

# Morphological characteristics and most frequent health constraints of urban draught horses attending a free healthcare programme in the south of Chile: A retrospective study (1997-2009)

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## Abstract

Working horses are still an important source of income for many families located in urban and peri-urban settings. An adequate health state in these horses is a prerequisite for welfare and work output, this is why the aim of the present study was: i) review the main systemic health problems; ii) describe their morphological characteristics; and iii) classify the drugs used in urban draught horses between 1997 and 2009. Morphological and health information was compiled for 263 horses from a total of 1132 clinical records between 1997 and 2009 by the free healthcare service.

Most horses were geldings (38.4%) followed by mares and stallions. The average age was 8.5 years and only 30.4% presented characteristics of a draught type of horse. The main health systemic problems were related to the Integumentary, Locomotor and Respiratory systems respectively, being skin lesions, lameness and nasal discharge the principal diagnosis for each system. In relation to the drugs administered, dewormers (29.9%), vitamins (29.9%) and anti-inflammatories (14.5%) are the most frequent. Continuous revision of extension programmes is necessary to re-design protocols and adopt proper management practices and optimize the use of resources in a sustainable way. The animal and health information revised in this study can be used to set up new intervention strategies based in the selection of proper horses according to the type of work, and for the incorporation of training programmes aimed towards the prevention of health problems such as skin lesions and lameness and recognition of the risks associated to the use of drugs such as anthelmintics.

**Key words:** health affections, husbandry, welfare, working horse

## Introduction

Working animals provide more than 50% of the world's agricultural energy for traction, while the internal combustion engines provide less than 30%, with the remaining percentage provided by men or women (Wilson 2003). The recent surge in fuel prices has hit impoverished people especially hard, consequently in many developing countries rising fuel prices are causing significant number of urban workers to switch from motorized vehicles to equine powered carts, such is the case in Pakistan and India (The Brooke 2007). This is more important in developing countries where working horses are still essential, representing many times the only source of income for their owners (Popescue and Diugan 2013) especially in the case of draught horses located in peri-urban areas, since under some conditions animal traction still results in the most economically viable option (Chirgwin 1995). By 1994 an estimated number of 20 million carts were being pulled by means of animal traction (Ramaswany 1994). In comparison with motorized vehicles, the potential to use animal traction is many times underestimated, especially for work that involves short and medium distance transport. Considering the continues efforts to contribute to the implementation of sustainable production systems, when cart horses are present as a local resource, communities should orient to the use of these under adequate husbandry practices (Chirgwin 1995).

On the other hand it is found that equine power is most common in the poorer communities, so the animals are generally undernourished, have limited access to water, and receive relatively little husbandry or veterinary attention (Wells and Krecek 2001, Burn et al 2010a). Consequently reports of skin wounds, poor body condition, respiratory diseases, high parasite burdens, lameness, dental problems and gastrointestinal illness in these animals are common (de Aluja 1998, de Aluja et al 2000, Wells and Krecek 2001, Pritchard et al 2005, Tadich et al 2008, Menarim et al 2010, Tadich et al 2011, Upjohn et al 2012), all these are problems directly related to a poor welfare state in these animals not allowing the system to be sustainable in terms of the consequences of work on the equines.

A proper health state is not only a prerequisite for welfare, but also in the case of working animals it is important for proper levels of work output and efficiency (FAO 2006). Animals that are undernourished or sick are unable to produce the energy levels required for work, in the same way young and inexperienced animals are less efficient (Pearson 2003a), indirectly reducing the income of the people that rely on them (Burn et al 2010b). Tadich et al (2008) described aspects of husbandry and welfare in a group of urban draught horses in the south of Chile, the authors applied animal based and resource based indicators in order to assess the welfare state of these horses. The small amount of health problems and low level of negative behavioural responses registered were interpreted as a positive result linked to the welfare of these animals (Tadich et al 2008).

Similar studies in other Latin American countries have reported that lesions in working horses are a common problem, which may vary from simple wounds to extensive and deep lesions, sometimes affecting muscles and bones (Chavira-Sevilla 2003). De Aluja et al (2000) assessed the most frequent pathological conditions reported in working equids treated in an extension programme between 1997 and 1999. The most important pathologies reported were intestinal parasitism, wounds, poor body condition, poor harnessing and hoof related problems (de Aluja et al 2000), similar findings were reported by Burden et al (2010) for working donkeys in México.

Equine owners in developing countries can rarely afford veterinary care or provide good quality husbandry (Burn et al 2010a). Because of this many times owners depend on volunteer programmes for maintaining their horse's health. This is the case of a free healthcare programme called AMIVECC (Amigos Veterinarios de los Caballos Carretoneros) provided since 1996 by veterinary students from the Veterinary Faculty of the Universidad Austral de Chile.

The identification of the main pathologies affecting working horses is essential not only for improving the well-being of the animals, but also for the development of proper educational strategies that can allow prevention of these, improvement of working practices, and by these means an improvement in the livelihoods of working horses owners. Having a programme that can target the main issues affecting equines within their geographical and demographic characteristics can also allow improvement in the use of available resources and funding.

## Objectives

- The aim of this study was to review the main systemic health problems presented by urban draught horses that assisted to an extension programme in the city of Valdivia, Chile, between 1997 and 2009; describe their morphological characteristics; and classify the drugs used in this group of urban draught horses.

## Material and Methods

The clinical records, belonging to a free healthcare programme called AMIVECC, which is part of the Veterinary Faculty of the Universidad Austral de Chile, were used.

Information from 1,132 clinical records from 263 urban draught horses that attended the free clinic between 1997 and 2009 were included in the study. Information was classified in two types:

### Individual Equine Information

Information on sex, age, estimated live weight (ELW), height to the withers (HW), heart girth (HG), and elbow to tuber ischii length (EIL), was obtained. From the records of 263 horses this information was complete for 207 horses. The remaining 56 horses had to be excluded from this part of the study because information on the clinical record was incomplete.

Baron's equation (Cassai 1944) for the characterization of the type of horse, draught type (DT) or speed type (ST) according to their anamorphosic index (AI), was applied, where variables are expressed in meters:  $AI = (HG)^2 / HW$

If the AI is greater than 2.12 the equine is considered to be of a draught type and if it is lower it is considered a speed/riding type (Cassai 1944).

For estimated live weight (ELW) the equation proposed for Chilean urban draught horses by Meyer (1992) was applied, where variables are expressed in centimeters:

$$ELW = HG^2 \times E.I.L / 11,462$$

## Health information:

The information contained in 1,132 clinical records was classified according to individual, date of attendance, systemic health problem, laboratory exams performed, clinical procedures performed, and drugs provided to the horses. This information was complete for the 1,132 attentions provided by the free clinic. An individual horse can have more than one attention depending on the number of visits to the free clinic between 1997 and 2009. In these cases each visit record was considered as an independent attention event.

## Statistical Analysis

For both results on animal information and health information descriptive statistics were applied. Results are reported in terms of averages, standard deviation and percentages, for this Microsoft Excel® was used.

## Results

Table 1 summarizes the individual information of the 207 equines with complete records. The distribution by sex and mean age in years (according to the last time they attended the free healthcare programme) was calculated. Most of the urban draught horses belong to the gelding category (38.4%). This category is also the one presenting the highest average age while working ( $9.6 \pm 6$  years). According to hipometric characteristics, stallions tend to have higher HW than geldings and mares respectively, but with a smaller HG and lower ELW than the other two categories. Only 30.4% of the equines presented characteristics of a draught type according to the AI, with gelding being the category with the lowest percentage of individuals with draught type aptitude.

**Table 1.** Summary of the individual (number, sex category and average age) and hipometric (HW, HG, ELW, AI and DT) characteristics of 207 urban draught horses assessed between 1997 and 2009 in the city of Valdivia.

Category	N°	% per category	Average Age	HW <sup>a</sup>	HG <sup>b</sup>	ELW <sup>c</sup>	Average AI <sup>d</sup>	AI >2.116	DT <sup>e</sup> (%)
Mares	86	32.7	7.9 ±4	142 ±9	167 ±18	351 ±78	1.99	30	34.9
Stallions	20	7.6	5.2 ±4	144 ±14	166 ±17	342 ±81	1.91	7	35
Geldings	101	38.4	9.6 ±6	143 ±9	168 ±17	357 ±77	1.98	26	25.7
Total	207	100	8.5 ±5	143 ±9	167 ±18	353 ±77	1.97	63	30.4

<sup>a</sup>HW= Height to the withers; <sup>b</sup>HG= Heart Girth; <sup>c</sup>ELW= Estimated Live Weight; <sup>d</sup>AI=Anamorphosis Index; <sup>e</sup>DT= Draught Type.

Of the 207 horses with age information, 44.4% are in between 5-8 years, 25% between 9-12, 18.8% between 2-4, and 11.6% were over 12 years of age.

A total number of 1,132 attentions were provided between the years 1997 and 2009 with an average of 87 per year. From the total 54.9% (n=622) correspond to horses that were clinically sound, the remaining 45.1% (n=510) presented clinical findings. Among the 13 years studied the integumentary system was the most affected system with 38.3% of the clinical diagnosis related to it, followed by the locomotor system (22.4%) and respiratory system (13.9%). The breakdown of findings within each of these three systems y presented in Table 2. Findings related to the urinary and digestive system, and ocular, mucosa and lymphatic nodes alterations account for the remaining 25.4% of the findings detected.

**Table 2.** Distribution and description of the main clinical findings for each of the three main systems affected between 1997 and 2009, according to 1,132 attentions.

System	Description	Percentage
Integumentary System	Skin lesions	62.5
	Alopecia	10.8
	Increases in volume	9.9
	Dermatophilosis	5.9
	Abscess	1.9
	Ectoparasites	1.9
	Other	7.5
	<b>Total</b>	<b>100</b>
Locomotor System	Lameness	62.2

	Hoof abnormalities	23.6
	Farriery problems	8.1
	Fractures	1.4
	Other	4.7
	<b>Total</b>	<b>100</b>
<b>Respiratory System</b>	Nasal discharge	34.8
	Cough reflex	28.3
	Pulmonary noises	25
	Cough	8.7
	Rhinitis	2.2
	Rhinotracheitis	1.1
	<b>Total</b>	<b>100</b>

The distribution of the main systems affected in relation to sex category were the locomotor system in mares (57.4%), and the respiratory system in geldings (53.3%) and stallions (23,9%) (Table 3).

**Table 3.** Frequency and percentage of presentation of the three most affected systems according to sex category in urban draught horses between 1997 and 2009.

Category Sex	Integumentary system		Locomotor system		Respiratory system	
	N°	%	N°	%	N°	%
<b>Mares</b>	112	44.3	85	57.4	21	22.8
<b>Stallions</b>	20	7.9	9	6.1	22	23.9
<b>Geldings</b>	121	47.8	54	36.5	49	53.3
<b>Total</b>	<b>253</b>	<b>100</b>	<b>148</b>	<b>100</b>	<b>92</b>	<b>100</b>

In relation to age of the urban draught horses assessed the range between 5 and 12 years was the one that reported the highest percentage of clinical findings. For the integumentary system 53.3%, for the locomotor system 51.3% and 58.7% of the respiratory system findings.

During the 13 years revised a total of 209 fecal samples were sent for parasite analysis and 30 samples were taken for other complementary blood exams including, haemogram, biochemistry and minerals concentrations, although the results of these were not reported in the clinical records.

In relation to the most frequent drug types administered by the programme to the horses dewormers and vitamins are the most frequent, followed by anti-inflammatories. The percentile distribution of the drugs provided by the programme among 13 years is shown in Table 4.

**Table 4.** Percentage and number of doses of the drugs provided to urban draught horses between 1997-2009.

Drug administrated	N° of doses	Percentage (%)
Anthelmintic	356	29.9
Vitamins	351	29.5
Anti-inflammatory	172	14.5
Antiseptics	110	9.3
Scar healing agents	87	7.3
Antibiotic	55	4.6
Expectorants and mucolytics	22	1.9
Mucous membrane protector	4	0.3
Others	32	2.7
<b>Total</b>	<b>1189</b>	<b>100</b>

## Discussion

The present study aimed to provide information on the morphological characteristics, common systemic health problems, and drugs used in a group of urban draught horses that attended a free healthcare programme in the city of Valdivia during a period of 13 years (1997-2009). The first issue that comes to our attention is the low percentage of complete clinical records, especially in what regards to morphological characteristics and age of the horses attending the clinic. Two factors could be contributing to the lack of information found, on one hand the volunteers may not know how to correctly fill the clinical sheets and fail in recording the correct information. On the other hand horse owners are usually in a hurry when attending the clinic and may not allow sufficient time to obtain all the information required. The recording system and training of volunteers should be revised by the programme in order to improve their information collection system in the future and generate a more comprehensive database system.

From those individual horse records that were complete (n=207) we were able to determine that the use of geldings for urban draught work is preferred over mares and stallions respectively. The average age at which horses are working is of 8.5 years, being geldings the ones working at higher average ages (9.6 years) (Table 1). These results are in accordance to the findings reported by Tadich et al (2008) and Tadich et al (2011), where over 50% of the population of urban horses included in the study, were geldings; followed by mares and stallions. Geldings are many times preferred by owners for work due to the ease of handling these horses while working when compared with stallions, and also because they avoid the loss of working days that mares incur while pregnant and later on with the foals. Castro (1997) also reports a general preference for geldings for equestrian activities and work. A similar tendency was reported by Pearson et al (2001) for working equids.

In relation to the age of horses working, the average age in the present study was 8.5 years, this finding is similar to those reported in 1999 and 2008 for the same group of horses by McLeod (1999) and Tadich et al (2008). Age is an important factor that may affect the welfare of urban draught horses. Ideally horses should not start work activities before 4 years of age, time at which zootechnical maturity is reached; and should not be working after 12 years of age, time at which work efficiency starts to decrease (Beltrán 1954, Ensminger 1972, Kamp 1983, Meyer 1992). Many times horses are found working over 12 years of age, in order to make decisions about their replacement, their health condition and work level required should be considered. Over 50% of the horses included in this study were within the optimal range, this is a positive fact when compared to studies in other Latin American countries. For example, in Mexico horses are already pulling heavy carts and carrying loads at the age of 3 years (de Aluja 1998) affecting directly the working life span of the animals.

Morphological characteristics can be useful when identifying draught type characteristics in horses. For this kind of work, horses are preferred not to be too long, since this implies a minor speed response and transmission of force along the vertebral spine towards the area where the breast band is located, but not too short in order to avoid the hind limbs overreaching the fore limbs (McLeod 1999). According to Beltrán (1954) the optimum height to the withers for a horse performing light draught work is between 150cm and 160cm. The mean height to the withers in the present study was 143 ±9cm, with an estimated average live weight was of 353±77kg (Table 1), with a large range that reflects diversity in the type of horses being used for urban draught work.

When calculating the AI index in order to determine if horses are of speed or draught type it comes to our attention that only 30% of the horses working have draught type characteristics, and that although owners prefer to work with geldings this group has the lowest percentage of horses within this type (Table 1). The use of lighter breeds has been acquiring importance among urban draught work, in the case of Chile the characteristics of the horses involved in the study are similar to those of the Chilean Creole Horse. Mixes with this breed could be easier to obtain in comparison to the classical draught breeds, and since the urban draught horse owners belong to a low socio-economical sector acquisition and maintenance of lighter horses could be economically convenient.

Health has been used as the most classical approach when assessing animal welfare (Broom 1991). In the case of working horse's health conditions can also decrease work efficiency of the animals and by these means reduce the income of the families that depend on them (Burn et al 2010b). Health problems can affect food consumption, reduce body condition score and as a result reduce work capacity (Pearson 2003b). A healthy, well-fed, well-managed draught animal is essential when providing animal power for agriculture and transport (Pearson and Krecek 2006). For the total population under study the integumentary system was the most affected one with 38.3% of the clinical diagnosis among the 13 years, followed by the locomotor (22.4%) and respiratory (13.9%) systems. The integumentary system included skin lesions, this makes our findings similar to those from Wells and Krecek (2001) for working donkeys in South Africa, where wounds and harness sores accounted for 55% of the health conditions reported followed by ticks (30%), arachnid not yet described in horses in the south of Chile.

The presence of skin lesions has been reported as one of the common affections found in working horses (de Aluja 1998, de Aluja et al 2000, Tadich et al 2008, Tadich et al 2011). Skin problems are mainly due to poor fitted harnesses (trauma), dermatitis and equine dermatophilosis (*Dermatophilus congolensis*). In the case of skin lesions due to trauma they have been reported to be more common in older and thinner mules and donkeys pulling carts by Burn et al (2010a), in that case the higher prevalence of lesions has been explained by the type of harnessing needed for pulling carts and the heavier loads involved in this type of work (Biffa and Woldemeskel 2006, Burn et al 2008). In the present study skin lesions were the most common integumentary problem (62.5%, Table 2), with most of these lesions being related to poor harnessing and cuts with objects (glass and metals) that occur when horses are left grazing in public green areas. Dermatophilosis is a common skin problem reported in horses in the south of Chile (5.9% of the diagnosis related to the integumentary system in the present study, Table 2), being related to the poor husbandry practices (lack of grooming) and weather conditions (temperate rainy climate) of the area.

In the case of locomotor problems lameness has been reported as one of the main pathologies affecting working equids. In developing countries 98% of working equines show gait abnormalities in all four limbs (Broster et al 2009), while in the south of Chile 43.3% have been reported to present lameness, in this last case pathologies of chronic

origin were the most common ones (osteoarthritis and degenerative desmitis) (Menarim et al 2010). In the present study lameness was the most common diagnosis related to the locomotor system accounting for 62.2% followed by hoof abnormalities (23.6%) (Table 2). The association of lameness and pain has been recognized as an important welfare issue (Broster et al 2009) that needs to be addressed. Inappropriate hoof health maintenance, lack of accessibility to affordable farriers, overwork, and inappropriate selection of horses for light draught work are some of the factors influencing the high incidence of lameness in working horses. Burn et al (2010a) also reported that gait abnormalities are more prevalent under humid conditions, this should be an environmental factor important to consider in the case of the city of Valdivia due to its geographical location and climate characteristics.

Mares were found to register the highest percentage of diagnosis related to the locomotor system, while for the integumentary and respiratory system geldings reported higher percentages (Table 3). According to age the three systems most affected were most diagnosed in equines between 5 and 12 years of age.

When analyzing the respiratory system affections most of the findings reported in the clinical records correspond to the symptoms presented by the horses, being nasal discharge and positive cough reflex the most common ones, no specific diagnosis were performed (Table 2). Contributing factors to respiratory symptoms can be the poor or lack of housing systems, overwork and inadequate feeding practices. Pneumonia and chronic respiratory disease were reported as common findings in working equines in Mexico (de Aluja et al 2000). Although no precise diagnosis have been done for this group of horses equine influenza virus should not be discarded as a possible cause of some of the respiratory symptoms reported since it has been reported in the country, for example there is one official report from 2006 (Méndez et al 2006).

Anthelmintic drugs represented the main group of pharmacological products given to the horses through the 13 years studied, together with vitamins (Table 4). The concept of strategic parasite control for horses was introduced almost 40 years ago through the interval dose system where owners were advised to treat all horses every 6 to 8 weeks (Drudge and Lyons 1966). Although this system was effective in reducing the incidence of clinical cases caused by *Strongylus vulgaris* today cyathostomes are recognized as the principal parasitic pathogen for horses (Kaplan et al 2004). Tadich et al (2008) reported that only 12% of urban draught horse owners had never given their horses a product for internal parasites.

It is now well established that anthelmintic resistance is a growing problem for the control of cyathostome parasites throughout the world (Kaplan 2002). In Chile, internal parasite control systems for horses are based almost exclusively on the regular administration of products (Canales 2001) without testing to identify presence or type of parasite in most cases. The ready availability of safe, effective, inexpensive, and easily administered anthelmintics to horse owners has led to a decrease in the veterinary involvement in parasite control, trend that needs to be changed in order to avoid the growing problem of anthelmintic resistance (Kaplan et al 2004). This sometimes may be difficult to implement in free healthcare programmes for equines since the delivery of these drugs is frequently used as a strategy to motivate owners to assist to them with their horses. In the case of the geographical area where Valdivia is located the delivery of vitamins could be justified since there is a selenium deficiency associated with volcanic soil. The use of supplements containing vitamins and minerals could be positive for the horses in this case, although further studies describing the mineral status of this group of horses should be performed.

Support services to assist people in looking after their working animals and keeping them in good condition face several problems, in the case of urban draught horses their work usually provides a daily cash income and owners operate from day to day with the previous day income providing for the family's food and other needs (Pearson and Krecek 2006). This means that sometimes part of the income can be derived to the horses needs while in certain periods of the year money cannot be invested in the animals and these results in poor husbandry practices and consequent poor welfare.

Training programmes should consider the provision of different tools to draught horse owners in order to allow them to detect health problems in an early stage, avoiding animal welfare problems such as unnecessary suffering and also losses due to inability to work. The human animal relationship is also crucial, the apathetic animal has higher probabilities of being beaten and suffer chronic fear, this since owners fail to recognize the symptoms of poor welfare and commonly attribute this changes in behavior to laziness (Swann 2006).

One of the problems detected in the present study was the lack of some important information in the clinical records, for example information related to body condition score, working practices and feeding practices. For example Pritchard (2003) describes that the main factors that contribute to poor body condition score in working equines are work load/hours (45%) and nutrition (35%), while the sum of endoparasites, disease and teeth problems contribute with the remaining 20%, but that the time spent addressing these issues by health programmes is of between 5-10% for the work load and nutrition, while 90% of the time is dedicated to the remaining issues.

Although poor BCS does not seem to be one of the most important issues in urban draught horses in the south of Chile, where only 8% of horses were found with a poor BCS (Tadich et al 2008); it has been suggested as useful

indicator of other welfare problems. For example Burn et al (2010a) reported that thinner animals were significantly more likely to have skin lesions and gait abnormalities among others, which are two of the three main health systemic problems reported in the present study. Having this into account a proper recording system across time would allow to determine if this low percentage of horses with poor BCS is a result of the free clinic programme, improvements in availability or accessibility to different types or amounts of feedstuff provided to the horses or other practices established during the 13 years period assessed and not only influenced by the time of the year in which horses were assessed in the for mentioned study.

Health problems encountered by working equines are often specific to individual countries, being findings determined by economic, geographic, climate and local husbandry practices (Upjohn et al 2012). This makes results difficult to compare with those from other regions, but important in order to implement local preventive practices, since many of the problems reported to affect horses welfare can be ameliorated through educational programme's for owners.

## Conclusions

- Knowledge and understanding of good husbandry practices and the constraints and advantages of animal draught power are essential for an adequate implementation revision and re-design of extension programme's protocols, trying to move forward from free first aid assistance towards educational and preventive programmes.
- Sustainable use of animal traction, and the need to use renewable sources of energy are concerns that need to be tackled from diverse areas of science including animal welfare. This takes mayor importance in urban and peri-urban areas where draught horse owners keep increasing in number in developing countries, but at the same time owners do not necessary have a tradition and knowledge of working with animals.

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