

# GROWTH STIMULATING EFFECTS OF *ASPILIA AFRICANA* FED TO FEMALE PSEUDO-RUMINANT HERBIVORES (RABBITS) AT DIFFERENT PHYSIOLOGICAL STATES

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## Abstract

**Background:** In recent times, there has been a significant short fall between the production and supply of animal protein to meet the ever increasing population. To meet the increasing demand for animal protein, there is need to focus attention on the production of livestock whose nutritional requirement does not put much strain on the limited sources of feed ingredients to which men subscribe. An example of such livestock is rabbit. Rabbit is a pseudo-ruminant herbivore which utilizes much undigested and unabsorbed feed materials as sources of nutrient for maintenance and production. Thus, this study was conducted to investigate the effects of feeding *Aspilia africana* as forage on the growth rates of female pseudo-ruminant herbivores (rabbits) at different physiological states.

**Method:** Thirty (30) dutch breed rabbit does of 5 – 6 months of age were used for the experiment which was conducted in a completely randomized design for a period of four (4) months. The rabbits were divided into three treatment groups, ten (10) does per treatment group; which consisted of mixed forages (*Centrosema pubescens* (200g), *Panicum maximum* (200g) and *Ipomea batatas* leaves (100g) without *Aspilia africana* (T<sub>1</sub>; control), fresh *Aspilia africana* (500g/doe/day) (T<sub>2</sub>) and wilted *Aspilia africana* (500g/doe/day) (T<sub>3</sub>). Rabbits in all treatment groups received the same concentrate (300g/animal/day) throughout the period of the study and mixed forages from the commencement of the experiment till the does kindled. After parturition, fresh and wilted *Aspilia africana* were introduced in treatments 2 and 3 respectively, whereas the control group continued on mixed forages throughout the study.

**Conclusion:** The result of the study revealed that the initial average body weight of the rabbit does was 1.74kg. At mating and gestation periods, the body weights of the does in T<sub>2</sub> was significantly higher (P<0.05) than the rest. There were no significant differences (P<0.05) in the body weights of does at kindling between the various treatment groups. During the physiological states of lactation, weaning and re-mating, the control group (T<sub>1</sub>) had significantly lower body weight than those of the treated groups (T<sub>2</sub> and T<sub>3</sub>). Furthermore, T<sub>2</sub> had significantly higher body weight than T<sub>3</sub>. The study revealed that *Aspiliaafricana*; particularly the fresh leaves have greater growth stimulating effects when fed to pseudo-ruminants (rabbits), thereby enhancing body weights of does during lactation and weaning.

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**Keywords:** *Aspilia africana*, Pseudo-Ruminant Herbivores, hysiological

## Introduction

In recent times, there has been a significant short fall between the production and supply of animal protein to feed the ever increasing population (Akpan *et al.*, 2009; Etim *et al.*, 2014). To meet the increasing demand for animal protein, emphasis needs to be given to

non-conventional sources as against the conventional sources such as cattle, sheep, goat, pig and poultry that would require more capital, space and time (Yusuf *et al.*, 2009). There is need to focus attention on the production of livestock whose nutritional requirement does not put much strains on the limited sources of feed ingredients to which men also subscribe. An example of such livestock is rabbit.

Rabbit (*Oryctolagus cuniculus*) is a pseudo-ruminant herbivore which utilizes much undigested and unabsorbed feed materials as sources of nutrient for maintenance and production. According to Dada-Joel (2010), rabbit has been described as a pseudo-ruminant scavenger capable of coprophagy with high feed conversion efficiency. Rabbits are known to supply animal protein and provide a cheap source of meat to the Nigerian populace (Hassan and Owolabi, 1996; Amaefule *et al.*, 2005; Henry *et al.*, 2009). Rabbit provides inexpensive source of meat that is low in cholesterol and fat, high in protein compared with beef, mutton and pork (Ensminger, 1991; Oguike and Oheja, 2009). There is evident in the widespread of small scale rabbitary in backyards in Nigerian cities (Henry *et al.*, 2009). In spite of the numerous advantages of rabbit over other classes of livestock, feed cost and scarcity still limit profitable rabbit production in the country (Ozuo and Anigbogu, 2009). High cost of feed ingredients and other costs associated with production had accounted for the failure of the various plans and policies formulated at one time or the other to combat shortage of animal protein supply (Adedeji *et al.*, 2010). According to Osagie (1998) increasing demand and subsequent high cost of conventional animal feed ingredients in the tropics and the competition between humans and farm animals on the available food sources have created the need for sustainable alternatives.

One of such alternatives is roughages and one of the roughages suitable for feeding rabbit is forages (Etim *et al.*, 2013). According to Iyeghe-Erakpotobor *et al.* (2009) competition between humans and rabbits for grain is low because rabbits can be raised on roughages. Rabbits can convert roughages with high fibre content to meat efficiently without the deterioration of the quality of meat. Oguike and Ojaha (2009) documented that traditionally, rabbits are managed with forage based diets as the principal feed sources and rabbits have the ability to thrive on forages which cannot be consumed directly by man. To ensure better performance, rabbits are fed with both concentrates and forages (Onyimonyi and Ene, 2003). Studies have shown that rabbits can thrive on a number of tropical forages supplemented with concentrates (Odeyinka and Ijiyemi, 1997; Shiawoya and Musa, 2003). Such forages are cheap, abundant and available in many parts of Nigeria (Yusuf *et al.*, 2009). One of such forages is *Aspilia africana* (Etim *et al.*, 2013).

Study conducted by Richardson (2003) revealed that bodyweight of does at first mating influences future body development and performance. Yamani *et al.* (1992) reported that rabbit does mated 10 days post-partum recorded higher weights than those mated 5 days post-partum. Female animals gain weight during pregnancy. Iyeghe-Erakpotobor *et al.* (2005) reported that weight gain increased as pregnancy progressed. Xiccato (1996) documented that rabbit does experience severe energy deficit and weight loss during first lactation. Rabbit does gain greater weight with reduction in lactation load. Richardson (2003) reported that does tend to lose weight after weaning their first litter. This weight loss is attributable to the high energy demand on the doe by the litter prior to weaning.

According to Adisa and Oladoja (2008) intensifying efforts in encouraging and motivating rabbit keepers to increase their stock and adapt more innovations, will undoubtedly increase rabbit production and ensure adequate nutrition for every household. Animal breeders are interested in getting their animal to a standard weight at any stage of their life since over-weight or under-weight of animals do not perform optimally. Under-weight could be a manifestation of poor health and/or malnutrition. The body weight of an animal is influenced by such factors as age, health status, breed, nutrition, physiological

status among others. The health and nutritional status of an animal could be determined using the body weight.

The aim of the study was to investigate the potentials of *Aspilia africana* as forage for rabbit does at various physiological states.

## **Materials and methods**

### **Experimental Location**

The study was conducted at the Rabbitry Unit of the Teaching and Research Farm of College of Animal Science and Animal Production, Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria. Umudike is located within the tropical rainforest zone and the environment is characterized by an annual rainfall of 2177mm.

### **Experimental Animals and Management**

The study was conducted using thirty (30) sexually mature nulliparous dutch breed rabbit does and four (4) dutch bucks aged 5 to 6 months sourced from Akwa Ibom State, Nigeria. The rabbits were certified healthy and were identified with plastic ear-tags. They were housed singly in pens in rabbit hutches. The hutches were made of wooden frames and wire mesh. The animals were fed 300g of concentrate daily, each of 18.5% crude protein and 2620Kcal/kg of metabolizable energy (Table 1) and mixed forages which comprised *Panicum maximum* 200g, *Ipomea batatas leaves* 100g and *Centrosema pubescens* 200g until after kindling. Clean water was also supplied *ad libitum*. After two weeks of commencement of the experiment, the does were taken to the bucks' pen for mating. The mating ratio was 1 buck : 10 does. The does were all mated within an interval of 3 days. The does were palpated after 14 days of mating to confirm pregnancy. Following parturition, *Aspilia africana* forage was introduced as the experimental diet at the rate of 500g per doe per day.

### **Experimental Design and Data Collection**

The experiment was in a completely randomized design with three (3) treatments. The treatments consisted of mixed forages (*Panicum maximum* (200g/per animal/day), *Ipomea batatas leaves* (100g/per animal/day) and *Centrosema pubescens leaves* (200g/per animal/day) without *Aspilia africana* (Control; T<sub>1</sub>), fresh *Aspilia africana* (500g/animal/day) (T<sub>2</sub>) and wilted *Aspilia africana* (T<sub>3</sub>). Ten (10) does were randomly assigned to each treatment. Each treatment was replicated 5 times with 2 does per replicate.

Data were collected on the weights of the does at the beginning of the experiment, prior to mating, during pregnancy, at parturition, during lactation, at weaning and prior to re-mating. Weight measurements were taken using weighing balance.

### **Data Analysis**

The data generated were analyzed using Analysis of Variance (ANOVA). Significant means were separated using Fisher's Least Significant Different (LSD) according to the methods of Steel and Torrie (1980) and Akindele (2004).

## **Results and discussion**

The result of the body weight of the does at different physiological states are presented in Table 2 and Fig. 1. The mean body weight of the does at the commencement of the experiment was 1.74kg. The body weight of the does at mating and gestation period revealed significant differences (P<0.05) with does in T<sub>3</sub> having significantly lower value than T<sub>2</sub>, while T<sub>1</sub> and T<sub>2</sub> showed no significant differences among each other. Weights of does at kindling revealed significant differences (P>0.05) between the various treatment groups. However, T<sub>3</sub> maintained lower weight values during the gestation period although

there were no significant differences. The lower weight of T<sub>3</sub> during gestation and kindling could be attributed to the weights of does in this group at the time of mating. It was observed that body weight of does in T<sub>2</sub> slightly decreased at kindling while those of T<sub>1</sub> and T<sub>3</sub> showed slight increase. The study revealed significant differences (P<0.05) between the body weights of does in the different treatments during the physiological states of lactation, weaning and re-mating. At these physiological states, T<sub>2</sub> had the highest significant values followed by T<sub>3</sub>, while T<sub>1</sub> (control) had the least value (Table 2 and Fig. 1). The higher body weights of the treated groups (T<sub>2</sub> and T<sub>3</sub>) could be due to the *Aspilia africana* forage fed to these groups following kindling. It was observed that the body weight of the does in T<sub>1</sub> and T<sub>2</sub> treatments at weaning was higher than their weights at the other physiological states. The T<sub>3</sub> group was an exception with the body weight at re-mating showing highest weight than in the rest of the physiological states. The higher weights at weaning observed in the present study is contrary to the reports of Xicatto (1996) who documented that rabbit does experience severe energy depletion during lactation and also at variance with the findings of Richardson (2003) who reported that does tend to lose weight after weaning their first litter until kindling of the second litter. The contrary result of the present study suggested that *Aspilia africana* is a good source of nutrients and energy and balances the expected energy deficit during lactation and weaning. In other words, the significant higher means of the does in the treated groups (T<sub>2</sub> and T<sub>3</sub>) corroborates the findings of Okwu and Josiah (2006) who analyzed *Aspilia africana* and found that it is a good source of Ca, P, K, Mg, Fe and Zinc ions. The result of this study is also consistent with the findings of Okwuonu *et al.* (2008) who reported that the phytochemical analysis of *Aspilia africana* revealed its richness in saponins, crude proteins, sterols and terpenes all of which could have led to the significant increase in body weights of weaning of the treated groups (T<sub>2</sub> and T<sub>3</sub>) who received fresh and wilted *Aspilia africana* respectively. The slight decrease in body weights of does fed wilted *Aspilia africana* compared with the does fed the fresh *Aspilia africana* forage might be due to loss of moisture from the wilted plant which might have led to decline in vital minerals and/or palatability.

### Conclusion

The body weights of does fed *Aspilia africana* was consistently higher than the weights of does in the control group which did not receive the experimental forage showing that *Aspilia africana* is a potential growth promoter. It could therefore be recommended for finishing and fattening rabbits.

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Table 1: Percent Composition of Concentrate Ration

Ingredients	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>
Maize offal	45.5	45.5	45.5
Palm kernel cake	30	30	30
Soybean meal	20	20	20
Blood meal	2.0	2.0	2.0
Bone meal	2.0	2.0	2.0
Vitamin-mineral Remix	0.25	0.25	0.25
Salt	0.25	0.25	0.25
	100	100	100

Metabolizable Energy – 2620Kcal/kg  
 Crude protein – 18.5%  
 Calcium – 1.10%  
 Phosphorus – 0.80%

Table 2: Body Weights of Does at Different Physiological States

Parameters	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	SEM
Body weight at mating (kg)	1.75 <sup>ab</sup>	2.01 <sup>a</sup>	1.67 <sup>b</sup>	0.07
Body weight during pregnancy (kg)	1.86 <sup>ab</sup>	2.08 <sup>a</sup>	1.77 <sup>b</sup>	0.07
Body weight at kindling (kg)	1.97	2.00	1.85	0.06
Body weight at lactation (kg)	2.07 <sup>c</sup>	2.30 <sup>a</sup>	2.19 <sup>a</sup>	0.07

a,b,c, means in same row with different superscripts are significantly different (P<0.05)

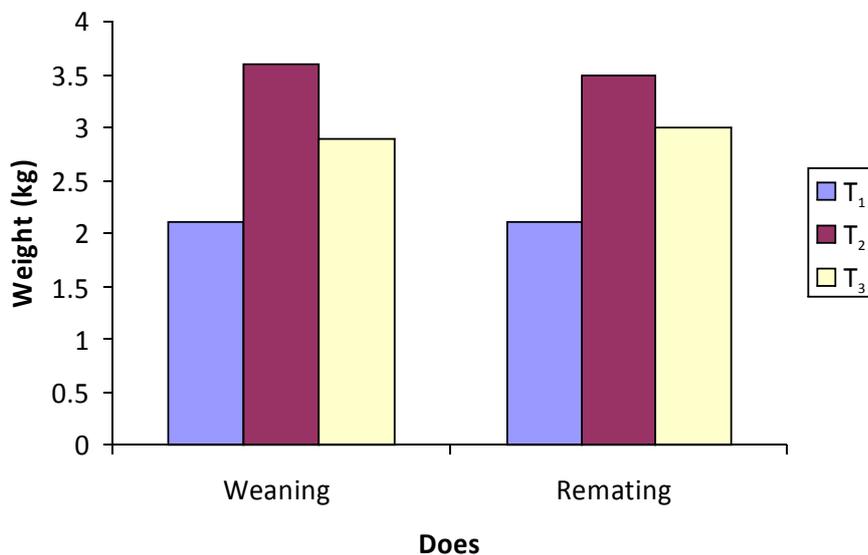


Fig. 1: Effect of *Aspilia africana* on body weights of does at weaning and at remating