ANIMAL PRODUCTION

Using the five domains to assess the well-being of equines in the municipality of Juatuba – state of Minas Gerais

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ABSTRACT. Due to the growth of horse breeding in Minas Gerais, there has been an increase in the number of horses kept in individual stalls, which compromises their health and favors the appearance of stereotypies, as horses are highly influenced by environmental conditions. In order to assess and minimize the effects of confinement, an analysis form was drawn up based on the Five Domains model and the Animal Welfare Assessment (AWA) practical guide. The aim of the study was to evaluate and quantify the EW status of 12 farms in the city of Juatuba, in the metropolitan region of Belo Horizonte, Minas Gerais. The data was analyzed by analysis of variance, using the FREQ procedure of SAS, version 9.0 (SAS Inst. Inc., Cary, NC, USA). The Welfare Assessment Form made it possible to identify which aspects within the Five Domains could be improved to ensure a better quality of life for the animals. The properties evaluated had a satisfactory Welfare status in general, but some specific characteristics require adjustments to meet the criteria mentioned.

Keywords: Confinement; behavior; stereotypy; health; equids.

Introduction

Currently, society is moving in a new direction to promote a deeper respect in our interactions with animals. This includes not only their breeding and use as food sources but also other purposes such as companionship, sport, work, and more. In recent decades, the science of animal welfare and its concepts have been widely debated, mainly because of the conditions imposed on domestic and wild animals in captivity.

In their natural environment, horses spend approximately 60 to 70% of their time grazing in open pastures and living in social groups. The remainder of their time is devoted to social interaction with other conspecifics, interspersed with periods of rest and searching for new pastures or other activities (Melo et al., 2021). In contrast, as horses have been domesticated for various purposes, such as sport, recreation, and work, they have been removed from their free-ranging habits, which directly affects their well-being.

Typically confined, these animals have their social interactions and environmental engagement reduced to long hours in stalls. This management alters their feeding habits, reducing forage intake and increasing the supply of concentrates. Under these conditions, horses spend most of their time inactive and become susceptible to various diseases (Melo et al., 2022).

The principle of the five freedoms advocates good welfare practices at different stages of the breeding and use of different domesticated species by humans (Mellor et al., 2020). The application of welfare principles points to effective approaches that often ensure success, particularly in terms of performance. The concept of the five freedoms emphasizes sound welfare practices at different stages of the breeding and use of different domestic species by humans (Mellor et al., 2020).

Considered as an expression of care, welfare practices are premised on providing animals with as natural an environment as possible and categorically avoiding adverse situations that could lead to physiological and athletic decline (Schmidek, 2018). Thus, Mellor and Reid (1994) developed the Five Domains of Animal Welfare (AW), a model designed to assess AW in a more complete, systematic, and comprehensive manner. AW considers the biological needs of animals to gain a better understanding of their welfare based on physiology by assessing the physical/functional elements and subsequently identifying the impact these would have on the affective experience.

The first four domains are "nutrition and hydration," "environment," "health and functional status," and "behavior"; the fifth domain, "mental state," reflects all the effects of the four primary physical/functional

domains. The five-domain model provides a useful framework for assessing the impact of humans on the psychological well-being of animals in their care (Webster, 2016) and encourages discussion of the impact of each domain on the mental state (McGreevy et al., 2018).

Therefore, the aim of the present study was to evaluate and quantify the AW status of confined horses.

Material and methods

Twelve properties in Juatuba, in the metropolitan region of the city of Belo Horizonte, Minas Gerais state (longitude: -44.3367, 19° 57′ 8″ South, 44° 20′ 12″ West) were visited from March to April 2022 to evaluate and record the items on the evaluation form. Each property was identified according to its purpose: stud farms, training centers, rehabilitation centers, and amateur breeders. Each property was assigned a number corresponding to the visit. Males and females over 1 year of age were evaluated. Animals were housed in wooden enclosures or masonry stalls measuring 4 m^2. Each pen had a food trough and a water trough.

To conduct the evaluation, it was necessary for only one evaluator to perform the evaluations in order to obtain the most consistent results possible. Finally, the scores were tallied, and the welfare status of the properties was determined. An evaluation form was developed based on the five-domain model and the Practical Guide for AW Evaluation (Figure 1):

Welfare Assessment Form
Ownership:
Number of Animals:
AREA 1 - NUTRITION AND HYDRATION
(   ) Sufficient food
(   ) Plenty of water
(   ) Varied food (tastes, textures, smells)
(   ) Quality food (feed, concentrate, quality pasture)
(   ) Clean water
DOMAIN 2 – ENVIRONMENT
(   ) Thermal comfort
(   ) Comfortable/nonslip floor
(   ) Fresh, renewed air/ventilation
(   ) Viewing other animals
(   ) Clean place
DOMAIN 3 - HEALTH AND FUNCTIONAL STATUS
(   ) Robust animals
(   ) No injuries/wounds/scars
(   ) Physically well conditioned
(   ) Healthy/tick-free animals
(   ) Up-to-date health program/vaccinations
DOMAIN 4 - BEHAVIOR
(   ) Able to explore
(   ) They live well in herds
(   ) They are sociable (with humans)
(   ) They exercise/play freely
(   ) Well-conditioned environment
DOMAIN 5 - MENTAL STATE
(   ) Pleasure in eating and drinking water
(   ) Feels comfortable in the environment
(   ) Herd behavior
(   ) Healthy, happy appearance
(   ) Not scared in the presence of humans

Figure 1. Well-being assessment form.

Five aspects were selected within each domain, each scoring between 0 and 2 points. Each domain could score a maximum of 10 points, so that the total score could be a maximum of 50 points. Based on the total score, it was possible to determine the welfare status of the animals, which was classified as follows:

0-9 points: Status E - *Extremely negative*

10-19 points: Status D - *Negative*

20-29 points: Status C - *Neutral*

30-39 points: Status B - *Positive*

40-50 points: Status A - *Extremely positive*

Thus, those attributes that approached the maximum score achieved a better welfare status, indicating a more appropriate quality of life for the animals. To create the tables, the sum and arithmetic mean of the scores were calculated for each item on the evaluation form. This made it possible to identify the most deficient characteristics and to suggest management practices that could help the evaluated horses achieve a satisfactory quality of life.

The conditions were classified as follows:

0-0.5 points on average = *very poor*

0.6-1.0 points on average = *poor*

1.1-1.5 points on average = *fair*

1.6-1.9 points on average = *good*

2.0 points on average = *very good*

Data were analyzed by analysis of variance using the FREQ Procedure of SAS version 9.0 (SAS Inst. Inc., Cary, NC, USA).

Variables were analyzed according to the model:

$$Yij = \mu + Ti + Bj + \varepsilon ij \tag{1}$$

where:

Y_{ij}: observation related to treatment "i" in block "j";

μ: constante associada a todas as observações;

T_i: effect of the evaluated farms "i," with "i" = 1, 2, 3...12;

B_j: block effect "j," with = 1, 2, 3...12;

ε_{ij}: experimental error associated with all observations (Y_{ij}), which is independent and, by hypothesis, has a normal distribution with a mean of zero and variance δ^2.

Results and Discussion

Based on the averages observed in Table 1, most of the properties evaluated achieved Welfare Status "A" (extremely positive), indicating that the horses on these properties enjoy a satisfactory quality of life. One property achieved Welfare Status "B" (positive), indicating that although the situation is satisfactory, there is still some need for improvement, particularly in animal health. A vaccination program is extremely important in maintaining the health of the animals.

Table 1. Scores and welfare status achieved by the evaluated properties

Property	Domain					Total	Status
	1	2	3	4	5		
1	9.7	9.8	10	9.9	10	49.4	A
2	9.8	9.8	10	10	10	49.6	A
3	10	9.6	10	10	10	49.6	A
4	8.0	10	8.0	10	9.3	43.3	A
5	8.8	9.3	1	8	9.5	36.6	B
6	9.8	9.8	10	10	10	49.6	A
7	10.0	10	10	10	10	50	A
8	9.3	10	9.8	10	10	49.1	A
9	2.5	2.5	0	4.8	5.0	14.8	D
10	9.6	7.6	10	9.0	10	46.2	A
11	10	9.3	9.6	9.6	9.8	48.3	A
12	9.1	9.6	9.9	9.8	9.8	48.2	A

Only one property received a "D" (negative) welfare rating, indicating management failures that compromise animal welfare. In Domain 1 (Nutrition and Hydration), failures were observed in the provision of quality water and food. Domain 2 (Environment) also scored low, indicating problems with the environment in which the animals were kept. Domain 3 (Health and Functional Status) received a score of zero, indicating that the health of the animals was in a critical state. Although the results for the other domains (Behavior and Mental State) were better, they still showed deficiencies.

However, a quantitative assessment of each area reveals opportunities for improvement across the board.

For Domain 1 (Nutrition and Hydration), Table 2 shows that the characteristics "Sufficient food" and "Plenty of water," "Varied food," "Quality food," and "Clean water" achieved a maximum score of 2 (very good) in 91.67%, 75%, and 41.67% of the properties evaluated, respectively. This indicates that these farms have good management practices for these attributes. Animals were fed twice a day and had unlimited access to hay and fresh forage. However, there is room for improvement to reduce future problems such as colic and malnutrition.

Providing quality nutrition plays a critical role in the health and proper performance of horses. Diets can vary according to the specific needs of each horse, considering factors such as age, activity level, and health status. These factors can influence the amount of nutrients required, depending on the category of animal. Water is an essential substance for the life of horses, especially for performance horses during training and before, during and after competition. Horses need continuous access to clean, fresh water because the loss of just 15% of their water reserves can be fatal (Cintra, 2014). Properties that received the highest scores for water quality were found to provide clear, odorless water.

Table 2. Frequency of assessment of Domain 1: Nutrition and Hydration.

Domain 1	Frequency (%)							
	0	0.5	1	1.5	1.6	1.7	1.8	2
AS	—	8.33	—	—	—	—	—	91.67
PW	—	—	8.33	—	—	—	—	91.67
VF	8.33	—	8.33	—	—	—	8.33	75.00
QF	8.33	—	8.33	16.67	8.33	—	16.67	41.67
CW	—	—	8.33	16.67	—	8.33	25.00	41.67

SF: Sufficient food; PW: plenty of water; VF: varied food; WF: quality food; CW: clean water

Regarding Domain 2 (Environment – Table 3), for the variables "Thermal comfort," "Fresh, renewed air/ventilation" and "Visibility of other animals," it was observed that 91.67% of the properties scored the maximum (2 points [very good]). For "Comfortable/nonslip floor" and "Clean area," 41.67% of the properties scored 2 (very good) and 8.33% scored 0 (very poor). Flooring should be nonslip in order to prevent accidents and physical injuries to the animals, which can affect their musculoskeletal system, development, and performance (Leme et al., 2017).

Table 3. Frequency of assessment of Domain 2: Environment.

Domain 2	Frequency (%)				
	0	0.5	1.5	1.8	2
TC	8.33	—	—	—	91.67
CNF	8.33	—	16.67	33.33	41.67
FRAV	—	8.33	—	—	91.67
VOA	8.33	—	—	—	91.67
CA	8.33	—	—	50.00	41.67

TC: Thermal comfort; CNF: comfortable/nonslip floor; FRAV: fresh, renewed air/ventilation; VOA: visibility of other animals; CA: clean area.

In Domain 3 (Health and Functional Status – Table 4), all of the traits evaluated had a frequency of 50% or higher with a score of 2 points (very good). For "Robust animals," "No injuries/wounds/scars" and "Up-to-date health program/vaccinations," 16.67% of the evaluated traits scored 0 points (very poor) (Table 3).

Inadequate nutritional management is one of the leading causes of poor equine health. The frequent occurrence of colic, stereotypies, dental problems, body deficiencies, and the development of undesirable oral and motor habits are common due to the way these animals are fed during confinement (Leme et al., 2017).

Animal health stands out as the primary factor directly related to the quality of animal welfare. Therefore, it is recommended to implement sanitary management practices and a prophylactic plan to prevent the exposure of animals to various diseases caused by viruses, bacteria, and parasites. This includes preventive measures to avoid the spread of zoonoses that affect equines and pose potential risks to public health.

Table 4. Frequency of assessment of Domain 3: Health and Functional Status.

Domain 3	Frequency (%)						
	0	0.5	1	1.5	1.8	1.9	2
RA	16.67	—	—	8.33	16.67	8.33	50.00
NIWS	16.67	—	—	—	—	—	83.33
PWC	8.33	16.67	—	—	8.33	—	66.67
HTFA	8.33	8.33	8.33	—	—	—	75.00
UHPV	16.67	—	—	—	—	—	83.33

RA: Robust animals; NIWS: no injuries/wounds/scars; PWC: physically well conditioned; HTFA: healthy/tick-free animals; UHPV: up-to-date health program/vaccinations.

Table 5 shows that in Domain 4 (Behavior), the horses live well in herds in all of the characteristics evaluated. In general, the animals had space to exercise, play freely, and showed good herd behavior in these traits. The other characteristics for this area also had a frequency of over 50%, which is considered very good. However, there is room for improvement in these aspects; the horses can spend part of the day outside the stables, either in paddocks or even in round pens.

Table 5. Frequency of assessment of Domain 4: Behavior.

Domain 4	Frequency (%)					
	0	0.5	1	1.8	1.9	2
AE	—	8.33	8.33	8.33	—	75.00
LWH	—	—	—	—	—	100.00
SWH	—	—	—	8.33	—	91.67
EPF	—	8.33	8.33	—	—	83.33
WCE	8.33	—	8.33	16.67	8.33	58.33

AE: Able to explore; LWH: they live well in herds; SWH: they are sociable (with humans); EPF: they exercise/play freely; WCE: well-conditioned environment.

Providing social animals with the companionship of other pleasant individuals in a spacious, enriched, and safe environment allows them to engage in behaviors that they find rewarding. In other words, it provides them with greater opportunities to engage in voluntary, self-generated, and goal-directed behaviors that they find gratifying (Mellor, 2014). Therefore, improving or enriching deficient external environments can lead to the replacement of some negative effects associated with the situation with positive effects.

A study conducted by Lofgren et al. (2020), which examined riders' perceptions of what constitutes good welfare in various descriptive scenarios, concluded that rotation and the ability to express natural behaviors were identified as the most positive aspects. Interestingly, although these factors were essentially the same, there was a contrast between emotional aspects and welfare needs. It is also crucial to consider that the different temperaments of horses and their individual levels of resilience may mean that horses subjected to the same management system may experience different states of welfare (Marchant-Forde, 2015).

When scoring Domain 5 (Mental State) in Table 6, the characteristics were scored as "very good." The animals showed pleasure in eating and drinking water, were comfortable in their environment, exhibited good herd behavior, appeared mostly healthy and happy, and did not become startled in the presence of humans, even unfamiliar ones.

Table 6. Frequency of assessment of Domain 5: Mental State.

Domain 5	Frequency (%)				
	0	1	1.8	1.9	2
PEDW	—	8.33	—	8.33	83.33
FCE	8.33	—	—	—	91.67
HB	—	—	—	—	100.00
HHA	8.33	—	16.67	16.67	58.33
NSPH	—	—	—	—	100.00

PEDW: Pleasure in eating and drinking water; FCE: feels comfortable in the environment; HB: Herd behavior; HHA: Healthy, happy appearance; NSPH: Not scared in the presence of humans.

Mental state, as one of the five domains, reflects all the others, including the physical/functional domains. Therefore, to ensure a perfect balance in the mental state, humans must provide horses with an environment that promotes a good quality of life. This means providing quality feed and water in adequate quantities, safe, comfortable and clean facilities, nutritional and sanitary management practices that promote good health, and treatment that allows them to express their natural behaviors comfortably. These comprehensive care

measures are fundamental to ensuring the development and maintenance of a healthy mental state in animals (Broom & Molento, 2004; Mellor, 2017).

Conclusion

The properties presented a satisfactory AW status; however, some management practices need to be better implemented to achieve an effective state of full animal welfare.

The assessment form used in the research proved to be an effective method for the practical assessment of the intended criteria, making it possible to visualize which aspects can be improved to ensure a better quality of life for the animals.

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