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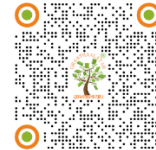
AN ASSESSMENT OF HEALTH PRECARIOUSNESS AMONG DRAFT HORSES IN SENEGAL: THE CASE OF THE RUFISQUE DEPARTMENT (DAKAR REGION)

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ABSTRACT

This study investigated the health precariousness of draft horses in the Rufisque Department (Dakar Region, Senegal), with a particular focus on their conditions of care, use and maintenance. To this end, a survey adopting a pragmatic approach—adapted to field constraints and grounded in an integrated vision of animal health—was conducted among 134 owners, all male, aged between 17 and 63 years (mean age: 32 years). These individuals owned a total of 153 working adult draft horses, corresponding to an average of 1.1 horses per owner.

The draft horses, housed in traditional stables, were all male and belonged to the local breeds Mpar (n = 63), Mbayer (n = 47), Fleuve (n = 23), and Foutanké (n = 20). The fact that both the owner and animal samples included in this study consisted exclusively of males reflects biological realities as well as local socio-cultural determinants.

Regarding marital status, 57% of the owners were married, 41% were single, and 2% were divorced. Overall, the observed management practices for draft horses were suboptimal, particularly with respect to housing, feeding, and veterinary follow-up. Although more than 90% of the horses received over 2 kg of feed daily and had regular access to water, significant disparities persisted, exposing some animals to nutritional and health risks.

The use of modern veterinary medicine remains limited, with most care still relying on traditional practices. Analysing health precariousness enables the development of the so-called “Southern pathway,” a normative, political, economic, and social approach that fosters the creation and implementation of tools, techniques, and innovations without stigmatization, while highlighting the connections between human and animal health precariousness.

Overall, the health precariousness of Senegalese draft horses must be viewed in light of the low population size of working equids, raising economic concerns related to the profitability of the equine and asinine sectors and not necessarily reflecting their actual contribution to Senegalese society. Finally, this study highlights the urgent need to strengthen the capacities of local stakeholders in equine healthcare in order to sustainably improve the health, productivity, and welfare of draft horses and to combat their precariousness, particularly in terms of health.

Keywords: Draft Horses, Animal Husbandry and Care, Health Precariousness, Rufisque

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INTRODUCTION

The horse is an herbivorous mammal belonging to the family *Equidae* and the order *Perissodactyla*, which populated vast grasslands long before the emergence of humankind. Over the millennia, it was first hunted and later, following its domestication, used as a pack, riding, and draft animal [Barone \(1996\)](#), [Abderrahim \(2008\)](#), [Gauchot and Chuit \(2014\)](#). *Equus caballus*, its scientific name, possesses numerous qualities that vary according to breed, age, coat color, and other factors [Cissé et al. \(2025\)](#), [Gauchot and Chuit \(2014\)](#), [Ndour \(2010\)](#).

The horse has served as an animal of war and transportation, thereby facilitating the expansion of trade and the emergence of civilizations across vast territories. Considered “the noblest conquest of humankind,” it is arguably the animal that has most profoundly shaped human history and progress.

In Senegal, horses are used in rural areas as draught or draft animals for cart traction, support to agricultural and livestock activities, and the transport of agricultural products to markets; they therefore remain a key means of transportation [Adjelakara Mossus \(2008\)](#), [Ndour \(2010\)](#), [Diop and Fadiga \(2018\)](#), [ANSD \(2023\)](#). In practice, the breeding and use of working equids generate an ecosystem that brings together numerous stakeholders, including cart and carriage drivers, suppliers of inputs (fodder, concentrate feeds, medicines), and service providers (veterinarians, cart repairers, farriers, saddlers, etc.) [Ly \(2003\)](#), [Akpo \(2004\)](#), [Diop and Fadiga \(2018\)](#).

From a legal standpoint, the circulation of horse-drawn vehicles used for the commercial and/or domestic transport of people and goods within Senegal is specifically governed by the provisions of Interministerial Decree No. 18457 of 9 December 2016. In addition to requirements relating to the technical characteristics and operation of horse-drawn vehicles, this decree mandates that every horse residing in Senegal be provided with a health and identification booklet. Beyond the specification of applicable penalties in cases of infringement, the text explicitly includes provisions aimed at preserving animal health and protecting public health. In this regard, it requires that equids used for commercial purposes (public transport of people and goods) be certified as fit for service by the competent authority responsible for issuing certificates of fitness. Furthermore, it establishes a mandatory special health inspection every six (06) months to assess the health status of animals engaged in animal-drawn transport activities.

In urban environments, especially in Dakar, despite the presence of motorized vehicles, horses contribute to urbanization through the transport of construction materials on building sites, as well as people, goods, and household waste [Mandé \(1990\)](#), [Ly \(2003\)](#), [Diop and Fadiga \(2018\)](#). However, the contribution of draft equids to the national economy is generally considered relatively modest in terms of gross domestic product (GDP). Nevertheless, the value of their traction power far exceeds a purely economic perspective and would merit greater consideration in sectoral policies and strategies for the development of livestock production, agriculture, and transport [Diop and Fadiga \(2018\)](#). This contrast is notably reflected in the attention paid to their health status. Indeed, draft horses, like racehorses, should benefit from appropriate and optimal care, particularly in terms of nutrition, hygiene, and health. However, in Dakar, some owners—primarily focused on financial gain—do not always provide the attention and care these animals require [Pizzetta \(2015\)](#), [Diop and Fadiga \(2018\)](#), [ANSD \(2023\)](#).

In a context marked by widening inequalities in human development [UNDP \(2025\)](#) and in line with the national program for the development of the equine sector in Senegal [Niang et al. \(2009\)](#), [CEP and MEPA \(2016\)](#), [MEPA \(2016\)](#), [MASAE \(2025\)](#), it appears particularly relevant to examine the situation, physical health, and welfare of draft horses in Dakar. Although the overall situation at the national level tends to improve—given that the development of equine husbandry is now a governmental priority [Bah \(1993\)](#), [CEP and MEPA \(2016\)](#), [MEPA \(2016\)](#), [MEPA \(2019\)](#), [Lejosne \(2023\)](#), [Mbaye \(2023\)](#), [MASAE \(2025\)](#)—the health precariousness of draft equids has long been reflected in the limited importance accorded to them within animal health and livestock policies [Diop and Fadiga \(2018\)](#).

While the concepts of “precariousness” and “health precariousness” are relatively recent and well documented in relation to humans [Alternatives Économiques \(2014\)](#), [Spira \(2017\)](#), [Vaucelle \(2021\)](#), [Avisé \(2025\)](#)—where they refer to “a social situation in which living and employment conditions are marked by a high degree of uncertainty” [Alternatives Économiques \(2014\)](#)—they remain only marginally mobilized in animal health. In contexts such as France, this concept is still essentially associated with humans, even when animals are at the centre of concern. This situation is partly explained by the fact that precariousness is expressed in domains such as employment, housing, food, health, education, family life, or social integration, placing individuals at the margins of poverty [Spira \(2017\)](#), [Vaucelle \(2021\)](#), [Avisé \(2025\)](#). An illustration of this dichotomy is the initiative “Veterinarians for all”, which aims to “support and empower people in situations of precariousness with regard to their responsibilities toward animals, while preserving the human–animal bond, sometimes the last barrier against social exclusion” [Guérin \(2021\)](#).

In Senegal, where issues of precariousness and poverty remain significant—as illustrated by the Harmonized Survey on Households Living Standards (EHCVM) [ANSD \(2024\)](#) and a Human Development Index (HDI) of 0.530 in 2025—new approaches are nevertheless emerging that seek to break down barriers between academic knowledge and social concerns. These include studies on the costs and benefits of animal welfare [Nalovic \(2023\)](#), [Dasinieres \(2025\)](#) as well as integrated approaches under the “One Health” concept. Within this framework, and by analogy with the reference definition of human health, animal health may be defined as “a state of optimal physical, social, and ethnic well-being, and not merely the absence of disease or infirmity” [Ntsama Abah \(2025\)](#).

The term “*ethnic*” here refers to animal ethnicity, understood as the set of natural or acquired behavioural habits and lifestyles specific to an animal or a group of animals [Marin \(n.d.\)](#). This definition should be considered alongside that of [ANSES \(2018\)](#), which defines animal welfare as “a positive mental and physical state related to the satisfaction of physiological and behavioural needs,” as well as the position of the World Organisation for Animal Health (WOAH), for which animal welfare constitutes a component of animal health [WOAH \(2025\)](#).

Thus, animal health precariousness may be understood as the situation of an animal or an animal population lacking sufficient access to regular health monitoring and to reliable, accessible, and effective medical care, capable of objectively and sustainably improving their health and living conditions.

It is within this perspective that the present study focuses on the health precariousness of draft horses in the Rufisque Department, in the Dakar Region, with particular emphasis on their conditions of use and management. To this end, a survey adopting a pragmatic approach—adapted to field constraints and embedded within an integrated vision of animal health—was conducted among draft horse owners in Rufisque.

MATERIALS AND METHODS

The Ecole Inter-Etats des Sciences et Médecine Vétérinaires (EISMV) is affiliated with Cheikh Anta Diop University (UCAD) in Dakar. Accordingly, all experimental procedures were conducted in compliance with the recommendations of the UCAD Research Ethics Committee [UCAD \(2024\)](#) and applicable Senegalese legislation.

SELECTION AND CHARACTERISTICS OF THE STUDY AREA

In the Dakar Region, draft horses are used for the transport of people and goods, particularly in areas that are difficult to access by cars and other motorized vehicles. Consequently, they are mainly concentrated in the peri-urban zones of Dakar, notably in Rufisque, due to the proximity of farriers and, above all, the availability of vacant land allowing the establishment of traditional stables, commonly referred to as “*thioury*”. Within these facilities, owners are able to tether their animals individually.

Accordingly, this study was conducted from March to June 2021 (four months) in the Rufisque Department, located approximately 25 km southeast of the city of Dakar, between parallels 14°41′ and 14°46′ North latitude and meridians 17°15′ and 17°20′ West longitude, at the extreme western edge of the Senegalese–Mauritanian Meso-Cenozoic sedimentary basin. Rufisque is the only department in the Dakar Region that encompasses both urban and rural areas. Divided into three district municipalities and covering an area of 371 km², Rufisque constitutes the sole terrestrial entry and exit route to Dakar, the capital city of Senegal.

According to statistics from the National Agency for Statistics and Demography [ANSD \(2023\)](#), equids account for approximately 2% of the livestock population recorded in Rufisque, as well as in the other departments of the Dakar Region [Table 1](#). However, the distribution of horses, donkeys, and other livestock categories in the Rufisque Department differs significantly from that observed in the other departments of the Dakar Region ($p < 0.05$; $\alpha = 0.05$). In Rufisque, there is approximately one donkey for every five horses. These proportions differ from regional statistics, which indicate approximately one donkey for every seven horses across the entire Dakar Region, and about one donkey for every thirty horses in the other departments of this region [Table 1](#).

Table 1

Table 1 Distribution of Horses, Donkeys, and Other Livestock Populations in Rufisque and the Dakar Region			
Livestock type	Rufisque Department	Other departments (excluding Rufisque)	Dakar Region
Horses	4,015	3,255	7,270
Donkeys	927	116	1,043
Other livestock	1,55,831	1,35,442	2,91,273
Total	1,60,773	1,38,813	2,99,586

Source: [ANSD \(2023\)](#)

DRAFT HORSE OWNERS INCLUDED IN THE STUDY SAMPLING STRATEGY

In order to reconcile speed and practicality, remain economically affordable, and limit respondent burden, a non-probability sampling method based on voluntary participation of animal owners was adopted. Owners included in this study were recruited in areas with a high concentration of equine populations, making it possible to enrol a sufficiently large and representative sample of draft horses while facilitating the acquisition of consent from the greatest possible number of owners.

TECHNICAL AND EDUCATIONAL MATERIALS

Survey forms were developed to collect data from the various stakeholders involved in equine sector activities in Rufisque (horses, owners, users). The design of the survey forms, as well as data processing and analysis, were carried out using several computer-based tools, including Microsoft Office 2016® (Word®, Excel®), XLSTAT® (versions 2022.4.5 and 2025.1.3), IBM SPSS Statistics® (version 25), R (version 4.5.1) [R Core Team \(2025\)](#), RStudio [Posit Team \(2025\)](#), BiostaTGV [iPLesp et al.\(n.d.\)](#), and Sample Size Calculators [Kohn and Senyak \(2025\)](#).

The methodological choices resulted from a combination of recommendations derived from the social sciences [Cibois \(2007\)](#), [Martin \(2007\)](#), [Rédaction Quanti IHMC \(n.d.\)](#) and from biological, medical, and veterinary research [Toma et al. \(2010\)](#), [StatCan \(2021\)](#), [Jauzein \(2022\)](#), [Rédaction Thot Cursus \(2022\)](#), [Rédaction Quanti IHMC \(n.d.\)](#).

STUDY METHODS

The study methods primarily relied on interviews with owners and on the identification of the animals included in the study.

OWNER INTERVIEWS

Questionnaires were administered at various locations, depending on the availability of horse owners, including animal resting sites, in front of shops, at the owners' homes, or at the clinic. These interviews were structured around the parameters recorded in the survey forms, notably including:

- the socio-economic status of the owners (name, region of origin, main occupation, etc.).
- herd structure (total number of animals, breeds used, etc.).

ANIMAL IDENTIFICATION

Despite legal requirements, such as those stipulated by Interministerial Decree No. 18457 of 9 December 2016 regulating animal-drawn vehicle transport in Senegal, the animal identification system remains in the process of modernization [CEP and MEPA \(2016\)](#), [MEPA \(2016\)](#). Consequently, the identification of horses included in this study relied on traditional descriptive identification.

Establishing a horse's descriptive identification is equivalent to creating its identity card. The objective is to record all characteristics enabling its identification, including species, sex, breed, age, height, coat color, type of service, extremities, and distinctive markings [Chuit \(1991\)](#), [Douart \(2008\)](#), [Dubois \(2014\)](#), [IFCE \(2019\)](#), [Cissé et al. \(2025\)](#). In addition to being identified by a sequential number assigned at the time of enrolment in the study, the horses were systematically linked to their respective owners.

RESULTS

This section presents the characteristics of the owners included in the study, the typology of the horses owned, as well as selected aspects related to the management and use of draft horses in Rufisque.

GENERAL CHARACTERISTICS OF HORSE OWNERS

Data were collected from 134 owners, all male, aged between 17 and 63 years, with a mean age of 32 years. These individuals owned a total of 153 working adult draft horses, all male, belonging to local breeds (Mpar, Mbayer, Fleuve, and Foutanké) and housed in traditional stables.

With regard to marital status, 57% of the owners were married, 41% were single, and 2% were divorced. None of the owners were native to the Dakar Region; however, they resided there for professional reasons. They belonged to various ethnic groups in Senegal, mainly Serer (42%), Wolof (33%), Lebou (17%), and Fulani (Peul) (8%).

TYOLOGY OF DRAFT HORSES OWNED BY THE PROPRIETORS

Among the 153 locally bred draft horses owned by the proprietors included in this study, 63 individuals (41%) belonged to the Mpar breed, 47 (31%) to the Mbayer breed, 23 (15%) to the Fleuve breed, and 20 (13%) to the Foutanké breed.

The mean number of horses per owner was 1.1. However, the number of horses owned ranged from one (1) to five (5), and 97% of owners owned one (1) to two (2) horses. In addition, 31% of the horses were aged between 2 and 5 years, 40% between 5 and 10 years, and 29% were over 10 years old.

ACTIVITIES OF THE HORSES

The horses were used for various types of activities. Of the 153 horses in the sample, 106 (69%) were used for cart traction, 32 (21%) for carriage traction, while 15 horses (10%) were alternately used for both types of traction.

With respect to working duration, the majority of owners (78%) worked their animals throughout the entire week, whereas the remaining owners (22%) used them for six days per week.

SELECTED ASPECTS OF HORSE HUSBANDRY AND CARE

The management, care, use, and handling of horses were assessed based on various aspects of their living conditions, including housing (accommodation and environment), feeding (quality, quantity, hydration, and schedule), and health, with a primary focus on physical well-being.

HOUSING

None of the horses encountered were truly free-ranging. During rest periods, they were most often kept tethered in a “*thioury*”, which in practice corresponds to a vacant plot of land. This type of housing is not necessarily optimal with regard to their ethology, particularly due to the absence of fencing, roofing, and adequate or sufficient bedding, among other shortcomings [Figure 1](#).

Figure 1



Figure 1 Traditional Resting Area (“*thioury*”) of Draft Horses in Rufisque.

FEEDING

According to the survey results, the horses’ diet mainly consisted of groundnut hay, millet, sorghum, and maize. However, the feeding regimen varied among owners. Among the 134 respondents, nearly 29% reported providing 5–7 kg of feed per day to their animals, while 64% supplied between 2 and 5 kg per day, and only 7% offered 1–2 kg per day.

Regarding feeding frequency, 76% of owners provided two daily meals, whereas 24% offered three. Watering was also an important component of dietary management: the majority of owners (approximately 83%) used tap water, while the remaining 17% relied on well water. Furthermore, 28% of owners reported watering their horses twice daily, with higher proportions for those providing water three times a day (39%) or *ad libitum* (33%).

HEALTH

Concerning medical history, 93 horses (61% of the sample) that had experienced various diseases were treated exclusively with traditional medicine (use of tree leaves, herbal decoctions, and occasionally amulets or talismans attached to the horse’s body). In

contrast, 54 horses (35%) were treated solely with modern veterinary medicine, and only 6 horses (4%) received combined treatments integrating both traditional and modern approaches.

It should be noted that veterinary consultations were not systematic, with animals most often being cared for directly by their owners. This situation is particularly concerning for oral and dental conditions, as owners acknowledged that they do not routinely examine the horses' oral cavities.

DISCUSSION

In sub-Saharan Africa, the importance of using draft animals for agriculture and transport, particularly in rural areas, is widely recognized. In this context, draft animals—including horses, donkeys, camels, buffaloes, and cattle—represent a major source of animal traction, helping to reduce the physical burden of agricultural work as well as other activities such as transportation. Their contribution is multifaceted and varies depending on the context, whether exclusively rural, urban, or mixed [Munzinger et al. \(1982\)](#), [Starkey and Faye \(1990\)](#), [Wilson \(2003\)](#), [FAO \(2010\)](#), [Diop and Fadiga \(2018\)](#), [Miara et al. \(2023\)](#).

The Dakar Region aligns with this observation: equid exploitation is widespread, both in urban centres and in peri-urban areas, such as the Rufisque Department. In urban centres, these animals are used for transporting people and various materials and goods—including cement bags, rebar, gas cylinders, beverages, household waste collection, and agricultural products to markets—usually for a fee.

Although donkeys can also perform such tasks in urban settings, they are less visible in large urban centres such as Rufisque, where the horse remains the preferred draft animal [Diop and Fadiga \(2018\)](#).

CONTRIBUTION OF THE HEALTH PRECARIOUSNESS APPROACH

In a context marked by growing inequalities within human societies, and where animal health is not limited to the mere prevention of contagious diseases, numerous concepts have emerged emphasizing the unity of nature and health: “One Health”, “One Forensic”, “One Violence”. etc. [NFAHW Council \(2017\)](#), [Garcia \(2017\)](#), [Fraser \(2018\)](#), [García-Ruiz et al. 2025](#), [Ntsama Abah \(2025\)](#), [Centre pour la Communication Scientifique Directe. \(n.d.\)](#). These approaches also advocate for integrating social, environmental, and economic concerns into activities of a company or organization, in interaction with all relevant stakeholders—for example, through corporate social responsibility (CSR) frameworks [Eurogroup for Animals \(2018\)](#), [Delcros \(2023\)](#), [Falc'hon \(2023\)](#), [Garcin \(2023\)](#), [A \(2024\)](#), [B and AFP \(2024\)](#), [Gisie \(2024\)](#), [Sourdet \(2024\)](#), [Gayraud \(2025\)](#). It is thus essential to pursue approaches that do not stigmatize and that take into account the realities of the most disadvantaged populations.

Generally, animal research emphasizes physical health and/or animal welfare dimensions [Lerner \(2008\)](#), [Lerner \(2016\)](#). While these approaches are relevant, they can fragment animal health issues by prioritizing a particular aspect or dimension of sanitary and zoonotic problems [Ntsama Abah \(2025\)](#). For instance, animal experimentation should not be conflated with autopsy.

It is important to emphasize that animal health is not limited to contagious diseases, and it is not always advisable to separate welfare or wellbeing from health [Ntsama Abah \(2025\)](#). Contemporary developments recommend simultaneously considering individual, collective, and environmental dimensions. Animal suffering may be individual, collective, or related to specific environmental conditions. This is particularly critical for aquatic species, whose survival is directly affected by variations in temperature, pressure, or chemical properties of their environment (salinity, oxygen levels, etc.) [Ntsama Abah \(2025\)](#).

In this context, the interministerial decree n° 18457 of 9 December 2026, which states that “it is prohibited to employ equids (for commercial and/or domestic purposes) whose weakness, illness, vices, infirmities, injuries, lameness, or decrepitude render them unfit for traction,” aligns with national, regional, and international recommendations [ANSES \(2018\)](#), [Nteme Ella et al. \(2025\)](#), [WOAH \(2025\)](#).

Moreover, it is essential not to “dehumanize” humans in the process of better humanizing animals. The relevance of approaches focused on abuse, CSR, or law enforcement necessarily depends on the context. The law itself operates within social and economic environments [Von Jhering \(1875\)](#), [Aspe and Jacqué \(2012\)](#), [Rouvière \(2018\)](#), [Rom et al. \(2022\)](#) and acts that compromise animal health or welfare cannot be assessed without considering the underlying circumstances. Depending on the situation, mistreatment may result from negligence, behavioral disorders (e.g., Noah's or Diogenes syndromes), incidental infractions (such as theft or non-compliance with transport standards), or intentional cruelty toward animals, with or without profit [Ascione et al. \(2007\)](#), [Hayes \(2010\)](#), [Andrade and Anneberg \(2014\)](#), [Devitt et al. \(2015\)](#), [Jegatheesan et al. 2017](#), [Fraser \(2018\)](#), [Stumpf et al. \(2023\)](#), [Animal Equality United Kingdom \(2024\)](#), [Touré \(2020\)](#), [Universities Federation for Animal Welfare](#), and [Fraser \(2024\)](#), [UNODC \(2024\)](#), [Magalie \(2025\)](#), [EWFN \(n.d.\)](#), [TRACE Wildlife Forensics Network \(n.d.\)](#).

In cases of neglect or insufficient veterinary care, it is crucial to situate the debate in the Senegalese or African context, which differs significantly from European or North American settings. Animal Health Canada or AHC (formerly National Farmed Animal Health and Welfare Council or NFAHW Council) emphasizes that rural populations are generally disadvantaged regarding animal health and welfare due to geographic factors, limited access to resources, and barriers to veterinary services [NFAHW Council. \(2017\)](#), [AHC \(2022\)](#).

In Senegal, ranked among low-HDI countries (169th out of 193 countries) [UNDP \(2025\)](#), a substantial portion of the population lives in poverty or precarious conditions, characterized by instability, uncertainty, and fragility. For these individuals and families, integrating the study of animal health precariousness within a multidisciplinary, interdisciplinary, and transdisciplinary perspective allows the development of the “Southern approach”: a normative, political, economic, and social framework that promotes the implementation of context-appropriate, non-stigmatizing solutions.

This approach also implies considering traditional knowledge and practices in modern veterinary medicine. Facing the challenges in developing countries (costs, accessibility, diverse sociocultural contexts), many international bodies recommend endogenous health development strategies that integrate traditional medicine, using substances derived from the animal, plant, and mineral kingdoms. These recommendations are accompanied by the need to establish a modernized and coherent legal framework that guarantees safe and accessible care while valuing historical and cultural knowledge [Dembélé \(1997\)](#), [WHO \(1991\)](#), [WHO \(2013\)](#), [WHO \(2025\)](#), [Tchetan et al. \(2021\)](#), [Ntsama Abah \(2025\)](#).

SAMPLE CHARACTERISTICS COMPARED TO THE SENEGALESE AND AFRICAN CONTEXT

In our sample, all horses were male. This observation is noteworthy because dental formulas vary between males and females [Barone \(1996\)](#), [Boyer \(2007\)](#), [Douart \(2008\)](#). However, this is not surprising in the Senegalese context. Most horses remain intact, very few are gelded, and consequently, geldings are scarce. Additionally, draft work is considered a low-status activity, generally reserved for males and, to a lesser extent, geldings. As a result, the use of females for draft work, particularly mares, is minimal or non-existent. Although data remain limited, the literature already indicates that primary draft animals are adult males, geldings, and, to a lesser extent, non-productive females [Lawrence et al. \(1993\)](#), [du Toit et al. \(2008\)](#), [Mota-Rojas et al. \(2021\)](#). An argument often cited by owners reluctant to use females is that they are generally less powerful than males [Santos et al. \(2015\)](#), [Tariq \(2024\)](#).

The owners included in this study were all male, reflecting in part the social realities of Senegal [Mbow \(2000\)](#), [Fall-Sokhna and Thiéblemont-Dollet \(2009\)](#), [Diop and Fadiga \(2018\)](#) and the difficulty of addressing gender issues in some research contexts. This sociological reality, combined with occasional material constraints [Diop and Fadiga \(2018\)](#), may give the impression that the role of females in animal traction is overlooked. In reality, especially in rural or mixed settings, draft work is used as a means to alleviate labour-intensive tasks, such as water collection.

It is also important to note that alongside horses, there is often a significant population of donkeys, as in Rufisque, where they represent 18.8% of domestic equids [ANSND \(2023\)](#). Donkey-drawn carts are generally operated by women during transhumance periods and are used to transport children, young livestock (lambs, kids), and household items (mattresses, utensils, tarpaulins, wardrobes, etc.) [Diop and Fadiga \(2018\)](#).

According to [ANSND \(2023\)](#), the male population in Rufisque is 289,670 individuals, representing approximately 7% of the Dakar region's population. This proportion corresponds to slightly more than half of the department's total population. Senegal's age pyramid reflects the typical structure of a developing country. In the Dakar region, about 67% of the population is of working age (15–64 years), while only 2% work in the agricultural sector, which includes crop farming, livestock, and mixed activities [Vitta \(1936\)](#). This proportion is supported by the fact that 99% of Dakar households engage in agro-pastoral activities [DAPSA \(2023\)](#). However, extreme poverty is less pronounced in this region compared to other parts of Senegal [ANSND \(2024\)](#).

The studied sample represents approximately 3% of working-age men in the agricultural sector, which is an indicative estimate to be refined. Regarding marital status, the proportions observed in our sample do not differ statistically from national data (single: 38%; married: 56%; divorced/separated/widowed: 6%) according to Fisher's exact test [ANSND \(2023\)](#). The average number of horses per owner in our study (1.1) is lower than the regional and departmental average (2 horses per household), which is the highest in Senegal [ANSND \(2023\)](#), [DAPSA \(2023\)](#). Compared to other species, the average number of animals per household in Dakar is as follows: goats 11.8; sheep 6.9; cattle 5.1; with the exception of poultry [ANSND \(2023\)](#), [DAPSA \(2023\)](#). This contributes to the perception that the economic contribution of draft equids is modest.

In general, our sample shows a predominance of Mpar (41%) and Mbayer (31%) horses compared to Fleuve (15%) and Foutanké (13%) horses in Rufisque. This distribution can be explained by the fact that Mpar and Mbayer horses, being more compact, are better adapted to sandy areas [Ndour \(2010\)](#), [MEPA \(2019\)](#).

Regarding draft horse management, evaluated based on housing, feeding, and physical health, our results reveal that practices vary among owners and require improvement, particularly following the repercussions of the COVID-19 pandemic [ANSND \(2021\)](#). As reported by [Ndour \(2010\)](#), horses are often tethered in unprepared open areas called “*thioury*”, exposing them to adverse weather and security risks.

Within the framework of Senegal's equine sector development program [Niang et al. \(2009\)](#), [CEP and MEPA \(2016\)](#), [MEPA \(2016\)](#), [MASAE \(2025\)](#), it would be desirable for authorities, in collaboration with stakeholders (civil society organizations, breeders' associations, etc.), to develop more suitable living spaces for draft horses in Rufisque. This measure is particularly important given the extensive nature of the husbandry system. Indeed, transitioning from an extensive to an intensive system can lead to the emergence of dental disorders in equids [Muñoz et al. \(2010\)](#), [Jacques et al. \(2011\)](#), [Lima et al. \(2011\)](#), [Leite et al. \(2019\)](#).

Overall, more than 90% of owners feed their horses more than 2 kg of feed per day, and over 80% provide water. This aligns with observations by [Diop and Fadiga \(2018\)](#), who noted that feed and water constitute the largest expense category for equine-drawn vehicles (carts and carriages), representing approximately 79% of daily costs, with an average expenditure of six euros per day in the Dakar region. However, disparities in feeding and watering frequency suggest a risk of nutritional deficiency, potentially leading to low performance and disease onset [Mandé \(1990\)](#), [Djimadoun \(1994\)](#).

HEALTH MONITORING AND THE ASSESSMENT OF HEALTH PRECARIOUSNESS IN DRAFT HORSES

Regarding health monitoring and medical care, veterinary consultation is not systematic: more than half of the horses are treated exclusively using traditional methods. Beyond this lack of veterinary follow-up and the predominance of traditional medicine, the health of these horses requires various adjustments, as many owners do not manage their animals adequately [Ndour \(2010\)](#), [Diop and Fadiga \(2018\)](#). These observations are not surprising, given that [Diop and Fadiga \(2018\)](#) reported that the cost of healthcare for equine-drawn vehicles (carts and carriages) represents only 3% of daily expenses, estimated at an average of six euros in the Dakar region.

A clear example of the health precariousness of draft horses is the early detection of dental disorders. Oral hygiene is rarely, if ever, practiced by owners in the Rufisque department [Djimadoun \(1994\)](#), [Ndour \(2010\)](#), [Diouf \(2013\)](#). Yet, even minor dental issues can compromise chewing efficiency, promote digestive disorders, deteriorate the overall condition of the animal, and reduce its draft performance [White \(1990\)](#), [Dixon and Dacre \(2005\)](#), [Tamzali \(2006\)](#), [Cox et al. \(2007\)](#), [du Toit et al. \(2009a\)](#), [du Toit et al. \(2009b\)](#), [Dubois \(2014\)](#).

This health precariousness is exacerbated by the fact that many conditions, particularly those that are visible and accessible, such as wounds, are mostly treated using traditional remedies. A paradox arises: without imaging or thorough dental examination, visual diagnosis between persistent deciduous teeth and supernumerary teeth (polydontia) can be difficult, depending on wear and tooth location.

Among the Peul, for instance, disease recognition distinguishes external and internal illnesses, fatal and non-fatal conditions, and illnesses affecting young versus adult animals. It also incorporates a supernatural component, ranging from superstition to beliefs whose rationality may be debated. Pragmatically, through keen observation, they perform incisions or excisions with knives on infected wounds, abscesses, or tumours, before suturing with plant fibres or applying palm oil or other remedies that appear effective [Bah \(1993\)](#), [Lobry \(2003\)](#). However, for fractures or supernumerary teeth, veterinary intervention remains necessary.

The aim is not to favour traditional medicine over conventional medicine, or vice versa, but to choose the most appropriate solution according to the socio-economic context. Beyond contemporary imperatives, such as combating antimicrobial resistance (AMR) [Ntsama Abah \(2025\)](#), [WOAH \(n.d.\)](#), the “[World Health Organization \(WHO\) \(2025\)](#)” emphasizes that traditional medicine “refers to codified or non-codified systems for healthcare and well-being, comprising practices, skills, knowledge and philosophies originating in different historical and cultural contexts, which are distinct from and pre-date biomedicine, evolving with science for current use from an experience-based origin. Traditional medicine emphasizes nature-based remedies and holistic, personalized approaches to restore balance of mind, body and environment.”

This health precariousness should also be considered in light of the small population of draft equids, raising questions about the economic profitability of the equine and donkey sectors and not always reflecting their social contribution [Diop and Fadiga \(2018\)](#).

The prosperity of any livestock sector largely depends on the theoretical and practical knowledge of stakeholders. Therefore, strengthening the capacity and expertise of these actors is essential. In this context, equine dentistry remains nascent in intertropical Africa due to insufficient infrastructure, a lack of expertise adapted to vulnerable contexts, prohibitive costs of specialized care, and the imprecision of visual diagnoses.

Developing the equine sector in Senegal is now a governmental priority, supported by international collaborations, for example with Morocco or France [Ba \(2023\)](#), [Lejosne \(2023\)](#), [Mbaye \(2023\)](#). In this regard, the EISMV recently established a residency program in working equid medicine, representing a sustainable development avenue for the veterinary profession and the health of working equids in intertropical Africa [Lejosne \(2023\)](#).

These findings highlight the importance of implementing awareness campaigns on oral health and health monitoring for draft horses among breeders, in order to reduce health precariousness and improve both performance and animal welfare.

SAMPLE SIZE AND STATISTICAL POWER

In practice, it is easier to recruit a horse when it is in a resting area or requires veterinary or farriery services than when it is actively engaged in economic work for its owner or about to return home. However, the application of appropriate statistical methods allows for consideration of individual variability and sampling fluctuations, which often simplify reality [Piant \(2007\)](#), [Indrayan and Mishra \(2021\)](#), [CEP and MEPA \(2016\)](#).

If the conditions for applying Fisher's exact test were met for our data [Bower \(2003\)](#), [Indrayan and Mishra \(2021\)](#), [Hae-Young, 2017](#)), it is then pertinent to examine the statistical power of this study. According to ANSD, the equine population of Rufisque in 2020–2021 was estimated at 4,942 individuals, including 927 donkeys (18.8%) and 4,015 horses (81.2%) [ANSD \(2023\)](#). However, the available data did not specify the male-to-female ratio, particularly for draft horses.

In the absence of context-specific data for Senegal, one can refer to ratios observed in similar studies [du Toit et al. \(2008\)](#) or among racehorses, which indicate that approximately 65–75% of horses are males (stallions and geldings), due to their physical strength, endurance, and focus [Tariq \(2024\)](#). Based on this, it can be estimated that the population of male draft horses in Rufisque in 2021 ranged between 2,610 and 3,011 individuals.

For a confidence level of 80% and a margin of error of 5%, the expected sample size would therefore be between 155 and 156 individuals. The number of horses included in this study closely matches this estimate. In the absence of more detailed censuses in the Senegalese context, it is reasonable to consider that this study has sufficient statistical power while optimizing human, financial, and logistical resources.

LIMITATIONS AND SCOPE OF THE STUDY

This study presents several limitations, particularly regarding the recruitment methods for owners and animals, the assumptions employed (male/female ratio), and the obtained sample size. Indeed, the sample of owners and animals included in this study was not constituted using a probabilistic sampling method (simple random, systematic, stratified, etc.), which limits the assumptions that can be made about the distribution of the observed variables. This also introduces challenges in terms of sample quality, as the data collected from owners were more or less conditioned by their availability.

In this context, it is not possible to completely rule out the existence of selection or undercoverage bias, meaning that certain units of the population had little or no chance of being included in the sample. As mentioned previously, the absence of female animals in our sample illustrates this limitation and prevents the formulation of robust hypotheses regarding the similarity between our sample and the equine population of Rufisque. This precaution is particularly relevant because, in the Dakar region, observations related to draft horses cannot be directly extrapolated to racehorses, which operate under different economic paradigms focused on performance and the inclusion of imported breeds [Ba \(2023\)](#).

Furthermore, the male/female ratio used in this study deserves attention. Not only was this ratio not derived from data specific to the Senegalese context, but it was primarily based on studies concerning racehorses [Touzot-Jourde \(2006\)](#) or donkeys [du Toit et al. \(2008\)](#). The male/female ratio of horses depends on several factors, such as the animal's level of confinement or freedom, its use (breeding, work, leisure), genetic selection, and local or national practices [Santos et al. \(2015\)](#).

These methodological limitations should, however, be put into perspective. The primary objective of this study was not to impose a rigid methodology that could bias the results, but rather to adopt a pragmatic approach suited to field realities in order to better understand the precarious conditions of draft horses in Rufisque, in the Dakar region. This approach is particularly relevant in contexts where acts of neglect, cruelty, or animal mistreatment are frequently encountered [Ascione et al. \(2007\)](#), [Hayes \(2010\)](#), [Andrade and Anneberg \(2014\)](#), [Devitt et al. \(2015\)](#), [Jegatheesan et al. 2017](#), [Fraser \(2018\)](#), [Stumpf et al. \(2023\)](#), [Animal Equality United Kingdom \(2024\)](#), [Touré \(2020\)](#), [Universities Federation for Animal Welfare](#), and [Fraser \(2024\)](#), [UNODC \(2024\)](#), [Magalie \(2025\)](#), [EWFN \(n.d.\)](#), [TRACE Wildlife Forensics Network \(n.d.\)](#).

It is recognized that many disciplines can contribute their methods and knowledge to understanding "health precariousness": sociology, history, anthropology, demography, political science, law, philosophy, etc. [Anonymous \(2017\)](#). Within this framework, this study, which bridges academic knowledge and social concerns, provides an original and essential contribution to understanding the health of draft horses in Senegal and Africa. It should also be noted that, in certain African regions, access to complete and reliable data has historically been a significant obstacle to veterinary and epidemiological research [Spinage \(1973\)](#), [Putt et al. \(1987\)](#), [Chabchoub et al. \(2005\)](#), [Ntsama et al. \(2024\)](#), [Nteme Ella et al. \(2025\)](#). In this context, the data collected, despite field constraints, represent a significant advance for an approach such as ours.

CONCLUSION

In Senegal, the horse plays a major socio-economic role, particularly in densely populated areas such as the urban and peri-urban centres of the Dakar region. However, draft horses remain, in a singular way, marginalized in terms of care and welfare. Despite their economic and social importance, these horses face significant health constraints that limit their performance and contribution to human activities.

In terms of zootechnical and health management, deficiencies have been observed regarding housing, feeding, and veterinary follow-up, responsibilities that primarily fall on the owners. In a context where animal health is not limited to the prevention of transmissible diseases—as illustrated by recent concepts such as "One Health", "One Forensic" or "One Violence"—the study of health precariousness opens the way to what could be called the "Southern approach." This normative, political, economic, and social

approach aims to develop tools, techniques, and innovations that do not stigmatize, but instead examine the link between human and animal precariousness.

While further studies are needed to deepen the dialogue between academic knowledge and social concerns, particularly in contexts where animal health precariousness has persisted for decades, it is essential to raise awareness and strengthen the skills of stakeholders in the equine sector. These actions will improve the health of draft horses and ensure responsible, sustainable, and beneficial use for both animals and local populations.

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