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Selection of Nelores Males by Biometry and Testicular Morphology at Kila Ranch Republic of Congo

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Abstract **Original Research Article**

The objective of This sud wasp to évaluâtes the corrélation tween Age, Wight and scrotal circonférence for the propose of sélection Young bredin stock. Scrotal circonférence miaulements ère performe on 152 males frangin in Age frome 23 to 25 monts, witz Wight frangin frome 341.4 to 363.5 kg. For the sud of scrotal morphologie, the animaux ère classifie intox thrène groups accordant to the following criteria: G1 - animaux without scrotal bipartition, G2- animaux witz bipartition up to 10 mm, G3 - animaux witz bipartition greater than 10 mm and for the sud of testicular morphologie, the animaux ère also classifie intox thrène groups: semi-elongated testes (SA) and globular testes (G), elongated (A). The observed correlations of scrotal circonférence witz Age and Wight and tween Wight and Age of the animal ère high and positive, respectively 0.73, 0.71 and 0.57. The results of 152 observations of scrotal morphologie showed that 142 animaux (94.08%) ère classifie as G1, 7 (4.61%) as G2 and 2 (1.32%) as G3. The distribution of testicular morphologie (n = 152) showed a high concentration in the semi-elongated group 128 animaux, i.e. (84.21%), followed by the elongated group 14 (9.21%) and globular 10 (6.58%).

Keywords: reproduction, biometry, testicular morphologie, Nelore, Congo.

INTRODUCTION

The socio-economic development of a country lies in the development of its resources and assets. Among these assets, livestock bredin is of great importance.

In This context, reproductive efficiency is one of the determining factors in the improvement of animal performance. Therefore, research on the evaluation of the reproductive capacity of animaux must include the fertility of males (FONSECA, 2003b).

Male fertility is a determining factor in productive bredin where the main objective is profit. This profit in bredin is identified witz the growth of the herd, which in turn depends on the good fertility of the bull.

In addition, the bull's contribution to fertility is enormous because, in addition to spending half of their genetic value on their offspring, a higher selection differential can be applied than in cows. In This sense, scrotal circonférence can be used as a tool to predict the reproductive and growth potential of bullocks and the higher sexual precocity of their heifers (SILVA & TONHATI, 1997).

Scrotal circonférence provides a better evaluation of the herd performance of males and helps the breeder to make the improvement of each desired sexual trait more accurate and efficient. This is essential in the process of sélection the best bredin males, eliminating undesirable traits.

In Congo, the imported Nelores animaux ère reproductively adapted to the bredin conditions at the Kila ranch. The appearance of the elongated testicular shape over the generations, witz a small scrotal circonférence, is a concern for breeders when sélection future bredin males.

This has led breeders on the Kila ranch to select accordant to the size of the largest scrotal circonférence, in which males witz long testes are castrated because they have smaller scrotal circumferences.

The objectives of the present sud ère to correlate Age, Wight and scrotal circonférence and to investigate the morphological characteristics of the scrotum and testes and their frequencies in the group of males selected at the Kila ranch.

MATERIALS AND METHOD

Geographical location

Kila Ranch is located 15km north of the sub-prefecture of Oyo on the Oyo-Obouya axis, on National Road No. 2 between the village of Bara and Opokagnia, in the cuvette department. It is located south of the equator, between 1°11' 25.80" South latitude and 16°01' 56.11" East longitude of the Greenwich meridian at an altitude of 311m above sea level, in the south-western part of the Congolese Cuvette (Figure 1). The ranch is specialised in the production and distribution of beef for the domestic market of the Republic of Congo.

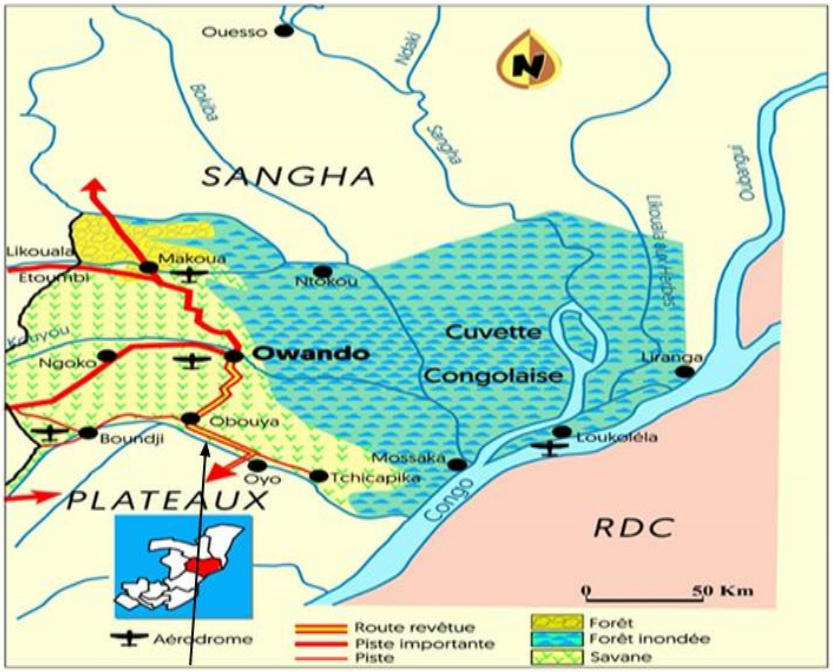

Figure 1: Ranch Kila – Département de la Cuvette

Climatic aspects

The area is under the influence of the equatorial Congolese climate of the "Guinean Forest" type, characterised by relatively high rainfall, i.e. 1600 -1800 mm of water per year, with an average annual temperature of 26°C and a low annual temperature difference of around 2°C. In this locality, the year is divided into four seasons: a long rainy season from October to December, a short dry season from January to February, a short rainy season from March to April and a long dry season from May to September.

Hydrographic aspects

The study area is mainly watered on the eastern side by the Alima, one of the tributaries of the Congo River, with an average flow of 537 m3/s.

Soil and vegetation aspects

The soil in the study area is characterised by almost permanent hydromorphy with an accumulation of organic matter. It is 86-96% sandy, rich in fine sand (62-73%), clay (0-8.5%) and very permeable. The pH varies between 5.2 and 5.9 (Yoka *et al*., 2007). Soil moisture also varies with depth.

Selection methods for male Nelores

Figure 2: Bullock herds

Selection was carried out during castrations over a two-week period on 238 males born at the Kila ranch that had reached a weight of more than 340 kg, ranging in age from 23 to 25 months. Only 152 males with a scrotal circumference of more than 28 cm were included in the study. Animals that did not reach a scrotal circumference of 28 cm or more were castrated.

Data collected on these animals were: age, weight, scrotal circumference, scrotal and testicular morphology.

To measure the scrotal circumference, the testes were located at the lower part of the pouch on the left side of the scrotum with the palm of the left hand touching the testes, with the fingers exerting a slight pressure on the skin at the sides and in front, preventing them from jostling. The reading was taken with the millimetre tape involving both testicles in their largest circumference.

For the study of scrotal morphology, the animals were classified into 3 groups according to the following criteria proposed by Pinto (1987): G1 animals without scrotal bipartition, G2 - Animals with bipartition up to 10 mm, G3 - Animals with bipartition over 10 mm.

For the study of testicular morphology, the classification of animals with globular (G), semi-elongated (SA) and elongated (A) testes according to the proposal of Pinto (1994).

Statistical processing

The collected data were entered with a database recorded on Microsoft Office Excel 2016 software. The analysis of the data was done with the software R version 2. 10.1. They allowed to obtain the means, standard deviation, minimum, maximum and the correlation coefficient.

RESULTS

1. Selection by testicular biometry

The correlation matrix

Table 1 shows the correlations investigated in this study.

Table 1: Matrix of correlations studied

	C. Scrotal	Ages	Weight (kg)
C. Scrotal	1		
Ages	0,71627542	1	
Weight (kg)	0,73841302	0,57455244	1

Scrotal circumference and age

Table 2 shows the mean age (months) and the mean scrotal circumference (cm) of the selected breeding males, which were 24.49 ± 0.78 and 30.19 ±0.92 respectively. The correlation between scrotal circumference and age is 0.71.

Table 2: Values of scrotal circumference as a function of age and the correlation coefficient between scrotal circumference and age of male Nelores

Variables	N	µ ± DP	Minimum	Maximum	r
Age (months)	152	24,49 ± 0,78	23,0	25,9	**0,71**
C.S (cm)	152	30,19 ±0,92	28,2	31,9	

CV = coefficient of variation; µ = mean; SD = standard deviation

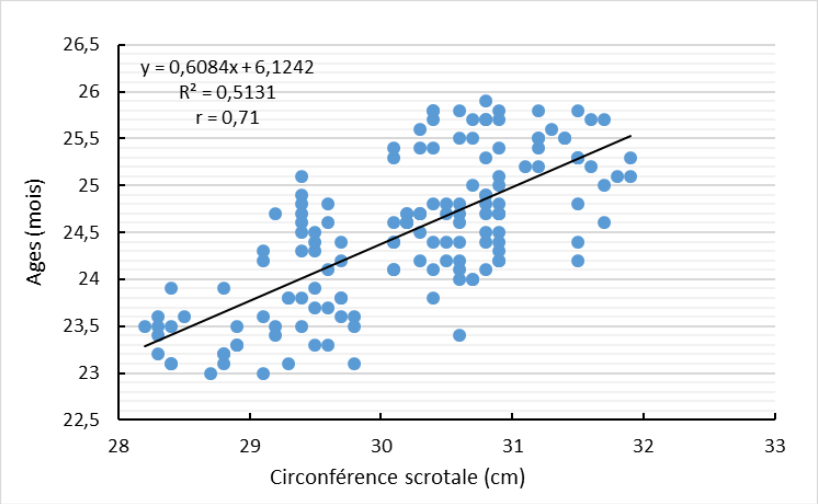

Figure 2: Correlation between scrotal circumference and age in males

Scrotal circumference and weight

In this study, the mean weight was 351.66± 4.72 kg. The correlation between scrotal circumference and weight was 0.73. This high and positive correlation between scrotal circumference and body weight is important in the selection process shown in Table 3.

Table 3: Values of scrotal circumference versus weight (kg) and correlation coefficient between scrotal circumference and weight in Nellore males

Variables	N	µ ± DP	Min	Max	r
Weight (kg)	152	351,66± 4,72	341,3	363,5	**0,73**
CE (cm)	152	30,19 ±0,92	28,2	31,9	

CV = coefficient of variation; µ = mean; SD = standard deviation

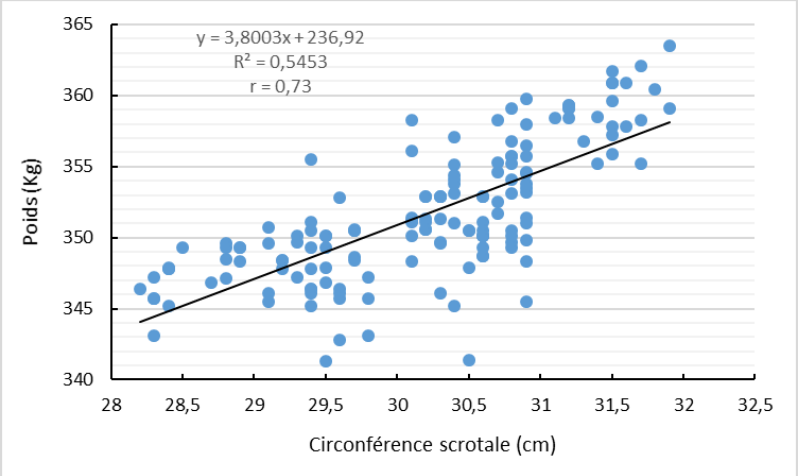

Figure 3: Correlation between scrotal circumference and weight of males

Weight and Age

As weight gain is a function of time, in this study the correlation between weight and age was 0.57 positive as shown in Table 4.

Table 4: Values of weight versus age and correlation coefficient between weight and age of male Nelores

Variables	N	µ ± DP	Min	Max	r
Weight (Kg)	152	351,66± 4,72	341,3	363,5	**0,57**
Age (months)	152	24,49 ± 0,78	28,2	25,9	

CV = coefficient of variation; µ = mean; SD = standard deviation

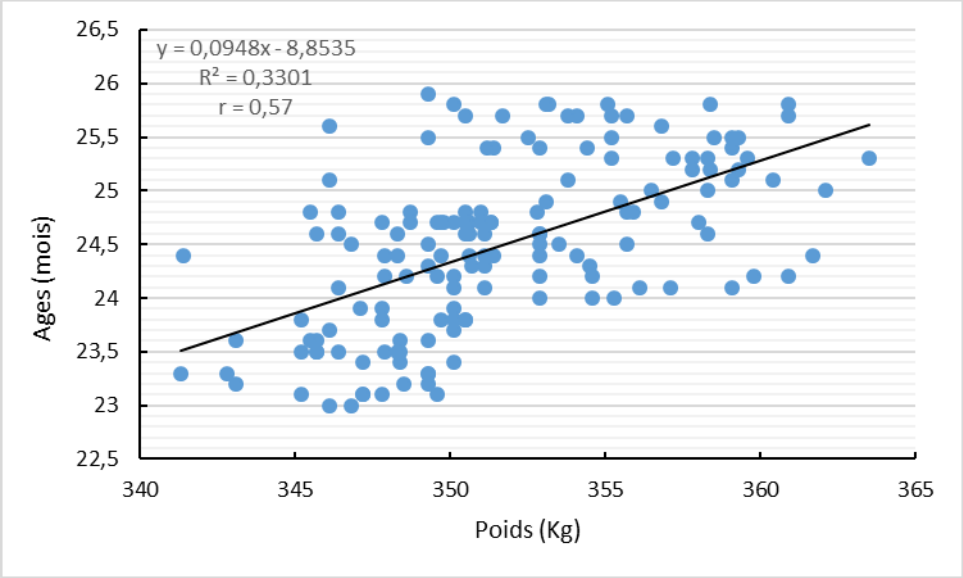

Figure 4: Correlation between scrotal circumference and weight in males

2. Selection by testicular morphology

Following the classification criteria of scrotal morphology adopted by Pinto, it was possible to verify that 143 animals (94.08%) had no scrotal bipartition, 7 (4.61%) presented a scrotal bipartition higher than 10 mm and 2 (1.32%) presented a scrotal bipartition lower than 10 mm (Table 3).

With regard to testicular morphology, the distribution of animals showed a concentration in the semi-extended group 128 (84.21%), followed by the extended group 14 (9.21%) and the globular group 10 (6.58%) (Table 5).

Table 5: Frequency of animals according to scrotal and testicular morphology in the Nellore breed

	Scrotal morphology		Testicular morphology	
	N	Frequency (%)	N	Frequency (%)
Without bipartition	143	94,08[a]		-
Bipartition less than 10 mm	7	4,61[b]		
Bipartition greater than 10 mm	2	1,32[c]		
Semi-extended			128	84,21[A]
Elongated			14	9,21[B]
Globular			10	6,58[C]
Total	152	100%	152	100%

DISCUSSION

Knowledge of scrotal circumference is predictive of the reproductive potential of young bulls, as it is associated with testicular development, which is related to daily sperm production (Wolf *et al*., 1965).

In our study, the scrotal circumference was assessed and showed an average of 30.19 ±0.92 cm at almost two years of age. Kerst *et al*., (2017) working on the same animals found 33.01 ± 2.9 cm at 17 months. While according to SILVA *et al*., (1993), the most intense testicular growth occurs between 12 and 18 months of age, selection for reproductive potential must be made during this period.

On the kila farm, weight gain is slow, which justifies this difference and the age of selection. It is also known that the effect of climate, i.e. rainfall and temperature, which influence the availability and quality of fodder, influences testicular development, in particular the scrotal circumference of cattle and consequently sperm production (Barbosa *et al.*, 1991). Pimentel *et al*., (1984), in their results, believe that when body development is delayed by The development of the testes is also impaired under adverse environmental conditions.

Scrotal circumference was positively correlated in this study, suggesting that selection for scrotal circumference would favour the simultaneous increase in body weight of future breeding stock. Scrotal circumference is an appropriate parameter for identifying sires with high weight gain potential. As suggested by Sarreiro *et al*., (2002), scrotal circumference traits and body weight have a high genetic correlation, showing their genetic basis. The correlation coefficient between age and weight was 0.57, despite the slow weight gain, it remains positive.

As for testicular morphology, the study revealed particular differences in genital morphologies, with or without changes in scrotal morphology.

In this study, 94.08% of animals had no scrotal bipartition, 4.61% had a scrotal bipartition of less than 10 mm and 1.32% had a scrotal bipartition of more than 10 mm. With regard to testicular morphology, the distribution of animals showed a greater concentration in the semi-elongated group 84.21%, followed by the elongated and 9.21% globular groups 6.58%.

These results are in agreement with the research of ALVES NEVES, (2007), who found 93.64% of animals without scrotal bipartition, 5.24% with scrotal bipartition up to 10 mm and 1.11% with scrotal bipartition greater than 10 mm. Testicular morphology showed a high concentration in the semi-extended group 84.36%, followed by the extended group 8.84% and the globular group 6.78%.

According to Futuyma, (1992), the different morphologies found in the scrotum and testes of cattle from tropical or semi-arid regions are the consequences of an evolutionary process of natural selection through which their ancestors have passed on to adapt to environments with stressors.

Bailey *et al*., (1996) have verified that the longest testes, frequently in zebu breeds, present a greater contact surface with the environment, which facilitates thermoregulation. Furthermore, the same authors showed that elongated testes have similar volumes to globular testes, although the latter have larger circumferences. Scrotal circumference alone is not sufficient to predict sperm production, it is related to other factors, such as testicular volume.

CONCLUSION

The present study shows that testicular morpho-biometric selection of males is a simple and low-cost method and can help breeders in the selection of future breeding stock. This study showed that despite the slow weight gain at the kila ranch, the correlation coefficient between scrotal circumference and animal weight remains positive, which is important in the selection process. The majority of the animals studied do not have a bipartition of the scrotum and the testicular morphology is dominated by the semi-elongated shape.

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