BIBLIOGRAPHY

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ABSTRACT

The study on growth performance of rabbit feed with galinsoga, watercress and chayote leaves was conducted at the poultry Experimental House, Balili, La Trinidad, Benguet on August to September 2012. This aimed to determine the effect of watercress, galinsoga and chayote leaves on the gain in weight and feed conversion ratio of rabbit. Fifteen 60 days old New Zealand rabbits were given the experimental rations for 45 days.

The rabbits were distributed to three dietary treatments with 5 replicates each, following the Completely Randomized Design. The treatments are as follows: (*Galinsogaparviflora*) galinsoga + commercial feeds, (*Nasturtium officinate*) watercress + commercial feeds, and (*Sechiumedule*) chayote leaves + commercial feeds.

Statistical analysis revealed highly significant differences among treatment means on final weight, total gain in weight, average daily gain, total feed consumption as fed and as dry matter and feed conversion ratio. The average initial weight of rabbits at 60 days of age was 0.784kg. Rabbits fed with watercress obtained the highest final weight of 1.780kg, those given chayote leaves had a lower final weight of 1.392kg and those given galinsoga

had the lowest final weight of 1.164kg. In terms of average daily gain (ADG), rabbits fed with watercress obtained an ADG of 0.021 followed by chayote leaves with a lower ADG of 0.012 and galinsogawith lowest ADG of 0.008. FCR, DM basis watercress obtained the highest feed conversion ratio of 3.554,those given chayote leaves had a lower feed conversion ratio of 4.592 and galinsoga had the lowest feed conversion ratio of 6.227.

INTRODUCTION

Rabbit are small mammals in the family leporidae of the order lagomorpha. Rabbit are non-ruminant and herbivore animal that has a digestive tract uniquely suited to the utilization of herbage hence they can be fed with different kinds of grasses or weeds and other vegetable products. They can be raised with simple housing and management. As with any animal enterprise, feed cost accounts for most of the production cost and this has prompted many rabbit raisers to explore ways to reduce their feed expenses. One of the common practices is to feed rabbits with grasses and vegetable refuse. Commercial feeds are often given as feed supplements. Others feed rabbits with roughages in order to reduce feed cost.

One of the common grasses fed to rabbits is galinsoga; however there is a need to explore other feed resources. Among these include watercress and chayote leaves. The result of this study may be used as a guide by rabbit raisers and may serve as a reference material for other researches especially those who would further research about growth performance of rabbits fed with galinsoga, watercress, and chayote leaves.

This study was conducted to determine the growth performance of rabbit fed with galinsoga, watercress, and chayote leaves.

Specifically it aimed to:

1. Determine the effect of watercress, galinsoga, and chayote leaves on the gain in weight and feed conversion ratio of rabbit.

The study was conducted at the Poultry Experimental House, Balili, La Trinidad, Benguet,from August to September 2012.

REVIEW OF LITERATURE

The conventional feeds in rabbit production in our locality are concentrates in the form of pellets and forage. Commercial feed usually accounts for about 70% of total cost of rabbit production. A problem with local production of concentrates is the absence of facilities to make pellets and rabbit do not want to be fed in the form of powder. Fine particles can cause respiratory and digestive problems. One advantage of rabbit is that it is herbivorous non-ruminant. Compared to the other monogastric animals, it can digest nutrient in forage very efficiently. While rabbits are herbivorous, it is a common practice to give them concentrate before they are provided with their regular roughage diet (Bennet, 1979).

Maddul (1999) explained that the digestive system of rabbits allows the utilization of the forage based diet effectively despite its being a non-ruminant. Consequently, rabbits are well suited to low energy fibrous feedstuffs and are less well-adopted to high energy ingredients such as cereal grains. Thus feed such as fodders or fresh forage is typically the basal ingredients of rabbit diet. For small-scale rabbit raising, feeding greens such as grass, vegetable tops, carrots, and other succulent feeds may be feasible, but is not practical on a commercial scale.

Escborn (1985) stated that rabbits are unique among small animals for food and commerce because they produce highly nutritious, low fat, low cholesterol meat that is rich in proteins and certain vitamins and minerals. Being herbivores, they do not compete with humans for food and are easily adaptable to different environments. Investment and labors are low and rabbits can be cared for by any family member. They are easy to transport and are highly productive, with short gestation and lactating periods.

Galinsoga Leaves

Galinsoga, annual dicot species of the family asteraceae, is a common herb that is often found in disturbed habitats and agriculture areas in many parts of the temperate and subtropical regions of the world. *Galinsogaparviflora* is considered to be a common weed in several crops of major importance, such as wheat, corn, cotton, tobacco, sugar beet, tomato, pepper, potato, bean, onion, cabbage and others. It is frequently found in gardens and uncultivated areas. *Galinsogaparviflora* competes strongly particularly with irrigated crops of short height and it might also hinder crop harvest (Damalas, 2008)

As to nutritional content, Grubben*et al.,* (2004) stated that Galinsogaparviflora contains 88.4g water, 653KJ energy, 3.2g protein.0.4g fat, 5.2g carbohydrates and 1.1g fiber for every 100g of its edible portion.

Watercress

Nasturtium officinate (watercress) is a perennial plant belonging to cruciferae family which thrives in clear, cold water and is found in ditches and streams everywhere, Watercress is cultivated for its leaves, which are principally used as green or garnishing. The shelf life of watercress is short when it is taken out from its cultivated environment, being semi aquatic in nature. However a recent scientific technique of packaging has resulted in extending its life thus ensures its national availability (VPTM, 1990).

Watercress contains 11kcal energy, 1.29g carbohydrates, 2.30g protein, 0.10g fat and 0.5g dietary fiber (VPTM, 1990).

Chayote Leaves

Chayote leaves (*Sechiumedule*) have high protein and vitamin content. The calorie and carbohydrate content is also high, chiefly in young stems and seeds. The micronutrients and macronutrients contents by the fruit are adequate. The fruit and particularly the seeds are rich in amino acids such as aspartic acids, glutamicacids, alanine, arginine, cyctine, phenyalanine, glycine, histidine, isoleucineneand methionine (Cruz-Leon, 1986).

Chayote is a good source of niacin, vitamin B6, panthothenic acid, magnesium and potassium. It is also a very good source of dietary fiber, vitamin c, vitamin k, folate, zinc, copper and manganese. It contains25.1 calories, 1.1g protein, 10.2mg vitamin C, 6.0g carbohydrates, and 0.2g fats (Cruz-Leon,1986).

MATERIALS AND METHODS

Materials

The materials that were used in the experiment were the following: 15 rabbits at two months old, cages, hutches, weighing scale, crocks for drinking water and record book.

Preparation of Rabbit Cages

Two weeks before the start of the study, the experimental cages including the feeding and watering trough were thoroughly cleaned and disinfected. The rabbits will be purchased from one of the rabbit raisers in the locality.

The treatments are as follows:

T_1-25g commercials feed + galinsoga

T_2-25g commercial feed + watercress

T_3-25g commercial feed + Chayote leave

Feeding Management

Fifteen rabbits were used in the experiment. They were fed with 25g of commercial feeds and any of the three forages: galinsoga, watercress, and chayote leaves. Depending on the treatment the concentrate and the forage was placed in separate feeding trough. The roughage was harvested every other day from several sources. Galinsoga and watercress were collected from Natubleng, Buguias, Benguetwhile chayote leaves was harvested from La Trinidad, Benguet. The commercial rabbit pellets were bought from La Trinidad, Benguet. The galinsoga, watercress, and chayote leaves were air dried for one hour. The duration of the feeding trial was 45 days. Feeding was done twice a day, once in the

morning at 7:00 o`clock and another in the afternoon at 4:00 o`clock. Water was alwaysavailable for consumption and cleaning purposes. Cleaning of the rabbit cages most especially the underside was done every morning before feeding time.

Data to be Gathered

1.Initial weight (kg). This is the individual weight of the rabbits at 2months of age the start of the feeding trial.

2.Final weight (kg).This was obtained by weighing the rabbit individually at the end of the study.

3. Number of experimental days. The 45 days of the feeding trial.

4. Amount of feed left over (g). Daily amount of feed not consumed by the rabbits and recorded for each replicate.

5. Amount of feed offered (kg). The amount of daily feed offered that was recorded for each replicate.

6. Dry matter of feed offered (%). This was determined by weighing the sample after oven drying to constant weight.

Data to be Computed

1. Total gain in weight (kg). This is the difference between the final and initial weight.

2. Average daily gain (kg). This was obtained by dividing the total gain in weight by the number of the experimental days.

$$\text{Average daily gain} = \frac{\text{Total gain in weight}}{\text{Duration of the experiment}}$$

3. Total feed consumption (kg). This was obtained by using the formula:

Total feed consumption = Total feed offered - Total feed left over.

4. % DM of feedstuff. This was determined using the formula:

$$\frac{\text{DM weight of sample}}{\text{Fresh weight of sample}} \times 100$$

5. Dry matter intake (g). This was determined using the formula:

Feed consumed x % DM

6. Feed conversion ratio. It will be computed as:

$$\text{Feed conversion ratio} = \frac{\text{Total feed consumption}}{\text{Total gain in weight}}$$

Statistical Analysis of Data

All the data was subjected to Analysis of Variance for a Completely Randomized Design (CRD). Treatment means were compared using the Duncan's Multiple Range Test (DMRT).

RESULTS AND DISCUSSION

Initial and Final Weight of Rabbits

Table 1 shows the initial and final weight of rabbit in the three treatments. Statistical analysis revealed that there were no significant differences in the weight of rabbits. This indicates that the rabbits have almost the same weight at the start of the study. This is attributed to the fact that the rabbit were in the same strain and ageswereманаged similarly prior to the start of the study. The mean initial weight of the rabbit was 0.784kg.

Statistical analysis revealed that the final weight of rabbits given different dietary treatments did not differ significantly. The experimental rabbits started with the same initial weight but with different weight at the end of the feeding trial. Rabbits given watercress obtained the highest final weight of 1.780kg, followed by rabbits receiving chayote leaves with the mean final weight of 1.392kg,rabbits fed with galinsoga had the lowest final weight of 1.164kg. The overall mean final weight of the rabbit was 1.445kg.

Table 1. Initial (at 60 days old) and final weight (at 105 days) of the rabbits

TREATMENT	BODY WEIGHTS (kg)	
	INITIAL	FINAL
Galinsoga	0.772	1.164[a]
Watercress	0.784	1.780[b]
Chayote leaves	0.796	1.392[c]

Means with the same superscript are not significantly different at 5%.

Total Gain in Weight

Table 2shows the mean total gain in weight and mean average daily gain (ADG) in weight of rabbits under the three treatments. Rabbits receiving watercress had a total gain in weight of 0.996kg. Those given with chayote leaves had 0.596kg. Lastly the total gain in weight of rabbits that received galinsoga had 0.392kg.

In terms of average daily gain (ADG) in weight, rabbits with watercress feeds gained 0.022kg per day. Those provided with chayote leaves had a mean of 0.013kg, followed by galinsoga had a mean of 0.008kg. Statistical analysis revealed that differences among treatment means were highly significant in both total gain in weight and average daily gain in weight.

Rabbits fed with watercress had better growth performance. It appears that the rabbits were able to utilize the nutrients present in the watercress well leading to a high gain in weight and ADG in weight. Rabbits fed with galinsogahadlower total gain in weight of 0.39kgandan ADG of 0.008kg. Rabbits fed with galinsoga had a lesser feed consumption and this is the most probable reasons of lower weight of the animal.

Table 2.Gain in weight of rabbits from 60 to 105 days of age

TREATMENT	TOTAL GAIN (kg)	AVERAGE DAILY GAIN (kg)
Galinsoga	0.390^{c}	0.008^{c}
Watercress	0.996^{a}	0.021^{a}
Chayote leaves	0.569^{b}	0.012^{b}

Means with the same superscript are not significantly different at 5%.

Feed Consumption

Table 3show the mean daily intake of commercial feeds and forage (as fed and DM basis) of the experimental rabbits. The experimental rabbits were fed with a commercial feedswith a dry matter content of 94% and a fresh forage namely galinsoga, with a DM content of 23.85%, watercress with a DM content of 5.46% and chayote leaves with a DM of 14.22%. The forage was submitted for crude protein analysis using the Micro kjeldahl technique. Watercress obtained the highestcrude protein of 32.68% then followed by chayote leaves with a crude protein of 20.98% and lastly galinsogawith a crude protein of 20.16%.

Statistical analysis revealed a highly significant difference observed in feed consumption, as fed and DM basis.

Rabbits fed with watercress had the greatest feed consumption, as fed basis, of 24.028kg, followed by rabbits given chayote leaves with a total feed consumption of 23.714kg andrabbitsgivengalinsoga with a total feed consumption of 22.446kg.

DM basis fed with watercress has the greatest feed consumption of 13.134kg followed by rabbits given chayote leaves with a total DM of 3.370 and lastly those rabbits given galinsoga had a total DM of 5.376.

Table 3 shows that rabbits fed with watercress had the highest fed consumption and DM basis followed by chayote leaves while those fed with galinsoga had the lowest feed consumption and DM basis. The table 1 also shows the same where rabbits given watercress had the highest gain in weight followed by chayote leaves and those rabbits given galinsoga had the lowest gain in weight.

Table 3. Feed consumption of rabbits given different forages

TREATMENT	FED INTAKE		DM INTAKE	
	CF	FORAGE	CF	FORAGE
Galinsoga	2.250	22.446[c]	2.132	5.376[b]
Watercress	2.250	24.028[a]	2.132	13.134[a]
Chayote leaves	2.250	23.714[b]	2.132	3.370[c]

Means with the same superscript are not significantly different at 5%.

Feed Conversion Ratio

Table 4 shows the feed conversion ratio of the rabbits fed with the different forages namely watercress, chayote leaves and galinsoga.

Feed conversion ratio, dry matter basis is a measure of the efficiency of converting feed input into productive output. It represents the feed consumed per unit of body gain. Higher numerical values are indication of poor feed efficiency since it means more feed is needed to every unit gain on the other hand, lower feed conversion ratio signifies better feed efficiency.

Statistical analysis showed that there were highly significant differences in the feed conversion ratio (FCR) between treatment means. BetterFCR of 3.354 was obtained from rabbits fed with watercress, 4.592 derived from the rabbits fed with chayote and lastly 6.435 derived from the rabbits fed with galinsoga.

Results indicated that rabbits given watercress consumed 1.238 less dry matter to produce a kilogram gain in weight compared with chayote and 3.081 less dry matter than those given galinsoga.

Table 4. Feed conversion ratio of rabbits given forages,DM basis

TREATMENT	MEAN
Galinsoga	6.227
Watercress	3.554
Chayote leaves	4.592

Means with the same superscript are not significantly different at 5%.

Mortality and Morbidity

During the entire duration of the study, there were no instances of mortality or morbidity among the rabbits, an indication of good care and management.

SUMMARY, CONCLUSION AND RECOMMENDATION

Summary

The study on growth performance of rabbit feed with galinsoga, watercress and chayote leaves was conducted at the poultry Experimental House, Balili, La Trinidad, Benguet on August to September 2012. This aimed to determine the effect of watercress,galinsoga and chayote leaves on the gain in weight and feed conversion ratio of rabbit. Fifteen 60 days old New Zealand rabbits were given the experimental rations for 45 days.

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weight of 0.008kg. Highly significant differences were observed in the Feed consumption, both as fed and as dry matter basis and on the feed conversion ratio of rabbits. Feed consumption, dry matter of rabbits given watercress was 13.134kg, which was higher than the feed consumption. FCR, DM basis watercress obtained the highest feed conversion ratio of 3.554,those given chayote leaves had a lower feed conversion ratio of 4.592 and galinsoga had the lowest feed conversion ratio of 6.227

Conclusion

Based on the results of the study, it is therefore concluded that watercress was the best among the three forages based on the growth performance of rabbits as evidenced by higher value ongain in weight and feed conversion ratio followed by Chayote leaves, then galinsoga based on their effect in the growth performance of rabbits in terms of gain in weight and feed conversion ratio.

Recommendation

Based on the results of the study, it is therefore recommended that watercress and chayote leaves be used as feed for rabbits.

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