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Survival and Weight Growth of Young Grasscutters until Weaning in Semi-Intensive Farming on the Outskirts of Lomé

Seme Kpassi[1*], Lamboni Matéyendou[2], Djagba Atouga Yembliman[3], Sama Oulétchayèwé Bertrand[1], Tchadjeri Djamel[1], Nadjagou Nanipo[1], Pitala Wéré[1,4]

[1]Higher School of Agronomy, Department of Animal and Veterinary Science, University of Lomé, ESA/UL, Laboratory of Agroresources and Environmental Health Research (LARASE), Lomé, Togo
[2]Department of Animal Health and Fish Production, Higher Institute of Agriculture Professions, Laboratory of Applied Agronomic and Biological Sciences (LaSABA), University of Kara (ISMA/UK), Kara, Togo
[3]Togolese Institute of Agronomic Research, Center for Agronomic Research in the Humid Savana, (ITRACRASH) Kolokopé Station, Anié, Togo
[4]Regional Center of Excellence in Avian Sciences, University of Lomé, CERSA/UL, Lomé, Togo
Email: *semejoseh@gmail.com

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Abstract

The grasscutter, easy to raise, is an alternative to poached meat. The objective of this study is to contribute to improving the survival and growth of grasscutters. The methodology consisted of following 75 young grasscutters in a semi-intensive farm on the outskirts of Lomé in Togo, from birth to weaning, to assess their mortality and growth. The results show an average mortality rate of 29.33%, more than half of which is observed during the first 10 days of life of the grasscutter. The family, sex and docility of the male in the cane ratter had an influence on the mortality of young grasscutters before weaning. The grasscutter born to docile males were heavier at birth (134.88 ± 18.61 g versus 127.17 ± 29.71 g), at weaning (948.38 ± 192 g versus 731.97 ± 213.19 g) and had a higher growth rate. In addition, the family of belonging had a significant effect on the birth weight, weaning, and growth rate of the grasscutter. Finally, the young from the 1st lactation recorded the best growth rates. This growth rate allowed them to catch up on their weight delay observed at birth, especially in the compartment where the males were docile. In conclusion, for a better birth weight, a good survival of the grasscutter, it is necessary to let the female grasscutter reach or even slightly exceed their sexual maturity at 8 months of age before being put into reproduction. Also, it will be necessary to prioritize the mating of males from docile families in order to ensure good growth of young grasscutter.

Keywords

Grasscutter, Mortality, Growth, Togo

1. Introduction

The grasscutter, scientifically known as *Thryonomys swinderianus*, often referred to as "agouti" in French-speaking West Africa and "grasscutter" in English-speaking West Africa, is undoubtedly one of the most hunted and consumed game animals in most Sub-Saharan African countries. Indeed, grasscutter meat is widely appreciated, regardless of ethnic or religious background [1]. Its annual consumption has been estimated at around 80 million animals across West Africa [2]. With the advent of the Ebola epidemic, the development of grasscutter farming was halted in Africa and resumed only after the epidemic. The situation in Togo is such that no revival has been observed, despite the significant role livestock farming plays in the national economy, which is estimated at 16.5% of agricultural GDP or 6.73% of national GDP [3]. It should be noted that grasscutter meat is mostly consumed in Togo as a result of hunting; however, grasscutter farming represents an effective way to reconcile nature conservation goals with the dietary needs of the population [4]. Furthermore, it is an important achievement in the farming of non-conventional animal species and the diversification of animal and fish production [2] [5]. It is worth noting that the evolution of zootechnical parameters recorded in experimental farms and the performance of grasscutter are strongly linked to rigorous farming practices, precise genetic selection, and improved feeding. This study is set within this context, with the general objective being to contribute to improving the productive performance of young grasscutter.

2. Materials and Methods

2.1. Study Area

This study was conducted on a farm located on the outskirts of Lomé, between 6˚09'43.49'' North latitude and 1˚14'08.84'' East longitude. This study area enjoys a tropical climate, with a hotter and drier period from December to February and a rainy season from April to October. The average annual temperature is 27˚C [6], with an average annual precipitation of 1000 mm.

2.2. Experimental Animals

The study involved 75 young grasscutter from 5 families and two types of parents: "docile" males and "non-docile" males (**Table 1**). Indeed, a "non-docile" male is a very fearful and aggressive male, regularly preventing the grasscutter female from feeding properly and having developed cannibalism. At birth, each grasscutter was identified and recorded on a weighing sheet within 24 hours. The identification consisted of marking a number on the ventral side of the young animal with an indel-

ible marker based on the birth order. These animals were housed in a semi-improved grasscutter enclosure, consisting of two grasscutter pens: one on the ground and the other on the upper floor. A scale with a capacity of 10 kg ± 10 g was used during the experiment to weigh them from birth to weaning.

Table 1. Number of animals in the study.

Lactation Rank	Families	Genitors		Young grasscutters		Total
		Female	Male	Male Grasscutter (♂)	Female Grasscutter (♀)	
1	A1-1	4	Docile	6	2	8
	A3-1	4	Non-docile	9	11	20
2	B3	4	Docile	4	6	10
	A6-2	5	Non-docile	14	7	21
3	A6-3	5	Non-docile	7	9	16
Total		22	5	40	35	75

2.3. Farming Practices

2.3.1. Feeding

The grasscutters are fed twice a day. Each morning, they receive a complete diet consisting of cubed bran, maize, soybeans, and cassava chips, with kitchen salt as a mineral supplement. In the evening, the animals are given forage made of *Panicum* sp., maize spathes and stalks, and palm tree branches.

2.3.2. Health

Regular monitoring of the animals in the enclosures allowed for the early detection of any illnesses. Proper hygiene and adequate feeding have helped reduce mortality. It is also important to avoid unnecessary noise and handling, which could cause accidents among the animals.

Internal parasite control is carried out using papaya seeds mixed with food and Ely sire at a dose of 1 liter for 33.33 liters of water every month. The enclosures and cages are swept every morning before feeding. The waterers are washed each evening before serving the forage; the feeders are removed from the cages and overturned in the evenings to dry and prevent the animals from depositing droppings inside them. Animals showing clinical signs are treated daily. The main pathologies encountered are aggression wounds, abscesses, lameness, and diarrhea. Treatment for these conditions is done using Ely sire, Aloe Vera, and charcoal.

2.4. Weighing and Weaning of Young Grasscutters

The young grasscutters were weighed at birth and then at weekly intervals starting from the birth date of the first grasscutter. These weights were then used to calculate the average daily gain (ADG) of the grasscutters.

Weaning of the young grasscutters was done at 90 days of age, and young males were separated from females and grouped based on their weight. Formulas 1, 2, and 3 were used to calculate the Mortality Rate (MR), Survival Rate (SR), and Average Daily Gain (ADG).

$$\text{MR}\ (\%) = \frac{\text{Number of deadgrasscutters in the group}}{\left(\text{Total number of live} - \text{borngrasscutters in the group}\right)} \times 100 \quad (1)$$

$$\text{SR}\ (\%) = 1 - \text{MR} \quad (2)$$

$$\text{ADG}\ (\text{g/day}) = \frac{\text{W}\left[\left(\text{D}+1\right) - \text{D}\right]}{\left(\left[\text{Date}\left(\text{D}+1\right) - \text{Date}\left(\text{D}\right)\right]\right)} \quad (3)$$

where:

W = Weight

D + 1 = Last weighing day

D = First weighing day

$\text{Date}\left(\text{D}+1\right) - \text{Date}\left(\text{D}\right)$ = Number of days between the two weighing.

2.5. Statistical Analysis

Data entry and histograms were generated using Excel version 2016. Mean calculations and statistical analysis were performed using SPSS version 26. Analysis of Variance (ANOVA) was used to test the effect of factors on the variables. The comparison of means according to the studied factors was done using the Tukey test. The error risk used in the analysis was 5%.

3. Results

3.1. Mortality of Young Grasscutters

- **According to the docility of the male in the grasscutters pen**

The young grasscutters born to non-docile males have a mortality rate of 28%, which is significantly higher compared to the young grasscutters born to docile males (1.33%) (Figure 1).

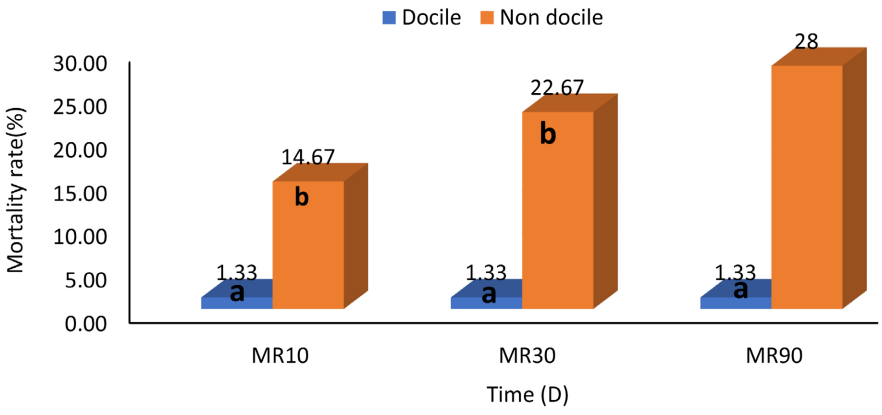

Figure 1. Mortality rate of young porcupines according to docility.

- **According to sex**

Mortality increases from birth to weaning, with a significantly higher rate in males (Figure 2).

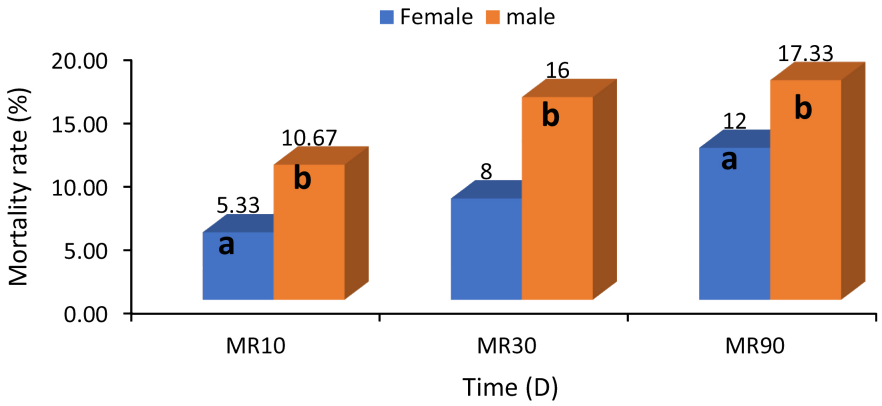

Figure 2. Mortality rates of grasscutter by sex.

- **According to the lactation rank of the grasscutter female**

The mortality of young grasscutters was inversely proportional to the lactation rank of the female grasscutter and remained significant from the first ten days of the young grasscutter's life (Figure 3).

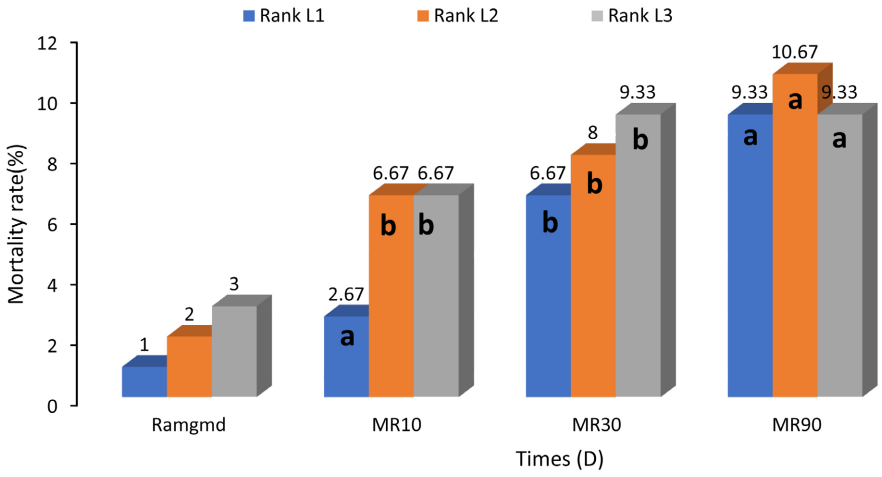

Figure 3. Mortality of young porcupines according to the lactation rank of the female porcupine.

3.2. Growth Rate of Young Grasscutters

- **According to the docility of the male**

The young grasscutters born to docile males had significantly higher birth weights than those born to non-docile males. At weaning, the young grasscutters born to docile males also had significantly higher weights than those born to non-docile males. The best growth rates were observed in the young grasscutters born to docile males compared to those born to non-docile males (Table 2).

Table 2. Evolution of average daily gain (g) of young grasscutters according to male docility.

Parameters	Male Docility		Mean ± SD	F	P	S
	Docile	Non-docile				
Birth weight (g)	135.72 ± 17.84a	120.21 ± 25.96b	123.93 ± 25.05	5.56	0.021	S
ADG (g)	9.29 ± 3.54a	7.19 ± 2.82b	7.71 ± 3.13	12	0.015	S
Weaning weight (g)	948.38 ± 192.1a	731.97 ± 213.1b	799.86 ± 228.63	6.22	0.001	HS

The numbers on the same line marked with different letters are significantly different at the 5% level ($p < 0.05$); ADG = Average Daily Gain; F = Fisher's test; p = Probability; S = Significance.

- **According to sex**

Sex did not have a significant effect ($p > 0.05$) on birth weight, weaning weight, or growth rate from birth to weaning. However, at birth, male young grasscutters had a higher weight than females, as well as at weaning (802.08 ± 273.94 g for males and 797.56 ± 175.27 g for females) (Table 3).

Table 3. Evolution of average daily gain (g) of young porcupines according to sex.

Parameters	Sex		Mean ± SD	F	P	S
	Female	Male				
Birth weight (g)	121.94 ± 25.97	125.68 ± 24.42	123.93 ± 25.05	0.41	0.52	NS
ADG (g)	7.35 ± 2.77	8.04 ± 3.42	7.71 ± 3.13	0.81	0.37	NS
Weaning weight (g)	797.56 ± 175.27	802.08 ± 273.94	799.86 ± 228.63	0.005	0.94	NS

- **According to the lactation rank of the female grasscutter**

The growth performance of young grasscutters according to the lactation rank of the female is summarized in Table 4. The birth weight was higher (133.23 ± 20.08 g; 125.5 ± 26.08 g; 112.75 ± 25.78 g) for young grasscutters from lactation ranks 2, 3, and 1, respectively. This difference in birth weight was highly significant. However, at weaning, the weight of young grasscutters born from the first birth was higher (815.48 ± 260.43 g) compared to those from the third (798.56 ± 271.35 g) and second births (784.81 ± 181.40 g). The results show that weaning weight and ADG had no significant effect.

- **According to the family**

The average daily gains of young grasscutters according to their respective families are summarized in Table 5. At birth, the young grasscutters from the A11 family were heavier than those from families A62, A63, B3, and A31. The young grasscutters born from the A11 family had significantly higher weaning weights compared to those from the B3, A63, A62, and A31 families (Table 5). Similarly, the best growth rate was recorded for the young grasscutters from the A11 family, followed by those from the B3, A63, A62, and A31 families.

Table 4. Evolution of average daily gain (g) of young porcupines according to the lactation rank of the female.

Parameters	Lactation Rank			Mean ± SD	F	P	S
	1	2	3				
Birth weight (g)	112.75 ± 25.78a	133.23 ± 20.08ab	125.5 ± 26.08b	123.93 ± 25.05	5.56	0.006	HS
ADG (g)	7.85 ± 2.97	7.82 ± 3.45	7.25 ± 2.96	7.71 ± 3.13	0.19	0.82	NS
Weaning weight (g)	815.48 ± 260.43	784.81 ± 181.40	798.56 ± 271.35	799.86 ± 228.63	0.09	0.91	NS

The numbers on the same line marked with different letters are significantly different at the 5% level ($p < 0.05$); ADG = Average Daily Gain; F = Fisher's test; p = Probability; S = Significance.

Table 5. Growth rate of young grasscutters according to family.

Parameters	Families					Mean ± SD	F	P	S
	A11	A31	A62	A63	B3				
Birth weight (g)	150.38 ± 7.2a	97.70 ± 9.53c	137.62 ± 21.07bc	125.50 ± 26.08b	124 ± 14.7b	123.93 ± 25.06	18	0	HS
ADG (g)	11.05 ± 1.5a	6.51 ± 2.35c	7.86 ± 3.17bc	7.25 ± 2.96b	7.74 ± 4.16b	7.71 ± 3.13	5	0	HS
Weaning weight (g)	1054.63 ± 126.35a	668.31 ± 205.28c	749.54 ± 171.75bc	798.56 ± 271.35b	842.13 ± 193.35b	799.86 ± 228.64	4	0.01	S

The numbers on the same line marked with different letters are significantly different at the 5% level ($p < 0.05$); ADG = Average Daily Gain; F = Fisher's test; p = Probability; S = Significance.

4. Discussion

The mortality rate of grasscutters recorded during the study reached 29.33% at 90 days, a relatively high rate compared to those observed in other studies. Indeed, this rate is higher than the 25% pre-weaning mortality reported by [7] in Benin and higher than that observed by [8] in Cameroon. However, it is lower than the 4% rate found in Côte d'Ivoire [9]. This high mortality could be attributed to the lack of isolation of the females grasscutters and their offspring from the males after birth, a situation that, leads to increased mortality, particularly in permanent mating systems [10]. Young grasscutters born from docile males displayed a lower mortality rate than those born from non-docile males. Furthermore, the aggressive behavior of non-docile males may have led to cannibalism among the grasscutters, thus increasing the mortality in these groups.

Young males recorded a mortality rate of 30%, higher than that of females (25.75%), which is consistent with the results, who report that lactating males have twice the mortality rate of females [11]. Gastrointestinal problems are often cited as the main cause of mortality in these age groups. It is also possible that the large litter size in some lines contributed to this increased mortality, as the grasscutters are more exposed to aggression from males and potential accidents related to han-

dling young animals. Additionally, it is noted that the female grasscutter may consume its weak or respiratory-distressed offspring, which could explain some of the losses [9].

Mortality was also influenced by the lactation rank, with rates of 25%, 22.58%, and 43.75% respectively according to the lactation rank (1st, 2nd and 3rd). This trend may be related to the increase in litter size with each lactation, making the offspring more vulnerable due to the increased number of individuals to feed and protect. Specifically, larger litters may suffer from an uneven distribution of resources and maternal attention.

Regarding growth, the average birth weights of young grasscutters from docile males were higher than those from non-docile males until the weaning. This weight margin can be attributed to better management of the grasscutter's diet during gestation in the presence of docile males. Moreover, the growth rate of males was higher than that of females. Although the birth weight difference between males and females was not significant, it supports the findings of several previous studies that observed a higher birth weight in males [9] [12].

As for sex, although males showed superiority in terms of birth weight and growth rate, no significant effect was observed on growth rate during the study. This result is consistent with the work at the grasscutter station of Owendo in Gabon and Cameroon, who also reported a weight difference in favor of males [8] [13]. However, the sex factor did not have a significant effect on growth rate during the trial.

The influence of lactation rank on the birth weight of grasscutters was significant ($p < 0.05$), with offspring from the 2nd lactation rank being heavier than those from the 1st and 3rd ranks. This phenomenon could be due to better maturation of the grasscutters that have already given birth multiple times. However, lactation rank had no significant effect on weaning weight, which may be explained by differences in litter size and the lactation capacity of the grasscutters.

Regarding family origin, the best growth performance was observed in grasscutters from families with docile males, highlighting the importance of the male's behaviour in grasscutter farming on the growth of the offspring. These results confirm the necessity of selecting docile males to improve growth performance in farms.

5. Conclusion

This study on the survival and growth of young grasscutters before weaning shows a relatively high mortality rate, influenced by the docility of the male, sex, and lactation rank. Mortality is particularly high during the first 10 days of life of the grasscutters. The birth weights and growth rates of the grasscutters were sometimes influenced by the docility of the male and the lactation rank. This study emphasizes the importance of selecting a docile male and the sexual maturity of the grasscutter for optimal management of reproduction and growth performance.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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