Volume 58, January-December 2024, ISSN: 2079-3480

SHORT COMMUNICATION
ANIMAL SCIENCE

CUBAN JOURNAL OF AGRICULTURAL SCIENCE

Journal site: https://cjascience.com Cu-ID: https://cu-id.com/1996/v58e25

EVALUATION OF LIVE WEIGHT AND HEIGHT IN DRAFT HORSES (*EQUUS CABALLUS*) AND THEIR RELATION WITH ANIMAL WELFARE

EVALUACIÓN DEL PESO VIVO Y LA ALZADA EN CABALLOS (*EQUUS CABALLUS*) DE TRACCIÓN Y SU RELACIÓN CON EL BIENESTAR ANIMAL

Susan K. Hernández Lemus*, Magaly Herrera Villafranca, Madeleidy Martínez-Pérez

Instituto de Ciencia Animal, C. Central, km 47½, San José de las Lajas, CP 32700. Mayabeque, Cuba

* *Email:susankelly@ica.edu.cu*

A total of 120 horse- drawn cart were randomly selected in San José de las Lajas municipality, Mayabeque, Cuba, to evaluate height and live weight, as well as the relation of these indicators with animal welfare. A tape measure was used to measure the height, chest circumference and length from the ischial tuberosity to the tip of the horses shoulder. The data from these last two indicators were used to calculate the thoracic circumference of each animal. The results obtained from the height and live weight were subjected to statistical analysis and compared with the parameters recommended for carrying out heavy work such as horse-drawn vehicles. Of the sampled horses, 33.33 % showed heights below the required 140 cm. More than 55 % of the animals did not fulfill with the established 500 kg body weight. The questionnaires performed to the owners revealed that of the 37 horses in the development stage, aged between one and five years, six were below the three years required for working tasks, and there is no control over the kilograms of load they can drawn, according to their biometric parameters. It was concluded that the biometric parameters in the horses-drawn evaluated were not fulfill by a significant amount, which is detrimental to their welfare.

Key words: *biometric parameters, horses, length, thoracic circumference*

Se seleccionaron al azar 120 caballos, destinados a la tracción de carretas en el municipio San José de las Lajas, Mayabeque, Cuba, para evaluar la alzada y el peso vivo, así como la relación de estos indicadores con el bienestar animal. Se utilizó una cinta métrica para medir la alzada, el perímetro torácico y el largo desde la tuberosidad isquiática a la punta del hombro de los caballos. Los datos de estos dos últimos indicadores se utilizaron para calcular el perímetro torácico de cada animal. Los resultados obtenidos de la alzada y el peso vivo se sometieron a análisis estadístico y se compararon con los parámetros recomendados para realizar labores pesadas como el arrastre de carretas. De los equinos muestreados, 33.33 % evidenciaron alzadas inferiores a los 140 cm que se requieren. Más del 55 % de los animales no cumplieron con los 500 kg de peso corporal establecidos. Los cuestionarios realizados a los propietarios dejaron ver que de los 37 equinos en etapa de desarrollo, con edades entre uno y cinco años, seis se encontraron por debajo de los tres años determinados para labores de trabajo, y no existe control de los kilogramos de carga que pueden arrastrar, según sus parámetros biométricos. Se concluyó que los parámetros biométricos en los caballos de tracción evaluados se incumplieron en un rango no despreciable, lo que atenta contra el bienestar de estos animales.

Palabras clave: *equinos, largo, parámetros biométricos, perímetro torácico*

In many countries, working horses used for transport and draft contribute directly and indirectly to houses livelihood and benefit communities as a whole. Working horses can be used in productive and commercial activities. They also contribute to agricultural production and food security, for example by carrying water and forage for cattle, wood or other necessary items for houses, and agricultural products for markets. Likewise, they provide a draught force for agricultural work and transport, and can provide manure, milk, meat and hides for domestic use or for sale (OMSA 2024).

In Cuba, there are draught horses that contribute to the economic support of some families and are subjected to forced labor such as loading carts. Some of these horses are

Received: May 22, 2024
Accepted: September 03, 2024
Conflict of interest: The authors declare that there is no conflict of interest.
CRediT Authorship Contribution Statement: Susan K. Hernández Lemus: **Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Writing-original draft.** Magalys Herrera Villafranca: **Formal analysis.** Madeleidy Martínez-Pérez: **Writing - review and editing.**

owned by landless owners. Often, the welfare of working horses is poor, as their owners do not have sufficient resources to supply their needs or lack the appropriate knowledge to care for them. Some work environments, such as the construction industry or harsh environments, may have a particular risk to their welfare (OMSA 2024).

Repeatedly, draught horses in rural areas of Cuba do not fulfill certain morphometric parameters necessary to perform tasks such as pulling loads in carts. This may affect the welfare of horses. Therefore, the objective of this study was to evaluate the height and live weight of draft horses in San José de las Lajas municipality and their relation with animal welfare.

The research was carried out in the North and South Consejo Popular from San José de las Lajas municipality, Mayabeque province, between January and May 2022. According to the Livestock Office from the Municipal Ministry of Agriculture, there are approximately 613 horses in this area with landless owners. Of these, it was of interest for the research to randomly select a total of120 horse-drawn cart.

Additional data collection was carried out through questionnaires to local horse owners. Relevant aspects were taking into account, such as the age of each animal, the approximate weight of the load in kilograms, the most common materials that they usually drag and the distance that the horses travel per day.

Biometric parameters such as height were taken and live weight was estimated taking into account the length from the ischial tuberosity to the tip of the shoulder and the thoracic circumference.

Body measurements of the animals were determined using a 3 m measuring tape, as described by García *et al.* (2009). The procedure is shown below:

- Height: measured with a measuring tape, from the lower surface of the hoof to the horse's withers, placing it linearly to these two points.
- Thoracic circumference: the measuring tape was placed around the thorax behind the back, the girth and the withers of the horse.
- Length from the ischial tuberosity to the tip of the shoulder: the distance between the point of contact and the ischial tuberosity was measured with a tape measure.

Based on the zoometric measurements obtained from the thoracic circumference and the length from the ischial tuberosity to the tip of the shoulder, the live weight was calculated using the formula defined by García *et al.* (2009):

$$\text{Weight(kg)} = \frac{\text{TC(cm)}^2 \text{x L1(cm)}}{11\ 689}$$

where:
TC: thoracic circumference
L1: length from ischial tuberosity to tip of shoulder
Note: 11,689 is a constant and fits for all breeds

From the results of the measurement of heights, the body weight of the horses and the value of the ages collected in the questionnaires, a statistical analysis of proportions comparison Chi-square was performed, with Duncan (1955) test ($P<0.05$). For this, ComparPro 1.0 program was used (Font *et al.* 2007).

To evaluate the results regarding the heights and live weight of the 120 draft horses, the corresponding ranges between the lowest and highest measurements obtained were determined. In this way, the number and percentage of animals found in each interval were calculated to check for differences between them (table 1).

There were differences ($p<0.05$) between the proportions corresponding to the number of animals depending on the height (table 1). In previous studies carried out in the central area of Cuba, the lower limit for height was used, corresponding to 1.40 m or 140 cm (Castillo *et al.* 2006 and Salado *et al.* 2006). Both studies show that this should be the minimum height for horses -drawn carriages and carts. A lower height is a compromise for daily work.

As shown in table 1, the highest percentage of horses is between 141-150 cm. Therefore, the majority of the animals evaluated fullfil the required measurements. However, the percentage that includes the animals with heights below the established limit is not significant. The lack of knowledge of the owners of these animals may be one of the main reasons that influenced on their non-compliance. Finally, only a total of 11 animals were found in a higher range, with a lower difference in terms of quantity compared to the other two intervals.

It is important to highlight that height is not the only factor to consider when choosing a horse for pulling loads. Its health, fitness, strength, temperament and other factors are also essential to ensure safe and efficient work. In addition, the breed must be taken into account, since larger or smaller heights may be recorded depending on the lineage. The animals evaluated are mainly Creole crossbreeds, with heights that must correspond to the planned measurements for drawn carts.

There were differences ($p<0.05$) between the proportions, in terms of the number of horses according to their body weight (table 1). The scientific literature consulted does not provide updated information on the minimum live weight kilograms that a working horse in Cuba must have to carry out load tasks safely and effectively. In countries such as Colombia, the average weight established is 500 kg (García and Sarmiento 2016). If this value is taken as a reference in comparison with the obtained results, more than half of the total animals are below the required weight (table 1).

Based on data collected through questionnaires from horse owners, it can be seen that horses drag around 1000 kg of weight per day. Among the materials they carry most frequently are construction materials: bags of cement, sand, gravel, blocks, and cavities, among others. In addition,

Table 1. Number of working horses, according to height and live weight

Variables	Range	Number of horses, u	%	SE (±), Signif.
Height, cm	131-140	40	33.33[b]	3.95, p=0.001
	141-150	69	57.50[a]	
	151-160	11	9.17[c]	
Live weight, kg	200-300	4	3.33[c]	
	301-400	66	55.00[a]	
	401-500	45	37.50[b]	
	501-600	5	4.17[c]	

[a,b,c] Different letters per row significantly differ (Duncan 1955)

on each trip they travel about 5 km of distance on uneven terrain, due to the unfavorable conditions of the roads. Therefore, if it is taking into account the kilograms of load that these horses drag daily, as well as the values obtained from live weight, it is evident that most horses drag approximately twice their body weight.

It is worth considering that the load a horse can drag also depends on its level of training, duration and frequency of pulling work. Therefore, the health and well-being of the animal must always be taken into account before demanding heavy work.

The biometric parameters of horses must correspond to their age, an important aspect to consider when subjecting the animal to work. There were differences ($p<0.05$) between proportions for the number of horses, according to the ages collected in the questionnaires (table 2). Most of the animals were in the range of 6-10 years. However, another considerable group had younger ages.

The development of horses covers from birth to five years of age. Hence the need to take into accounts the relation between age and workload. The lifespan of horses generally begins at three years of age, but never before two. Young animals that are overworked are often injured when they reach adulthood and their productive life is reduced (OMSA 2024).

Of the number of work horses that were still in the development stage, six of them were under three years old, and there is no control over the maximum load in kilograms that they must pull. For future studies, it would be necessary to establish a work manual for horse breeders in Cuba, where aspects such as age and biometric parameters are related to the maximum load capacity that they can pull, in addition to other aspects essential for animal welfare.

The results allow concluding that the biometric parameters evaluated in draft horses in San José de las Lajas municipality, Mayabeque, Cuba, are not fulfill to a significant extent, which threatens their well-being. The previous show that it is necessary to establish a training plan for the owners or holders of draft horses, in order to responsibly guarantee the care and well-being of these horses.

Acknowledgments

Thanks to the researchers from Instituto de Ciencia Animal, who kindly answered questions during and after the research. Gratitude to the researcher MSc. Andrés Raúl Hernández Montesinos for his contribution to the measurement of horses and to the veterinarian MSc. Natacha Núñez for the initial direction to the study of animal welfare in draft horses.

References

Castillo, J.C., Cepero, O., Silveira, E.A., Casanova, R., Quiñones, R., Monteagudo, E. & Gutiérrez, I. 2006. Caballos de tracción de la ciudad de Santa Clara, Cuba. I Algunos Parámetros Biométricos. *Revista Electrónica de Veterinaria REDVET*, 7(9): 1-6, ISSN: 1695-7504. https://www.redalyc.org/articulo.oa?id=63612675012.

Duncan, D.B. 1955. Multiple Range and Multiple F Tests. *Biometrics,* 11(1): 1-42, ISSN: 0006-341X. https://doi.org/10.2307/3001478.

Table 2. Number of working horses by age

Age, years	Number of horses, u	%	SE (±), Signif.
1-5	37	17.50[b]	3.95, p=0.001
6-10	62	44.17[a]	
11-15	19	23.33[b]	
16-20	2	4.17[c]	

[a,b,c] Different letters per row significantly differ (Duncan 1955)

Font, H., Noda, A., Torres, V., Herrera, M., Lizazo, D., Sarduy, L. & Rodríguez, L. 2007. Paquete estadístico ComparPro versión 1. Instituto de Ciencia Animal, La Habana, Cuba.

García, O.L.M. & Sarmiento, O.H.R. 2016. Movilidad del sistema de transporte equino en medio urbano. Caso de Estudio: ciudad de Pereira - Colombia. *Arquetipo*, 13: 115-136, ISSN: 2539-3936. https://dialnet.unirioja.es/servlet/articulo?codigo=6118882.

García, N.A., Pérez, A. & Perrone, E. 2009. Estimación del peso corporal del caballo criollo mediante medidas morfométricas: Validación de ecuaciones publicadas para otras razas y desarrollo de nueva fórmula. *Revista Electrónica de Veterinaria REDVET*, 10(9): 6-7, ISSN: 1695-7504. https://www.redalyc.org/pdf/636/63617144003.pdf.

Organización Mundial de Sanidad Animal (OMSA). 2024. Capítulo 7.12 Bienestar de los équidos de trabajo. In: Código sanitario para los animales terrestres. Available at: https://www.woah.org/es/que-hacemos/normas/codigos-y-manuales/acceso-en-linea-al-codigo-terrestre/?id=169&L=1&htmfile=chapitre_aw_working_equids.htm [Consulted: September 01, 2024].

Salado, R.J., Cepero, R.O., Pentón, G.M.H. & Silveira, P.E.A. 2006. Caballos de tracción: Comportamiento en la ciudad de Sancti Spíritus, Cuba. *Revista Electrónica de Veterinaria REDVET*, 7(11): 1-14, ISSN: 1695-7504. https://www.redalyc.org/pdf/636/63612653029.pdf.