BIBLIOGRAPHY

DOYAYAG, ROLDAN P. APRIL 2013. The Growth Performance of Rabbits Fed with Various Garden weeds. Benguet State University, La Trinidad Benguet.

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ABSTRACT

The study was conducted to find out the growth performance of rabbits when fed with garden weeds namely Japanese weeds ("Sapsapon"), Creeping nods ("Gagate") and Cobblers peg ("Poket"). Specifically, the study was conducted to determine the performance of rabbit in terms of gain in weight, feed intake, feed conversion ratio and return on investment when fed with various garden weeds.

Twelve 60 day old New Zealand White rabbits were used in the study. These were distributed randomly into three treatments using the three different feedstuffs namely: Japanese weeds (T_1), creeping nods (T_2) and cobblers peg (T_3).

Results revealed no significant differences in terms of gain in weight feed intake (as fed basis), feed conversion ratio (as fed basis) among the treatment evaluated. However, in terms of dry matter basis in feed intake and feed conversion ratio, statistical analysis revealed that there were significant differences among treatments. This is expected because of the different dry matter contents of the three garden weeds used in the study which was 8.65% for Japanese weeds, 11.61 % for cobblers peg and 13.25% for creeping nods.

Based on the results of the study, Japanese weeds, creeping nods and cobblers peg when fed to rabbits, had the same effect on the growth performance of rabbits. Raisers may feed these weeds, whichever is available, to their rabbits.

INTRODUCTION

Rabbits (*Oryctolagus cunniculus*) are unique among other animals because they are not only used for pets but also raised for meat, fur or wool, and laboratory uses. As food, it is a good source of protein and has a lower fat content compared to other livestock meat (Warren, 2002).

Rabbit is a non-ruminant herbivore, having an enlarged hind gut. This has considerable influence on its ability to utilize feedstuffs and dietary nutrient requirements. Rabbit's stomach has a very low pH of about 1.6 which effectively kills bacteria (Church, 1986).

Rabbit raising has several advantages over other agricultural animals. It can easily be raised by anyone under any climatic condition. The facilities take up a little space compared to the other agricultural animals such as cattle and swine. They are also herbivores and can be feed with roughage diets (Warren, 2002).

In rabbit enterprise the high cost of feeds has prompted many small farm rabbit raisers to various practices to reduce their feed expenses. The usual practice of some rabbit raisers is to use commercial feeds like swine grower ration which accounts for a large percentage of the total production cost.

One way to minimize feed cost is by introducing feedstuffs which are locally found such as garden weeds like Japanese weed (*Crassocephalum crepidioides*), Cobbler's peg (*Bidens pilosa*), and Creeping nods (*Borreria laevis*). This study was then conducted to determine the effect of the above garden weeds on the performance of rabbits.

Results of the study will contribute to the knowledge of the students. It also help farmers or backyard raisers to choose on what weeds to feed their rabbits most especially those that are of high nutritive value and are available in the locality to help them reduce feed cost.

Generally, this study was conducted to determine the growth performance of rabbits fed with various garden weeds namely Japanese weeds (*Crassocephalum crepidioides*), Cooblers peg (*Bidens pilosa*) and Creeping nods (*Borreria laevis*).

Specifically, the study aimed to:

1. determine the performance of rabbits in terms of gain in weight, feed conversion ratio, and feed intake when fed with the above garden weeds;

2. determine which local feedstuffs are preferred by the rabbits; and,

3. determine the returns on investment of raising rabbits when fed with the above garden weeds.

This study was conducted at the Benguet State University (BSU) Rabbitry Balili, La Trinidad, Benguet from November 2012 to January 2013.

REVIEW OF LITERATURE

Maddul (1991) cited that the digestive system of rabbits allows the utilization of the forage- based diets effectively despite its being a non- ruminant. Consequently, rabbits are well suited to low energy fibrous feedstuffs and are less well- adapted to high energy ingredients, such as cereal grains. Thus, fibrous feedstuffs such as fodders or fresh forage are typically the basal ingredients of rabbit diet. For small- scale rabbit rising, feeding greens such as grass, vegetable tops, carrots and other succulent feeds may be feasible, but is not practical on a commercial scale.

De Leon (1998) cited that the basic feed for rabbits is roughage and so they should be given a wide selection of grass, cover crops, and any given leafy plants. He also cited that to ensure fast growth rabbits can be fed pellets, growing mash, and corn or rice bran. Church (1986) stated that if palatable greens are fed free choice to rabbits, the amount of pellets offered will be reduced about half, with no adverse effect on performance. He also mentioned that most greens are very high in water content, so large amounts have to be consumed to make a useful contribution to the nutritional needs of rabbits.

Church (1991) stated that growing rabbits of 5-10 weeks of age will have an average daily dry feed consumption of 80-95g/kg body weight (2500kcal/kg). Feed conversion ratio varies widely among rabbit's breeds and managements. An average feed conversion for meat- producing rabbits should be 3:1 that is 3kg of feed for each kg of live weight of age. For good economic return it is important to produce rabbits that reach slaughter weight in the shortest time. Total feed utilized includes both feed consumed and feed efficiency. A good efficiency and average daily gain can be obtained through the good

animal genetic selection, proper nutrition and health, good feeding practices and constant management improvement.

Likewise, Cheeke in 1987 reported that the amount of concentrate used can be reduced by feeding forage. Weeds or green are high in water content, they should not be relied upon as the only source of nutrients. Full feeding on grains (with no pellets) will not support a satisfactory growth rate of fryers.

Weeds have importance in the management of all land and water resources; its greatest effect is on agriculture. It is widely known that losses, caused by weeds exceed the losses from any category of agricultural pests, such as insects, nematodes, diseases, rodents, etc. However, most weeds are found to be edible to human and animals. Weeds also contribute to the nutritional needs of livestock because these are utilized as supplementary greens to livestock and poultry (Rao, 2000).

Indigenous plants, in which weeds are included, play an important role in livestock diets particularly in the Cordillera Region. These plants supply large proportion of the proteins, vitamins, and minerals to the animal. In addition, some are used in medicinal purposes. The plants are adapted to the temperature, moisture, and soil specific conditions and grow well on water logged soil, and some are fast growing and harvested all year around (Buathoki, 1993).

Longbuan (2009) in his study on the growth response of rabbits fed with selected weeds, reported that rabbits fed with Cobblers' peg or "poket" had the highest body weight, compared to the rabbits fed with 'kalunay" (*Amaranthus spinosus L.*) and "kalunay" plus "poket".With the result of his study he concluded that cobblers' peg can be used as an

alternative to sustain production of rabbits during the time of crisis when pellets are very high in cost.

Japanese weed, locally termed as “Sap-sapon”, belongs to the family asteraceae. It is an annual herb growing up to 180 cm tall. Its use is widespread in many tropical and subtropical regions. Its fleshy, mucilaginous leaves and stems are eaten as a vegetable, and many parts of the plant have medical uses and are also used as food for rabbits. These weeds are commonly found in vegetative crops, plantation crops, cultivated lands, and waste places (Colting,*et al.*, 2003). This weed is rich in protein, fat, soluble sugar and ash. It also includes the minerals like: calcium, magnesium, iron, zinc, and copper (Huang, *et al***,** 2011).

Bidens pilosa, commonly known as Cobblers peg or “poket”, belongs to the family asteraceae. It is an annual weed that grows up to about one meter in height, depending on the local conditions (Colting, *et al.*, 2003). According to Muchuweti *et al.*, (2009), Cobblers peg is found to be a valuable source of vitamin C (63mg/100g), iron (15mg/100g), zinc (19mg/100g), phosphorus (273mg/100g), potassium (267mg/100g), protein (24.5mg/100g), fat (4g/100g), and carbohydrates (56mg/100g).

MATERIALS AND METHODS

Materials

The materials used in this study were 12 two months old New Zealand White rabbits. Other materials used include cages, drinking troughs, weighing scale, cleaning materials, record book, and garden weeds namely Japanese weed or "Sapsapon" (*Crassocephalum crepidioides*), Creeping nods or "Gagatte" (*Borreria laevis*) and the Cobbler's peg or "Poket" (*Bidens pilosa L.*).

Figure 1. Japanese weeds "Sapsapon"

Figure 2. Creeping nods "Gagate"

Figure 3. Cobblers peg "Poket"

Methodology

Preparation of experimental cages. Two weeks before the start of the study, the experimental cages including the feeding and watering troughs were thoroughly cleaned and disinfected.

Preparation of the weeds. The weeds were collected in La Trinidad, Benguet. These were washed and drained to remove excess water before giving to the rabbits.

Experimental animals. The rabbits were purchased from one of the rabbit raisers within La Trinidad, Benguet. The rabbits used were 60 days old.

Experimental treatments and design. Using the completely randomized design (CRD), the rabbits were grouped into three treatments. Each treatment was replicated four times and one rabbit was assigned per replicate. The different treatments were as follows:

T_1 =Japanese weed

T_2 = Creeping nods

T_3 = Cobbler's peg

Before the rabbits were placed into their respective cages, their individual weights were taken and recorded.

Care and management of the experimental rabbits. All the experimental rabbits were subjected to the same care and management except on the type of weeds fed to them depending on the treatment where these were assigned. The rabbits assigned in treatment 1 were given Japanese weeds or "sap-sapon". Those in treatment 2 were given creeping nods or "gagatte" and those in treatment 3 were given cobbler's peg or "poket".

The rabbits were fed twice a day between 6:00 to 7:00 in the morning and 5:00 to 6:00 in the afternoon. The weeds were given *ad libitum* to the rabbits. Fresh and clean water was available at all times for the rabbits. Daily cleaning of the rabbit cages was done. The rabbits were fed with the garden weeds until they were 4 months old.

Dry matter determination. The dry matter contents of the garden weeds were determined at the laboratory of the Department of Animal Science, Benguet State University. The weeds were chopped into smaller sizes. Each sample had a weight of 10 grams. After the weighing, the samples were oven dry for two days. The oven dry weights were taken, and the dry matter contents were computed.

Data Gathered

1. Initial weight (g). This refers to the weight of the rabbits at the start of the study.
2. Final weight (g). This refers to the weight of the rabbits at the end of the study.
3. Feeds offered (g). This refers to the amount of feeds that were given to the rabbits per day.

4. Feed left over (g). This was the amount of feeds not consumed by the rabbits which was taken every morning before feeding time.

5. Production cost (Php). This includes the expenses on the cost of the stocks and other expenses that were used during the experiment.

6. Mortality. This refers to the number of rabbits that died during the study period.

From the data gathered above, the following were computed:

1. Total gain in weight (g). This was computed by subtracting the initial weight from the final weight of the rabbits.

2. Average daily gain (g). This was computed by dividing the total gain in weight by the duration of the study.

3. Feed intake, Dry matter basis (g). This was computed by subtracting the total amount of feed left over from the feed offered.

4. Feed conversion ratio (DM Basis). This was taken by using the formula:

$$\text{Feed Conversion Ratio} = \frac{\text{Total Feed Intake}}{\text{Total Gain in Weight}}$$

5. Morbidity and Mortality rate (%). This was computed by dividing the number of rabbits that died by the number of rabbits per replicate multiplied by 100%.

6. Return on investment (ROI). This was computed using the formula:

$$\text{ROI} = \frac{\text{Net Profit}}{\text{Total Cost of Production}} \times 100\%$$

7. Dry matter content of the weeds (%). This was computed using the formula:

$$\%DM = \frac{\text{Weight of Feed Sample after Drying}}{\text{Weight of the Feed Sample before Drying}} \times 100\%$$

Data Analysis

All data were analyzed using the analysis of variance for Completely Randomized Design (CRD). The treatment means were compared using Duncan's Multiple Range Test (DMRT).

RESULTS AND DISCUSSION

Body Weights of the Rabbits

Table 1 presents the initial and final weights of the rabbits in the different treatments. True to both parameters, no significant differences were observed between treatments as revealed by the statistical analysis. These imply that the rabbits at the start of the study were more or less of the same weights. The mean initial weight was 0.866 kg.

The non- significance in final weights reveals that the rabbits were more or less of the same weights at the end of the study. The mean final weight of the rabbits in the different treatments was 2. 041 kg.

Gain in Weight

Table 2 presents the gains in weight of the rabbits in the different treatments. Similar to the final weight, statistical analysis revealed no significant differences between treatment means. This reveals that the rabbits had more or less the same gains in weight. It also reveals that the weeds used in the study namely Japanese weeds ("sapsapon"),

Table 1. Initial and final weights of rabbits in the different treatments

TREATMENT	BODY WEIGHTS (kg)	
	INITIAL	FINAL
Japanese weed	0.901[a]	2.050[a]
Creeping nods	0.821[a]	2.004[a]
Cobblers peg	0.875[a]	2.069[a]

*Means with the same letter superscript are not significantly different at 5% level of significance by DMRT.

Creeping nods and Cobbler's peg had more or less the same effect in terms of gain in weight. The mean total gain in weight was 1.18 kg and the average daily gain in weight

was 0.02 kg. This result is similar with the findings of Longbuan (2009), where weeds namely "Kalunay" and cobblers peg did not affect nor improve the gains in weight of the rabbits

Feed Intake

The feed intakes of the rabbits in the different treatments are shown in Table 3. As fed, statistical analysis revealed that there were no significant differences between treatment means. This indicates that the rabbits in the different treatments had consumed more or less the same amount of feeds. It is also revealed that the palatability of Japanese weeds, cobblers peg and creeping nods are more or less the same when fed to New Zealand rabbits. The overall mean feed intake, as fed basis, was 17.15 kg. The feed intake is very high because it was pure weeds which are succulent most especially the Japanese weeds.

Table 2. Gains in weight of the rabbits in the different treatments

TREATMENT	GAIN IN WEIGHT (kg)	
	TOTAL	DAILY
Japanese weed	1.15[a]	0.01925[a]
Creeping nods	1.21[a]	0.02025[a]
Cobblers peg	1.19[a]	0.01978[a]

*Means with the same letter superscript are not significantly different at 5% level of significance by DMRT

Table 3. Feed intake of the rabbits in the different treatments

TREATMENTS	FEED INTAKE (kg)	
AS FED	DRY MATTER	
Japanese weeds	17.170[a]	1. 480[c]
Creeping nods	17.166[a]	2.310[a]
Cobblers peg	17.114[a]	1.990[b]

*Means with different letters superscript are significantly different at 5% level of significance by DMRT.

Church (1986) mentioned that most greens are very high in water contents so large amounts have to be consumed to make a useful contribution to the nutritional needs of rabbits.

However, in terms of dry matter, statistical analysis revealed that rabbits fed with creeping nods consumed the highest amount of feeds with a mean of 2.31kg followed by the rabbits fed with cobblers peg with a mean of 1.99 kg. The rabbits fed with Japanese weeds consumed the lowest amount with a mean of 1.48 kg. This is expected because the creeping nods have the highest dry matter content, followed by the cobblers peg and lastly the Japanese weeds. The dry matter content of creeping nods obtained was 13.25%, 11.61% for cobblers peg and 8.65% for Japanese weeds.

Feed Conversion Ratio

Table 4 presents the feed conversion ratios of New Zealand rabbits. Statistical analysis revealed that there were no significant differences in terms of as fed basis. However, in terms of dry matter, significant differences were observed. Rabbits fed with Japanese weeds had a better FCR of 1.29 compare to those fed with cobblers peg and creeping nods with FCRs of 1.68 and 1.89, respectively. Though the study of Longbuan

Table 4. Feed conversion ratio (FCR) of the rabbits in the different treatments

TREATMENTS	FFED CONVERSION RATIO	
	AS FED	DRY MATTER
Japanese weeds	15.054[a]	1.2945[b]
Creeping nods	14.338[a]	1.8928[a]
Cobblers peg	14.476[a]	1.6793[a]

*Means with different letter superscripts are significantly different at 5% level of significance by DMRT.

(2009), was a comparison between "kalunay" and cobblers peg as feed supplement to the rabbits, his findings also revealed that rabbits fed with pellets plus cobblers peg had a higher FCR of 2.69 compared to those rabbits fed with pellets plus "kalunay" that had an FCR of 2.56. Meanwhile Church (1991), reported that an average feed conversion ratio for meat- producing rabbits should be 3:1 that is 3 kg of feed for each kg of live weight of age.

Morbidity and Mortality

There were no mortality nor even morbidity observed among the rabbits during the entire experimental period. This indicates that Japanese weeds, Creeping nods and Cobblers peg contain no toxic substance and are edible feeds for rabbits. This findings support the report of Rao (2000), which stated that most weeds are found to be edible to human and animals.

Returns on Investment

The returns on investment in the different treatments are shown in Table 5 and the particulars are found in appendix Table 11. The ROI of the rabbits was not subjected to statistical analysis; however it is shown in the Table that rabbits given cobblers peg had

the highest ROI of 6.40% followed by the rabbits given Japanese weeds with an ROI of 5.44% and finally the rabbits fed with creeping nods that had an ROI of 3.06%.

Dry Matter Contents of the Garden Weeds

The dry matter contents of the weeds are shown in Table 6 and the statistical analysis revealed that there were highly significant differences between treatment means. This indicates that the weeds had different dry matter contents. The result revealed that Creeping nods had the highest mean dry matter content of 13.25%, followed by the Cobblers peg with a mean dry matter content of 11.61% and finally the Japanese weed with a mean dry matter content of 8.65%.

Table 5. Returns on investment per treatment

TREATMENT	INCOME (PhP)	TOTAL COST OF PRODUCTION (PhP)	NET INCOME (PhP)	ROI (%)
Japanese Weeds	1804	1711	93	5.44
Creeping nods	1763.3	1711	52.3	3.06
Cobblers peg	1820.5	1711	109.5	6.40

Table 6.Dry matter contents of the weeds

TREATMENT	DRY MATTER (%)	
	TOTAL	MEAN
Japanese weed	34.59^{c}	8.65^{c}
Creeping nods	52.98^{a}	13.25^{a}
Cobblers peg	46.44^{b}	11.61^{b}

Means with different letters superscript are significantly different at 5% level of significance by DMRT.

SUMMARY, CONCLUSION AND RECOMMENDATION

Summary

The study was conducted to determine the growth performance of rabbits fed with garden weeds namely Japanese weeds, Creeping nods and Cobblers peg. Specifically, it aimed to determine the gain in weight, feed intake, feed conversion ratio and returns on investment.

A total of 12 sixty days old rabbits were used in the study. Following the Completely Randomized Design (CRD), the 12 rabbits were distributed into three treatments. Each treatment was replicated four times with one rabbit per replication. The different treatments were as follows: T_1- Japanese weeds; T2-Creeping nod; T_3- Cobbler's peg.

Results of the study revealed no significant differences between treatment means in terms of initial and final weights and gains in weight. These results imply that the rabbits in all the treatments were more or less of the same weights at the start and end of the study. Also, the growth of the rabbits in all the treatments, which was measured in terms of gains in weight or increase in body weight, was more or less the same.

Statistical analysis also revealed no significant differences in both the feed intakes and feed conversion ratios if the feed intake is on as fed basis. However, if the feed intake is on a dry matter basis, significant differences were observed in both feed intake and feed conversion ratio. This is expected because of the differences on the dry matter contents of the weeds used in the study. The dry matter contents obtained in the study were 8.65% for the Japanese weeds, 11.61% for the Cobblers peg and 13.25% for the creeping nods.

Thou the returns on investment was not subjected to statistical analysis, results show that higher ROI was obtained from the rabbits given cobblers' peg of 6.40% while rabbits fed with Japanese weeds and creeping nods had a ROI, of 5.44% and 3.06%, respectively.

Conclusion

Based on the result of the study, it is therefore concluded that Japanese weeds, creeping nods and cobblers peg has the same effect on the growth performance of the rabbits.

Recommendation

Based on the results of the study, it is recommended that rabbit raisers can use any of the Japanese weeds, creeping nods and cobblers peg as feeds to their rabbits.

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