Effects of *Aspilia Africana* on Conception Rates of Rabbit Does

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Abstract. The study was conducted to investigate the conception rates of rabbit does fed *Aspilia africana* as forage using thirty (30) dutch breed rabbit does of average age of 6 months in a completely randomized design. The rabbits in all the treatment groups were fed the same concentrate diet 18.0% crude protein (CP) and 2620 kcal/kg Metabolizable Energy (ME) throughout the study and mixed forages which consisted of *Ipomea batatas* leaves, *Centrosemapubescens*, *Musa sapientum* leaves, and *Panicum maximum*from the commencement of the experiment until parturition. Introduction of the experimental forages followed immediately after parturition and consisted of three treatments (T_1, T_2 and T_3). The treatment consisted of T_1: mixed forages (*Ipomea batatas* leaves, *Centrosema pubescens, Musa sapientum* leaves, *Panicum maximum*) without *Aspilia africana* (control), T_2: fresh *Aspilia africana* and T_3: wilted *Aspilia africana*. The results of the study revealed no significant differences in gestation length, receptivity and conception rates of the does in the various treatment groups before the introduction of the test plants (*Aspilia africana*). During the period of administration of the test plant, the treated groups; T_2 and T_3 had significantly lower mean values for receptivity (T_2 and T_3 = 1) compared to T_1 (3), conception rates for T_2 and T_3 were 0% and T_1 was 100%. The gestation length for the control was 30.5 days while gestation was not recorded for T_2 and T_3 since they did not conceive at all. The ovarian weight of the control T_1 (0.20 g) was significantly higher than T_2 and T_3 both of which recorded 0.13 g for their ovarian weights. The study showed that *Aspilia africana* has anti-fertility properties.

Key words: *Aspilia africana,* conception, contraceptive, rabbit does, reproduction

Abstrak. Penelitian ini dilakukan untuk mengkaji tingkat kebuntingan kelinci betina yang diberi pakan *Aspilia africana* pada 30 kelinci peranakan Dutch dengan rataan umur 6 bulan menggunakan Rancangan Acak Lengkap. Kelinci di semua kelompok perlakuan diberi pakan yang sama berupa 18.0% protein kasar (PK) dan 2620 kkal/kg Energi Metabolit selama penelitian dan pakan campur yang terdiri dari daun ubi jalar (*Ipomea batatas*), sentro (*Centrosema pubescens*), daun pisang (*Musa sapientum*) dan rumput benggala (*Panicum maximum*) dari awal percobaan hingga kelahiran. Pakan percobaan diberikan segera setelah kelahiran yang terdiri dari tiga perlakuan (T_1, T_2 and T_3) dimana T_1: pakan kombinasi (daun ubi jalar, sentro, daun pisang, rumput benggala) tanpa *Aspilia africana* (kontrol), T_2: *Aspilia africana* segar dan T_3: *Aspilia africana* layu. Hasil penelitian menunjukkan tidak ada perbedaan nyata dalam masa kebuntingan, penerimaan dan tingkat kebuntingan kelinci di berbagai kelompok percobaan sebelum diberikan perlakuan (*Aspilia africana*). Selama periode pemberian perlakuan, kelompok percobaan: T_2 dan T_3 memiliki rataan yang lebih rendah (T_2 dan T_3 = 1) dibandingkan T_1 (3), tingkat kelahiran T_2 dan T_3 adalah 0% dan T_1 adalah 100%. Masa kebuntingan grup kontrol adalah 30,5 hari sedangkan pada T_2 dan T_3 tidak ada karena kelinci sama sekali tidak bunting. Berat indung telur kontrol T_1 (0.20 g) lebih tinggi daripada T_2 dan T_3 yaitu 0,13 g. Penelitian menunjukkan bahwa *Aspilia africana* memiliki nilai anti-fertilitas.

Kata kunci: *Aspilia africana*, kebuntingan, kontraseptif, kelinci betina, reproduksi

Introduction

The relevance of animal protein in human and animal nutrition in Nigeria cannot be overemphasized. 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). Nutritionists and other related workers have expressed grave concern at the alarming low level of animal protein supply in the

developing countries (Ogbonna and Adebowale, 1993; Awonorin et al., 1994). Animal protein in the diets of low income earners that constitute the majority of Nigerian populace is very low (Yusuf et al., 2009). Average consumption of animal protein in this country is estimated at 4.5 g/head/day as against a minimum requirement of 35 g/head/day recommended by the Food and Agriculture Organization of the United Nations (Atsu, 2002). The production of the conventional protein and energy sources is still grossly inadequate in most developing countries of the world and often times, demand exceeds supply (Matthew et al., 2010). Therefore, in order 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). Efforts have to be directed towards boosting the micro-livestock sector (Akpan et al., 2009) for example rabbit. Rabbit (*Oryctolagus cunniculus)* is a non-ruminant herbivore which utilizes much undigested and unabsorbed feed materials as sources of nutrient for maintenance and production (Hassan and Owolabi, 1996; Amaefule et al., 2005; Henry et al., 2009). Substantial part of rabbit feed can be provided from herbage crops and weeds (Zahraddeen, 2006). Rabbits are known to supply animal protein and provide a cheap source of meat to the Nigerian populace, evident from the widespread of small scale rabbitary in backyards in Nigerian cities (Henry et al., 2009). Rabbit provides inexpensive source of meat that is low in cholesterol and fat, high in protein compared to beef, mutton and pork (Ensminger, 1991; Oguike and Ohaja, 2009). Rabbits can be described as a pseudo-ruminant scavenger capable of coprophagy with high feed conversion efficiency (Dada-Joel, 2010). Thus, rabbits offer an avenue for rapid transformation in animal protein production in the country. This is because of the possibility of high turn over rate in its production. In spite of the numerous advantages of rabbit over other classes of livestock and recent advances for alternative sources for this micro-livestock in Nigeria, feed cost and scarcity still limit profitable rabbit production in the country (Ozuo and Anigbogu, 2009).

The shortage of good quality feeds needed to sustain livestock production has been a major challenge to the Livestock industry in most developing countries (Nsa and Ukachukwu, 2009), that put the blame on the rising needs of human for the same feedstuffs for food and industry (Duruna et al., 2006). This has led to the use of alternative feed sources which may not be suitable for human consumption in feeding animals (Oguike and Etim, 2010). According to Etim and Oguike (2011), the new global search for forage suitable for feeding livestock has led to the recent investigation of many more Nigerian plants than before. In Nigeria, many plants are used for feeding livestock, one of which is *Aspilia africana*, which belongs to Asteracea family, a perennial herb varying in height from 60 to 150 cm depending on rainfall. It is a common weed of field crops in West Africa and sometimes found in fallow land, especially the forest zone (Akobundu, 1987; Etim and Oguike, 2011). The plant is a weed grazed by cattle and sheep and is mostly used in Western States of Nigeria as feed for rabbits and hares (Burkil, 1985; Etim and Oguike, 2011). The effects of some of these feedstuffs on the animal during the different physiological states are not certain (Oguike and Etim, 2010) but when used correctly, is assured for the maintenance of normal body physiology and improved performance.

According to Burkil (1985), *A. africana* is used as abortifacient and lactation stimulants. Eweka (2008) documented that in some communities, women boil and filter the leaves of *A. africana* which they drink to prevent

conception. Eweka (2008) posited that the ovary of wistar rats given aqueous extract of *A. africana* orally showed some cellular hypertrophy of the theca folluli and complete distortion/destruction of the basement membrane. Frandson (2003) stated that a number of plants produce substances that have estrogenic activity and that estrogen is used in hormonal treatment to produce abortion in domestic animals. The number of mating to conception varies and may depend on re-mating interval, nutrition and environment (Yaman et al., 1992). A conception rate of 60 to 90% was recorded by Partridge et al. (1981) for normal rabbit does. According to Aduku and Olukosi (1990), gestation in rabbit does may last between 28 to 32 days. There is a dearth of information on the effects of *A. africana* on conception rates of does. The study aimed at investigating the consequences of feeding *A. africana* to rabbit does, to ascertain its effect on the conception rates of rabbit does.

Materials and Methods

Experimental location. The research was conducted in the Rabbitry Unit of the Teaching and Research Farm of the 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 animal rainfall of 2177 mm, while average ambient temperature is 26°C with relative humidity of 63-80%.

Experimental animals and management. Thirty (30) sexually mature nulliparous Dutch does and four (4) Dutch bucks averagely 6 months old and 1.74 kg with good health performance record from Akwa Ibom State were used for the study. A two week pre-experimental quarantine period was allowed to enable the animals adjust to the new environment. The animals were tagged and housed singly in pens in rabbit hutches, separated by sexes. Before mating and kindling, all animals were fed with 300 g of concentrate each of 18.5% crude protein and 2620 kcal/kg of Metabolizable Energy and mixed forages comprising *Panicum maximum, Ipomea batatas* leaves*, Centrosema pubescens* and *Musa sapientum* leaves*.* Mating of the does was carried out 2 weeks after commencement of the experiment with the ratio of 1 buck : 10 does. Receptivity was recorded according to the method reported by Berepubo et al. (1993); the combined observation of the three "vital signs" namely increased vascularization and turgescence (swelling) of the vilva, exposition of the rear quarters (tail goes up), arching of back and frequent micturition) and any of the secondary signs included scratching of the ear, rubbing of the chin on feed trough or waterer and aggressive restlessness, particularly towards the end of a one week observation period is considered intensive heat and attracted an arbitrary score of 5. Manifestation of any two vital signs with or without secondary signs was labeled "less intensive heat" and assigned a score of 3 or 2. One vital sign with or without secondary signs was recorded as mild heat and was scored 1. Mating in all the treatment groups were carried out within one week. The does were palpated in the abdomen 14 days after mating to confirm pregnancy *A. africana* was introduced.

The kits were weaned on the 4th week and the does were allowed 14 days rest before they were remated to determine if pregnancy would occur while consuming *A. africana.* After 14 days, the does were palpated and it was observed that pregnancy did not occur. *Aspilia africana* was suspended for 3 weeks and the does were given mixed forages. After 3 weeks, the does were remated and palpated on the 14th day and it was observed that pregnancy was still absent. One month after remating, two does in each treatment group were slaughtered by severing the jugular. The carcass were

eviscerated and the ovaries were removed and weighed with an electronic scale.

Slaughtering of animals. One month after remating, two does in each treatment group were slaughtered. The mode of slaughtering was by severing the jugular vein.

Experimental design. The experiment was a completely randomized design with three treatments (Table 1). The treatments consisted of mixed forage without *Aspilia africana* (T_1) fresh *Aspilia africana* (T_2) and wilted *Aspilia africana* (T_3). Ten (10) does were randomly assigned to each treatment. Each treatment was replicated 5 times with 2 does per replicate.

Data analysis. The data generated were analyzed using anova. Significant means were separated using LSD according to the methods of Steel and Torrie (1980).

Results and Discussion

The result of the reproductive performance of the does before receiving *A. africana* are presented in Table 2. The results revealed that there were no significant differences (P>0.05) in all parameters tested; before parturition does in the three treatment groups had moderate receptivity (3,3,2) and average gestation period (29.10, 29.40, 29.20) respectively in line with the report (28-32) by Aduku and Olukosi (1990). The conception rate for the three treatment groups also showed no significant difference (P>0.05) and was high and varied. This may be associated with the nutrition and environment as observed by Yamani et al., (1992). The conception rate of 96 to 99% obtained in the experiment was higher than that (60-90%) obtained by Patridge et al. (1981).

The result of the effects of *A. africana* on the reproductive performance are presented in Table 3. Does in T_1 were more receptive to bucks than that in T_2 and T_3. The ease with which the does in T_1 accepted the buck could be attributed to hormonal action on the reproductive organs of the does as reported by Hulls et al. (1991). The increase in weight of the vulva was indicative of animals in ovarian growth/oestrus and hence the high receptivity observed in this group. The decrease in

Table 1. Percent composition of concentrate ration

Ingredients	T_1	T_2	T_3
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 premix	0.25	0.25	0.25
Salt	0.25	0.25	0.25
	100	100	100

T_1: mixed forages (*Ipomea batatas* leaves, *Centrosema pubescens, Musa sapientum* leaves, *Panicum maximum*) without *Aspilia africana* (control), T_2: fresh *Aspilia africana* and T_3: wilted *Aspilia africana*. M.E – 2620kcal/kg; C.P – 18.0%; Calcium – 1.10%; Phosphorus – 0.80%

Table 2. Reproductive performance of does before receiving *Aspilia africana*

Parameters	T_1	T_2	T_3	SEM
Receptivity	3	3	2	0.33
Conception rate (%)	99	96	99	3.00
Gestation length (days)	29.10	29.40	29.20	0.23
Ovarian weight (g)	0.20	0.22	0.20	0.06

Values bearing different superscript at the same row shows significant (P<0.05).

T_1: mixed forages (*Ipomea batatas* leaves, *Centrosema pubescens, Musa sapientum* leaves, *Panicum maximum*) without *Aspilia africana* (control), T_2: fresh *Aspilia africana* and T_3: wilted *Aspilia africana*.

Table 3. Effect of *Aspilia africana* on reproductive performance of does

Parameters	T_1	T_2	T_3	SEM
Receptivity	3	1	1	0.33
Conception rate (%)	100	0	0	0.00
Gestation length (days)	30.50^a	0^b	0^b	2.67
Ovarian weight (g)	0.20	0.13	0.13	0.02

Values bearing different superscript at the same row shows significant (P<0.05).

T_1: mixed forages (*Ipomea batatas* leaves, *Centrosema pubescens, Musa sapientum* leaves, *Panicum maximum*) without *Aspilia africana* (control), T_2: fresh *Aspilia africana* and T_3: wilted *Aspilia africana*.

receptivity observed in does in T_2 and T_3 could be attributed to lack of manifestation of oestrus as well as follicular growth which may be as a result of non-release of gonadotrophins from the anterior pituitary of the does to stimulate ovarian activities. This low receptivity of the *A. africana* treated groups (T_2 and T_3) could be associated with the effects of the test plant (*A. africana*) on the ovary.

The conception rate for T_1 was 100% while T_2 and T_3 does did not conceive at all (0%). The non-conception of does fed fresh and wilted *A. africana* (T_2 and T_3) may be attributed to the influence of the test plant (*A. africana*) on reproductive activity of the does which could have manifested in low receptivity of the does to the bucks and non-contraception. The cause of non-conception of does in treatments 2 and 3 could be suggestive of the contraceptive effect of *A. africana*as reported by Eweka (2008). It is suggestive that the test plant could have caused the non-conception in does in T_2 and T_3 which is consistent with the findings of Eweka (2008) who reported that the ovary of wistar rats given aqueous extract of *A. africana* orally showed some cellular hypertrophy of the theca folliculi, and complete distortion/destruction of the basement membrane. He also observed degenerative and atrophic changes in the oocyte and granulosa and also marked vacuolation appearing in the stroma cells when compared to the control sections. Furthermore, the result of this experiment was also in line with the findings of Burkil (1985) that *A. africana* leaves may be used as abortifacients which were likely to cause non-conception. *Aspilia africana* was furthermore assumed to produce excess estrogen with which conception cannot occur. This was in line with Frandson (2003) that a number of plants produce substances that have estrogenic activity. Any hormone that can produce abortion can also cause non-conception. It was unidentified whether this was the cause of non-conception observed in T_2 and T_3 does fed with *A. africana*. The result suggested that *A. africana* might have some contraceptive or anti-fertility properties.

The result of the ovarian weights showed no significant differences (P>0.05), in which the highest (0.20 g) was in control group T_1 and the lowest (0.13 g) was in T_2 and T_3, which might result from the degenerative effects of *A. africana*on the ovary as reported by Eweka (2008). This may have been the cause of the lack of conception observed in does in T_2 and T_3 as manifested in the diminishing ovary size. The higher mean ovarian weight (0.20 g) of T_1 may have led to the higher conception rate.

Conclusion

Does fed with *Aspilia africana* consistently recorded lower values than those in the control group without *Aspilia africana*, indicating that *Aspilia africana* may have some contraceptive or anti-fertility properties. It could therefore be recommended for non-breeding animals.

References

Adewumi OF, RA Ajalade, D Bayode,OA Osinowo and OM Onagbesan. 2009. Evaluation Of The Effects Of Trial Mucus Of Archachatina Marginata On The Haematology And Organ Morphology Of

Wistar Rats. In: Proceedings of 34th Annual Conference of NSAP, March 15th – 18th, Uyo. 206-209.

Akobundu IO. 1987. Weed Science In The Tropics; Principles And Practices. John Wiley and Sons, Chinchester, UK. Pp. 522.

Awonorin SO, JA Ayoade, SW Carew, EK Ingbian and AT Girgih. 1994. Quality characteristics of fresh and frozen meat from rabbits fed different levels of Gliricid: A sepium. Nig. J. Anim. Prod. (1 and 2):170-176.

Burkil HM. 1985. The Useful Plants of West Tropical Africa. Royal Botanic Garden. Kew. (1) 2nd Ed. Families A–D. Pp. 446-447.

Durunna CS, ABI Udedibe and GA Anyanwu. 2006. Combination of maize/sorghum based dried brewers grain, cocoyam, corn and cassava tuber meals as substitutes for maize in the diets of laying hens. J. Agric. Biotech. Environ. 1:1-7.

Etim NN and MA Oguike. 2011. Haematology and serum biochemistry of rabbit does fed *Aspilia africana.* Nig. J. Agric. Food and Environ. 7(4):121-127.

Eweka AO. 2008. Histological studies of the teratogenic effects of oral administration of *Aspilia africana* (*Asteraceae*) extract on the developing kidney of wistar rats. Int. J. Toxicol. 4(2).

Frandson RD. 2003. Anatomy and Physiology of Farm Animals. Chp. 31, p. 462.

Hulls W, DL Brooks and D Benaknudsen. 1991. Response of adult New Zealand white rabbits to enrichment objects and paired housing. Labo. Anim. Sci. 41:609-612.

Nsa EE and SN Ukachukwu. 2009. Effect of thermal processing methods on the proximate composition, gross energy, minerals and ricin content of undecorticated castor oil seed (*Ricinus communis*). Global J. Agric. Sci. 8(2):223-227.

Ogbonna JU and A Adebowale. 1993. Effects of cassava peel meal as replacement for maize and wheat offal on performance nutrient utilization of cockerels. Nig. J. Anim. Prod. 20(1):61-70.

Oguike MA and NN Etim. 2010. Effects of *Aspilia africana* on Body Weight of Rabbit Does at Different Physiological States. In: Proceedings of 35th Conf. Nig. Soc. for Anim. Prod. 14th–17th March, 2010. University of Ibadan. Nig. Pp. 216-218.

Partridge GA, S Foley and W Corrgall. 1981. Reproductive performance in pure bred and cross bred commercial rabbits. Anim. Prod. 32:325-33.

Yamani KA, AH Daader and A Askar. 1992. Effect of Remating Interval on the Performance Of Rabbit, Production and Reproduction Options. Mediterraneenes-Serie Seminaries, 17:173-178.

Zahraddeen D. 2006. Studies on Reproductive Performance and Milk Productivity of Goats in Bauchi. Ph.D Thesis. Abubakar Tafewa Balewa University, Bauchi, Nigeria, Pp. 210.