

Rabbit Intensification Systems in Rwanda: Feeding Influence and Growth

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Abstract

A study was conducted in Northern Province of Rwanda, from the College of Agriculture and Veterinary Medicine, Busogo Campus located in Musanze district to evaluate the effect of feed type on rabbit growth in rabbit intensification systems in Rwanda. The Complete Randomized Design (CRD) was used and data were collected on rabbit growth weekly for a period of 12 weeks. The experiment was composed of three treatments replicated ten times. The treatments included three types of feeds namely; cabbage combined with *Mucuna pruriens* added to local forage (I), cabbages combined with *Leucaena leucocephala* added to local forage (II) and a control composed of other varieties of locally available forage, such as *Bidens pilosa*, *Crassocephalum vitellium* and *Galinsoga parviflora* (III) which was considered as the control (Farmers practice). The feeds were given to ten rabbits separated in individual cages, and each rabbit was considered a replicate. Water was given ad libitum. One month old rabbits (weaners) were used and data were collected after one week of adaptation for 12 weeks. The results showed that the mean of weight gain after 12 weeks was 783.3 g, 760.7 g and 705.7 g for feed type I, II and III respectively. The difference between means of feed types after 12 weeks was not significant ($p > 0.5$), which implied that rabbit growth did not depend on the feed type. The mean weight gain after 8 weeks was 707.5 g, 661.4 g and 577.1 g for feed type I, II and III respectively. At 8 weeks, the difference between means of feed types was significant ($p < 0.5$), which implied that rabbits fed on *Mucuna pruriens* combined with cabbage and local forage were growing faster than rabbits from other treatments at 8 weeks. The researchers recommended that farmers should be facilitated with feeding materials by the concerned institutions. Training of rabbit farmers and further researches on locally available feeding materials were also given as recommendations at the end of this study.

Keywords

Feed Type, Rabbit Growth, Forage, Intensification System

1. Introduction

Agriculture is central to human well-being and sustainable development [1]. Whereas meat consumption is declining in some western European countries, the demand for animal products is projected to rise further in developing countries. Rapid rural and urban population growth and increased market access in eastern Africa provide the stimulus to drive agriculture towards intensification [2].

Rabbits have greater potential of contributing to food security and income generation, as they are easily integrated in farming systems, because they can convert plant materials with low nutritive value, to high quality meat, in a small space and with low investment; while also providing manure from feces and urine which is rich in nutrients, and can be used to nurture the soil [3]. Local feeds have been used in growing rabbits at low cost and for the sustainability of integrated farming systems [4]. It has been pointed out that there is a need of studies for appropriate and specific forage-based diets, to be applied as out of 170 vegetal feed-stuffs or by-products which are well known for their nutritional qualities, only 10% are used by feed mills in developing countries [4]. The strength analysis done in rabbits' development plan in Rwanda showed that the availability of forage through the years not only makes the rabbits more suitable to the crop-livestock system, but also raises a need of studies on the quality of available forages [5]. The aim of this study was to evaluate the effect of feed type on rabbit growth in intensive rabbit farming systems of Rwanda. Determining the quality of rabbit feed and selecting the best combination of local forage to be recommended to farmers were the specific objectives of this study.

2. Materials and Methods

2.1. Area of the Study

The experiment was carried out at the farm of the College of Agriculture, Animal sciences and Veterinary medicine, Busogo Campus located in Northern Province, Musanze district. The College of Agriculture, Animal Sciences and Veterinary Medicine (CAVM) is one of the 6 colleges of the University of Rwanda (UR), created in 2013 after merging all former Institutions of Higher Learning [6].

2.2. Data Collection

One month old rabbits (weaners) from the New Zealand breed were raised in individual cages and labeled for identification (as presented in **Figure 1**). These were fed for one week for adaptation and the weight was recorded. The quantity



Figure 1. New Zealand experimental rabbits in cages.

of feed (500 grams) was equally distributed to all rabbits per day for all treatments. There were three treatments replicated ten times, as each rabbit was considered a replicate. These included three types of feeds namely; cabbage combined with *Mucuna pruriens* added to local forage (I), cabbages combined with *Leucaena leucocephala* added to local forage (II) and a control composed of other varieties of locally available forage, such as *Bidens pilosa*, *Crassocephalum vitellium* and *Galinsoga parviflora* (III) which was considered as the control (Farmers practice). Rabbits were weighed (in grams) on weekly basis using a weighing scale to study rabbit growth and data were collected for 12 weeks.

2.3. Data Analysis

After data collection, statistical analysis was carried out by one-way ANOVA, using SPSS software version 20 and MINITAB 14 to evaluate the significant differences among means of all tested parameters at 95% level of confidence. Further statistical validity of the differences among treatment means were estimated using the Least Significance Difference (LSD) method.

3. Results

The rabbit growth was considered by comparing the weight gained by all experimental rabbits from each treatment. Means, standard deviations, ANOVA tables and boxplots were presented for weight gain after 12 weeks and after 8 weeks.

3.1. Comparison of Weight Gain after 12 Weeks

The results show that rabbits under treatment of feed type I have higher mean of weight gain (783.3 g) with less standard deviation (123.2 g), followed by those under feed type II having the mean of weight gain of 760.7 g with 197.1 g of standard deviation. The rabbits under feed type III (control) gained less weight (705.7) with higher standard deviation (203.5 g) compared to other treatments.

The results are presented on **Figure 2**.

The above graph shows better results from feed type I, which is composed by local forage + cabbage + *Mucuna pruriens*; followed by feed type II, composed by local forage + cabbage + *Leucaena leucocephala* and lastly feed type III composed by local forage only. The daily growth rates in this study were 9 g for feed type I, 8 g for feed type II and 8 for feed type III and these are comparable to the growth rate of 10 - 20 g/day in tropical countries [7]. It has been found that growth rates of rabbits vary from 10 to 20 g/day in the tropical regions while in temperate countries the growth performance ranges between 35 to 40 g/day. Those differences may be due to heat stress and quality of the diets. Considering the above results, the reason of these lower growth rates may be because the experiment was conducted in the coldest region of the Country.

The difference between means of feed types was not significant ($p > 0.5$), and this implied that rabbit growth did not depend on the feed type after 12 weeks.

3.2. Comparison of Weight Gain after 8 Weeks

The results showed that after 8 weeks, rabbits under treatment of feed type I, have higher mean of weight gain (707.5 g) with less standard deviation (83.5 g), followed by those under feed type II, having the mean of weight gain of 661.4 g with a standard deviation of 149.3 g. The rabbits under feed type III (control) gained less weight (577.1) with higher standard deviation (152.6 g) compared to other treatments. The results are presented on **Figure 3**.

After 8 weeks, the average daily weight gain for rabbits under feed type I is 12 g, followed by the rabbits under feed type II with daily weight gain of 11 g and lastly 10 g for rabbits under feed type III (control). Comparing those numbers with the ones presented above for 12 weeks, they show that the weight gain decreases with time with the same feeds.

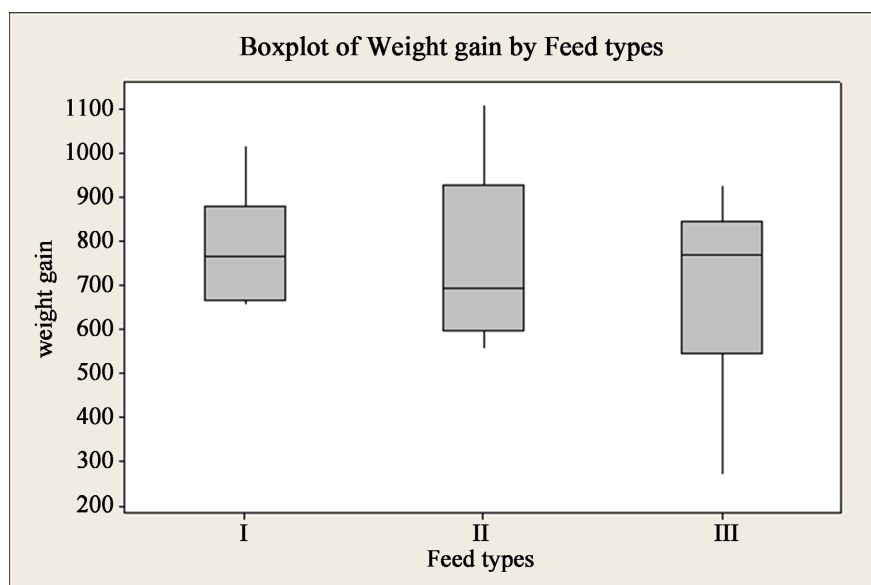


Figure 2. Boxplot of weight gain per feed type after 12 weeks.

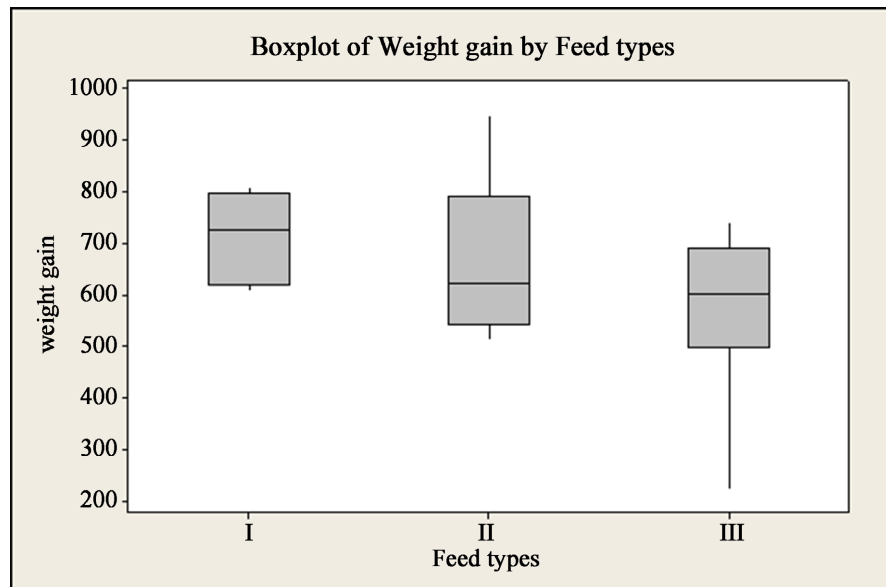


Figure 3. Boxplot of weight gain per feed type after 8 weeks.

It was found by [8] who conducted a rabbit experiment using the partial replacement of concentrate with *Leucaena* leaves (10%, 20%, and 30%), that using *Leucaena* at the 10% level, rabbits grew faster than at the levels of 20% and 30%. They said that the reduction of growth rate might have been caused by the effects of mimosine contained in *Leucaena*. They recommended the feeding level of *Leucaena* in the range of 0 to 30% and should depend on economics in terms of realized feed cost savings in relation to growth response.

The highest averages weight gains were 28.42 g after 8 weeks in the experiment that used the conventional feed as control and in combination with the indigenous yeast strains [9].

The difference between means of feed types after 8 weeks is significant ($p < 0.5$), which implied that rabbit growth at 8 weeks depended on the feed type.

3.3. Multiple Comparisons for LSD

The results for Least Significant Difference (LSD) showed that the difference between means of feed type I and II was not significant but the difference between means of feed type I and III was significant. The difference between the means of feed type II and III was also not significant.

4. Conclusion

There is a high demand for rabbit meat on the market in Rwanda, and manure from rabbits is still not used by many farmers because they don't know how to find it in enough quantity and how to use it appropriately. *Mucuna pruriens* and *Leucaena Leucocephala* can be used in rabbit feeding especially during the first 8 weeks of age to stimulate the growth. Rabbit health and feeding challenges must be addressed to keep rabbit farming profitable to farmers and therefore, making a positive impact on the entire agriculture sector in Rwanda.

5. Recommendations

More research on the effect of locally available forage on rabbit growth should be carried out.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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