

BIBLIOGRAPHY

BAWAYAN, JOEY T. APRIL 2013. Carcass Characteristics of Rabbit (*Oryctolagus cuniculus*) Fed with Sweet potato, Cassava, Oregano and Chayote leaves. Benguet State University, La Trinidad Benguet.

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ABSTRACT

This study conducted to determine the effect of different forages on the slaughter weight, carcass weight and dressing percentage; weight of liver and heart, gastrointestinal tracts; and to determine the percent lean and bone in rabbits. Eight (8) rabbits were distributed to four treatments following the completely randomized design (CRD) with two replicate each as follows: sweet potato leaves, 300g sweet potato leaves + oregano, 300g sweet potato leaves + cassava leaves, and 300g sweet potato leaves + chayote leaves.

Results showed significant differences among the treatments in the dressing percentage and weight of loin and hind leg as percent of carcass weight and weight of lean and bone as percent of slaughter weight. While slaughter weight, carcass length, weight of front legs, belly and hind legs expressed as percent of carcass weight, and weights of full and empty GIT of rabbits slaughtered at an average of 1.26 kg live weight showed no significant differences between treatments.



The average slaughter weight of the rabbits at 110 days of age was 1.26 kg with a dressing percentage ranging from 36.70% to 45.05%, an average carcass length of 41.14 cm and weight of front legs, belly and hind legs expressed as percent of carcass weight of 6.74%, 3.26% and 12.96%, respectively.

The average percent loin of rabbits slaughtered at 1.26 kg live weight ranged from 13.13% to 17.59%, percent of hind leg ranged 11.60% to 14.22%, percent bone slaughter ranged from 3.93% to 4.67% and percent lean of ranged from 20.10% to 23.41%.



INTRODUCTION

Rabbit (*Oryctolagus cuniculus*) is a descendant of European wild rabbit. Over 45 breeds of rabbits exist and it has been raised as a source of food for centuries as well as loving pets. All rabbits come into three basic sizes: small, medium and large with body weight reaching as high as 15 pounds. Rabbit meat is nutritious, and contains more protein (25%) than chicken (15%). It has a lower fat content than pork and beef (Jamora, 1978).

Rabbit meats are not popular in the country because of limited high price and its availability in the local market. Though not popular, rabbit raising is already being done in small scale in the Philippines as source of protein. Owen (1981) stated that rabbit meat is a good source of high quality meat with low cholesterol and therefore suitable for special diets. Rabbits that are intended for meat should be at least 2.0 kg live weight so that during slaughter it can produce at most 1.0 kg carcass, considering that the dressing percentage is less than 50%.

Rabbit is a non-ruminant herbivore animal with a satisfactory growth rate and a short production cycle (Wolfgang, 1981). Rabbit is also easy to take care because it utilizes forages efficiency, even coarse vegetation that is high in fiber and under ideal conditions, it can grow rapidly (Vietmeyer, 1991). It is therefore of interest to study how rabbits utilize locally available feed resources like sweet potato, cassava, oregano and chayote leaves. These herbs are rich in nutrients and vitamins and could possibly supply the nutritional needs of rabbits.

The study intends to provide information on how different feed resources can influence carcass characteristics of rabbits. The result of this study can contribute or



provide additional knowledge to the reader and most especially to the interested rabbit raisers. This can also serve as a basis for another or further study.

The study aimed to evaluate the carcass characteristic of rabbit fed with sweet potato, cassava, oregano and chayote leaves. Specifically, study aimed to: determine the slaughter weight, carcass weight and dressing percentage; weight of viscera, gastrointestinal tracts of rabbits given sweet potato, cassava, oregano and chayote leaves and to determine the effect of feeding rabbits these forages to percent lean and bone.

The study was conducted at the Meat Laboratory of the Animal Science Department, College of Agriculture, Benguet State University, La Trinidad, Benguet on January 2013.



REVIEW OF LITERATURE

Rabbit are herbivores and require in a ration containing predominantly fresh green plants in general, rabbits love fresh herbs and they are amazing source of vitamins and minerals (Warren, 2002).

Rabbit meat is a high in protein (20.24%) and low in fat (7.95%) than those of common meat source like chicken, lamb and pork (LRRD, 2007).

According to Ishida (2000), the leaf meal has a high protein content of between 26 to 33%, with high amino acid score. It has good mineral profile and vitamins such as A, B₂, C and E. the leaves of plants have been used in the tropics as a cheap protein source in ruminant feed.

Sweet potato contain large amount of starch and sugar and are used mainly are energy supplement in livestock feeds. The commonly published average dry matter content of sweet potato is 13%, while USDA sweet potato indicates a value of 27% (Wenstendorf, 2000).

Sweet potato are rich in vitamin A and vitamin C; thiamine, riboflavin, niacin and carotene, however they are low in protein, calcium and phosphorous. Sweet potato leaves had a crude protein content of 25.5-28.9% in dry matter, which was markedly higher than the stems. The digestibility in growing pigs of dry matter, organic matter and crude protein of ensiled sweet potato leaves was high, but the crude protein was low (Mula,1992).

Cassava is a good substitute for cereals and livestock and poultry ration. The chemical composition of dried cassava root as reported by Muller, *et al* (1975) revealed that the product is generally high in carbohydrates (83.30%) low in protein (2.50%) fat (0.30) and minerals (1.80%). Its carbohydrates contain approximately 3.50% crude fiber



and 79.80% nitrogen free extract. It is therefore highly digestive for non-ruminants the metabolizable energy value of cassava root for poultry was 3650 kcal/kg which is compatible to maize (3,600 kcal/kg).

Omole (1990) has received the use of cassava in rabbit feeding. Cassava meals have supported adequate performance when used at levels up to 30 – 40% of diet.

Tampulay (2006) stated that rabbits have high gain in weight when fed with ipil-ipil and cassava leaves. He also mentioned that ipil-ipil leaves, cassava leaves and mango leaves and palatable to rabbits and can be used to sustain rabbit production during times of feed scarcity.

Oregano (*Origanum vulgare*), oregano, traditionally used in Mediterranean cooking, is an aromatic herb with many known beneficial uses in animals. Recent animal studies have shown that oregano stimulates the immune system, helps regulate blood sugar levels and contains significant levels of antioxidants. It also possesses anti-bacteria, anti-fungal, and anti-parasite properties (Bender and Bender, 2005).

Oregano leaves has a nutritive value per 100g of: Energy (360 kcal) carbohydrates (64.43g), protein (11g), Total fat (10.25g), and dietary fiber (42.8g). It also contains the following vitamins; choline (32.3mg), folate (274mg), niacin (6.22mg), vitamin E (18.86mg) and Vitamin K (621.7mg), phosphorous (200mg), Iron (44mg), Selenium (5.9 mg) and Zinc (4.43mg) (Anonymous (2010) as cited by Baggeo, 2011).

According to the Philippine Food Composition published by Portugal *et.al* (1997) as cited by Guinyang (2005), chayote contains 35% edible portion, 440 energy (Kcal), 46proteins, 9% Ash per 100grams. According to Baliaga (1985) as cited by Guinyang



(2005), 20% of the chayote leaves in the ration of rabbits is not detrimental to the growth of the animal.

Bautista and Mabesa (1997) stated that green leafy vegetables such as chinese cabbage, pechay, kangkong, mustard, saluyot, young leaves of sweet potato, ampalaya, sitao, gabi, chayote, malunggay, and katuray are rich in vitamin A and vitamin C.



MATERIALS AND METHOD

Materials

The materials used in the study were eight one hundred ten (110) days old rabbits, weighing scale, bolo or knife, pail, basin, chopping board, record book, tape measures and camera.

Methods

The rabbit used in this study were fed the following ration for 50 days, starting when the rabbits were two months old: The dietary treatments were as follows:

T₁ - Sweet potato leaves, *ad libitum*

T₂-300g sweet potato leaves + oregano, *ad libitum*

T₃-300g sweet potato leaves + cassava leaves, *ad libitum*

T₄– 300g sweet potato leaves + chayote leaves, *ad libitum*

Two rabbits from each treatment were slaughtered. Before the animals were slaughtered, they were fasted for 6 hours. During slaughtering, the jugular vein was cut with sharp knife. To allow complete bleeding, the head were immediately removed across the back of the head down to the tip of the jaw. The feet were removed and then, the skin was cut at the back joints of the legs across the lower part of the body. A slit was made from the lower part of the abdomen near the anus to the mid-point of the lowest rib taking care to not puncture the intestine. The internal organs and gut contents were removed and weighed during evisceration. The dressed carcass was weighed. The organ weights were taken and expressed as percentage of the dressed weight. The carcass was washed with clean water to removed hair and any other soil or debris. The lengths of the dressed carcass



were measured from the atlas vertebra to the base of the tail. The lean from each carcass were removed then weighed and expressed as percentage of carcass weight. The bone without flesh was weighed and expressed as percentage of carcass weight.

Nutrient Analysis of Meat samples

Meat samples were analyzed at Department of Science and Technology for crude fat and crude protein.

Data Gathered

1. Slaughter weight (kg). This was taken by weighing of the live rabbit before slaughter.

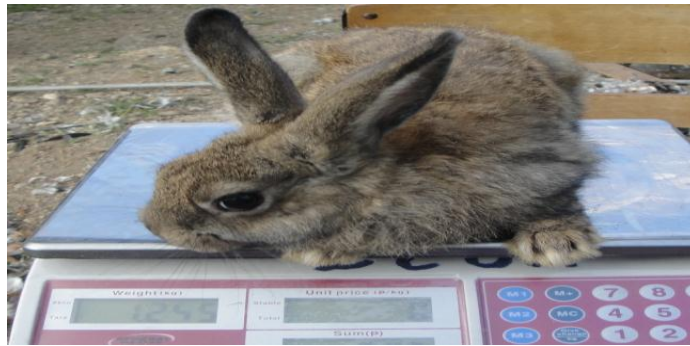


Figure 1. Rabbit being weighed before slaughter

2. Carcass weight (kg). This refers to the weight of the carcass with the head, pelt, tail, feet, and viscera removed.



Figure 2. Carcass of rabbit being weighed

3. Carcass length (cm). This refers to the length of the carcass from the atlas to the base of the tail.



Figure 3. Carcass length

4. Weight of cuts (kg). These are the weight of the front legs, hind legs, rib, belly, and loin.

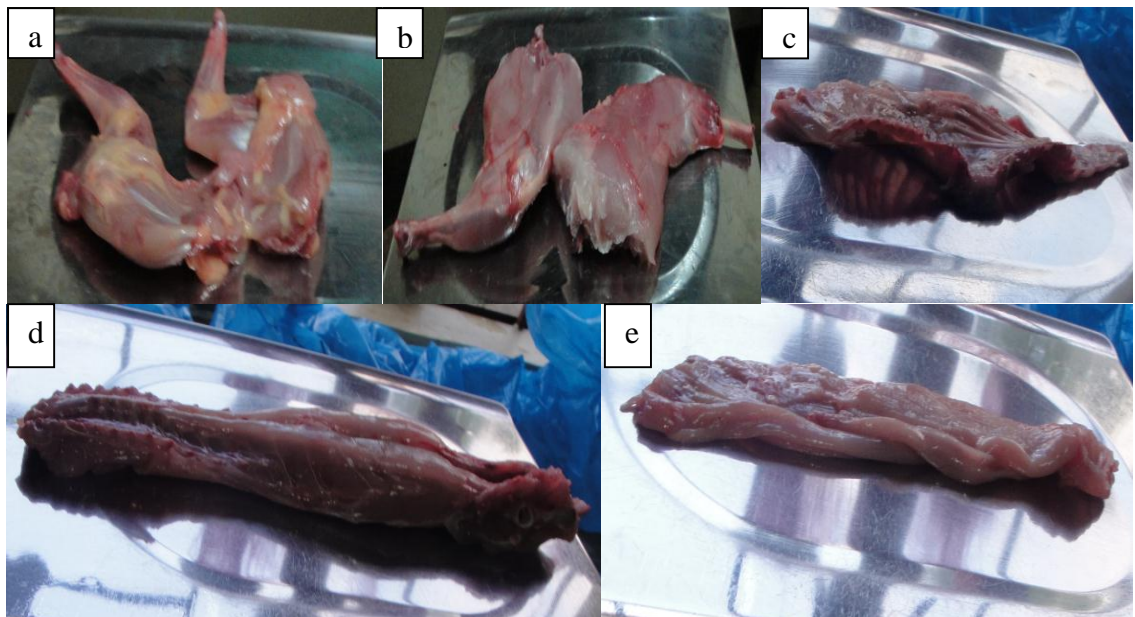


Figure 4. Weights of cuts: (a) Front quarter, (b) hind quarter, (c) rib, (d) loin and (e) belly

5. Weight of viscera (kg). This refers to the weight of the internal organs such as heart, spleen, and liver.

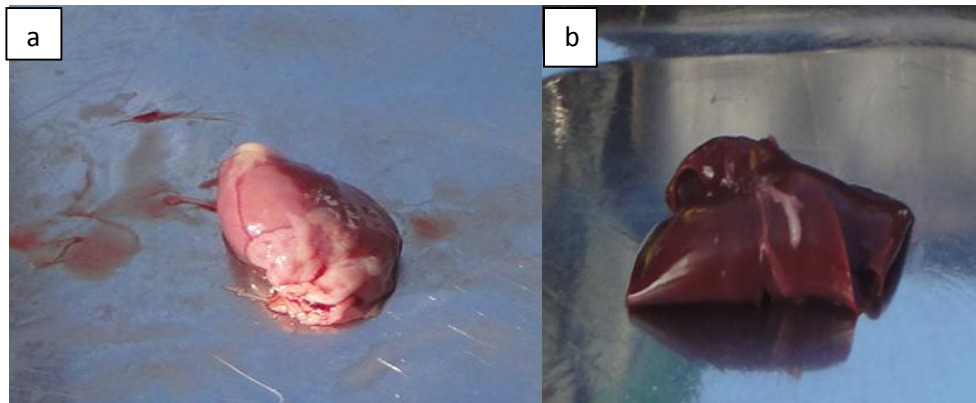


Figure 5. The viscera: (a) heart and (b) liver

6. Weight of full GIT (kg). This refers to the weight of the gastrointestinal tract and contents.



Figure 6. Full GIT being weighed

7. Weight of cleaned GIT (empty) (kg). This refers to the weight of the empty gastrointestinal tract.



Figure 7. Empty GIT being weighed

8. Weight of lean (kg). This refers to the weight of the lean separated from each carcass after deboning.



Figure 8. Lean being weighed

9. Weight of bone (kg). This refers to the weight of the bone of each carcass after deboning.



Figure 9. Bone being weighed

Data Computed

1. Dressing percentage (kg). This was obtained by dividing the carcass weight by the slaughtered weight and multiplied by 100.
2. Percentage of cuts (kg). This was obtained by dividing the carcass weight by the slaughtered weight multiplied by 100.
3. Percentage of viscera. This was obtained by dividing the viscera weight by the slaughter weight and multiplied by 100.
4. Percentage of full GIT. This was obtained by dividing the full GIT by the slaughter weight and multiplied by 100.
5. Percentage of clean GIT. This was obtained by dividing the cleaned GIT by the slaughter weight and multiplied by 100.
6. Percentage of lean. This was obtained by dividing the lean by the carcass weight and multiplied by 100.

7. Percentage of bone. This was obtained by dividing the bone by the carcass weight and multiplied by 100.

Data Analysis

Data gathered were analyzed using Completely Randomized Design (CRD). Differences between treatment means were compared using the Duncan Multiple Range Test (DMRT).



RESULTS AND DICUSSION

Slaughter and Carcass Weight of Rabbits at 110 Days of Age

The slaughter weight, carcass weight and dressing percentage of rabbits are shown in Table 1. Statistical analysis showed no significant differences in the mean slaughter weight of rabbits between treatments indicating homogeneity of experimental units. Rabbits fed with sweet potato leaves which served as the control had a mean weight of 1.265 kg while those fed with 300g sweet potato and oregano had a mean weight of 1.185kg. Rabbits fed with 300g sweet potato leaves and cassava leaves had a mean initial weight of 1.233kg and those fed with 300g sweet potato leaves had a mean weight of 1.340kg. The average carcass weight of rabbits slaughtered at 110 days of age was 0.570kg for those fed with sweet potato, 0.505kg for those fed with 300g sweet potato leaves + oregano, 0.495kg for those fed with 300g sweet potato + cassava leaves, and 0.490kg for those fed with 300g sweet potato leaves + chayote leaves.

Statistical analysis showed significant differences in the dressing percentage of rabbits between treatments. Rabbits fed with sweet potato leaves had the highest mean dressing percentage of 45.05%, followed by those fed with 300g sweet potato leaves + oregano leaves (42.59%), then by those fed with 300g sweet potato + cassava leaves (40.17%), and the lowest dressing percentage of 36.74% was obtained in rabbits fed with 300g sweet potato + chayote leaves. Carcass weight of rabbits was 0.570 kg for those fed with sweet potato leaves, 0.505 kg for those fed 300g sweet potato leaves + oregano leaves, 0.495kg for those fed with 300g sweet potato + cassava leaves and 0.490 kg for those fed with 300g sweet potato + chayote leaves.



Table 1. Mean slaughter and carcass weight of rabbits at 110 days of age

TREATMENT	SLAUGHTER WEIGHT (kg)	CARCASS WEIGHT (g)	DRESSING PERCENTAGE
Sweet potato leaves, <i>ad libitum</i>	1.265 ^a	0.570	45.05 ^a
300g sweet potato leaves + oregano, <i>ad libitum</i>	1.185 ^a	0.505	42.59 ^a
300g Sweet potato leaves + cassava leaves, <i>ad libitum</i>	1.233 ^a	0.495	40.17 ^{ab}
300g sweet potato leaves + chayote leaves, <i>ad libitum</i>	1.340 ^a	0.490	36.74 ^b

*Mean with the same letters are not significant different at 5% level, DMRT

Comparison of means by DMRT showed that the dressing percentage of rabbits fed with sweet potato leaves *adlibitum*, those fed with 300g sweet potato + oregano and 300g sweet potato + cassava leaves are not significantly different. Likewise dressing percentage of rabbits is not significantly different with that of rabbits fed with sweet potato leaves, rabbits fed with 300g sweet potato leaves + cassava leaves and with 300g sweet potato leaves + oregano. Conversely, dressing percentage of rabbits fed with sweet potato leaves + chayote is significantly lower than the dressing percentages of rabbits in the other treatments.

Carcass Length of 110 Days Old Rabbit (cm)

Carcass length of the rabbits is shown in Table 2. Statistically analyzed showed no significant differences between treatments. The average carcass length of rabbits fed with sweet potato, 300g sweet potato + cassava leaves 29cm, while 300g sweet potato +



oregano 28cm, and 300g sweet potato leaves + chayote leaves slaughtered at 110 days with an average slaughter weight of 1.26 kg was 28.5 cm.

Weight of Major Cuts

The weight of major cuts namely the front legs, hind legs, rib, belly and loin of rabbits slaughtered at an average live weight of 1.26 kg at 110 days of age is shown in Table 3. Statistical analysis showed no significant differences and the weight of the front legs ribs and belly expressed as percent of carcass weight among treatments. The average percent front leg was 6.74 %, percent rib 3.28 and percent belly was 3.26 % respectively.

Statistical analysis showed significant differences in the weight of hind legs and loin and expressed as percent of carcass weight. Comparison of means by DMRT showed that the percent hind legs of rabbits fed with sweet potato (14.22%) was significantly higher than the percent hind leg of rabbits fed with 300g sweet potato + chayote leaves (11.60%) but was not significantly different with those given 300g sweet potato + oregano leaves (13.49%) and those given 300g sweet potato + cassava leaves (12.59%).

Table 2. Carcass length of 110 days old rabbit

TREATMENT	CARCASS LENGTH (cm)
Sweet potato leaves, <i>ad libitum</i>	29.0 ^a
300g sweet potato leaves + oregano, <i>ad libitum</i>	28.0 ^a
300g sweet potato leaves + cassava leaves, <i>ad libitum</i>	29.0 ^a
300g sweet potato leaves + chayote leaves, <i>ad libitum</i>	28.5 ^a

*Mean with the same letters are not significant different at 5% level, DMRT

Table 3. Mean weight of major cuts as percent of carcass weight



*Mean with the same letters are not significant different at 5% level, DMRT

TREATMENT	MAJOR CUTS				
	FRONT LEGS	HIND LEG	RIB	BELLY	LOIN
Sweet potato leaves, <i>ad libitum</i>	7.11 ^a	14.22 ^a	2.77 ^a	3.16 ^a	17.59 ^a
300g sweet potato leaves + oregano, <i>ad libitum</i>	6.54 ^a	13.49 ^{ab}	3.57 ^a	3.37 ^a	15.40 ^{ab}
300g sweet potato leaves + cassava leaves, <i>ad libitum</i>	7.10 ^a	12.59 ^{ab}	3.64 ^a	3.25 ^a	14.82 ^b
300g sweet potato leaves + chayote leaves, <i>ad libitum</i>	6.21 ^a	11.60 ^b	3.15 ^a	3.18 ^a	13.13 ^b

As to the weight of loin expressed as percent of carcass weight, the percent loin of rabbits fed with sweet potato leaves was significantly higher than the percent loin of rabbits fed 300g sweet potato + cassava leaves and 300g sweet potato leaves + chayote leaves but not different with the percent loin of rabbits fed with 300g sweet potato leaves with oregano.

Weight of viscera

The weight of internal organs specifically the heart and liver of 1.26 kg rabbits expressed as percent of slaughter weight is shown in Table 4. Statistical analysis showed no significant difference in both percent liver and percent heart between treatments.

The average weight of heart and liver expressed as percent of slaughter weight of 1.26 kg rabbits was 0.40% and 2.65%.



Table 4. Mean weight of viscera expressed as percent of slaughter weight

TREATMENT	HEART	LIVER
Sweet potato leaves, <i>ad libitum</i>	0.40 ^a	2.57 ^a
300g sweet potato leaves + oregano, <i>ad libitum</i>	0.42 ^a	2.75 ^a
300g sweet potato leaves + cassava leaves, <i>ad libitum</i>	0.41 ^a	2.84 ^a
300g sweet potato leaves + chayote leaves, <i>ad libitum</i>	0.38 ^a	2.45 ^a

*Mean with the same letters are not significant different at 5% level, DMRT

Percentage of Full and Empty Gastrointestinal Tract (GIT)

The weight of the internal organs of the rabbits as percent of the slaughter weight of the rabbits is presented in the Table 5. Statistical analysis revealed no significant differences between treatment means in the percent weight of full and empty GIT of rabbits slaughtered at 1.26 kg live weight. This implied that the percent weight of the internal organs of the rabbits in different treatments were more or less similar. The average full GIT weight expressed as percent of live weight was 22.81%, while the weight of the empty GIT expressed as percent of slaughter weight 9.85%.

Weight of Lean and Bone

Statistical analysis showed significant differences between treatments in the weight of lean and bone expressed as percent of slaughter weight of rabbits (Table 6).



Table 5. Weight of full and empty GIT as percent of slaughter weight

TREATMENT	WEIGHT OF FULL GIT	WEIGHT OF CLEAN GIT
Sweet potato leaves, <i>ad libitum</i>	21.15 ^a	9.69 ^a
300g sweet potato leaves + oregano, <i>ad libitum</i>	23.04 ^a	10.36 ^a
300g sweet potato leaves + cassava leaves, <i>ad libitum</i>	23.32 ^a	9.75 ^a
300g sweet potato leaves + chayote leaves, <i>ad libitum</i>	23.72 ^a	9.58 ^a

*Mean with the same letters are not significant different at 5% level, DMRT

Table 6. Weight of lean and bone as percent of carcass weight

TREATMENT	LEAN (%)	BONE (%)
Sweet potato leaves, <i>ad libitum</i>	21.94 ^{ab}	3.95 ^b
300g sweet potato leaves + oregano, <i>ad libitum</i>	23.41 ^a	4.01 ^b
300g sweet potato leaves + cassava leaves, <i>ad libitum</i>	20.10 ^b	4.67 ^a
300g sweet potato leaves + chayote leaves, <i>ad libitum</i>	20.38 ^b	3.93 ^b

*Mean with the same letters are not significant different at 5% level, DMRT

The percent lean of rabbits fed 300g sweet potato leaved + oregano (23.41%) was significantly higher than the percent lean of rabbits fed with 300g sweet potato leaves + cassava leaves (20.10%) and sweet potato leaves + chayote leaves (20.38%) but not significantly different with those fed with sweet potato leaves only (21.94%)

The percent bones of rabbits fed with 300g sweet potato + cassava (4.67%) was significantly higher than the percent bones of rabbits fed with 300g sweet potato leaves + oregano (4.01), those fed with sweet potato leaves only (3.95%) and those fed with 300g



sweet potato leaves + chayote leaves (3.93). The higher bone weight of rabbits given cassava leaves as compared to the other treatments maybe attributed to the relatively high ash content of cassava leaves. Cassava leaves contain approximately 25.8 to 27.3 % crude protein, 7.6 to 10.5% fat, 5.7 to 8.8% ash, 4.8 to 7.9 % crude fiber and 50.1 to 51.9 % nitrogen free extract, on dry matter basis (Omole, 1977).

Crude Fat and Crude Protein Analysis

Meat samples obtained from the loin area of rabbits was sent to the DOST laboratory for crude fat and crude protein analysis. The result of the analysis is shown in Table 7. The crude fat of the meat sample from rabbits fed with Sweet potato leaves 0%, those fed 300g sweet potato leaves 0.01%, those fed 300g sweet potato leaves + cassava leaves 0.05%, and those fed 300g sweet potato leaves + chayote leaves 3.86%. While the crude protein of rabbits fed with Sweet potato leaves 15.21%, those fed 300g sweet potato leaves 13.82%, those fed 300g sweet potato leaves + cassava leaves 13.16%, and those fed 300g sweet potato leaves + chayote leaves 14.70%. Since there was only one sample sent for analysis per treatment, the differences in the values cannot be attributed to the treatment imposed.



Table 7. Crude fat and crude protein analysis of rabbit meat from the two treatments

TREATMENT	CRUDE FAT (% w/w)	CRUDE PROTEIN (% w/w)
Sweet potato leaves, <i>ad libitum</i>	0	15.21
300g sweet potato leaves + oregano, <i>ad libitum</i>	0.01	13.82
300g sweet potato leaves + cassava leaves, <i>ad libitum</i>	0.05	13.16
300g sweet potato leaves + chayote leaves, <i>ad libitum</i>	3.86	14.70

*Mean with the same letters are not significant different at 5% level, DMRT



SUMMARY, CONCLUSION AND RECOMMENDATION

Summary

The study on the carcass characteristic of rabbits as affected by different forages was conducted at the Meat Processing Laboratory of the Department of Animal Science, College of Agriculture, Benguet State University, La Trinidad, Benguet on February 2013.

Specifically, this study aimed to determine the slaughter weight, carcass weight and dressing percentage; weight of liver and heart, gastrointestinal tracts; and to determine the percent lean and bone in rabbits. Eight (8) rabbits were distributed to four treatments following the completely randomized design (CRD) with two replicate each. The dietary treatments were: sweet potato leaves, 300g sweet potato leaves + oregano, 300g sweet potato leaves + cassava leaves, and 300g sweet potato leaves + chayote leaves.

Statistical analysis showed significant differences among the treatments in the dressing percentage and weight of loin and hind leg as percent of carcass weight and weight of lean and bone as percent of slaughter weight. While slaughter weight, carcass length, weight of front legs, belly and hind legs expressed as percent of carcass weight, and weights of full and empty GIT of rabbits slaughtered at an average of 1.26 kg live weight showed no significant differences between treatments.

The average slaughter weight of the rabbits at 110 days of age was 1.26% with a dressing percentage ranging from 36.70% to 45.05%, an average carcass length of 41.14% and weight of front legs, belly and hind legs expressed as percent of carcass weight of 6.74%, 3.26% and 12.96%, respectively.



The average percent loin or rabbits slaughtered at 1.26 kg live weight ranged from 13.13% to 17.59%, percent of hind leg ranged 11.60% to 14.22%, percent bone slaughter ranged from 3.93% to 4.67% and percent of ranged from 20.10% to 23.41%.

Conclusion

Based on the results of the study, sweet potato leaves, 300g sweet potato leaves + oregano, sweet potato leaves + cassava leaves, 300g sweet potato leaves + chayote leaves, fed *ad libitum* to rabbits had no detrimental effect on the carcass characteristic considered in this study.

Recommendation

Sweet potato leaves, given *ad libitum* in combination with oregano, chayote or cassava is recommended as feed for rabbits.



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