

The Journal of Phytopharmacology

(Pharmacognosy and phytomedicine Research)

Research Article

ISSN 2230-480X

JPHYTO 2016; 5(3): 122-125

May- June

© 2016, All rights reserved

Dougnon Jacques Tossou

Laboratory of Research in Applied Biology, Polytechnic School of Abomey-Calavi, University of Abomey-Calavi, 01 BP 2009 Abomey-Calavi, Benin

Ahossi Philippe Kapko

Laboratory of Research in Applied Biology, Polytechnic School of Abomey-Calavi, University of Abomey-Calavi, 01 BP 2009 Abomey-Calavi, Benin

Soha Sas Arnaud Sèsséya

Laboratory of Research in Applied Biology, Polytechnic School of Abomey-Calavi, University of Abomey-Calavi, 01 BP 2009 Abomey-Calavi, Benin

Ohouko Okri Fréjus Hans

Laboratory of Research in Applied Biology, Polytechnic School of Abomey-Calavi, University of Abomey-Calavi, 01 BP 2009 Abomey-Calavi, Benin

Correspondence:

Dougnon Jacques Tossou

Laboratory of Research in Applied Biology, Polytechnic School of Abomey-Calavi, University of Abomey-Calavi, 01 BP 2009 Abomey-Calavi, Benin

Email: dougnonj[at]yahoo.fr

Effect of *Annona senegalensis* leaves on morphometric parameters of reproductive organs in rabbits

Dougnon Jacques Tossou*, Ahossi Philippe Kapko, Soha Sas Arnaud Sèsséya, Ohouko Okri Fréjus Hans

ABSTRACT

The present study aimed to evaluate the effect of the leaves of *Annona senegalensis* on morphometric parameters of the female reproductive organs in rabbits. A total of 120 rabbits were divided into four batches A, B, C and D of 30 animals each. Lots B, C and D received 10, 20 and 30 g leaves of *Annona Senegalensis* / kg of feed respectively, while lot A (control group) was fed with the staple feed (without *Annona senegalensis* leaves). At the end of the experiment, the animals were dissected and morphometric parameters of the different genital organs were measured. The results showed that the average live weight, the average lengths of the left oviduct and the average lengths of the vagina did not vary significantly between different experimental groups ($p > 0.05$). On the other hand, the weight of the right ovary, the left and right uterus, right oviduct, vagina and reproductive system varied significantly between batches ($p < 0.05$). The right oviduct length of Lot D was the longest ($15.52 \text{ cm} \pm 2.83$) with a shorter right uterus ($5.87 \text{ cm} \pm 1.43$) compared to other lots.

Keywords: *Annona senegalensis*, Morphometric parameters, Rabbits, Reproductive organs.

INTRODUCTION

Livestock is a key sector in the economic development of a country and also helps to meet the needs of populations in animal protein. In Benin, a study revealed that the livestock sub-sector contributes up to 15-18% of the GDP^[1]. Despite this contribution, it does not significantly alleviate poverty and its corollaries such as undernourishment and especially the lack of animal protein. To reduce this animal protein deficiency, development strategies are placing more emphasis on the short-cycle animals 'rearing like rabbits. Therefore, rabbit production has experienced a rapid expansion through the rabbit Center for Research and Information (CECURI) in Benin^[2]. Formerly unknown by many Beninese', rabbit production is now among the most important livestock activities^[3]. Rabbit (*Orytholagus cuniculus*) is a mammal of the order of lagomorphs, native of southern Europe and Africa. It is known for its prolificacy, with short gestation and lactation periods. A female rabbit can produce up to 40 rabbits / year^[4].

Despite these advantages, the development of rabbit production requires studies in a wider range of fields such as genetics, pathology, nutrition and reproduction. Improving reproductive performance of rabbits is an important way for the achievement of expected progress on self-sufficiency in animal protein. It is reported that rabbits are not able to reproduce until the moment where the genitals are sufficiently developed and physiologically capable of operating^[5].

The morphometric study of reproductive organs in rabbits would be very important because it would provide specific information for assessing its capacity and potential fertility.

MATERIALS AND METHODS

Study area

The experiment took place at the rabbit Center of research and Information (CECURI), on the Campus of University of Abomey-Calavi from 04 May to 4 September. The building that housed the animals was of 210m^[2]. The side walls have a height of about 2m and topped with trellises to allow ventilation. It is equipped with galvanized iron cages of 80cm in length, 50 cm width and 30 cm height that are above ground. Each is equipped with a drinking trough and a manger with a recovery system that helps to retain the droppings and the leftover foods.

Material

Animal material

The experiment was performed on 120 rabbits, divided into (04) four batches of 30 animals. The rabbits were all placed in the same conditions. The body live weight of the animals ranged from 2kg to 3kg

before experimentation.

Technical Equipment

The technical equipment consists of trough, manger, an electronic load cell, a load cell laboratory, dissection kit, aluminium and paper forms for data collection.

Plant Material

The plant material consisted of *Annona senegalensis* leaves of the family Annonaceae.

Feed experimentation

Two experimental feeds in pellet form were used. The first is a commercial food bought at the feed mill Association of rabbit feed mill-Providence (ACP-LP) and served as a control. The second is made from the powder of the leaves of *Annona senegalensis*.

Other equipment

Other materials used are: plastic seals, cleaning tools (brooms, brushes, shovels sponges knife.

Methodology

Constitution of lots and experimental ration

Animals were divided into four batches of 30 each. Each lot received different dietary treatments of the leaves of *Annona senegalensis* for a month at a rate of 150 g of granulated per subject per day according to batch so constituted:

Lot A: control group; 150g granulated feed without the leaves of *A. senegalensis*,

Lot B: 150 g of pellet feed made with 10g of *A. senegalensis* per kg of feed per subject per day,

Lot C: 150 g of pellet feed made with 20g of *A. senegalensis* per kg of feed per subject per day,

Lot D: 150 g of pellet feed made with 30g of *A. senegalensis* per kg of feed per subject per day.

Data Collection

Data was recorded using a form. The weight of the animal is registered. After dissection, the entire reproductive tract was obtained. Fat and other connective tissues were left aside. The weight of the entire extent was taken; after measures such as the total weight of the reproductive organ, weight and length of left and right ovaries, weight and length of the left and right oviducts, weight and length of the left and right uterus and weight and vaginal length was recorded. Weights were recorded with highly sensitive digital scale and lengths with grout stone.

Statistical analysis

The variables considered in the processing of data were: the total weight of the reproductive organ, weight and length of left and right ovaries, weight and length of the left and right oviducts, weight and length of the left and right uterine and vaginal weight and length of each lot. These data are subjected to analysis of variance (ANOVA).

RESULTS AND DISCUSSION

Morphometric parameters evaluated in reproductive rabbits in this study are presented in Table 1.

Since the 1990s, several characterization studies were conducted on animal performance, incorporating a number of local raw materials in

the rabbit feed^[9] and study of its nutritional growing needs^[6-10]. However in terms of the physiology of reproduction, few data are available. They informed us specifically on hormonal profiles of local rabbits, the characterization of some plasma and histological parameters in non-pregnant rabbits and during gestation and the anatomo-histological changes (uterus and ovaries) during the postpartum period^[11-13].

The results obtained in this study show that the use of leaves *Annona senegalensis* in rabbit's diet has no effect on body weight ($p > 0.05$). These results are consistent with that of author showing that the incorporation of papaya leaves in rabbits feeding has no significant effect ($P > 0.05$) on their body weight^[14].

In terms of left and right ovaries, left and right oviduct, left and right uterus and vagina, weights varied significantly between the experimental groups ($p < 0.05$). For the left ovary, the heaviest weight was recorded from the control group with a value of 0.11 ± 0.16 g. However, the lightest left ovary 0.09 ± 0.06 g was observed in the group treated with 10g of *Annona senegalensis* leaves per kg of feed. As regards the right ovary, the highest value (0.19 ± 0.15 g) was observed in the group treated with 30 g/kg of leave per feed while the lowest weight is recorded in the group treated with 10 g of leave per kg of feed. *Annona senegalensis* leaves therefore have an effect on the right ovary at 30% level of incorporation. This result is consistent with that author who used neem leaves in the diet of hybrid rabbits (Chinchilla \times New Zealanders)^[15]. Against, the introduction of papaya leaves at 30% in the diet doesn't change morphometric characteristics of rabbits^[14]. Similarly, it reported that the incorporation of 27% cassava leaf in the feed has no adverse effect on the morphometric characteristics of reproductive organs and reproductive function rabbits^[16].

Regarding the weight of the left uterus and the right, only those of the untreated lot showed significant differences from those of other lots with the highest values and 2.46 respectively ± 1.56 g and 2.19 ± 1.01 g ($p < 0.01$).

It demonstrated that the incorporation of neem leaves in the diet showed no significant difference between the control group and the Treated ones^[16]. Neem leaves showed no influence on the weight of the uterus of rabbits. The size of the uterus is correlated with the stage of reproduction and represents a bio-indicator of the presence of estrogens in rabbit^[17-18]. The reduction in uterine weight observed in the experimental groups compared to the control group in this study indicates that the *Annona senegalensis* leaves have an influence on estrogens production in rabbits and consequently on the reproduction. The effect of the plan administered during this study reveals that the reproductive organs, the reproductive process and probably fertility can be affected when the leaves of *Annona senegalensis* are included in the diet from 10g.

During the study, the weight of the left oviduct ranged from 0.30 ± 0.17 to 0.20 ± 0.11 g. The highest value was observed in the untreated lot while the lowest value was observed in the group treated with 10g of leave per kg of feed. For the right oviduct, only the weight of the lot treated with 10g of leave per kg of feed varied significantly compared to other lots with the smallest value of 0.18 ± 0.09 g. It reported that the weight of the lot with paired oviducts received 5% (T1) of the neem feed was significantly ($p < 0.05$) higher than batches T0 (0%), T2 (10%) and T3 (15%)^[15]. This result is comparable to those where the lot whose diet was supplemented with 10% of papaya leaves presented a significantly higher value than the lots that received 0%, 20% and 30% of papaya leaves^[14]. Also the weight of the vagina obtained in the group treated with 30g of *Annona senegalensis* leaves per kg of feed was higher (4.44 ± 2.94 g) and significantly different from those obtained in other lots ($p < 0.01$). This result is consistent with that of author which revealed that rabbits in the control group (diet without incorporation of neem leaves) had a significantly lower vaginal weight ($p < 0.05$) compared to those fed with 5% of neem in the diet^[15].

Table 1: Morphometric parameters evaluated on reproductive rabbits

Variables	lot A	lot B	lot C	lot D	Significance
Animal live weight	2.65 ± 0.34 a	2.64 ± 0.40 a	2.50 ± 0.26 a	2.54 ± 0.20 a	NS
Left ovary weight	0.16 ± 0.11 a	0.09 ± 0.06 b	0.13 ± 0.05 ab	0.11 ± 0.04 ab	*
Right ovary weight	0.13 ± 0.05 ab	0.10 ± 0.7 b	0.12 ± 0.5 ab	0.19 ± 0.15 a	*
Left oviduct weight	0.30 ± 0.17 a	0.20 ± 0.11 b	0.28 ± 0.19 ab	0.23 ± 0.09 ab	*
Right oviduct weight	0.28 ± 0.17 a	0.18 ± 0.09 b	0.24 ± 0.15 a	0.27 ± 0.06 a	*
Left uterus weight	2.46 ± 1.56 a	1.08 ± 0.68 b	1.04 ± 0.66 b	1.42 ± 0.63 b	**
Right uterus weight	2.19 ± 1.01 a	1.17 ± 0.76 b	1.09 ± 0.74 b	1.48 ± 0.69 b	**
Vagina weight	1.92 ± 0.42 b	1.88 ± 0.74 b	2.06 ± 1.86 b	4.44 ± 2.94 a	**
Reproductive system weight	10.28 ± 4.11 a	7.31 ± 3.32 b	7.26 ± 4.31 b	9.50 ± 3.32 a	*
Left ovary length	1.18 ± 0.11 b	1.32 ± 0.16 a	1.44 ± 0.23 a	1.21 ± 0.11 b	*
Right ovary length	1.25 ± 0.17 b	1.33 ± 0.19 ab	1.43 ± 0.16 a	1.13 ± 0.06 c	**
Left oviduct length	14.12 ± 2.85 a	14.38 ± 2.06 a	13.89 ± 6.18 a	15.25 ± 5.20 a	NS
Right oviduct length	13.17 ± 3.76 b	13.10 ± 3.22 b	13.84 ± 4.95 ab	15.52 ± 2.83 a	*
Left uterus length	6.82 ± 2.08 bc	7.71 ± 2.21 ab	8.37 ± 2.30 a	5.96 ± 0.84 c	*
Right uterus length	7.92 ± 1.84 a	7.92 ± 2.38 a	7.31 ± 2.47 a	5.87 ± 1.43 b	***
Vagina length	8.66 ± 0.86 a	8.21 ± 1.52 a	8.55 ± 1.54 a	8.57 ± 1.17 a	NS

NS: not significant; *** p<0.001. Means in the same column followed by different letters

In contrast to these results, it reported that the weight of the vagina has shown a significant difference ($p < 0.05$) between treatments with a tendency to decrease when the rate of incorporation of cassava leaf increases in diet ^[19].

The evaluation of the weight of the reproductive system during this study has changed very little with values between 7.26 ± 4.31 and 10.28 ± 4.11 g ($p < 0.05$). The control group presented the highest weight (10.28 ± 4.11 g) followed by the lot D (9.50 ± 3.32 g); Lots B (7.31 ± 3.32 g) and C (7.26 ± 4.31 g) having the lowest weight. Dissimilar results are reported with the gradually decreased weight of the entire tract beyond 5% incorporation of neem leaves in the diet ^[15].

The length of the left oviduct and the vagina showed no significant difference between the batches ($p > 0.05$). It reported that rabbits' vaginal length in the control group did not vary significantly ($p > 0.05$) compared to experimental groups ^[15]. Furthermore, an author reported that the length of the left oviduct, presented a significant difference ($p < 0.05$) with a tendency to decrease when the rate of incorporation of cassava leaves increased in the diet ^[19]. However, the lengths of the left and right ovary, right oviduct, left and right uterus varied significantly from one batch to another ($p < 0.05$). For the left ovary, the highest lengths were recorded for the batches treated with 10 and 20g of leaves per kg of feed. No significant differences were observed between these two lots. The length of the right ovary was significantly higher (1.43 ± 0.16 cm) in the group treated with 20 g of leaves per kg feed. As for the right oviduct, lengths varied significantly from 13.10 ± 3.22 cm to 15.52 ± 2.83 cm. However, the highest length was recorded in the group treated with 30g of leaves per kg of feed.

As for the left and right uterus, the lowest lengths were recorded in the group treated with 30g of leaves per kg of feed. Nevertheless, the highest length was observed in the group treated with 20 g per kg of feed for the left uterus while no difference was observed between the

lengths of the right womb in groups treated with 0g, 10g, and 20g of leaves per kg of feed. According to those, the length of the right womb showed no significant difference ($p > 0.05$) for the batches treated with cassava leaves in the diet ^[19].

CONCLUSION

The study of morphometric parameters of reproductive organs of rabbits show that 30 g leaves of *Annona senegalensis* per kg of feed could allow normal reproductive process. In fact, *Annona senegalensis* has no effect on body weight, the lengths average of the left oviducts and lengths average of vaginas. On the other hand, *Annona senegalensis* negatively influences the weight of the uterus. This may affect the reproductive process and possibly fertility. In view of the foregoing; we suggest that the phytochemical screening of *Annona senegalensis* be performed to look for major chemical groups present in this plant and what could be their effects on reproductive organs in rabbits.

Acknowledgments

The authors are thankful to the Professor and Head, Department of Animals Health and Production, Professor and Head, Laboratory of Research in Applied Biology for providing their infrastructure and scientific skills in carrying out the research work.

Competing Interests

The authors declare that they have no competing interests.

REFERENCES

1. Bongi S, Obama G, Le Dain SA, Cossi A. Analyse globale de la vulnérabilité de la sécurité alimentaire et de la nutrition en république du Bénin, PAM, 2009, 168p.
2. Kpodékon M, Coudert P. Impact d'un centre Cunicole de la recherche et le développement de la cuniculture au Bénin. World rabbit science. 1993, P 25-30.
3. Djossa AB. La croissance de lapin en climat tropical: comparaison d'un aliment composé local et d'un aliment commercial importé sur des lapins locaux et des lapins néo-zélandais importés. Mémoire: Diplôme d'Ingénieurs des Travaux: EPAC/ UAC (Bénin). 1995.
4. Lebas F, Coudert P, de Rochambeau H, Thebault R. Le lapin en élevage et pathologie. Rome FAO (nouvelle édition révisé). 1996, 227p.
5. Derivaux J, Ectürs F. Reproduction chez les animaux Domestiques. Paris: Acadia éditions. 1986 -1141 p.
6. Belhadi S. Characterization of local rabbit performance; 8th World Rabbit Congress Puebla (Mexico). World Rabbit Science Association September 2004, 218-223.
7. Zerrouki N, Bolet G, Berchiche M, Lebas F. Evaluation of breeding performance of local Algerian rabbit population raised in the Tizi-Ouzou area (Kabylia); World Rabbit Science 2005, (13):, 29-37.
8. Zerrouki N, Kadi SA, Lebas G, Bolet G. Characterization of a Kabyle population of rabbits in Algeria: Birth to winning, Growth performance; World Rabbit Science. 2007
9. Lounaouci G. Alimentation du lapin de chair dans les conditions de production algérienne. Mémoire de Magister en sciences agronomiques Université de Blida (Algérie) 2001, 129p.
10. Benali N, An BH. Caractérisation de deux populations de lapins locales: les performances de croissance, l'utilisation digestive des aliments et la morphométrie intestinale. Mémoire de Magistère en science vétérinaire, Ecole Nationale Supérieure Vétérinaire d'Alger (Algérie) 2009, 177p.
11. Remas K. Caractéristiques zootechniques et hormones sexuelles chez les populations locales du lapin domestique *Oryctolagus cuniculus*. Thèse de Magister Ecole Nationale Supérieure Vétérinaire d'Alger (Algérie) 2001, 89p.
12. Othmani-Mecif K, Benazzoug Y. Caractérisation de certains paramètres biochimiques plasmatiques histologiques (tractus génital femelle) chez la population locale de lapin (*Oryctolagus cuniculus*) non gestante et au cours de la gestation ; Science et technologie, 2005 ; 23: 91-96.
13. Boumahdi Z, Belabbas R, Theau-Clément M, Bolet G, Brown P, Kaidi R. Behavior at birth and anatomo-histological changes studies of uteri and ovaries in the post-partum phase in rabbits; European Journal of Scientific Research. 2009, 34(4): 474-484.
14. Bitto II, Arubi JI, Gumel A. A Reproduction tract morphometry and some haematological characteristics of female rabbits fed papaw peel meal based diets. Afri. J. Biomed. Res. 2006, 9: 199-209.
15. Ogbuewu IP, Okoli IC, Iloeje MU. Serum biochemical evaluation and organ weight characteristics of buck rabbits fed graded levels Neem (*Azadirachta indica*) leaf meal diets. Vet-on - line - The International Journal of Veterinary Medicine 2008.
16. Ahemen T, Bitto II, Oluremi OIA, Anugwa FOI. Genital tract morphometry and haematology of male rabbits fed graded levels of cassava leaf meal. Nigerian Journal of Animal Production, 2015, 42(1): 1-8.
17. Aragona P, Puzzolo D, Micali A, Ferreri G, Britti D. Morphological and morphometric analysis on the rabbit connective globet cells in different hormonal conditions. Exp Eye Res. 1998, 66:81-88.
18. Bai W, Oliveros-Saunders B, Wang Q, Acevedodunca M, Nicosia S. Estrogen stimulation of ovarian surface epithelial cell proliferation. In Vitro Cell Dev Biol, 2000; 36:657-666.
19. Shaahu DT, Ayoade JA, Ate ME. Carcass Characteristics, Haematological Parameters and Reproductive Tract Morphometry of Rabbits Fed Cassava Leaf Meal. Journal of Agriculture and Veterinary Science, 2014, 7(5): 31-35.

HOW TO CITE THIS ARTICLE

Tossou DJ, Kapko AP, Sèsséya SSA, Hans OOF. Effect of *Ammonia senegalensis* leaves on morphometric parameters of reproductive organs in rabbits. The Journal of Phytopharmacology 2016;5(3):122-125.