

Determination of Gestation Length as a Prelude to Synchronization of Estrus in the Female Grasscutter (Rodentia: Thryonomyidae) for the Massive Production of Grasscutter-meat in Nigeria

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Abstract

Mean gestation length ($GL_{MEAN}=158.76\pm 3.2$ days) was established for pregnant grasscutters (*Thryonomys swinderianus*, Temminck) in a study carried out between August 2004 and February 2005. There was no significant difference between the average gestation lengths ($GL_{BRM}=160.06$ and $GL_{SEM}=157.46$ days) based on the intervals I_{BRM} and I_{SEM} between parturition and the appearances of bright red vaginal mucous membrane (BRM) about the 30th day of conception, and of sticky elastic vaginal mucous membrane (SEM) about the 60th day of conception, respectively, in pregnant grasscutters ($P > 0.05$). Parturition was predicted to occur between 127th to 130th day from the day of appearance of BRM, and 97th to 100th day from the day of appearance of SEM. Determination of mean gestation length $\Sigma[\frac{1}{2}(90+I_{BRM}+I_{SEM})_{1,\dots,n}]/n$ (where n was the number of female grasscutters observed) would enable prospective grasscutter producers and the researcher predict the approximate dates of parturition in this potential 'mini-livestock'. The development of hormone supplements for inclusion in the diets, to synchronize estrus in female grasscutters for the successful implementation of 'all in-all out' grasscutter-meat massive production policy being advocated by this paper, should be the present challenge to Bio-researchers in Africa.

Keywords: Grasscutter-meat production, Synchronization of estrus, Gestation length, Prediction of parturition

Introduction

The average daily animal protein intake of 10.6g per capita reported for Nigeria represented a shortfall of about 31.2% of 34.8g per capita recommended by FAO/WHO (1983). The integration of wildlife farming into convectional farming system, as a strategy for the improvement of animal protein supply, was earlier advocated by FAO (1980). In response, calls were made for the domestication of the grasscutter (*Thryonomys swinderianus* Temminck), a wild species that could be suitable for farming because of its easy adaptability to management in captivity (Ajayi, 1983; Hemmer, 1992). The productive performance of the grasscutter was therefore evaluated under the Floor, Open-cage and Closed-cage Housing Systems of Management, and it was shown that Floor System was superior to the Cage Systems for captive-rearing of the grasscutter (Ikpeze and Ebenebe, 2004a). To boost grasscutter-meat supply in the country, an "all in – all out" production policy has to be adopted by prospective producers. This would involve synchronization of estrus in female grasscutters to bring about conception at nearly the same time, and to ensure that parturition would occur within a short interval of days. The crop of newly weaned grasscutters would then be reared in a batch, for 10 months, to attain the average finishing weight of 1.5 kg (Ikpeze and Ebenebe, 2004b).

Practical aspects of the sexual cycle in the female grasscutter were elucidated using hormonal assessment to detect pregnancy few hours after a successful mating (Adjanohoun, 1992). Bright red mucus (BRM) derived from haemorrhages at the

uterine horns, during ovarian involution, appeared at about the 30th day of conception on the vulva-vaginal mucus membranes. At about the 60th day post-conception, this mucus changed in consistency to become a sticky elastic mucus membrane (SEM), which was coiled 10 times around the cotton-bud without being broken. The aim of this study, therefore, is to apply the knowledge of the observable changes in the colour and consistency of vulva-vaginal mucus membranes, about 30 and 60 days after conception, to estimate the gestation length in the grasscutter. Results from this study will help prospective grasscutter producers and the researcher to predict the days of parturition in this potential mini-livestock, as well as stimulate urgent bioresearch on hormonal substances needed to be included in feeds to synchronize estrus amongst mature females grasscutters.

Materials and Methods

Experimental animals: Fifteen 6-months-old female and five 7-months-old male grasscutters reared under the Floor Housing System of Management (Ikpeze and Ebenebe, 2004a) were used for this study. Each subject was identified by the clipping off of a digit at either the right/left fore limb, right/left hind limb or a combination of digits at both fore and hind limbs. Three females were paired with a male in one cage. All pairings were on 1/8/04 and the animals were observed under the open-cage housing system of management described by Ikpeze and Ebenebe (2004a).

Day of conception was not easily ascertained, but visual observations of the external female genitalia for the appearance of BRM

Table 1: Estimation of mean gestation length in the female grasscutter

Pairing of 1 male to 3 female were done on 1/8/04	[A] Date of first appearance of Bright Red Vaginal Mucus	[B] Date of first appearance of Sticky Elastic Vaginal Mucus	[C] Date of Parturition	[D] Interval B/W [C] & [A] in days	[E] Interval B/W [C] & [B] in days	[F] Gestatio n Length _F in days = (D + 30)	[G] Gestatio n Length _G in days = (E + 60)	[H] Average Gestation Length in days = ½(90+ F + G)
Female ₁	5/9/04	4/10/04	8/1/05	125	97	155	157	156.0
Female ₂	8/9/04	8/10/04	20/1/05	134	100	164	160	162.0
Female ₃	2/9/04	3/10/04	11/1/05	130	100	160	160	160.0
Male ₁								
Female ₄	5/9/04	9/10/04	16/1/05	133	99	163	159	161.0
Female ₅	15/9/04	16/10/04	20/1/05	127	96	157	156	156.5
Female ₆	31/10/04	26/11/04	28/2/05	135	94	165	154	159.5
Male ₂								
Female ₇	5/9/04	11/10/04	17/1/05	134	98	164	158	161.0
Female ₈	15/9/04	19/10/04	27/1/05	134	100	164	160	162.0
Female ₉	29/9/04	23/10/04	29/1/05	132	98	162	158	160.0
Male ₃								
Female ₁₀	15/9/04	13/10/04	20/2/05	127	98	157	158	157.5
Female ₁₁	30/9/04	29/10/04	2/2/05	125	96	155	156	155.5
Female ₁₂	14/10/04	15/11/04	20/2/05	128	95	158	155	156.5
Male ₄								
Female ₁₃	30/9/04	1/11/04	8/2/05	131	99	161	159	160.0
Female ₁₄	25/9/04	29/10/04	1/2/05	126	95	156	155	155.5
Female ₁₅	10/9/04	13/10/04	18/1/05	130	97	160	157	158.5
Male ₅								
	Average			130.06	97.46	160.06 ^a	157.46 ^a	
Mean Gestation Length (Days) = $\Sigma[\frac{1}{2}(90 + F + G)]/n$, where n = 15							158.76±3.2	

^a The difference in the Average Gestation Lengths [F] and [G] is not statistically significant ($P > 0.05$).

commenced on the 15th day of pairing, while consistency tests for the appearance of SEM commenced 10 days after the appearance of BRM. Consistency tests of the vulva-vaginal mucus involved coiling of the mucus up to 10 times over the cotton-bud to determine whether it was sticky, elastic and unbroken. The dates of appearances of BRM, SEM and of parturition were recorded for each female grasscutter.

Data analysis: Data were entered in a well-structured format. The intervals (I_{BRM} and I_{SEM}) between parturition and the appearances of BRM and SEM were computed for each female grasscutter using the 2004/2005 Annual Calendar. Two approximate gestation lengths were estimated for each female grasscutter as $(30 + I_{BRM})$ and $(60 + I_{SEM})$ days, while the average gestation length was computed as $\frac{1}{2}(90 + I_{BRM} + I_{SEM})$. The overall mean gestation length for the grasscutters was derived as $\Sigma[\frac{1}{2}(90 + I_{BRM} + I_{SEM})_{1...n}]/n$, where n represented the number of pregnant grasscutters observed from conception to parturition.

Results and Discussion

The results of the study are presented in Table 1. All pairings were done on 1/8/04. Different dates recorded for the appearances of BRM (Range = 5/9/04–31/10/04), SEM (Range = 3/10/04–26/11/04) and parturition (Range = 8/1/05–28/2/05) indicated

that conception took place in the female grasscutters at different dates. The haphazard nature of parturition observed suggests that management of baby grasscutters would be difficult if the dams were not programmed to conceive at nearly the same time in order that parturition would occur within a short time interval. This observation makes a strong case for the application of synchronization of estrus to ensure massive production of grasscutter-meat in a controllable manner.

The overall average interval between parturition and appearance of BRM was 130.06 days while that between parturition and appearance of SEM was 97.46 days. The Average gestation lengths of 160.06 and 157.46 days, obtained by statistics were the same result obtained by simply addition 30 or 60 days to the interval between parturition and the appearances of BRM or SEM, since it has been shown that conception occurred about 30 days before the appearance of BRM and 60 days before the appearance of SEM (Adjanohoun, 1992). There was no significant difference between the two estimated gestation lengths ($P > 0.05$). The estimated overall mean gestation length $\Sigma[\frac{1}{2}(90 + I_{BRM} + I_{SEM})_{1...15}]/15 = 158.76 \pm 1.32$ was the statistical mean of averages in gestation lengths for all fifteen pregnant grasscutters observed.

By observing the date of appearance of BRM, then moving 30 days backward to interpolate

the presumed conception date in the breeding calendar, the approximate dates of parturition could now be predicted based on the estimated gestation length. Parturition dates could similarly be achieved by noting the appearance of SEM, then moving 60 days backward to determine the conception date. Parturition in the grasscutter could also be predicted to occur between 127th to 130th or 97th to 100th day from the dates of appearances of BRM or SEM, respectively.

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