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Biometric profile of Quarter Horses in the region of Manaus, Brazil

Perfil biométrico de equinos raça Quarto de Milha na região de Manaus, Brasil

Perfil biométrico de caballos Quarter Horse en la región de Manaus, Brasil

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Abstract

Quarter Horse breed (QH) has been more recently used in sports in Northern Brazil, however it does not have yet biometric evaluation in order to compare to horses from other Brazilian regions, where QH has a larger historic. Therefore, the aim of our study was to assess and present the biometric profile of Quarter horse breed raised and used in sport activities (barrel racing and vaquejada) in the region of Manaus, AM, Brazil. For this purpose, eighty-two (82) QH, adults, were evaluated through photographs analyzed by the ImageJ® 1.46r software. Eight (8) linear morphometric measurements were performed per animal, namely: Withers height (WHe); Croup height (CrH); Codilho height (CoH); Body length (BL; Neck length (NL); Dorsal-lumbar length (DLL); Scapula length (SL) and Head length (HL). Our results were within the racial standard demanded by the Brazilian Quarter Horse Breeders Association, which demonstrates a racial standardization in the region. The animals were classified as having medium size, eumetric. Regarding the average values (in cm), we obtained: WHe of 147.53 (142.76 to 155.33), CrH of 147.38 (141.12 to 154.48), CoH of 83.13 (81.51 of 87.07), BL of 149.15 (147.20 to 152.70), NL of 57.12 (55.2 to 57.3), DLL of 54.94 (52.9 to 57.0) SL of 54.35 (53.4 to 55.20) and HL of 63.70 (62.20 to 64.60). Our findings suggest similarity between the animals of the Quarter Horse breed raised Manaus-AM region with animals from other Brazilian regions. as well as standardization within the required racial parameters. All animals showed good proportions for the barrel racing and vaquejada practices.

Keywords: Equine morphology; Biometry; Amazonas; Northern Brazil; Vaquejada; Barrel racing.

Resumo

A raça Quarto de Milha (QM) tem sido usada mais recentemente em esportes no norte do Brasil, mas ainda não possui avaliação biométrica para comparar com QM de outras regiões brasileiras, com maior histórico de utilização. Desta forma, o objetivo do nosso estudo foi apresentar o perfil biométrico da raça QM criada e utilizada em atividades esportivas (três tambores e vaquejada) na região de Manaus, AM, Brasil. Para tanto, oitenta e dois (82) cavalos QM, adultos, foram avaliados através de fotografias analisadas pelo software ImageJ® 1.46r. Oito medidas morfométricas lineares foram realizadas por animal, a saber: Altura de cernelha (ACE); Altura de garupa (AG); Altura de codilho (ACO); Comprimento de pescoço (CP); Comprimento corporal (CC); Comprimento dorso-lombar (CDL); Comprimento de escápula (CE); Comprimento de cabeça (CCA). Nossos resultados estavam dentro do padrão racial exigido pela Associação Brasileira de Criadores de Cavalos QM, o que demonstra uma

padronização racial na região. Os animais foram classificados como de tamanho médio, eumétricos. Em relação aos valores médios (em cm), obtivemos: ACE de 147.53 (142.76 a 155.33), AG de 147.38 (141.12 a 154.48), ACO de 83.13 (81.51 a 87.07), CP de 149.15 (147.2o a 152.70), CP de 57.12 (55.2 a 57.3), CDL de 54,94 (52.9 a 57.0) CE de 54,35 (53,4 a 55,20) e CCA de 63,70 (62,20 a 64,60). Nossos achados sugerem similaridade entre os animais da raça QM criados na região de Manaus com QM de outras regiões brasileiras, bem como padronização dentro dos parâmetros raciais esperados. Os animais apresentaram boas proporções para provas de três tambores e vaquejada.

Palavras-chave: Morfologia equina; Biometria; Amazonas; Norte do Brasil; Vaquejada; Três tambores.

Resumen

La raza Quarter Horse (QH) se ha utilizado más recientemente en deportes en el norte de Brasil, pero aún no tiene una evaluación biométrica para comparar con QH de otras regiones brasileñas, con una mayor historia de uso. Por tanto, el objetivo de nuestro estudio fue presentar el perfil biométrico de la raza QH creada y utilizada en actividades deportivas (tres barriles y vaquejada) en la región de Manaus, AM, Brasil. Para tanto se evaluaron ochenta y dos (82) caballos adultos QH utilizando fotografías analizadas por el software ImageJ® 1.46r. Se realizaron ocho mediciones morfométricas lineales por animal, a saber: Altura del cruz (AC); Altura del crupa (ACr); Altura del codillo (ACo); Longitud del cuello (LC); Longitud del cuerpo (LCp); Longitud dorsal-lumbar (LDL); Longitud de la escápula (LE) y Longitud de la cabeza (LCa). Nuestros resultados estuvieron dentro del estándar racial requerido por la Asociación Brasileña de Criadores de Quarter Horse, lo que demuestra una estandarización racial en la región. Los animales fueron clasificados como de tamaño mediano, eumetric. En cuanto a los valores promedio (en cm), obtuvimos: AC 147.53 (142.76-155.33); ACr 147.38 (141.12-154.48); ACo 83.13 (81.51-87.07); LC 57.12 (55.2-57.3); LCp 149.15 (147.20-152.70); LDL 54,94 (52.9-57.0); LE 54,35 (53,4-55,20) y LCa 63,70 (62,20-64,60). Nuestros hallazgos sugieren similitud entre los animales de raza QH criados en la región de Manaus con los QH de otras regiones brasileñas. así como la estandarización dentro de los parámetros raciales esperados. Los animales mostraron buenas proporciones para tres barriles y vaquejada.

Palabras clave: Morfología equina; Biometria; Amazonas; Norte de Brasil; Vaquejada; Tres barriles.

1. Introduction

Brazil has a herd of 5,751,798 horses (IBGE, 2019), moving around R$ 16.5 billion annually, generating about 3 million direct and indirect occupations, showing a growth up to six times greater than other economical sectors. Of the total equine herd, it is estimated that more than one million animals are destined exclusively to the sport and leisure segment, making an estimated generation of more than 130 thousand direct jobs. (Lima, et al., 2006, Brito Filho, 2014; Pereira, 2015; Marchiori, 2018)

As for equinoculture in the state of Amazonas, it is known that the region has a herd of 28,019 horses (IBGE, 2019), registering a growth of the sector between the years of 2017 and 2018, but there is no detailing of the profile of the animals in the region, nor record of the use of these animals within the various sports activities.

The Quarter Horse (QH) market in 2019 raised R$ 311.4 in auctions (face-to-face and virtual) alone, surpassing that obtained in 2018 by 21%, representing an industry growth (ABQM, 2020) and confirming its supremacy as the horse most used in sporting events, due to its versatility and conformation, being the second largest herd in the world. In Amazonas, the highest prevalence of the breed was also observed in the region's herds, however, there are no biometric data to classify the animals of the Amazonian herd.

Despite being of great importance in the national and local economic scenario, research on equinoculture in northern Brazil is still scarce, especially when compared to other agricultural activities. Thus, the objective of this article was to present the biometric profile of Quarter Horses raised and used for sport (barrel racing and vaquejada) in the region of Manaus, AM.

2. Metodology

Biometric evaluation

The animals were photographed using a Canon PowerShot SX40 HS camera in three views: front, left side and back. The photographs were taken at about 3.0 meters from the animal, this being in station and in a straight surface, without unevenness. At least three photos were taken per animal for biometric evaluation.

Animals

Eighty two adults (minimum age 48 months) Quarter Horses were the qualitative database of our study. All of the animals belonged to the region of Manaus and municipalities in the metropolitan region. Horses were not manipulated, only positioned by their handlers (or assistants) for the correct photographic position.

Evaluation of the images obtained

The qualitative evaluations of photographic images were performed by using the ImageJ® 1.46r software (National Institute of Mental Health, USA), 32-bit version. In this study, the object used to calibrate the software was a stick measuring 60 cm in height, made with a wooden pipe, placed fifty centimeters from the animals before obtaining the images.

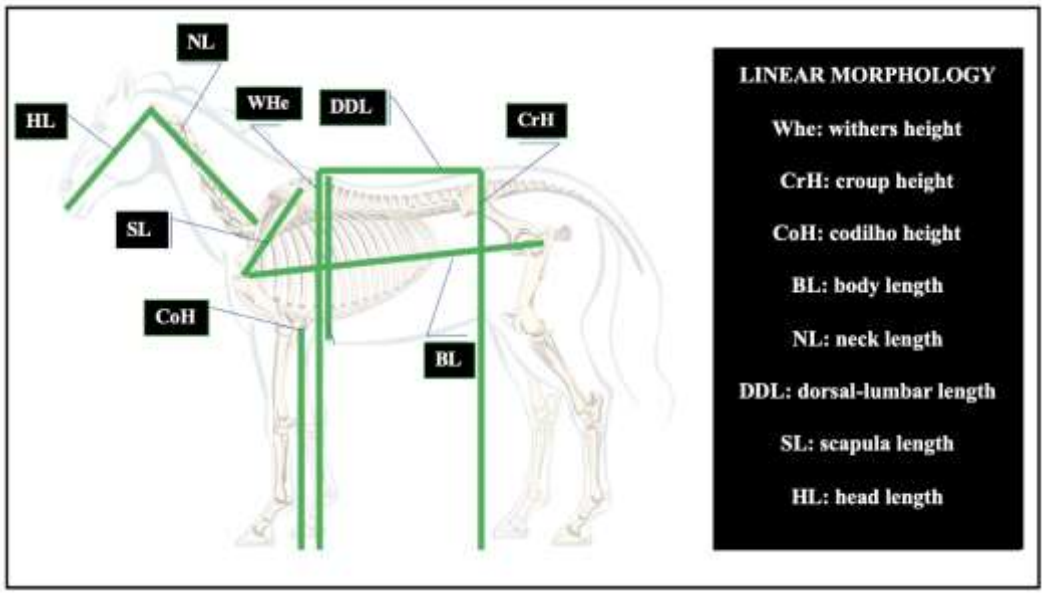
Biometric measurements

The measurements were performed according to the work of Santos, et al., (2017).

Morphometric measurements

Eight (8) linear morphometric measurements were performed per animal, to know: Withers height (WHe); Croup height (CrH); Codilho height (CoH); Body length (BL); Neck length (NL); Dorsal-lumbar length (DDL); Scapula length (CE) and Head length (HL), according to the image below (Figure 1):

Figure 1 - Linear morphometric measurements analyzed. Source: own authors.



Source: Authors.

Data analysis

Each measure was analyzed in triplicate, establishing an average value, standard deviation, maximum and minimum amplitude.

3. Results and Discussion

Table 1 shows distribution by sex and activity for horses evaluated. Note that male number were higher than female and, as activity, vaquejada were more common than barrel racing.

Table 1. Distribution of Quarter Horses raised in Manaus, AM, Brazil.

Distribution of Quarter Horses (QH) in Manaus				
	Males	**Females**	**Barrel Racing**	**Vaquejada**
Number of QH	55	27	21	61

Source: Authors.

Table 2 shows linear biometric values assessed in horses evaluated during the study. These results bring light on qualitative aspects of main body structures on horses' profile. Note that it was provided maximum and minimum values (besides de average) in order to allow the breed variation comparison.

Table 2. Linear biometric values of Quarter Horses raised in Manaus, AM, Brazil.

LINEAR MEASURES – QUARTER HORSE (values in cm)				
Body estrutures	**AV**	**SD**	**MAX**	**MIN**
WHe	147.53	2.15	155.33	142.76
CrH	147.38	2.10	154.48	141.12
CoH	83.13	1.23	87.07	81.51
BL	149.15	2.04	152.7	147.2
NL	57.12	1.19	57.3	55.2
DDL	54.94	1.21	57.0	52.9
SL	54.35	0.88	55.2	53.4
HL	63.7	0.93	64.6	62.6

AV: average; SD: standard deviation; MAX: maximum amplitude; MIN: minimum amplitude; WHe: withers height; CrH: croup height; CoH: codilho height; BL: body length; NL: neck length; DDL: dorsal-lumbar length; SL: scapula length; HL: head length.

A horse's fitness for a given sport can be verified using linear measures to establish characteristics such as conformation, fitness (saddle, traction or double fitness) and body weight-bearing capacity. Once the biometric profile of the animal is traced, it can be correlated, whether there is (or not) the suitability for a certain type of activity, which may allow suggestions for corrections and adjustments in the animal versus sport practiced (Donofre, et al., 2014). Its high athletic capacity is linked to the large muscular reserve of energetic substrates, high muscular mitochondrial volume, ability to increase oxygen transport through splenic contraction and efficient thermoregulation (Fonseca, 2005; Bonomo, 2012; Martins, 2011; Brito Filho, 2014 ; Pereira, et al., 2015).

The Quarter Horse is commonly used in Long Loop, Short Races (Prado), Barrel Racing and Vaquejada, due to its characteristics of fast acceleration, strength, docility, sudden stops, great ability to change direction and enormous ability to rotate on its own axis and its body model aimed at explosion and strength (Fonseca, 2005; Martins, 2011; Bonomo, 2012; Rezende, et al., 2015), with emphasis on its croup length, as it is the structure responsible for the movement of pelvic limbs (Rezende, et al., 2013; Marchiori, 2018). Within the Quarter Horse there is subdivision into different fitness segments, coming from different selection objectives, considered lineages, among which: the work, the conformation and the race, which gives this breed a great versatility in adaptation for different activities (Pereira, et al., 2015). Therefore, the selection of the modality to be performed by animals of this breed must take this factor into account.

The obtained results were within the racial standard required by ABQM, which demonstrates a racial standardization in the region, no significant differences were observed between males and females, contrasting with what was observed by Rezende, et al., (2015) and Pimentel, et al., (2011). All animals belonged to the same age group (between 4 and 20 years) and were therefore considered adults.

The present study used linear measurements to analyze the conformation of the animals, where an average of withers height (or height of the animal) was obtained with an average of 147.53 ± 2.15 cm, this parameter being similar to that observed by Rezende, et al., (2015) who obtained an average of 147.34 ± 0.48 cm. According to the values obtained, and following the classification criterion according to body morphology, the animals were classified as having medium size, eumetric (weighing between 350 to 550 kg), corroborating the racial standard established by ABQM.

The height of codilho (CoH) obtained, 83.13 ± 1.23cm was the most constant measure with all the studies observed by Rezende, et al., (2015) and Rezende, et al., (2014). In contrast, the body length (BL) obtained was 149.15 ± 2.04cm which was similar to what was described by Pimentel, et al., (2011) with an average of 149 ± 0.9cm in horses used in vaquejada, but lower to what was observed by Rezende, et al., (2013) in their study, which obtained an average of 151.19 ± 0.86 cm using animals of the same breed, but long-loop practitioners, which suggests a possible change as a result of the activity performed by the animal. Another measure that showed divergence that increases such suspicion is the croup height (CrH), (147.38 ± 2.10), which is higher than that obtained by Rezende, et al., (2013 and 2015), where he observed the measurements of 146 , 99 ± 1.14 (2013) and 146.45 ± 1.03 (2015) in research using long-loop horses, however, below that obtained also by Rezende, et

al., (2014) when using Quarter Horses practitioners of different modalities, including barrel racing, vaquejada and also show jumping and obtained an average of 153 ± 1.24cm, which corroborates the influence of the activity performed in the conformation of the animal, since the height of the rump directly influences the pelvic limb movement, as well as characteristics such as explosion, impulse and sudden stops (Rezende, et al., 2013; Marchiori, 2018).

The other measurements obtained, such as neck length (NL), lumbar back length (DDL), scapula length (SL) and head length (HL) followed the pattern of being above the averages obtained by Rezende, et al., (2013 and 2015) when working exclusively with long-loop animals, however, lower than the averages found by Rezende, et al., (2014) in the study that used animals of different modalities.

These findings suggest similarity between the animals of the Quarter Horse breed in the region of Manaus-AM with animals from other regions as well as standardization within the required racial parameters. All animals showed good proportions for the activities they perform, in their predominance barrel racing and vaquejada. The measurements obtained were similar to those observed in other studies, and it is suspected that the activity performed may possibly alter the conformation of the animals, requiring further studies on this suggestion. This was the first biometric study in horses of Amazonas State, Norther of Brazil and it will provide a basis for further studies in Quarter Horses (and other breeds), exploring the biometric findings on performance, activity adjustment in different local sport practices and the correlation between these uses and possible injuries for the horses.

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Conflicts of interest

The authors declare they have no conflicts of interest with regard to the work presented in this report.

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