

# Assessment of male aggressiveness and female receptability in grasscutter domestication in Ibadan, Nigeria

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## Abstract

A study was carried out for a period of five years to determine the level of aggression in males and the receptability of female grasscutters reared in captivity. A total of one hundred and fifty six (156) grasscutters in the ratio of fifty two (52) males and one hundred and four (104) females were used during the study period in a Completely Randomized Design (CRD). The initial body weight of the bucks ranged between 2.5kg-3.8kg while that of the does were 1.8kg-2.8kg, respectively. The grasscutters were housed in concrete floor hutches with hutch doors positioned at the top of each compartment. They were served forages ad libitum and concentrate supplement. Twenty six (26) was the highest number of does paired while nineteen (19) was the lowest number paired in years 2011, 2008 and 2010, respectively. Injured does in the pairing group was highest in 2011 where fourty seven percent (47%) out of the twenty six (26) does paired were wounded. This was followed by thirty six percent (36%) in 2010 out of the twenty (20) does paired and lastly six percent (6%) out of the nineteen (19) does paired. No does was injured in years 2007 and 2008, respectively. Similarly, percentage mortality was highest among the does when compared to their male counterpart. With a record of twenty four (24%) in 2010 and lowest in 2007 with a record of four percent (4%). One hundred and fifteen (115) litters were acquired comprising thirty five (35) males and eighty (80) females.

## **Keywords**

Grasscutters, Aggression, Receptability, Mortality, Litter Size

# **1. Introduction**

The term 'aggression' is from the Latin word aggression, meaning attack. Aggression is a behaviour or disposition that is forcefull, hostile or attacking. It may be either in retaliation or without provocation. In Social Sciences and Behavioural Sciences, aggression is an intension to cause harm or an act intended to increase relative social dominance. According to Van Staaden et al. (2011), aggression can involve bodily contact such as biting, hitting or pushing, but most conflicts are settled by threat displays and intimidating thrust that cause no physical harm. These may include a display of body size, antlers, claws or teeth, stereotyped signals including facial expressions, vocalizations such as bird song, the release of chemicals and change in colouration.

The grasscutter (Thryonomys swinderianus) is a wild

hystricomorph rodent found currently only in Africa (Adoun 1993). It is the preferred and perhaps the most expensive meat in West Africa (National Research Council 1991; Asibey and Addo 2000). Oke et al. (2004) clearly stated that Nigerians consume only about a quarter of the minimum daily animal protein requirement which is on the low side. Its domestication is being encouraged in West Africa to help address the problems of exploitation through aggressive hunting, provide alternative source of income for farmers and increase farmers' access to and utilization of animal protein for dietary needs (Heul-Rolf 2002; Wontewe 2002).

There is however, paucity of information on its grasscutter biology (Ewer 1969; Yeboah and Adamu 1995), including its nervous temperament and the difficulty in getting it acclimatized in captivity (Hemmer 1993). The propagation of this species depends crucially on the reproductive characteristics.

This paper therefore reports on the reproductive characteristics of the grasscutter specifically in mating, pregnancy, maternal mortality and litter size. It will also discuss the aggressive status of the male grasscutters bred in captivity so as to aid in the selection of virile breeding stock and the formulation of colony breeding programmes.

## 2. Materials and Method

#### 2.1. Study Area

The study was conducted at the Grasscutter Research and Domestication Unit of Forestry Research Institute of Nigeria (FRIN). FRIN is located within latitude  $7^0$  23 N and longitude  $3^0$  51 E in the rain forest zone, Ibadan. The mean annual rainfall is about 420 mm in 109 days, maximum temperature of  $34^{\circ}$ C and minimum temperature of  $24^{\circ}$ C. Relative humidity rages from about 82% between June and September, to approximately 60% between December and February (Adio *et al.*, 2011; Ariwaodo *et al.*, 2012).

#### **2.2. Experimental Animals and Management**

Fifty two (52) matured male grasscutters each not less than a year old and one hundred and four (104) females which were not less than eight months were used in a Completely Randomized Design (CRD) for the study. The animals were initially weighed and then randomly allotted in equal numbers (1 male to two females). The initial body weight for males ranged between 2.5-3.8kg and the females body weight varied between 1.8-2.8kg respectively. Their body weight was a determinant of the various breeding groups formed. The animals were housed in concrete floor hutches measuring  $2m \ge 0.70m \ge 0.5m$  for length x breadth x height and entrance of  $20cm \ge 20cm$  for length and breath. Each hutch is made up of two compartments with a hole in between to allow easy accessibility of animals. The hutch doors are positioned at the top of the compartments. The building is netted round with wire mesh, covered with cellophane nylon which aids in the regulation of the ambient temperature. The animals were served with forage (*Pennisetumpupureum*) once daily *ad libitum* between 0800hrs-1000hrs and concentrate supplements mixed with multivitamin with little water added (to eliminate respiratory tract infection by reducing dustiness) at 1400hrs. Routine check of animals was done every morning before the cages were cleaned of remnants of the previous day and fresh ones served. Mineral lick was served continually. The experiment lasted for a period of five years.

#### **3. Results and Discussion**

The total number of animals paired is as shown in figure 1. In 2011, the total number of female animals paired was highest while virile male grasscutters used for breeding were the lowest and ranked same in 2009 and 2011, respectively. The individual body weight of the bucks and the does in the unit each year determined the number of breeding groups formed in the unit. This can be linked to sexual dimorphism (refers to differences in body characteristics between females and males) in body size which according to Owens and Hartley (1998), Geary and Flinn (2001) and Dunn et al. (2001) has been linked to mating behavior. In polygynous species, grasscutters inclusive, males compete for control over sexual access to females. Large males have an advantage in the competition for access to females, and they consequently pass their genes along to a greater number of offspring. This eventually leads to large differences in body size between females and males. Polygynous males are often 1.5 to 2.0 times larger in size than females.



Figure 1. Paired grasscuters

In figure 2, the percentage incidence of mortality is shown. The percentage incidence of mortality was at its peak in 2010 (24%) and at its lowest in 2007 (4%), respectively. The does were the worst hit (Plates 1, 2.3 and 4). This could be attributed to the fact that precopulatory or courtship behaviours which include a female's willingness to approach a male and to show solicitatiousbehaviors, known as proceptive behaviour was minimal.

There are three components to proceptivebehaviour: approach (in which the female approaches the male), orientation (female orients to the male in such a way that the male may sniff and groom the female's anogenital region), when the male approaches the female, the female will often show "ear wiggling" which is an extremely rapid vibration of the head which makes it appear as though the ears are wiggling; and runaway (in which female shows hopping anddarting; hopping is a rapid hop with almost rigid legs, and this is combined with fast "darting" movements away from the male). This sequence of events: approach, orientation and runaway shown by the female rat, will induce a male rat to chase after the female, and to engage in copulation. When this is lacking in a breeding group, there arises the tendencies of the buck to attack the does in order to satisfy its sexual urge thus leading to injury or death.



Figure 2. Mortality of paired grasscutters



Figure 3. Injured female grasscutters

The female population in the pairing group reduced greatly when compared to their male counterparts due to mortality. This is shown in Table 1 with detailed report of the summary of the pairing activities done in the unit within the five years reported. The does mortality was highest in 2010, this was followed by 2011 and lastly 2009. The values recorded were seven (7), five (5) and three (3), respectively. Within the study period, years 2007, 2008, 2010 and 2011 recorded nil for male mortality. The only male mortality recorded in the pairing group died of an unknown cause. This further buttresses the fact that either the bucks are aggressive or the does show low receptability whereby the bucks forces them to submit to undesired mating which results to death either as

90

a result of damage to internal organs, deep wounds and cuts, secondary bacterial infection and trauma.

The wounded does out of the twenty six (26) paired was fourty seven percent (47%). Twenty (20) does were paired in 2009 and thirty six percent (36%) were wounded. In 2009, six percent (6%) of the nineteen (19) does paired were injured. However, there were no wounded does in years 2007 and 2008, respectively (Figure 3).

The litter sizes recorded was highest for both male and female gender in 2008 (Figure 4). Numerically for this year, the total litter size of females was 80 while the males was 35, respectively.



Figure 4. Litter sizes of paired grasscutters

Table 1. Summary of pairing report in the unit

Year of pairing	Paired animals		Total	Mortality		Injured females	Litter size		Total litter size
	Male	Female		Male	Female		Male	Female	
2007	11	19	30	-	1	-	25	25	50
2008	13	20	33	-	2	-	34	81	115
2009	9	19	28	1	3	1	12	28	40
2010	10	20	30	-	7	7	4	11	15
2011	9	26	35	-	5	12	4	12	16

It is a known fact that when animal sexual behaviour is reproductively-driven, it is often termed *mating* or *copulation and* for most non-human mammals, as reported by Kent (2000) andThorpe and Thorpe (2009) mating and copulation occur at the point of estrus (the most fertile period of time in the female's reproductive cycle), which increases the chances of successful impregnation. This may account for the high litter size recorded within this year. However, in 2010 and 2011, the total litter size recorded was on the lower size which is in contrast to the higher number of grasscutters paired particularly in 2011. In many contexts, conflicts occur between animals, such as potential mating partners, parents and off spring and between competitors for resources. To establish a dominance hierarchy within a paired group, there exists competition on breeding opportunities. In this case, a male grasscutter contends with the female in a common environment (Adamson *et al.*, 1999) and the dominant ones are the more aggressive ones (Heitor *et al.*, 2006 and Cant *et al.*, 2006). A doe, when attacked or wounded, losses confrontations. In the view of Hsu (2006), social defeat and winning or losing is associated with a range of practical and psychological conequences. Abnormal levels of social aggression and self-harm that are related to aspects of the physical or social environment may be shown in captive animals which according to Honess and Marin (2006) is dependent on the species including individual factors such as gender, age and background (e.g raised wild or captive).

Physiologically, the brain area controls the expression of aggression through electrical stimulation of the hypothalamus in mammalian species. Coie and Dodge, (1997) and Maccoby and Jacklin (1994) were of the opinion that in mammals, physical aggression is higher in males than in females. Multiple theories have sought to explain findings that males and females of the same species can have differing aggressive behaviours although the conditions for the difference are not well understood (Eagly and Steffen, 1986). When a lasting solution is found, it will reduce fight, wounds which could lead to secondary bacterial infection, maiming, low conception rate and mortality.



Plate 1. A wounded dead doe



Plate 2. A doe wounded at the hind limb



Plate 3. A dead doe with a bruise and blood stain



Plate 4. Mutilated body of a doe

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