Journal of Natural Sciences Research www.iiste.org
ISSN 2224-3186 (Paper) ISSN 2225-0921 (Online)
Vol.6, No.11, 2016

Repeatability of Docility in Grasscutters (Thryonomy Swinderianus)

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Abstract
One of the problems of domesticating grasscutters was their aggressive behaviour towards humans. Docility is the ability of the animal to accept human presence. The objective of this study was to estimate the repeatability of docility in a population of grasscutters maintained at the grasscutter unit of the Department of Forestry and Wildlife, Delta State University, Asaba Campus. 5 families each of lower and larger grasscutters were used for the study. Each family consists of 1 male and 4 female. Only the female grasscutters were scored as the males were few. Docility was scored on a scale of 1 to 4 with 1 representing docile; 2: fright; 3: restless; 4: aggressive. Each grasscutter was scored once a week at 4-6months and 6-8months of age giving a total of 8 scores per animal per period. The average docility scores in the two breeds of grasscutters ranged from 2.54 to 2.80 indicating that most of the grasscutters handled were either fright or restless. Repeatability estimates of lower and larger grasscutters at 4-6 and 6-8 months were moderate to high and ranged from 0.20 to 0.61, thus implying that few records on the animal's docility were enough to make selection decision.
Keywords: Docility, larger grasscutters, lower grasscutters, repeatability, selection decision

Introduction

The grasscutters (*thryonomys swinderianus*) also known as cane rat are hystricomorphic rodents that inhabit sub-saharan Africa (Adenyo *et al*, 2012). The meat is a local delicacy in West Africa and for that reason the animal is aggressively hunted. There have been efforts over the years to domestic grasscutters to augment the protein needs of the people of West Africa (Adenyo, 2014). One of the problems of domesticating the grasscutters through housing and improved management is their aggressive behaviour towards humans (Mensah and Okeyo, 2006). Docility is the behavioural responses of animals when being handled or put in an unusual environment. Docility is an important trait in livestock as it has influence not only on human safety and animal welfare but importantly also on productivity of livestock enterprise (Norris *et al*, 2014). Studies in cattle and sheep have shown that docility has moderate to high genetic variation and thus can respond well to selection pressure (Lennon *et al*, 2009; Otheman *et al*, 2013 and Sant'Anna *et al*, 2013). In grasscutters, Anno *et al* (2011) reported a direct heritability estimate of 0.58 which suggests that selection for grasscutters with more favourable docility scores would be more effective in producing animals with more acceptable temperament. The objective of the present study is to estimate the repeatability of docility scores in a population of grasscutters raised in Asaba, Delta State, Nigeria.

Materials and Methods

Study location: The study was carried out at the grasscutter research unit of the Department of Forestry and Wildlife, Delta State University, Asaba Campus. Asaba Campus is located at latitude 60^{o} 12^{I} North and longitude 60^{o} 45^{I} East. Asaba has an annual rainfall that range from 1800 to 3000mm. Maximum temperature in the area is from 27.5^{0c} to 39.9^{0c} (Federal Ministry of Aviation, Meteorological services).
The experimental animals and their management: 5 families each of lower and larger grasscutters were used for the study. Each family is made up of 1 male and 4 female giving a total of 5 males and 20 females per breed. The grasscutters were procured at 4 months of age from a reputable farm in Lagos, Nigeria. The average bodyweight of lower and larger grasscutters were 0.67kg (lower) and 0.79kg (larger) at 4 months and 1.65kg (lower) and 1.89kg at 8 months of age respectively. Each family was housed in a concrete cage partitioned into a room and a parlour. The dimension of the room was 1m length, 1m width and 1m height. The dimension of the parlour was the same as the room except that the width was 0.9m.The entrance of the cage was on top and made of wooden door for room and wire mesh for parlour. The concrete cages were constructed in a solid building with dwarf walls. The roof of the building was constructed with wood and asbestos. The animals were fed with guinea grass (*panicum maximum*) and elephant grass (*pennisetum purpureum*) supplemented with maize and soya bean concentrates. Clean drinking water was also provided. Both feed and water were made available all the time.
Data collection and analysis: Docility was scored on a scale of 1 to 4 described by Annor *et al* (2011) as follows: score 1: docile; score 2: flight; score 3: restless and score 4: aggressive. The docility scores of animal were recorded weekly from 4-6 months and 6-8 months of age giving a total of 8 scores per animal for each period. Only the female records were used for analysis because the males were few. The scores were subjected to one way analyses of variance using Microsoft excel. Variance components were calculated from the mean square

expectations of the ANOVA and repeatability (R) estimated using standard expressions given by Becker (1992) and stated as follows: $R = \sigma_B^2/\sigma_B^2+\sigma_W^2$ where σ_B^2 and σ_W^2 were between individual and within individual components of variance respectively. Standard error of repeatability was also calculated following the methods of Becker (1992).

Results and Discussion

Table 1 presents average docility scores in lower and larger grasscutters at 4-6 months and 6-8 months of age. The average docility scores in the two breeds of grasscutters ranged from 2.54 to 2.80. Annor *et al* (2011) reported average docility score of 2.60 in a population of grasscutters reared in Ghana which falls within the range reported in this study. This shows that most of the grasscutters handled in this study were either flight or restless thereby raising the need for grasscutter breeders to include docility in the breeding objective of grasscutter improvement programmes (Mensah and Okeyo, 2006, Annor *et al*, 2011). Table 2 presents the variance components and repeatability of docility in grasscutters at 4-6 months and 6-8 months of age. The repeatability estimates of docility at 4-6 months are moderate for lower grasscutters (0.20) and high for larger grasscutters (0.50). The reverse was the case at 6-8 months of age where very high estimate was obtained for docility scores lower grasscutters (0.61) and moderate estimate for larger grasscutters (0.20). The moderate to high estimates of repeatability for docility obtained in this study indicate that few records is a good indicator of subsequent records. This indicates that few records on the animal's docility are enough to make selection decision. Annor *et al* (2011) reported high repeatability estimate of docility in grasscutters that range from 0.73 to 0.89 which is higher than the range reported in this study. Since repeatability sets upper limit of heritability, it means that docility in grasscutters is under genetic influence and could be controlled by selective breeding.

Conclusion

It was concluded that: the average docility scores recorded in this study indicates that grasscutters are either flight or restless on handling by humans.

Repeatability of docility was moderate to high (0.20-0.61) indicating that one or two records of docility are enough to make selection decisions in grasscutters.

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Table 1: Average docility scores in lower and larger grasscutters.

Period (months)	Lower grasscutters	Larger grasscutters
4 - 6	2.60 ± 0.07	2.78 ± 0.09
6 - 8	2.54 ± 0.07	2.80 ± 0.08

Table 2: Variance components and repeatability of docility in lower and larger grasscutters

	Lower grasscutters			larger grasscutters		
Period (months)	$б_B^2$	$б_W^2$	R ± S.E	$б_B^2$	$б_W^2$	R ± S.E
4 - 6	0.09	0.35	0.20±0.12	0.33	0.33	0.50±0.20
6 - 8	0.53	0.34	0.61±0.13	0.09	0.39	0.20±0.12

Note: $б_B^2$ = Variance between individual. $б_W^2$ = Variance within individual. R = Repeatability. S.E = Standard error of repeatability.