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The Male Effect on Grasscutters (*Thryonomys swinderianus*, Temminck 1827) Farming Performance in Côte d'Ivoire

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Abstract

The male effect on reproductive parameters was studied on 100 grasscutters, divided into two lots, over a period of two breeding years. On one side, females were living permanently with males. Females temporally lived with males, on other side. The results have shown that the mode of cohabitation influenced the fertility rates and the delay between two litters' periods of aulacodine. Indeed, the fertility rate (100%) obtained in discontinuous mode cohabitation is significantly better ($p<0.05$) than mode continuous cohabitation (70%). In contrary, the continuous cohabitation ($p<0.05$) reduces the duration of the interval between two litters of the aulacodine. It is 238 ± 7.28 days in continuous cohabitation and 272 ± 1.44 days in discontinuous cohabitation. It appears from this study that the reproductive performances of grasscutters are influenced by the discontinuous mode of cohabitation within female and male.

Keywords: Grasscutter breeding; the male effect; reproductive parameters.

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1. Introduction

Food security is one of the major challenges in the African cultural context. Self- sufficient in meat products (meat, eggs and fish) remains a major concern for policy makers in Côte d'Ivoire. In this context, the issue of food self-sufficiency is of great importance both family and national level. Thereby raising unconventional animal species including cane rats (grasscutters) is an alternative and an opportunity of a strategic nature that many African countries south of the Sahara have adopted [1-3]. The grasscutter (*Thryonomys swinderianus*), also called "agouti" (in West Africa), "hedgehog" (in Central Africa) or "rat reeds" and "sibissi" (in Central African Republic) is a species of family Thryonomyidae. Comparable to that of a rabbit size, largest rodent provides a popular African meat. But this breeding encounters many difficulties. Some females have a too long period of sexual rest and a short sexual receptivity period or non-existent. Consequently, aulacodines remain locked in pro estrus and refuse the projections, despite a long courtship of the male [4, 5]. However, during anoestrus, special techniques herd are likely to cause ovulation and the onset of estrus. They were presented in several works [6]. Most of these techniques involve photoperiodic and hormonal treatments. At present, alternative methods without the use of hormones are recommended to better meet the expectations of consumers [7]. It is then necessary to know to what extent the presence of the male may reduce or eliminate the time infertility of female.

2. Materials and methods

2.1 Animals

Animal material consists of 100 grasscutters (80 females and 20 males) reared following the standard conditions, refer to Mensah & Ekué [8]; in the experimental station of the University Nangui Abroagoua former University of Abobo -Adjamé. Animals are selected from the age of 2 months and reared separately in pens of breeding until the age of reproduction which is 6 months for females and 7 months for males. The selection criteria are based on health status; the live weight significant body ranging between 0.5 and 1 kg (in the selection) and the pedigree to avoid inbreeding.

2.2 Constitution of breeding groups

All animals were left in two lots (lot 1; lot 2). Each batch consists of 50 grasscutter including 40 females and 10 males. Living arrangements in polygamous groups each composed of one aulacodin and 4 aulacodines was performed. Females having a strong body weight less than 1.5 kg were mated with a male whose body bodyweight is higher than that of females at least 0.5 kg on average [9].

2.3 Aulacodines' gestation test

Four weeks after cohabitation (male and female), each female is subjected to a test of gestation according to Mensah & Ekué [8]. The test is made every 2 weeks till its remaining negative.

2.4 Principle of the male effect

At the age of reproduction, females are grouped four in each pen. We adopted and practiced two modes of cohabitation: continuous cohabitation and discontinuous cohabitation.

- Continuous Cohabitation*:* In each group of Lot 1, the aulacodin is left permanently with aulacodines . A pregnancy test is performed four weeks later and repeated every 2 weeks in the case of a negative result. Females give birth in the enclosure in the presence of the male. Weaning is performed one month of age and aulacodeaux are separated from their parents, and settled in other enclosures. To avoid early projections, young males (aulacodinets) are separated from young females (aulacodinettes).
- Cohabitation discontinuous: In each group of Lot 2, the male is isolated in an enclosure. After a period of at least one month apart, the females are introduced into its pen. As in the case relating to the continued cohabitation, the first pregnancy test was performed 4 weeks after cohabitation. If females are all pregnant, the male is removed and installed in another enclosure. Otherwise, it is removed from the group and 15 days later reintroduced. The test is repeated two weeks after release of the male. But, it is removed from the breeding group one month before the first calvin. It is returned to its breeding group after weaning the aulacodeaux (30 days) and a new post-weaning period at least 15 days, depending on the physical condition of the female parent.

2.5 Collette and statistical analysis

Data on fertility, duration of gestation and the interval between two farrowing were recorded on two years of breeding. Comparisons of the values of reproductive parameters were made with STATISTICA version 7.0 and by the Newman Keuls test at 0.05.

3. Results

3.1 Fertility aulacodines depending on the mode of cohabitation

As soon as females are introduced into the enclosure of the male, then it started jutting them. But the aulacodines appear more obvious and synchronized responsiveness in 2 months of aging (Fig. 1). The introduction and reintroduction of the male fertilizing projections allowed for all females (100%), 8 weeks of cohabitation discontinuous. Fertilizing projections are however distributed over time in females' continuous cohabitation. Alone (70%) of aulacodines remained permanently with males are projections and fertilized in 8 weeks. Despite this continuous male alongside females, there have been 30% empty after 2 months of cohabitation aulacodines. All females (100%) were fertilized projections after 4months of continuous cohabitation with the male (Fig.1).

3.2 *Gestational age according to the mode of cohabitation*

The average length of aulacodines' gestation varies very little. It varies from 149 to 156 days with an average of 152 ± 2 days but no significant difference ($p>0.05$) between the time obtained by the continuous and discontinuous cohabitation (Table 1). The coefficient of variation is very homogeneous ($CV \leq 2\%$) in the two modes of reproduction. Interval between two consecutive litters depending on the mode of cohabitation. The

average time interval between calving of aulacodine was significantly reduced ($p<0.05$) continuous cohabitation (238 days) that cohabitation discontinuous (272 days) (Table 2).

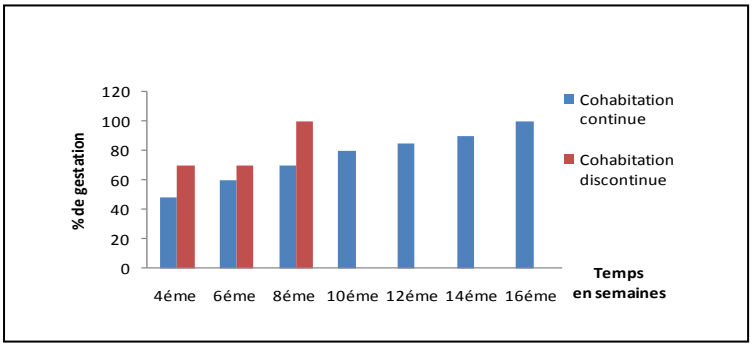

Fig. 1 Aulacodines' fertility referred to the mode of cohabitation

Table 1. Gestation period of aulacodine depending on the mode of cohabitation

Mode of cohabitation	Days of gestation	CV (%)	Minimum (day)	Maximum (day)
Continued cohabitation	153±0,39a	1.27	149	156
Discontinuous cohabitation	152±0.26*a*	1.32	150	156

e = standard error of the mean, Mean values with the same letters similar on a column are not significantly different ($p>0.05$).

A reduction of at least 34 days on average. The reduction is 19 days minimum and 88 days maximum. The duration of the time interval between two consecutive calving is very heterogeneous (CV>30%) both in cohabitation continues discontinuous (Table 2). In fact, some females remain empty for the duration of estrous cycle and beyond.

Table 2. Interval between two litters of aulacodine depending on the mode of cohabitation

Mode of cohabitation	Time interval between two farrowing	CV (%)	Minimum (day)	Maximum (day)
Continued cohabitation	238±7.28*a*	22	164	343
Discontinuecohabitation	272 ± 1.44*b*	32	183	431

e = standard error of the mean, Mean values with different letters in the same column are significantly different ($p< 0.05$).

4. Discussion

All females (100%) in discontinuous cohabitation with the male projections were all fertilized in 8 weeks (2 months) cohabitation. These results agree with those obtained by [10, 11] after dietary supplementation of

females. However, those used in continuous cohabitation with the male had a spread up to the 16th week fertility (4 months) of cohabitation.

One explanation for the increase in response to the male fertility effect is described by [12, 13] showed in sheep after a period of complete isolation. The reintroduction of the male in the female group immediately causes a sudden increase in the frequency and amplitude of the peaks hormone luteinizing (LH) levels. Neurophysiologically, sensory exchanges at stake can intervene on the hypothalamic -pituitary axis and monitor ovarian activity. The perception of the male by the female is primarily through olfactory. Tactile stimuli (the court of male, sniffs the anogenital area, prosecution and sexual assault) also play a role. Every sense of the female is involved in the response to the male effect (smell, sight, hearing, touch). According to Pearce & Oldham [14], the maximum ovulatory response is always obtained when there's sudden physical contact between male and female.

As regards the duration of the gestation aulacodine, no significant difference was found in the two modes of cohabitation. This long gestation 152 ± 2 days (5 months) is consistent with that reported by [9, 15]. This aspect of reproduction is genetic and species-specific. It is almost identical to that of small ruminants that is 145 to 150 days in sheep and goats. This long gestation period of an animal so small size is a biological constraint that any specialist in animal husbandry and animal production should take into account that this is not a big handicap for breeding. The minimum time interval between two farrowing in the aulacodine is 238 days within continuous cohabitation and 272 days within cohabitation discontinuous, a reduction of 34 days. This statistically significant reduction ($p<0.05$) in the time interval between two farrowing in cohabitation continues, is explained by the fact that females have projections postpartum with the permanent presence of the male in the group. The presence of the male alongside the female mother also induces male effect which manifests physiologically by stimulation of the estrous cycle; the result is the onset of estrus. It is the presence and the court of male to female after parturition of the latter, which causes changes in the stage of proestrus to the estrus in the aulacodine. As the average length of gestation is 152 days [11], barely 3 days after farrowing the female permanently with the male, is physiologically ready to accept projection. In play mode discontinuous, at least 30 days of waiting are achieved after parturition to bring the females for coupling.

4. Conclusion

Continuous cohabitation, projections and calving of aulacodines are spread throughout the year. Some females have postpartum projections that allow them to have a time interval between calving reduced. Cohabiting discontinuous activity research projects females by males is high. Parturition is almost synchronized. The fertility rate is high. The time interval between calving cohabitation discontinuous mode is a bit longer. For the control of reproduction, the discontinuous mode of male cohabitation with females is the best practice.

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