




Management and welfare of working equids in the Guerrero state

Manejo y bienestar de équidos de trabajo en el estado de Guerrero

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ABSTRACT. The management of farm work equids in Guerrero, Mexico was described and related to animal welfare. Sixty-four equids owners were randomly surveyed. Horses were used more than donkeys and mules. The 89% of owners worked the animals before 5 years of age. Only 5% provide helmet management. The 83% of breeders provide living space >4 m². In 53% of the units animals socialize. The 45% of breeders feed on forage and grain. The 59% of breeders give access to water 2-4 portions / day and 41% *ad libitum*. Deworming is partial (44%) and not vaccine is applied. The common diseases are skin lesions (84%), digestive system disorders (77%), respiratory (59%) and locomotor (44%). In conclusion, the management of equids compromises their well-being in different ways, reducing their quality of life.

Key words: Health, feed, health, behavior, medicine.

RESUMEN. Se describió el manejo de los équidos de trabajo agrícola en Guerrero, México y se relacionó con el bienestar animal. Fueron encuestados al azar 64 propietarios de équidos. Los caballos fueron más utilizados que burros y mulas. El 89% de los propietarios trabajaron los animales antes de 5 años de edad. Sólo el 5% proporcionan manejo de cascos. El 83% de los criadores proporcionan espacio vital >4 m². En el 53% de las unidades los animales socializan. El 45% de los criadores alimentan con forraje y grano. El 59% de los criadores dan acceso al agua 2 - 4 veces/día y el 41% dan libre acceso. La desparasitación es parcial (44%) y no se vacuna. Las enfermedad comunes son lesiones en piel (84%), alteraciones en sistema digestivo (77%), respiratorio (59%) y locomotor (44%). En conclusión el manejo de los équidos compromete su bienestar en distintas formas, disminuyendo su calidad de vida.

Palabras clave: Sanidad, alimentación, salud, conducta, medicina.

INTRODUCTION

The employment of equidae for work is a common practice as a means of subsistence for rural families and less frequently in urban areas (Mariscal *et al.* 2015). In this environment the man-equine relationship can place this species as a natural resource that is exploited for the benefit and economic savings of many families (Rahman and Reed 2014). In this relationship, the human being consciously or unconsciously neglects the basic principles of welfare that his animals must enjoy, to be free of suffering (Whay *et al.* 2015). Recognizing these problems is the responsibility of the people in charge of their care, including owners and veterinarians. Most of these animals are used to transport, load or land work by low-income people who live in rural communities (Regan *et al.* 2015). Despite their important role, these animals are raised in inadequate conditions, which limits their service and longevity in the worst case (Hameed *et al.* 2016). One way to compensate service to equids is to worry about improving their quality of life (Brooke 2014). The World Organization for Animal Health considers that an animal is in a state of welfare when the five freedoms are fulfilled, that is, the animal is healthy, comfortable and well fed, can express its innate behavior and does not suffer pain, fear or stress (Sanmartin *et al.* 2015, OIE 2019). The equidae welfare worldwide is a matter of concern, below farm animals (Sanmartín *et al.* 2016). Recently models of welfare assessment have been adapted for equines in order to measure and manage their life quality, these can be used in work animals and equestrian sports disciplines (Sommerville *et al.* 2018). In the Guerrero state, many families use equidae for work, transportation, fun and even for sports, despite this, there are no studies that describe the welfare conditions of these animals. For this reason, the objective of the study was to describe the zootechnical management practices that are granted to the equidae of agricultural work in the Guerrero state and determine their relationship with the animal's welfare.

MATERIALS AND METHODS

Description of the study area

The study was developed out between August 2018 and May 2019, in the state of Guerrero, which is located in the south of the Mexican Republic in the tropical zone, between 16° 18' and 18° 48' of NL and 98° 03' and 102° 12' of WL. Limit to the north with the states of Mexico, Morelos, Puebla and Michoacan; to the south, with the Pacific Ocean; to the east with Puebla and Oaxaca; and to the west with Michoacan and the Pacific (Gobierno del estado de Guerrero 2018).

Study design

The sample size was 384 surveys determined by the equation described by Rojas (2013) for studies in large populations: $n = \frac{Z^2 p \cdot q}{E^2}$ where, Z (confidence level) of 95%, p and q (variability of the studied phenomenon) of 50% and E (precision level) of 5%. The sample was distributed in sub-samples ($n = 64$) by strata formed by the activity performed by the equids in the Guerrero state (1. Agricultural work, 2. Rodeo, 3. Dance, 4. Racing, 5. Ride, 6. Tourist work). To describe the zootechnical management and its relation to welfare, 64 breeders of equidae for agricultural work were randomly surveyed. For the interviews, a survey with closed questions on general aspects, basic management, feeding, reproduction, housing and sanitary management of the animals was used. Additionally, from a sample of sixty-four considered as population and a reliability of 95% and a variation of 50% were introduced to win episcopo software 2.0 (Thrusfield *et al.* 2001) and a selection of 10% of the breeders was obtained, to physically evaluate their animals of the different systems (integumentary, locomotor, oral and ocular cavity) according to the Welfare Quality[®] protocol, to identify signs of injuries and / or diseases, as well as the body condition in scale from 0 to 5 of the body condition score system cited by Sanmartin *et al.* (2016) to refer to animal welfare.

Statistical analysis

The data of the variables included in the survey were analyzed by descriptive statistics and presented

in tables and figures. In addition, a Q-Kendall correlation analysis and a chi squared significance test at an alpha of 0.05 were developed to relate management activities with health status and body condition of the equids, as welfare indicative.

RESULTS AND DISCUSSION

Generalities

In a sample of 112 working equids reared by 64 surveyed owners, the most frequent species was *Equus caballus* (47%), followed by *Equus asinus* (41%) and *Equus mulus* (13%). The distribution of equid species can be attributed in the case of *E. mulus*, which is the preferred species for agricultural activities because of its resistance, load capacity and traction force. This hybrid requires mating between *E. asinus* and *E. caballus*, which is uncommon (Herrera et al. 2018). Breeders usually prefer horses over donkeys because of their strength and speed. For this reason horses are the most important species for agricultural work. All of the equids used for agricultural activities were born in the region.

During work activities the total of the owners use harnesses for their equids, the materials used to build the harnesses were, leather (44%), rope (41%), rags (9%), plastic (5%) or metal (1%). The use of harnesses is necessary for handling and taming equines during work. Even when the material used is adequate, most owners ignore the fact that these devices must be adjusted to the body measurements of the animals to ensure that they fit comfortably, without risk of pain or injury as established by the OIE, Terrestrial Animal Health Code (2018). In this study the good use of harnesses tended ($p < 0.07$) strongly to prevent lesions on the skin of animals (Table 1). In terms of the number of hours worked by the equids, 69% of breeders made them work between 2 to 4 hours and 28% between 5 to 8 hours, and only 88% of owners allowed a rest break during work activities. In the current study the hours of work performed by equids differed from those reported by Mariscal et al. (2015), who found that 68% of equids were overexploited and worked more than 8 hours each day. In this study only 2% of owners overworked their animals. The majority

(89%) of owners subject their animals to agricultural work between the ages of 2 and 4 years and only 11% started working their animals after the age of 5 years. The most owners begin working their animals at too young an age, given that Baxter (2011) recommended waiting until they are 5 years old, due to the fact that at younger ages the bone growth plates have not yet closed and any work activity could harm development and/or cause permanent locomotor alterations. In addition Dixon (2002) found that the permanent denture is complete at 5 years of age and after that any use of brakes or snacks is less likely to cause discomfort or alterations in the oral cavity that might harm animal health.

In the extremities management, the majority (66%) of the owners do not trim the hooves or place horseshoes on their animals, while 34% of the owners carry out this practice every 4 or more weeks each year. In the trimming and horseshoe placement in hooves, few owners (5%) follow the recommendations of Obregón and Ramos (2011), who suggested trimming and fitting horseshoes to the helmets every 4 to 6 weeks, as they grow approximately 1 cm each month. However, it is important to consider that extensive periods of daily work in rugged places causes natural wear of the helmets (Schade et al. 2013). In some cases the natural wear on the wall or cover of the helmet can be severe and reach the sensitive layers and cause pain and claudication in the animals, thus affecting their welfare (Malheiros et al. 2017). This implies that owners must periodically check the structure and integrity of the hulls on their animals because excessive wear or growth can affect the aplombs and / or locomotion of the equids. In Table 1 it can be seen that the molding and horseshoe placement in hooves had a high and positive correlation with affections in hooves ($p < 0.007$) and claudication ($p < 0.0001$) of the animals, which indicates that the development of this practice can help solve hooves problems.

Accommodation

Housing during rest periods is diverse, 77% of the owners keep their animals tied with ropes, 22% use rustic pens and 2% stables. The majority of

Table 1. Association analysis between variables evaluated on the welfare of working equids in the Guerrero state, Mexico.

X	Variables	y	Q-Kendall correlation	P-value*
	Proper use of harnesses	Skin lesions	0.66	0.0700
	Hooves molding and hardware	Claudications	0.90	0.0001
	Hooves molding and hardware	Helmet affections	0.62	0.0070
	Social contact	Emotional state	0.06	0.8000
	Medical assistance	Health condition	0.61	0.0060
	Deworming	Body condition	0.70	0.0070

*Significance of the association between the variables, square *ji* test, minimum alpha 0.05.

the owners (83%) provide an inadequate amount of space for the animals to rest comfortably ($\leq 4 \text{ m}^2$ per animal). It can be seen that the most common practice was to tie up the animals with ropes. This practice may greatly limit the freedom to express natural behavior, as stipulated in the Welfare Quality[®] protocol. In addition, McBane (2008) mentioned that to ensure adequate rest equids should be housed in a space allowing at least 4 m^2 per animal, which implies that most equids in the state of Guerrero do not have enough space for rest. The bed types used to provide comfort to the animals during rest are adequate (88% soil, 8% manure and only 2% shavings). Merial (2009) stated that the material used can be diverse, as long as it provides comfort to the animals and allows a good rest. However, only 77% clean the beds daily, weekly, biweekly or monthly. Cleaning and hygiene are important practices to prevent disease (Merial 2009). This implies that 23% of the owners that not clean their animals' beds, they put the health of your animals at risk. The 53% of owners consider their animals' social needs, allowing interaction with other equids, and 95% of the owners allow interaction with other species. Living with other individuals of the same species gives security to each individual and promotes freedom to express the behavior of their species (Zuluaga *et al.* 2018). The current study revealed that a proportion of equids have no contact with individuals of the same species, which could be stressful and affect their welfare. On the other hand McBane (2008) found that the interaction of individuals of different species as in the present study at least allows individuals to focus on their surroundings, although it limits the expression of their

natural behavior. Although in the present study no association ($p > 0.80$) was observed between social needs with the emotional state of the animals (Table 1).

Feeding

With regards feeding (Figure 1A), all the owners feed their animals with forage and items such as corn grain, commercial food or homemade waste in various proportions and frequency, three portions a day, followed by two and four portions a day, respectively (Figure 1B). The practice in feeding equids is similar to that reported by Sanmartín *et al.* (2015) who found that the diet of the animals was based on concentrates and hay and that it was provided in three rations during the day. However, our study found that the quantity and quality of the diet provided was determined by the owners without considering the species, the physiological status, body weight, activity or workload of the animals, all of which should be taken into consideration according to the NRC (2007); this could cause deficiencies or excesses that affect the health and welfare of the animals. With regards access to water only 41% of the owners provide water *ad libitum*, while the rest do so two, three or four times during the day. Few owners provide water *ad libitum*, which would help comply with the "prolonged absence of thirst" recommendation of the Welfare Quality[®] protocol. However, if it is difficult for an animal to have free access to water while working, in these cases it is advisable to consider that the more intense the activity, the greater the number and frequency of water breaks required by the animal (Cymbaluk 2013).

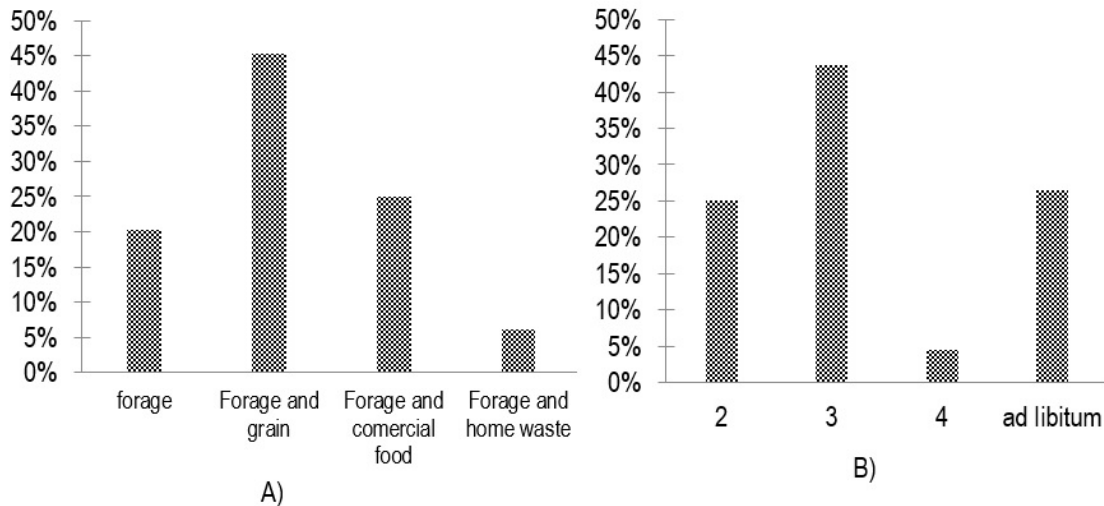


Figure 1. A) Type and B) Feeding frequency (portions / day) in working equids of the state of Guerrero.

Health and reproduction

In the reproductive, only 22% of the owners reproduce their animals during the spring and summer seasons. This conduct was attributed to the increase in daylight hours, which increases the natural photoperiod in the mares and female donkeys and the development of their estrus cycle (Bergfelt and Adams 2007). Regarding reproduction, only 22% of the owners reproduce their animals during the spring and summer seasons. Regarding animal health (Figure 2), a little more than half of the owners deworm externally or internally and most do it every 3, 6 or 12 months. In addition, none of the owners vaccinate their animals to prevent viral and/or bacterial diseases and only 39% request veterinary attention when their animals become ill. The results differ from those reported by Márquez *et al.* (2010) in sport horses, who found that all owners provided veterinary attention to their animals and had an adequate vaccination and deworming program. In this study it was found that deworming tends to improve the body condition of the animals ($p < 0.007$) and that medical care increased ($p < 0.006$) the health conditions in the equids (Table 1). Regan *et al.* (2015) reported that working equids without deworming or vaccination are at risk of developing multiple health problems that affect the welfare of the animals. The most frequent diseases in working equids are in the tegumentary, respira-

tory and digestive systems and to a lesser degree in the locomotor system and eyes (Table 2). In the integumentary system, the most common ailments are wounds, inflammation, scabs and pruritus; in the respiratory system the most common ailments are secretions, cough, dyspnea and epistaxis; in the digestive system pain, diarrhea and mouth ulcers, while the locomotor system suffers only lameness with deformations and the eyes suffer mydriasis with ulcers and wounds. Regan *et al.* (2015) identified musculoskeletal and respiratory disorders more frequently than other disorders. Mariscal *et al.* (2015) reported on skin conditions such as wounds and pain under the pressure points of harnesses. Recognizing these problems is the responsibility of the people in charge of the care of the animals, including their owners and veterinarians.

Physical inspection

The body condition of the working equids was between very poor (score 0) and regulate (score 2) (Figure 3B and C). This is partly attributed to the fact that the owners provide food in a quantity and quality based on common sense, without considering the nutritional requirements of the species per growth stage and/or the activity they are performing (NRC 2007).

In the quality of the human-equid relationship, 50% of the animals showed interest in having con-

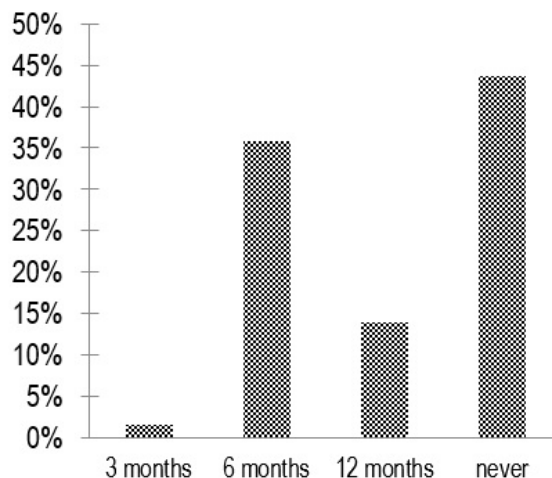


Figure 2. Frequency of deworming for their animals in the Guerrero state.

Table 2. More frequent manifestations of disease that occur in working equids in the Guerrero state.

System	Suffering	Answers (n = 64)	
		n ^o	%
Tegumentary	Wounds, Inflammations, Scabs, Pruritus	54	84.3
Digestive	Abdominal pain, Diarrhea, Mouth sores	49	59.3
Respiratory	Nasal discharge, Cough, Epistaxis, Dyspnea	38	76.5
Locomotor	Lameness, Deformities	28	43.7
Eyes	Wounds, Secretion, Ulcers	13	20.3



Figure 3. Physical examination of equids A: back injuries due to misuse of harnesses; B: regular body condition (two score); C: bad body condition (one score); D: Cebaceous and opaque hair; E: wear of helmets and wounds by working days in scabrous places.

tact with the evaluator and in the other cases they were alert and responded neutrally to the inspection. This small proportion of animals were alert to contact with the evaluator, which could indicate mistreatment and punishment by the owners of these animals. During the physical evaluation, evidence of muscu-

lar pain was noted in all equids, skin wounds in 84% (Figure 3A) eye afflictions in 17% and commissures in the incisors in the oral cavity in 34% of the animals. Hooves afflictions with claudication and matted (83%) and dry (17%) hair were also observed in the animals. The corporal afflictions identified in the work equidos

they were usually attributed to the improper use of harnesses (Figure 3A) and to the premature use of equids as working animals, similar to that reported by Mariscal *et al.* (2015). The affected hooves and claudications, can be attributed to the long days of work on rough terrain and the lack of attention of the owners to place horseshoes to the animals (Figure 3E). Matted and dry hair was attributed to poor hygiene and nutrition of the animals, and the lack of provision of veterinarian services (Figure 3D). It is important to mention that the economic status of the owners limits the care and attention they can give to their equids, as reported by Márquez *et al.* (2010) in sport equines with skin conditions. Finally, all the diseases identified directly affect the welfare conditions of working equids in the state of Guerrero.

Is established as a conclusion that equids are important animals in the economy of rural families in

the Guerrero state because of the work force they provide in agricultural activities. During work and rest hours' equids from the state of Guerrero have been mistreated, on the one hand, the inadequate use of harnesses, poor care of the extremities, decreased medical care and the poor use of preventive medicine, along with the work activity developed, has led to skin injuries, claudication and hooves injuries, affecting the health and body condition of the animals, compromising their welfare. The native Creole origin of the equids has allowed the species to survive and evolve in the region under conditions of excessive work and with minimal attention in health, food and rustic management. The correlation analysis between the variables indicates that the increase and care in the management practices and the medical assistance of the equids, improves the state of health and body condition.

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