organoleptic

## INTRODUCTION

Meat the flesh of animals (other than fish) used for food, is the most common and valued food of animal origin all over the world due to its outstanding sensory and varied culinary properties. Since 1960, there has been a significant increase in global meat production attributable to increase in population, as well as to the increase in affluence in many countries. A consumer demand driven increase in the production and consumption of meat and meat products had been predicted to occur in the developing countries between 2010 and 2050 (FAO, 2011). Meat is a rich source of highly valued proteins, variety of fats, minerals and vitamins. Cattle, sheep and goats and more recently poultry, pig and rabbits are the main livestock of commercial importance used for meat production in Nigeria (Ogbeide, 2015). Due to increase in population and demand for meat, a livestock that is fast growing and has short gestation period should be reared. Rabbit *(Oryctolagus cuniculus)* is monogastric animal that is fast growing and have short gestation length, with the ability to rebreed shortly after parturition. They are highly prolific, and have the ability to efficiently convert non-competitive feed sources to meat and can utilize up to 30% crude fiber (Egbo *et al*., 2001). Rabbit meat has high biological value protein, notable amount of polyunsaturated fatty acids (PUFA) which decrease low density lipoprotein cholesterol levels thereby decrease cardiovascular risk (Whitney & Rolfes, 2002)and also has Minerals and vitamins (Dalle Zotte and Szendro, 2011). The meat industry is faced with a number of challenges in producing high quality meat products in a cost effective manner with regards to cheap and availability of feed ingredients in raising the animals. Therefore, there is need to exploit cheaper feedstuff that is readily available in under to replace expensive feedstuff for livestock production. Dry cassava leaf meal can be used as a source of protein in rabbits diets (Adegbola and Okonkwo, 2002) and minerals and vitamins (Adewusi and Bradbury 1993).Cassava leaves are highly nutritious; they have high protein content ranging from 16.6% to 39.9% (Khieu *et al*., 2005). Fresh cassava leaves have a significant level of Hydrocyanic acid (HCN) which limits their use in rabbit feed. However, drying or ensiling of cassava leaves can markedly reduce the HCN content to 80% of the original concentrations found in the leaves Borin, 2005). Cassava leaves have been used as a protein supplement for feeding rabbit and can, partly, replace soybean meal in rabbit diets (Phuc, 2001). Partly incorporation of cassava leaf meal in the diet of rabbit will help to relieve the food-feed competition in the future and to produce a cheaper quality rabbit meat that does not pose health risks to the public thereby affecting the meat industry, animal feed producer and meat processors positively

through profit optimization. This study evaluated the effects of cassava leaf meal on the proximate composition and sensory qualities of rabbit meat.

## MATERIALS AND METHODS

Fresh cassava leaves were harvested from the farm, washed and dried under shade for three days to a constant weight. The dried cassava leaves were milled and put into an airtight container. Sample of the milled cassava leaves was taken for proximate analysis. Three diets were formulated using Cassava Leaf Meal (CLM) in replacement for full fat soybean as shown in the Table 1 below; Diet 1 (control with 0% CLM) while diet 2 and 3 contained CLM at 10 and 20% inclusion levels respectively. A total of Eighteen (18) 4-5 weeks old male rabbits of mixed breeds were used in an 8 weeks feeding trial. The animals were randomly selected and assigned to treatments using Completely Randomized Design (CRD) on the basis of equal mean live weight to three treatment groups each with six rabbits. Each treatment had three replicates of two rabbits per replicate. The experimental rabbits were housed in a wood-wire hutches equipped with feeders and drinkers. The experimental diets, fresh forages (*Tridax procumbens*) and water were provided ad-libitum. The rabbits were allowed to acclimatize to their various hutches for one week during which they were dewormed and necessary vaccine were administered to the rabbits to build up immunity against disease. At the end of the 8 weeks feeding trial, the rabbits were slaughtered and 10 g of the loin part was stored at 12 °C under very hygienic condition until needed for analysis.

### Proximate analysis

The proximate composition of the rabbit meat was determined by the method of AOAC (2006).

### Sensory evaluation

Data was collected on the sensory qualities of the rabbit meat by the method described by Nasiru *et al*. (2011). Weighed samples of 500g of the loin part of the grower rabbit from each treatment were cut into pieces, washed and dip into salt solution and cooked for 45 minutes after which it was removed and randomly assigned for sensory evaluation. The meats were served to 18 trained panelists. Panel members were trained after which meat samples from the treatments were served immediately to panelists one at a time. Each panelist evaluated at most two treatments and were subjected to sensory evaluation for tenderness, juiciness, flavor, connective tissue and off flavor characteristics. A 8 point scale was used to score, where 8 = extremely desirable, extremely juicy, intense in beef flavor, extremely tender and 1 = extremely undesirable, extremely dry, devoid of beef flavor and tough. For each replication of the experiment three different sessions were conducted.

### Statistical analysis

Data generated from the proximate and sensory analysis were subjected to analysis of variance (ANOVA) in completely randomized design (CRD) and means will be separated using the least significant difference (LSD).

**Table 1: Percentage composition of the experimental diets of grower rabbits**

| Ingredients | $T_1$ (Control) | $T_2$ (10% CLM) | $T_3$ (20% CLM) |
|---|---|---|---|
| Maize | 33.70 | 33.70 | 33.70 |
| Full fat soybean | 38.00 | 34.20 | 30.40 |
| Cassava leaf meal | - | 3.80 | 7.60 |
| Maize offal | 27.70 | 27.70 | 27.70 |
| Rice offal | 8.00 | 8.00 | 8.00 |
| Bone meal | 3.00 | 3.00 | 3.00 |
| Premix | 0.50 | 0.50 | 0.50 |
| Methionine | 0.25 | 0.25 | 0.25 |
| Lysine | 0.25 | 0.25 | 0.25 |
| Salt | 0.30 | 0.30 | 0.30 |
| Total | 100 | 100 | 100 |

## RESULTS AND DISCUSSION

The proximate composition of cassava leaf meal (CLM) as shown in Table 2 showed moisture content of 8.9% which is lower than 9.55 ± 0.1(g 100 g−1 as reported by (Oresegun *et al*., 2016). The lower level of moisture content observed in this study is enough to discourage microbial growth and undesirable enzymatic activities. Crude protein 32.10 % was higher than 24.2% reported by (Adegbola and Okonkwo, 2002). The Crude fiber 11.20% recorded in this study is lower than 14.8% reported by (Adegbola and Okonkwo, 2002). The ash was higher than 5.56 ± 0.03 reported by (Oresegun *et al*., 2016) which is an indication that that the cassava leaf meal has high mineral content. Nitrogen free extract was 33.90%. The variability in proximate composition observed could be as a result of the variety of the cassava, soil type, climatic condition as well as processing condition.

**Table 2: Proximate composition of cassava leaf meal.**

| Composition | g/kg-1/Dm |
|---|---|
| Moisture | 8.90 |
| Dry-matter | 91.10 |
| Crude protein | 32.10 |
| Crude fiber | 11.20 |
| Ash | 6.70 |
| Ether extract | 7.02 |
| Nitrogen free extract | 33.90 |

**Proximate composition**

The results of the proximate composition of rabbit meat fed graded level of cassava leaf meal shown in Table 3 indicates no significant difference (p>0.05) across the treatment group. The moisture content was similar across the treatment. The high moisture content of the meat recorded in $T_1$ (control) is an indication that the meat is liable to spoil quickly if not well preserve because high moisture content encourages growth of wide range of organism according Jay *et al*. (2005), water activity (aw) and availability of specific nutrients are required for the growth of bacteria, yeasts, and molds. The ash content increases across the treatment as a result of increase in inclusion level of cassava leaf meal which is an indication that the meat is good source of minerals. The crude protein content of rabbit meat was similar across the treatment. The crude protein content value in this study is an indication that rabbit fed with cassava leaf meal can be used to achieve the same result as in the control. This is agrees with Dalle Zotte, (2004) which reported that rabbit meat is a lean meat rich in protein. The low fat content found in this study is in agreement with Hernanded and Gondret, (2006) which reported low fat content and less saturated fatty acid in rabbit meat. This is an indication that the meat is safe for consumption especially people with fat related issue and higher fat content in the rabbit that had 10% CLM in the diet had better flavour and juiciness compare to other treatment. This is an agreement of Winger & Hagyard (1994) that reported that juiciness is related to the fat content of the meat Fats was also found to be the most important precursors of cooked meat flavor (Resconi *et al*., 2013)

**Table 3: Proximate composition of rabbit meat fed graded level of cassava leaf meal.**

| **Parameter** | **$T_1$ (control)** | **$T_2$ (10% CLM)** | **$T_3$ (20% CLM)** | **SEM** |
|---|---|---|---|---|
| Moisture | 72.75 | 71.72 | 71.91 | 0.9590 |
| Ash | 1.11 | 1.60 | 1.64 | 0.2049 |
| Crude protein | 21.79 | 21.74 | 21.76 | 0.3369 |
| Fat | 1.35 | 1.64 | 1.34 | 0.1454 |

NS = not significant at (p>0.05); SEM = Standard Error of Mean.

**Panel sensory score**

Table 4 showed the panel sensory score of rabbit meat fed graded level of cassava leaf meal. Significant differences were not found (p>0.05) in all the sensory parameters evaluated across the treatments. Increase in inclusion level of cassava leaf meal (CLM) led to an increase in the tenderness of the

treatments and 10% inclusion of cassava leaf meal ($T_2$) was more preferable than other treatments in hedonic rating of the rabbit meat. This could be attributed to highest mean score found in the flavour and tenderness of the meat which was as a result of high fat content found in Table 3

**Table 4 Panel sensory score of rabbit meat fed graded level of cassava leaf meal.**

| Parameter | $T_1$ (control) | $T_2$ (10% CLM) | $T_3$ (20% CLM) | SEM |
|---|---|---|---|---|
| Tenderness | 3.00 | 4.00 | $4.00^{ns}$ | 0.69 |
| Connective tissue | 4.00 | 4.03 | $4.00^{ns}$ | 0.42 |
| Flavour | 3.00 | 4.66 | $4.00^{ns}$ | 0.73 |
| Off flavour intensity | 5.00 | 5.00 | $6.00^{ns}$ | 0.50 |
| Juiciness | 3.00 | 4.00 | $5.00^{ns}$ | 0.71 |
| Hedonic rating | 3.00 | 6.00 | $5.00^{ns}$ | 0.94 |

ns = not significant at ($p>0.05$); SEM = Standard Error Mean.

## CONCLUSION

The result of the study indicated that there was no significant difference ($p>0.05$) among the rabbit meat in $T_1$, $T_2$ and $T_3$ both in proximate composition and sensory quality of rabbit meat which showed that good nutritional and sensory qualities of meat can be obtained when cassava leaf meal is used to partly replaced soybean meal at 10 and 20% inclusion level in the diet of a grower rabbit

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