

The relationship between working horse welfare and their owners' socio-economic status

R Lanas[†], D Luna[‡] and T Tadich^{*†}

[†] Departamento de Fomento de la Producción Animal, Facultad de Ciencias Veterinarias y Pecuarias, Universidad de Chile, Santa Rosa 11735, La Pintana, Santiago, Chile

[‡] Programa Doctorado en Ciencias Silvoagropecuarias y Veterinarias, Universidad de Chile, Becario Conicyt N°21130091, Chile

* Contact for correspondence and requests for reprints: tamaratadich@u.uchile.cl

Abstract

The relationship between the socio-economic status of working equine owners and the welfare status of their animals is yet to be documented. The aim of this study was to provide an approach to understanding socio-economic status, quality of life and working aspects of working horse owners, in order to establish their social vulnerability index and to determine how these measures correlate with the welfare state of their horses. Seventy-two owners and their urban working horses ($n = 122$) were studied. Owners' socio-economic and educational status was established together with their quality of life perception and multi-dimensional poverty index. The animal welfare index was constructed using animal-based measures. Whilst over 90% of owners were considered vulnerable, only 28.3% of horses were classified as being in a poor welfare state (eg presence of lesions and morphology not adequate for draught type). There were no significant correlations between owners' factors and the animal welfare index. We conclude, therefore, that social vulnerability of owners does not necessarily imply that their animals will be in a poor welfare state.

Keywords: animal welfare, livelihood, poverty, quality of life, socio-economic status, working horse

Introduction

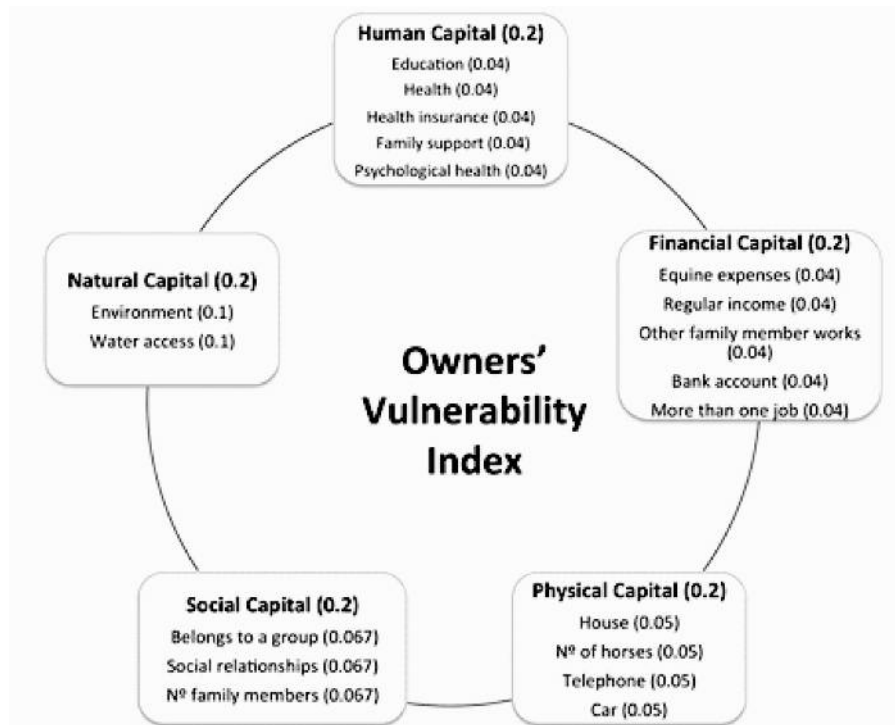
A person's livelihood comprises their capabilities and their means of living, including food security, income and tangible and intangible assets (Chambers & Conway 1991). Assets are usually considered in five categories: i) human capital (including labour power, health status, skills and knowledge); ii) natural capital (access to land, water, wildlife, flora and forest); iii) financial capital (including savings and access to regular income); iv) physical capital (houses, vehicles, equipment, tools and livestock); and v) social capital (refers to the networks, kin networks or group memberships) (Food and Agriculture Organisation [FAO] 2009). These categories have been used to estimate vulnerability or multi-dimensional poverty indices in human communities (Alkire & Santos 2010, 2011). Working horses could be considered as natural, financial, physical and social capital (Pritchard 2014), being an important component of the livelihood of many families around the world that still depend on them as a means of living. At the same time, the welfare state of working horses can be affected by the livelihood of their owners, since the provision of resources, such as the working practices associated with their work, are essential for the maintenance of their welfare. The link between the welfare state of working horses and the livelihood of their owners has not been

studied in detail. Some studies refer to the role and impact that working horses have on livelihoods, mainly looking into the effect on income generation (Chang *et al* 2010; Mburu *et al* 2012), with a lack of information on how livelihoods affect the welfare of working horses.

Livelihoods could influence animal welfare in different ways, for example, the human capital includes the skills and knowledge of people; in this case, the caretakers of working horses can have a direct effect on animal welfare. The knowledge and technical competence of caretakers plays a major role, since inadequate knowledge may lead to poor decision-making, for example, in husbandry practices (Rushen & de Passillé 2010). This has been observed by Tadich *et al* (2008), where most of the welfare problems described in urban working horses were found to be due to the owners' lack of knowledge in relation to feeding and farriery practices. The lack of knowledge can be explained by the high percentage of owners that are illiterate or with incomplete primary school education (Tadich & Stuardo-Escobar 2014).

Financial and physical capitals are also important assets when considering the welfare of working horses. This is particularly noteworthy when it's taken into account that the income of most urban draught horse owners lies below the poverty line, thereby reducing the affordability of some resources necessary for the proper maintenance of horses (Tadich *et al*

Figure 1



Dimensions of the vulnerability index and the indicators included in each with their respective weights.

2008; Tadich & Stuardo-Escobar 2014). Working horse owners can rarely afford veterinary care, adequate feedstuff and proper harnessing (Burn *et al* 2009), consequently the health of horses becomes at risk. As a result, the main welfare issues reported in working horses across the world are lameness, skin lesions, poor body condition score and (in certain countries) dehydration (de Aluja 1998; Pritchard *et al* 2005, 2008; Tadich *et al* 2008; Ali *et al* 2015).

Understanding the livelihood of horse owners and how it relates to the welfare of their working horses can allow us to establish appropriate animal welfare intervention strategies, and better understand how important horses are as an asset for livelihoods. The aim of this study was to study socio-economic status, quality of life and working aspects of working horse-owners, in order to establish their vulnerability index and determine how it relates to the welfare state of their horses.

Materials and methods

The bioethics committee of the Veterinary Faculty, Universidad de Chile, approved the methodology of this study.

Owners' characteristics

A total of 72 working horse owners were interviewed by the observer (RL: a veterinary surgeon) in order to obtain information about their age, socio-economic level, education, quality of life perception, vulnerability index and perception of their horses. All owners signed an informed consent before being interviewed where they agreed to participate in the study under the understanding that no economic benefit was involved and that they could retire from the study at any given point.

Socio-economic level

The Esomar method adapted by Adimark (2000) was applied to estimate the socio-economic level. The system uses a matrix that associates the educational level of the person with his/her employment status. If the person is not engaged in active employment, a set of goods is used instead (eg if they own a television set, a mobile phone, a freezer). The matrix provides six possible outcomes (A = very high, B = high, Ca = medium-high, Cb = medium, D = medium-low, E = low).

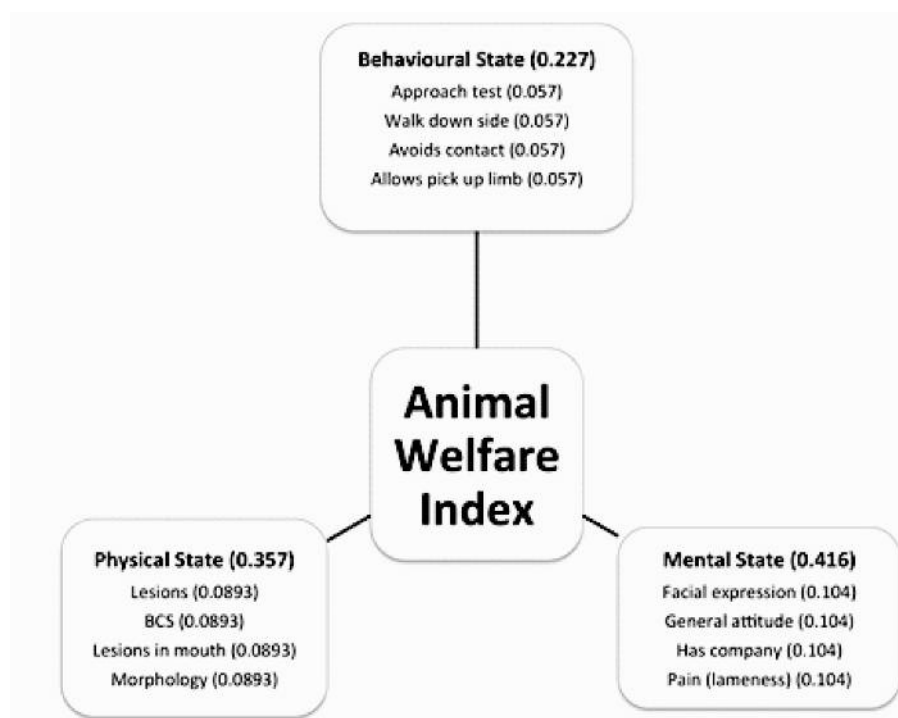
Education

Owners were asked to indicate if they: never went to school; completed pre-school; had incomplete middle school; completed middle school; had incomplete high school; or completed high school. They were also asked directly whether they could read and write.

Quality of life

In order to obtain information on their own perception of their quality of life, the World Health Organization (WHO) Quality of Life Questionnaire (Spanish version) was used (WHOQOL-Bref 1996). The questionnaire consists of four dimensions (physical health, psychological health, social relationships and environment) with questions that provide five Likert options. Each question was read to the owners. Each domain was analysed separately and had a maximum possible score of 20 generating a quality of life profile.

Figure 2



Dimensions of the animal welfare index developed with the animal-based welfare indicators included in each dimension and their respective weights.

Vulnerability index

An adaptation of the Multidimensional Poverty Index (MPI) (Alkire & Santos 2011) was used. This index measures acute poverty and also the proportion of people who experience multiple deprivation. Five dimensions were included in the index (Figure 1) chosen according to the Livelihood Assessment Tool developed by the Food and Agriculture Organization (FAO 2009), including aspects of: human capital, financial capital, natural capital, social capital and physical capital.

All indicators were assigned a value of zero (0) or one (1), one indicating that the person was deprived for that indicator. Then, each dimension received 1/5 of the weight and each indicator received (1/5)/number of indicators in the dimension. Every owner was assigned a deprivation score equal to the sum of the weighted indicators. The deprivation score lies between 0 and 1, with the score increasing as the deprivation level increases. The person was identified as vulnerable (multi-dimensionally deprived) if his/her score was equal or exceeded 1/3 (0.333). The proportion of owners that were considered deprived (H) according to the index was calculated by dividing the people that were multi-dimensionally deprived (q) by the total population (n) [$H = (q/n)$].

Perception of their horses

Owners were asked to provide a qualitative description of their horses. They had to define their horses as: calm, friendly, nervous, difficult to manage, aggressive, fearful or self-confident.

Animal welfare measures

One hundred and twenty-two working horses were assessed, all performing urban draught work by pulling two wheel-carts for the transport of different types of commodities. All horses belonged to the owners interviewed and were working at the time. In order to assess animal welfare, animal- and resource-based information was acquired on horses' resting days.

An animal welfare index was developed for use in this study using the same methodology applied for the vulnerability index. The index was built with three dimensions, according to the welfare definition provided by Duncan and Fraser (1997). These were physical, behavioural and mental states; each dimension (state) included a group of welfare indicators (Figure 2). In order to weight the dimensions, the Saaty process was used (Saaty 2008). For this, an electronic survey was developed where eight experts in animal welfare were asked to compare the three states in pairs (health versus behavioural state; health versus mental state; and mental versus behavioural state) in terms of preference, importance and probability over the basis of a numeric scale from 1 to 9. The survey results allow measuring how each state contributes to the animal welfare construct in a scale from 0 to 1 (Figure 2). To obtain the weight of an indicator, the weight of the state is divided by the number of indicators within it. The final animal welfare index ranged from 0 to 1, where higher scores indicate poor welfare; a cut-off point equal or exceeding 1/3 (0.333) was established to define a horse in poor welfare and then calculate the proportion of horses in poor welfare condition.

Table 1 Demographic characteristics of the urban working horses' owners ([n = 72] surveyed). According to socio-economic status all owners belong to the two lowest levels and 70.8% to the lowest.

Demographic Characteristics		Number	Percentage of owners of owners
Age (years)	< 18	4	5.6
	18–29	14	19.4
	30–39	9	12.5
	40–49	17	23.6
	50–59	15	20.8
	> 60	13	18.1
Education	Illiterate	13	18.1
	None	9	12.5
	Pre-school	1	1.4
	Primary incomplete	38	52.8
	Primary complete	14	19.4
	High school incomplete	9	12.5
	High school complete	1	1.4
Socio-economic level	Medium Low (D)	21	29.2
	Low (E)	51	70.8

Table 2 Scores obtained by working horses' owners (n = 72) for each of the domains of the perception of quality of life instrument (WHO-Bref 1996).

Domain	Mean (\pm SD)	Median	Minimum-Maximum
Physical health	16.2 (\pm 2.4)	16.6	10.3–20
Psychological health	15.6 (\pm 2.3)	15.7	7.3–20
Social relationships	15.3 (\pm 3.8)	16	6.7–20
Environment	14.5 (\pm 2.0)	15	9.0–18.5

Table 3 Description of the characteristics of the working horses ([n = 122] assessed).

Characteristic	Factor	Results
Age (years)	Mean (\pm SD)	8.4 (\pm 5)
	Range	1.5–22
Sex	Stallions	38.70%
	Mares	59.80%
	Geldings	11.50%
Estimated live weight (kg)	Mean (\pm SD)	389 (\pm 81)
	Range	185–707
Anamorphosic (AI) index (type of horse)	Speed < 2.12	68.9%
	Draught > 2.12	31.1%

Statistical analysis

Means, standard deviation and percentages were used to describe the owners' characteristics. Horses' welfare index and owners' vulnerability index were calculated. The nature of the distribution of data was determined with the Shapiro-Wilk test and Spearman rank correlation was applied to establish correlations between education and quality of life characteristics of owners and the horse welfare index. The association between socio-economic status and the animal welfare index was scanned with a Chi-squared test. The vulnerability index of owners was correlated with the welfare index of horses with the Spearman rank correlation test. A significance level of $P < 0.05$ was used in conjunction with Minitab 14® statistical software.

Results

A total of 72 working horse owners were interviewed; from these, 25% were less than 30 years of age. In relation to education, 18.1% were illiterate and only one owner had completed high school (Table 1). According to quality of life perception, the physical health domain was the one best evaluated by the owners, while the environment domain had the lowest scores (Table 2).

The average age of working horses was 8.4 years, ranging from 1.5 to 22 years. Owners showed a preference for using mares (59.8%) with an average estimated live-weight of 389 kg. Most horses had a conformation of a speed type of horse (68.9%) according to the anamorphosic index (AI) (Table 3).

Table 4 describes the animal welfare measures used. The main welfare considerations are the presence of lesions and horses not having the appropriate conformation for draught work.

Of the 72 owners interviewed, 91.4% were considered vulnerable, while only 28.3% of horses were considered in a poor welfare state (Table 5).

No significant correlations were found between the vulnerability index of owners and the animal welfare index ($r = 0.064$; $P = 0.48$); between the animal welfare index and education level of owners ($r = -0.08$; $P = 0.33$) and between the animal welfare index and owners' quality of life scores (physical health: $r = -0.03$; $P = 0.72$; psychological health: $r = -0.03$; $P = 0.71$; social relationships: $r = -0.16$; $P = 0.077$; environment: $r = -0.14$; $P = 0.1$). There was no association between the socio-economic level and the welfare index ($\chi^2 = 0.1486$; $P = 0.699$).

Discussion

The benefits of using animal power for livelihoods have been described previously (Pearson & Krecek 2006), but how the dimensions involved in livelihood (social, physical, natural, human and financial) affect the welfare of horses has not been studied. Some authors have postulated that a complex combination of social conventions, economic constraints, knowledge, availability and affordability of resources, together with impoverishment and perception of owners could underlie how horses are treated (Pritchard et al 2005; Upjohn et al 2014).

Table 4 Proportion and number of horses (n = 122) that presented a positive evaluation when applying the animal-based indicators. The definition of what was considered as a positive evaluation is provided.

Welfare indicators	Definition for compliance	Complies % (n)
<i>Behavioural state</i>		
Approach test	Horse turns head towards owner when he approaches from 3–5 m away at an angle of approximately 45° moving towards the head (Pritchard <i>et al</i> 2005)	81.9% (100)
Walk down side	Horse acknowledges the presence of owner by ear turn, head turn or moving when the owner walks down side at a distance of 30 cm (Pritchard <i>et al</i> 2005)	68.8% (84)
Allows contact	Horse does not avoid contact when owners' hand is placed under the chin (Pritchard <i>et al</i> 2005)	76.2% (93)
Allows pick up limb	Horse does not resist owner picking up the left front limb	95.9% (117)
<i>Physical state</i>		
Body lesions	Horse does not present any lesions on the body, with the exception of mouth	35.2% (43)
BCS	Body condition score was measured on a 5-point scale, horses with scores of 3 and 4 were considered as having an adequate BCS	80.3% (98)
Lesions in mouth	Horse does not present lesions at the commissures of lips	95.1% (116)
Morphology	Horse presents a morphology that corresponds to draught type. Calculated using the anamorphosis index (AI) (Cassai 1944)	31.1% (38)
<i>Mental state</i>		
Facial expression	Horse's facial muscles are not tightened up and eyes are open	87.7% (107)
General attitude	Horse is alert to its surroundings	92.6% (113)
Has company	Horse is kept with another horse, usually its dam	62.3% (76)
Pain	Horse does not present lameness at the locomotion evaluation or signs of physical pain	81.9% (100)

According to the socio-economic and demographic characteristics of owners (Table 1), all were male and working in an urban context. Ages fluctuated from below 18 years of age to over 60 with most owners being between 40 and 49 years of age, similar to the range and average age of Spiti horse owners in India (Pal *et al* 2013); at this age, range owners could still make changes in their sources of work more easily than older owners. Interestingly, there is an important percentage of young owners, contrary to the expectations that this type of work might be declining in developing countries, such as Chile. For example, in Chile, by 2016 only 17 owners (16 men and one woman) are registered with an animal traction permit in the country (Registro Civil e Identificación 2016), meaning that rather than a decline there is a lack of owners registering as driving an animal traction vehicle. The level of illiteracy is still high (18.1%), but lower than the 36% reported by Pal *et al* (2013) in India. Although free access to primary education exists in Chile, in reality many children have to work at home and many drop out of school early. In Chile, the percentage of students that abandon school varies between 9–16% and can reach up to 80% in the first year of primary education (MINEDUC 2013). The level of illiteracy is important when considering strategies such as education, training and the replacement of animal traction vehicles by motorised vehicles. For example, in Chile, in order to get access to a drivers' licence, either for 2-, 3- or 4-wheel vehicles, completion of eight years of school is required by law, a prerequisite that is not mandatory for animal traction vehicles (Chile 2009). This would leave

Table 5 Results of the vulnerability and welfare index constructs applied to owners (n = 72) and their working horses (n = 122).

Index	Factor	Results
Vulnerability index	Mean (\pm SD)	0.45 (\pm 0.1)
	Range	0.17–0.73
	Above vulnerability cut-off	91.4%
Welfare index	Mean (\pm SD)	0.26 (\pm 0.17)
	Range	0.0–0.91
	Above poor welfare cut-off	28.3%

many owners in a vulnerable position in case measures, such as the replacement of horses by motorised vehicles, are taken. This strategy was adopted in Colombia (Decreto N°595 2013), where prerequisites for obtaining a drivers' licence are different. The substitution process in Colombia required an investment of over US\$1,000,000 by the Municipality of Medellín, from which half was used for replacement by either a motorised vehicle or capital for developing a new business (US\$2,300 for each owner) and the other half for characterising the population, social support and training of people (Alcaldía de Medellín 2009). Medellín was a pioneer city in implementing a substitution strategy for animal traction in South America, although we were not able to find information on the success rate of the horse adoption programme.

In order to understand how a working horse owner perceives his quality of life, the WHO instrument was applied (WHOQOL-Bref 1996). In general, owners scored high in each domain of the instrument; the dimension in which they scored the lowest was the perception of their environment (Table 2). This was to be expected since most owners live in slums in the peri-urban areas of cities, with restricted access to electricity, potable water or any cleaning services from local municipalities due to the illegal use of these areas (Tadich & Stuardo-Escobar 2014). No correlation was found between the owners' quality of life and the welfare index of their horses, in other words the owners who perceived their own quality of life the most poorly did not necessarily maintain the horses with the lowest welfare scores. Similar results were found when considering only owners' education or socio-economic level, where no association was found with the welfare state of their horses. It seems that the educational level and access to resources according to socio-economic level are not enough for good decision-making when it comes to good husbandry practices in order to maintain their horses' welfare. Other individual characteristics, such as empathy, might play a crucial role in decision-making, attitudes towards animals and the resulting animal welfare; however, the present study was not designed to measure owners' empathy level.

The owner's vulnerability index recognises those owners that are multi-dimensionally deprived, revealing that over 91% of owners were classified as vulnerable (Table 5). This is in accordance with previous studies that highlight the close association between working animals and the poorest communities worldwide (Pritchard *et al* 2005; Burn *et al* 2010; Tadich & Stuardo-Escobar 2014). Since the index is constructed on the basis of multiple aspects comprising livelihoods, in which working with horses is an important aspect, banning this type of work could leave them and their families at risk of not being able to cope or find a new means of living. Zaman *et al* (2014) reported that households with an equid are likely to have increased resilience as they have diverse income-generating strategies. In this study, the number of horses per household was included as physical capital, although it could be included in any of the aspects of the vulnerability context.

The difficulty in balancing different welfare indicators into a multi-dimensional welfare index has been pointed out by Rushen (2003), but providing equal weighting to all indicators does not necessarily result in an objective measure. The Saaty process used in the present study, where the criterion of a group of experts in animal welfare was applied, seemed to provide a useful approach for solving this problem. The construction of an animal welfare index allowed setting a cut-off point, where horses that had over one-third of the indicators evaluated as poor were considered to be in a poor welfare state. The instrument will need further research in order to determine its validity, but did result in a practical

assessment approach to combine indicators allowing one final welfare score. The experts assigned the highest weight to the mental dimension (0.416), followed by the physical (0.357) and behavioural (0.227) dimensions. Health is frequently applied as the most obvious measure of welfare (Dawkins 2004) and it has been pointed out that physical health is where animal welfare has its roots (Dawkins 2006). While many negative and positive mental states may be manifested as physical symptoms (Rushen 2003; Dawkins 2006) its assessment is still challenging (Waran & Randle 2017). More research is needed in order to define and validate reliable indicators of subjective experiences (Wemelsfelder 1997; Phillips & Santurtun 2013) and consciousness in working animals. In addition, special emphasis should be given to the integration of positive mental states' indicators within welfare assessment protocols, considering always that this should be practical, affordable and ethically acceptable (Waran & Randle 2017).

Within the welfare index, the major welfare issues were associated with the presence of body lesions, only 35.2% of the horses did not have any lesions and only 31.1% of them had the morphology of a draught-type horse (Table 4). Not having a draught-type morphology was previously identified as a risk factor for the presentation of lesions (OR = 2.39; $P = 0.044$), and for poor BCS (OR = 0.24; $P = 0.029$) (FONDECYT 2016), being an animal-based measure that is easy to obtain and that owners can also use for selection and monitoring of horses. Nevertheless, only 28.3% of horses were classified as being in a poor welfare state, according to the welfare index generated (Table 5). No correlation was found between owners' vulnerability index and the animal welfare index constructed. Therefore, it is concluded that vulnerability of owners, measured in terms of the dimensions that make up a livelihood, does not necessarily imply that their animals will be in a poor welfare state. This could imply that other factors associated with owners, such as empathy, might be implicated in decisions related to the care of their horses.

Animal welfare implications

This study provides evidence that the vulnerability of owners of working horses, measured as multi-dimensional poverty, does not necessarily imply that they will maintain their animals in a poor welfare state. This is a significant finding since most working animals are kept by the poorest communities and provide them with a higher resilience capacity. Moving forward, strategies aiming to improve the welfare state of working horses worldwide should, perhaps, consider other factors, such as owners' empathy level.

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