

AN EVALUATION OF EQUID WELFARE PERCEPTIONS AND
KNOWLEDGE DISCREPANCIES

A Thesis

by

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Submitted to the Office of Graduate and Professional Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

MASTERS OF SCIENCE

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December 2015

Major Subject: Agricultural Leadership, Education, and Communications

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ABSTRACT

Equids are used as beasts of burden, show animals, and as a protein and milk source throughout the world; the uses vary from country to country. The depth and topical range of knowledge also varies significantly. This study identifies topical and geographical areas that need education on equid management and welfare, and ways to best distribute educational material. Knowledge related to husbandry, management, and health needs was measured and observed through the distribution of in-depth surveys and on-farm observation. Surveys and observations took place in Spain, Portugal, and Italy to determine how equid owners use their equids and how owners prioritize management and care practices, sources of information used for equid education, perceived credibility of sources used, current perceived knowledge of equid welfare, and owner perceived importance of welfare knowledge.

The overall response rate among the 3 countries described competitive showing as the primary use of equids. The cumulative response in all countries showed that books were the most commonly used source of information; though, the cumulative response for the countries collectively resulted in seminars being perceived to have the highest credibility amongst equid owners. Overall, owners in Spain, Portugal, and Italy generally had a perceived knowledge of “average” for equid care practices. Using a mean weighted discrepancy score, lameness and nutrition were identified as areas in which the largest “gap” between perceived knowledge and perceived importance occurred. This

gap identifies these areas as the target subjects for future educational programs. It is concluded that the dissemination of educational information would be most effective if provided through seminars.

ACKNOWLEDGEMENTS

I would like to thank my committee chair, Dr. Rutherford, and my committee members, Dr. McKim, Dr. McLean, and Dr. Vogelsang, for their guidance and support throughout the course of this research. I have learned so much, and I cannot thank you enough for this research opportunity.

Thanks also go to my many friends that have helped me through this process and enriched my college experience beyond belief.

Finally, thanks to my mother and father for their endless encouragement, love, and support throughout this journey, and to Austin Rayzor for his patience and love.

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CHAPTER I

INTRODUCTION

Knowledge of animal welfare is becoming essential to veterinary professionals in the United States and internationally (Siegford et al., 2005). However, the type of veterinary care that is generally supplied to animals in both industrial and developing countries is still not known, especially in regards to care for working equids. Working equids include horses, donkeys, mules, and hinnies. Donkeys, mules and hinnies (a hybrid offspring of mating a donkey with a horse), have been used for centuries as beasts of burden (Way, 2010).

Today, these animals can still be found working in some of the world's poorest countries serving small shareholder farmers, but in industrial countries, these animals are finding a new uses as show and recreational animals (Burn et al., 2010). Donkeys have also gained a new application with the use of their milk to feed humans affected by cow milk protein allergy (Iacono et al. 1992; Businco et al. 2000; Chiofalo et al. 2004; Salimei et al. 2004; Vincenzetti et al. 2008). In addition to these animals being used as beast of burdens and in the dairy sector, there is an increasing interest to use these animals for recreational purposes such as show and trail riding. The many facets of use of donkeys, mules, and hinnies has created a need for many industry professionals and farmers to learn more about the common health and management practices associated with donkeys and mules (McLean et al., 2012).

Working equids in many developing countries are often thought of as a tool, rather than something that requires health care. Healthcare and welfare requirements may be neglected due to lack of education, sources of information, or access to professional care (i.e. veterinarians or farriers). Equid welfare is often overlooked, leaving working animals with preventable sores and lameness problems that often affect the longevity of the animal (Burn, Dennison, & Whay, 2009). Because equid power is most commonly used in low-income communities (de Aluja, 1998), the animals are generally undernourished, have limited access to water, and presumably receive little husbandry or veterinary attention (Burn, Dennison, & Whay 2010). Most farmers are believed to not be intentionally cruel to their animals, but due to lack of education, they do not know how to work or care for their animals differently (Heleski et al., 2010). The same may be true for some of these issues such as proper nutrition, tack/harnessing fit, and lameness for owners using these same animals for recreational and show purposes.

Equids are often unable to maximize their output per day due to a myriad of problems (McLean et al., 2012). Most donkeys receive little medical care and problems go largely untreated (McLean et al., 2012). The loss of a donkey (i.e., death or lameness) or the time that a donkey cannot work creates hardships for the people relying on the animal's contribution (Diarra et al., 2007). The well-managed equid can work productively for 20-40 years (Jones, 2003), maximizing the farmer's financial gain from the equid. It is this targeted longevity, through enhanced welfare practices and education, that is the focus of this study.

Working equids require up to 10 liters of water daily and 6 kilograms of feed daily. Minimal intake requirements, in addition to the equid's ability to carry the same loads as an ox and cover a comparable amount of ground daily, make equids an essential part of farming for many villages (Jones, 2003). Farmers who do not properly manage working equids may significantly decrease the number of years the equid can work, decreasing the profit gained by the farmer (Burn et al., 2010).

There are an overwhelmingly large proportion of farmers that disregard veterinary care for their working equids. Diarra et al. (2007) found most owners in Mali did not seek medical treatment for their donkeys nor did they know it was available, contributing to our hypothesis that there is currently little education for owners and farm workers.

In Spain and Portugal, equids are used in a variety of working capacities, including plow fields for crops, pull wagons to transport people and goods, and for riding. Many of the equids in Spanish and Portuguese villages are hinnies (the offspring of a male horse and a female donkey). Hinnies, which have a comparable working output to mules, are more prevalent in small working communities.

Donkeys are less expensive than horses; therefore, most villagers own a jenny instead of a mare. To produce a hybrid working equid, such as a mule or hinny, villagers breed their jennies to a stallion to produce hinnies. These villages have an unparalleled number of hinnies in comparison to many areas, including the United States.

Many Italian donkeys are used in dairies, where jennies are milked up to three times per day. These jennies produce approximately 1 liter of milk daily, which is sold for up to 30 euros per liter. Though the majority of observed animals in Italy are not used in a physical working occupation, the livelihood of the dairy farmers is dependent on the overall welfare and milking ability of each animal. The number of donkey dairies in Italy is higher than in any other area of the world.

In areas where Equids are used in a showing capacity equids are hauled to shows to accumulate points to win year-end awards. These owners are not dependent on their equids for their source of income, and the animals are seen as recreational.

In Spain, Portugal, and Italy data was collected visiting farms and small communities of equid owners. Enthusiastic owners showed their animals to researchers and willingly helped to collect data. In these communities, face-to-face interaction was the only way to collect data, as the majority of owners did not have access to the Internet or telephones.

Currently there are no equid management standards anywhere in the world; unlike horses, who not only have standards as an entirety, but breed standards as well. Furthermore, it is unknown where/if equid owners receive educational information regarding their animals, or what the educational needs of owners are. Welfare practices and educational needs are measured and observed the European countries of Spain, Portugal, and Italy the surveys collected reflect ownership and welfare management of working equids.

This study identifies topical and geographical areas that need education on equid management and welfare and ways to best distribute educational material. This will allow future researchers to implement educational programs that will enhance the welfare of equids, both working and recreational. Future educational programs based off of this research could result in welfare and conformation standards for donkeys, mules, and hinnies. This standard could potentially enhance the working ability of equids through selective breeding and care; therefore, increasing owners' income through increased production.

This study will describe small shareholder farmers' knowledge of equid management and care practices in Spain, Portugal, and Italy. Knowledge related to husbandry, management, and health needs prior to an educational program about working equid health and husbandry practices has been measured and observed through the distribution of in-depth surveys and on-farm observation. According to Burn et al. (2010) today, despite growing information on working equine health, little is currently known about the animal welfare implications. This study attempts to examine how owners in different countries and use of working equids and recreational equids manage and care for their animals as well as where information is obtained. Furthermore, the study attempts to quantify such data and suggest areas that may need more attention and education. Such findings may help improve the overall welfare and care of both working equids and recreational animals.

Definition of Terms

Equid- any of various hoofed mammals of the family Equids, which includes horses, donkeys, and zebras. Equids have muscular bodies with long, slender legs adapted for running and a single hoofed digit at the end of each limb. (Science Dictionary)

Equine- of, relating to, or resembling a horse or the horse family (Merriam-Webster)

Gelding- a castrated male donkey or horse

Hinny- The offspring of a Stallion (intact male horse) and a Jenny (female donkey)

Jack- an intact male donkey

Jenny- a female donkey

Mare- a female horse

Mule- The offspring of a Jack (intact male donkey) and a Mare (female horse)

Stallion- an intact male horse

Working equid- a mule, hinny, or donkey used for things such as plowing, packing, transporting goods, etc.

It was understood that the participants would provide honest responses to survey questions. In addition, each respondent clearly, understood each question, regardless of language, and participants were the primary caregivers of their equids. We hypothesized that the responses reflect variation in knowledge, sources, willingness to seek professional care, and willingness to consult with a professional about animal healthcare

and management. We concede that these factors may be related to the overall welfare of the animal and its use (i.e. a working equid would be less cared for than a show donkey). We first determined the use of the equids and how owners received and perceived information. Next, we used a ranking system to examine the perceived relative importance and knowledge of equid care practices. Next, we will determine if there is a “gap” between perceived knowledge and perceived importance of equid care.

Significance of the Study

The results of this study are important in evaluating areas concerning equid welfare, which need implemented educational programs in Europe. The responsibility of the owner is to make provisions for good welfare through sound husbandry and management practice. Examples include; a healthy animal free from injuries, in adequate body condition, sound, with proper fitting tack and harness; this animal in return will live longer and be more productive. An animal in good welfare exposed to proper management and welfare practices is a prerequisite for the improved output or performance of animals (Passantino, 2010). This study will allow for data to be collected and to better understand current management practices and deficiencies. This could lead to enhanced management practices through evaluation of current practices and recommendation of future welfare educational opportunities.

CHAPTER II

LITERATURE REVIEW

History of the Working Equid

“The original motive for domesticating the donkey is unknown, and it is not certain that it would necessarily reflect its common usage today, as transport for people and goods. It may have been domesticated for its meat or milk, with its use for portage a later development” (Blench 2000).

According to Burn et al. (2010), working equids tend to be employed by the poorest farmers in developing areas. “In these poorer communities the animals are generally overworked, are less likely to have easy access to water and nutritional supplements and often suffer from lameness and harness sores” (Burn et al., 2010). Blench (2000) states that donkeys are not conventional sources of meat, and their uses for packing and traction do not fit within the stereotypical perspectives of livestock agencies. However, donkeys and mules are essential to the subsistence strategies of many communities and semi-arid regions (Blench, 2000; Fielding & Pearson, 1991).

In the past, throughout West Africa, donkeys were diffused principally from farmer to farmer or sold by occupationally specialized pastoralists (Blench 2000). However, donkeys and mules have been dispersed in the present century as part of broad

agricultural strategies associated either with the nation-state or with aid agencies (Blench, 2000).

Donkeys and mules are being used for traction in regions with light, sandy soils, primarily as pack animals, either for carrying loads or for riding. The industrial manufacturing ability to create axles for donkey-carts has also aided in the diffusion of mules and donkeys among farmers considerable stimulus (Blench, 2000). “Although donkeys are both widespread and economically important to their owners, they are rarely studied and are not usually subject to any improvement, development or load schemes” (Blench, 2000; Svendsen, 1986).

Importance of the Working Equid

Donkeys are vital to small businesses in small communities. “Donkeys and mules are perceived to be more robust than horses; indeed they are relatively tolerant of droughts and poor quality feed” (Pearson et al., 1999; Nengomasha et al., in press) via Burn et al., 2010. They are used for carrying water to irrigate the crops, and to carry items into town to sell. “The main health and welfare problems arise from poor management and working practices...poor feeding and inhumane hobbling practices” (International Department Report- Ethiopia 2012).

“Equine power is most common in poorer communities, so the animals are generally under nourished, have limited access to water, and receive relatively little husbandry or veterinary attention” (Burn et al., 2010).

Lack of owner education leads to an excess of working equids with low body condition, open wounds, lameness, parasites, dental and respiratory problems. With these problems, equids are unable to perform their tasks with maximum effort, reducing the income of the farmer or village. (Burn, Dennison, & Whay, 2010)

Body Condition Score

According to Henneke et al. (1984) breeding efficiency was enhanced in mares (horses) with a body condition score of 5.0 (average to good condition) or above. In this study initial excess store of body fat enhanced fertility. This, applied to working donkeys and used on a body condition scale for donkeys, would increase the productivity of donkey dairy farms and working farms. “Mares in this study which foaled in low body condition (condition score less than 5.0) had significantly lower pregnancy rates and maintenance of pregnancies when body condition was maintained at a low level (Henneke et al., 1984). Thus encouraging breeding programs to strive for a higher body condition score for increased fertility and production rates. There is a significant lack of existing information correlating body condition score and

productivity, it can be assumed that the Henneke (1984) results are applicable to working equids.

Importance of Equid Owner Knowledge

“Working equine animals are an essential source of power in agriculture and for urban and peri-urban transport in developing countries” (Swann 2006). But the lack of knowledge and funds, working donkeys, mules, and hinnies often receive little to no veterinary care (Burn et al., 2010). “Many equid handlers are unaware of the proper way to fit harnesses and equipment to their working equid. Working equids are often asked to pull loads of materials too heavy for them to pull due to lack of knowledge of the handler” (McLean et al., 2012). According to McLean et al. (2012) an educational course focused on equid owner/users could be taught. The course could focus on many areas that could improve the overall welfare and care of these animals. Not only could owners be taught the proper way to use and fit their equid, but the proper way to care for their animals.

“Working animals are the power providers of the developing world before urbanization and economic development displaces them with internal combustion power” (Swann, 2006). With proper care, these working equids can work up to 40 years or more of their life. (Heleski et al., 2010). This age is often not met by the working

equids in developing areas, creating a larger expense for the farmer when they have to replace their equids.

Weaknesses in equid welfare include inadequate information and prioritization of feeding, watering and stabling (International department report- Egypt 2012).

“Enhancing (equid) welfare subsequently improves the well-being of the families that the donkeys provide for and should be emphasized” (McLean et al., 2010). It was observed that in Mali, Africa, where an educational program was implemented, that many men attended the school, though women are the primary equid care providers. “The large number of participants in the equid educational program could be seen as a positive step towards better equid care; however, there is a lingering need to educate the women that work with the animals as well” (McLean et al., 2012). According to McLean et al. (2012) correctly implemented educational programs could show owners the benefit to spending a minimal amount of money on veterinary care for their working equids.

People in developing countries rarely provide optimal husbandry practices or food supplementation for their equids. Nutritional availability also differs from urban to rural populations (Burn et al. 2010). Due to this lack of education working equids and donkeys are often not able to work to their full potential, thus reducing producer income (A.K McLean et al. 2012).

Owners would benefit from being taught not only how to care more effectively for their equids, but how caring for their donkeys, mules, and hinnies could increase the return on their investment of purchasing their equid (Burn et al., 2010).

CHAPTER III

MATERIALS AND METHODS

A 12-page, 80-question survey was created using InDesign and made to be compatible with the Teleform program. This survey instrument was developed using questions, created in conjunction with an Extension Equine Specialist, that would best assess the knowledge of equid owners and welfare practices that were currently being implemented by owners. The survey was created in four languages, first English then translated into Spanish, Portuguese and Italian. Veterinary professionals who were studying at Texas A&M University in College Station, Texas, performed the translations; translators were from Spain, Portugal, and Italy. The translators were familiar with the correct veterinary terms and how to properly translate them. The translations were then sent to a veterinarian in Portugal to confirm that the translations in Spanish and Portuguese were correct. Researchers were unable to get confirmation of the translated Italian surveys.

Population

The target population for this study included owners of working equids (i.e. donkeys, mules, and hinnies). The study encompassed equid owners in 3 countries: Italy, Portugal, and Spain. A working equid was defined as an equine (i.e. horse,

donkey, mule, or hinny) whose owners' livelihoods depended on the ability of their equids to work around the farm and/or village. The population samples in Spain and Portugal consisted primarily of owners who used equid-powered plows and carts on a daily basis. Veterinary professionals in the regions sampled identified the target population in Spain and Portugal. A subpopulation of working equids was surveyed in Italy whose primary use was not fieldwork, but milk production. The frame of this study expands further to include donkeys that provide milk for dairies, are used in pack strings, and for recreational purposes. The expansion of the target population allowed for the inclusion of equid welfare and owner education in previously un-researched equid occupations, dairies, and recreation.

Survey Design

The research questions asked in the surveys were selected to provide information about equids where there is currently limited research available. Equids perform many duties, including transporting commodities and people to market, hauling garbage, or carrying water and firewood (Diarra et al., 2007). These tasks coupled with the recreational use of equids, such as showing, are the primary occupations of equids in the countries visited. There is currently no found material on the welfare or sources of information used by owners of donkeys and mules used for recreational use. "There have been very few studies looking how different types of work affect equine welfare"

(Burn et al., 2010). This gap in current knowledge creates the foundation for research question 1, which asks how surveyed owners use their equids.

Research Design

The research design of this non-experimental quantitative study was descriptive in nature. The construct of this study sought to measure the welfare of equids and the educational levels and needs of equid owners. These measurements were obtained through a 12-page, 80-question survey that was distributed in Spain, Portugal, and Italy.

Research Question 1

Question one asked owners what was their use of animals and how they managed their equids. Data relevant to research question 1 was reported in section 2 of the survey instrument. Results will include frequency and percentages for each item. Items will be disaggregated by country, Portugal, Spain, and Italy, then summarized collectively. Data was collected from 32 equid owners in Spain, 14 in Portugal, and 14 in Italy.

Research Question 2

The second research question asked each owner to describe how owners use and perceive sources of information. Data relevant to research question 2 was collected in section 9 of the survey instrument. Results will include frequency and percentages for each item. Items will be disaggregate by country, Portugal, Spain, and Italy, then summarized collectively.

Research Question 3

The third research question asked owners to describe what educational needs in the area of management and care. Results will include frequency and percentages for each item. Items will be disaggregated by country (Portugal, Spain, Italy) and then summarized collectively.

Instrumentation

Owners in Spain, Portugal, and Italy were observed at their home farms or in their villages. In Malaga, Portugal, a data collection area was set up in the town square and owners were asked to bring their animals to researchers for observation, often after

using their equids to work the fields. In Spain, equids were viewed at farms and individually examined by researchers. In Portuguese villages and some Spanish villages, a local veterinarian spoke with each owner individually to interpret the survey to them in their native language. After going through several surveys one on one with owners, it was decided to complete surveys at a separate time, after the equid evaluation.

In Italy, equids were observed at individual farms, many of which were dairies and during a donkey dairy management conference. Researchers observed the dairy donkeys going through the milking process, in addition to observing them in barns and fields. The surveys were distributed at the time of our visit and were read to the owners by Italian veterinarians. Surveys were also distributed through an equid conference in Milan, Italy. This ensured that owners throughout Italy were surveyed; however, we were not able to observe each owners animal due to time constraints and availability of the animals.

The 12-page, 80-question survey was created using InDesign, made to be compatible with the Teleform program. This survey instrument was developed using questions, created in conjunction with an Equine Extension Specialist, that would best assess the knowledge of equid owners and welfare practices currently being implemented by owners. The survey was created in English then translated into Spanish, Portuguese, and Italian. Veterinary professionals who were studying at Texas A&M University in College Station, Texas, performed the translations; translators were

originally from Spain, Portugal, and Italy. Researchers and veterinarians in each country distributed the surveys.

The first section of the survey identified the type of equids owned (donkeys, mules, hinnies, donkeys/mules, mules/hinnies, donkeys/mules/hinnies). This section then identified the type of equid (breed, mini, mammoth, standard), if the animal was named, the mean age of the animal(s), the sex, the owners perception of the body condition score of the animal(s), and how the owner acquired the animals. When asked how the owner acquired their animal participants could choose from breeding their equid, buying their equid, trading for their equid, or receiving their equid as a gift. These questions were asked to identify what type of equid the survey was being answered in accordance with and to see if the owner would place a increased/decreased value on the animal based on how that animal was acquired.

The second section of the survey identified how often the equid was used for plowing, packing, transporting goods, showing, riding, showing driving, showing: halter, showing: all, showing driving and halter, showing: riding and halter, and retired. Each owner was asked to rank each occupation using a 1 to 4 scale with corresponding anchors (1 = never, 2 = rarely sometimes, 3 = quite often, and 4 = very often). The annual cost was then ranked from greatest to least, using numbers 1-7, given the following items to choose from feed, shoeing, vaccines, dewormer, show expenses, new tack or equipment (if so which kind: harness, pack, saddle cart, grooming equipment, grooming supplies, or other), and annual visit by the veterinarian. Each number, 1-7,

could only be used once. This section sought to identify the use of each animal and what services/items the owner was willing to spend the most money on for the equid.

The third section of the questionnaire asked owners to rank their perceived knowledge and the perceived importance of: nutrition, hoof care, lameness, infectious disease, dental disease, breeding, ill-fitting tack, parasite infections and longevity. For importance and knowledge participants could choose from: no importance, below average importance, average importance, above average importance, and utmost importance. This allowed researchers to identify what owners thought was important and how they would self-rank their level of knowledge.

The fourth section of the survey analyzed how the owner cared for its animal such as routine procedures such as dental and hoof care as well as the cost of the procedures and who performed them. In the fifth section of the survey owners could indicate how they would treat different medical situations concerning their equid. The choices of self treat, call a neighbor for advice, call a veterinarian, monitor for a day to see if condition changes, and leave alone were available for the owner to choose for each situation. The type of diet, method of water reception, and usage of minerals and supplements was also analyzed. These questions sought to identify and measure the basic day-to-day welfare practices of the owners.

The sixth section of the survey collected additional information on how owners addressed various conditions, alternative medicine application/use as well as how owners prevented injuries (e.g. protective gear or equipment). Alternative medicine and

practices included massage therapy, chiropractic work, infrared therapy, acupuncture, or other as well as how many times a veterinarian typically visited per year.

The seventh and eighth sections of the survey were composed of yes/no questions giving different medical scenarios and asking if the owner would use a veterinarian in each case. The final section asked owners which sources they found credible for information and which sources they used. At the conclusion of the survey owners were asked to provide any additional information or comments in an open-ended manner. These questions sought to gain information on a case-by-case basis to determine if the owner would call a veterinarian in different situations. Questions also identify the channels that equid owners use to get information, and how/if they identify them to be accurate or trustworthy.

Validity and Reliability

The questionnaire, developed by an equine specialist at North Carolina State University, was constructed using information from similar studies and professional knowledge. Each version of the questionnaire (Spanish, Portuguese, Italian, and English) consisted of 80 welfare-based questions.

“Validity asks the question: are we measuring what we want to measure?” (Muij’s, 2004, pg. 65). As the most important thing to consider in developing and

evaluating measuring instruments (Ary et al., 2006) validity was determined by a panel of 4 industry experts. “According to Muijs (2004), for a study to be valid, it must be reviewed by a panel of experts” (Leggette, 2005). This panel, comprised of agricultural communications and animal science industry professionals, came from Texas A&M University and the University of North Carolina State. 2 panel member were Agricultural Communications professors at the University of Texas A&M, one panel member was an Animal Science professor at the University of Texas A&M, and one panel member was a professor and equine industry professional at the University of North Carolina State. “There are kinds of questions only knowledgeable people can answer”(Dillman, 2007, p. 141). This panel addressed each question to determine validity as well as determining the distribution method.

A pilot study was conducted in the United States at 2 different donkey and mule shows to obtain professional critique, and determine if the questionnaire was valid. The first questionnaire was distributed to n = 10 at the San Antonio Livestock Show, San Antonio, Texas, U.S. After the initial round of critique, the questionnaire was reformatted and distributed at the Houston Livestock Show and Rodeo donkey and mule show, Houston, TX, U.S. (n = 30). IRB approval for this study is under IRB2015-0181 through Texas A&M University in College Station, Texas.

CHAPTER IV

RESULTS AND FINDINGS

These results are a product of a convenience sample; therefore, results are limited to the surveyed population. Collecting data via a convenience sample was the most reliable way for researchers to collect data in surveyed areas where technology did not allow for additional or alternative means of data collection. However, due to limited research in this field, implications from this study may be applicable to other populations. Participants ranged in age from 18 to 76. The mean age of respondents was 48 and there was no missing data. Gender of participants was 78.21% male and 21.79% female with missing data from 2 surveys.

Equid owners in Spain provided basic care (food, water, shelter) for their equids. Though it was observed that many equids had untrimmed hooves and teeth that had not been floated. This increased the risk of laminitis and decreased the ability to consume food. Many farmers fed a mixture of non-traditional feed including bread, cabbage, and other vegetables; possibly reducing the digestibility and nutrient balance of rations.

The basic needs of the observed equids in Portugal appeared to be met. A general knowledge and understanding regarding the health and soundness of animals to maximize work and production appeared present among owners. However, lameness in one village did not seem to be a concern as long as the equids were sound to plow during the plowing season.

Equids were used for recreational and dairy purposes in Italy. The farm that used mules for recreational purposes rode them for leisure in a western-type saddle. The 2 donkey dairy farms visited used the donkeys primarily for milk and the male donkeys were often sold for meat. The dairy located in Miranda, Italy consisted of approximately 75 donkeys producing ≥ 30 liters of milk daily. This milk was sold in its liquid form, in addition to being added in lotions, soaps, and gelato dessert. The dairy in Torino, Italy consisted of approximately 500 donkeys, producing ≥ 120 liters of milk daily. This dairy produced milk, powdered milk, lotions, soaps, fragrance, cookies, and liquor with the milk. The dairy also capitalized on the donkey farm as a bed and breakfast. Surveyed equid owners that attended an equid management conference in Milan, Italy complete surveys; however, their equids were not evaluated beyond the constraints of the survey.

In Italy, the owners' main concern for their equids (primarily all donkeys) was milk production. Therefore, the animals did not receive vaccinations, dewormer, or other medical treatments due to concerns that it may be a contaminant or residuals may be found in the milk. This caused a visible increase in wellness reduction versus the animals used in other capacities. In the donkey dairies the animals were provided with shelter, free-choice water and forage.

How Equid Owners Used Their Equids

Research objective 1 sought to determine the primary uses of equids in developing areas. Each participant was asked to rate 10 different types of use using a Likert-type scale. Participants were asked to rank equid occupations from never, rarely, sometimes, quite often, and very often. The occupations measured were plowing, packing, transporting goods, showing: riding, showing: driving, showing: halter, showing: all, showing: driving and halter, showing: riding and halter, retired. These questions were asked in Spain, Portugal, Italy, and the United States. Tables reflect the cumulative responses from all countries, as well as the results divided by individual country. The tables represent each country accordingly; Table 1 Use of Equids Cumulative From All Countries, Table 2 Spain, Table 3 Portugal, and Table 4 Italy.

Table 1: Cumulative Use of Equids

Use	1 ^a		2 ^b		3 ^c		4 ^d		5 ^e	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Plowing	36	60.0	3	5.0	5	8.3	7	11.7	1	1.7
Packing	30	50.0	5	8.3	12	20.0	7	11.7	0	0.0
Transporting Goods	36	60.0	4	6.7	7	11.7	4	6.7	0	0.0
Showing: Riding	31	51.7	2	3.3	7	11.7	4	6.7	6	10.0
Showing: Driving	31	51.7	3	5.0	7	11.7	2	3.3	6	10.0
Showing: Halter	34	56.7	1	1.7	6	10.0	2	3.3	6	10.0
Showing: All	36	60.0	1	1.7	3	5.0	2	3.3	5	8.3
Showing: Driving & Halter	35	58.3	1	1.7	4	6.7	2	3.3	6	10.0
Showing: Riding & Halter	38	63.3	1	1.7	4	6.7	2	3.3	6	10.0
Retired	39	65.0	4	6.7	0	0.0	1	1.7	4	6.7

^a = never ^b = rarely ^c = sometimes ^d = quite often ^e = very often

The compilation of data from the three surveyed countries reflected that the majority (60%) did not use their equids for plowing, showing: all, or transporting goods; however, some (11.7%) responded that their equids are used for plowing “quite often”. Data indicates that a majority of the respondents “never” use their equids for packing, though 20% of respondents use their equids “sometimes” for packing. 60% “never” use their equids for transporting goods and 11.7% use their equids “sometimes” for transporting goods. Respondents reported that 51.7 “never” used their equids for showing: riding and 10% used their equids “very often” for showing: riding. The majority of respondents (51.7%) “never” use their equids for showing: driving, and 10% reported “very often” use for showing: driving. 56.7% of respondents never use their equids for showing: halter, and 10% use their equids “very often” for showing: halter. The majority of respondents (60%) “never” use their equids for showing: all and 8.3% reported “very often” use. This makes showing: all the equid occupation with the highest percentage of people whom use their equids “very often” for showing: all. 58.3% responded “never” to showing: driving and halter, and 10% responded very often to showing: driving and halter. The majority (63.3%) reported “never” to showing: riding and halter, and 10% reported “very often”. 65% reported to “never” have retired their equid, though 6.7% reported “very often” concerning equid retirement.

Table 2 summarizes data for different equid uses in Spain. There were a total of 32 respondents in Spain. The highest percentage (18.8%) of “very often” responses were equal between showing: riding, showing: driving, showing: halter, Showing: driving and halter, and showing: riding and halter. Researchers did not observe any owners that used their animals for show purposes. However, the majority of the Spanish surveys were conducted in Andalusia, Spain where there are multiple shows per year. This data is likely a result of owners in that region. The highest percentage of “never” responses occurred for retired equids. For the category retired 12.5% reported “rarely”, with no responses for “sometime”, “quite often”, or “very often”. Spanish data concludes that the majorities of equids are not retired and continue to work, even with increased age.

Data collected in Portugal (refer to Table 3) reflects that 100% (valid %) of surveyed participants do now show their equids in any facet. Furthermore, data indicates that the majority of Portuguese equid owners use their equids “quite often” for plowing (42.9%), and “quite often” for packing (21.4%). The majority (64.3%) does not use their equids for transporting goods. With only one respondent having retired their animal, 64.3% of owners “never” retired their equids and continue to use them. Retirement was not defined in this study; however, it was perceived to be a state in which equids no longer work. Portuguese owners use their equids for working capacities, and very seldom retire their animals.

Table 4 reflects the variety of uses for equids in Italy. There were 14 respondents in Italy. With over 50% of participants reporting that they never use their equids for any aspect of showing, working capacities can be concluded as the primary use of equids in Italy. With 100% “never” using their equids for plowing and 64.3% “never” using their equid for packing it can be concluded from the surveys that the majority use their equids for transporting. However, 64.3% “never” used their equid for transporting goods. The survey did not account for equids used to produce products for human consumption. Human consumption includes, but is not limited to, meat and milk production.

While collecting data it was observed that many Italian equid owners used their donkeys in dairies. They collect their milk, prepare it for consumers, and sell the donkey milk. This was not an option for this section of the survey. This missing data could contribute the elevated percentages of “never” responses without correlating “very often” answers in different capacities. Dairies were prevalent among farmers, and seemed to contribute greatly to the equid industry.

Table 2: Use of Equids in Spain

Use	1 ^a		2 ^b		3 ^c		4 ^d		5 ^e	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Plowing	21	65.6	3	9.4	2	6.3	1	3.1	1	3.1
Packing	17	53.1	3	9.4	4	12.5	4	12.5	0	0
Transporting Goods	18	56.3	2	6.3	5	15.6	3	9.4	0	0
Showing: Riding	14	43.8	1	3.1	5	15.6	3	9.4	6	18.8
Showing: Driving	13	40.6	1	3.1	7	21.9	1	3.1	6	18.8
Showing: Halter	14	43.8	1	3.1	5	15.6	2	6.3	6	18.8
Showing: All	16	50.0	1	3.1	3	9.4	2	6.3	5	15.6
Showing: Driving & Halter	14	43.8	1	3.1	4	12.5	2	6.3	6	18.8
Showing: Riding & Halter	17	53.1	0	0	4	12.5	2	6.3	6	18.8
Retired	22	68.8	4	12.5	0	0	0	0	1	3.1

^a = never ^b = rarely ^c = sometimes ^d = quite often ^e = very often

Table 3 Use of Equids in Portugal

Use	1 ^a		2 ^b		3 ^c		4 ^d		5 ^e	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Plowing	3	21.4	0	0	3	21.4	6	42.9	0	0
Packing	3	21.4	1	7.1	6	42.9	3	21.4	0	0
Transporting Goods	9	64.3	1	7.1	1	7.1	0	0	0	0
Showing: Riding	10	71.4	0	0	0	0	0	0	0	0
Showing: Driving	10	71.4	0	0	0	0	0	0	0	0
Showing: Halter	10	71.4	0	0	0	0	0	0	0	0
Showing: All	10	71.4	0	0	0	0	0	0	0	0
Showing: Driving & Halter	10	71.4	0	0	0	0	0	0	0	0
Showing: Riding & Halter	10	71.4	0	0	0	0	0	0	0	0
Retired	9	64.3	0	0	0	0	0	0	1	7.1

^a = never ^b = rarely ^c = sometimes ^d = quite often ^e = very often

Table 4: Use of Equids in Italy

Use	1 ^a		2 ^b		3 ^c		4 ^d		5 ^e	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Plowing	12	85.7	0	0	0	0	0	0	0	0
Packing	10	71.4	1	7.1	2	14.3	0	0	0	0
Transporting Goods	9	64.3	1	7.1	1	7.1	1	7.1	0	0
Showing: Riding	7	50.0	1	7.1	2	14.3	1	7.1	0	0
Showing: Driving	8	57.1	2	14.3	0	0	1	7.1	0	0
Showing: Halter	10	71.4	0	0	1	7.1	0	0	0	0
Showing: All	10	71.4	0	0	0	0	0	0	0	0
Showing: Driving & Halter	11	78.6	0	0	0	0	0	0	0	0
Showing: Riding & Halter	11	78.6	1	7.1	0	0	0	0	0	0
Retired	8	57.1	0	0	0	0	1	7.1	2	14.3

^a = never ^b = rarely ^c = sometimes ^d = quite often ^e = very often

How Equid Owners Prioritize Management and Care Practices

With willingness to pay reflecting priority in this data set, owners' highest priority coincides with what they are most willing to spend money on. These questions were asked in Spain, Portugal, and Italy. Tables reflect the cumulative responses from all countries (Table 6), as well as the results divided by the individual country. The tables represent each country accordingly, 7=Spain, 8=Portugal, 9= Italy.

Overall, the cumulative data set (table 6) reflects that the highest priority is placed on feed (M=1.80) and the lowest priority is placed on vaccines (M=4.31). The highest expense for owners in Spain is show expenses. Table seven reflects that the highest expense priorities in Spain are show expenses (M= 2.32). This coincides with the highest percentage of "very often" response for equid use in Spain. It is likely that the meaning of "show" was lost in translation, as it was not observed that anyone participated in showing his or her equids. The lowest equid care priority was vaccines (M= 4.07).

Table eight shows that the primary equid care priority in Portugal is feed (M= 1.08), with the lowest priority being show expenses (M= 6.50).

Table nine shows that the primary equid care priority in Italy is feed (M= 1.23), with the lowest priority being show expenses (M= 5.38).

Table 5

Equid Care Priorities: Complete Data Set

	<i>N</i>	Minimum	Maximum	<i>M</i>	<i>SD</i>
Feed	57	1	7	1.89	1.698
Shoeing	49	0	7	3.00	2.582
Vaccines	45	0	7	4.31	1.905
Dewormer	52	0	7	3.96	1.857
Show Expenses	40	0	7	3.35	3.051
New Tack or Equipment	44	0	7	3.52	2.672
Annual Visit by Veterinarian	50	0	7	3.74	1.946
Valid N (listwise)	38				

Table 6

Equid Care Priorities: Spain

	<i>N</i>	Minimum	Maximum	<i>M</i>	<i>SD</i>
Feed	31	1	7	2.52	2.047
Shoeing	30	0	7	2.60	2.737
Vaccines	28	0	7	4.07	2.017
Dewormer	31	0	7	3.71	1.987
Show Expenses	28	0	7	2.32	2.907
New Tack or Equipment	29	0	7	2.52	2.487
Annual Visit by Veterinarian	29	0	7	3.59	1.842
Valid N (listwise)	26				

Table 7

Equid Care Priorities: Portugal

	<i>N</i>	Minimum	Maximum	<i>M</i>	<i>SD</i>
Feed	13	1	2	1.08	.277
Shoeing	9	1	7	3.33	2.291
Vaccines	7	3	7	4.43	1.618
Dewormer	8	3	5	3.63	.744
Show Expenses	4	5	7	6.50	1.000
New Tack or Equipment	7	3	7	5.86	1.464
Annual Visit by Veterinarian	8	2	7	3.63	1.923
Valid N (listwise)	4				

Table 8

Equid Care Priorities: Italy

	<i>N</i>	<i>Minimum</i>	<i>Maximum</i>	<i>M</i>	<i>SD</i>
Feed	13	1	4	1.23	.832
Shoeing	10	2	7	3.90	2.283
Vaccines	10	2	7	4.90	1.792
Dewormer	13	1	7	4.77	1.878
Show Expenses	8	1	7	5.38	2.066
New Tack or Equipment	8	2	7	5.13	2.167
Annual Visit by Veterinarian	13	1	7	4.15	2.267
Valid N (listwise)	8				

How Equid Owners Find Information

Research objective 2.1 sought to determine the primary sources of information used by equid owners. Each participant answered if they did or did not use TV, radio, newspaper, magazine, books, online, social media, seminars, or “other” as sources of information. These questions were asked in Spain, Portugal, Italy, and the United States. Tables reflect the cumulative responses from all countries (Table 11), as well as the results divided by individual country. The tables represent each country accordingly, 12=Spain, 13=Portugal, 14= Italy.

Table 11 reflects the cumulative surveyed population’s response to how equid owners find information. Overall the majority of owners did not use TV (no= 68.3%), radio(no= 65%), or online (no= 61.7%); however, the majority of owners did use newspapers (yes= 45%), magazines (yes= 48.3%), books (yes= 55%), and seminars (yes= 35%).

Table 12 reflects the sources of information used in Spain. Data shows that 65.6% of owners did not use TV, 59.4% did not use radio, and 6.8% did not see online as a source for information. When comparing sources of information in Spain to all the countries the findings are similar in terms of newspapers as being a primary source. Main sources of information for Spanish owners included the use of books (68.8%), magazines (59.4%) and seminars (56.3). When comparing the sources of information to Portuguese owners the findings are more concentrated to magazines (28.6%= “yes”).

Books (57.1%= “no”) and seminars (50%= “no”) were used less frequently. However, owners in the Italy compared to Spain and Portugal are more likely to use social media as a source of information. Italian owners, like in Spain and Portugal, do utilize books (57.1%= “yes”), then magazines (42.9%= “yes”), and newspapers (50%= “yes”); however, they less frequently utilize seminars (21.4%= “no”). Owners in the U.S. had similar responses to the European owners by most frequently utilizing magazines (41.2%= “yes”), books (41.2%= “yes”), newspapers (41.8%= “yes”) closely followed by social media (35.8%= “yes”) and then seminars (23.9%= “yes”). The response for use of publications in the U.S. was the same (41.8%) where this response varied according to publication in other countries (i.e. response to use of magazine or book for information source.)

Table 9
Primary Sources of Information: Cumulative

Sources of Information	1		2	
	<i>f</i>	%	<i>f</i>	%
TV	11	18.3	41	68.3
Radio	13	21.7	39	65.0
Newspaper	27	45.0	27	45.0
Magazine	29	48.3	25	41.7
Books	33	55.0	19	31.7
Online	14	23.3	37	61.7
Social Media	25	41.7	26	43.3
Seminars	21	35.0	15	25.0
Other	0	0.0	0	0.0

Table 10
Primary Sources of Information: Spain

Sources of Information	1		2	
	<i>f</i>	%	<i>f</i>	%
TV	9	28.1	21	65.6
Radio	11	34.4	19	59.4
Newspaper	21	65.6	10	31.3
Magazine	19	59.4	12	37.5
Books	22	68.8	9	28.1
Online	9	28.1	22	68.8
Social Media	16	50.0	14	43.8
Seminars	18	56.3	5	15.6
Other	0	0	0	0

Table 11
Primary Sources of Information: Portugal

Sources of Information	1		2	
	<i>f</i>	%	<i>f</i>	%
TV	2	14.3	10	71.4
Radio	1	7.1	11	78.6
Newspaper	3	21.4	10	71.4
Magazine	4	28.6	9	64.3
Books	3	21.4	8	57.1
Online	0	0	11	78.6
Social Media	2	14.3	9	64.3
Seminars	2	14.3	7	50.0
Other	0	0	0	0

Table 12
Primary Sources of Information: Italy

Sources of Information	1		2	
	<i>f</i>	%	<i>f</i>	%
TV	0	0	10	71.4
Radio	1	7.1	9	64.3
Newspaper	3	21.4	7	50.0
Magazine	6	42.9	4	28.6
Books	8	57.1	2	14.3
Online	5	35.7	4	28.6
Social Media	7	50.0	3	21.4
Seminars	1	7.1	3	21.4
Other	0	0	0	0

How Equid Owners Perceive Credibility of Information Sources

Research objective 2.2 sought to determine the perceived credibility of information sources used by equid owners. Each participant was asked to rate TV, radio, newspaper, magazine, books, online, social media, seminars, and “other” on a 5-point scale from “not credible” to “extremely credible”. Survey participants answers reflect the strength of credibility for each source used. These questions were asked in Spain, Portugal, Italy, and the United States. Tables reflect the cumulative responses from all countries (Table 16), as well as the results divided by individual country. The tables represent each country accordingly, 17=Spain, 18=Portugal, 19= Italy.

Table 16 reflects that the majority (41.7%) of people find TV to be “not credible”. The majority of respondents (35%) found radio to be “not credible”. The majority of respondents (30%) found newspapers to be not credible. The majority (21.7%) perceived magazines to have an average of 3 for credibility. The majority (26.7%) of respondents found books to be extremely credible. The majority (26.7%) perceived online to have a score of 3, with the majority (31.7%) finding social media to be “not credible”. Seminars were found to be “extremely credible” by the majority (26.7%) of respondents. Thus radio, newspapers, and social media were perceived as not credible and books, online, and seminars to be credible sources of information.

Seminars were the only information source that was found as a credible source in each country. The majority of respondents found books to be credible in every country with the exception of Portugal, where only 14.3% found books to be a credible source of information. Magazines were found to be credible in every country except Italy. The US was the only country where online was viewed as a credible source, other countries found online to be a 3, neither credible nor not credible. Social media was found as not a credible source of information in each country. TV was found to be not credible in each country with the exception of the US, where the majority ranked TV as a 3. Radio was viewed as not credible in each country with the exception of Portugal. Newspapers were seen as not credible in any country with the exception of Portugal, where the majority ranked it a 3.

Table 17 reflects the perceived credibility of information sources in Spain. The majority (43.8%) of people find TV to be “not credible”. The majority of respondents (37.5%) found radio to be “not credible” and found newspapers (34.4%) to be “not credible”. The majority (25.0%) perceived magazines to have an average of 4 for credibility and (28.1%) of respondents found books to be an “extremely credible” source of information. The majority (28.1%) perceived online to have a score of 3, with the majority (40.6%) finding social media to be “not credible”. Seminars were found to be “extremely credible” by the majority (31.3%) of respondents.

Table 18 reflects the perceived credibility of information sources in Portugal. 28.6% of respondents find TV to be “not credible” and 28.6% found TV to have a score of 3. The majority of respondents (28.6%) found radio to have a score of 3. The majority of respondents (50.0%) found newspapers to have a score of 3. 21.4% of respondents found magazines to be “not credible,” and 21.4% found magazines to have a score of 4. The majority (28.6%) of respondents found books to have a score of 3 as a source of information. 21.4% of respondents found online to be “not credible”, equivalent to the 21.4% that found online to have a score of 3. The majority (28.6%) of respondents found social media to be “not credible”. Seminars were found to be “not credible” by 21.4% of respondents, with a tied majority having 21.4% with a score of 4.

Table 19 reflects the perceived credibility of information sources in Italy. The majority (50.0%) of people find TV to be “not credible”, this is a constant for each country. The majority of respondents (50.0%) found radio to be “not credible”. A tied majority of respondents (28.6%) found newspapers to be “not credible,” and have a score of 2. The majority (28.6%) perceived magazines to have an average of 3 for credibility. The majority (35.7%) of respondents found books to be an “extremely credible” source of information. The majority (28.6%) perceived online to have a score of 3, with the majority (21.4%) finding social media to have a score of 2. Seminars were found to be “extremely credible” by the majority (35.7%) of respondents.

Table 13
Perceptions of Information Source Credibility: Cumulative

Perceptions of Credibility	1		2		3		4		5	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
TV	25	41.7	10	16.7	13	21.7	3	5.0	1	1.7
Radio	21	35.0	8	13.3	17	28.3	5	8.3	2	3.3
Newspaper	18	30.0	13	21.7	16	26.7	5	8.3	1	1.7
Magazine	9	15.0	6	10.0	13	21.7	11	18.3	10	16.7
Books	10	16.7	3	5.0	10	16.7	11	18.3	16	26.7
Online	9	15.0	7	11.7	16	26.7	9	15.0	8	13.3
Social Media	19	31.7	8	13.3	12	20.0	2	3.3	4	6.7
Seminars	11	18.8	2	3.3	5	8.3	12	20.0	16	26.7
Other	1	1.7	0	0.0	4	6.7	3	5.0	18	30.0

Table 14
Perceptions of Information Source Credibility: Spain

Perceptions of Credibility	1		2		3		4		5	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
TV	14	43.8	5	15.6	8	25.0	2	6.3	1	3.1
Radio	12	37.5	3	9.4	10	31.3	3	9.4	2	6.3
Newspaper	11	34.4	7	21.9	7	21.9	4	12.5	1	3.1
Magazine	6	18.8	3	9.4	7	21.9	8	25.0	6	18.8
Books	7	21.9	1	3.1	4	12.5	8	25.0	9	28.1
Online	6	18.8	5	15.6	9	28.1	6	18.8	4	12.5
Social Media	13	40.6	4	12.5	8	25.0	1	3.1	3	9.4
Seminars	7	21.9	1	3.1	4	12.5	7	21.9	10	31.3
Other	0	0	0	0	0	0	0	0	0	0

Table 15
Perceptions of Information Source Credibility: Portugal

Perceptions of Credibility	1		2		3		4		5	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
TV	4	28.6	3	21.4	4	28.6	1	7.1	0	0
Radio	2	14.3	2	14.3	4	28.6	1	7.1	0	0
Newspaper	3	21.4	2	14.3	7	50.0	1	7.1	0	0
Magazine	3	21.4	0	0	2	14.3	3	21.4	1	7.1
Books	3	21.4	1	7.1	4	28.6	1	7.1	2	14.3
Online	3	21.4	0	0	3	21.4	1	7.1	1	7.1
Social Media	4	28.6	1	7.1	2	14.3	0	0	0	0
Seminars	3	21.4	0	0	0	0	3	21.4	1	7.1
Other	0	0	0	0	0	0	0	0	0	0

Table 16
Perceptions of Information Source Credibility: Italy

Perceptions of Credibility	1		2		3		4		5	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
TV	7	50.0	2	14.3	1	7.1	0	0	0	0
Radio	7	50.0	3	21.4	0	0	0	0	0	0
Newspaper	4	28.6	4	28.6	2	14.3	0	0	0	0
Magazine	0	0	3	21.4	4	28.6	0	0	3	21.4
Books	0	0	1	7.1	2	14.3	2	14.3	5	35.7
Online	0	0	2	14.3	4	28.6	2	14.3	3	21.4
Social Media	2	14.3	3	21.4	2	14.3	1	7.1	1	7.1
Seminars	1	7.1	1	7.1	1	7.1	2	14.3	5	35.7
Other	0	0	0	0	0	0	0	0	0	0

Perceived Importance of Equid Management and Care

Research objective 3.1 sought to determine the perceived importance that equid owners put on equid care and management practices. The mean and standard deviation of each care variable is reflected in each table (refer to tables 21-25). In tables 21-25 1= no importance, 2= below average, 3= average importance, 4= above average, and 5= utmost importance.

The cumulative responses reflect that breeding is most important (16.7%), followed closely by hoof care and lameness. Longevity was perceived to be average in regards to perceived importance (36.7%). The majority of owners placed an “average importance” on infectious disease (31.7%), dental disease (33.3 %), ill-fitting tack (30%), and parasite infection (38.3%). It can be concluded from this data that the majority of owners, across Spain, Portugal, and Italy place at minimum an “average importance” on all equid care practices in question.

In Spain a majority of equid owners place an “utmost importance” on nutrition (71.9%), hoof care (46.9%), lameness (56.3%), infectious disease (46.9%), dental disease (50%), breeding (59.4%), parasite infections (46.9%), and longevity (34.4%). These findings were similar for owners surveyed in Italy. The majority of equid owners in Italy placed the “utmost importance” on nutrition (71.4%), hoof care (64.3%), lameness (42.9%), dental disease (28.6%), breeding (57.1%), parasite infections (42.9%), and longevity (35.7%) (Refer to Table 24). However, the majority of owners in Spain placed an “average importance” on ill-fitting tack (34.4%) (refer to Table 22). In contrast, Portuguese saw nutrition as only “average importance” Portuguese; with hoof care receiving a higher level of importance. The majority of equid owners in Portugal placed an “average importance” on nutrition (28.6%), hoof care (50.0%), and ill-fitting tack (64.3%). The majority of Portuguese equid owners place a “below average” importance on nutrition, equal with “average importance” (28.6%), lameness (35.7%),

infectious disease (50.0%), dental disease (50.0%), breeding (50.0%), parasite infections (50.0%), and longevity (42.9%). There was no majority percentage in the “above average” category for any care practice. However, the Italian owners like the Spanish, responded by placing an “above average” importance on ill-fitting tack (34.4 % Spanish response and 21.4% Italian). However, Italian responses were more similar to Portuguese response on importance of infectious diseases as being “below average” (35.7% Italian; 50% Portuguese) compared to the Spanish’s response of “average importance” (46.9 %, refer to tables 22, 23, 24, 25).

Table 17
Importance of Equid Care Practices: Cumulative

Importance	1		2		3		4		5	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Nutrition	0	0.0	7	11.7	28	46.7	10	16.7	7	11.7
Hoof Care	0	0.0	8	13.3	24	40.0	14	23.3	6	10.0
Lameness	2	3.3	11	18.3	20	33.3	11	18.3	5	8.3
Infectious Disease	1	1.7	17	28.3	19	31.7	7	11.7	5	8.3
Dental Disease	1	1.7	17	28.3	20	33.3	8	13.3	5	8.3
Breeding	2	3.3	9	15.0	15	25.0	15	25.0	10	16.7
Ill-fitting tack	2	3.3	11	18.3	18	30.0	11	18.3	7	11.7
Parasite Infections	1	1.7	14	23.3	23	38.3	8	13.3	5	8.3
Longevity	0	0.0	10	16.7	22	36.7	8	13.3	9	15.0

1= No importance 2 = Below average 3= Average 4= Above Average 5= Utmost importance

Table 18
Importance of Equid Care Practices: Spain

Importance	1		2		3		4		5	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Nutrition					3	9.4	6	18.8	23	71.9
Hoof Care					8	25.0	7	21.9	15	46.9
Lameness			2	6.3	8	25.0	4	12.5	18	56.3
Infectious Disease			1	3.1	10	31.3	6	18.8	15	46.9
Dental Disease	1	3.1	1	3.1	9	28.1	4	12.5	16	50.0
Breeding	2	6.3	4	12.5	1	3.1	6	18.8	19	59.4
Ill-fitting tack			1	3.1	11	34.4	7	21.9	10	31.3
Parasite Infections			2	6.3	11	34.4	3	9.4	15	46.9
Longevity			6	18.8	7	21.9	7	21.9	11	34.4

1= No importance 2 = Below average 3= Average 4= Above Average 5= Utmost

importance

Table 19
Importance of Equid Care Practices: Portugal

Importance	1		2		3		4		5	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Nutrition			4	28.6	4	28.6	3	21.4	2	14.3
Hoof Care					7	50.0	3	21.4	3	21.4
Lameness			5	35.7	3	21.4	2	14.3	2	14.3
Infectious Disease			7	50.0	3	21.4	1	7.1	1	7.1
Dental Disease			7	50.0	2	14.3	1	7.1	2	14.3
Breeding	1	7.1	7	50.0	2	14.3	2	14.3		
Ill-fitting tack			1	7.1	9	64.3	2	14.3	1	7.1
Parasite Infections			7	50.0	1	7.1	4	28.6	1	7.1
Longevity			6	42.9	4	28.6	1	7.1	2	14.3

1= No importance 2 = Below average 3= Average 4= Above Average 5= Utmost importance

Table 20
Importance of Equid Care Practices: Italy

Importance	1		2		3		4		5	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Nutrition					1	7.1	3	21.4	10	71.4
Hoof Care			1	7.1	2	14.3	1	7.1	9	64.3
Lameness					4	28.6	2	14.3	6	42.9
Infectious Disease	2	14.3	5	35.7	1	7.1	2	14.3	4	28.6
Dental Disease			3	21.4	2	14.3	3	21.4	4	28.6
Breeding					4	28.6	1	7.1	8	57.1
Ill-fitting tack	4	28.6			2	14.3	3	21.4	2	14.3
Parasite Infections			1	7.1	4	28.6	3	21.4	6	42.9
Longevity			1	7.1	3	21.4	3	21.4	5	35.7

1= No importance 2 = Below average 3= Average 4= Above Average 5= Utmost importance

Perceived Knowledge of Equid Management and Care

Research objective 3.2 sought to determine the perceived knowledge that equid owners have regarding equid care and management practices. Survey participants answers reflect the level of perceived self-knowledge that owners possess for each care practice. These questions were asked in Spain, Portugal, Italy, and the United States. The mean and standard deviation of each care variable is reflected in each table (refer to tables 27-30). Tables reflect the cumulative responses from all countries (Table 26), as well as the results divided by individual country. The tables represent each country accordingly, 27=Spain, 28=Portugal, 29= Italy. Tables 27-30 reflect survey responses 1= no knowledge, 2= below average, 3= average knowledge, 4= above average, 5= expert knowledge.

Table 26 shows that the majority of equid owners across the three surveyed countries find themselves to have “expert knowledge” of nutrition (58.3%), hoof care (45%), lameness (43.3%), infectious disease (33.3 %), dental disease (36.7%), breeding (44.5%), parasite infections (36.7%), and longevity (30%). The majority of owners reported “average knowledge” knowledge of ill-fitting tack (36.7%).

The majority of owners in Spain (40.6%), Portugal (42.9%), and Italy (64.3%) perceived their knowledge of equid nutrition to be “average”, or 3 on tables 27-30. Knowledge of hoof care was perceived to be the lowest in Portugal, where 42.9% had

“below average” knowledge. Owners in Spain (46.9%) and Italy (35.7%) had “average” knowledge. Portugal had a perceived “below average” knowledge of every care practice and, with the exception of Italy (28.6%) in regards to dental disease, was the only country to report a “below average” knowledge in any category. Spain (43.8%) reported to have “average knowledge” of lameness, with Italy (28.6%) having an “above average” knowledge. Spain (37.5%) and Italy (28.6%) reported an “average” knowledge of infectious disease. For dental disease Italian respondents were divided equally (28.6% each) with some perceiving to have “below average” knowledge and some perceiving the have “above average” knowledge. Spain (46.9%) had an “average” knowledge of equid dental disease. Italy (35.7%) had an “average” knowledge of breeding, while Spain (37.5%) had an “above average” knowledge of breeding. Italy was equally divided regarding ill-fitting tack. Half of the majority of Italian respondents (21.4%) had “average” knowledge and half had “above average” knowledge of ill-fitting tack. Spain (34.4%) had “average” knowledge of ill-fitting tack. Spain (43.8%) and Italy (42.9%) had “average” knowledge of parasite infections. In regards to longevity Spain (37.5%), and Italy (50%) had a perceived “average” knowledge.

Table 21
 Knowledge of Equid Care Practices: Cumulative

Knowledge	1		2		3		4		5	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Nutrition	0	0.0	4	6.7	8	13.3	12	20.0	35	58.3
Hoof Care	0	0.0	1	1.7	17	28.3	11	18.3	27	45.0
Lameness	0	0.0	7	11.7	15	25.0	8	13.3	26	43.3
Infectious Disease	0	0.0	13	21.7	14	23.3	9	15.0	20	33.3
Dental Disease	1	1.7	11	18.3	13	21.7	8	13.3	22	36.7
Breeding	3	5.0	11	18.3	7	11.7	9	15.0	27	45.0
Ill-fitting tack	4	6.7	2	3.3	22	36.7	12	20.0	13	21.7
Parasite Infections	0	0.0	10	16.7	16	26.7	10	16.7	22	36.7
Longevity	0	0.0	13	21.7	14	23.3	11	18.3	18	30.0

1= No knowledge
 2= Below Average
 3= Average Knowledge
 4= Above Average
 5= Expert Knowledge

Table 22
Knowledge of Equid Care Practices: Spain

Knowledge	1		2		3		4		5	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Nutrition			2	6.3	13	40.6	8	25.0	7	21.9
Hoof Care			1	3.1	15	46.9	10	31.3	4	12.5
Lameness	2	6.3	3	9.4	14	43.8	6	18.8	4	12.5
Infectious Disease			7	21.9	12	37.5	5	15.6	5	15.6
Dental Disease			6	18.8	15	46.9	4	12.5	5	15.6
Breeding			2	6.3	7	21.9	12	37.5	9	28.1
Ill-fitting tack	1	3.1	3	9.4	11	34.4	8	25.0	6	18.8
Parasite Infections			5	15.6	14	43.8	6	18.8	5	15.6
Longevity			3	9.4	12	37.5	5	15.6	9	28.1

1= No knowledge
2= Below Average
3= Average Knowledge
4= Above Average
5= Expert Knowledge

Table 23
Knowledge of Equid Care Practices: Portugal

Knowledge	1		2		3		4		5	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Nutrition			5	35.7	6	42.9				
Hoof Care			6	42.9	4	28.6	1	7.1		
Lameness			7	50.0	3	21.4	1	7.1		
Infectious Disease	1	7.1	7	50.0	3	21.4				
Dental Disease	1	7.1	7	50.0	3	21.4				
Breeding	2	14.3	6	42.9	3	21.4				
Ill-fitting tack			7	50.0	4	28.6				
Parasite Infections	1	7.1	7	50.0	3	21.4				
Longevity			7	50.0	3	21.4				

1= No knowledge
2= Below Average
3= Average Knowledge
4= Above Average
5= Expert Knowledge

Table 24
Knowledge of Equid Care Practices: Italy

Knowledge	1		2		3		4		5	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Nutrition					9	64.3	2	14.3		
Hoof Care			1	7.1	5	35.7	3	21.4	2	14.3
Lameness	5	35.7	1	7.1	3	21.4	4	28.6	1	7.1
Infectious Disease			3	2.4	4	28.6	2	14.3		
Dental Disease			4	28.6	2	14.3	4	28.6		
Breeding			1	7.1	5	35.7	3	21.4	1	7.1
Ill-fitting tack	1	7.1	1	7.1	3	21.4	3	21.4	1	7.1
Parasite Infections			2	14.3	6	42.9	2	14.3		
Longevity					7	50.0	3	21.4		

1= No knowledge
2= Below Average
3= Average Knowledge
4= Above Average
5= Expert Knowledge

Educational Needs of Equid Owners on Equid Management and Care

Research objective 3.3 sought to determine the educational needs of equid owners regarding equid care and management practices. Mean and standard deviation were reported for nutrition, hoof care, lameness, infectious disease, dental disease, breeding, ill-fitting tack, parasite infections, and longevity. Mean weighted discrepancy scores were calculated to find the gap, if any, between perceived importance and perceived knowledge of equid care and management practices. Differences between perceived relevance (importance) and knowledge for each competency produces identifiable “gaps” where training and professional development may occur (McKim 2013). To determine this “gap” the formula

$$\text{MWDS} = \frac{\sum [M_{\text{Associated Importance Rating}} (\text{Importance} - \text{Knowledge})]}{n}$$

was used. The MWDS was calculated for Spain, Portugal, and Italy. To prioritize the competencies in need of attention, competencies were ranked, from high to low, using the mean weighted discrepancy scores (McKim, Saucier 2010). A mean of MWDS was calculated for each construct to find constructs in need of attention (McKim, Saucier 2010). As in McKim and Saucier’s 2010 study, competencies or constructs with high MWDS indicated the areas needing the most improvement. Grand means for importance

of competencies and grand means for knowledge for equid management and care practices are reported in tables that reflect the cumulative responses from all countries (Table 31), as well as individual countries. The tables represent each country accordingly, 32=Spain, 33=Portugal, 34= Italy.

Table 31, representing the cumulative responses in Spain, Portugal, and Italy, represents the gap between perceived knowledge and perceived importance. In each category, nutrition, hoof care, lameness, infectious disease, dental disease, breeding, ill-fitting tack, parasite infections, and longevity, the perceived importance is higher than the perceived knowledge, creating a “gap” where education and training are needed.

Lameness is the area with the largest education “gap” with a MWDS of 4.86.

Overall Portugal (MWDS 4.38), and Italy (MWDS 7.30 showed the largest “gap” between perceived importance and perceived knowledge in lameness. Spain (MWDS 1.03) showed the largest “gap” between perceived importance and perceived knowledge to be in nutrition.

Table 32 represents responses in Spain showing the gap between perceived knowledge and perceived importance of equid welfare practices. In Spain, nutrition had the largest knowledge gap (MWDS 1.03), followed closely by lameness (MWDS 1.00).

Table 33 represents responses in Portugal showing the gap between perceived knowledge and perceived importance of equid welfare practices. In Portugal, lameness had the largest knowledge gap (MWDS 4.38), followed closely by hoof care (MWDS

4.06), infectious disease (MWDS 3.85), ill-fitting tack (MWDS 2.67), nutrition (MWDS 2.41), parasite infections (MWDS 2.14), dental disease (MWDS 2.06), longevity (MWDS 1.32), breeding (MWDS 1.04).

Table 34 represents responses in Italy showing the gap between perceived knowledge and perceived importance of equid welfare practices. In Italy, lameness had the largest knowledge gap (MWDS 7.30) followed closely by nutrition (MWDS 6.32), breeding (MWDS 2.86), parasite infections (MWDS 2.67), longevity (MWDS 2.63), hoof care (MWDS 2.32), dental disease (MWDS 1.80), ill-fitting tack (MWDS 0.80), and infectious disease (MWDS 0.77).

Table 25
Education Gap Between Importance and Knowledge: Cumulative

Rank	Content	<i>N</i>	MWDS	<i>N</i>	Importance		<i>N</i>	Knowledge	
					<i>M</i>	<i>SD</i>		<i>M</i>	<i>SD</i>
1	Lameness	64	4.86	54	2.83	1.328	56	3.95	1.119
2	Nutrition	65	4.41	52	3.33	.879	59	4.32	.955
3	Hoof Care	60	4.01	52	3.35	.883	56	4.14	.923
4	Dental disease	64	3.71	51	2.98	.990	55	3.71	1.242
5	Parasite Infections	65	3.35	51	3.04	.958	58	3.76	1.144
6	Ill-fitting tack	64	3.05	49	3.20	1.080	53	3.53	1.137
7	Infectious diseases	64	2.88	49	2.96	.999	58	3.52	1.354
8	Breeding	64	2.22	51	3.43	1.118	57	3.81	1.355
9	Longevity	64	1.03	49	3.33	1.008	56	3.61	1.171

Table 26
Education Gap Between Importance and Knowledge: Spain

Rank	Content	<i>N</i>	MWDS	<i>N</i>	Importance		<i>N</i>	Knowledge	
					<i>M</i>	<i>SD</i>		<i>M</i>	<i>SD</i>
1	Nutrition	30	1.03	32	4.63	.660	30	3.67	.922
2	Lameness	29	1.00	32	4.19	1.030	29	3.24	1.057
3	Dental disease	29	0.93	31	4.06	1.124	30	3.27	.980
4	Infectious diseases	29	0.76	32	4.09	.963	29	3.28	1.032
5	Parasite infections	29	0.69	31	4.00	1.065	30	3.37	.964
6	Hoof care	29	0.66	30	4.23	.858	30	3.57	.774
7	Ill-fitting tack	27	0.48	29	3.90	.939	29	3.52	1.056
	Breeding	30	0.37	32	4.13	1.314	30	3.93	.907
	Longevity	29	0.14	31	3.74	1.154	29	3.69	1.039

Table 27
Education Gap Between Importance and Knowledge: Portugal

Rank	Content	<i>N</i>	MWDS	<i>N</i>	Importance		<i>N</i>	Knowledge	
					<i>M</i>	<i>SD</i>		<i>M</i>	<i>SD</i>
1	Lameness	14	4.38	12	3.08	1.165	11	2.45	.688
2	Hoof care	14	4.06	13	3.69	.855	11	2.55	.688
3	Infectious diseases	14	3.85	12	2.67	.985	11	2.18	.603
4	Ill-fitting tack	14	2.67	13	3.23	.725	11	2.36	.505
5	Nutrition	14	2.41	13	3.23	1.092	11	2.55	.522
6	Parasite infections	14	2.14	13	2.92	1.115	11	2.18	.603
7	Dental disease	14	2.06	12	2.83	1.193	11	2.18	.603
8	Longevity	14	1.32	12	2.92	1.115	10	2.30	.483
9	Breeding	14	1.04	12	2.42	.900	11	2.09	.701

Table 28
Education Gap Between Importance and Knowledge: Italy

Rank	Content	<i>N</i>	MWDS	<i>N</i>	Importance		Knowledge		
					<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>
1	Lameness	14	7.30	12	4.17	.937	14	2.29	1.899
2	Nutrition	14	6.32	14	4.64	.633	11	3.18	.405
3	Breeding	14	2.86	13	4.31	.947	10	3.40	.843
4	Parasite infections	14	2.67	14	4.00	1.038	10	3.00	.667
5	Longevity	14	2.63	12	4.00	1.044	10	3.30	.483
6	Hoof care	14	2.32	13	4.38	1.044	11	3.55	.934
7	Dental disease	14	1.80	12	3.67	1.231	10	3.00	.943
8	Ill-fitting tack	14	0.80	11	2.91	1.640	9	3.22	1.202
9	Infectious diseases	14	0.77	14	2.93	1.774	9	2.89	.782

CHAPTER V

SUMMARY AND CONCLUSIONS

Research Objective 1.1: Describe How Equid Owners Use Their Equids

The overall response rate, among the 3 countries for use, reflected competitive showing as the main use of equids where owners reported quite often or very often for use. In Spain, showing was the most prevalent use of equids, followed closely by plowing, packing, and transporting goods. In Portugal the primary use of equids was plowing and packing, reflecting the country with the highest day-to-day use of their equids. In Italy transporting goods, showing: riding, and showing: driving were the most common uses for equids. It was observed that, while not stated on the survey, that there were multiple farmers in Italy that used equids as dairy animals.

Research Objective 1.2: Describe How Equid Owners Prioritize Management and Care Practices for Equids

For Portugal, and Italy equid owners reported that feed represented the highest cost associated with equids. This is consistent with the higher perceived importance in nutrition seen in research question 3.1; however, the majority of respondents reported

that they had at least an “average knowledge” of nutrition. In Spain the highest equid cost was associated with show expenses.

Research Objective 2.1: Describe How Equid Owners Find Equid Information

The cumulative response between the 4 surveyed countries showed that books were the most commonly used source of information. Books and magazines were the top sources of information in Spain and Portugal. This is supported by the researchers observations that the majority of people in Spain and Portugal did not have access to technology such as televisions, radios, or Internet. In Italy social media was the primary source of information.

Research Objective 2.2: Describe Equid Owners Perceptions of Information

Sources

The cumulative response for the countries combined resulted in seminars being perceived to have the highest credibility amongst equid owners. In Spain, and Italy equid owners perceive seminars to be the most credible sources of information; however, in Portugal owners perceive books to be the most credible sources of information.

Overall, owners did not see social media and Internet, the more modern facets of information, to be credible.

Research Objective 3.1: Describe the Perceived Importance of Equid Management and Care

Collectively the highest perceived importance was placed on equid nutrition. Nutrition was the highest perceived importance in Spain and Italy. Hoof care was the highest perceived importance in Portugal.

Research Objective 3.2: Describe the Perceived Knowledge of Equid Management and Care

Overall owners in Spain, Portugal, and Italy generally had a perceived knowledge of “average” for equid care practices.

Research Objective 3.3: Determine the Educational Needs of Equid Owners in the Area of Equid Management and Care

Lameness and nutrition were the areas in which the largest “gap” between perceived knowledge and perceived importance occurred. These would be ideal areas to implement educational materials in attempts to narrow the “gap” between knowledge and importance.

Recommendations and Future Implications

In future studies it would be ideal to have a larger population sample. With the limited number of participants in this study it is possible that these results featured isolated instances. A follow-up study could ideally set up an education plan following the perceived credibility of information sources and the knowledge gap of owners. Additional studies could be beneficial to both researchers and practitioners. Further research in the area of equid welfare could show ways to make a conceptual shift of information. Practitioners could then establish new educational programs to disseminate research using the found credible ways of information distribution. In this study the largest information gap showed to be focused in lameness, where the smallest gap between importance and knowledge was with longevity. A large number of surveyed participants had equids over the age of 20, making it possible that longevity

had no perceived importance because it was already being achieved. This could lead to future studies correlating the age of the animals with the owners' response. Future surveys should focus on general uses of animals such as work/traction, milk production, recreational and other (this section could allow for owners to write in their answer). It's possible that some respondents didn't correctly respond when they couldn't find an appropriate answer. Furthermore, since multiple respondents for this study used their equids in a dairy capacity, and there was not an area to indicate dairy as a use, questioners did not encompass dairy questions or response options. Further research could incorporate a dairy section to increase the welfare knowledge of the dairy industry.

The level of animal health, source of information, and perceived importance could also be evaluated based on their relationship to one another. If the level of animal health is ranked as high, medium, or low; the source of information is ranked print, seminar, broadcast; and the perceived importance is ranked high, medium, low, the relationships could be analyzed to show how sources of information could affect perceived importance and animal health. When producers have a low level of importance they could be using print for their primary source of information and have animals that fall into the medium and low levels of health. Future surveys could also include animal parameters related to responses to measure implications of practices such as owners who perceive nutrition, dental care and deworming as important, could relate this to their animal's overall well being and correlate to age and body condition score.

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