BIBLIOGRAPHY

JOCELYN B. MALOTE. APRIL 2012. Nutrient Intake and Digestibility of *Galinsoga parviflora* and *Ipomoea aquatica* by Rabbits. Benguet State University, La Trinidad, Benguet.

Adviser: Sonwright B. Maddul, Ph. D.

ABSTRACT

The study was conducted to determine the nutrient content of these feedstuffs; the nutrient intake and digestibility of nutrients in galinsoga and kangkong. New Zealand white and Chinchilla rabbits were distributed in a Completely Randomized Design. The four treatments used during preliminary period were *Galinsoga parviflora* (T_1), *Talinum triangulare* (T_2), *Ipomoea aquatica* (T_3), *Moringa oleifera* (T_4). Among the treatments the top two preffered feedstuffs used in digestibility trial were Galinsoga (T_1) and kangkong (T_2).

Ipomoea aquatica has the higher dry matter content (11.17%) as feed basis, crude protein (22.93%), and gross energy (3843kcal/kg) as DM basis. *Galinsoga parviflora* has has a higher content of (22.33%) crude fiber and ash with (18.76%). There was a highly significant difference between the two treatments in the intake of crude protein, crude fiber, ash, dry matter digestibility, ash digestibility, and digestible nutrients of dry matter, crude protein, and crude fiber. The digestible energy of the two feedstuffs found significantly different. However, ash intake, digestibilty of crude protein, crude fiber, ash and digestible nutrients of crude fiber were not significantly different among the two feedstuffs. Results

shows that kangkong has the higher nutrient intake, coefficient digestibility and digestible of nutrients than galinsoga. On the other hand, both galinsoga and kangkong are recommended as basal diet for rabbit.

INTRODUCTION

Rabbits *(Oryctolagus cuniculus*) are found in virtually every country in the world. They contribute in improving the nutrition and the economy of small holder families, both as source of animal protein, as well as a source of extra income. Relative to more common livestock species, its small size, efficient reproductive ability, highly nutritious meat, utilization of forage rather than cereal grains, early age at puberty, and rapid generation rate make the rabbit a unique animal for the majority of small, limited resource farms (Chuke *et al*., 1986) as cited by Akinfala (2003).

On the other hand, insufficient supplies of feedstuffs at economic prices have continued to limit the production of rabbit. In addition, the high cost of commercial feeds which are the most common problem of smallholder families, and there is a keen competition between man and livestock for conventional feedstuffs. Thus, this situation makes it imperative to research for alternative feed sources in order to reduce the cost of animal feeds.

Rabbits however, are herbivores and are classified as hindgut fermentors. The said species has an efficient monogastric mode of digestion that is followed by fermentation of selected cellulose feed and endogenous materials in cecum through the action of resident bacterial ecosystem (Leng, 2004). The digestibility system can cope with fibrous plant matter such as grasses, grains, leaves, legumes or hay. Leaves from drought-resistant, some leguminous trees can provide the major source of dietary protein to rabbits. Grasses, herbs and vegetables are also used as rabbit feed. The utilization of unconventional feed resources holds great relevance to farmers and producer.

However, these feedstuffs are seasonal and can be in short supply during summer

months. Foliage from trees and herbs can serve as substitute for rabbit feed. Malunggay, galinsoga, talinum and kangkong are abundant and producing plenty of leaves. In addition, they are locally available and considered as non-conventional feeding materials. However, there is dearth of information when it comes to evaluation of these feedstuffs for rabbits in terms of nutrient intake and digestibility.

There is a need to look for potential feeding materials as an alternative source of nutrients for rabbits during times of feed shortage. Additionally, such sources should contribute to lower the farmer's expenses in buying concentrated feed. These foliage can serve as alternative rabbit feed when common feedstuffs are scarce. This study may help in alleviating nutritional deficiencies experienced in dry season. This feeding system can encourage farmers and hobbyists to go for rabbit production because it will demonstrate that rabbits not only need low investment but give more returns.

To fully understand the nutritive value of this foliage, palatability and digestibility experiments should be carried out with rabbits. This study serves as source of significant information about the voluntary intake and apparent digestibility of nutrients in these foliage by rabbits under local conditions.

The general objective of this study is to determine the nutritive value of herbs and fodder tree available locally for rabbits. Specifically, it aimed to: determine the nutrient content of galinsoga and kangkong; determine the nutrient intake of the fresh foliage by rabbits, and determine the digestibility of dry matter, crude protein, crude fiber, ash and gross energy in foliages by rabbits.

This study was conducted at the Animal Genetic Resources (TANGERE) Project of Benguet State University at Bektey, Puguis La Trinidad,Benguet from November-December 2011.

REVIEW OF LITERATURE

Protein supplementation is often important to improve livestock performance. The use of plant leaves as a source of protein is one possible alternative for commercial feeds. Studies on shrub and tree leaves, leafy vines, grasses, and algae and other water plants have shown that, on a 90dry-matter basis, their crude protein contents vary from 20 to 30%, and crude fiber from 12 to 18%.

Utilization of Galinsoga Leaves

Galinsoga (*Galinsoga parviflora*) is an annual dicot species of the family Asteracea, a common herb that is often found in distributed habitats and agricultural areas. Galinsoga is considered to be a common weed. This herb will continue to make contribution to the diet of many (Damalas, 2008). Galinsoga is grazed by livestock and used as feed for chicken, rabbit and pigs.

Abad (2002) in his study on galinsoga, sweet potato vines, cabbage and pigweed can be used as feed for rabbits. However, based on chemical composition, sweet potato vines and Galinsoga has a high nutritive value than the whole cabbage and pigweed. The edible parts of this herb contain 3.2g of protein, fiber (1.1) and high in calcium (284mg). Galinsoga is also a good source of vitamin A or beta carotene, magnesium, potassium, zinc, thiamine, riboflavin, niacin and ascorbic acid.

Utilization of Kangkong Leaves

Kangkong (*Ipomoea aquatica*) is easy to plant and has a very high yield biomass, which is rich in protein. The crude protein content in the leaves and stem can be as high as 32% and 18% in dry basis (Ly Thi Luyen, 2003) as cited by Phimmassan *et al.*,

(2004*)*. It is considered that water spinach can be a low cost for rabbits at small holder farmer level.

This forage is palatable to rabbits (Doan Thi Gang *et al*., 2006) as cited by Phimmassan *et al*., (2004) but the leaves are more easily eaten than the stems (Phimmasan *et al.,* 2004). In rabbits fed to a concentrate diet, fresh water spinach resulted in a slightly higher intake and daily gain (21.9 g/d) than sweet potato vines. The best performances were obtained in adding Guinea grass to sweet potato vines, water spinach or mixture of both forages; though the digestibility diets were lower (Doan Thi Gang *et al*., 2006). Rabbit fed only with fresh water spinach gained 18.1g/d (Phimmasan *et al*., 2004).

Utilization of Talinum leaves

Talinum (*Talinum triangulare)* is an herbaceous perennial, caules cent and glabrous plant that belong to family Portulacea widely grown in tropical regions as a leaf vegetable (Ezekwe *et al*., 2001) as cited by Onu (2010). Nutritionally, the leaves and shoots are edible and also fed to livestock.

Water leaf has been proven to be high in crude protein (22.1%), ash (33.98%) and crude fiber (11.12%). Aside from its medicinal values in humans, it is highly palatable to stock and has been suggested as a palatability improvement in pasture. Moreover, it acts as green forage for rabbit feed management (Aduko *et al*., 1990) as cited by Enete and Okun (2010).

Utilization of Malunggay Leaves

Malunggay (*Moringa oleifera*), commonly called horse radish tree or drumstick tree is used as a protein source for livestock (Sarwatt *et al*., 2002) as cited by Nuhu (2010). *Moringa* leaves have quality attributes that make it a potential replacement for soybean meal or fish meal in non-ruminant diets. *Moringa* can easily be produced. Furthermore, there is the possibility of obtaining large amount of high quality forage from *Moringa* without expensive inputs due to favorable soil and climatic conditions for its growth.

According to (Sarwatt *et al*., 2004) as cited by Nuhu (2010), *Moringa* foliage is a potential inexpensive protein source for livestock feeding. The advantages of using *Moringa* for a protein resource are numerous and include the fact that it is a perennial plant that can be harvested several times in one growing season and also has the potential to reduce feed cost. *Moringa oleifera* is the group of high yielding nutritious browse plants with every part having food value (Duke, 1998) as cited by Nuhu (2010).

Lefroy *et al*., (1997) as cited by Cawad (2004) states the importance of trees, shrubs and herbs for their nutrition capacity for browsing and grazing animals, which it is not yet being utilized to the maximum possible extent. Several trees and herbs could provide palatable and nutritious leaves which can be alternative sources of livestock feeds during scarcity period.

MATERIALS AND METHODS

The main materials used in this study were 24 heads of New Zealand white and chinchilla breed of mature rabbit. The other materials needed were the digestion cages, crocks for drinking water, weighing scales, record book, and polyethylene bags for storing samples.

The foliage was collected daily from several resources; herbs from Tayug, Pangasinan and tree leaves from Tuba, Benguet and galinsoga was harvested from La Trinidad, Benguet.

This study involved two experiments to evaluate the fresh foliage:

1. Voluntary intake trial. Foliage of four feedstuffs was tested for determination of voluntary intake by rabbits. Each feedstuff was offered with stalk, petiole and leaves.

2. Digestibility trial. The top two feedstuffs from those tested in the palatability trial was subjected to digestibility trial. The same experimental animals offered previously with the selected feedstuffs were used in the second experiment.

Experiment 1: Palatability Trial

In this trial, foliage of herbs and fodder tree was separately offered on each experimental rabbits to determine which foliage preferred most. The foliage was harvested early in the morning. Kangkong and talinum was then subjected for air drying about one day while malunggay was offered fresh. Water was always available at all times.

Each individual rabbit was fed with 300g of feedstuff twice a day at 7:30am and 4:30pm. The amount was adjusted to ensure at least 20% feed leftover. The first day was the collection of feedstuffs and the next day was the collection offered left over before feeding the rabbits in the morning. The trial lasted for 14 days.

The different treatments are as follows:

T_1 =Galinzoga (*Galinsoga parviflora*)

T_2 =Kangkong (*Ipomoea aquatica*)

T_3 =Talinum (*Talinum triangulare*)

T_4 =Malunggay (*Moringa oleifera*)

Experiment 2: Digestibility Trial

A total of 12 heads New Zealand white and Chinchilla of mature rabbits were distributed to individual digestion cages (Figure 1) in a completely randomized design. Feces were collected by means of a tray that is suspended under the floor of each pen. Urine collection was excluded in this experiment.

The experimental diets consisted of the top two feedstuffs (Figures 2 and 3) preferred by rabbits in experiment one as follows:

T_1 = Galinsoga

T_2= Kangkong

Figure 1. Rabbit distributed to individual digestion cages

Figure 2. *Galinsoga parviflora*

Figure 3. *Ipomoea aquatica*

The foliage was harvested early in the morning. Kangkong and talinum was then subjected for air drying about one day while malungay was offered fresh. Feeding time was twice a day at 7:30am and 4:30pm. Water was available at all times.

The digestibility trial lasted for nine days. The first 14 days (Day 1-14) was the preliminary period. The last nine days (Day 15-23) serve as the input and output measurement period. Each experimental rabbits were offered 1000g of fresh foliage daily or atleast 20% should be uneaten (feed leftover). Uneaten foliage was discarded after saving a grab sample. From the feed offered on each day of measurement period, a 5-10% sample was saved in airtight plastic container (ziplock). All fresh sample of daily feed offered and leftover was kept separately in a freezer. On day 17 through 23, all the feces voided was collected, weigh, kept frozen and oven dried (Figure 4) pending for chemical analysis. The experimental animals were weighed after fecal collection and before feeding on day 23.

The experimental procedure is summarized as follows:

Days	Activity
1	Weigh animal; start feeding experimental diets; determine voluntary intake
2-14	Adaptation/ preliminary period
15	Collect sample of feed offered
16	Collect samples of feed offered and leftover
17-22	Collect samples of feed offered, left over and feces
23	Collect samples of feed offered, left over and feces; and weigh the animal

Figure 4. Air-drying of fecal samples

Preparation of Samples for Chemical Analysis

Samples of feed offered, leftover and feces were prepared following the procedures of Osuji *et al*., (1993).

Feed offered and leftover samples were subjected to grinding (Figure 5) and passing through a 2mm sieve. A 50g sample was taken per dietary treatment and sealed in an airtight plastic bag. Samples (Figure 6) were forwarded at the Institute of Animal Science, University of Los Baños, Laguna for laboratory analysis.

Fecal samples were dried at 60°C and ground through a 2mm screen. A 50g representative sample was kept in a sealed plastic bag to prevent changes in moisture content.

Figure 5. Grinding of feed samples

Figure 6. Forage samples for analysis

Data Gathering and Analysis

The following data were gathered:

1. Amount of foliage offered. The amount of foliage given to each experimental rabbits.

2. Amount of foliage leftover. The amount of foliage not consumed by each experimental rabbits.

3. Body weight of animals. This was taken by weighing the experimental animals before and after the digestibility trial.

4. Fecal output. The amount of feces voided by each experimental rabbits.

5. Fresh and oven dried weight of the foliage and feces. This was obtained by weighing the fresh samples before and after drying at 60°C.

6. Chemical composition of foliage and feces. This was the proximate composition of herbs and trees foliage, leftover and feces to determine among AOAC methods.

a. Crude protein of feeds and feces. This was obtained by multiplying %N of sample to 6.25.

b. Crude fiber of feeds and feces. This was obtained by extracting the sample with boiling water ether, distilling off the ether and then weighing the residue.

c. Ether extract of feeds and feces. This was obtained by extracting the sample with boiling ether and distilling off the ether and weighing the residue.

d. Ash of feeds and feces. This was obtained by burning the samples at 450°C in temperature for at least two hours.

e. Gross Energy. This was computed as measured by direct calorimetry.

From the above data; the following data were computed:

1. Feed intake. This was determined by subtracting between the amount of herbs and tree foliage offered from amount of herbs and tree foliage leftover.

2. Dry matter of feeds and feces. This was determined by using this formula:

$$\%DM = \frac{\text{Wt. of Sample After Drying}}{\text{Wt. of Sample Before Drying}} \times 100$$

3. Nutrient Intake. This was computed as follows:

Feed Intake x % Nutrient

4. Amount of nutrient in feeds. This was computed as follows:

$$\frac{\text{Amount of Feeds x \% of Nutrient in Feeds}}{100}$$

5. Amount of nutrient in feces. This was computed as follows:

$$\frac{\text{Total Amount of Feces Excreted x \% of Nutrient in Feces}}{100}$$

6. Amount of nutrient digested .This was obtained by subtracting the amount of nutrient in weekly feeds from amount of nutrient in weekly feces.

7. Coefficient of digestibility of nutrient. This was computed as follows:

$$\frac{\text{Amount of Nutrient Digested}}{\text{Amount of Nutrient in feeds}} \times 100$$

8. Digestible nutrient in feeds. This was computed as follows:

$$\frac{\text{\% of Nutrient in Feed x Coefficient of Digestibility of Nutrient}}{100}$$

Data Analysis

All data were subjected to analysis of variance for a Completely Randomized Design. Duncan's Multiple Range Test (DMRT) was used to compare treatment means.

RESULT AND DISCUSSION

Chemical Characteristics of Feedstuffs

The nutrient compositions of test feedstuffs fed to the experimental rabbits are shown in Table 1. On fresh basis, Galinsoga contained 10.17% dry matter (DM) while kangkong had 11.15% DM. Kangkong leaves used as based diet for rabbits was found to have 12.9% to 14.3% DM by Hongthong Phimmasan *et al*.,(2004) and Sisomphone, Southarong and Preston(2008). As DM basis, the water spinach also had a low DM content, which has also been noted by (Buntha and Ty, 2006 and Samko *et al*.,2006 as cited by Nguyen *et al*.,2007).

The content in the leaves and the stem of kangkong can be as high 32% (Ly Thi Luyen, 2003. Pil-o (2010) mentioned that Galinsoga content is 19.56% of crude protein. Kangkong has a high crude protein which contains 22.93% and 18.10% for galinsoga. The crude protein levels in water spinach is high and similar to the results of Preston (2006) but lower than the values 262 to 278g/kg DM of leaves plus petioles reported by (Buntha and Ty, 2006 and Samko *et al*.,2006 as cited by Nguyen *et al*.,2007). The high CP levels reported by these authors can be due to harvesting age of the water spinach of nutrients available in the soil.

The chemical composition of galinsoga had a crude fiber content of 22.33% lower than 26.68% by Pil-o (2010) while kangkong only contains 15.71% CF. Galinsoga had a high content of ash with 18.76% compared to kangkong with 14.96%. The high ash content in the feedstuffs is an indication that the leaves contain nutritionally important minerals elements. The gross energy of galinsoga and kangkong contains 3669kcal/kg and 3843kcal/kg.

Table 1. Chemical characteristics of feedstuffs

TREATMENT	DM(%) FRESH BASIS	DM(%) DRY BASIS	CP(%)	CF(%)	ASH(%)	GE(kcal/kg)
Galinsoga	10.17	94.36	18.10	22.33	18.76	3669
Kangkong	11.17	92.72	22.93	15.71	14.96	3843

Feed samples were analyzed at the Institute of Animal Science Nutrition Laboratory. UPLB College, Laguna

Mean Total Feed Intake

Table 2 shows the mean of two different feedstuffs by rabbits were not significantly different. The mean total feed intake of galinsoga and kangkong was 6631.25 grams and 6223.75 grams, respectively. The average feed intake of galinsoga with 889.1071 grams was lower than 947.3214 grams with kangkong.

During the preliminary period it was observed that animals given with talinum and malunggay had a higher feed left-over. The experimental rabbits fed with these two treatments started to decreased in feed intake due to low palatability of these two feedstuffs that affected their body weight.

The two preferred feedstuffs involved in digestibility trial that have higher palatability were *Galinsoga parviflora* and *Ipomoea aquatica*.

Table 2. Mean feed intake of experimental rabbits

TREATMENT	FEED INTAKE	
	TOTAL	AVERAGE
Galinsoga	6223.75 [a]	889.1071 [a]
Kangkong	6631.25 [a]	947.3214 [a]

Means with the same letter are not significantly different (P<0.05) by DMRT

Nutrient Intake of Experimental Rabbits

Table 3 shows the amount of nutrient intake of the experimental rabbits. Treatment means were different except for ash as revealed by statistical analysis.

Crude protein intake, crude fiber intake, dry matter intake, and gross energy intake were marked as highly significant. Kangkong has high numerical value of 169.541 grams while 114.565 grams for galinsoga of crude protein intake. The crude fiber intake of galinsoga and kangkong were 141.339 grams and 116.157 grams. Gross energy intake of kangkong was higher with 2841.899 grams than 2321.560 grams of galinsoga. Kangkong has dry matter intake of 739.385 grams while 632.956 grams for galinsoga. This study is in contrast to (Buntha and Ty, 2006 as cited by Nguyen *et al*., 2007) findings that dry matter intake of water spinach is lower; this is probably due to the high water content. However, there were no difference between galinsoga and kangkong that has an ash intake of 118.742 grams and 110.612 grams.

Statistically, it was observed that kangkong has the higher intake of dry matter, crude protein and gross energy except crude fiber intake. Experimental rabbits consumed more leaves of the kangkong than stems because leaves are much higher in crude protein by Pok *et al*., (2006). Galinsoga is also higher of crude fiber and ash. Similarly, to the

Table 3. Amount of nutrient intake by experimental rabbits

TREATMENT	DM (g)	CP (g)	CF(g)	ASH(g)	GE (kcal/kg)
Galinsoga	632.956[b]	114.565[b]	141.339[a]	118.742[a]	2321.560[b]
Kangkong	739.385[a]	169.541[a]	116.157[b]	110.612[a]	2841.899[a]

Means with the same letter are not significantly different (P<0.05) by DMRT

study of Pil-o (2010) and Abad (2004) that the dry matter intake is related to the moisture content of the feedstuffs. The nutrient intake of galinsoga and kangkong meet the requirements of rabbits.

Coefficient Digestibility of Nutrients

The digestibility coefficient of dry matter, crude protein, crude fiber, ash and gross energy of feedstuffs by rabbits is shown in Table 4. Statistical analysis revealed that among the treatments there was highly significant between dry matter and ash. The dry matter digestibility of kangkong was higher than in galinsoga (65.042% and 58.382%), respectively. Based from Phimmasan *et al*., (2004) found that the dry matter digestibility of kangkong ranged from 84.7% to 89.3%. The ash digestibility of kangkong has 57.129% while 47.658% for galinsoga.

However, there were no significant difference between crude protein, crude fiber and gross energy. The crude protein digestibility of galinsoga is 60.616% quite lower than 65.297% for kangkong. Crude fiber digestibility of galinsoga and kangkong were 32.255% and 29.866%. Samkol *et al*., (2006) revealed that fiber digestibility, as the

Table 4. Coefficient of digestibility of nutrients

TREATMENT	DM(%)	CP(%)	CF(%)	ASH(%)	GE(%)
Galinsoga	58.382[b]	60.616[a]	32.255[a]	40.262[b]	47.658[a]
Kangkong	65.042[a]	65.297[a]	29.866[a]	77.010[a]	57.129[a]

Means with the same letter are not significantly different (P<0.05) by DMRT

proportion of dry matter consumed as leaves increased, indicates that the crude fiber in the leaves is less digestible than the crude fiber in the stems.

It was observed that rabbit fed with kangkong has the high feed intake and feces excreted during the experiment. Thus, the other nutrient content is carried into the feces as mentioned by Pil-o (2010). The result of this study shows that this two feedstuffs have the same coefficient digestibility except for dry matter and ash.

Digestible Nutrients in Feeds

Table 5 shows that the amount of digestible dry matter, crude protein, and ash were significantly higher in kangkong than in galinsoga. The dry matter of galinsoga and kangkong are 7.249 grams and 5.124 grams. It was been shown that kangkong has the high crude protein of 14.973grams and 10.971grams for galinsoga. The ash of galinsoga and kangkong has slightly differences that contain 7.553 grams and 11.521grams.

Significant difference was observed to digestible energy. Kangkong has 2195.468 kilograms higher than in 1748.570kilograms for galinsoga.

There is minimum requirement for roughage in order to optimize the digestive processes and the more digestible the fiber the higher is the requirement in order to

Table 5. Amount of digestible nutrient in feed

TREATMENT	DM(g)	CP(g)	CF(g)	ASH(g)	DE(kcal/kg)
Galinsoga	5.124[b]	10.971[b]	7.203[a]	7.553[b]	1748.572[b]
Kangkong	7.249[a]	14.973[a]	4.692[a]	11.521[a]	2195.468[a]

Means with the same letter are not significantly different (P<0.05) by DMRT

satisfy the need for 10% of indigestible fiber in the diet by (Lebas *et al*., 1997 as cited by Pok et *al*., 2006). However, there is no significant difference among the two treatments. Crude fiber digestibility of galinsoga has 7.203 grams and 4.692 grams for kangkong. The problem with water spinach would not appear to be one of too high digestibility of the fiber, but rather than too low concentration of fiber in the total plant (73% in leaf DM and 19.1% in stem DM) by Pok *et al*., (2006). Result has been shown that kangkong has the high dry matter, crude protein, ash and gross energy except crude fiber. Furthermore, kangkong has the higher nutrient intake and digestible nutrient than galinsoga.

Mean Total Gain in Weight
of Experimental Rabbits

Table 6 shows the mean total gain in weight of two different feedstuffs. Initial and final weight has no significant difference among the treatments. The initial weight of experimental rabbits fed with galinsoga and fed with kangkong are 1.7125kg and 1.735kg. From the final weight the two feedstuffs are not quite difference which is 1.8625kg fed with galinsoga and 2.0125kg fed with kangkong.

The gain in weight of experimental animals is still not significant difference between the two treatments because maybe, rabbits had already reach the mature body size before and end of the experiment.

Table 6. Mean total gain in weight of experimental rabbits

TREATMENT	INITIAL WEIGHT (kg)	FINAL WEIGHT (3rd week) (kg)	GAIN IN WEIGHT (kg)
Galinsoga	1.7125[a]	1.8625[a]	0.15[a]
Kangkong	1.7375[a]	2.0125[a]	0.28[a]

Means with the same letter are not significantly different (P<0.05) by DMRT

SUMMARY, CONCLUSIONS, AND RECOMMENDATION

Summary

The study on the nutrient intake and digestibility of Galinsoga (*Galinsoga parviflora*) and Kangkong (*Ipomoea aquatica*) by rabbits was conducted at the animal Genetic Resources (TANGERE) project of Benguet State University at Bektey, Puguis La Trinidad, Benguet from November to December 2011.

This study aimed to determine the nutrient content; the nutrient intake and digestibility of dry matter, crude protein, crude fiber, ether extract, ash and gross energy in foliages by rabbit. This experiment involved 24 heads of New Zealand White and Chinchilla of mature rabbits following the Completely Randomized Design.

The different treatment used in palatability trial were Galinsoga (T_1), Talinum (T_2), Kangkong (T_3), Malunggay (T_4) and the two preferred feedstuffs that subjected to digestion trial are Galinsoga (T_1), Kangkong (T_2). A series of digestibility trial with a conventional collection was conducted for a total of 23 days. Feeds and fecal samples of the two feedstuffs were collected during the period and analyzed following the procedures of Osuji *et al*., (1993) for crude protein, crude fiber, ash and gross energy. Galinsoga (T_1) and kangkong (T_2) are subjected for analysis and computed for the nutrient intake, coefficient digestibility, and digestible of nutrients. Then, all the data were subjected to analysis of variance of Duncan's Multiple Range Test (DMRT) to compare the treatment means. The nutrient content of kangkong has the high crude protein, gross energy, and galinsoga is also high in dry matter, crude fiber, and ash. Results showed that kangkong obtained the higher dry matter intake, crude protein intake, and gross energy intake. Highly significant differences on the intake of dry matter, crude protein, crude fiber, gross energy,

dry matter digestibility, ash digestibility; digestible nutrients of dry matter, crude protein, and ash. Digestible energy of nutrients has difference among the treatments. However, ash intake, crude protein digestibility, crude fiber digestibility, gross energy, and crude fiber digestible of nutrients were not significantly difference.

Conclusion

In terms of nutrient intake, kangkong is better than galinsoga except for crude fiber. Kangkong has high dry matter and ash digestibility except for crude protein, and gross energy. The digestible nutrient is similar for galinsoga and kangkong except for GE and crude fiber. However, gain in weight is not significantly different between the two feedstuffs.

Recommendation

It is recommended that both *Galinsoga parviflora* and *Ipomoea aquatica* can be used as basal rabbit feed due to their high nutritive value. During scarcity of feed, other feedstuffs like talinum and malunggay can also be used to feed rabbits.

LITERATURE CITED

ABAD, M. 2002. The Digestibility and Intake of Forages by the Domestic Rabbit. BS Thesis (Unpub). Benguet State University, Philippines.

AKINFALA, E. 2003. Preliminary Studies on Response of Weaner Rabbits to Whole Cassava Plant Meal Basal Diets in the Humidtropics.Livestock Research for ruralDevelopment (15). Retrieved August 21, 2011from http://www.lrrd .org/lrrd15/4/akin154.htm

CAWAD, J.E. 2004. Digestibility and Intake of Some Tree Leaves by Rabbits. BS Thesis (Unpub).Benguet State University, Philippines.

DAMALAS, C.2008.Distribution, Biology and Agricultural Importance of *Galinsoga parviflora*(Asteraceae). Weed Science Society of Japan. Retrieved September 8, 2011 from http://www.onlinelibrary.wiley.com/doi/10.1111/j.14456664.2 008.00290.x/full

ENETE A. and U. OKUN. 2010. Economics of Waterleaf (*Talinum Triangulare)*Production of in Akwa Iborn State, Nigeria.Retrievd from http://facts report. Revues.org/438?file=1

LENG, R.A.2004. Digestions in the Rabbit- A new look at the Effects of their Feeding and Digestive Strategies. Queensland, Australia. Retrieved July 4, 2011 from http://www.meekarn.org/probab/leng.htm

NGUYEN THI KIM DONG, NGUYEN VAN THU, OGLE R. B. and PRESTON T. R. 2007. Effect of supplementation level of Water Spinach(*ipomoea aquatica*) leavesin the diets based on para grass(*Brachiaria mutica*) on Intkae, Nutrient Utilization,Growth Rate and Economic returns of crossbreed in the Mekong Delta of Vitnam. Workshop-Seminar "Forages for Pigs and Rabbits" MEKARN-CelAgrid, PnomPenh, Cambodia, 22-24 August, 2006. Article # 20. Retrieced March 2, 2012, from http://www. Mekarn.org/proprf/kimd2.htm

NUHU, F. 2010. Effect of Moringa leaf meal (MOLM) on Nutrient Digestibility, Growth, Carcass and Blood Indices ofWeaner Rabbits. Retrieved September 6,2011 from the World Wide Web: http://dspace.knust.edu.gh: 8080/jspui/bitstream/123456789/337/1/Binder1.pdf

ONU, P.N. 2010. Phytochemical Composition of *Talinum Triangulare* (Water Leaf) Leaves. Pakistan Journal of Nutrition 9(6): 527-530

OSUJI, P. O., I. V. NSAHLAI and H. KHALILI. 1993. Fed evaluation- ILCA Manual 5. International livestock Centre of Africa, Addis Ababe, Ethiopia. Pp. 40

PIL-O, C. 2010. Chemical Composition, Intake Index and Digestibility of Different Weeds by Rabbits. BS Thesis (Unpub). Benguet State University, Philippines.

PHIMMASAN, H., I.V. KONGVONGZAY, T. CHAY and T.PRESTON. 2004. Water Spinach (*Ipomoea aquatica*) and Stylo 184 (*Stylosanthes* CIAT 184) as Basal Diets for Growing Rabbits. Livestock Research for Rural Development.Vol. 16, Art.#34. Retrieved September 4, 2011 from http://www.lrrd.org/lrrd16 /hong16034.htm

POK SAMKOL, PRESTON T.R. and LY J. 2006. Effect of Increasing offer level of Water Spinach (Ipomoea aquatica) on intake, growth, and digestibility coefficient of rabbits. Livestock Research for Rural Development. Volume 18, Article # 25. Retrieved March 4, 2012 from http://www.lrrd.org18/2/samk18025.htm

SISOMPHONE SOUTHAVONG and T.R. PRESTON. 2008. Effect of Access to Caecotropes and Supplementation with Sugar Cone Stalk in Rabbits fed with a basal diet of Water Spinach. Miniproject, Mekarn MSC 2008-10. http://mekarn.org/msc2008-10/miniproject/siso02.htm